10/21/04

FINAL AMENDMENT 23

TO THE

REEF FISH FISHERY MANAGEMENT PLAN

TO SET VERMILION SNAPPER SUSTAINABLE

FISHERIES ACT TARGETS AND THRESHOLDS

AND TO ESTABLISH A PLAN TO END OVERFISHING

AND REBUILD THE STOCK

(Including a Final Supplemental Environmental Impact Statement, and Regulatory Impact Review)

OCTOBER, 2004

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List of Acronyms and Abbreviations Used in this Document

ABC	Acceptable (or Allowable) Biological Catch
AP	Reef Fish Advisory Panel
B	Stock biomass
B_{MSY}	The stock biomass needed to allow harvest at maximum sustainable yield
$B_{CURRENT}$	The current biomass of the stock
Council	Gulf of Mexico Fishery Management Council
CPUE	Catch-per-unit-effort
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
DEIS	Draft EIS
FEIS	Final EIS
SEIS	Supplemental EIS
F	Rate of instantaneous fishing mortality
F_{MSY}	F that can produce maximum sustainable yield
F_{OY}	F that can produce optimum yield.
$F_{30\%SPR}$	F that can maintain a stock at 30 percent SPR
$F_{CURRENT}$	The current F applied to a stock
FMP	Fishery Management Plan
FSAP	Ad Hoc Finfish Stock Assessment Panel
GMFMC	Gulf of Mexico Fishery Management Council
GOM	Gulf of Mexico
IFQ	Individual Fishing Quota
IRFA	Initial Regulatory Flexibility Analysis
M	Rate of Instantaneous Natural Mortality
MFMT	Maximum Fishing Mortality Threshold
MMS	Minerals Management Service

mp	Million Pounds
MRFSS	Marine Recreational Fisheries Statistics Survey
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MSST	Minimum Stock Size Threshold
MSY	Maximum Sustainable Yield
NOAA Fisheries	National Marine Fisheries Service
NSG	National Standard Guidelines
OY	Optimum Yield
RA	Regional Administrator (NOAA Fisheries Southeast Regional Office) (formerly Regional Director)
RFA	Regulatory Flexibility Act
RFSAP	Reef Fish Stock Assessment Panel
RIR	Regulatory Impact Review
SEFSC	Southeast Fisheries Science Center
SEIS	Supplemental Environmental Impact Statement
SEP	Socioeconomic Panel
SERO	Southeast Regional Office
SFA	Sustainable Fisheries Act
SPR	Spawning Potential Ratio
SSBR	Spawning Stock Biomass Ratio or Spawning Stock Biomass per Recruit
SSB	Spawning Stock Biomass
SSC	Scientific and Statistical Committee
TAC	Total Allowable Catch
TL	Total Length
Y	Yield
YPR	Yield-Per-Recruit
VPA	Virtual Population Analysis

Abbreviated Glossary

A full glossary of terms used in this document is provided in Section 14; however, several common terms have colloquial definitions to fishers and slightly different meanings for stock assessment and fishery management. These differences typically cause some confusion depending on who is reading the document. Therefore selected terms are defined here and also appear in the full glossary in Section14.

Catch 1) The act of catching a fish. 2) All fish that a fisher catches by any of the gear being used. Catch includes fish which are released, used for bait, or cut off after being fought. Other terms describe the eventual disposition of the catch.

Discards Discards are those fish in the catch that are released at sea. Discards can be the result of regulations (out of season or too small), economics (the target of a fishery but are not retained because they are of an undesirable size, sex, or quality, or for other economic reasons), or catch-and-release fishing (targeting a fish for sport but not intending to keep).

Harvest Harvest includes all fish that are kept for any purpose. This includes **Landings** plus that portion of the catch retained for some other purpose such as bait. Harvest would be equal to **Catch** if no fish were **Discarded** or used for bait.

Landings Landings are those fish that are brought to shore and kept by the fisher for some purpose such as eating, mounting, giving to friends or selling.

Supplemental Environmental Impact Statement (SEIS) Cover Sheet

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Name of Action: Final Amendment 23 to the Reef Fish Fishery Management Plan to Set Vermilion Snapper Sustainable Fisheries Act Targets and Thresholds and to Establish a Plan to End Overfishing and Rebuild the Stock

Type of Action: (X) Administrative; ( ) Legislative; ( ) Draft; (X) Final

Summary: The Gulf of Mexico Fishery Management Council defined maximum sustainable yield (MSY), optimum yield (OY), minimum stock size threshold (MSST), and maximum fishing mortality threshold (MFMT) for the vermilion snapper stock in its 1999 Generic Sustainable Fisheries Act Amendment. However, estimates of MSY, OY, and MSST proposed in that amendment were disapproved because they were not biomass-based. Consequently, the Council is required to define biomass-based estimates of MSY, OY, and MSST for the vermilion snapper stock. Additionally, the National Marine Fisheries Service (NOAA Fisheries) has determined that the Gulf of Mexico vermilion snapper stock is overfished and experiencing overfishing. Vermilion snapper biomass was estimated to be 32 percent of the biomass associated with B_{MSY} in 2000 which is well below the default definition of MSST (1-M)*B_{MSY} = 0.75*B_{MSY} for vermilion snapper) provided by NOAA Fisheries' National Standards Guidelines(NSGs). The agency also concluded that the vermilion snapper stock experienced a fishing mortality rate in 1999 of nearly twice F_{MSY}. Section 304(e)(3) of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) requires the Council to prepare a plan to end overfishing and rebuild the stock within one year of being notified that the stock is overfished. The Council received notice on October 30, 2003. Therefore, the purpose of this amendment is to:

- define biomass-based estimates of MSY, OY, and MSST for the vermilion snapper stock;
- to modify, as needed, the definition of MFMT for vermilion snapper to incorporate the best available scientific information on the fishery;
- to establish a plan to end overfishing and rebuild the vermilion snapper stock to B_{MSY} that is consistent with the requirements of the MSFCMA.

Filing Dates with EPA
Draft SEIS filed with EPA on May 20, 2004
Draft SEIS comment period ended on July 14, 2004

Table of Contents for Final SEIS

The table of contents and sections that comprise the FSEIS are as follows:

Fishery Impact Statement/Social Impact Assessment Summary

Table of Contents

This table of contents and summary of social and economic impacts on fishery participants and communities are provided to aid the reader in reviewing fishery and social impacts by referencing corresponding sections of the amendment that are inclusive of the Fishery Impact Statement (FIS) and the Social Impact Analysis (SIA).

Summary

Reference points and status criteria, such as maximum sustainable yield (MSY), minimum stock size threshold (MSST), and maximum fishing mortality threshold (MFMT) are mainly biological in nature but have relevance to the determination of impacts on fishing participants to the extent that they provide the general benchmark for regulatory measures. Regulatory measures that flow from the choice of these parameters have immediate impacts on fishing participants. Optimum yield (OY) alternatives, in terms of specific values, are proposed and socioeconomic factors are implicitly introduced in the process of the Gulf of Mexico Fishery Management Council's (Council) selection of a Preferred Alternative. The general impacts of these alternatives would become an important issue at such time when the vermilion snapper stock is fully rebuilt, since OY represents the long-term management goal.

Alternative 1 (no action) for MSY, OY, MFMT, and MSST does not comply with the provisions of the MSFCMA so it is not a viable alternative. This alternative preserves the short-term socioeconomic conditions in the vermilion snapper fishery but leaves no clear direction for purposes of conserving and managing the stock. All other alternatives specify levels of MSY, OY, MFMT, or MSST. All MSY alternatives are within the range of historical harvest levels. Because more recent harvests are fairly low relative to the upper limit of the Preferred Alternative for MSY, fishing participants can expect to derive benefits from rebuilding the stock not only in terms of higher future harvest, but also long-term sustainability of that higher harvest level.

The economic consequences resulting from a rebuilding strategy may be characterized in general as a tradeoff in value of catches over time. A larger harvest now would yield greater commercial and recreational benefits in the short term, but at the expense of a slower stock recovery. Conversely, a smaller harvest now would generate fewer short-term benefits, but likely would also lead to a faster realization of the benefits of a larger vermilion snapper resource in the future made possible by a faster recovery of the fish stock.

There are five rebuilding alternatives presented in Section 4.2.2 of this amendment. Alternative 1, which is the no action alternative, is considered unacceptable as a rebuilding strategy because the stock would likely continue to decline rather than rebuild. This leaves only four viable alternatives. Alternatives 2-4 are 10-year rebuilding plans that rebuild the stock biomass to B_{MSY} by 2013. The plan proposed by Alternative 2 is based on constant harvest strategy. Alternative 3 (preferred) uses a stepped approach, with harvest kept constant for 3 or 4 years at an average harvest based on the constant-fishing mortality rate (F) strategy. The rebuilding plan proposed by Alternative 4 is based on the maximum constant F rate that would allow the stock to rebuild by 2013. Alternative 5 is a 7-year rebuilding plan using a similar stepped approach as Alternative 3.

Alternatives were compared over a 10-year period using a net present value approach. Relative to the no action alternative, each of the rebuilding alternatives would reduce the economic benefits of the recreational and commercial sectors in the first five years of the rebuilding, but benefits would increase during the second five years. Benefit increases in the second five years of the rebuilding would more than compensate for the losses in the earlier years. Thus, the overall economic effects for the entire 10-year period would be a net gain to fishing participants.

For the entire 10-year period, all four viable rebuilding alternatives would generate total gains that range from four percent for Alternative 2 to 16 percent for Alternative 5, with the Council's preferred alternative generating an 11 percent gain. Overall gains in the recreational sector (5 percent to 26 percent) are large relative to those of the commercial sector (2 percent to 10 percent). This is because commercial vessels generate most revenues from other reef fish species. Revenues considered for economic impact analysis include revenues from the sale of vermilion snapper as well as other species. Therefore, commercial economic benefits are smaller because they consider revenues generated from all species harvested on a trip, in addition to vermilion snapper. Alternative 5 (7-year stepped strategy) would generate the largest net benefits of any of the rebuilding strategies. This is followed by Alternative 4 (constant F strategy), which would generate additional benefits of about 14 percent less than those of Alternative 5. Alternative 3 (10-year stepped) ranks in the middle of the group. Alternative 1 (no action) and Alternative 2 (constant harvest) have the lowest ranking. Of the four viable alternatives, Alternative 2 provides for the lowest gains in benefits. These gains may be considered substantially smaller than those from the other alternatives. In this way, Alternatives 3, 4, and 5 may be considered the best alternatives from a long-term perspective.

As noted above, losses would be incurred during the first five years of the rebuilding period. The presence of these losses in both the recreational and commercial sectors signals the need to temper the overall ranking of alternatives over a 10-year period by effects on the fishery in the first five years. For the period 2004-2008, Alternative 2 is ranked highest for both the recreational and commercial sectors, indicating that it would incur the least cost to the fishing participants over this period. But as noted earlier, this alternative is ranked lowest over the long term. The next best alternative for the 2004-2008 period is Alternative 3, followed by Alternative 5, and lastly by Alternative 4. Among these three, Alternative 4 may be considered the least desirable because of its relatively large short-term loss. While commercial vessels must absorb less than $91 thousand over the first five years, for-hire vessels may not be able to absorb more than $4 million in net revenue losses. From a short-term perspective then, Alternatives 3 and 5 may be considered the best alternatives in terms of economic impacts. To reduce the recreational and commercial harvests for a rebuilding plan, management measures are needed. Because rebuilding strategy Alternative 3 (10-year, stepped approach) was selected by the Council as their preferred alternative, harvest reduction alternatives for the recreational and commercial fisheries were limited to those that could reduce harvest to the appropriate level.

There are six management measures to achieve the required reduction in recreational harvest. Alternative 1 is the no action alternative and would not affect any harvest reduction. Alternative 2 provides for a daily bag limit of two fish per person within the existing 20-reef fish aggregate bag limit. Alternative 3 imposes a minimum size limit of 11 inches TL and either a 10-fish per person daily bag limit (preferred Alternative 3A) or a 7-fish per person daily bag limit (Alternative 3B) within the existing 20-reef fish aggregate bag limit . Alternative 4 effectively considers the implicit recreational allocation of total allowable catch (TAC) as a quota, thereby subjecting the recreational fishery to a quota closure. Alternative 5 provides for a vermilion snapper seasonal closure from May 1 to June 21.

To examine the economic effects of these measures, a model was constructed recognizing three fishing modes: private/rental, charter boats, and headboats. Under the no action alternative, the economic benefit would be $37.9 million in 2004-2008, but would decline to $22.9 million in 2009-2013 (a 40 percent decline). These benefits would be expected to decline even further after 2013. As a result of declining benefits over time, vessels may exit the vermilion snapper fishery, and if they also exit the reef fish fishery, their loss would trickle down to the support industries and communities where those industries operate. For the other alternatives, economic losses were projected over the short term but positive economic effects were projected over the long term. The positive economic impacts in the second five years of rebuilding would more than offset the losses in the first five years of the rebuilding such that the overall effects for all of the action alternatives would be positive over the 10-year period.

Net revenue changes range from $3.63 million for Alternative 3A (preferred) or 3B to $25.3 million for Alternative 4 for the entire 10-year period, whereas consumer surplus changes only range from $1.37 million for Alternative 3A (preferred) or 3B to $9.9 million for Alternative 4. This dominance of the net revenue figures over consumer surplus also holds true for the two sub-periods. In 2004-2008 for example, net revenue changes range from -$3.98 million for Alternative 3A (preferred) or 3B to $8.33 million for Alternative 4 whereas consumer surplus changes range from -$0.97 million for Alternative 3A (preferred) or 3B to $3.15 million for Alternative 4.

The ranking of alternatives over the 10-year period follows that of the 2009-2013 sub-period and indicates the benefits in this sub-period outweigh any losses in the first five years of the rebuilding. It appears that in terms of both consumer surplus and net revenues, the quota (Alternative 4) and seasonal closure (Alternative 5) do better than the other alternatives. The 2-fish bag limit (Alternative 2) and size limit with bag limit (Alternatives 3A and 3B) options are ranked lower than the quota and seasonal closure options. However, the economic effects of a 2-fish bag limit are very close to those of the seasonal closure alternative. In terms of economic impacts, Alternatives 2 and 5 differ by less than two percent, and this difference is mainly accounted for by differences in consumer surplus. On the other hand, Alternative 2 is more than 6% higher than Alternative 3A or 3B. In essence, Alternative 4 may be ranked highest, but Alternatives 2 and 5 may be ranked equally. These two alternatives may be ranked higher than Alternative 3A or 3B.

There are eight management measures considered to achieve the required reduction in commercial harvest in order to rebuild the vermilion snapper stock. Alternative 1 is the no action alternative. Alternative 2 provides for a trip limit of 1,625 pounds of vermilion snapper. Alternative 3 imposes a minimum size limit of 12 inches TL. Alternative 4 imposes an 11-inch TL minimum size limit together with a trip limit of 2,300 pounds of vermilion snapper (4A) or with a trip limit of 2,250 pounds of vermilion snapper (Alternative 4B). Alternative 5 imposes a quota equivalent to a 67 percent allocation of TAC, thereby subjecting the commercial fishery to a quota closure. Alternative 6 would establish a seasonal closure for vermilion snapper from August 1 through September 30 and December 1 through 31. Preferred Alternative 7 imposes an 11-inch TL minimum size and a seasonal closure from April 22 through May 31.

To examine the economic effects of these measures, a model was constructed that assumes that all vessels that landed vermilion snapper in the period 2000-2002 remained in the fishery throughout the rebuilding period, commercial harvests of vermilion snapper were not constrained to the implicit commercial allocation (with the exception of Alternative 5), and that the catch rate of vermilion snapper proportionally changes with stock biomass. The analyses indicated that the economic benefits from the fishery under the no action alternative would fall from $40.73 million in 2004-2008 to $27.92 million in 2009-2013. As a result of declining benefits over time, vessels may exit the vermilion snapper fishery. If they also exit the reef fish fishery, their loss would also trickle down to the support industries and communities where those industries operate.

Each of the other alternatives would reduce commercial harvest during the first few years of the rebuilding plan. However, as the stock rebuilds, benefits would increase and eventually exceed the decreasing benefits under the no action alternative. Over the 10-year period, all measures, except the 12-inch TL size limit, would benefit the fishery more than if no actions were taken. Considering that the size of the vermilion snapper fishery is small relative to the entire reef fish fishery, it is not surprising that the changes in benefits from rebuilding the vermilion snapper stock would be relatively small, ranging from -1.6 percent for Alternative 3 to about 5 percent for Alternative 6. These relatively small changes in benefits are partly a function of the time period considered. Over a longer period when the stock has rebuilt, regulations could be relaxed so that benefits could consequently increase.

Over the 10-year period, alternatives that set seasonal closure (Alternative 6), quota (Alternative 5), and the 11-inch TL minimum size with a seasonal closure of April 22 through May31 (Preferred Alternative 7) would provider greater economic benefits than the other size limit alternatives (including the combination of size and trip limits). Alternative 3 (12-inch TL minimum size limit) is the only measure that would result in overall negative impacts on the commercial sector for the entire rebuilding period. Of the top three alternatives (Alternatives 6, 5, and 7), Alternative 6 also ranked high during the 2004-2008 period when losses would be incurred. It would appear that one of these three alternatives can generate the highest economic impacts, at least over the 10-year period.

1 EXECUTIVE SUMMARY

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) directs the regional fishery management councils to adopt conservation and management measures that prevent overfishing while continuously achieving optimum yield (OY) from managed fisheries (MSFCMA §301(a)(1)). To assist the regional fishery management councils in achieving this mandate, fishery management plans (FMPs) are required to specify biological reference points and status determination criteria. These criteria are intended to provide managers with the means to measure the status and performance of a fishery, and they allow managers to assess whether management measures are achieving established goals. The Council defined biological reference points (maximum sustainable yield (MSY) and OY) and status determination criteria (minimum stock size threshold (MSST) and maximum fishing mortality threshold (MFMT)) for vermilion snapper in the 1999 Generic SFA amendment. However, all proposed definitions, with the exception of MFMT, were disapproved because they were not biomass-based.

Additionally, on October 30, 2003, NOAA Fisheries determined that the Gulf of Mexico vermilion snapper fishery was overfished and undergoing overfishing. The MSFCMA requires the Council to prepare a plan to end overfishing and rebuild the stock within one year of this notice. The MSFCMA also requires stocks to be rebuilt to MSY abundance levels in the shortest time frame possible. The rebuilding time should not exceed ten years, except in cases where biology, other environmental conditions, or international agreements dictate otherwise [16 USC § 304(e)(4)].

Therefore, the purpose of this amendment is to:

- Define biomass-based estimates of MSY, OY, and MSST for the vermilion snapper stock
- Review and modify, as needed, the definition of MFMT for vermilion snapper to incorporate the best available scientific information on the fishery
- Establish a plan to end overfishing and rebuild the vermilion snapper stock to B_{MSY}

1.1 Description of alternatives

1.1.1 Biological reference points and status determination criteria

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. MSY is the long-term average catch that can be taken on a continual basis from a stock under prevailing biological and environmental conditions. OY typically is less than MSY and depends on social, economic, and environmental factors. OY is intended to "provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems (MSFCMA §3(28))." Status determination criteria are defined by 50 CFR §600.310 to include a MSST and a MFMT.

- A stock is considered to be overfished if current stock biomass is below MSST.
- A stock is considered to be undergoing overfishing if the current fishing mortality rate is above MFMT.

Two different methodologies were used to estimate MSY, F_{MSY} (the fishing mortality rate that can produce MSY), and B_{MSY} (the stock biomass needed to allow harvest at MSY) in the most recent peer-reviewed stock assessment (Porch and Cass-Calay, 2001). The Pella-Tomlinson surplus production model was used to directly estimate MSY and associated parameters while the virtual population analysis (VPA) model was used to estimate a proxy for MSY based on a

30 percent SPR stock condition (SPR is defined as the lifetime spawning output per recruit relative to the spawning output that would be realized in the absence of fishing). Data from these assessment runs were used to calculate alternative definitions for MSY, OY, MSST, and MFMT. The Reef Fish Stock Assessment Panel (RFSAP) reviewed both of the assessment models and recommended the surplus production model for stock status determination (RFSAP, 2001).

The alternatives for the biological reference points and status criteria are as follows:

1.1.1.1Maximum Sustainable Yield (MSY) Alternatives

Alternative 1: No action (status quo). Do not define a separate MSY for vermilion snapper, but retain within the 51 mp whole weight estimate of MSY for the entire snapper and grouper fishery.

Preferred Alternative 2: MSY for vermilion snapper is the yield associated with F_{MSY} when the stock is at equilibrium. MSY is estimated to be 3.37 mp. (range 3.18 to 4.03 mp).

Alternative 3: MSY for vermilion snapper is the yield associated with $F_{30\%\ SPR}$ when the stock is at equilibrium. The MSY proxy is estimated to be between 2.58 and 3.24 mp.

Alternative 1 would not define a specific MSY value for vermilion snapper, but would include vermilion snapper in the MSY value defined for the reef fish complex in the initial Reef Fish FMP. This definition is outdated and is not based on the best available scientific information.

Preferred Alternative 2 would define MSY as the yield associated with fishing at F_{MSY} when the stock is at equilibrium. This value differs from that proposed in Alternative 3, which is calculated using the SPR-based proxy. The preferred definition is recommended by the RFSAP and is based on the Pella-Tomlinson surplus production model used in the most recent vermilion stock assessment (Porch and Cass-Calay, 2001),

Alternative 3 would define MSY as the yield associated with the F that maintains the stock at a 30 percent spawning potential ratio (SPR) under equilibrium conditions and is consistent with the current definition of MFMT. This definition is based on the VPA model used in the most recent vermilion snapper assessment (Porch and Cass-Calay, 2001). The RFSAP was critical of this estimate because the VPA model requires length-at-age data, which is highly variable for vermilion snapper.

1.1.1.2 Optimum Yield (OY) Alternatives

Alternative 1: No action (status quo). OY is any harvest level that maintains or is expected to maintain over time at least 20 percent spawning stock biomass per recruit (SSBR) relative to the SSBR that would occur with no fishing.

Alternative 2: OY is the yield corresponding to a fishing mortality rate (F_{OY}) defined as $0.65*F_{MSY}$ (or F_{MSY} proxy) when the stock is at equilibrium. During the rebuilding period (2004-2013), OY is defined as the allowable harvest for each year based on the rebuilding strategy selected in this amendment.

Preferred Alternative 3: OY is the yield corresponding to a fishing mortality rate (F_{OY}) defined as $0.75*F_{MSY}$ (or F_{MSY} proxy) when the stock is at equilibrium. During the rebuilding period (2004-2013), OY is defined as the allowable harvest for each year based on the rebuilding strategy selected in this amendment.

Alternative 4: OY is the yield corresponding to a fishing mortality rate (F_{OY}) defined as 0.85*F_{MSY} (or F_{MSY} proxy) when the stock is at equilibrium. During the rebuilding period (2004-2013), OY is defined as the allowable harvest for each year based on the rebuilding strategy selected in this amendment.

Alternative 1 would retain the current definition of OY. This definition is not consistent with the current definition of MFMT, and would in fact set F_{OY} greater than MFMT. NOAA Fisheries disapproved a definition of OY in the Generic SFA amendment that was described as a percent SPR (similar to percent SSBR) rather than as a biomass-based value.

Alternatives 2-4 would all define OY based on a proportion of the fishing mortality rate associated with MSY. Alternative 2 is the most precautionary alternative for OY. The yield corresponding with this alternative is about 88 percent of MSY with a stock biomass associated with this F that is 135 percent of B_{MSY}. Preferred Alternative 3 is intermediate to Alternatives 2 and 4 in terms of level of precaution. The yield derived from fishing at this rate is approximately 6 percent less than that derived from fishing at F_{MSY}, yet the stock biomass supported by this fishing mortality rate is estimated to be about 125 percent of B_{MSY}. Alternative 4 is the least precautionary of the three alternatives and would provide the highest yield (nearly 98 percent of MSY), but support the lowest biomass level (115 percent of B_{MSY}). The chance for overfishing to occur would be less than 50 percent for all three alternatives. Alternative 2 provides the lowest chance for overfishing to occur (less than 20 percent), followed by Alternative 3 (20-30 percent) and Alternative 4 (less than 50 percent).

Alternatives 2 - 4 provide the long-term value for OY once the stock has been rebuilt. Prior to the stock recovering to B_{MSY}, the allowable harvest will be dictated by the preferred rebuilding strategy and OY will be defined as that harvest. Depending on the strategy selected, this harvest may change as a result of predetermined management goals or in response to the recovery of the stock.

1.1.1.3 Maximum Fishing Mortality Threshold (MFMT) Alternatives

Alternative 1: No action (status quo). MFMT = $F_{30\%\ SPR}$. The most recent stock assessment estimates $F_{30\%\ SPR}$ to be between 0.24 and 0.39 (RFSAP, 2001).

Preferred Alternative 2: Set MFMT = F_{MSY}. The most recent stock assessment estimates F_{MSY} as 0.32 (RFSAP, 2001).

Alternative 3: Set MFMT = 0.90 * F_{MSY} (or F_{MSY} proxy).

Alternative 1 was recommended by NOAA Fisheries and by the Finfish Stock Assessment Panel (FSAP) (GMFMC, 1998). The RFSAP and FSAP recommended that stocks like vermilion snapper be managed to maintain a 30 percent SPR, provided that such species are managed with a minimum size limit that is at least the size at 50 percent maturity. The current minimum size limit for vermilion snapper is 10 inches TL and greater than the size at 50 percent maturity.

Preferred Alternative 2 and Alternative 3 would define MFMT to equal F_{MSY} or 0.9*F_{MSY} The F_{MSY} estimate provided by the Pella-Tomlinson surplus production model was identified by the RFSAP as the most reliable during the most recent stock assessment. Alternative 3 reduces the overfishing threshold level to less than F_{MSY} and provides additional precaution into the MFMT definition.

1.1.1.4 Minimum Stock Size Threshold (MSST) Alternatives

Alternative 1: No action (status quo). No minimum stock size threshold would be defined.

Preferred Alternative 2: Set the MSST to (1-M)*B_{MSY} (or B_{MSY} proxy). M is the natural mortality rate for vermilion snapper and is currently estimated to be 0.25. The most recent stock assessment estimates B_{MSY} as 10.6 mp (Porch and Cass-Calay, 2001). Based on this information, MSST would equal 7.95 mp.

Alternative 3: Set the MSST to 0.5*B_{MSY} (or B_{MSY} proxy). Based on the estimate of B_{MSY} provided by the most recent stock assessment (10.6 mp; Porch and Cass-Calay, 2001), MSST would equal 5.3 mp.

Alternative 4: Set the MSST to (0.65)*B_{MSY} (or B_{MSY} proxy). Based on the estimate of B_{MSY} provided by the most recent stock assessment (10.6 mp; Porch and Cass-Calay, 2001), MSST would equal 6.9 mp.

Alternative 1 does not define MSST. This would leave fishery managers with no objective and measurable criteria for determining whether the stock is overfished, as required by the MSFCMA.

Alternatives 2-4 would define the MSST based on a proportion of the biomass at MSY. Preferred Alternative 2 would define MSST as (1-M)*B_{MSY} which equals 0.75*B_{MSY} and is the most precautionary of Alternatives 2-4. This definition is recommended by NOAA Fisheries for species such as vermilion snapper, and is likely to ensure that the vermilion snapper stock could rebuild to B_{MSY} from an overfished condition within ten years.

Alternative 3 would define the MSST at the lowest level recommended by NOAA Fisheries' technical guidance. However, this level is suggested for stocks where M is equal to or greater than 0.50. This MSST definition provides a larger buffer between what would be considered to be an overfished (0.50*B_{MSY}) condition and the rebuilt condition (B_{MSY}), and would increase the risk that the stock would not be able to recover from an overfished condition within ten years.

Alternative 4 is intermediate to Alternatives 2 and 3 in terms of precaution. While this value is more precautionary than Alternative 3, it is still below the threshold level recommended by NOAA Fisheries' technical guidance, which states that MSST should be set equal to (1-M)* B_{MSY}, if M is less than 0.5.

1.1.2 Plans for rebuilding the fishery

According to the MSFCMA, overfished stocks must be rebuilt to MSY abundance levels (B_{MSY}) in the shortest time frame possible, taking into account the status and biology of the stock, the needs of fishing communities, international agreements, and ecological interactions. The rebuilding time should not exceed ten years except in cases where biology, other environmental conditions, or international agreements dictate otherwise [16 USC § 304(e)(4)].

Using the assessment model recommended by the RFSAP, it was determined that vermilion snapper could rebuild by 2007 if all sources of fishing mortality were eliminated starting in 2004. According to NOAA Fisheries' National Standard Guidelines (NSGs), a stock that can be rebuilt within ten years in the absence of any fishing should have a rebuilding plan that takes no longer than ten years [50 CFR § 600.310(e)(4)(ii)(B)]. Consequently, rebuilding scenario alternatives were developed that would allow vermilion snapper stock to rebuild to MSY abundance levels (B_{MSY}) within seven to ten years. These time frames are consistent with NOAA Fisheries' NSGs and provide a range of possibilities in balancing short-term socioeconomic losses with long-term socioeconomic and ecological gains.

Alternatives for ending overfishing and rebuilding the stock are as follows:

Alternative 1: No Action (status quo). Do not establish a rebuilding strategy for Gulf of Mexico vermilion snapper.

Alternative 2: Rebuild the vermilion snapper stock in ten years using a constant harvest strategy. The allowable harvest starting in 2004 would be 1.627 mp and equates to a 17.9 percent reduction in directed harvest based on 2003 estimated landings.

Preferred Alternative 3: Rebuild the vermilion snapper stock in ten years using a stepped strategy that holds harvest constant for an initial four year interval consistent with the average of the same four years under a constant fishing mortality rate, then three-year intervals thereafter. The allowable harvest starting in 2004 would be 1.475 mp and equates to a 25.5 percent reduction in directed harvest based on 2003 estimated landings.

Alternative 4: Rebuild the vermilion snapper stock in ten years using a constant fishing mortality rate strategy. The allowable harvest starting in 2004 would be 0.982 mp and equates to a 50.5 percent reduction in directed harvest based on 2003 estimated landings.

Alternative 5: Rebuild the vermilion snapper stock in seven years using a stepped strategy that holds harvest constant for an initial four year interval consistent with the average of the same four years under a constant fishing mortality rate. The allowable harvest starting in 2004 would be 1.216 mp and equates to a 38.7 percent reduction in harvest based on 2003 estimated landings.

Alternative 1 would not develop a rebuilding plan for vermilion snapper as required by the MSFCMA. The stock would remain overfished, fishing mortality would continue to be above $F_{MSY,}$ and the stock biomass would continue to decline due to ongoing overfishing.

Alternatives 2-4 all would rebuild the stock within ten years or less. However, the short-term and long-term biological and socioeconomic effects vary for each of the rebuilding strategies. Alternative 2 would set a 10-year rebuilding plan based on a constant harvest strategy of 1.627 mp annually. It would end overfishing five years after the rebuilding plan is implemented and would allow higher harvests initially but at the cost of more slowly realized biological benefits. As a result, it would allow the slowest population growth of all the action alternatives and thus provide the slowest ecological benefits.

Preferred Alternative 3 would set a 10-year rebuilding plan based on a stepped harvest strategy of 1.475 mp for the first four years, then 2.058 mp for the next three years and 2.641 mp for the final three years. It would end overfishing by 2007, three years after the rebuilding plan is implemented. This strategy allows relatively moderate harvests initially with moderate to slow realization of long-term biological benefits. As a result, it would allow the population to grow relatively slowly and thus delay ecological benefits as well. Analyses suggest that Alternative 3 may be the best balance between initial and long-term economic impacts, biological recovery and the administrative burden to manage the plan.

Alternative 4 would set a 10-year rebuilding plan based on a constant fishing mortality strategy that would raise allowable harvests from 0.982 mp to 3.517 mp over the course of the plan. It would end overfishing in 2004, the first year of the plan. This strategy would require the greatest initial harvest reductions but would also allow the largest harvests in the later years of the plan. As a result, it would allow the population to grow quickly and provide early ecological benefits, but not quite as quickly as Alternative 5.

Alternative 5 would set a 7-year rebuilding plan based on a stepped harvest strategy of 1.214 mp for the first four years of the plan followed by 2.219 mp for the final three years. It would end overfishing by 2005, one year after the rebuilding plan is implemented. This strategy allows relatively low harvests initially but higher harvests in subsequent years. As a result, it would allow the population to grow most quickly and provide the earliest ecological benefits.

1.1.3 Alternatives for reducing harvest

Proposed management measures were developed to be consistent with the Council's preferred ten-year stepped rebuilding strategy, which requires a 25.5 percent reduction in total harvest, based on 2003 estimated landings. Currently the fishery is regulated only by a 10-inch TL minimum size limit and 20-fish aggregate recreational bag limit. Recreational management alternatives considered in this amendment include increasing the size limit, decreasing the bag limit, implementing a closed season, establishing a quota, and implementing a combination of size and bag limits. Similar alternatives are proposed for the commercial fishery and include increasing the minimum size limit, establishing a trip limit, implementing a closed season, setting a quota, and implementing a combination of size and trip limits or season closures.

Alternatives for reducing recreational harvest are as follows:

Alternative 1: No Action or Status Quo (strategy 1). Do not reduce the recreational harvest of vermilion snapper. Maintain a 10-inch TL minimum size and aggregate bag limit of 20 fish.

Alternative 2: The recreational bag limit for vermilion snapper will be 2 fish within the current 20-reef fish aggregate bag limit. (30 percent harvest reduction).

Preferred Alternative 3A: The minimum size for recreationally caught vermilion snapper will be 11 inches TL and the bag limit will be 10 fish within the current 20-reef fish aggregate bag limit. (21.5 percent reduction)

Alternative 3B: The minimum size for recreationally caught vermilion snapper will be 11 inches TL and the bag limit will be 7 fish within the current 20-reef fish aggregate bag limit. (25.6 percent harvest reduction).

Alternative 4: The annual recreational quota in whole weight for vermilion snapper will be 0.487 mp. (allows 17 percent harvest increase)

Alternative 5: The recreational closed season for vermilion snapper will be May 1 to June 21. (25.5 percent harvest reduction).

Alternative 1 will not reduce vermilion snapper fishing mortality. Consequently, the harvest would continue to decrease. The average size and age of vermilion snapper could be reduced as the stock declines in size. The reproductive and genetic health of the stock could be adversely affected as well. If realized, these effects would increase the stock's vulnerability to adverse environmental conditions.

Alternatives 2, 3, 4, and 5 would all reduce fishing effort to a level that, along with appropriate commercial harvest reductions, rebuilds the stock within ten years. The biomass of vermilion snapper is predicted to increase approximately four times over current levels no matter which harvest reduction alternative is used. This increase in stock biomass is expected to promote a more natural age and size distribution, greater reproductive capability, and better genetic health.

Alternative 2 reduces the vermilion snapper bag limit to two fish within the current 20-reef fish aggregate bag limit . In recent years, single day fishing trips have produced a median harvest of about one fish per angler trip and 75 percent of the angler trips produced two fish or less. Charter and private anglers would be affected more by bag limits than would the headboat sector because they harvest more fish per trip.

Preferred Alternative 3A would increase the minimum size limit to 11 inches TL and reduce the bag limit to ten fish within the current 20-reef fish aggregate bag limit to obtain the necessary overall harvest reduction. Alternative 3B would increase the minimum size limit to 11 inches TL and establish a seven-fish bag limit. Size limits are an effective method to protect fish until they become mature and have had a chance to spawn. Ninety percent of female vermilion snapper are mature by 8 inches TL, so even the fastest growing fish would be able to spawn before entering the fishery. Reducing the bag limit would reduce fishing mortality on legal-sized fish. A seven-fish limit outperforms a ten-fish bag limit by about four percent in the context of overall harvest reduction.

The Council identified Alternative 3A as preferred because it shifts some of the socioeconomic costs of rebuilding to the commercial fishery. Vermilion snapper harvest increased dramatically during the late 1980s and early 1990s due primarily to increases in commercial harvest. This increase is believed to have created the overfishing and overfished conditions that must now be addressed by this amendment. Preferred Alternative 3A decreases the harvest reductions required from the recreational fishery to 21.5 percent (4 percent below the target 25.5 percent reduction; Alternative 3B). This then increases the harvest reduction required in the commercial fishery and compensates for the proportional decrease in harvest by the recreational sector that occurred beginning in the early 1990s.

Alternative 4 would establish a quota for the recreational fishery. Amendment 1 to the Reef Fish FMP allocated 33 percent of the vermilion snapper harvest to the recreational sector based on average harvests from 1979 through 1987. Currently, the recreational fishery accounts for approximately 21 percent of the annual harvest. Effectively, this allocation allows the recreational harvest to increase by 17 percent from the projected 2003 landings. Quotas are generally considered to be the most risk averse management method because they place annual limits on harvest. However, in practice quotas can be difficult to monitor and enforce. The history with recreational red snapper quotas suggests that it would be difficult to effectively manage a recreational vermilion snapper quota using the available data collection programs (MRFSS survey and Headboat logbook).

Alternative 5 would close a portion of the year (May 1 to June 21) to recreational harvest of vermilion snapper. MRFSS data indicates that harvest has peaked during the summer months since at least 1990 (See Table 4.2.3.1.9). This alternative would provide fishing opportunities when the recreational red snapper season is closed from November 1 through April 20.

Alternatives for reducing commercial harvest are as follows:

Alternative 1: Status Quo or No Action (strategy 1). Do not reduce the commercial harvest of vermilion snapper. Maintain the 10-inch TL minimum size limit.

Alternative 2: The commercial trip limit for vermilion snapper will be 1,625 lbs. (25.2 percent harvest reduction)

Alternative 3: The minimum size for commercially caught vermilion snapper will be 12 inches TL (27 percent harvest reduction).

Alternative 4A: The minimum size for commercially caught vermilion snapper will be 11 inches TL and the trip limit will be 2300 lbs. whole weight. (25.8 percent harvest reduction)

Alternative 4B: The minimum size for commercially caught vermilion snapper will be 11 inches TL and the trip limit will be 2250 lbs. whole weight. (26.3 percent harvest reduction)

Alternative 5: The annual commercial quota in whole weight for vermilion snapper will be 0.989 mp (37 percent harvest reduction)

Alternative 6: The commercial closed season for vermilion snapper will be August 1 through September 30 and December 1 through 31. (24.8 percent harvest reduction).

Preferred Alternative 7: The minimum size for commercially caught vermilion snapper will be 11 inches TL and the closed season will be April 22 through May 31. (26.3 percent harvest reduction)

Alternative 1 would allow overfishing to continue and prevents the stock from rebuilding. Alternatives 2-6 would all reduce fishing effort to a level that, along with appropriate recreational harvest reductions, rebuilds the stock within ten years and is predicted to increase vermilion snapper biomass to approximately four times greater than current levels. This increase in stock biomass is expected to promote a more natural age and size distribution, greater reproductive capability and better genetic health.

Alternative 2 would establish a commercial trip limit of 1,625 lbs. This trip limit would have affected 8.4 percent of the trips in 2000 - 2001. During this same time period, the average landings per trip were about 500 pounds.

Alternative 3 increases the minimum size to 12 inches TL. The median size harvested in the commercial fishery is slightly over 12 inches TL and the mean size is about 12.75 inches. Increasing the minimum size will increase protection for mature female vermilion snapper. Ninety percent of females are mature by eight inches TL and an increase to 12 inches would allow even the fastest growing fish to spawn for several years before being harvested.

Alternative 4A and Alternative 4B would establish an 11-inch TL size limit and either a 2,300 or 2,250 pound trip limit. Less than 6 percent of trips would be affected by these trip limits. Increasing the minimum size to 11 inches TL would produce almost the same biological effects as Alternative 3. The fastest growing females would be protected for several spawning seasons. Alternative 4B is the companion to the preferred recreational harvest reduction Alternative 3A and is designed to shift more of the burden of rebuilding to the commercial fishery. Decreasing the commercial harvest by slightly less than 1 percent over the target reduction of 25.5 percent would be sufficient to offset a 4 percent increase in the allowance for the recreational fishery.

This is because the commercial proportion of the harvest is currently 79 percent. Alternative 4A maintains the target 25.5 percent reduction and matches recreational Alternative 3B.

Alternative 5 would establish a quota for the commercial fishery. Amendment 1 to the Reef Fish FMP establishes the allocation percentages for vermilion snapper as 67 percent commercial based on average harvests from 1979 through 1987. However, since 1996, the commercial share of the total harvest has averaged 79 percent, which would equate to a quota of 1.17 mp based on the harvest target of 1.476 mp. A quota of 0.989 mp would effectively decrease the commercial harvest by 37 percent. Commercial quotas are typically the most risk averse way to control harvest because they halt fishing when the quota is projected to be met and the regulatory mandates for reporting are already in place.

Alternative 6 would establish a seasonal closure from August 1 through September 30 and all of the month of December. This alternative would keep the commercial vermilion snapper fishery open when the red snapper fishery is open to avoid bycatch. This closure would also protect vermilion snapper during the end of the spawning season.

Preferred Alternative 7 would establish an 11-inch TL minimum size and a seasonal closure from April 22 through May 31. Alternative 7 was developed at the Council's July, 2004 meeting based on public testimony and the recommendation of some commercial fishermen. Alternative 7 reduces harvest by 26.3 percent, enough to compensate for the recreational preferred alternative 3A and rebuild the stock. Discard mortality should be minimized because the mean size of commercially caught vermilion snapper exceeds 12 inches and one 40-day closed period should not significantly disrupt market channels. The closure is centered around May when harvest has been highest and markets are glutted reducing wholesale dockside prices. This closure would also occur during the early portion of the spawning season and provide some protection when fish aggregate and are easy to catch.

1.2 Environmental consequences of alternatives

The environmental consequences for alternatives proposed in this amendment are discussed in Sections 4 and 8, and are summarized in Tables 1.2.1 - 1.2.4. The level of significance (low, medium, and high) for each of the four environments is indicated in the table. Significance levels are intended to provide a qualitative scale for comparing the effects of each of the various management alternatives on the physical, biological, socioeconomic, and administrative environments.

Alternative biological reference points and status determination criteria would have no direct positive or negative effects on vermilion snapper, other species, or participants in the vermilion snapper fishery because they simply provide fishery managers with biological goals to consider in developing fishery management measures. These reference points and status criteria may indirectly affect the physical and biological environment by defining the future level of fishing effort that will sustain the stock after it is rebuilt. They could also indirectly affect the socioeconomic environment by influencing the setting of total allowable catch (TAC) and associated management measures, or the administrative environment by requiring implementation and adjustment of management measures once the stock is rebuilt. Overly conservative parameters could also lead to greater conservation than is necessary and greater socioeconomic loss from forgone yield. Conversely, establishing insufficiently conservative parameters can produce greater short-term (five years) socioeconomic benefits from increased yield, but lead to long-term (duration of rebuilding plan or longer) losses due to the stock being fished to a level less than the true MSY level.

Rebuilding plan alternatives should positively affect stock abundance and increase socioeconomic benefits. Alternatives should have minimal effects on the physical and administrative environments. No indirect effects are expected for the physical environment; however, potential errors in the estimation of stock productivity could result in additional management measures being implemented in the future to rebuild the fishery. In the long-term, all alternatives produce positive socioeconomic benefits that would indirectly benefit support industries and fishing communities. Indirect biological effects are difficult to assess and the effects of rebuilding the vermilion snapper fishery may be unrecognizable compared to those associated with rebuilding other GOM reef fishes.

Harvest reduction alternatives for both the commercial and recreational fishery would result in similar environmental consequences. Direct and indirect effects on the physical environment are expected to be minimal. All alternatives increase stock abundance and result in positive effects, although the indirect effects on the biological environment are not well understood. All alternatives, except a 12-inch TL commercial size limit, would result in long-term socioeconomic benefits that indirectly benefit support industries and fishing communities. Alternatives are expected to have a minor effect on the administrative environment since most fall within the current management system. The administrative environment could be indirectly affected if future adjustments to management measures are needed.

Table 1.2.1 Summary of direct, indirect, and cumulative effects on the environment and their significance for biological reference points and status determination criteria alternatives.

	Physical Environment	Biological, Ecological Environment	Social and Economic Environment	Administrative Environment
Direct Effects	No beneficial or adverse effects of gear on habitat by any alternative.	No beneficial or adverse effects by any alternative because biological reference points and stock status criteria only provide managers with a defined harvest target to consider in developing fishery management measures.	There should be no direct effects on operations of fishery participants. Direct effects accrue from future actions that directly effect harvest or fishing behavior.	Adjustments to stock status criteria and biological reference points would need to be made periodically based on new information gathered for the vermilion snapper stock. These effects should not be significant because they fall within the current scope of the management system.
Indirect Effects	Once the stock is rebuilt, possible effects from fishing gear, but difficult to assess the level of effects since few trips currently target vermilion snapper. Alternatives that decrease fishing effort should have less of an effect.	As the stock rebuilds, possible effects with prey and competitor species. Such interactions are poorly understood and difficult to assess.	More conservative stock parameters conserve the stock better, but could incur a loss from forgone yield. Less conservative stock parameters allow a greater socio-economic benefit from increasing yields, but may incur long-term losses if the stock is being fished at levels above the true MSY level.	Once the stock is rebuilt, potential management measures may be needed to regulate harvest. Implementing such measures would require conducting periodic stock assessments, informing the public about regulatory changes, and monitoring harvest levels.
Cumulative Effects	No beneficial or adverse effects were identified for any of the alternatives.	Once the stock is rebuilt, possible positive effects because population level will allow sustainable level of harvest.	No beneficial or adverse effects were identified for any of the alternatives.	Assessments would have to completed periodically to adjust status criteria and reference points and to determine that the appropriate stock status is being maintained.
Significance	Low - All alternatives result in minimal impact to the physical environment.	Low - Alternatives only provide managers with a defined harvest target to consider in developing fishery management measures.	Low - Alternatives would not affect operations of fishery participants. In the long-term, significance may increase if alternatives are overly or insufficiently conservative and result in either short- or long-term socioeconomic losses.	Low - Adjustments to status criteria and biological reference points fall within the current scope of management.

Table 1.2.2 Summary of direct, indirect, and cumulative effects on the environment and their significance for rebuilding plan alternatives.

	Physical Environment	Biological, Ecological Environment	Social and Economic Environment	Administrative Environment
Direct Effects	Direct effects from fishing gear were determined to be minimal. No adverse or beneficial effects were identified for any of the alternatives.	All of the rebuilding alternatives, except Alt. 1, should have a positive effect on the vermilion snapper stock because they allow the stock size to increase. Alternatives 4 and 5 rebuild the stock more quickly than Preferred Alt. 3 and Alt. 2. All alternatives increase bycatch.	All alternatives, except Alt. 1, should have a positive effect because of increasing stock sizes. Alt. 4 provides the largest short-term (5 years) economic effects, while Alts. 1 and 2 provide the least. In the long-term, Alts. 3, 4, and 5 provide the greatest net economic benefits.	Alternatives that have the smallest short-term reductions in catch level are likely to pose the greatest administrative burden. Stricter initial short-term restrictions reduce the likelihood that additional restrictions will be necessary later on in the rebuilding plan.
Indirect Effects	No adverse or beneficial effects were identified for any of the alternatives.	Indirect effects are difficult to assess because little information is available on the interrelationships between species. The effects of rebuilding the vermilion snapper stock may be unrecognizable compared to those associated with rebuilding other Gulf of Mexico reef fishes.	Over the short-term, Alt. 4 provides the greatest negative short-term effects, resulting in an adverse spillover to associated businesses and the community. Over the long-term, all alternatives produce net economic benefits. Alts. 3 and 5 would result in the greatest long-term gains and some of the smallest short-term losses.	Errors in estimated stock productivity could require additional adjustments in management measures in the future to rebuild the fishery.
Cumulative Effects	No adverse or beneficial effects were identified for any of the alternatives.	Cumulative effects of simultaneously rebuilding vermilion snapper and other GOM reef fish fisheries, such as red snapper, are not well understood.	If future benefits from rebuilding are large enough to offset negative effects due to past and current actions, the compound effects of regulations would result in improving fishery participation in the vermilion snapper fishery.	No beneficial or adverse effects were identified for any of the alternatives.
Significance	Low - All alternatives result in minimal impact to the physical environment.	High - All alternatives are expected to rebuild the stock to levels 3-4 times greater than current levels, except Alt. 1.	High - Alts. 3 and 5 have greatest long-term benefits and smallest short-term losses; Medium - Alt. 4 has greatest short-term losses, but high long-term benefits; Low - Alts. 1 and 2 have smallest short-term losses and long-term benefits.	High - Alts. 2 and 3 would pose greatest administrative burden. Alt. 1 would increase risk of litigation under the MSFCMA.; Medium - Alt. 4 has intermediate administrative burden; Low - Alt. 5 has smallest administrative burden.

Table 1.2.3 Summary of direct, indirect, and cumulative effects on the environment and their significance for commercial harvest reduction alternatives.

	Physical Environment	Biological, Ecological Environment	Social and Economic Environment	Administrative Environment
Direct Effects	No beneficial or adverse effects of gear on the habitat by any alternative.	All alternatives, except Alt. 1, will decrease fishing effort and positively effect the vermilion snapper stock by increasing stock abundance. Excluding Alt. 1, all alternatives will increase bycatch, but increases in stock abundance are expected to outweigh losses associated with bycatch.	All alternatives result in negative short-term economic effects, except Alt. 1. In the long-term (excluding Alt. 1), all alternatives result in positive economic benefits. Alt. 6 results in the greatest benefits, followed by Alts. 5, 7, 2, and 4. Alts. Alternative 3 results in long-term economic losses when compared to status quo	All alternatives would require managers to make minor adjustments to the Reef Fish FMP, except Alt. 1. Alt. 5 would likely have the greatest effect because harvest levels would have to be carefully monitored to comply with a quota. All other management measures fall within the current scope of the management system.
Indirect Effects	Once the stock is rebuilt, possible effects from fishing gear, but difficult to assess the level of effects since few trips currently target vermilion snapper. Alternatives that decrease fishing effort should have less of an effect.	Indirect effects are not well understood. Reductions in harvest and increases in stock abundance could lead to changes in predator-prey relationships and abundance of competitor species.	In the long-term, all alternatives positively affect support industries and fishing communities, except Alts. 1 and 3.	Errors in estimated stock productivity or changes in fishing behavior not accounted for by harvest reductions could require additional adjustments in management measures in the future to rebuild the fishery.
Cumulative Effects	No beneficial or adverse effects were identified for any of the alternatives	Existing and proposed regulations for other reef fish fisheries could increase or decrease estimated harvest reductions and make the rebuilding plan easier or more difficult to achieve.	If future benefits from rebuilding are large enough to offset negative effects due to past and current actions, the compound effects of regulations would improve fishery participation in the vermilion snapper fishery.	Regulatory actions would require dissemination of new rules, monitoring of landings to ensure rebuilding plan objectives are being met, and periodic stock assessments to evaluate the status of the stock.
Significance	Low - All alternatives result in minimal impact to the physical environment	High - All alternatives are expected to rebuild the fishery to levels 3-4 times greater than current levels	High - Alternative 6 has greatest short-term losses and long-term benefits; Medium - Alternatives 2, 4, 5 and 7 have intermediate short-term losses and long-term net benefits; Low - Alternative 3 has the largest short-term and long-term losses.	High - Alternative 5 would have the greatest effect on administration; Low - Alternatives 1, 2, 3, 4, 6 and 7 all fall within the current scope of reef fish management.

Table 1.2.4 Summary of direct, indirect, and cumulative effects on the environment and their significance for recreational harvest reduction alternatives.

	Physical Environment	Biological, Ecological Environment	Social and Economic Environment	Administrative Environment
Direct Effects	No beneficial or adverse effects of gear on the habitat by any alternative.	All alternatives, except Alt. 1, will decrease fishing effort and positively effect the vermilion snapper stock by increasing stock abundance. Excluding Alt. 1, all alternatives will increase bycatch, but increases in stock abundance are expected to outweigh losses associated with bycatch.	All alternatives, except Alts. 1 and 5, result in negative short-term economic effects. Over the long-term, all alternatives would result in positive economic benefits, except Alt. 1. Alt. 4 results in the greatest economic benefits, followed by Alternative 5 and 2. Alts. 1 and 3 result in the smallest long-term economic benefits.	All alternatives would require managers to make minor adjustments to the Reef Fish FMP, except Alt. 1. Alternative 4 would likely have the greatest effect because harvest levels would have to be carefully monitored to comply with a quota. All other management measures fall within the current scope of the management system.
Indirect Effects	Once the stock is rebuilt, possible effects from fishing gear, but difficult to assess the level of effects since few trips currently target vermilion snapper. Alternatives that decrease fishing effort should have less of an effect.	Indirect effects are not well understood. Reductions in harvest and increases in stock abundance could lead to changes in predator-prey relationships and abundances of competitor species.	In the long-term, all alternatives positively effect support industries and fishing communities. Alt. 3 would result in the largest short-term economic effects, while Alt. 4 would result in the largest benefits. Alt. 1, 2, and 5 result in intermediate benefits.	Errors in estimated stock productivity or changes in fishing behavior not accounted for by harvest reductions could require additional adjustments in management measures in the future to rebuild the fishery.
Cumulative Effects	No beneficial or adverse effects were identified for any of the alternatives.	Existing and proposed regulations for other reef fish fisheries could increase or decrease estimated harvest reductions and make the rebuilding plan easier or more difficult to achieve.	If future benefits from rebuilding are large enough to offset negative effects due to past and current actions, the compound effects of regulations would result in improving fishery participation in the vermilion snapper fishery.	Regulatory actions would require dissemination of new rules, monitoring of landings to ensure rebuilding plan objectives are being met, and periodic stock assessments to evaluate the status of the stock.
Significance	Low - All alternatives result in minimal impact to the physical environment.	High - All alternatives are expected to rebuild the fishery to levels 3-4 times greater than current levels, except Alt. 1.	High - Alt. 4 has greatest short-term and long-term benefits; Medium - Alts. 2 and 5 have intermediate short-term losses and long-term net benefits; Low - Alts. 1 and 3 have largest short-term losses and smallest long-term benefits.	High - Alt. 4 has greatest effect on administration; Low - Alts. 1, 2, 3 and 5 all fall within the current scope of reef fish management.

1.3 Major conclusions and areas of controversy

The Council is required to define biomass-based biological reference points and status determination criteria for the vermilion snapper stock. In the Council's 1999 Generic Sustainable Fisheries Act Amendment, reference points and status determination criteria were disapproved because they were not biomass-based. The preferred biological reference points and status determination criteria selected by the Council in this amendment are biomass-based. The Council has selected a preferred MSY level that is consistent with the results of the most recent peer-reviewed stock assessment (Porch and Cass-Calay, 2001). This MSY estimate was considered the most reliable during review of the stock assessment by the RFSAP. Preferred alternatives for OY and status determination criteria are consistent with NOAA Fisheries' technical guidance for precautionary approaches to these parameters.

The preferred rebuilding plan and harvest reduction alternatives reflect positive actions in the long-term management of the vermilion snapper stock and fishery. The preferred rebuilding plan is expected to rebuild the fishery in ten years to biomass levels that are 3-4 times greater than current levels. The Council has chosen one preferred harvest reduction alternative for the recreational fishery (11-inch TL size limit and a 10 fish bag limit within the 20-reef fish aggregate bag limit) and one for the commercial fishery (11-inch TL size limit and a season closure from April 22 through May 31). The preferred harvest reduction alternatives shift some of the socioeconomic costs for rebuilding the fishery to the commercial fishery, because increased commercial harvest during the late 1980s and early 1990s is believed to have created the overfishing and overfished conditions that must now be addressed by this amendment. Each of these harvest reduction alternatives, except the 12-inch TL commercial size limit, are expected to have long-term biological and socioeconomic benefits that exceed short-term economic losses. Economic analyses predict that short-term costs associated with a 12-inch TL commercial minimum size limit would not be recovered during the time frame of the rebuilding plan, resulting in net economic losses.

2 HISTORY OF MANAGEMENT RELATING TO VERMILION SNAPPER

The following history of management only pertains to vermilion snapper management or regulations that could secondarily affect vermilion snapper so some reef fish amendments may not be listed. Management objectives are listed in Table 2.1 and reference the FMP or amendment establishing the respective objectives. Please contact the Gulf of Mexico Fishery Management Council for a complete history of reef fish management in the Gulf of Mexico.

2.1 Fishery management plan and regulatory amendments

The Reef Fish FMP (with its associated EIS) was implemented in November 1984. It established four management objectives for the reef fish fishery (Table 2.1). The FMP established the list of species in the management unit, which included vermilion snapper, and an inshore stressed area within which certain gear was prohibited, including fish traps and roller trawls [49FR 39548].

Amendment 1 (with its associated environmental assessment [EA], regulatory impact review [RIR], and initial regulatory flexibility analysis [IRFA]) to the Reef Fish Fishery Management Plan, was implemented in January, 1990. It revised and added seven objectives to the FMP (Table 2.1).

Amendment 1 set a vermilion snapper minimum size limit of 8 inches TL; however, vermilion snapper were excluded from the 10-snapper recreational bag limit. A framework procedure for specification of total allowable catch (TAC) was created to allow for annual management changes. The procedure included subdividing TAC into commercial and recreational allocations of 67 percent and 33 percent respectively. This amendment required a commercial vessel reef fish permit for harvest in excess of the bag limit, and for the sale of reef fish. In addition, this amendment prohibited the use of longline and buoy gear for the directed harvest of reef fish inside of the 50-fathom isobath west of Cape San Blas, Florida (85°30'W) and inside of the 20-fathom isobath east of Cape San Blas, Florida (85°30'W) [55 FR 2078].

Amendment 4 (with its associated EA and RIR), implemented in May 1992, established a moratorium on the issuance of new commercial reef fish vessel permits for a maximum period of three years [57 FR 11914].

Amendment 5 (with its associated SEIS, 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 [59 FR 966].

Amendment 8 (with its associated EA and RIR) was implemented in July 1995. This amendment proposed to establish a red snapper individual transferable quota system; however, the regulatory portions of the amendment were disapproved through Congressional action. Amendment 8 added and revised five management objectives of the FMP (Table 2.1) [60 FR 61200].

Amendment 11 (with its associated EA and RIR) was partially approved by NOAA Fisheries and implemented in January 1996. It implemented a new reef fish permit moratorium for no more than five years or until December 31, 2000, during which time the Council was to consider limited access for the reef fish fishery [60 FR 64356].

Amendment 12 (with its associated EA and RIR), submitted in December 1995 and implemented in January 1997. It created an aggregate bag limit of 20 reef fish for all reef fish species (including vermilion snapper) not having a bag limit [61 FR 65983].

Amendment 14 (with its associated EA, RIR, and IRFA), implemented in March and April, 1997, provided for a ten-year phase-out for the fish trap fishery; allowed transfer of fish trap endorsements for the first two years and thereafter only upon death or disability of the endorsement holder, to another vessel owned by the same entity, or to any of the 56 individuals who were fishing traps after November 19, 1992, and were excluded by the moratorium; and prohibited the use of fish traps west of Cape San Blas, Florida.

Amendment 15 (with its associated EA, RIR, and IRFA), implemented in January 1998, permanently increased the vermilion snapper size limit from 8 to 10 inches TL; prohibited harvest of reef fish from traps other than permitted reef fish traps, stone crab traps, or spiny lobster traps; removed black sea bass, rock sea bass, bank sea bass, and all species of grunts and porgies from the Reef Fish FMP; and removed sand perch and dwarf sand perch from the recreational 20-reef fish aggregate bag limit. [62 FR 67714].

An August 1999 regulatory amendment (with its associated EA, RIR, and IRFA) closed two areas (i.e., created two marine reserves), known as Steamboat Lumps and Madison-Swanson (104 and 115 square nautical miles respectively), year-round to all fishing under the jurisdiction of the Council with a four-year sunset closure [65 FR 31827].

Generic Sustainable Fisheries Act Amendment (with its associated EA, RIR, and IRFA), partially approved and implemented in November 1999, set MFMT for vermilion snapper at $F_{30\%\ SPR}$. Estimates of MSY, MSST, and OY were disapproved because they were based on SPR proxies rather than biomass-based estimates [67 FR 47967].

Amendment 17 (with its associated EA), implemented by NOAA Fisheries in August 2000, extended the commercial reef fish permit moratorium for another five years, from December 31, 2000 to December 31, 2005, unless replaced sooner by a comprehensive controlled access system [65 FR 41016].

Proposed Amendment 18 is being developed as an options paper and contains several actions that could impact the vermilion snapper fishery. There are proposed measures to reduce bycatch in the reef fish fishery, add new closed areas to protect grouper spawning aggregations, and change framework procedures for developing and managing TACs.

Amendment 19, also known as the **Generic Amendment Addressing the Establishment of the Tortugas Marine Reserves** (with its associated EIS, RIR, and IRFA), was submitted to NOAA Fisheries in March 2001, and implemented on August 19, 2002. This amendment, affecting all FMPs for Gulf fisheries, establishes two marine reserve areas off the Tortugas and prohibits fishing for any species and anchoring by fishing vessels inside the two marine reserves [67 FR 47467].

Amendment 20, also known as the **Charter/Headboat Moratorium Amendment** (with its associated EA and RIR), amended the Reef Fish FMP and the Coastal Migratory Pelagic FMP (Amendment 14) and was implemented by NOAA Fisheries on July 29, 2002, except for some provisions which became effective on December 26, 2002. This amendment establishes a three-year moratorium on the issuance of new charter and headboat vessel permits in the recreational for-hire fisheries in the Gulf exclusive economic zone (EEZ). The moratorium expires June 16, 2006. The purpose of this moratorium is to limit future expansion in the recreational for-hire fishery while the Council monitors the impact of the moratorium and considers the need for a more comprehensive effort management system [67 FR 43558].

Amendment 21 (with its EA, RIR and IRFA) was implemented on June 3, 2004, and extended the Madison-Swanson and Steamboat Lumps closures for an additional six years. Additionally, surface trolling is to be allowed during the months of May through October; whereas, the original regulatory amendment did not allow any fishing [69 FR 24532].

Proposed Amendment 22 (with its SEIS) was submitted to NOAA Fisheries on May 25, 2004, for implementation. Besides setting biological reference points and a rebuilding plan for red snapper, it provides alternatives to improve bycatch monitoring in the reef fish fishery. When implemented, these monitoring requirements will improve future stock assessments for vermilion snapper.

2.2 Control date notices

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

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

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

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

March 29, 2001 - The Council is considering whether there is a need to limit participation in the reef fish and coastal migratory pelagics charter and headboat fisheries. The intent of this notice is to inform the public that entrants into the charter vessel/headboat fisheries after this date may not be assured of a future access to the reef fish and/or coastal migratory pelagics resources if: 1) an effort limitation management regime is developed and implemented that limits the number of vessels or participants in the fishery; and 2) if the control date notice is used as criterion for eligibility [67 FR 32312].

Table 2.1. Objectives of the Reef Fish FMP.

MANAGEMENT OBJECTIVE		FMP/AMENDMENT
1.	Rebuild the declining reef fish stocks wherever they occur within the fishery.	Original FMP November, 1984
2.	Establish a fishery reporting system for monitoring the reef fish fishery.	Original FMP
3.	Conserve reef fish habitats and increase reef fish habitats in appropriate areas and provide protection for juveniles while protecting existing and new habitats.	Original FMP
4.	Minimize conflicts between user groups of the resource and conflicts for space.	Original FMP
5.	Stabilize long-term population levels of all reef fish species by establishing a certain survival rate of biomass into the stock of spawning age to achieve at least 20 percent spawning stock biomass per recruit.*	Amendment 1 January, 1990
6.	To reduce user conflicts and nearshore fishing mortality [modifies Objective 4].	Amendment 1
7.	To respecify the reporting requirements necessary to establish a database for monitoring the reef fish fishery and evaluating management actions [modifies Objective 2].	Amendment 1
8.	To revise the definitions of the fishery management unit and fishery to reflect the current species composition of the reef fish fishery.	Amendment 1
9.	To revise the definition of optimum yield to allow specification at the species level.	Amendment 1
10.	To encourage research on the effects of artificial reefs.	Amendment 1
11.	To maximize net economic benefits from the reef fish fishery.	Amendment 1
12.	To avoid to the extent practicable the “derby” type of fishing season.	Amendment 8 July, 1995
13.	To promote flexibility for the fishermen in their fishing operations.	Amendment 8
14.	To provide for cost-effective and enforceable management of the fishery.	Amendment 8
15.	To optimize net benefits to the fishery [modifies Objective 11].	Amendment 8

*Identified as the primary objective of the Reef Fish FMP.

3 NEED FOR AND PURPOSE OF ACTION

3.1 Need for action

The MSFCMA directs the regional fishery management councils to adopt conservation and management measures that prevent overfishing while continuously achieving OY from managed fisheries (MSFCMA §301(a)(1)). The MSFCMA defines OY as "the amount of fish which will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems" (MSFCMA §3(28)(A)). The OY is to be prescribed based on MSY from the fishery, as reduced by relevant economic, social, or ecological factors (MSFCMA §3(28)(B)). In the case of an overfished fishery, OY must provide for rebuilding to a level that would support MSY on a continuing basis (MSFCMA §3(28)(C)).

To assist the regional fishery management councils in achieving this mandate, the MSFCMA requires that each FMP assess and specify the present and probable future condition of, and the MSY and OY from, fisheries (§303(a)(3)), and specify objective and measurable criteria for identifying when a fishery is overfished (§303(a)(10)). Status determination criteria are defined by 50 CFR 600.310 to include a MSST below which a stock would be considered to be overfished, and a MFMT above which a stock would be considered to be experiencing overfishing. Together, these criteria are intended to provide fishery managers with the means to measure the status and performance of a fishery. By evaluating stock biomass (B) and fishing mortality rate (F) in relation to these parameters, fishery managers can determine the status of a fishery at any given time and assess whether management measures are achieving established goals.

The Council defined MSY, OY, MSST, and MFMT for the vermilion snapper stock in its 1999 Generic Sustainable Fisheries Act Amendment. However, the estimates of MSY, OY, and MSST proposed in that amendment were disapproved because they were not biomass-based. Consequently, the Council is required to define biomass-based estimates of MSY, OY, and MSST for the vermilion snapper stock.

Additionally, NOAA Fisheries has determined that the Gulf of Mexico vermilion snapper stock is overfished and experiencing overfishing. In a letter to the Council dated October 30, 2003, the agency concluded that vermilion snapper biomass was 32 percent of the biomass associated with B_{MSY} in 2000. That value is well below the default definition of MSST $(1-M)*B_{MSY} = 0.75*B_{MSY}$) provided by NOAA Fisheries' NSGs. The agency also concluded that the vermilion snapper stock experienced a fishing mortality rate in 1999 of nearly twice F_{MSY}. Section 304(e)(3) of the MSFCMA requires the Council to prepare a plan within one year of this notice to end overfishing and rebuild the stock.

3.2 Purpose of action

The purpose of Amendment 23 to the Reef Fish FMP is to: (1) define biomass-based estimates of MSY, OY, and MSST for the vermilion snapper stock; (2) to determine if the current definition of MFMT for vermilion snapper is consistent with the best available scientific information on the fishery; and (3) to establish a plan to end overfishing and rebuild the vermilion snapper stock to B_{MSY} that is consistent with the requirements of the MSFCMA.

The goals and objectives informing the development and selection of alternatives are broadly defined by the MSFCMA's ten national standards outlined in Appendix A and by the objectives of the Reef Fish FMP (defined in Section 2). A priority objective of the MSFCMA is to define a management and rebuilding program that balances the conservation mandate provided by national standard 1 (MSFCMA §301(a)(1)) with the directive provided by national standard 8 to minimize to the extent practicable adverse economic impacts on fishing communities (MSFCMA §301(a)(8)).

4 MANAGEMENT ALTERNATIVES

4.1 Biological reference points and status determination criteria

The primary goal of federal fishery management, as described in National Standard 1 of the MSFCMA, is to conserve and manage U.S. fisheries to "...prevent overfishing while achieving, on a continuing basis, the OY from each fishery for the United States fishing industry" (MSFCMA §301(a)(1)). While economic and social factors are to be considered in defining the OY for each fishery, OY may not be defined as an amount of fish that would compromise a stock's ability to produce MSY – or the largest long-term average catch that can be taken continuously (sustained) from a stock under prevailing ecological and environmental conditions. OY must prevent overfishing, and in the case of an overfished fishery, OY must provide for "rebuilding to a level consistent with producing MSY in such a fishery" (50 CFR §600.10).

Fishery managers use the parameters MSST and MFMT to monitor the current level of biomass ($B_{CURRENT}$) and rate of fishing mortality ($F_{CURRENT}$) in a fishery in relation to B_{MSY} and F_{MSY}. MSST represents the threshold biomass level below which a stock would not be expected to be capable of rebuilding to B_{MSY} within ten years if exploited at MFMT. A stock with a biomass below the MSST (e.g., $B_{CURRENT}$ < MSST) would be considered to be overfished. Once this designation is made, a rebuilding plan would need to be put in place to rebuild the stock to B_{MSY}. MFMT represents the maximum level of fishing mortality that a stock can withstand, while still producing MSY on a continuing basis. A fishery experiencing a fishing mortality rate that exceeds the MFMT (e.g., F_{CURR} > MFMT) would be considered undergoing overfishing.

4.1.1 Range of maximum sustainable yield (MSY) alternatives

MSY, B_{MSY}, and F_{MSY} estimates provided by the most recent peer-reviewed stock assessment (Porch and Cass-Calay, 2001) serve as the foundation for OY, MSST, and MFMT considered in this amendment. Two models were used in the assessment: (1) an age-structured virtual population analysis (VPA) model, and (2) a surplus production (Pella-Tomlinson) model. The VPA model provided a proxy for MSY based on the Council's current definition of MFMT ($F_{30\% SPR}$) while the surplus production model directly estimated MSY. In both cases, the most probable model runs indicated that the vermilion stock was overfished and undergoing overfishing.

The estimates produced by each model were highly uncertain. Length-at-age data used in the age-based VPA model were highly variable due to the growth of vermilion snapper. This made it very difficult to reliably estimate age from the length data available for the assessment. For the surplus production model, only 14 years of data were available. Generally, surplus production models require a longer time series (>50 years) of catch and effort data to produce reliable estimates of the stock biomass. The RFSAP reviewed the vermilion snapper assessment in October, 2001, and determined that VPA or other age-structured analyses of vermilion snapper were inappropriate due to the enormous variance in size-at-age, particularly when cohort slicing techniques are the only methods available to age the harvest. In their review of the Pella-Tomlinson stock production model (PT-SPM), the RFSAP concluded that, even though there was only a short time series of data, the base model output fit the data well and none of the other variations of this model significantly improved the fit of the model. Their conclusion was that stock status and benchmarks were best provided by the PT-SPM. The RFSAP determined that in addition to the modeling exercises, landings data and catch-per-unit-effort (CPUE) indices were sufficiently informative to conclude that the biomass of the vermilion snapper stock had declined below the overfished threshold (RFSAP, 2001). The full vermilion snapper stock assessment by Porch and Cass-Calay, with a detailed discussion of their assumptions and caveats as well as the full October 2001, RFSAP report may be downloaded from the Gulf of Mexico's website http://www.gulfcouncil.org/downloads.htm under "Stock Assessment Documents".

The range of alternatives offered for MSY encompasses both the estimate offered by the surplus production model that directly estimates MSY and the VPA model which provides a proxy for MSY as the yield obtained from fishing at $F_{30\%\ SPR}$. These values are biomass-based and comply with NOAA Fisheries' technical guidance. The other alternative is a no-action alternative that would not set an MSY value.

4.1.2 MSY alternatives

Alternative 1: No action (status quo). Do not define a separate MSY for vermilion snapper but retain a 51 mp whole weight estimate of MSY for the entire reef fish complex.

Preferred Alternative 2: MSY for vermilion snapper is the yield associated with F_{MSY} when the stock is at equilibrium. Based on the Pella-Tomlinson surplus production model used in the most recent vermilion stock assessment (Porch and Cass-Calay, 2001), MSY is estimated to be 3.37 mp whole weight. (range 3.18 to 4.03 mp).

Alternative 3: MSY for vermilion snapper is the yield associated with $F_{30\%\ SPR}$ when the stock is at equilibrium. Based on the VPA model used in the most recent vermilion snapper assessment (Porch and Cass-Calay, 2001), the MSY proxy is estimated to be between 2.58 and 3.24 mp whole weight. (RFSAP did not recommend a specific value)

Discussion: **Alternative 1**, or no action, would not define a specific MSY value for vermilion snapper, but would include vermilion snapper in the MSY value defined for the reef fish complex in the initial Reef Fish FMP. This definition is outdated and is not based on the best available scientific information. The target fishing mortality rate associated with the reef fish FMP for OY is $F_{20\%SPR}$ and is substantially higher than current estimates of F_{MSY} for vermilion snapper (Porch and Cass-Calay, 2001). Consequently, while the no action alternative could provide for a higher yield in the short term, it would prevent the stock from producing MSY on a continuing basis over the long term.

Preferred Alternative 2 would define MSY as the yield associated with fishing at F_{MSY} when the stock is at equilibrium based on the Pella-Tomlinson surplus production model. This value differs from that proposed in Alternative 3, which is calculated using the SPR-based proxy. No direct estimates of MSY or F_{MSY} were available when the Council originally defined MFMT. The Pella-Tomlinson surplus production model used in the 2001 stock assessment provided a point estimate of 3.37 mp (sensitivity runs off the base model estimated MSY values from 3.18 to 4.03 mp). This estimate has been endorsed by the RFSAP as the most reliable.

Alternative 3 would define MSY as the yield associated with the F that maintains the stock at 30 percent SPR in equilibrium conditions. This was the preferred MSY definition previously identified by the Council in the Generic SFA amendment based on the best available scientific information and recommended by the RFSAP and Ad Hoc Finfish Stock Assessment Panel (FSAP) (RFSAP, 2001; GMFMC, 1998). The RFSAP and FSAP recommended that stocks like vermilion snapper be managed to maintain 30 percent of the SPR that would be achieved in the absence of fishing as long as such species are managed with a minimum size equal to at least the size at 50 percent maturity (unless certain life history characteristics or management strategies warrant a more precautionary approach). Hood and Johnson (1999) found that most female vermilion snapper from the eastern Gulf of Mexico were mature at 8 inches TL and by age 1.

The current minimum size limit for vermilion snapper is 10 inches TL. Consequently, the conditional recommendation of the RFSAP and FSAP applies to this stock. The definition of MSY provided by Alternative 3 also is consistent with the Council's previous definition of MFMT. However, as noted above, the RFSAP was critical of the estimate derived from the VPA model because it required length-at-age data that have been deemed inadequate to properly generate age-length keys for this species.

Because MSY simply provides managers with a defined target to consider when selecting fishery management measures, selecting or not selecting an MSY value should not directly affect the environment as detailed in Section 8.1.2. Also, because vermilion snapper is a small component of the reef fish fishery and generally is not targeted, the indirect and cumulative effects of the MSY alternatives would be relatively minor overall.

Establishing an MSY value (alternatives 2 and 3) would require reductions in future levels of fishing effort for trips targeting vermilion snapper. This would have slight positive consequences for the physical and biological/ecological environments by reducing gear effects on the bottom and by allowing the vermilion snapper population to increase. However, as the stock improved, effort would likely return to previous levels.

MSY can also have indirect effects on the social and ecological environments of the stock. Not establishing an MSY value may lead to continued overfishing on the stock resulting in a lower stock size. This would reduce the catchability of this species and could produce long-term economic losses. Establishing an MSY value (Alternatives 2 and 3) would cause short-term losses as the harvest is constrained to rebuild the stock. However, once rebuilt, economic benefits from greater yields would be realized. The only foreseeable effects on the administrative environment relate to promulgating and enforcing management measures needed to rebuild the stock biomass to B_{MSY}.

4.1.3 Range of optimum yield (OY) alternatives

The range of OY values evaluated for the vermilion snapper stock is derived from the 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 $0.75*F_{MSY}$ (75 percent of F_{MSY}). Studies using Mace's deterministic model (Mace, 1994) indicate that, when a stock is at equilibrium, fishing at an OY value based on $0.75*F_{MSY}$ would produce biomass levels between 125 percent and 131 percent of B_{MSY}, and yields equal to at least 94 percent of MSY (Restrepo et al., 1998). In addition, Restrepo et al. (1998) determined that the probability of overfishing (i.e., exceeding F_{MSY}) would be low (20-30 percent). Table 4.1.1 provides estimates OY as a percent of MSY and the ratio of B_{OY}/B_{MSY} for several levels of F_{OY}.

Table 4.1.1 OY as a percentage of MSY and B_{OY} in relation to B_{MSY} at different levels of F. Estimates assume a logistic population growth along the lines of: $dB/dt = r(B/K)(1-B/K)$, where $F_{MSY} = 4/(2K)$, $B_{MSY} = K/2$, and K is the unfished population biomass.

F_{OY}	$0.65*F_{MSY}$	$0.75*F_{MSY}$	$0.85*F_{MSY}$
Percent of MSY	87.8 %	93.8 %	97.8%
B_{OY}/B_{MSY}	1.35	1.25	1.15

The range of alternatives provided below contains a more conservative alternative that would set F_{OY} equal to $0.65*F_{MSY}$ to a less conservative alternative that would set F_{OY} equal to $0.85*F_{MSY}$. In addition, there is a no-action alternative that would maintain the current OY definition that is not consistent with NOAA Fisheries' technical guidance. Alternatives 2 - 4 provide the long-term value for OY once the stock has been rebuilt. Prior to the stock recovering to B_{MSY}, the allowable harvest would be dictated by the preferred rebuilding strategy and OY would be defined as that harvest. Depending on the strategy selected, this harvest may change as a result of predetermined management goals or in response to the recovery of the stock.

4.1.4 OY alternatives

Alternative 1: No action (status quo). OY is any harvest level that maintains or is expected to maintain at least 20 percent spawning stock biomass per recruit (SSBR) relative to the SSBR that would occur with no fishing.

Alternative 2: OY is the yield corresponding to a fishing mortality rate (F_{OY}) defined as $0.65*F_{MSY}$ (or F_{MSY} proxy) when the stock is at equilibrium. This yield is approximately 88 percent of MSY. During the rebuilding period (2004-2013), OY is defined as the allowable harvest for each year based on the rebuilding strategy selected in this amendment.

Preferred Alternative 3: OY is the yield corresponding to a fishing mortality rate (F_{OY}) defined as $0.75*F_{MSY}$ (or F_{MSY} proxy) when the stock is at equilibrium. This yield is approximately 94 percent of MSY. During the rebuilding period (2004-2013), OY is defined as the allowable harvest for each year based on the rebuilding strategy selected in this amendment.

Alternative 4: OY is the yield corresponding to a fishing mortality rate (F_{OY}) defined as $0.85*F_{MSY}$ (or F_{MSY} proxy) when the stock is at equilibrium. This yield is approximately 98 percent of MSY. During the rebuilding period (2004-2013), OY is defined as the allowable harvest for each year based on the rebuilding strategy selected in this amendment.

Discussion: **Alternative 1** would retain the current definition of OY. This definition is not consistent with the current definition of MFMT, and would set F_{OY} greater than MFMT. NOAA Fisheries disapproved a definition of OY in the Generic SFA amendment that was described as a percent SPR (similar to percent SSBR) rather than as a biomass value. SPR and SSBR values are calculated on a per recruit basis and therefore do not change in relation to annual recruitment into a stock. For that reason, they are not good indicators of stock status.

Alternative 2 is the most precautionary alternative for OY. The yield corresponding with $0.65*F_{MSY}$ is about 88 percent of MSY with a stock biomass associated with this F as $1.35*B_{MSY}$ (Table 4.1.1). Based on Restrepo et al. (1998), fishing at this rate once the stock has achieved equilibrium would reduce the chance that the stock would be subject to overfishing to less than 20 percent. OY would be calculated using the F_{MSY} value adopted in Section 4.1.2. For example, should the Council select the MSY definition in Alternative 2 (F_{MSY} is equal to 0.32), then F_{OY} would be defined as 0.21 (0.65*0.32) and OY would be approximately 2.96 mp (87.8 percent of 3.37 mp).

Preferred Alternative 3 follows the recommendation of Restrepo et al. (1998) and defines OY as the yield obtained by fishing at $0.75*F_{MSY}$. This alternative is intermediate to Alternatives 2 and 4 in terms of level of precaution. The yield derived from fishing at this rate is approximately six percent less than that derived from fishing at F_{MSY} while the stock biomass supported by this fishing mortality rate is estimated to be about $1.25*B_{MSY}$ (Table 4.1.1). These estimates are comparable to those provided by Restrepo et al. (1998) and should reduce the chance of overfishing to about 20 to 30 percent. Fishing at OY based on $0.75*F_{MSY}$ provides a good balance between protecting the stock from overfishing and producing social and economic benefits close to those achieved by fishing at the maximum allowed yield of MSY.

Alternative 4 would define OY as the yield obtained by fishing at $0.85*F_{MSY.}$ This alternative is the least precautionary of Alternatives 2-4. This OY definition is estimated to provide the highest yield (nearly 98 percent of MSY), but also to support the lowest biomass level ($1.15*B_{MSY}$) (Table 4.1.1). Because the F used to obtain this yield is higher, the chance for overfishing to occur will also be higher, but still less than 50 percent.

As with MSY, OY simply provides managers with a defined target to consider when selecting fishery management measures. Selecting or not selecting an OY value should not directly affect the environment as detailed in Section 8.1.3. Also, because vermilion snapper is a small component of the reef fish fishery and generally is not targeted, the indirect and cumulative effects of the OY alternatives would be relatively minor overall.

Establishing an OY value will have no indirect effect on the environment until the stock has been rebuilt. Rebuilding goals are dependent on MSY and B_{MSY}. Once the stock is rebuilt, then OY would determine the level of fishing effort for trips targeting vermilion snapper. For Alternatives 2 to 4, this would have positive consequences for the physical and biological/ecological environments because effort levels would be reduced from MSY levels. This would reduce the interaction of fishing gear with the bottom and allow the vermilion snapper population to increase to above B_{MSY}. The degree of the benefit would be correlated to the reduction in effort. Therefore, Alternative 2 would have a greater benefit than Alternative 3, and Alternative 3 would have a greater benefit than Alternative 4. Not establishing an OY value (Alternative 1) could result in higher effort as the fishery chases fewer fish, thus leading to increased interactions by the gear with the bottom and changes in vermilion snapper demographics.

OY can also have indirect effects on the social and ecological environments of the stock. Not establishing an OY value would lead to continued overfishing on the stock resulting in a lower stock size because F_{OY} would be greater than MFMT. This would reduce the catchability of this species and could produce long-term economic losses. Establishing any of the OY values from Alternatives 2 to 4 would allow for increased economic benefits through greater yields than current values ; however, the lower OY is, the less economic benefit is derived.

4.1.5 Range of maximum fishing mortality threshold (MFMT) alternatives

MFMT is the fishing mortality rate threshold and should not exceed F_{MSY}. Fishing at a level above MFMT for a period of one or more years would constitute overfishing. The current definition of MFMT for vermilion snapper is the F value needed to maintain the stock at 30 percent static SPR ($F_{30\% SPR}$) as defined by the Council in the Generic SFA Amendment and approved by NOAA Fisheries. $F_{30\%SPR}$ was estimated by the VPA stock assessment model and is used as a proxy for F_{MSY} in an alternative. The surplus production model provided a direct estimate of F_{MSY} and this value is also offered as an alternative. The third alternative provided for MFMT is a more conservative definition that would set MFMT equal to the F corresponding to $0.9*F_{MSY}$.

4.1.6 Overfishing threshold (MFMT) alternatives

Alternative 1: No action (status quo). MFMT = $F_{30\%\ SPR}$. The most recent stock assessment estimates $F_{30\%\ SPR}$ to be between 0.24 and 0.39 (RFSAP, 2001).

Preferred Alternative 2: Set MFMT = F_{MSY}. The most recent stock assessment estimates F_{MSY} as 0.32 (RFSAP, 2001).

Alternative 3: Set MFMT = 0.90 * F_{MSY}.

Discussion: The fishing mortality rate defined in **Alternative 1** was recommended by NOAA Fisheries and by the FSAP (GMFMC, 1998), following general recommendations by Mace (1994). The RFSAP and FSAP recommended that stocks like vermilion snapper be managed to maintain 30 percent of the SPR that would be achieved in the absence of fishing provided that such species are managed with a minimum size limit. The minimum size limit to support this level of F would need to be at least the size at 50 percent maturity (unless certain life history characteristics or management strategies warrant a more precautionary approach). Hood and Johnson (1999) found that most female vermilion snapper from the eastern Gulf of Mexico were mature at 8 inches TL and by age 1. The current maximum size limit for vermilion snapper is 10 inches TL. Consequently, the conditional recommendation of the RFSAP and FSAP applies to this stock. However, the RFSAP did not endorse the VPA model from which the estimate of $F_{30\%\ SPR}$ is based (See Section 4.1.1 for a discussion of the assessment models and their caveats).

Preferred Alternative 2 would define MFMT to equal F_{MSY}. This is the value for MFMT recommend in Restrepo et al. (1998). The F_{MSY} estimate provided by the Pella-Tomlinson surplus production model was identified by the RFSAP as the most reliable during the most recent stock assessment. The RFSAP considered this model to be highly uncertain due to data deficiencies (see Section 4.1.1 for additional discussion), but recommended the results of that model over those produced by the VPA model that estimates $F_{30\%SPR}$.

The MFMT definition in **Alternative 3** reduces the overfishing threshold level to less than F_{MSY} and provides additional precaution in the definition of MFMT. Alternatives 1 and 2 are risk neutral because there is an equal chance that the actual F is above or below F_{MSY} should the stock be managed for MSY. This is due to natural fluctuations in fish populations. Alternative 3 provides a buffer to the stock from overharvest by defining MFMT as a fraction of F_{MSY}. However, it should be noted that under equilibrium conditions, the chance of overfishing if F is constrained to F_{OY} would be much lower than 50 percent (see Section 4.1.3), and would also provide a buffer from overharvest.

As with MSY, MFMT simply provides managers with a defined value to consider when selecting fishery management measures. Selecting or not selecting an MFMT value should not directly affect the environment as detailed in Section 8.1.4. Also, because the reef fish fishery generally does not target vermilion snapper, but catches this species in conjunction with other reef fish species, the indirect and cumulative effects of the MFMT alternatives would be relatively minor.

Establishing an MFMT value will have no indirect affect on the environment until the stock has been rebuilt. Rebuilding goals are dependent on MSY and B_{MSY}. Once the stock is rebuilt, MFMT would act as a limit on F. For all the alternatives, this could have positive consequences for the physical and biological/ecological environments should a lower F result in reducing fishing effort. This would reduce the interaction of fishing gear with the bottom and protect the vermilion snapper population from excessive fishing effort that could cause the stock biomass to fall below B_{MSY}. The degree of the benefit would be correlated to the threshold level set. Because Alternative 1 and 2 are estimated using different stock assessment models, it is difficult to determine if one estimate is more beneficial than the other; however, because Alternative 3 would establish a lower MFMT value, F is more constrained. This would further reduce gear interactions with the bottom and protect the vermilion snapper stock from overharvest.

From an economic and social standpoint, the level of MFMT selected eventually leads to the setting of TACs and associated management measures such that this threshold is not exceeded. More conservative parameters such as Alternative 3 can lead to greater conservation than necessary and greater short-term socioeconomic loss from forgone yield due to any implemented management restrictions. Conversely, establishing insufficiently conservative parameters can produce greater short-term socioeconomic benefits from increased yield, but lead to long-term losses due to the stock being fished to a level less than true MSY. NOAA Fisheries' Technical Guidance (Restrepo et al., 1998) suggests that setting MFMT equal to F_{MSY} is the best approach to balancing the health of the stock against the negative social and economic effects of reduced harvests.

4.1.7 Range of minimum stock size threshold (MSST) alternatives

Restrepo et al. (1998) provided a proxy for MSST 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 its productivity; 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. However, it would prevent MSST from being set at less than one-half the B_{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 not be capable of recovering to B_{MSY} within ten years in the absence of fishing mortality. Applied to the vermilion snapper stock, this proxy is equal to 0.75*B_{MSY} because M is estimated to be equal to 0.25 (Porch and Cass-Calay, 2001).

No alternative is offered that set MSST greater than 0.75 * B_{MSY}. This is because if the difference between MSST and B_{MSY} is small, natural variation in recruitment could cause stock biomass to more frequently alternate between an overfished and rebuilt condition even if the fishing mortality rate applied to the stock was within the limits specified by the MFMT. If realized, this situation would result in unnecessary administrative and socio-economic burdens related to developing and implementing rebuilding plans every time the stock is declared overfished.

4.1.8 Overfished threshold (MSST) alternatives

Alternative 1: No action (status quo). No minimum stock size threshold would be defined.

Preferred Alternative 2: Set the minimum stock size threshold (MSST) to (1-M)*B_{MSY} (or B_{MSY} proxy). M is currently estimated to be 0.25, and the most recent stock assessment estimates B_{MSY} as 10.6 mp (Porch and Cass-Calay, 2001). Based on this information, MSST would equal 7.95 mp.

Alternative 3: Set the minimum stock size threshold (MSST) to 0.5*B_{MSY} (or B_{MSY} proxy). Based on the estimate of B_{MSY} provided by the most recent stock assessment (10.6 mp; Porch and Cass-Calay, 2001), MSST would equal 5.3 mp.

Alternative 4: Set the minimum stock size threshold (MSST) to (0.65)*B_{MSY} (or B_{MSY} proxy). Based on the estimate of B_{MSY} provided by the most recent stock assessment (10.6 mp; Porch and Cass-Calay, 2001), MSST would equal 6.9 mp.

Discussion: MSST would not be defined under **Alternative 1**. This would leave fishery managers with no objective and measurable criteria for determining whether the stock is overfished as required by the MSFCMA.

As noted in Section 4.1, the NSGs recommend that MSST be defined as a stock biomass level that would allow a stock to recover from an overfished condition to B_{MSY} within ten years if exploited at the MFMT. **Preferred Alternative 2** would define MSST as 0.75*B_{MSY}. This definition is likely to ensure that the vermilion snapper stock could rebuild to B_{MSY} from an overfished condition within ten years. Simulations on a wide variety of species indicate that stocks at biomass levels below B_{MSY} can rebuild to B_{MSY} with little difficulty as long as fishing mortality is suitably constrained below the MFMT (Myers et al., 1994; Restrepo et al., 1998).

Alternative 3 would define the MSST at the lowest level recommended by NOAA Fisheries' technical guidance and provides a larger buffer between what would be considered to be an overfished (0.50*B_{MSY}) condition and the rebuilt condition (B_{MSY}). However, this alternative would increase the risk that the stock would not be able to recover from an overfished condition within ten years, and would likely require greater reductions in harvest following an overfished determination. This alternative is not consistent with NOAA Fisheries' technical guidance because the estimated M for vermilion snapper (0.25) is not greater than 0.5.

Alternative 4 is intermediate to Alternatives 2 and 3 in terms of precaution. While this value is more precautionary than Alternative 3, it is still below the threshold level recommended by NOAA Fisheries' technical guidance, which states that MSST should equal (1-M)* B_{MSY}, if M is less than 0.5.

As with MFMT, MSST simply provides managers with a defined threshold to consider when selecting fishery management measures. Selecting or not selecting an MSST value should not directly affect the environment as detailed in Section 8.1.5. Also, because the reef fish fishery generally does not target vermilion snapper, but catches this species in conjunction with other reef fish species, the indirect and cumulative effects of the MSST alternatives would be relatively minor.

Establishing a MSST value would have no indirect effect on the environment until the stock has been rebuilt. Rebuilding goals are dependent on MSY and B_{MSY}. Once the stock is rebuilt, then MSST would act to limit the level stock biomass can fall to before a rebuilding plan would need to be initiated. Alternatives 2-4 would have positive consequences for the physical and biological/ecological environments because F would be reduced from current levels. This could reduce the interaction of fishing gear with the bottom and protect the vermilion snapper population from excessive fishing effort if reduction in effort results from the lower F. Also, overharvesting a stock can change population demographics that affect the species' productivity. The degree of the benefit would be correlated to the protection to the stock each threshold sets. Preferred Alternative 2 provides the greatest benefit, followed by alternatives 4 and 3, respectively.

From an economic and social standpoint, the level of MSST selected eventually leads to the setting of TACs and associated management measures such that the stock biomass does not fall below this threshold. More conservative parameters such as Preferred Alternative 2 can lead to more stringent conservation measures and have greater short-term socioeconomic loss from forgone yield due to any implemented management restrictions. Conversely, establishing insufficiently conservative parameters, such as Alternative 3 or 4, can produce greater short-term socioeconomic benefits from increased yield, but lead to long-term losses due to the stock biomass being fished down to a level where recovery would require cuts in TAC.

4.2 Rebuilding plans

4.2.1 Background

The Gulf of Mexico vermilion snapper stock was assessed most recently in 2001 (Porch and Cass-Calay, 2001) using data through 1999. The RFSAP reviewed this assessment in October (RFSAP, 2001), and subsequently so did the Council and its advisory panels. The Council's Reef Fish Advisory Panel (RFAP) raised concerns that the decreased landings might be explained by changes in fishing pressure rather than fish abundance, and the Council requested follow-up analysis when suitable data became available. NOAA Fisheries reexamined the assessment as well as more recent data and, on October 30, 2003, supported the findings of the assessment and declared the Gulf of Mexico vermilion snapper stock overfished.

According to the MSFCMA, overfished stocks must be rebuilt to B_{MSY} in the shortest time frame possible, taking into account the status and biology of the stock, the needs of fishing communities, international agreements, and ecological interactions. The rebuilding time should not exceed ten years except in cases where biology, other environmental conditions, or international agreements dictate otherwise [16 USC § 304(e)(4)].

The RFSAP (RFSAP, 2001) examined several models that were developed and analyzed as part of the assessment. The Panel determined that the surplus production models, which tracked total fish biomass rather than separating them into age classes, were more appropriate because of difficulties in determining the age of individual vermilion snapper. Moreover, they chose what was termed the base model, which made a particular assumption about the shape of the stock-recruitment relationship, as the best model because of its relatively good fit to the observed data (See Section 4.1.1 for a discussion of the assessment models and their caveats) .

Using this base model, it was determined that vermilion snapper could rebuild by 2007 if all sources of fishing mortality were eliminated starting in 2004. According to NOAA Fisheries' NSGs, a stock that can be rebuilt within ten years in the absence of any fishing should have a rebuilding plan that takes no longer than ten years [50 CFR 600.310(e)(4) (ii)(B)]. Consequently, rebuilding scenarios were developed on a schedule of ten years or less.

However, running the assessment model to project future outcomes was complicated by the fact that, since the last full assessment, new data collected since 1999 suggests the stock is in better condition than predicted. NOAA Fisheries monitors the CPUE of vermilion snapper in various fishing sectors, including recreational headboats and commercial handline boats, on the assumption that it is an indicator of stock abundance. Turner (2003), used these data to extend the CPUE indices used in the assessment through 2002. These extended indices suggest that vermilion snapper has either stabilized (Western and Eastern headboat indices, Figs. 4.2.1.1 and 4.2.1.2) or increased (handline index, Fig. 4.2.1.3) since 1999. Harvests have also increased in all three sectors since 2000. Indications from the post 1999 data raise a problem. The assessment model, which was based on the best data available at the time of its creation, predicts that the Gulf of Mexico vermilion snapper population would have been reduced to very low levels by post-1999 harvests. In contrast, recent evidence suggests the population is, if anything, improving. The only way to thoroughly balance these data would be to redo the assessment, a lengthy process scheduled to begin in early 2005.

Figure 4.2.1.1. Reprinted from Turner (2003) - Figure 5: A comparison of the previous and updated relative abundance indices for vermilion snapper in the Western Gulf of Mexico headboat fishery. In this figure, the indices are scaled to the common mean of both indices (1986-1999). The indices used the same model construction described in Brown and Cass-Calay (2001), and used in the 2001 Assessment.

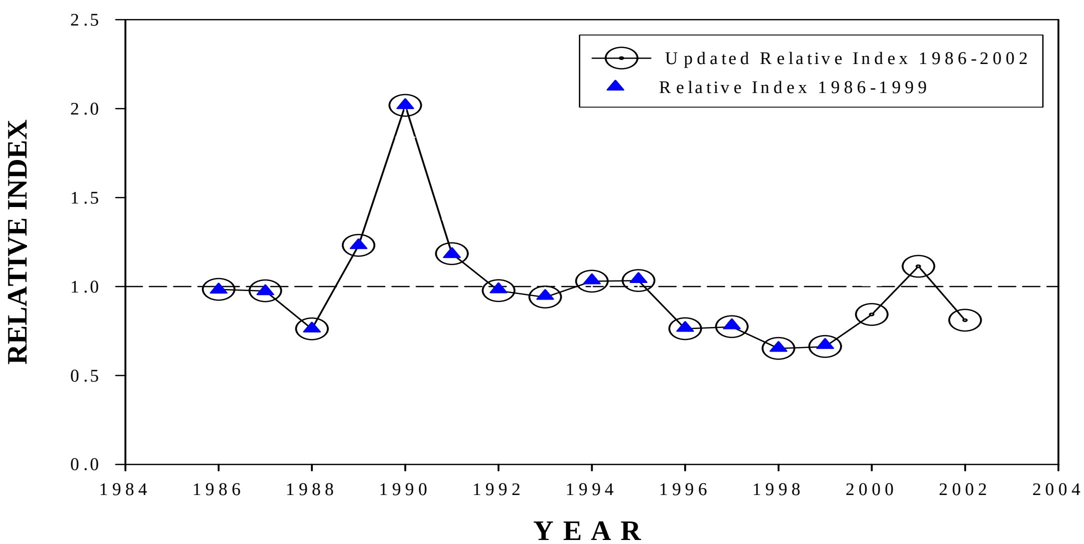


Figure 4.2.1.2. Reprinted from Turner (2003) - Figure 6: A comparison of the previous and updated relative abundance indices for vermilion snapper in the Eastern Gulf of Mexico headboat fishery. In this figure, the indices are scaled to the common mean of both indices (1986-1999). The indices used the same model construction described in Brown and Cass-Calay (2001) and used in the 2001 assessment.

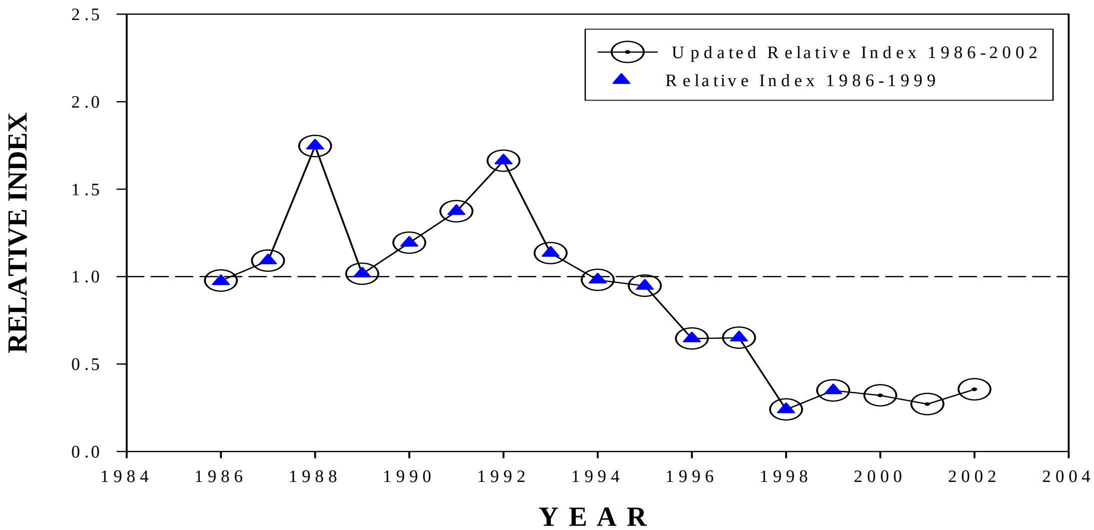
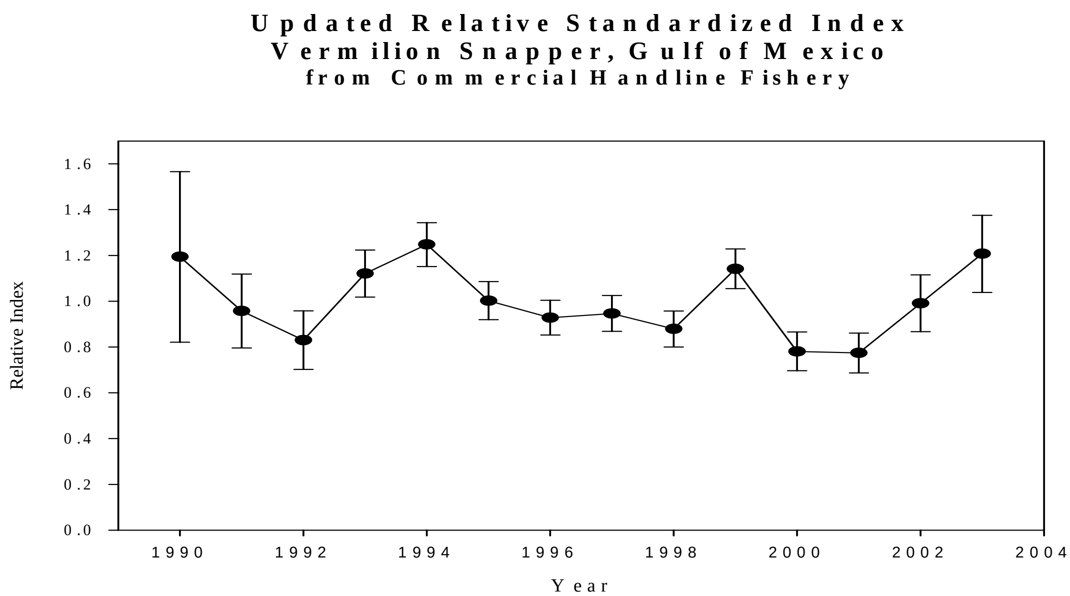


Figure 4.2.1.3. Reprinted from Turner (2003) - Figure 9: Relative abundance indices for commercial handline caught vermilion snapper in the Gulf of Mexico with approximate 95 percent confidence intervals.



Until then, NOAA Fisheries has determined that the most objective and balanced way to resolve this issue is to partially incorporate the new data, recognizing that ignoring it is not a viable option but that fully incorporating it without redoing the assessment could place undue influence on a relatively small amount of data. New data were not incorporated when determining biomass trajectories and the pattern of harvest limits that would be necessary in order to rebuild the stock within specified time frames and strategies. Instead, fishing mortality rates from 2000-2003 were assumed to remain at the 1999 levels. New data were incorporated into the harvest levels as follows. Harvests were scaled up from 2003 and into the future by the amount the 2000-2002 harvests exceeded those predicted by the models (a 21.6 percent increase). This approach was more conservative than if harvest and biomass levels had been scaled up to reflect recent harvests and CPUE values, but not so restrictive had recent harvest data been used in the model without any scaling.

This issue has ramifications for ending overfishing as well. The data suggest the stock may be larger than predicted by the 2001 assessment. Since fishing mortality rates are a function of stock abundance and harvest levels, a larger stock size would mean lower fishing mortality rates. Had they only been incorporated into the harvest projections but not biomass, the projected fishing mortality rates would have been higher and the times to end overfishing longer. These projections would have most likely been overestimates, though, since it is likely that approach would have underestimated biomass levels. To avoid this bias, fishing mortality rates were examined from runs that did not incorporate new data. If these data had been incorporated into both biomass and harvest projections, the fishing rates would have been similar to those obtained by the approach described above.

Using this approach, harvest levels were estimated that would permit the vermilion snapper stock to rebuild to B_{MSY} within four-, seven-, and ten-year time frames. These periods are consistent with NOAA Fisheries' NSGs and provide a range of possibilities in balancing short-term socioeconomic losses with long-term socioeconomic and ecological gains. Several alternatives were considered but rejected early in the process, including rebuilding in seven years using a constant harvest or constant fishing mortality approach, and rebuilding in four years by eliminating all sources of directed and incidental fishing mortality on vermilion snapper (these alternatives are listed in Appendix B). Four other alternatives to the status quo were retained for analysis (Table 4.2.1.1). These included three strategies to rebuild the stock within ten years: constant harvest, where total annual harvest remains the same throughout the rebuilding period; constant fishing mortality, where fishing mortality remains the same throughout rebuilding, resulting in increasing annual harvests as the stock size increases; and a stepped approach, which approximates a constant fishing mortality approach but holds harvest constant for three to four years at a time. A stepped strategy to rebuild the stock within seven years was also analyzed. These four rebuilding strategies assume that regulations were enacted to reduce harvests beginning in 2004. Since the year has already begun, an interim rule or other form of temporary action might be necessary to keep the rebuilding plan on schedule.

Table 4.2.1.1. Predicted harvest, biomass and fishing mortality (F) from 1998 to 2015 for status quo and four rebuilding strategies for vermilion snapper. Biomass and harvest are in thousands of pounds, whole weight. Predicted values are based on the Pella-Tomlinson surplus production model determined by the RFSAP as the best fit to the empirical data. Highlighted values indicate the year when the stock is no longer overfished or overfishing is no longer occurring (F_{MSY} = 0.31831, B_{MSY} = 10.589 mp whole weight).

	Alternative 1			Alternative 2			Alternative 3		
	No Action			Constant Harvest (2013)			Stepped (2013)		
Year	Biomass	Predicted	F	Biomass	Allowable	F	Biomass	Allowable	F
1998	4,004	2,625	0.66						
1999	3,432	2,272	0.66						
2000	3,136	1,896	0.66						
2001	2,887	2,422	0.66						
2002	2,676	2,635	0.65						
2003	2,495	1,982	0.65						
2004	2,337	1,852	0.65	2,575	1,627	0.52	2,731	1,476	0.44
2005	2,199	1,739	0.65	2,703	1,627	0.49	3,106	1,475	0.39
2006	2,076	1,639	0.65	2,908	1,627	0.46	3,688	1,475	0.33
2007	1,967	1,551	0.65	3,229	1,627	0.41	4,560	1,475	0.27
2008	1,870	1,472	0.65	3,723	1,627	0.36	5,247	2,057	0.32
2009	1,781	1,401	0.65	4,462	1,627	0.30	6,185	2,058	0.27
2010	1,702	1,336	0.65	5,520	1,627	0.24	7,397	2,058	0.23
2011	1,629	1,278	0.64	6,941	1,627	0.19	8,352	2,640	0.26
2012	1,562	1,225	0.64	8,697	1,627	0.15	9,440	2,641	0.23
2013	1,501	1,176	0.64	10,656	1,627	0.13	10,603	2,641	0.20
2014	1,445	1,131	0.64	11,368	3,209	0.23	11,327	3,196	0.23
2015	1,393	1,090	0.64	11,907	3,389	0.23	11,877	3,378	0.23
		% reduction	None	Initial % reduction		17.9%	Initial % reduction		25.5%

Table 4.2.1.1 Continued

	Alternative 4			Alternative 5					
	Constant F (2013)			Stepped (2010)			T_{MIN}		
Year	Biomass	Allowable	F	Biomass	Allowable	F	Biomass	Predicted	F
1998									
1999									
2000									
2001									
2002									
2003									
2004	3,246	982	0.25	2,997	1,216	0.33	4,226	0	0.00
2005	4,123	1,261	0.25	3,783	1,214	0.26	6,726	0	0.00
2006	5,098	1,579	0.25	4,951	1,214	0.20	9,846	0	0.00
2007	6,120	1,921	0.26	6,573	1,214	0.15	11,219	1,965	0.18
2008	7,132	2,269	0.26	7,735	2,218	0.24	11,796	2,755	0.23
2009	8,075	2,603	0.26	9,106	2,219	0.20	12,223	2,873	0.24
2010	8,909	2,905	0.27	10,601	2,219	0.17	12,531	2,959	0.24
2011	9,610	3,165	0.27	11,325	3,195	0.23	12,749	3,021	0.24
2012	10,176	3,380	0.27	11,875	3,378	0.23	12,901	3,064	0.24
2013	10,645	3,517	0.27	12,280	3,515	0.24	13,007	3,094	0.24
2014	11,359	3,206	0.23	12,572	3,614	0.24	13,079	3,115	0.24
2015	11,901	3,386	0.23	12,778	3,685	0.24	13,129	3,129	0.24
	Initial % reduction		50.4%	Initial % reduction		38.7%			

In 2005, the new vermilion snapper assessment will produce a population model that incorporates the most recent harvest and CPUE data. As such, it will displace the last assessment as the best available science. To the extent that the new assessment, or any future assessment during or after the rebuilding program, indicates a substantially different status or fishing pressure than was predicted, the rebuilding plan will be reexamined and may be modified.

4.2.2 Rebuilding strategies

Alternative 1: No Action (status quo). Do not establish a rebuilding strategy for Gulf of Mexico vermilion snapper.

Alternative 2: Rebuild the vermilion snapper stock in ten years using a constant harvest strategy. The allowable harvest starting in 2004 would be 1.627 mp and equates to a 17.9 percent reduction in harvest based on the 2003 predicted landings.

Preferred Alternative 3: Rebuild the vermilion snapper stock in ten years using a stepped strategy that holds harvest constant for an initial four year interval consistent with the average of the same four years under a constant fishing mortality rate, then steps to two three-year constant harvest intervals thereafter. The allowable harvest starting in 2004 would be 1.475 mp and equates to a 25.5 percent reduction in harvest based on the 2003 predicted landings

Alternative 4: Rebuild the vermilion snapper stock in ten years using a constant fishing mortality rate strategy. The allowable harvest starting in 2004 would be 0.982 mp and equates to a 50.5 percent reduction in harvest based on the 2003 predicted landings.

Alternative 5: Rebuild the vermilion snapper stock in seven years using a stepped strategy that holds harvest constant for an initial four year interval consistent with the average of the same four years under a constant fishing mortality rate, then steps to a higher constant harvest for the last three years. The allowable harvest starting in 2004 would be 1.216 mp and equates to a 38.7 percent reduction in harvest based on the 2003 predicted landings.

Discussion: All of the alternatives, except **Alternative 1** (no action), would end overfishing and rebuild the vermilion snapper stock to B_{MSY} in ten years or less. The stock biomass is expected to improve by more than four-fold under harvest levels that, once rebuilding is achieved, are predicted to exceed recent levels by 35 to 40 percent. However, there are major short-term biological and socioeconomic implications on how the various rebuilding strategies accomplish this long-term objective. The following discussions are summarized from Section 8 (Environmental Consequences) and Section 5 (Regulatory Impact Review) which provide the detailed analyses required by the MSFCMA and by the NEPA.

Alternative 1 (no action) would not develop a rebuilding plan for vermilion snapper as required by the MSFCMA. The stock would remain overfished, fishing mortality would continue to be above F_{MSY} and the stock biomass would continue to decline due to ongoing overfishing. Although it would allow greater short-term socioeconomic benefits, it would come with much greater long-term costs. Ultimately the stock would stabilize at a biomass of about one-tenth of

B_{MSY} levels. These low stock levels would increase the risk of a population collapse, reduce the roles vermilion snapper play in the ecosystem, and result in much reduced social and economic benefits from the fishery. While this alternative would require no short-term regulatory burden, it would raise the risk of litigation under the MSFCMA. Any of the action alternatives would provide significant long-term benefits for the social, economic, and ecological environments over the status quo alternative.

Alternative 2 would set a 10-year rebuilding plan based on a constant harvest strategy of 1.627 mp annually. It would end overfishing by 2009, five years after the rebuilding plan is implemented. This strategy initially allows higher harvests but at the cost of more slowly realized benefits. As a result, it would allow the slowest population growth of all the action alternatives and thus provide the slowest ecological benefits. This alternative would provide the greatest net economic benefits in the short run (smallest loses) and by far the least economic gains by the end of the rebuilding period as the stock rebuilds and harvest must be held constant. This alternative would create the greatest administrative burden during the rebuilding period because of the need to reduce effort to maintain harvest levels. Another disadvantage associated with this alternative is its vulnerability to data uncertainty. If the productivity of vermilion snapper had been inadvertently overestimated by 10 percent and the error discovered in 2007, the stock would have been driven to very low levels. Given this error, in order to rebuild the stock by 2013, the fishery would likely need to be closed for the duration of the rebuilding period.

Preferred Alternative 3 would set a 10-year rebuilding plan based on a stepped harvest strategy of 1.475 mp for the first four years (2004-2007), then 2.058 mp for the next three years (2008-2010), and then 2.641 mp for the final three years (2011-2013). It would end overfishing by 2007, three years after the rebuilding plan is implemented. This strategy allows relatively moderate harvests initially with moderate to slow realization of long-term biological benefits. As a result, it would allow the population to grow relatively slowly and thus delay ecological benefits. This alternative would provide net economic benefits of 6 percent ($4.3 million) to the commercial and 16 percent ($10.1 million) to the recreational sectors, but less than Alternatives 4 and 5. As with all the rebuilding strategies, all sectors would have a small net economic loss in the first five years of the rebuilding period. Though more robust to errors than Alternative 2, this option would still require major adjustments if a similar error were made as hypothesized for Alternative 2. In this case, the population would have also been driven to low levels (but not as low). The fishery would still need to be closed to rebuild the stock by 2013. Because harvest would be allowed to increase in steps, the administrative burden would be moderate, requiring two regulatory changes during the ten-year rebuilding period.

Alternative 3 was considered the best balance between initial and long-term economic impacts, biological recovery, and the administrative burden to manage the plan. The minimum rebuilding period (T_{MIN}, Table 4.2.1.1), slightly more than three years, may be adjusted upward to the extent warranted by the needs of the fishing communities not to exceed ten years [50 CFR600.310(e)(4)(ii)(B)]. All of the action alternatives produce the same annual economic returns after ten years so the socioeconomic considerations for the fishing communities are based on differences during the ten-year rebuilding period only. Three-, seven- and ten-year rebuilding periods were initially considered; however, the three-year period was rejected because zero harvest would cause major economic and social hardship on the recreational for-hire and commercial fisheries and increase bycatch mortality, lengthening the rebuilding period. The seven-year period, Alternative 5, rebuilds three years sooner and provides a 5 percent gain in economic returns over the preferred Alternative 3 by the end of ten years. However, it requires an 18 percent deeper harvest reduction in the first four years to accomplish this. Alternative 4 also rebuilds the stock more rapidly and provides slightly higher economic returns (2.6 percent) but requires 33 percent cuts initially. The Council did not consider either Alternative 4 or 5 warranted because of the significant higher short-term reductions necessary to accomplish temporary, small economic benefits. Alternative 2 did not perform as well as preferred Alternative 3 either in rebuilding the stock or economic gains over the short or long term and would likely require frequent changes to management measures to maintain the rebuilding plan.

Alternative 4 would set a 10-year rebuilding plan based on a constant fishing mortality strategy that would raise allowable harvests from 0.982 mp to 3.517 mp over the course of the plan. It would end overfishing in 2004, the first year of the plan. This strategy would require the greatest initial harvest reductions but would also allow the largest harvests in the later years of the plan. As a result, it would allow the population to grow quickly and provide early ecological benefits but would not grow as quickly as from Alternative 5. This alternative would result in the second best net economic gains overall at the end of the rebuilding period. However, this Alternative is the worst for the recreational sector, primarily headboats, during the first five years (negative 12 percent, $4.5 million). Because of the stability of effort throughout rebuilding, this alternative would create the least administrative burden. Additionally, this alternative is the most resilient to management errors. If stock productivity were overestimated, the stock would rebuild by 2020 instead of 2013 without any adjustments. A reduction of 21 percent in 2008 and beyond would also be sufficient to rebuild on the original schedule.

Alternative 5 would set a seven-year rebuilding plan based on a stepped harvest strategy of 1.214 mp for the first four years, followed by 2.219 mp for the final three years. It would end overfishing by 2005, one year after the rebuilding plan is implemented. This strategy requires relatively low harvests initially but higher harvests in subsequent years, with the quickest recovery. As a result, this alternative would allow the population to grow most quickly and provide the earliest ecological benefits as well. This alternative would result in the best net economic gains overall (16 percent, $21.3 million) by the end of the rebuilding period, but the commercial fishery does not do quite as well under this Alternative as it does under Alternative 4. Alternate 5 was relatively robust to errors but would not rebuild without a correction, and would require a 51 percent reduction in harvests in 2008 to rebuild the stock by 2013.

4.2.3 Harvest reduction alternatives

4.2.3.1 Background

The following discussion of definitions and concepts provides background information on release mortality and management measures (bag limits, trip limits, size limits and seasonal closures) considered by the Council for managing vermilion snapper harvest in the recreational and commercial fisheries. This background information and the associated tables provide the basis for all the proposed alternatives except quotas. Quotas are developed directly from the allowable harvests presented in Table 4.2.1.1.

<u>Definitions and concepts:</u>

Release mortality: For the various management actions proposed, release mortality is a very important component in calculating reductions in harvest. Release mortality places additional pressure on the stock and requires more stringent reductions on directed mortality to compensate. From the fishers perspective, mortality of discarded fish due to decompression or predation is usually obvious and they recognize that it affects management decisions. The more precautionary approach to selecting harvest reduction alternatives would be to assume a higher discard mortality rate. The following is a synopsis of information available on vermilion snapper discard mortality rates.

Table 4.2.3.1.1. Percent release mortality by study and depth for vermilion snapper in the Gulf of Mexico (GOM) and South Atlantic Bight (SAB).

Study	Location	Depth	Percent Mortality
Fable (1980)	Western GOM	> 165 ft	33%
Fable (1995)	NE GOM	90-100 ft	21-40%
Burns et al. (2002)	E&NE GOM	145 ft	10%
		180 ft	15%
Collins et al. (1999)	SAB	95-115 ft	5%
		140-180 ft	18%

Estimates of release mortality for the Gulf of Mexico range from 15 to 40 percent (Table 4.2.3.1.1). Fable (1980) reported a 33-percent discard mortality for vermilion snapper caught off Texas at depths of 165 feet or greater, more than the 21-percent discard mortality he reported for fish caught off Florida at depths of 90 to 100 feet (Fable, 1995). Most of these fish did not show signs of decompression (abdominal distension, inverted stomach, and swelling around the eyes). Those fish that did show the effects of decompression had a lower survival rate (60 percent). To obtain these results, Fable (1995) held fish in floating pens for over two weeks after they were caught and recorded the amount of mortality that occurred. Fable (1995) felt that his mortality estimates were probably high because fish were subjected to the added stress of captivity, but this overestimate might be compensated for by protecting the captive fish from predation and providing them with an easily available food source.

Burns et al. (2002) also conducted cage experiments to determine the release mortality of vermilion snapper. Cages with captured fish were deployed on the bottom in areas where the fish were caught. Vermilion snapper were caught and released at depths of approximately 145 and 180 feet. Release mortalities were low (< 15 percent) and there was no evident pattern attributable to capture depth. However, while survivorship was quite high, they recaptured very few vermilion snapper in the tag-recapture portion of their study. They recaptured less than one percent of the fish they tagged compared to recapture rates of 3.8 percent for red grouper, 6.8 percent for gag, and 6.0 percent for red snapper. Based on recovering fish they observed in the lab, they speculated that the low return rate was due to predation. Recovering vermilion snapper tended to rest on the bottom of the tank for the first few days after capture. In nature, vermilion snapper tend to swim above the reef structure. Therefore, if they seek the bottom after release, they may be more vulnerable to predators such as groupers or other species of snapper.

Collins et al. (1999) observed release mortality rates for South Atlantic Bight-caught fish that were similar to those reported by Burns et al. (2002). They captured vermilion snapper at depths of 95-115 feet and 140-180 feet. After holding fish for 24 hours *in situ*, they reported no mortality at the shallower depth range, and a mortality rate of 5 to 18 percent depending on whether the fish was vented or not (venting removes air pressure from the swim bladder and vented fish had a slightly higher survival rate). Recapture rates of tagged vermilion snapper (≈1 percent) by Parker (1990) were very similar to those reported by Burns et al. (2002) suggesting that the same mechanisms that operate on vermilion snapper tag-recapture studies in the Gulf may also operate in the South Atlantic Bight.

During the Southeast Data Assessment and Review (SEDAR) vermilion snapper data workshop held on March 6 - 7, 2003, there was discussion of both discard rates and release mortality in the vermilion snapper fishery. Recreational fishers at the meeting believed that vermilion snapper discard rates were low, possibly between 15 to 18 percent. They also felt that most fish actively swam down after the air bladder was deflated but were unsure of their fate after reaching the bottom. Anglers also indicated that vermilion snapper are effective live bait for grouper, amberjack and other large predators. Some fishers estimated that the quantity of vermilion snapper used as bait was less than five percent of the recorded landings.

The information provided above indicates a wide range of possibilities for defining vermilion snapper release mortality. The published reports indicate release mortality of between 15 and 40 percent with no clear delineation by depth. Additionally, the use of vermilion snapper for bait and the fact that some of the Northern Gulf recreational and commercial vermilion snapper fisheries are secondary to the primary target, red snapper complicate the development of defensible discard mortality rates. At the January 14-15, 2004 meeting, the Council accepted the use of 20 percent release mortality for the recreational fishery and 33 percent for the commercial fishery as the best estimates for developing this amendment.

Bag limits: Brooks (2003) examined the use of bag limits to reduce harvest in the recreational fishery using 2001 - 2002 data from the MRFSS and 1998 - 1999 data from the headboat logbook data bases. Daily bag limits ranged from one to ten vermilion snapper per person within the existing 20-fish aggregate bag limit for vermilion and lane snapper, gray trigger fish, almaco jack and five species of tilefish. In addition, Brooks examined the effect of moving vermilion snapper to the existing ten-snapper aggregate bag limit (Brooks, 2004). There are eleven snappers currently in the ten-snapper aggregate bag limit: gray, mutton, yellowtail, schoolmaster, cubera, dog, mahogany, queen, blackfin, and silk snapper and wenchman. For the analysis of the effect of a ten-snapper aggregate bag limit, Brooks assumed that all fish over the proposed bag limit became discards and were subject to release mortality. Fish in excess of the ten-snapper limit were assumed to be released in the same proportion as they were caught. In order to simplify the results of these analyses, weighted averages were developed across years for each data source (MRFSS and Headboat) and then the data sources were weighted according to the proportion of landings from the two sectors for the common years (1998 - 1999).

The results of the bag limit analyses are presented in Table 4.2.3.1.2. As expected, the smaller the bag limit, the larger the estimated reduction in harvest. The median recreational harvest of vermilion snapper is about one fish per angler trip and 75 percent harvest 2 fish or less. Moving vermilion snapper out of the 20-reef fish aggregate and into the 10-snapper aggregate bag limit had little effect on vermilion snapper harvest, less than 0.3 percent beyond that for the basic ten-fish bag limit. Approximately 77 percent of the trips harvesting vermilion snapper harvested none of the snappers in the snapper aggregate and another 20 percent of the trips harvested only one other snapper. Moving vermilion snapper out of the 20-reef fish aggregate could potentially increase fishing effort on the species remaining in the 20-reef fish aggregate, particularly gray triggerfish and lane snapper. Retaining vermilion snapper in the 20-reef fish aggregate but reducing the bag limit to five fish or less could also shift some effort to the other species but most likely this shift would be less than removing vermilion entirely from the 20-reef fish aggregate. Of MRFSS trips harvesting vermilion snapper, only 1.9 percent produce more than 10 fish within the 20-reef fish aggregate, so effort shifting would be small if it occurs.

Table 4.2.3.1.2: Estimates of reduction in recreational harvest based on various bag limits. Data from Brooks (2003; 2004), were weighted by year for each sector and by harvest proportion as well as year for overall averages. The current 10-snapper aggregate bag limit include 11 species of snappers, only vermilion snapper and lane snapper are excluded. A release mortality of 20% is factored into the estimates.

Bag limits	Data Source	Sector %	Combined %
10 Fish	MRFSS	1.7%	1.4%
	Headboat	0.8%	
10 snapper aggregate	MRFSS	2.0%	1.6%
	Headboat	1.0%	
5 Fish	MRFSS	11.6%	9.6%
	Headboat	5.9%	
4 Fish	MRFSS	15.8%	13.6%
	Headboat	9.6%	
3 Fish	MRFSS	22.2%	19.8%
	Headboat	15.7%	
2 Fish	MRFSS	32.4%	30.2%
	Headboat	26.3%	
1 Fish	MRFSS	48.7%	47.3%
	Headboat	44.8%	

Although the analyses assumed that all fish in excess of the bag limit are discarded, it is unlikely that all fishers would continue fishing for vermilion snapper once they have reached the bag limit, so the mortality due to discards would likely be less and the actual harvest reductions may be slightly more than estimated values. Charter and private sectors (MRFSS) would be affected more than the headboat sector by any reduction in bag limits because their current harvest per angler trip is higher. For instance, at a five-fish bag limit, MRFSS estimates of reduced harvest are 11.6 percent, whereas headboat harvests are only reduced 5.9 percent.

Trip limits: Poffenberger (2003) examined reductions in harvest from the commercial fishery based on various possible trip limits as if they had been in effect during 2000 and 2001 (Table 4.2.3.1.3). Logbook data collected by SEFSC were used to determine the potential decreases in vermilion snapper harvests. Logbook data indicated that handline and bandit rigs were the principal types of gear used to catch vermilion snapper (99 percent of the reported harvest from 2000-2002, Table 5.2). The assumption is made that commercial fishermen would quit targeting vermilion snapper once a trip limit is met; so, estimated reduction in harvest for each trip limit was determined by comparing the vermilion snapper harvest for the trip to the respective trip limit and no discard mortality was included. The amount that the reported harvest exceeded the trip limit was recorded for each trip and was the amount of the decrease in harvest that would have occurred for that trip. The calculation of the total reduction for a given year was the sum of the excess harvests for each trip during the year. The percentage reductions were calculated using the total amount of excess harvest relative to the total reported harvest of vermilion snapper for the two years. The last column of this table provides the estimated reduction expected from the corresponding trip limit assuming that all harvest ended once a trip limit was achieved. For instance, a 1000 pound commercial trip limit is expected to reduce annual harvest by 40 percent and would affect 494 commercial fishing trips of 3581 total trips which harvested vermilion snapper (13.8 percent of all trips).

A trip limit will have different effects based on the target species, overall trip harvest, and the region that is being fished. Commercial vessels using longlines or bandit rigs along the West Florida shelf are typically not targeting vermilion snapper, and therefore, may be affected only rarely by a small trip limit. Longlines and traps, the next most important gears used in the vermilion snapper fishery, harvest only about 16,000 lbs. per year combined (see Table 5.2). It is unlikely that these gears produce large enough harvests per trip to be affected by any of the analyzed trip limits. The effects of a small trip limit would be greatest in the Northern Gulf where vermilion snapper are targeted most often. These differential effects have been discussed by the RFAP in relation to red grouper and other species.

Table 4.2.3.1.3. Percent reduction in Gulf of Mexico vermilion snapper commercial harvest by different trip limits. The table is reprinted from Poffenberger (2003) and landings data are given as whole weight. A total of 3581 fishing trips landed vermilion snapper in 2000 and 2001.

Table 1. Estimated effects of various scenarios of trip limits on the catches of vermilion snapper for trips in the Gulf of Mexico, 2000 - 2001.

Trip Limit (pounds whole weight)	2000		2001		Average for 2000 - 2001			
	No Trips	Pounds over the trip limit	No Trips	Pounds over the trip limit	Average number of trips	Average pounds over limit	% of trips over limit	% reduction in catch from limit
500	738	858,507	827	1,064,584	783	961,546	21.9	59.3
750	591	692,722	641	882,434	616	787,578	17.2	48.6
1000	473	560,887	514	738,284	494	649,586	13.8	40.1
1250	382	454,891	435	620,330	409	537,611	11.4	33.1
1500	308	368,829	353	522,095	331	445,462	9.2	27.5
1750	254	298,321	291	441,095	273	369,708	7.6	22.8
2000	205	240,822	251	373,232	228	307,027	6.4	18.9
2250	165	193,997	218	315,290	192	254,644	5.4	15.7
2500	133	156,918	182	265,035	158	210,977	4.4	13.0
2750	108	127,246	144	224,555	126	175,901	3.5	10.8
3000	90	102,804	120	190,841	105	146,823	2.9	9.1
3250	69	82,698	108	162,048	89	122,373	2.5	7.5
3500	58	66,944	94	136,707	76	101,826	2.1	6.3
2750	49	53,590	86	113,781	68	83,686	1.9	5.2
4000	42	42,253	77	93,123	60	67,688	1.7	4.2
4250	37	32,561	60	75,808	49	54,185	1.4	3.3
4500	29	24,512	53	61,318	41	42,915	1.1	2.6
2750	24	18,051	44	48,639	34	33,345	0.9	2.1
5000	17	12,934	41	37,941	29	25,438	0.8	1.6
5250	11	9,382	34	33,484	23	21,433	0.6	1.3
5500	7	7,235	30	25,448	19	16,342	0.5	1.0
5750	7	5,485	23	18,680	15	12,083	0.4	0.7
6000	5	4,003	20	13,286	13	8,645	0.4	0.5

Source: Southeast Fisheries Science Center, Logbook Program, Miami, FL.

Minimum size: Reductions in harvest from the recreational (Brooks, 2003) and commercial fishery (Chih, 2003) were analyzed for different minimum size limits. These analyses utilized the most recent data available from the MRFSS survey (2001, 2002) and headboat logbooks (1998-1999) for the recreational fishery and 2001 to 2002 TIP data for the commercial fishery.

MRFSS data for the charter and private recreational sectors indicated that the median size of vermilion snapper harvested was about 12.3 inches TL, whereas the median size from headboat caught fish was about 11.6 inches TL. Ten percent of the fish harvested by the charter and recreational fishers were over 15.5 inches TL, whereas the same percentage of fish harvested by headboat fishers were over 14.7 inches TL. Minimum size limits examined for the recreational fishery ranged from 11 to 13 inches TL (Table 4.2.3.1.4). The savings from a recreational minimum size limit at 20-percent release mortality increases from 20.4 percent at 11 inches TL to 52 percent at 13 inches TL. The analyses assume that sublegal-sized fish would have to be discarded, thus increasing the deaths due to release mortality. Unlike fishing under a bag limit, fishers who are targeting vermilion snapper are likely to continue to fish as long as they have an expectation of catching their bag limit. Thus, it is expected that percent reductions in this analysis are the upper bounds of the potential reduction in harvest. Any minimum size increase will affect headboats more than charter and private fishers because headboats catch smaller fish. As with recreational bag limits, this difference between headboat and the MRFSS charter and private sectors decreases as the size limit is increased to 13 inches TL. When a reduced size limit is first implemented, the discard rate will be substantially higher than what is currently experienced by the recreational fishery until fishers change how and where they fish and until the stock rebuilds into the larger sizes. Dorf (1999) studied the headboat fishery for red snapper shortly after the minimum size was changed from 16 to 18 inches TL and found an 87 percent discard rate where previous estimates of discard rates from MRFSS were about 18 percent from 1998 through 2002.

Table 4.2.3.1.4. Percent reductions in recreational harvest based on various size limits. Data from Brooks (2003), were weighted by year for each sector and by harvest proportion as well as year for overall averages. A 20% release mortality is factored into the harvest reduction estimates.

Size Limit		By Sector	Combined
11 inches TL	MRFSS	16.4%	20.4%
	Headboat	27.3%	
12 inches TL	MRFSS	35.0%	37.9%
	Headboat	42.9%	
13 inches TL	MRFSS	50.2%	51.8%
	Headboat	54.6%	

Minimum size limits examined for the commercial fishery ranged from 11 to 15 inches TL (Table 4.2.3.1.5). The commercial fishery harvests more larger fish compared to the recreational fishery as a whole. The median size of harvested fish was above 12.2 inches TL and about 10 percent of the harvested fish exceeded 16.5 inches TL. At 33 percent release mortality, reductions in harvest from the commercial fishery would increase from 13 percent for an 11-inch TL minimum size to 53 percent for a 15-inch TL minimum size. The minimum size for the commercial fishery would have to be approximately one inch larger than it would be for the recreational fishery to obtain a similar percent reduction because of the differences in release mortality and the size of fish targeted. As with the recreational fishery, discard rates will initially increase with the implementation of any new size limit. However, because the commercial fishery targets larger fish the increase in discard rates would likely be less than those from the recreational fishery.

Table 4.2.3.1.5. Percent reduction in commercial harvest based on various size limits. Data from Chih (2003) were weighted by year to obtain average percent reductions. Harvest reductions are calculated using a 33% release mortality which was calculated as a simple linear proportion between 30% and 40%.

	11inches TL	12 inches TL	13 inches TL	14 inches TL	15 inches TL
Harvest reduction	12.6%	27.2%	37.7%	45.7%	52.5%

Combination bag and size limits: Estimates of the effects of a combination bag and size limit can be derived from independent estimates of the effect of recreational bag limits or size limits (Brooks, 2003; Tables 4.2.3.1.2 and 4.2.3.1.4 in this document). The equation for deriving the combination percent reduction is: [Combination % = 1 - (1-bag limit%) * (1-size limit %)]. Another way of expressing this is that the harvest is first reduced by one management action and then the harvest that remains is reduced by the second management action. The result would be the same regardless of which action is calculated first. The percent reductions for a release mortality of 20 percent are shown in Table 4.2.3.1.6. There are no data to suggest how fishers may change fishing behavior in reaction to a management measure that combines bag and size limits.

Table 4.2.3.1.6. Percent reductions in recreational harvest under different combinations of bag and size limits. Data combinations are based on Brooks (2003)

Minimum size	10 fish	10 fish aggregate	5 fish	4 fish	3 fish	2 fish	1 fish
11 inches TL	21.5%	21.7%	28.0%	31.2%	36.2%	44.4%	58.1%
12 inches TL	38.7%	38.9%	43.8%	46.3%	50.2%	56.6%	67.3%
13 inches TL	52.5%	52.6%	56.4%	58.3%	61.4%	66.4%	74.6%
14 inches TL	63.5%	66.5%	66.5%	68.0%	70.3%	74.2%	80.5%

Commercial combination limits were derived from the trip limit and size limit analyses in Tables 4.2.3.1.3 and 4.2.3.1.5. Combination size and trip limit reductions were estimated and are shown in Table 4.2.3.1.7 by using the same equation as used for the recreational fishery. A release mortality of 33 percent has been incorporated into the size limit portion of the calculations; however, release mortality has not been included in the trip limit analyses for the reasons described in that section.

Seasonal closures: Table 4.2.3.1.8 summarizes seasonal harvests by the recreational and commercial vermilion snapper fisheries. The monthly distribution of commercial average monthly landings have been very consistent. The distribution from 1990 through 2002 are nearly identical to landings over the more recent years of 1998 through 2002. Landings appear to be spread out relatively evenly over the year with a small peak from April through August at about ten percent per month. For the remainder of the year, monthly landings account for approximately six to seven percent of the total annual harvest. The monthly distribution of

Table 4.2.3.1.7. Percent reductions in commercial harvest from different combinations of trip and size limits and 33 percent release mortality for discards from the minimum size implementation. Trip limits are not assumed to generate additional discards.

Trip Limit	11inches TL	12 inches TL	13 inches TL	14 inches TL	15 inches TL
500	64.4%	70.4%	74.7%	77.9%	80.7%
750	55.1%	62.6%	68.0%	72.1%	75.6%
1000	47.7%	56.4%	62.7%	67.5%	71.5%
1250	41.5%	51.3%	58.4%	63.7%	68.2%

1500	36.6%	47.2%	54.9%	60.6%	65.5%
1750	32.5%	43.8%	51.9%	58.1%	63.3%
2000	29.1%	40.9%	49.5%	56.0%	61.5%
2250	26.3%	38.6%	47.5%	54.2%	59.9%
2500	24.0%	36.6%	45.8%	52.7%	58.7%
2750	22.1%	35.0%	44.5%	51.6%	57.6%
3000	20.6%	33.8%	43.4%	50.6%	56.8%
3250	19.2%	32.6%	42.4%	49.8%	56.0%
3500	18.1%	31.7%	41.7%	49.1%	55.5%
3750	17.2%	30.9%	41.0%	48.5%	55.0%
4000	16.3%	30.2%	40.4%	48.0%	54.5%
4250	15.5%	29.6%	39.8%	47.5%	54.0%
4500	14.9%	29.0%	39.4%	47.1%	53.7%
4750	14.4%	28.7%	39.1%	46.8%	53.5%
5000	14.0%	28.3%	38.7%	46.6%	53.2%
5250	13.8%	28.1%	38.6%	46.4%	53.1%
5500	13.5%	27.9%	38.4%	46.2%	53.0%
5750	13.2%	27.7%	38.2%	46.1%	52.8%
6000	13.1%	27.5%	38.1%	46.0%	52.7%

recreational average landings by wave are also consistent between the longer time period (1990 -2002) and the more recent five-year time period (1998-2002). Recreational landings have a more pronounced seasonality than do commercial landings. Landings are highest from wave 2 through 4 at 20 percent or more, and then decrease during the fall and winter during waves 5, 6 and 1. To develop seasonal closure options for the commercial fishery, months or fractions of months are added to obtain the level of reduction needed. For the recreational fishery, waves or fractions thereof would be added as well.

Table 4.2.3.1.8. Average percent harvest by month for the commercial fishery and by Wave (two month periods) for the recreational fishery.

Commercial			Recreational		
Month	1990-2002	1998-2002	Wave	1990-2002	1998-2002
1	6.5%	6.6%	**1**	3.1%	3.5%
2	4.5%	4.4%			
3	6.3%	6.9%	**2**	17.3%	20.8%
4	9.4%	10.9%			
5	11.6%	12.5%	**3**	29.1%	29.1%
6	10.8%	10.4%			
7	9.1%	8.5%	**4**	19.6%	23.3%

8	10.2%	9.9%			
9	9.1%	6.8%	**5**	18.6%	15.5%
10	7.0%	7.3%			
11	7.0%	7.7%	**6**	12.2%	7.7%
12	8.5%	8.1%			

4.2.3.2 Recreational harvest reduction alternatives

The four basic tools considered in this Amendment to reduce the recreational harvest are bag limits, size limits, seasonal closures, and quotas. Each harvest reduction option is designed to correspond with a rebuilding strategy alternative (Table 4.2.3.2.1). Rebuilding strategies are ordered from least restrictive to most restrictive to enable a comparison of the effects of successively more restrictive rebuilding strategies on the harvest reduction alternatives. For instance, in recreational harvest reduction Alternative 2 (size limits), an 11-inch TL minimum size would accomplish rebuilding strategy Alternative 2, a 12-inch TL minimum size would accomplish rebuilding strategy Alternatives 3 or 5; while it requires minimum sizes of 13-inches TL to accomplish rebuilding strategy Alternative 4. A harvest reduction alternative for a more restrictive rebuilding strategy alternative would accomplish any less restrictive rebuilding strategy. In addition, there are both short- (< five years) and long-term (after rebuilding is complete) implications of the harvest reduction methods. At the March 11 - 12, 2004, meeting, the Council identified Alternative 3, a ten-year stepped approach as its preferred rebuilding alternative (Table 4.2.3.2.1) based on preliminary analyses provided in the draft Public Hearing Document dated March 1, 2004. As a result, the alternatives carried forward for consideration in Sections 4.2.3.2 and 4.2.3.3 are based on a 25.5 percent harvest reduction fishery wide.

Table 4.2.3.2.1: Alternatives to reduce the recreational vermilion snapper harvest to meet various rebuilding strategies. The lightly shaded sections under the ten-year stepped harvest are the basis for the harvest reduction alternatives considered. All others were considered at the March, 2003, Council meeting but have since been moved to Section 12.3 (Alternatives considered but rejected).

Rebuilding Strategies	Strategy 1: No Action	Strategy 2: Ten-year Constant Harvest	Preferred Strategy 3: Ten-year Stepped harvest	Strategy 5: Seven-year Stepped Harvest	Strategy 4: Ten-year Constant F
Harvest Management Options	No required reduction	Initial reduction = 18%	Initial reduction = 25.5%	Initial reduction = 39%	Initial reduction = 50.4%
Bag limit	20 fish aggregate	3 fish (19.8% reduction)	2 fish (30.2% reduction)	1 fish (47.3% reduction)	1 fish (47.3% reduction)
Minimum Size	10 inches TL	11 inches TL (20.4% reduction)	12 inches TL (37% reduction)	12 inches TL (37% reduction)	13 inches TL (52% reduction)
Minimum size of 11 inches TL and a bag limit	Not applicable	Status Quo (20.4% reduction)	7 fish (25.6% reduction)	3 fish (36.2% reduction)	2 fish (44.4% reduction)
Minimum size of 12 inches TL and a bag limit	Not applicable	Status Quo (37% reduction)	Status Quo (37% reduction)	10 fish (39% reduction)	3 fish (50.2% reduction)
10 snapper aggregate bag limit and a minimum size	Not applicable	11 inches TL (21.7% reduction)	11 inches TL (21.7% reduction)	12 inches TL (38.9% reduction)	13 inches TL (52.6% reduction)
Annual quota*	Not applicable	0.536 mp whole weight	0.487 mp whole weight	0.401 mp whole weight	0.324 mp whole weight
Closed season	Not applicable	May 1 - June 7 (18% reduction)	May 1 - June 21 (25.5% reduction)	May 1 -July 31 (41% reduction)	May 1 - August 31 (52% reduction)

* The annual quota is based on Reef Fish Amendment 1 allocation of 67 % commercial and 33% recreational. Initial reductions are then made from that allocation.

The recreational management measures for the non-preferred rebuilding alternatives that are presented in Table 4.2.3.2.1 have been moved to Considered but Rejected (Appendix B). These alternatives will not be discussed further in this section, but are offered in the table for comparison.

Alternative 1: No action (status quo) (strategy 1) Do not reduce the recreational harvest of vermilion snapper. Maintain a 10-inch TL minimum size and aggregate bag limit of 20 fish.

Alternative 2: The recreational bag limit for vermilion snapper will be 2 fish within the current 20-reef fish aggregate bag limit. (30 percent harvest reduction)

Preferred Alternative 3A: The minimum size for recreationally caught vermilion snapper will be 11 inches TL and the bag limit will be 10 fish within the 20-reef fish aggregate bag limit. (21.5 percent reduction)

Alternative 3B: The minimum size for recreationally caught vermilion snapper will be 11 inches TL and the bag limit will be 7 fish within the 20-reef fish aggregate bag limit. (25.6 percent harvest reduction)

Alternative 4: The annual recreational quota in whole weight for vermilion snapper will be 0.487 mp based on Reef Fish Amendment 1 allocation of 67 percent commercial and 33 percent recreational. (allows 17 percent harvest increase)

Alternative 5: The recreational closed season for vermilion snapper will be May 1 to June 21. (25.5 percent harvest reduction)

Discussion: The MSFCMA requires that federal frishery management actions be consistent with the ten National Standards (reproduced in Appendix A). In addition, the National Environmental Policy Act (NEPA) requires that management actions considered by the Council be evaluated for their short-term and long-term direct, indirect and cumulative effects. Section 8 (Environmental Consequences) and Section 5 (Regulatory Impact Review) provide the detailed analyses required by the MSFCMA and by the NEPA. The following discussions are summarized from those sections.

Because analyses indicate that the physical environment would not be significantly affected by any of the harvest reduction alternatives, the potentially minimal physical effects to that environment will not be summarized for each alternative. Recreational fishing for vermilion snapper is primarily done with hook-and-line gear, which is the least destructive of all bottom tending fishing gears. Minimal physical effects to the bottom habitat, including EFH, or to the water column are expected by this type of fishing. Less than one percent of the trips harvesting vermilion snapper are directed and are likely the only trips that would be affected by new regulations. Initial effects to the physical environment from the harvest reduction alternatives might be slightly positive if harvest reductions reduce effort in the vermilion snapper fishery. However, since so little of the fishery is directed at vermilion snapper, it is expected that effort would likely shift to other reef fish species until the stock rebuilds. Once the stock rebuilds, that effort would likely return to the fishery.

All the alternatives but Alternative 1, would reduce fishing mortality to a level that is predicted to rebuild the stock within ten years. The biomass of vermilion snapper is expected to increase approximately four times over current levels no matter which harvest reduction alternative is used. This increase in stock biomass is expected to promote a more natural age and size distribution, greater reproductive capability, and better genetic health. The ecosystem would be affected as the vermilion snapper population expands geographically and predator and prey relationships return to more natural conditions.

Alternative 1, (no action) or status quo would maintain a 20-reef fish aggregate bag limit and a 10-inch TL minimum size for vermilion snapper. These management measures would not reduce the vermilion snapper fishing mortality rate. As a result, stock biomass and harvest would continue to decrease. Directed fishing effort would likely be reduced as vermilion snapper become more difficult to find, and may eventually cease if the fishery becomes economically extinct, leaving only non-directed incidental harvest.

The average size and age of vermilion snapper could be reduced as the stock declines in size. The reproductive and genetic health of the stock could be adversely affected as well. If realized, these effects would increase the stock's vulnerability to adverse environmental conditions. The level of bycatch associated with Alternative 1 is likely to be lower than that associated with many of the other alternatives in the short term (< five years). Regulatory discards would dominate the catch over the long term as fewer legal fish would be available as the stock declines. But the long-term effect (once rebuilding is complete) of this alternative on bycatch would still likely be less than that of other alternatives designed to rebuild the stock. Any significant effects on the vermilion snapper stock would be expected to affect reef fish ecosystems in some way, for example, by altering predator-prey relationships. However, the type and magnitude of such effects are not well understood.

The short-term socioeconomic effects of Alternative 1 would be positive because no mandatory reductions are required. However, harvest would decline as stock biomass declines and after ten years, would be much less than it would had the fishery been rebuilt. This alternative would not present a regulatory burden. However, it does not comply with the mandates of MSFCMA nor achieve the objectives of this Amendment and could be subject to legal challenge.

Alternative 2 reduces the vermilion snapper bag limit to two fish within the 20-reef fish aggregate bag limit (See Table 4.2.3.2.1). The size limit would remain at ten inches TL. Single day fishing trips produce a median harvest of about one fish per angler trip and 75 percent of the angler trips produce two fish or less. Charter and private anglers would be affected more by bag limits than would the headboat sector because they harvest more fish per trip.

A two-fish bag limit may reduce bycatch better than quota and season closures in the short term because it would not limit when fish could be harvested. Assuming that fisher's quit targeting vermilion snapper after reaching the bag limit, this could result in small reductions in release mortality compared to status quo in the short term. Bycatch should further decline as the stock becomes more abundant and larger vermilion snapper appear. But there may be a potential for some high-grading(discarding legal fish when a larger one is caught) which could limit reductions in discard mortality. This alternative, as well as others that do not propose increasing the size limit, would not protect as many mature fish as would Alternative 3.

All the harvest reduction alternatives except the quota reduce consumer surplus and for-hire vessel net revenues by 4 to 10 percent (1.37 to 3.98 million dollars) in the short term (2004-2008). Net economic losses for a two fish bag limit are four percent (1.55 million dollars) relative to the status quo during the first five years (Table 5.8). By the end of the rebuilding program, the two-fish bag limit would result in a net economic gain of 14.9 percent (9.07 million dollars) when compared with status quo. A two-fish bag limit does not affect the administration and enforcement of regulations because a bag limit currently exists.

Preferred Alternative 3 A would increase the minimum size limit to 11 inches TL and reduce the bag limit to ten fish within the 20-reef fish aggregate to obtain the necessary overall harvest reduction. **Alternative 3 B** would increase the minimum size limit to 11 inches TL and establish a seven-fish bag limit. Size limits are an effective method to protect fish until they become mature and have had a chance to spawn. Ninety percent of female vermilion snapper are mature by 8 inches TL, so even the fastest growing fish would be able to spawn before entering the fishery. Reducing the bag limit would reduce fishing mortality on legal-sized fish. A seven-fish bag limit outperforms a ten-fish bag limit by about four percent in the context of overall harvest reduction.

The Council identified **Alternative 3 A** as the preferred because it shifts some of the socioeconomic costs of rebuilding to the commercial fishery. Vermilion snapper harvest increased dramatically during the late 1980s and early 1990s due primarily to increases in commercial harvest (Figure 5.1). This increase is believed to have created the overfishing and overfished conditions that must now be addressed by this amendment. Preferred **Alternative 3 A** reduces the harvest reduction required from the recreational fishery to 21.5 percent (4 percent below the target 25.5 percent reduction) and requires increasing the harvest reduction in the commercial fishery to compensate.

The 11-inch TL minimum size limit proposed by this alternative would increase bycatch in the short-term relative to the level of bycatch that would be expected to occur under Alternatives 1 and 2. The level of bycatch associated with Alternative 3 would likely be comparable to that associated with Alternatives 4 and 5 which would prohibit fishing for vermilion snapper during part of the year. Bycatch is expected to decrease under Alternative 3 as the stock rebuilds, but not to a level as low as would be expected for Alternative 2.

Analyses estimate that the recreational fishery would experience a net economic loss of 10.5 percent (3.98 million dollars) during the early phases of the rebuilding period under Alternative 3. This loss is expected to be greater than those associated with Alternatives 2 and 5. However, at the end of the rebuilding period, this alternative provides net economic gains of eight percent (5 million dollars). These economic gains are the lowest of any of the alternatives. This alternative would not affect the administrative environment because the vermilion snapper fishery is currently managed with bag and size limits.

Alternative 4 would establish a 0.487 mp whole weight quota for the recreational fishery. Amendment 1 to the Reef Fish FMP allocated 33 percent of the vermilion snapper harvest to the recreational sector when TAC is used as a management tool based on average harvests from 1979 through 1987. This alternative would allocate 33 percent of the allowable harvest to the recreational fishery and maintains the current bag (20 fish) and size (10 inches TL) limits. Effectively, this alternative allows the recreational harvest to increase by 17 percent from the projected 2003 landings.

Quotas are considered to be the most risk averse management method because they place annual limits on harvest. However, in practice quotas can be difficult to monitor and enforce. The history with recreational red snapper quotas suggests that it would be difficult to effectively manage a recreational vermilion snapper quota using the available data collection programs (MRFSS survey and Headboat logbook). The 2002 recreational harvest is just above 500,000 pounds whole weight, so the recreational fishery might not be affected by this alternative for the first year or so of the rebuilding period. However, the quota would be met faster as the stock rebuilds, resulting in closures that would increase in length as stock biomass increases.

No change in bycatch is expected for the first few years under Alternative 4 because fishing effort is not expected to change significantly over this period of time. However, as the stock rebuilds bycatch should decline during the open season because more larger fish would be available, and should increase during the closed season for the same reason as fishers target other species. Overall, the bycatch effects associated with this alternative are expected to be similar to those associated with Alternative 5, slightly less than those associated with Alternative 3 and greater than those resulting from Alternative 2. However, the 10-inch minimum size limit maintained by Alternatives 2, 4, and 5 would not protect mature vermilion snapper as well as 11-inch TL size limit proposed in Alternative 3.

Alternative 4 is the only alternative that would result in short-term economic gains compared to the status quo (Table 5.7). By the end of the rebuilding period, this alternative economically outperforms all alternatives and would result in a net economic gain of 58 percent (35.2 million dollars) when compared to status quo. This alternative is expected to have a significant effect on administration and enforcement because quotas would have to be established and require careful monitoring.

Alternative 5 would close a portion of the year to recreational harvest of vermilion snapper. MRFSS data indicates that harvest has peaked during the summer months since at least 1990 (See Table 4.2.3.1.9). This alternative would provide fishing opportunities when the recreational red snapper season is closed from November 1 through April 20. The closed season begins on May 1 (nine days after red snapper season opens) and closes on June 21. Fishing effort directed at vermilion snapper could increase around the beginning and ending of the open season as angler anticipate the closure.

Alternative 5 has similar bycatch implications as Alternative 4. Bycatch would likely decrease during the open season and, as more larger fish appear, would increase during the closed season when fishers target red snapper. Bycatch should decrease overall as stock biomass improves. Alternative 5 would protect spawning vermilion snapper better than would Alternative 4 because the closed season would coincide with the species' peak spawning season. However, it is unlikely that Alternative 5 performs as well as Alternative 3, which increases protection year-round through the 11-inch TL minimum size.

Analyses indicate that economic losses from a closed season in the first five-year period are 3.6 percent (1.37 million dollars), when compared to status quo. These losses are less than those anticipated under Alternatives 2 and 3. In the long term, Alternative 5 results in the second greatest economic gains of any of the alternatives. Net economic gains are estimated to be 16.6 percent (10.1 million dollars) greater than status quo. The administrative burden of Alternative 5 would be slightly higher than Alternatives 2 and 3 because notices of closure would be announced occasionally. Enforcement would be no different than other types of possession limits (bag and size regulations).

4.2.3.3 Commercial harvest reduction alternatives

The same four basic management measures (bag limits are replaced by trip limits) are available to reduce the commercial harvest. The value for each option is consistent with the harvest reduction necessary for that rebuilding strategy (Table 4.2.3.3.1). Rebuilding strategies are ordered from least restrictive to most restrictive so that the effects of successively more restrictive rebuilding

Table 4.2.3.3.1: Alternatives to reduce the commercial vermilion snapper harvest to meet various rebuilding strategies. The lightly shaded sections under the ten-year stepped harvest are the basis for the harvest reduction alternatives considered. All others were considered at the March, 2003, Council meeting but have since been moved to Appendix B (Alternatives considered but rejected).

Rebuilding Strategy	Strategy 1: Status Quo	Strategy 2: Ten-year Constant Harvest	Preferred Strategy 3: Ten-year Stepped harvest	Strategy 5: Seven-year Stepped Harvest	Strategy 4: Ten-year Constant F
Harvest Reduction Options	No required reduction	Initial reduction = 18%	Initial reduction = 25.5%	Initial reduction = 39%	Initial reduction = 50.4%
Trip limit	unlimited	2000 lbs. (19% reduction)	1625 lbs . (25.2% reduction)	1000 lbs. (40% reduction)	750 lbs. (48.6% reduction)
Minimum size	10 inches TL	12 inches TL (27% reduction)	12 inches TL (27 % reduction)	13 inches TL (37.7% reduction)	15 inches TL (52 % reduction)
Minimum size 11 inches TL and a trip limit	Not applicable	3500 lbs (18% reduction)	2300 lbs (25.8% reduction)	1350 lbs (39.6% reduction)	900 lbs (50.7% reduction)
Minimum size 12 inches TL and a trip limit	Not applicable	Status quo (unlimited) (27% reduction)	Status quo (unlimited) (27% reduction)	2250 lbs. (39% reduction)	1350 lbs. (50% reduction)
Annual quota*	Not applicable	1.090 mp whole weight	0.989 mp whole weight	0.815 mp whole weight	0.658 mp whole weight
Closed season	Not applicable	Aug. 1-Sept 30 (16.7% reduction)	Aug 1 - Sept. 30 and Dec. 1 - 31 (24.8% reduction)	Aug 1 - Sept 30 and Nov. 1 - Jan. 31 (39.1% reduction)	Aug. 1 -Feb. 28 (50.8% reduction)

* The annual quota is based on Reef Fish Amendment 1 allocation of 67 % commercial and 33% recreational. Initial reductions are then made from that allocation.

strategies on the harvest reduction alternative can be compared. In any of these cases, a limit for a more restrictive rebuilding strategy would accomplish any less restrictive rebuilding strategy. In addition, there are short- and long-term implications of the harvest reduction methods. At the March 11 - 12, 2004, meeting, the Council identified alternative 3, a ten-year stepped approach as its preferred rebuilding alternative (Table 4.2.3.3.1) based on preliminary analyses provided in the draft Public Hearing Document dated March 1, 2004. As a result, the harvest reduction alternatives carried forward for consideration are based on a 25.5 percent harvest reduction fishery wide.

The commercial management measures for the non-preferred rebuilding alternative that are presented in Table 4.2.3.3.1 have been moved to Considered but Rejected (Appendix B) and will not be discussed further.

Alternative 1: No action (status quo) (strategy 1). Do not reduce the commercial harvest of vermilion snapper. Maintain the 10-inch TL minimum size limit.

Alternative 2: The commercial trip limit for vermilion snapper will be 1625 lbs. whole weight (25.2 percent harvest reduction)

Alternative 3: The minimum size for commercially caught vermilion snapper will be 12 inches TL. (27 percent harvest reduction).

Alternative 4A: The minimum size for commercially caught vermilion snapper will be 11 inches TL and the trip limit will be 2300 lbs. whole weight. (25.8 percent harvest reduction)

Alternative 4B: The minimum size for commercially caught vermilion snapper will be 11 inches TL and the trip limit will be 2250 lbs. whole weight. (26.3 percent harvest reduction)

Alternative 5: The annual commercial quota in whole weight for vermilion snapper will be 0.989 mp based on Reef Fish Amendment 1 allocation of 67 percent commercial and 33 percent recreational. (37 percent harvest reduction)

Alternative 6: The commercial closed season for vermilion snapper will be August 1 through September 30 and December 1 through 31. (24.8 percent harvest reduction).

Preferred Alternative 7: The minimum size for commercially caught vermilion snapper will be 11 inches TL and the closed season will be April 22 through May 31. (26.3 percent harvest reduction)

Discussion: The physical environment would not be significantly altered by any of the alternatives, including Alternative 1, and therefore, will not be discussed separately under each alternative. In recent years, vertical line fishing accounts for about 99 percent of the commercial vermilion snapper harvest with most of the remainder coming from long lines (Table 5.2). Vermilion snapper are usually found up in the water column over structure, so when targeting vermilion snapper, vertical gear is typically fished by depth of the bite, rather than bottom tending which can damage habitat through snagging or entanglement. Vertical gear is far less damaging than other commercial fishing gears such as traps or trawls.

Vermilion snapper represent about 27 percent of the total harvest by weight and about 26 percent by value (Table 5.2) for those vessels that reported landing vermilion snapper between 2000 to 2002. Regulations that reduce harvest of vermilion snapper may cause a few marginal vessels to leave the reef fish fishery, reducing effort and the chance for habitat damage. However, most affected vessels would shift effort to other reef fish species, so the overall change in effort would be minimal for a gear that has minimal impact. As the fishery rebuilds, effort would most likely return to pre-regulation levels or above.

With the exception of Alternative 1, all the Alternatives would reduce fishing mortality to a level that is predicted to rebuild the stock within ten years. The biomass of vermilion snapper would increase approximately four times over current levels no matter which harvest reduction alternative is used. The average size, age, reproductive capacity, and genetic health of the vermilion snapper resource would be significantly improved to the same level. The ecosystem would be altered similarly; the vermilion snapper population would expand geographically and predator and prey relationships would change.

The various harvest reduction alternatives do differ in the way they implement harvest reductions and the effects that those reductions have on the short-term (< five years) biological environment, primarily bycatch and shifting effort trends, and on the socioeconomic and administrative environments. These will be summarized within the discussion of each alternative based on the details presented in Sections 5 and 8.

Alternative 1, (status quo or no action) maintains the current 10-inch TL minimum size. Maintaining this rule would achieve no reductions in the vermilion snapper fishing mortality rate and would be counter to mandates of MSFCMA. Stock biomass and harvest would continue to decline, reaching levels 40 percent lower than current levels in about 10 years. The average size, age, reproductive capacity and genetic health of the vermilion snapper resource would be significantly reduced, making the stock more susceptible to collapse under adverse environmental conditions. Bycatch would be equal to or lower than harvest reduction alternatives in the beginning and as harvest drops to 40 percent of current values, bycatch would dominate the catch but decrease overall. The commercial fishery would be much more economically viable at the beginning since no reductions would be mandated, but would be significantly reduced in ten years. Lastly, status quo is counter to the mandates of the MSFCMA and the objectives of this amendment and could be subject to legal challenge.

Alternative 2 would establish a 1,625-pound whole weight commercial trip limit. A 1,625 pound trip limit would have affected 8.4 percent of the trips in 2000 - 2001 (Table 4.2.3.1.3). During this same time period, the average landings per trip was about 500 pounds (Table 5.2). Most of the trips with these larger harvests are probably opportunistic, targeting reef fish species (e.g., red snapper) and harvesting vermilion snapper as available.

For trips that target vermilion snapper, even opportunistically, a trip limit would normally be expected to reduce bycatch on the assumption that no more vermilion snapper would be caught. However, the average trip harvests almost three times as many pounds of other reef fish species than of vermilion snapper, so it is not expected that fishing effort would cease nor that discards would decrease. Under the continuing 10-inch TL minimum size, there would be no added protection for mature fish.

All harvest reduction alternatives would cause unavoidable, small, short-term net economic losses in relation to the status quo simply because harvest must be reduced by approximately 25 percent.

Net economic losses for a 1,625-pound trip limit are less than three percent (0.94 million dollars) during the first five years and change to a positive 1.4 percent (0.96 million dollars) by the end of the rebuilding period. A trip limit results in intermediate economic benefits when compared to other alternatives. Economic benefits in the long term (after rebuilding) are greater than Alternatives 3 and 4, but less than Alternatives 5, 6 and 7. The administrative burden of establishing a trip limit is high because the enforcement costs are the largest of any of the alternatives. To be effective, trip limits should be monitored at the dock upon arrival or on the water. In either case, considerable time is necessary to determine compliance because total landings from each vessel would be a mixture of many reef fish species.

Alternative 3 increases the minimum size to 12 inches TL. The median size harvested in the commercial fishery is slightly over 12 inches TL and the mean size is about 12.75 inches, while fish are harvested up to at least 24 inches TL. Increasing the minimum size to 12 inches TL would significantly improve protection for mature female vermilion snapper. Ninety percent of females are mature by eight inches TL and an increase to 12 inches TL would allow even the fastest growing fish to spawn for several years before being harvested. The effect of a minimum size increase on discards, and consequently release mortality, would initially be large. Any increase in minimum size would increase regulatory discards and subsequently, the total mortality associated with those discards. As fish grow into the larger sizes, this effect lessens, but would always be higher than status quo (10 inches TL).

Alternative 3 is the only alternative that results in economic losses during the rebuilding time period. During the first five years, a minimum size of 12 inches TL shows a net economic loss of more than 6.5 percent (2.6 million dollars). By the end of the rebuilding program, the 12-inch TL size limit would result in a net loss of 1.6 percent (1.11 million dollars) when compared with status quo. Essentially, the early losses are never recovered by the end of the ten-year rebuilding period. There is no additional administrative or enforcement burden for a minimum size since current regulations include a minimum size.

Alternative 4A establishes a minimum size of 11 inches TL and a trip limit of 2,300 pounds to attain a harvest reduction slightly more than the 25.5 percent target; whereas, **Alternative 4B** sets the trip limit at 2,250 pounds for a reduction of 26.3 percent. Alternative 4B is a companion to the preferred recreational harvest reduction Alternative 3A and is designed to shift some of the burden of rebuilding to the commercial fishery because of increased commercial landings in the late 1980s and early 1990s. Decreasing the commercial harvest by slightly less than 1 percent over the target reduction of 25.5 percent is sufficient to offset a 4 percent increase in the allowance for the recreational fishery. This is because the commercial proportion of the harvest is currently 79 percent. Alternative 4A maintains the target 25.5 percent reduction and matches recreational alternative 3B.

Increasing the minimum size to 11 inches TL would produce almost the same biological effects as a 12-inch TL minimum size. The fastest growing females would be protected for several spawning seasons and discards would increase early and then decrease somewhat as the population rebuilds. Trip limits combined with the 11-inch TL minimum size reduce harvest but do not add any negative biological effects.

Only 5.2 or 5.4 percent of trips would be affected by the 2,300 or 2,250 pound trip limits respectively. Many of those trips would be significantly affected economically because, within that group, trip totals range up to 6,000 pounds. Economic losses in the first five years are estimated to be 3.2 to 3.3 percent (1.29-1.37 million dollars) relative to status quo but at the end of the rebuilding period economic gains should be approximately one percent (0.51-0.75 million dollars) better than status quo. As with Alternative 3, there is no additional administrative or enforcement burden for the 11-inch TL minimum size; however, the enforcement burden for the trip limit is the same as Alternative 2 and higher than any of the other alternatives.

Alternative 5 would establish a quota of 0.989 mp whole weight for the commercial fishery. Current size limits (10 inches TL) would remain in place. Amendment 1 to the Reef Fish FMP allocated 67 percent of the vermilion snapper harvest to the commercial sector when TAC is used as a management tool based on average harvests from 1979 through 1987. So, this alternative allocates 67 percent of the allowable harvest to the commercial fishery and maintains the current size (10 inches TL) limit. Effectively, this alternative reduces commercial harvest by 37 percent from the projected 2003 landings. However, since 1996, the commercial share of the total harvest has averaged 79 percent which would equate to a quota of 1.17 mp based on the target harvest of 1.476 mp. Commercial quotas are typically the most risk averse way to control harvest because they halt fishing when the quota is projected to be met and the regulatory mandates for reporting are already in place. The fishing year for this species starts on January 1 and the fishery would likely shut down sometime during the month of July. Derby fishing could result as the stock rebuilds shortening the effective season even further.

Quotas would not change the proportion of discards during the open season as compared to status quo; but once the quota is met and the season is closed, discards would increase during the trips for other species such as red snapper. The amount of increase is unknown because it is assumed that some fishermen would avoid vermilion snapper if they are not the target of the trip. Closing vermilion snapper fishing from July through December would protect much of the spawning season and almost all of the peak spawning period of July and August. No other biological effects are expected since size limits remain ten inches TL.

Economically, this quota is expected to produce a small net loss during the first five years of implementation and about a 2.3 percent (1.57 million dollars) increase by the end of the rebuilding period, second only to Alternative 6. The administrative and enforcement burden is increased somewhat in order to notice the public of, and monitor compliance with, closures.

Alternative 6 would establish a seasonal closure from August 1 through September 30 and all of December. The intent of this alternative is to keep the vermilion snapper fishery open when the red snapper fishery is open to avoid bycatch. Approximately 21 percent of the annual landings of vermilion snapper occur during the 10-day open periods, so if vermilion snapper could not be landed during those times, there would be increased discards.
Similar to the effects of a quota, this season closure would have no effect on regulatory discards during the open season, but would increase discards when the season is closed. Closing vermilion snapper fishing during August and September would protect almost half of the summer spawning season. No other biological effects are expected since the size limit remains ten inches TL. Overall, Alternative 6 is expected to have fewer discard problems and better protection of the spawning season than Alternative 5 and 7 and possibly equal to Alternatives 3 and 4, which increase size limits.

This season closure is expected to produce a small net loss during the first five years of implementation and about a 4.9 percent (3.38 million dollars) increase by the end of the rebuilding period. Alternative 6 results in the greatest economic gains during the course of the rebuilding plan. The administrative and enforcement burden is increased somewhat in order to notice and monitor compliance with closures.

Preferred Alternative 7 would establish an 11-inch TL minimum size and a seasonal closure from April 22 through May 31. The Council had selected two preferred alternatives (Alternative

3 and Alternative 4B) to go to public hearings. Based on those public hearings, public testimony at the July 12 - 15, 2004 Council meeting in Houston, TX, and fisherman's desire to avoid trip limits, the Council asked commercial fishermen and staff to develop season closures that would reduce the harvest by 26.3 percent to compensate for the recreational Preferred Alternative 3A and be acceptable to the commercial industry. Commercial fishing representatives recommended Alternative 7 as a compromise to closed seasons alone. Their rationale was 1) that an 11-inch TL minimum size was acceptable because commercially-caught vermilion snapper normally exceed 12 inches and 2) that a single 40-day closed period would not affect product value by reducing access to markets once the season re-opened. The commercial representatives selected the April 22 through May 31 closure because markets were glutted due to high harvest levels, thus reducing wholesale dockside prices. An additional benefit of closing the fishery at this time would be the protection of fish that are aggregated for spawning. The Council chose Alternative 7 as the preferred based on the commercial industry's recommendation and because it is projected to reduce harvest by 26.3 percent, enough to rebuild the stock and compensate for the recreational preferred alternative.

Increasing the minimum size to 11 inches TL would produce the same effects as Alternatives 3 and 4. The fastest growing females would be protected for several spawning seasons and discards would increase initially and then decline somewhat as the population rebuilds. Season closures would increase discards during the time that red snapper is open, May 1 through May 10. The closed season would have some positive effect on vermilion snapper spawning even though it is at the beginning of that season.

This combination size limit and season closure is expected to produce a small net economic loss during the first five years of implementation and about a 2.1 percent (1.47 million dollars) increase by the end of the rebuilding period. Alternative 7 results in economic gains during the course of the rebuilding plan nearly equal to Alternative 5, less than alternative 6 and better than all others including the original alternatives selected by the Council for public hearings. The administrative and enforcement burden is increased somewhat in order to notice and monitor compliance with closures.

5 REGULATORY IMPACT REVIEW

5.1 Introduction

NOAA Fisheries requires a Regulatory Impact Review (RIR) for all regulatory actions that are of public interest. The RIR does the following: (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 regulation is a "significant regulatory action" under certain criteria provided in Executive Order 12866, and provides the general basis for determining whether the proposed regulation would have a significant economic impact on a substantial number of small entities in compliance with the Regulatory Flexibility Act of 1980 (RFA).

This RIR analyzes the potential impacts that the alternatives in this plan amendment to the Reef Fish FMP would have on participants in the reef fish fishery.

5.2 Problems and issues in the fishery

The specific problems addressed in this proposed plan amendment are enumerated and discussed in Section 3.0 and are incorporated here by reference. The major issues identified for this plan amendment are: (1) specifying sustainable fishing parameters for vermilion snapper, (2) rebuilding the overfished vermilion snapper stock, and (3) reducing recreational harvests through the use of such management measures as minimum size limit, bag limit, quota, or seasonal closures, and (4) reducing commercial harvest through the use of such management measures as minimum size limit, trip limit, quota, or seasonal closures.

5.3 Objectives

Section 3.0 discusses the specific need for this plan amendment and is incorporated here by reference.

5.4 Description of the fishery

5.4.1 Status of the stock

The vermilion snapper resource in the Gulf of Mexico was listed as approaching an overfished state by NOAA Fisheries in the 1998 and the 1999 Report to Congress on the Status of Fisheries of the United States. These results were based on a stock assessment conducted by Schirripa (1998) that concluded that vermilion snapper were not over harvested, but that recruitment and catch trends pointed to possible declining future abundance. The SPR from 1986-1995 ranged from 0.26-0.28. The Council also received a letter from NOAA Fisheries on November 17, 1999[1] advising the Council it was required to address overfishing in the vermilion snapper fishery within one year of notification of its status.

[1] Letter to Council Chairperson Robert Shipp from NOAA Fisheries Regional Administrator William Hogarth, dated November 17, 1999.

Schirripa and Legault (2000) assessed stock condition using two VPA models that added abundance indices to the model used in 1998. Both models used a recruitment index from the NOAA Fisheries' Fall Groundfish Survey. One model incorporated CPUE from both the handline and the headboat fisheries, while the other did not use the handline CPUE. The handline-headboat CPUE represents data from virtually the entire fishery, while the headboat-only CPUE incorporates data from about 10 percent of the landings. The handline-headboat model indicated a high probability of overfishing and an overfished condition, while the headboat-only model indicated a low probability of overfishing and the overfished condition. They suggested that vermilion snapper is a bycatch of the red snapper fishery, and Schirripa (1998) noted that vermilion snapper catch varied inversely with red snapper catch. Therefore, declining catches may be associated with increasing abundance of red snapper. While CPUE of the commercial vessels has varied with out trend since 1990, the recreational headboat CPUE has declined more than 50 percent since 1993.

The most recent assessment of the vermilion snapper fishery was undertaken in 2001 using data through 1999, with some commercial catch data for 2000 and two different model types (Porch and Cass-Calay, 2001). The age-structured VPA model requires length-at-age estimators so that the age structure of the population can be estimated from fishery dependent length data. However, vermilion snapper aging studies (Zhao et al., 1997; Hood and Johnson, 1999; and Allman et al., 2001) have shown that because of variable growth, length is a poor predictor of age. The Pella-Tomlinson production model optimally requires a long time series (50-100 years), but there were only 14 years of catch and effort data. Half of the six VPA runs and all but one of the production model runs indicated that the stock was overfished. With regards to overfishing, most of the runs using the VPA and production models indicated that the stock was undergoing overfishing based on the default thresholds. These results were considered to be consistent with the results of Schirripa and Legault (2000).

In their review of the vermilion snapper assessment (RFSAP, 2001), the RFSAP used the Pella-Tomlinson model runs to examine stock status. Based on these model runs that explored a variety of stock condition scenarios, the RFSAP considered the vermilion snapper stock to be overfished and undergoing overfishing. The RFSAP used the base Pella-Tomlinson model run (P1) to examine stock status using two constant F strategies and a constant harvest strategy. Based on the output from those, reductions needed in F to halt overfishing and rebuild the stock to B_{MSY} are between 35 percent and 60 percent based on catch data through 1999. Since then, both CPUE estimates and harvest have risen to levels similar to 1999 (See Section 4.2.1). These changes indicate that the stock biomass has improved or that the fishery may be driven by other factors such as economics or interactions with other fisheries (e.g. red snapper).

From 1955 through 2002, total reported landings of vermilion snapper have ranged between 1,300 pounds (1957) and 3.8 mp (1993) (Figure 5.1). Landings slowly increased from the 1950s to 1983, after which total reported landings jumped from 812,000 pounds to 1.7 mp in 1984. This increase is mostly due to misreporting approximately 727,000 pounds of vermilion snapper as red snapper in Louisiana and Mississippi (Porch and Cass-Calay, 2001). Total landings continued to increase rapidly through 1993, mostly due to commercial increases; recreational landings leveled off after 1986 (Fig. 5.2). Prior to 1986, MRFSS landings could not be separated by charter or headboat and so charter/ private recreational landings can not be estimated for these years. Since 1993 when landings peaked at 3.8 mp, landings have steadily declined. Total landings for 2002 are estimated to be approximately 2.5 mp.

In general, most fish are caught by the commercial fishery. The proportion of harvest taken by the commercial fishery was highly variable from 1979 through 1987, ranging from 25 percent to 85 percent, but remained stable with little variation at an average of 70 percent from 1988 through 1995. Landings from both commercial and recreational sectors generally declined from

1993 until 2000; however, proportionally, the commercial sector has increased its share since1996 and has accounted for 79 percent of the harvest between 1996 and 2002. Since 1996, landings recorded for the headboat fishery account for about 42 percent of the recreational landings.

Figure 5.1 Vermilion snapper landings from 1955 through 2002.

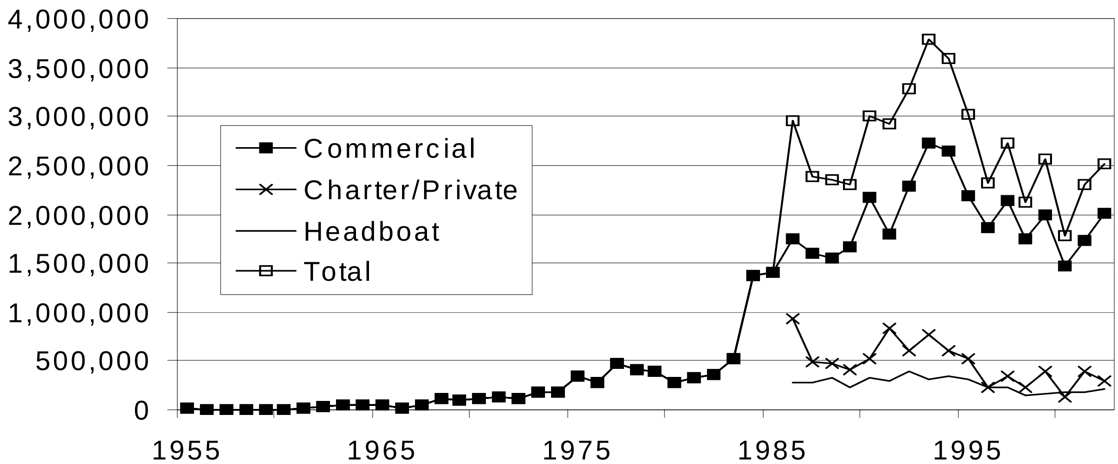
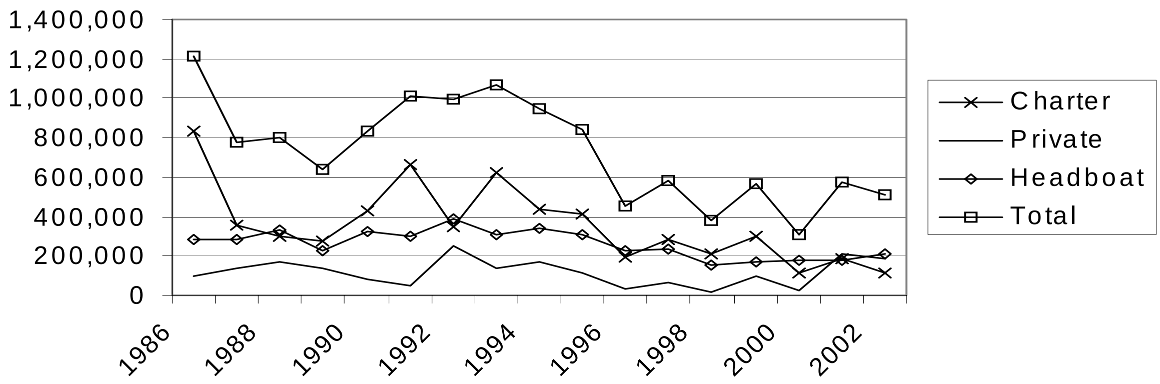


Figure 5.2 Recreational landings by Mode, 1986 - 2002



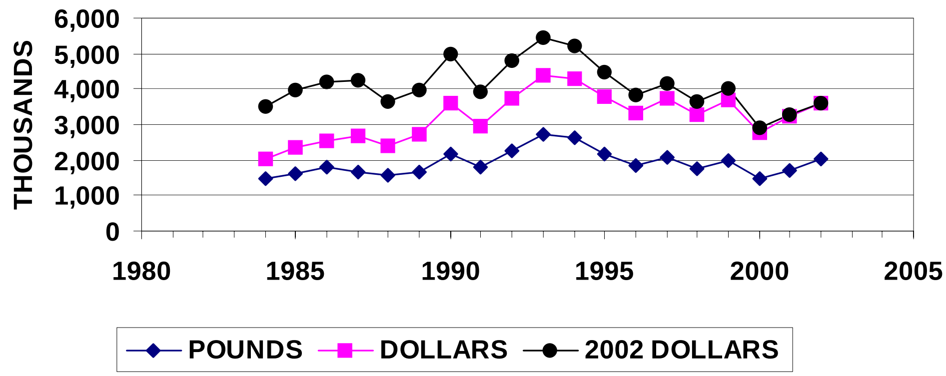
Based on trip interview program (TIP) data that has been collected since 1984, length distributions of vermilion snapper are generally similar between gears. However, there does appear to be a trend of smaller fish being caught off Florida and larger fish being caught off Texas. Fish landed in Florida have a mode of 11 to 12 inches TL compared to a mode of 14 to 15 inches TL for Texas caught fish. The mode for Louisiana/Mississippi caught fish is intermediate to Florida and Texas fish, while there are insufficient data from Alabama to make any comparisons.

Other than the general management measures affecting the reef fish fishery as a whole, the management of vermilion snapper since 1990 has been mainly based on bag and size limits. No particular TAC has been specified for this species.

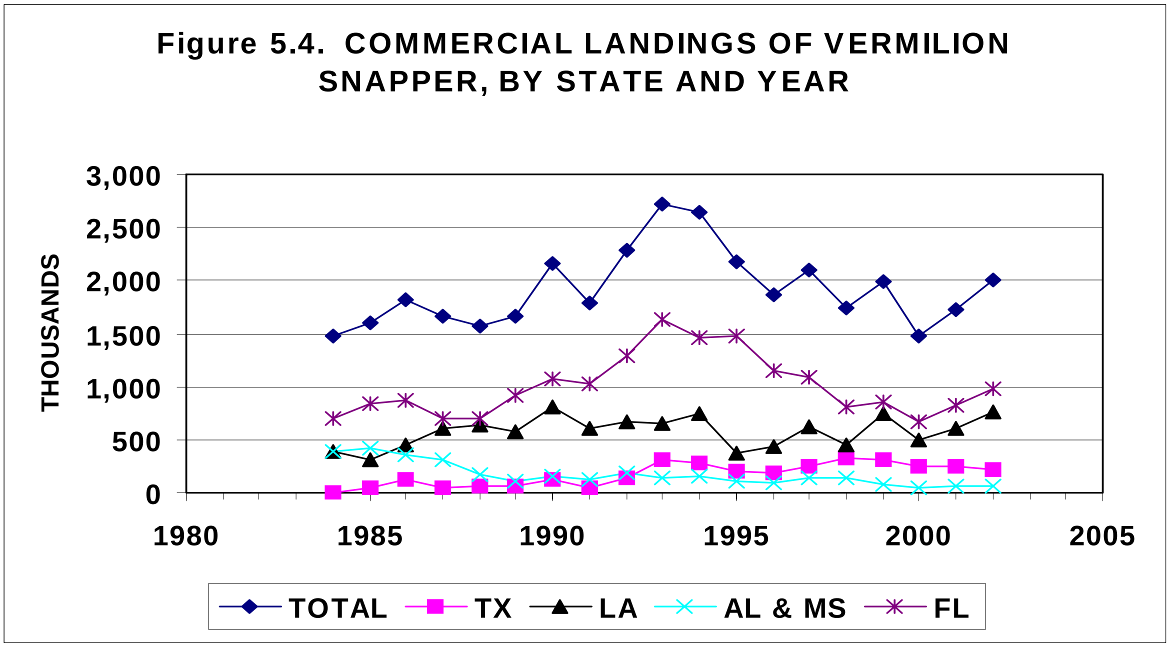
5.4.2 Commercial fishery

Vermilion snapper are not a primary species in the commercial reef fish fishery, making up less than 10 percent of the total reef fish commercial landings. Landings and dockside (ex-vessel) values of vermilion snapper in the Gulf from 1984 through 2002 are depicted in Figure 5.3. Dockside values are expressed both in terms of current year dollars and 2002 dollars (i.e., adjusted for inflation). Since 1983, landings of vermilion snapper have risen from approximately 0.5 mp to their peak of 2.7 mp in 1993 (Fig. 5.1). After 1993, landings gradually declined and reached a low of about 1.47 mp in 2000. Landings increased over the last three years. The corresponding dockside, or ex-vessel, revenues tracked the trends in landings, with a peak of about $4.36 million in 1993. The relatively wide difference in current and real (2002) dockside revenues in the early years reflects the relatively high inflation rate in the 1980's, while the small difference between the two curves in more recent years reflects the low inflation rate for the period. Merely looking at the level of revenue shown in Figure 5.3, it appears that while vermilion snapper is not a major fishery, it is not an inconsequential source of vessel revenues either.

Figure 5.3. COMMERCIAL LANDINGS AND DOCKSIDE VALUE OF VERMILION SNAPPER IN THE GULF OF MEXICO, 1984-2002

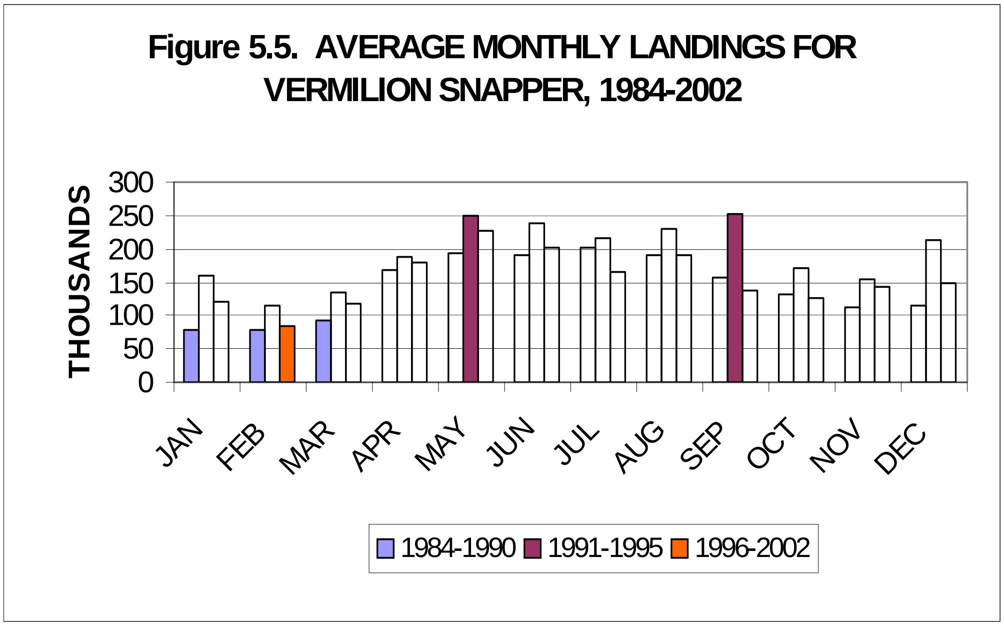


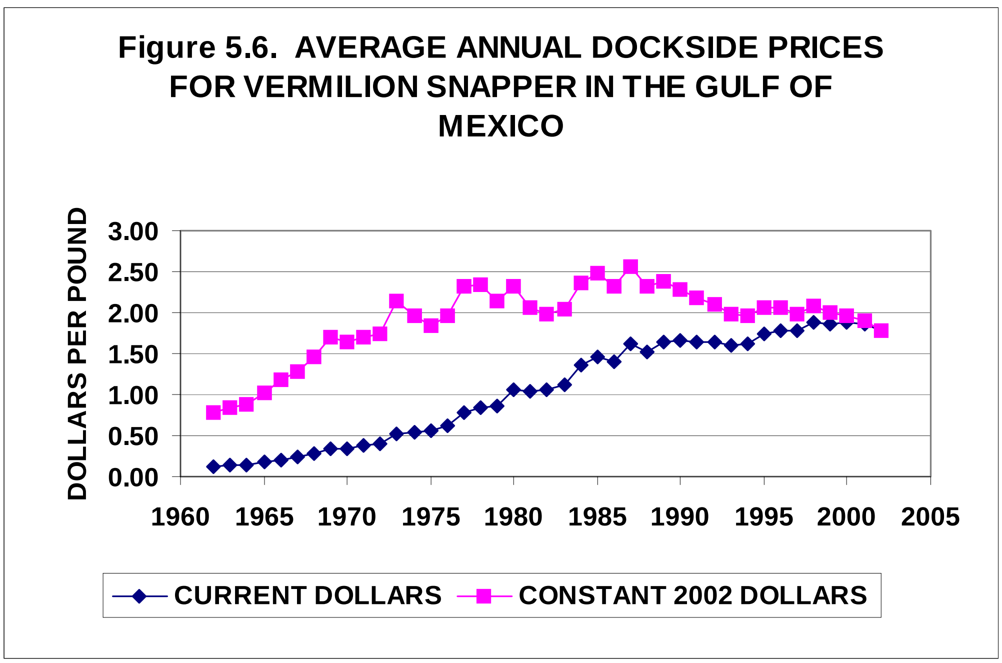
Florida has been the dominant state in terms of landings of vermilion snapper, such that the direction of movement in total landings of vermilion snapper mirrors that of landings in Florida (Figure 5.4). Historically, most vermilion snapper are landed in Florida. In recent years, 1998-2002, Florida harvested an average of 47 percent of the total, whereas Louisiana, Texas and Alabama harvested an average of 34 percent, 16 percent, and 1 percent, respectively. Mississippi's landings are higher than Alabama for those years when landings are reported but are confidential during the recent period. In the last 10 years, landings of vermilion snapper in Texas have slightly but steadily increased while landings in Florida have experienced substantial declines (Figure 5.4).



Displayed in Figure 5.5 is the monthly distribution of vermilion snapper landings for the period 1984-2002. Average monthly landings for three sub-periods are shown to examine the effect of regulations. The first period (1984-1990) refers to the time when regulations were minimal; the second (1991-1995) refers to the time when regulations on the reef fish fishery were increasing and vermilion snapper in particular started to become more stringent; and the third (1996-2002) pertains to the period when more regulatory changes occurred in the reef fish fishery, including the increase in size limit for vermilion snapper from 8 inches to 10 inches TL. As shown in this figure, the monthly distribution of vermilion snapper landings has remained relatively stable over the years. From October to March, monthly landings were relatively lower than from April to September. In addition, monthly landings have not significantly differed for the three time periods, with the possible exception of the months of September and December for the period 1991-1995.

Possibly due to the absence of marked changes in the monthly landings of vermilion snapper, the price for vermilion snapper has not substantially fluctuated. Moreover, the gradual increase of vermilion snapper landings in the early years and their subsequent gradual decline in the later years must have contributed to a relatively stable price structure for vermilion snapper. As can be seen from Figure 5.6, nominal (current year) price for vermilion snapper has gradually increased over the years. This is true despite the decline in landings in the most recent years, which could potentially exercise an upward pressure on prices. Despite a reported close interaction between the red snapper and vermilion snapper fisheries, prices for vermilion snapper have not experienced the type of wild swings in prices that occurred in the red snapper fishery. One other point worth noting in Figure 5.6 is the fact that while nominal prices have increased over the years, real prices (in 2002 dollars) have declined since the late 1980's.





NOAA Fisheries lists 27 gear codes (including not coded) for which vermilion snapper were landed during the period 1955-2002 (Table 5.1). Of these gear codes, the top four comprise nearly 98 percent of the reported landings. For those fish that could be identified to specific gear types, most fish (95percent) are landed with various forms of hand lines and rod and reels. Several types of longlines together account for about 4 percent and gear not coded accounts for about 7 percent. Trips when multiple gear types are used are categorized as combined gears and account for about 57 percent of the commercial harvest. The harvest for these trips cannot be proportioned to the gear types used.

Table 5.1. Pounds landed, percent of total, and cumulative percent by gear for vermilion snapper caught in the Gulf of Mexico. Landings are totaled over the time period 1955-2002

Gear type	Pounds landed	Percent of total	Cumulative percent
Combined Gears	22,415,829	57.18	57.18
Lines Hand, Other	12,385,616	31.59	88.77
Not Coded	2,737,036	6.98	95.75
Reel, Electric or Hydraulic	881,386	2.25	98.00
Lines Long, Reef Fish	564,567	1.44	99.44
Troll & Hand Lines Combined	109,500	0.28	99.72
Otter Trawl Bottom, Shrimp	86,053	0.22	99.94
Pots And Traps, Fish	18,865	0.05	99.99
Pots And Traps, Blue Crab	3,209	less than 0.01%	greater than 99.99%
Pots And Traps, Spiny Lobster	791		
Otter Trawl Bottom, Fish	500		
Lines Long Set With Hooks	259		
Diving Outfits, Other	107		

Summary characteristics of vessels that landed vermilion snapper in the last three years (2000-2002) are presented in Table 5.2 taken from Waters (2004). This table combines information from logbooks, general canvass, and a survey of commercial reef fish vessels in the Gulf. An annual average of 473 boats, taking 3.745 trips, commercially landed vermilion snapper. Most of these boats (82 %) used vertical line gear, and they accounted for almost all (99 %) vermilion snapper landings. Boats that landed vermilion snapper also landed other species (Table 5.2). In fact, catches of other species by vertical line boats were about 2 to 4 times those of vermilion snapper. Boats using other gear types appear to catch vermilion snapper in a more incidental way than boats using vertical line.

Table 5.2. Summary characteristics of boats landing vermilion snapper, 2000-2002 (thousand pounds, thousand dollars)

	2000		2001		2002		Ave. 2000-2002	
	V. Line	O. Gear	V. Line	O. Gear	V. Line	O. Gear	V. Line	O. Gear
No. Of Boats	381	84	395	92	393	74	390	83
No. Of Trips	3,279	228	3,398	256	3,827	248	3,501	244
Pounds (Vermil)	1,489	12	1,732	15	2,049	22	1,757	16
Revenues (Vermil)	2,815	23	3,243	28	3,666	39	3,241	30
Pounds (O.Species)	4,358	680	4,825	969	5,353	786	4,845	812
Revenues (O. Species)	7,902	1,295	9,325	1,872	10,452	1,479	9,226	1,549
Net Revenues	6,347	964	7,870	1,456	8,890	1,126	7,702	1,182

Source: Waters (2004).

Note:

Vermil = vermilion snapper

O. species = other species caught by boats in the same trip as vermilion snapper

Net revenues = revenues less routine trip costs

V. Line = Vertical lines

O. Gear = Other gear

Commercial vessels landing reef fish (including vermilion snapper) are required to sell their catch only to fish dealers with federal reef fish permits. Based on information from the permit file, about 227 dealers possess these permits. Most of these dealers 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. There are no specific income or sales restrictions to secure a federal permit for dealers, so the total number of dealers can vary from year to year. Some may be operational one year but not in another year.

As part of their requirement to submit logbook reports to NMFS, reef fish fishermen have to identify the dealers to whom they sold their fish. Based on 1997-2002 logbook information, an average of 154 reef fish dealers were actively buying vermilion snapper. These dealers were distributed around the Gulf states as follows: 7 in Alabama, 96 in Florida, 22 in Louisiana, 7 in Mississippi, and 22 in Texas. Since these numbers are averages, they could differ from the ones based on permit file, but in any one year, the number of dealers reported per state in logbooks does not exactly match that contained in the permit file. These dealers are likely to be the same ones that also purchase red snapper. For the period 1997-2002, dealers in Florida purchased annually an average of $1.6 million of vermilion snapper, followed by dealers in Louisiana with purchases of $1.1 million, and dealers in Texas with purchases of $509 thousand. Dealers in Mississippi purchased $125 thousand worth of vermilion snappers and those in Alabama, $31 thousand. These dealers may hold multiple types of permits, and lacking knowledge of 100 percent of their business revenues, it is not possible to determine what percentage of their business comes from vermilion snapper fishing activity.

Antozzi (2004) developed a quick view of the commercial market for vermilion snapper based on information from some fish dealers in the Gulf. The following are some salient features:

- vermilion snapper occupies a market niche for the small snapper fresh market
- the market is about 2/3 retail (for home preparation) and 1/3 restaurant
- consumers are dominated by ethnic groups, primarily of Asian and Caribbean extraction
- New York, Toronto, and Montreal are the best markets while California and the Gulf are less significant markets
- fish dealers generally adopt a 3-tier or 4-tier pricing, with the smallest (½ to 3/4 lb. or twinkie) commanding a price range of $1.25 to $1.75 per pound and the largest (2 lbs. and up), $2.00 to $2.50 per pound
- wholesale prices at the New York Fulton Fish Market average at $0.50 to $1.00 per pound above the ex-vessel prices
- significant competition comes from snapper imports from Mexico, Panama, and Venezuela

5.4.3 Recreational fishery

The recreational component of the vermilion snapper fishery in the Gulf includes charter boats, headboats (or party boats), and private anglers fishing from shore or private or rental boats. As noted earlier in this section, no TAC has been established for vermilion snapper so there has been no issue related to allocation or quota closures. Essentially, the recreational sector of the vermilion snapper fishery has been regulated via a size limit (currently 10 inches TL) and bag limit as part of the 20-reef fish aggregate bag limit.

Vermilion snapper landings have been recorded through the MRFSS since 1979; however, data collected prior to 1981 is generally not used as these data appear to be less reliable than data from later effort (Porch and Cass-Calay, 2001). In addition, headboats were no longer sampled by MRFSS since 1985 when the NOAA Fisheries' Headboat Survey began sampling this segment of the fishery. The Texas Parks and Wildlife Department has conducted their own recreational survey since 1983 and so MRFSS was discontinued in this state.

Headboats are responsible for about 37 percent of the GOM recreational landings of vermilion snapper; while charter vessels harvest an average of 47 percent and private recreational fishers average 16 percent (Figure 5.2). Manmade and shore landings make up a small part of the catch. Trends in landings between all three sectors show similar downward trends from 1986 through 1998. From 1998 through 2002, landings were variable but show no trend. Peak landings occurred in the head boat fishery in 1992 at 655,948 pounds. Peak landings occurred in the charter fishery in 1991 at 665,443 pounds and landings by private recreational fishers peaked in 1992 at 253,816 pounds. All of these peaks were in the same time frame and coincided with peaks in commercial landings.

Most recreationally caught vermilion snapper are also landed in Florida (Table 5.3). From 1984 through 2002, Florida has contributed 62 percent of the catch, followed by Alabama at 25 percent, Texas at 11 percent, Louisiana at 1.5 percent, and Mississippi at less than one percent. While the percentage of fish landed in Florida is generally greater than 50 percent, Alabama landings were larger in some years .

Table 5.3. Recreational landings of vermilion snapper by state from 1981 to 2002. Values are in numbers.

Year	Florida	Louisiana	Alabama	Mississippi	Texas
1981	79,180	23,793	28,619	0	1,058
1982	451,677	35,278	27,812	0	82,635
1983	80,612	17,909	21,155	0	58,117
1984	57,675	489	127,097	0	70,357
1985	304,819	31,369	0	0	0
1986	540,747	1,244	47,508	0	52,555
1987	639,663	1,039	41,646	0	56,899
1988	678,959	0	109,223	0	49,882
1989	390,006	0	116,780	0	74,512
1990	211,260	1,563	335,687	493	102,211
1991	667,157	4,135	182,255	10,646	82,548
1992	349,620	18,383	284,590	431	73,085
1993	410,392	1,149	331,827	1,266	73,835
1994	450,493	8,780	144,959	231	115,011
1995	452,154	4,428	242,816	0	101,678
1996	149,851	2,373	115,857	0	73,658
1997	129,824	4,167	181,688	967	79,940
1998	99,643	2,536	106,347	0	62,559
1999	234,701	2,041	149,933	688	42,259
2000	133,678	0	24,582	0	1085
2001	262,838	6,150	133,375	0	11447
2002	206,577	3,777	95,736	0	5402
Total	6,981,507	170,603	2,835,985	14,722	1,270733

Table 5.4 shows the trend in recreational trips targeting and catching vermilion snapper based on MRFSS data. The total number of recreational trips in the GOM was relatively stable at below 20 million in the early years and above 20 million in the last three years. Individual angler trips targeting vermilion snapper were rare relative to overall recreational trips (less than 0.05 percent). This condition probably places vermilion snapper at the lower end of targeted species, although it should be noted that most angler trips have no particular species targeted. Targeted

trips for vermilion snapper follow no perceptible trend, but large fluctuations appear during certain periods. For example, targeted trips rose from 532 in 2000 to 11,584 the very next year. Catch trips for vermilion snapper are substantially larger than target trips. The number of trips catching vermilion snapper has ranged from approximately 108,000 to 170,000 since 1999. Throughout the period 1986-2002, trips catching vermilion snapper made up less than one percent of all recreational trips. Just like targeted trips, catch trips show no perceptible trend, but unlike targeted trips, catch trips have not experienced very wide fluctuations from year to year since 1986.

Table 5.4. Recreational vermilion snapper effort in the Gulf of Mexico based on MRFSS data, 1986-2002.

	Target Trips		Catch Trips		Total Trips
	Level	% to Total	Level	% to Total	
1986	690	0.00	99,870	0.52	19,039,944
1987	5,445	0.03	154,162	0.96	16,089,446
1988	4,549	0.02	176,315	0.89	19,743,299
1989	605	0.00	122,911	0.79	15,622,510
1990	3,722	0.03	95,163	0.71	13,310,226
1991	9,927	0.05	155,700	0.86	18,173,598
1992	1,217	0.01	166,950	0.92	18,079,250
1993	2,157	0.01	242,039	1.39	17,431,009
1994	1,118	0.01	193,768	1.11	17,503,737
1995	0	0.00	201,653	1.16	17,390,316
1996	1,988	0.01	110,851	0.65	17,032,778
1997	1,121	0.01	146,120	0.79	18,593,084
1998	1,486	0.01	85,452	0.51	16,703,364
1999	4,800	0.03	170,847	1.07	15,893,729
2000	532	0.00	108,417	0.52	21,017,783
2001	11,584	0.05	165,519	0.72	22,889,697
2002	6,985	0.04	146,282	0.74	19,665,578

Notes: Target trips are recreational trips taken by anglers who specified vermilion snapper as their first or second target species regardless of whether vermilion snapper was caught or not. Catch trips are recreational trips taken by anglers who caught vermilion snapper regardless of their target preference. Total trips are recreational trips taken by all anglers in the Gulf of Mexico regardless of the species targeted or caught.

Table 5.5 contains a breakdown of recreational vermilion snapper effort by fishing mode. For both target and catch trips, the shore mode has historically accounted for a relatively small component of recreational vermilion snapper effort. In fact, there are virtually no target trips for the shore mode and catch trips were observed mainly in the early 1990's. Both the charter and private/rental modes have accounted for most of targeted and catch trips for vermilion snapper. Unlike the case with red snapper where targeted and catch trips have been dominated by the private/rental mode, the charter mode has accounted for relatively more targeted and catch trips for vermilion snapper than the private mode. This advantage of the charter over the private mode is not as evident in the targeted trips as it is in the catch trips. Private mode catch trips are about a quarter to one-half of charter mode catch trips.

Table 5.5. Recreational vermilion snapper effort in the Gulf of Mexico based on MRFSS data, by mode, 1986-2002.

	Target Trips			Catch Trips		
	Shore	Charter	Private	Shore	Charter	Private
1986	0	690	0	0	79,729	20,141
1987	0	519	4,926	0	93,757	60,404
1988	0	0	4,549	0	113,928	62,387
1989	0	605	0	0	88,656	34,255
1990	0	0	3,722	7,131	65,487	22,545
1991	0	8,691	1,237	14,908	99,867	40,926
1992	0	332	885	3,558	81,668	81,724
1993	352	589	1,216	3,214	151,658	87,167
1994	0	553	565	0	147,833	45,935
1995	0	0	0	0	132,826	68,827
1996	0	0	1,988	0	75,542	35,309
1997	0	1,121	0	0	122,331	23,788
1998	0	530	957	0	71,703	13,749
1999	0	1,272	3,528	0	120,946	49,901
2000	0	247	285	0	86,776	21,641
2001	0	224	11,360	0	87,914	77,606
2002	0	3,162	3,823	832	79,845	65,605

5.4.3.1 Private anglers

About 2.7 million anglers fished for marine species in the GOM. These anglers targeted drum about 35 percent of the time and spotted sea trout about 33 percent of the time. Red snapper is the most common reef fish targeted by approximately 4.5 percent of intercepted anglers. Vermilion snapper are not as highly targeted as red snapper.

Social and economic characteristics of private anglers are collected periodically by the Marine Recreational Economics Survey through an economic add-on survey. The following discussion relies heavily on the economic data add-on conducted during 1997-98 as summarized in Holiman (1999 and 2000). The typical angler in the GOM is 44 years old, male (80 %), white (90 %), and employed full time (92 %), with a mean annual household income of $42,700, and has fished in the state for an average of 16 years. The average number of fishing trips taken in the 12 months preceding the interview was about 38 and these were mostly (75 %) one-day trips where expenditures on average were less than $50. Seventy-five percent of surveyed anglers reported that they held saltwater licenses, and 59 percent of them 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 (Holiman, 1999) when fishing on a party/charter or rental boat. About 76 percent of these anglers were employed or self-employed and about 23 percent were unemployed, primarily due to retirement.

5.4.3.2 Charter boats, headboats and party boats

There are about 1,907 charter boats/headboats/party boats with permits that allow them to harvest both reef fish and coastal pelagic fish within the Gulf states. The majority of these permits are in Florida (1,194), followed by Texas (300), Louisiana (162), Alabama (159) and Mississippi (92) (NOAA Fisheries' permit file as of June 2001).

Between 1987 and 1997, several major changes occurred in the Florida charter and headboat industry. The number of charter boats on Florida's west coast increased by about 16 percent to 615 vessels and the number of charter boats in the Florida Keys increased about 12 percent to 230 vessels. Most of this growth occurred along the Florida peninsula coast; in contrast, the number of charter boats in the Panhandle region decreased by 8 percent. The number of headboats in the Florida Gulf increased about 20 percent, primarily along the southwest Florida coast. In contrast, the number of headboats in the Florida Keys decreased 11 percent. Charter passenger trips remained stable at about 848,458 passengers on 180,523 trips in 1997 while headboat passenger trips increased to 1,137,362 passengers on 44,655 trips in 1997 (Holland et al., 1999).

Between 1987 and 1997, a number of changes also occurred in the charter and headboat industry in Alabama, Mississippi, Louisiana, and Texas. The number of charter boats increased about 105 percent to 430 vessels, with the increase occurring primarily in Alabama, Mississippi, and Texas. In contrast, the number of headboats decreased 12 percent to 23 vessels. The number of passenger trips taken on both charter and headboats increased threefold. In 1997, there were 318,716 charter boat passenger trips and 117,990 headboat passenger trips (Sutton et al., 1999).

5.4.3.3 Florida charter and headboat industry

Holland et al. (1999) estimated there were 615 charter and 53 headboats located along the Florida Gulf in 1998 (excluding the Keys). Of the charter boat operators sampled in 1998, 52.9 percent held Gulf reef fish charter permits, 56.8 percent held coastal migratory pelagic permits, 14.3 percent held South Atlantic snapper/grouper permits, 5.2 percent held swordfish permits, 7.8 percent held shark commercial permits, 26.6 percent held king and Spanish mackerel commercial permits, 6.5 percent held South Atlantic snapper/grouper commercial permits, 13.7 percent held red snapper commercial permits, and 22.1 percent held commercial Gulf reef fish commercial permits. Of the headboat operators sampled, 76.5 percent held Gulf fish reef charter permits, none held Gulf reef fish commercial permits, and 70.6 percent held coastal migratory pelagic charter permits.

About one-third of Florida charter boats targeted three or less species, two-thirds targeted five or less species and 90 percent targeted nine or less species. About 40 percent of these charter boats did not target particular species. The species targeted by the largest proportion of Florida charter boats were king mackerel (46%), grouper (29%), snapper (27%), dolphin (26%), and billfish (23%). In the Florida GOM, the species receiving the most effort were grouper, king mackerel and snapper. About one-fourth of Florida headboats targeted three or less species, three-fourths targeted four or less species, and 80 percent targeted five or less species. About 60 percent of headboats did not target any particular species. The species targeted by the largest proportion of Florida headboats are snapper and other reef fish (35%), red grouper (29%), gag grouper (23%), and black grouper (16%). In Florida Gulf, the species receiving the most effort were snapper, gag, and red grouper.

Major activity centers for charter boats in Florida are: Destin, Ft Myers, Ft Myers Beach, Islamorada, Key West, Marathon, Naples, Panama City, Panama City Beach, and Pensacola. The average charter boat was 37 feet in length and carried a maximum of 6 passengers. Most

(88 %) had fiberglass hulls, were diesel fueled (76%) with single (41%) or dual engines (59%). Most offered half-day trips and full-day trips. Only 15 percent offered overnight trips. Average boat fees were $348 for half-day; $554 for full-day, and $1,349 for overnight trips. Forty-seven percent of Florida trips were half-day, 50 percent were full day and 3 percent were overnight trips. Almost all charter trips (98%) were made to federal waters (Holland et al., 1999).

Major activity centers for headboats in Florida are: Clearwater, Destin, Ft. Myers, Ft. Myers Beach, Islamorada, Key West, Marathon, Panama City, and Panama City Beach. The average headboat in Florida was 62 feet in length and carried a maximum of 61 passengers. About 51 percent had fiberglass hulls and are diesel fueled (97%) with single (8%) or dual (92%) engines. Most (86%) offered half-day trips and full-day (64 %) trips but one in the survey offered overnight trips. Average Florida headboat fees were $29 for half-day and $45 for full day trips. Of the total number of trips, 80 percent were half-day, and 20 percent were full day. About two-thirds of these trips were in federal waters offshore and 36 percent of the headboats took 100 percent of their trips in federal waters (Holland et. al., 1999).

The mean age of Florida charter boat operators was 46 years with 82 percent between 31 and 60 years. Sixty-three percent were married and 15 percent were divorced. Florida charter boat operators had an average of 13 years of education, with 95 percent having at least 12 years of education and 34 percent with 16 years or more. About 98 percent of the operators were male. Most (90%) operated on a full-time basis and about 61 percent reported that all of their household income was from the charter business. Eighty percent had lived in their home port county for more than 10 years and had operated their boat out of their home port county for an average of 15 years. Twenty-four percent of them belonged to their local chamber of commerce, and 34 percent belonged to their local charter boat association (Holland et. al., 1999).

The mean age of Florida headboat operators was 48 years with 84 percent between the ages of 31-60. Seventy-eight percent were married and 11 percent were divorced. Florida headboat operators had an average of 13 years of education, with 100 percent having at least 12 years of education and 22 percent with 16 years or more. About 86 percent of the operators were male. All operated on a full-time basis and about 92 percent reported that all of their household income was from their headboat business. Ninety-four percent had lived in their homeport county for more than 10 years and had operated their boat out of their homeport county for an average of 19 years. Eighty-one percent of them were members of their local chamber of commerce and 44 percent were members of a local headboat association (Holland et al., 1999).

5.4.3.4 Charter and headboat industry in Alabama, Mississippi, Louisiana, and Texas

Most of the following discussion is taken from the study, "A Cross-Sectional Study and Longitudinal Perspective on the Social and Economic Characteristics of the Charter and Party Boat Fishing Industry of Alabama, Mississippi, Louisiana and Texas," by Stephen G. Sutton, Robert B. Ditton, John R. Stoll and J. Walter Milon (1999). Some information from this study should be viewed with caution since some charter industry participants have expressed concerns with respect to the financial sections of the study, notably the underestimation of revenues and cost of engines.

Sutton et al. (1999) estimated there were 430 charter and 23 headboats operating out of the four-state area. Of the charter boat operators sampled in 1998, 85.4 percent held Gulf reef fish charter permits, 83.3 percent held coastal migratory pelagic permits, 5.2 percent held South Atlantic snapper/grouper permits, 4.2 percent held swordfish permits, 6.3 percent held shark commercial permits, 6.3 percent held king and Spanish mackerel commercial permits, 2.1 percent held South Atlantic snapper/grouper commercial permits, 14.6 percent held red snapper commercial permits, and 11.5 percent held commercial Gulf reef fish permits. Of the headboat operators sampled, 100 percent held Gulf reef fish charter permits, 95.2 percent held coastal migratory pelagic fish charter permits; no headboat operators held South Atlantic snapper/grouper permits, swordfish commercial permits, shark commercial permits, king and Spanish mackerel commercial permits, South Atlantic snapper/grouper commercial permits, or red snapper commercial permits, and 9.5 percent held Gulf reef fish commercial permits.

The average charter boat was 39 feet long, with a total passenger capacity of 12 people. Alabama had the largest charter boats at an average length of 46 feet and an average capacity of 15 passengers while Texas had the smallest charter boats at an average length of 35 feet and an average capacity of 9 passengers. Most had fiberglass hulls (81 %), were diesel fueled (72 %) with single (27 %) or dual engines (73 %). Most offered half-day trips (63 %) and full-day trips (98 %). About 48 percent offered overnight trips. Average boat base fees were $417 for half-day, $762 for full-day, and $1,993 for overnight trips. Of the total number of trips taken by operators, 16 percent were half-day, 78 percent were full day, and 6 percent were overnight trips. (Sutton et al., 1999).

The average headboat was 72 feet long, with a total passenger capacity of 60 people. Most boats had an aluminum hull (67 %) and were diesel fueled (100 %) with dual (100 %) engines. All boats offered half-day trips, 81 percent offered full-day, and 57 percent offered overnight trips. Average headboat base fees were $41 for half-day trips, $64 for full-day trips and $200 for overnight trips. Of the total number of trips, 25 percent were half-day, 67 percent full-day and 8 percent overnight trips. (Sutton et. al., 1999).

The majority of charter boats in the four-state area reported targeting snapper (91%), king mackerel (89%), cobia (76%), tuna (55%), and amberjack. The species receiving the largest percentage of effort by charter boats in the four-state area were snapper (49%), king mackerel (10%), red drum (6%), cobia (6%), tuna (5%), and speckled trout (5%). The majority of headboat/party boat operators reported targeting snapper (100%), king mackerel (85%), shark (65%), tuna (55%), and amberjack (50%). The species receiving the largest percentage of total effort by headboats/party boats in the four-state area were snapper (70%), king mackerel (12%), amberjack (5%), and shark (5%).

Major activity centers for charter boats in the four-state area are: South Padre Island, Port Aransas, and Galveston/Freeport in Texas; Grand Isle-Empire-Venice in Louisiana; Gulfport-Biloxi in Mississippi; and Orange Beach-Gulf Shores in Alabama. Major activity centers for headboats in the four-state area are: South Padre Island, Port Aransas, and Galveston/Freeport in Texas and Orange Beach-Gulf Shores in Alabama

The mean age of charter boat operators in the four-state area was 47 years, with 86 percent between the ages of 31 and 60. Eighty-two percent were married and 8 percent were divorced. Charter boat operators had an average of 14 years of education, with 95 percent having at least 12 years of education and 26 percent with 16 years or more. Most (91%) operated on a full-time basis, and about 50 percent reported that all of their household income was from the charter business. About 78 percent had lived in their home port, and on average they had lived near their home port for 24 years and had operated their boat out of their home port county for an average of 14 years. Forty percent of them belonged to their local chamber of commerce, 60 percent belonged to their local charter boat association, and 61 percent were members of some other fishing-related association. (Sutton et. al., 1999).

The mean age of headboat operators in the four-state area was 49 years, with 67 percent between the ages of 31and 60. Eighty-one percent were married and none were divorced. Headboat operators had an average of 12 years of education, with 81 percent having at least 12 years of education and 10 percent with 16 years or more. All operated on a full-time basis and about 78 percent reported that all of their household income was from their headboat business. Ninety-one percent had lived near their home port, and on average they had lived near their home port for 26 years and had operated a headboat out of the port for 13 years. Eighty-one percent of them were members of their local chamber of commerce, 52 percent were members of a local headboat association, and 44 percent were members of some other fishing-related association (Sutton et al., 1999).

5.4.4 Fishing communities

A "fishing community" is defined in the MSFCMA, as amended in 1996, as "a community which is substantially dependent on or substantially engaged in the harvesting or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew and United States fish processors that are based in such community" (Magnuson-Stevens Act section 3(16)). The NSGs (May 1, 1998; 63 FR 24211) define a fishing community as a social or economic group whose members reside in a specific location and share a common dependency on commercial, recreational, or subsistence fishing, or on directly related fisheries-dependent service and industries (for example, boatyards, ice suppliers, tackle shops).

Several studies have been conducted in various parts of the country to determine and/or characterize fishing communities. In the Gulf of Mexico, some studies have been completed that detail some of the characteristics of the identified fishing communities. More information is now being collected by NOAA Fisheries to describe some Gulf coast fishing communities more fully.

Some notable issues regarding the characteristics of fishing communities potentially affected by regulations on the reef fish fishery are contained in Amendment 22 to the Reef Fish FMP and Secretarial Amendment 1. Salient features of discussions on fishing communities contained in these documents are highlighted below.

The literature on fishing dependent communities addresses three areas: identification of the communities, selection of variables appropriate for assessment, and the assessment method itself. Community identification and selection criteria can be very complex or very simple. A simple first level approach would involve examining social and demographic variables at the county level where some fishing activity occurs. A more complex approach involves attempting to gather data and information on as small an entity as possible that qualifies as a fishing community.

Dyer and Griffith (1996) conducted a baseline study of communities dependent on the multispecies groundfish fishery in the Northeast, drawing on the concept of Natural Resource Community (NRC) as a basis of their definition of a fishery dependent community. NRCs exist where individuals have dependence on a "renewable natural resource and are rooted in local history and local traditions and derive social and cultural identity from a sense of place whose life rhythms rise and fall with populations of fish, seasonal conditions at sea, and the increasingly complex regulatory environment entangling their tradition".

Wilson et al. (1998) conducted a social and cultural impact assessment of the Highly Migratory Species (HMS) FMP and the amendment to the Atlantic Billfish FMP. The study selected a sample of fishing communities in Puerto Rico, Louisiana, Florida, North Carolina, New Jersey, and Massachusetts to illustrate the range of potential impacts of the proposed regulatory changes. Wilson et al. (1998) outlined three categories of impacts on their selected communities: those that "affect the volume of money that is going through the community;" those that "affect the flexibility of the fishing operations;" and those that "impose direct costs on fishing operations." In order to measure social and cultural impacts, they refer to the "economic vulnerability" of the fishery in terms of competition faced in supply and marketing and the extent of social capital or community networks available.

Griffith (1996) categorized fishermen's dependence on resources in North Carolina by examining: 1) motivation for fishing (e.g., income, recreation, subsistence); 2) percentage of income derived from fishing; 3) time commitment (months/years of experience); 4) flexibility index, from low to high, measuring the numbers of gears, fisheries and species with which the fisherman is engaged; 5) number of different kinds of vessels; 6) number of crew involved in fishing operations; 7) relationship to the seafood marketing/processing sector; 8) principal social problems; 9) principal biological issues; 10) most desired regulations; and 11) most disruptive regulations. Using this system, fishermen were grouped into seven categories on a continuum from full time, owner operator commercial fisherman to affiliated recreational fisherman (angler). This classification scheme goes beyond simple ranking by income earned from the fishery and introduces economic relationships with crew and market.

McKay (2000) suggested that assessments of regulatory impacts on fishing-dependent communities consider not only geographic definitions of communities and economic characteristics therein, but also the level of vulnerability or resilience, of fishing communities and operations. That is, questions of fishing dependence and "sustained participation" in fisheries must consider how able participants in a given fishery can move among fishery sectors, and how able they are to move out of the fishery altogether into alternative employment opportunities.

Jacob et al. (2001) developed a protocol for defining and identifying fishing dependent communities by employing central place theory to identify communities in Florida. A central place is where services, goods and other needs are met for the residents in the central place, as well as for those in surrounding hinterlands. Using their protocol of defining fishing-dependent communities, the authors initially determined 5 communities as commercially fishing dependent: Steinhatchee, Apalachicola, Panama City, Ochopee/Everglades City, and Panacea.

In Secretarial Amendment 1 (GMFMC, 2003b), an attempt was made to identify fishing communities that would be affected by the red grouper rebuilding plan. The following criteria were used to include communities. First, an area was included if it was associated with commercial vessel reef fish permit holders using these gears: longline, spears, traps, or vertical lines. Second, an area was included if it was associated with greater than 10 charter, party, or headboat reef fish permit holders. Third, an area was included if it was in the top 20 locations for grouper sales in the GOM (top 85%). Fourth, an area was included if it was identified as a fishing community or activity center by a previous study. Fifth, an area was included if there were more than 20,000 private anglers holding licenses in the county where the proposed area was located. Using these criteria, 38 cities/ports around the GOM were identified where any of these types of grouper activity occurred. Being included in this universe does not imply that a significant amount of grouper related fishing activity occurred in the area, simply that some activity potentially occurred and that activity might be impacted by the rebuilding plan or other regulations in Secretarial Amendment 1.

The addresses of permit owners for the 156 bottom longline vessels are clustered in Florida: Cortez, Madeira Beach, Miami, St. Petersburg, and Tampa.

The permit owner addresses for 894 vertical line vessels are clustered in: Apalachicola, Carrabelle, Cedar Key, Clearwater, Crystal River, Destin, Ft. Myers, Indian Rocks Beach, Madeira Beach, Marathon, Panacea, Panama City, Pensacola, Nokomis, St. Petersburg, Steinhatchee, Tampa, Tarpon Springs, and Yankeetown in Florida; Orange Beach, AL; New Orleans, LA; Pascagoula, MS; and Houston, TX.

The permit owner addresses for vessels using fish traps are clustered in: Destin, Homosassa, Naples, Steinhatchee, and Tarpon Springs, FL. Vessels used for diving to catch reef fish do not show a clear cluster but are found in several areas of the Gulf. There are more than three reef fish permitted dealers with a facility in these locations: Cameron, LA; Galveston, TX; and Destin, Ft. Myers Beach, Key West, Madeira Beach, Marathon, Panama City, Pensacola, St. Petersburg, Tampa, and Tarpon Springs, FL.

The permit owner addresses for charter/headboat holders of reef fish permits are clustered in these areas: Apalachicola, Carrabelle, Clearwater, Destin, Marathon, Naples, Panama City Beach, Pensacola, Sarasota/Nokomis/Englewood in Florida; Orange Beach, AL; Biloxi, MS; Chauvin, LA; Freeport, Galveston, Houston, Port Aransas in Texas. In June 2001, a charter vessel/headboat permit moratorium was submitted to NOAA Fisheries for approval and implementation. It should be noted that in the NOAA Fisheries' data files, some owners listed ports where vessels were documented rather than actual homeports.

In general, these areas have small populations, many with less than 7,000 persons (Apalachicola, Carrabelle, Cedar Key, Cortez, Homosassa, Ft. Myers Beach, Everglades City, Madeira Beach, and Stock Island). Several of these areas have an unusually high rate of less than high school graduation, some as high as 50 percent. With exceptions (Carrabelle, 13.6% and Cedar Key, 12.2%) many of the areas have relatively low percentages, 2-3 percent, counted as employed in agriculture, forestry and fishing. These types of demographic statistics provide an idea of the background and labor market conditions within which the various fishing activities operate. Small, isolated areas with low educational attainment among the labor force indicate relatively few alternatives for the labor force. In these cases, losing fishing as a labor choice would impact the area relatively more than equally situated areas with a more educated workforce.

The Generic Essential Fish Habitat Amendment (GMFMC, 2003a) provides more extensive characterization of fishing communities throughout the Gulf coasts. The fishing communities included in the characterizations are: (1) Alabama: Fairhope, Gulf Shores, Orange Beach, Bayou La Batre, and Dauphin Island; (2) Florida: Pensacola, Gulf Breeze, Ft. Walton Beach, Destin, Panama City, Panama City Beach, Port St. Joseph, Apalachicola, Eastpoint, Carabelle, St. Marks, Horseshoe Beach, Cedar Key, Yankeetown, Inglis, Crystal River, Homosassa, New Port Richey, Tarpon Springs, Clearwater, Madeira Beach, St. Petersburg, Tampa, Cortez, Matlacha, Bokeelia, Ft. Myers Beach, Naples, Marco Island, Everglades, Key Largo, Islamorada, Marathon, Big Pine Key-Summerland Key, and Key West; (3) Louisiana: Venice, Empire, Grand Isle, Golden Meadow, Cutoff, Chauvin, Dulac, Houma, Delcambre, Morgan City, and Cameron; (4) Mississippi: Pascagoula, Gautier, Biloxi, and Gulfport; and, (5) Texas: Port Arthur, Galveston, Freeport, Palacios, Port Lavaca, Seadrift, Rockport, Port Aransas, Aransas Pass, Brownsville, Port Isabel, and South Padre Island.

These various areas identified as fishing communities include practically all fishing communities associated with the vermilion snapper fishery, since this fishery is closely associated with the rest of the reef fish fishery. The following are the major homeports for dealers of vermilion snapper: Bon Secour in Alabama; Apalachicola, Ft. Walton Beach, Panama City, Pensacola, St. Petersburg and Tarpon Springs in Florida; Cameron, Golden Meadow, Grand Isle, and Venice in Louisiana; Pascagoula, Mississippi; and, Galveston, Texas. Because this information is based on logbook records, it is highly likely that these are the cities where dealers of vermilion snapper conduct their business.

5.5 Impacts of management alternatives

5.5.1 Biological reference points and status determination criteria

Discussion in Section 4.1 and 8.1 comprise part of the impact analysis for RIR purposes, and it is incorporated herein by reference.

The setting of MSY, F_{MSY}, and B_{MSY} parameters does not by itself create socioeconomic impacts. However, it affects the determination of OY targets, MSST, and eventually the setting of TACs and associated management measures. Overly conservative parameters can lead to greater conservation than necessary and greater short-term socioeconomic loss from forgone yield due to management restrictions. Conversely, setting the parameters at an insufficiently conservative level can produce greater short-term socioeconomic benefits from increased harvests, but induce long-term losses due to the stock being fished to a level less than the true MSY level.

Alternative 1 for MSY, OY, MFMT, and MSST does not comply with the provisions of SFA so that it is not a viable alternative. Alternative 1 preserves short-term socioeconomic conditions in the vermilion snapper fishery, but leaves no clear direction for purposes of conserving and managing the stock. All other alternatives specify levels of MSY, OY, MFMT, or MSST. All MSY alternatives are within the range of historical harvest levels. Because more recent harvests are fairly low relative to the upper limit of the Preferred Alternative for MSY, fishing participants can expect to derive benefits from rebuilding the stock not only in terms of higher future harvest but also of long-term sustainability of that higher harvest level. Because vermilion snapper is considered overfished, the rebuilding strategies presented below involve harvest reductions for a number of years. As the stock rebuilds, however, harvest restrictions would be relaxed. This condition presents the classic case of trading off short-term losses with long-term benefits.

5.5.2 Rebuilding plans and management measures

5.5.2.1 Introduction

The discussions in Sections 4.2 and 8.2 comprise part of the impact analysis for RIR purposes and are incorporated here by reference.

In rebuilding the vermilion snapper stock, the Council's main control instruments are TAC and associated regulatory measures to constrain harvests to the chosen TAC. In developing a TAC, the Council may adopt either a constant-catch, constant-F strategy, or some combinations of the two. Under a constant catch strategy, TAC is maintained at the same level over the rebuilding period whereas under a constant F, TAC is initially set at lower level and gradually adjusted upwards as the stock recovers. One possible combination of the two approaches is the "stepped approach." In a stepped approach, the rebuilding period is divided into sub-periods, with the TAC kept constant for each sub-period. The TAC for each sub-period is derived as an average of constant F TACs for that sub-period. In addition, the estimated TAC may be considered explicit or implicit. An explicit TAC is binding in the sense that either sector (commercial or recreational) is constrained by quotas and is closed once their allocation is reached. If the TAC is implicit, neither sector is closed once their respective allocation is reached. An implicit TAC requires only an adjustment of regulatory measures that are deemed to effectively constrain both the commercial and recreational sectors to their respective allocations.

Ever since the implementation of the Reef Fish FMP in 1984, the Council has not adopted an implicit or explicit TAC for vermilion snapper. But since 1990, a minimum size limit for vermilion snapper has been established for both the commercial and recreational sectors. Since 1997, vermilion snapper has been included in the aggregate recreational bag limit for reef fish. Alternatives considered in this amendment could alter the relatively lax management of vermilion snapper to a potentially more stringent management regime of quota/seasonal closures. The various alternatives to rebuild the vermilion snapper stock provide an ABC range for the entire rebuilding period. Depending on the type of management measures adopted to constrain harvests to the specified ABC, an implicit or explicit TAC may be adopted. Either way an allocation ratio between the commercial and recreational sectors has to be considered, at least for the purpose of determining the economic implications of the rebuilding measures adopted.

Over the rebuilding period and beyond, the economic issue for the vermilion snapper fishery may be characterized as a tradeoff in value of catches over time. A larger TAC now would yield greater commercial and recreational benefits in the short-term, but at the likely expense of a slower stock recovery. Conversely, a smaller TAC now would reduce short-term benefits, but likely would also lead to a faster realization of benefits as the stock recovers more quickly. The net present value approach is useful in this particular situation.

Net present value is calculated as a weighted sum of annual net benefits expected to be received over time. The weighting factor is determined by the discount rate and declines exponentially over time. The choice of a discount rate plays an important role, especially when net present valuation is done over a longer period. A higher discount rate would favor a rebuilding period that generates more short-term benefits. Conversely, a lower discount rate would favor a rebuilding period with larger benefits in the long-term. A 7 percent discount rate is generally used for net present valuation in U.S. fisheries, and is used here.

5.5.2.2 Analytical tool

The primary analytical tool used here is a model developed by Waters (2004) and Carter (2004) that combines biological information about the vermilion snapper stock with economic information about the fishery. The biological parameters of the model are based on the 1999 stock assessment, with projections on the status of the stock given certain TAC levels. The economic component of the model considers two harvesting sectors, a commercial sector and a recreational sector which includes the for-hire fleet. A 10-year horizon is considered for economic analysis to match the maximum time required to rebuild the stock.

The recreational sector is modeled as consisting of two major participants: for-hire vessels and recreational anglers. The for-hire segment is further composed of charter boats and headboats. Recreational anglers fish using private/rental, charter, and headboat platforms. For purposes of net present valuation, consumer surplus is calculated for the recreational anglers and net revenue for the charter boats and headboats. Consumer surplus is generally defined as the difference between what a consumer actually pays and the maximum amount the consumer would be willing to pay for a unit of goods or services. Total consumer surplus per period per fishing mode is calculated as the product of total catch trips, catch per trip and consumer surplus per catch. The number of catch trips and catch per trip are derived from basic information provided by MRFSS, the Texas Parks and Wildlife Sportfishing Coastal Creel Survey, and the Headboat Survey. Consumer surplus per vermilion snapper is based on the estimates of consumer surplus for the bottom-fish complex in Haab et al. (2001). Net revenues for charter boats and headboats are calculated as gross revenues less variable trip costs. Gross revenue calculations are based on average number of annual trips by a charter boat or headboat by geographical area (i.e., eastern Gulf vs. western Gulf), average number of passengers per trip, and average base fee by type of trip (i.e., half-day, full-day, or overnight). Variable costs include such items as fuel, ice, bait, docking fee, permits/licenses, etc. The net revenue calculation is also based on information from two surveys on the for-hire fishery (Holland et al., 1999; Sutton et al., 1999). Where applicable, all dollar values are expressed in 2002 dollars using appropriate price indices.

As earlier noted in the discussion with respect to Table 5.2, the commercial vermilion snapper fishery is an integral part of the commercial reef fish fishery at large. This fishery is unlike the red snapper fishery where vessels are clearly identifiable as either participating or not in the red snapper fishery. The vermilion snapper commercial fleet (so to speak) is mainly composed of vertical line vessels, although fish trap and longline vessels also catch some vermilion snapper. During each year of the analysis, logbook data for the three most recent years (2000-2002) are used to simulate the fishery under different management alternatives. All trips that reported at least one pound of vermilion snapper are included in the analysis. Each reported trip is subjected to the proposed rule to be examined, and the effects of the rule on trip revenues and costs are calculated. The number of trips, pounds and revenues for vermilion snapper and all other species, trip costs, and net operating revenues are totaled for all trips within each logbook year (2000-2002), and then averaged across all three years. This process is repeated for each of the 10 years analyzed for each management alternative, with each 3-year average from logbook data recorded as the expected outcome of the policy for that year in the planning horizon. For purposes of net present valuation, vessel net revenue is calculated as gross revenue per vessel less trip costs. Net revenue is then considered as net return to boat owners, captain and crew. Throughout the rebuilding period and thereafter, average monthly price per pound for vermilion snapper is held constant. Trip cost is allowed to vary according to a functional relationship between trip cost and pounds landed, days per trip away from port and crew size.

In analyzing each alternative regulatory measure to rebuild the vermilion snapper stock, the recreational sector is assumed to match its annual allocation. This limiting assumption is made necessary by the lack of functional estimates regarding the behavior of anglers with respect to changes in catch rates. The commercial sector, on the other hand, is allowed to catch whatever it can under a specific management measure, except in quota alternatives where the sector is constrained to its quota. In effect, the commercial sector is allowed to exceed or fall below its allocation unless the management measure considered is a quota. Total harvest of both sectors in one period are considered in determining the stock biomass for the succeeding period. Changes in stock biomass serve as the major driving force in catch rate changes for the commercial sector. Recreational catch and trip changes are a function of the recreational allocation of TAC.

Throughout the 10-year period, a management measure, such as size or trip limit, is assumed to be in effect. Also, regulations in other fisheries (e.g., red snapper fishery) and market conditions affecting the commercial and recreational sectors are assumed to remain constant throughout the 20-year period. These assumptions are very limiting, particularly when considering the fact that the Council and NOAA Fisheries can introduce regulatory changes from time to time. In addition, market forces are always at play to redefine conditions in the commercial and recreational sectors of the vermilion and other fisheries. However, it is not possible at this time to incorporate in the model some of these potential changes that could affect the behavior of participants in the vermilion snapper fishery.

5.5.2.3 Potential TACs

There are 5 rebuilding alternatives presented in Section 4 of this amendment. Alternative 1, which is the no action alternative, is considered unacceptable as a rebuilding strategy, thus leaving only 4 viable alternatives. Alternative 2 is a 10-year rebuilding plan based on constant harvest strategy. Alternative 3 is a 10-year rebuilding plan using a stepped approach, with harvest kept constant for 3 or 4 years at some average harvest based on a constant F strategy. Alternative 4 is a 10-year rebuilding plan based on the maximum constant F rate that would allow rebuilding the stock by 2013. Alternative 5 is a 7-year rebuilding plan using a similar stepped approach as Alternative 3.

Under each rebuilding alternative in Table 4.2.1.1, the predicted harvests may be considered the relevant TACs. These potential TACs are presented in Table 5.6. Because the commercial and recreational sectors have differing valuation of harvest, the TACs have to be allocated between the two sectors for purposes of economic analysis. There are several potential allocation ratios that may be used for this purpose. One such ratio is the one stipulated in Amendment 1 to the Reef Fish FMP which provides for a 67 percent allocation to the commercial sector and 33 percent allocation to the recreational sector. Another is the ratio implied in the 2000-2002 harvest of vermilion snapper by the two sectors which would result in a 79% allocation to the commercial sector and 21% to the recreational sector. Fishery characteristics for the 2000-2002 period are used to develop baseline economic information for the commercial and recreational sectors of the vermilion snapper fishery. If the Council were to choose a TAC in this amendment, such choice would have to be accompanied by an allocation ratio based on the provisions of Amendment 1, unless a different allocation ratio is concomitantly changed in this amendment. In the present amendment, the Council would merely establish target harvests according to a selected rebuilding strategy. Thus, the choice of allocation ratio for purposes of economic impact analysis does not need to be the one set under Amendment 1. In fact, it is deemed more fitting to use the 79/21 ratio because, in addition to the fact that it is one of the baseline economic characteristics, impacts on the fishing participants can be better gauged using more recent conditions of the fishery. For purposes of the economic analysis, the various TACs are allocated between the commercial and recreational sectors according to the 79/21 ratio. An exception is made with respect to quota management measures wherein the 67/33 commercial/recreational allocation is used. Regardless, the benchmark used for analyzing the quota measures is still the 79/21 split.

Table 5.6. TACs under various alternatives for rebuilding the vermilion snapper stock. (thousand pounds).

Year	Alternative 1 (No Action)	Alternative 2 (Constant Catch)	Alternative 3 (Stepped: 10 years)	Alternative 4 (Constant F)	Alternative 5 (Stepped: 7 years)
2004	1,852	1,627	1,476	982	1,216
2005	1,739	1,627	1,475	1,261	1,214
2006	1,639	1,627	1,475	1,579	1,214
2007	1,551	1,627	1,475	1,921	2,218
2008	1,472	1,627	2,057	2,269	2,219
2009	1,401	1,627	2,058	2,603	2,219
2010	1,336	1,627	2,058	2,905	3,195
2011	1,278	1,627	2,640	3,165	3,378
2012	1,225	1,627	2,641	3,380	3,515
2013	1,176	1,627	2,641	3,517	3,614
Total	14,669	16,270	19,996	23,582	24,002

5.5.2.4 Rebuilding strategies

This section discusses the general ramifications of the five rebuilding strategies, with particular reference to the impacts on fishing participants. In and by itself, a rebuilding strategy does not effect changes on the economic status of fishing participants. Such changes would be brought about by management measures adopted to implement a rebuilding strategy. In order to compare the various rebuilding strategies from the standpoint of impacts on fishing participants, it is necessary to make an assumption regarding the implementing regulatory measure. For this purpose, it is assumed that each strategy is implemented using quotas on both the commercial and recreational sectors. Any regulatory measure or a combination of measures could have been selected, but quotas have the added advantage of restricting "actual" harvest to the harvest level specified in a rebuilding strategy. The quota measure is modeled such that harvests by both the commercial and recreational sectors exactly match the harvest level specified in a specific rebuilding alternative. For allocation purposes, a 79/21 split is used for each rebuilding strategy. This allocation ratio reflects the proportional harvests of the commercial and recreational sectors in more recent years (2000-2002). By keeping constant the management measure and allocation ratio across the rebuilding strategies, the resulting economic effects can be used to rank the various strategies, particularly with respect to the no action alternative.

Under Alternative 1 (no action alternative), stock biomass and harvests are projected to decline over time. As shown in Table 4.2.1.1, rebuilding the vermilion stock to target biomass is expected to be achieved in the 10th year under Alternatives 2, 3, and 4 and in the 7th year under Alternative 5. It is natural to expect that larger benefits can be gained after the stock is fully rebuilt when the TAC is increased and accompanying regulations relaxed. Since the current analysis limits the period considered to 10 years, the potential larger benefits after the stock is rebuilt would not be included for purposes of comparing costs and benefits over time. This would render the cost/benefit approach more biased toward the cost side, and the rebuilding alternatives may be incorrectly viewed as generating either economic losses or small gains to the fishing participants. Evaluating the alternatives from the standpoint of least cost may be the more appropriate approach, considering that each rebuilding alternative is designed to achieve the same biomass target. This falls then into the realm of cost effectiveness analysis. As an aside, cost effectiveness analysis is perhaps a better approach when considering the uncertainties surrounding future regulations and market conditions, particularly that the general metric for effectiveness would be the rebuilding of the stock as indicated by a target B_{MSY}. Nevertheless, as can be observed also from Table 4.2.1.1, projected harvests increase over time under three of the five alternatives and kept constant under one alternative. Harvests under Alternatives 2 through 5 are initially lower than those under Alternative 1, but exceed those harvest levels by the fourth year (fifth year for Alternative 3) of the rebuilding period (see Table 5.6). This information alone implies that positive benefits may start to accrue even during the rebuilding period. On this basis, a cost/benefit approach is still undertaken but with the important caveat regarding the potential bias that a 10-year period may introduce into the analysis.

Presented in Table 5.7 are the economic results of the various rebuilding alternatives. Each rebuilding alternative is assumed to be implemented using binding quotas on both the commercial and recreational sectors of the vermilion snapper fishery. The numbers in this table are instructive in making comparison of the various rebuilding alternatives, and such comparison is the main thrust of the ensuing discussions. Extending the interpretation of the results to the relative valuation of harvest between the recreational and commercial sectors may not be appropriate without a further evaluation of the models used.

Some clarifications are worth noting regarding the economic results in Table 5.7. First, the effects on the recreational sector are the sum of consumer surplus of anglers from the three fishing modes and net revenues of charter boats and headboats. Effects on the commercial sector refer to changes in vessel net revenues. Second, numbers (other than rank) corresponding to the no action alternative are values in million dollars; numbers for the other alternatives are also values in million dollars, but taken as differences from the values of the no action alternative. Third, the net benefit figures for both the recreational and commercial sectors under the no action alternative are large relative to the two sectors' harvest and revenue performance with respect to vermilion snapper. The reason for this is that these figures are performance measures of the entire trip, inclusive of all the species harvested in a trip that caught or landed vermilion snapper. Under the assumption that the only change in management is the adoption of a rebuilding strategy for vermilion snapper, any change in benefits (costs) from those of the no action alternative can be attributed to the action adopted for vermilion snapper.

Relative to the no action alternative, each of the rebuilding alternatives would reduce the economic benefits of the recreational and commercial sectors in the first five years of rebuilding, but benefits would increase during the second five years. Benefit increases in the second five years of the rebuilding would more than compensate for the losses in the earlier years. Thus, the overall economic effects for the entire 10-year period would be a net gain to fishing participants. The results for the first five years are as expected, since under each of the rebuilding strategies harvest reductions would be experienced by the fishery participants. Benefit gains in the second five years reflect both the declining harvest under the no action alternative and the quota increases, especially for those rebuilding alternatives that required larger initial reductions in harvest. It is probably rare for a rebuilding plan to generate net benefit gains during the rebuilding period, especially within a 10-year horizon. But in the present case for the vermilion snapper stock, benefit gains after the first 5 years of the rebuilding would more than compensate for losses in the early years.

For the entire 10-year period, all four viable rebuilding alternatives would generate total gains that range from 4 percent for Alternative 2 to 16 percent for Alternative 5, with the Council's preferred alternative generating an 11 percent gain. Overall gains in the recreational sector (5% to 26%) are large relative to those of the commercial sector (2% to 10%). Alternative 5 (seven-year stepped strategy) would generate the largest net benefits than any of the rebuilding strategies. This is followed by Alternative 4 (constant F strategy), which would generate additional benefits of about 14 percent less than those of Alternative 5. Alternative 1 (no action) and Alternative 2 (constant harvest) have the lowest ranking. Alternative 3 (10-year stepped), which is the Council's preferred alternative, ranks in the middle of the group. The overall ranking of alternatives for the entire 10-year period almost follows the respective ranking by the recreational and commercial sectors. The two sectors differ only in their ranking of Alternatives 4 and 5, with the commercial sector ranking Alternative 4 higher than Alternative 5.

Percent benefits from each of the rebuilding alternatives do not appear to differ much from one another. For example, Alternative 3 is seven percent higher than Alternative 2, Alternative 4 is three percent higher than Alternative 3, and Alternative 5 is two percent higher than Alternative 4. However, in terms of absolute numbers, the differences of effects among the various alternatives and therefore their ranking carry some significance. For example, Alternative 5, which is the highest ranked alternative, provides for benefit gains of about $3 million to $17 million more than the other viable rebuilding alternatives. Considering the size of the vermilion fishery relative to the entire reef fish fishery, these differential gains in benefits between alternatives may not be simply dismissed as inconsequential. Of the four viable alternatives, Alternative 2 provides for the lowest gains in benefits. These gains may be considered substantially smaller than those from the other alternatives. In this way, Alternatives 3, 4, and 5 may be considered the best alternatives from a long-term perspective.

The ranking of alternatives over a 10-year period matches with the ranking in the second five years of the rebuilding but not with that of the first five years. As noted earlier, losses would be incurred in the first five years of the rebuilding. The presence of these losses in both the recreational and commercial sectors signals the need to temper the overall ranking of alternatives over a 10-year period by effects on the fishery in the first five years of the rebuilding. For the period 2004-2008, Alternative 2 is ranked highest for both the recreational and commercial sectors, indicating that it would incur the least cost to the fishing participants over this period.

But as noted earlier, this alternative is ranked lowest over the long term. The next best alternative for the 2004-2008 period is Alternative 3, followed by Alternative 5, and lastly by Alternative 4. Among these three, Alternative 4 may be considered the least desirable because of its relatively large losses in the short-term. While commercial vessels must absorb less than $91 thousand over the first five years, for-hire vessels may not be able to absorb more than $4 million in net revenue losses. From a short-term perspective then, Alternatives 3 and 5 may be considered the best alternatives in terms of economic impacts.

Taking into account the 5-year and 10-year periods, the choices for rebuilding alternatives with economic impacts as the guiding principle could be narrowed down to Alternatives 3 and 5. Both alternatives use the stepped approach in establishing annual harvest levels.

Table 5.7. Summary of economic impacts of various rebuilding strategies on the recreational and commercial sectors of the vermilion snapper fishery (million dollars). **Except for Alternative 1, each alternative shows changes in values relative to the no action alternative.** Economic impacts refer to changes in angler consumer surplus and net revenues of charter boats and headboats in the recreational sector and vessel net revenues in the commercial sector. Recreational vessel net revenues refer to gross receipts less operating costs, including salaries and wages of hired personnel. Commercial vessel net revenues refer to gross operating revenues to boat owners, captains and crew after deducting trip costs but not fixed costs. A 7 percent discount rate is used for present value calculation.

Rebuilding Strategy		**Recreational**		**Commercial**		**Total**	
		$ million	**Rank**	**$ million**	**Rank**	**$ million**	**Rank**
2004 - 2008							
Alternative 1:	no action	37.895	1	40.730	1	78.625	1
Alternative 2:	constant harvest	-0.532	2	-0.048	2	-0.58	2
Alternative 3:	stepped (10 years)	-1.373	3	-0.055	3	-1.428	3
Alternative 4:	constant F	-4.453	5	-0.091	4	-4.544	5
Alternative 5:	stepped (7 years)	-1.924	4	-1.051	5	-2.975	4
2009 - 2013							
Alternative 1:	no action	22.860	5	27.918	5	50.778	5
Alternative 2:	constant harvest	3.778	4	1.344	4	5.122	4
Alternative 3:	stepped (10 years)	11.458	3	4.394	3	15.852	3
Alternative 4:	constant F	15.802	2	6.972	1	22.774	2
Alternative 5:	stepped (7 years)	17.933	1	6.329	2	24.262	1
2004 - 2013							
Alternative 1:	no action	60.755	5	68.648	5	129.403	5
Alternative 2:	constant harvest	3.246	4	1.296	4	4.542	4
Alternative 3:	stepped (10 years)	10.085	3	4.339	3	14.424	3
Alternative 4:	constant F	11.349	2	6.881	1	18.23	2

Alternative 5: stepped (7 years)	16.009	1	5.278	2	21.287	1

Sources of basic data: Carter (2004); Waters (2004).

5.5.2.5 Results on the recreational fishery

Inclusive of the status quo, there are six management measures considered to achieve the required reduction in recreational harvest. Alternative 1 is the no action alternative, which does not affect any harvest reduction. Alternative 2 provides for a daily bag limit of two fish per person within the existing 20-reef fish aggregate bag limit. Alternative 3A imposes a minimum size limit of 11 inches TL and a 10-fish per person daily bag limit within the existing 20-reef fish aggregate bag limit while Alternative 3B imposes an 11-inch TL minimum size limit together with a daily bag limit of seven fish per person. Alternative 4 effectively considers the implicit recreational allocation of TAC as a quota, and thereby potentially subjects the recreational fishery to quota closures. Alternative 5 provides for a vermilion snapper seasonal closure from May 1 to June 21. A tabular presentation of these alternatives is also found in Section 4, specifically Table 4.2.3.2.1.

Estimates of the economic impacts of the various measures to reduce recreational catch under various rebuilding strategies are presented in the next four tables. The recreational model recognizes three fishing modes – private/rental, charter boats, and headboats. There are two types of net benefits estimated for the recreational sector: (1) consumer surplus to the recreational anglers, and (2) net revenues to the for-hire fishery which is composed of charter boats and headboats. Consumer surplus may be generally described as the excess of benefits derived from vermilion snapper fishing over what anglers pay for the trip. For the current purpose, consumer surplus is considered to be derived by anglers from fishing through the private/rental mode, fishing through charter boats, and fishing through headboats. Net revenue is calculated as gross receipts less operating costs. Fixed costs are excluded from current modeling considerations due to controversy associated with available estimates associated with these costs for participants in the Western Gulf for-hire fishery.

Table 5.8 contains the overall economic impacts on the recreational fishery, taking into consideration the three fishing modes of private/rental, charter boat, and headboat and two economic measures of recreational values of consumer surplus and vessel net revenues. Consumer surplus numbers are totaled from consumer surpluses in the three fishing modes and net revenues are summed from net revenues from charter boats and headboats. The numbers shown for the no action alternative are levels while those for the various alternatives are changes from status quo levels.

Over a 10-year period, the recreational vermilion snapper fishery would generate total economic benefits of $60.8 million dollars, expressed in terms of 2002 dollars, if no rebuilding plan were adopted. Although projections indicate that the fishery would still exist over the next 10 years without adopting a rebuilding plan, the stock level and therefore harvest would decline over time. Economic benefits from the fishery would also decrease over time. As shown in Table 5.8, economic benefits from the fishery under the no action alternative would be $37.9 million in 2004-2008, but would decline to $22.9 million in 2009-2013, or a 40 percent decline. These benefits can be expected to decline even further into the future. As a result of declining benefits over time, vessels may exit the vermilion snapper fishery, and if they also exit the reef fish fishery, their loss would trickle down to the support industries and communities where those industries operate.

Each of the measures considered is expected to result in economic losses in the short term but positive economic effects in the long term. An exception to this general expectation is the quota alternative which would immediately increase the benefits to the recreational sector, both in terms of angler consumer surplus and for-hire vessel net revenues. As previously discussed in Section 5.5.2.4, this condition of immediate positive effects on the recreational sector is mainly a product of the 67/33 allocation ratio employed in assigning quotas to the recreational and commercial sectors. Since the no action alternative, which uses a 79/21 allocation ratio is taken as the benchmark scenario, the use of the 67/33 ratio for allocating the quota would immediately increase the harvest allocation assigned to the recreational sector. For all management measures, the recreational sector is assumed to fully harvest its implicit or explicit allocation. Results as found in Table 5.8 match with expectations, with all the measures, except the quota alternative, generating negative impacts in 2004-2008 and positive impacts in 2009-2013. Positive economic impacts in the second five years of rebuilding more than offset the losses in the first five years of the rebuilding. The overall effects of all alternatives are positive over the 10-year period. Unlike the case with the red snapper fishery (see Amendment 22 to the Reef Fish FMP), the magnitude of economic impacts is decidedly in favor of vessel net revenues. For the entire 10-year period, net revenue changes range from $3.63 million for Alternative 3A or 3B to $25.3 million for Alternative 4, whereas consumer surplus changes only range from $1.37 million for Alternative 3A or 3B to $9.9 million for Alternative 4. This dominance of the net revenue figures over consumer surplus also holds true for the two sub-periods. For example, in 2004-2008, net revenue changes range from -$3.98 million for Alternative 3A or 3B to $8.33 million for Alternative 4, whereas consumer surplus changes only range from -$0.97 million for Alternative 3A or 3B to $3.15 million for Alternative 4.

The ranking of alternatives over the 10-year period follows that of the 2009-2013 sub-period, indicating the benefits in this sub-period outweigh any losses in the first five years of rebuilding. It appears that in terms of both consumer surplus and net revenues, the quota (Alternative 4) and seasonal closure (Alternative 5) dominate the other alternatives. The dominance of the quota alternative is expected because of the higher allocation of TAC assigned to the recreational sector. The dominance of the seasonal closure is partly due to the recreational model not having a seasonal component. The modeling of the seasonal closure is patterned after a quota. The main reason the results for the seasonal closure alternative differ from the quota alternative is the allocation ratio use, with the seasonal closure alternative assuming a 21 percent TAC allocation to the recreational sector. The 2-fish bag limit (Alternative 2) and size limit with bag limit (Alternatives 3A and 3B) options are ranked lower than the quota and seasonal closure options. However, the economic effects of a 2-fish bag limit are very close to those of the seasonal closure alternative. In terms of economic benefits, Alternatives 2 and 5 differ by less than 2 percent, and this difference is accounted for by differences in consumer surplus. On the other hand, economic benefits from Alternative 2 are more than 6 percent higher than Alternative 3A or 3B. In essence, Alternative 4 may be ranked highest, but Alternatives 3 and 5 may be ranked equally. These two alternatives may be ranked higher than Alternative 3A or 3B.

Noticeable in Table 5.8 is the identical effects of Alternatives 3A and 3B. The two alternatives differ only in the accompanying bag limit. The recreational model is not sensitive enough to pick up this fine distinction, mainly because both the 7-fish and 10-fish bag limit are not as limiting as the 11-inch TL size limit.

Table 5.8. Summary of economic impacts of various management measures on the recreational sector relative to the no action alternative (million dollars). **Except for Alternative 1, each alternative shows changes in values relative to the no action alternative.** Economic impacts refer to changes in angler consumer surplus and net revenues of charter boats and headboats. Recreational vessel net revenues refer to gross receipts less operating costs, including salaries and wages of hired personnel. Commercial vessel net revenues refer to gross operating revenues to boat owners, captains and crew after deducting trip costs but not fixed costs. A 7 percent discount rate is used for present value calculation.

Measure		Consumer Surplus	Net Revenue	Total	Rank
2004 - 2008					
Alternative 1:	no action	6.446	31.449	37.895	2
Alternative 2:	2-fish bag limit	-0.519	-1.034	-1.553	4
Alternative 3A:	11-inch size limit, 10-fish bag	-0.968	-3.008	-3.976	5
Alternative 3B:	11-inch size limit, 7-fish bag	-0.968	-3.008	-3.976	5
Alternative 4:	0.487 mp quota	3.151	8.330	11.481	1
Alternative 5:	May 1-June 21 closure	-0.339	-1.034	-1.373	3
2009 - 2013					
Alternative 1:	no action	3.566	19.294	22.86	5
Alternative 2:	2-fish bag limit	2.193	8.438	10.631	3
Alternative 3A:	11-inch size limit, 10-fish bag	2.341	6.638	8.979	4
Alternative 3B:	11-inch size limit, 7-fish bag	2.341	6.638	8.979	4
Alternative 4:	0.487 mp quota	6.782	16.977	23.759	1
Alternative 5:	May 1-June 21 closure	3.019	8.438	11.457	2
2004 - 2013					
Alternative 1:	no action	10.012	50.743	60.755	5
Alternative 2:	2-fish bag limit	1.674	7.404	9.078	3
Alternative 3A:	11-inch size limit, 10-fish bag	1.373	3.630	5.003	4
Alternative 3B:	11-inch size limit, 7-fish bag	1.373	3.630	5.003	4
Alternative 4:	0.487 mp quota	9.933	25.307	35.24	1
Alternative 5:	May 1-June 21 closure	2.680	7.404	10.084	2

Source of basic data: Carter (2004).

The next three tables break down the overall economic impacts on the recreational sector into the three components of the fishery. Table 5.9 contains the economic impacts on anglers fishing through the private/rental mode, Table 5.10 contains the economic impacts on both anglers and vessels in the charter boat fishery, and Table 5.11 contains the economic impacts on both anglers and vessels in the headboat fishery. The presentation of benefits in these three tables follows that of Table 5.7, which breaks down the overall economic impacts on the three sectors into consumer surplus and net revenues. In the private/rental mode, consumer surplus is the only relevant economic variable.

On an alternative by alternative basis, all three tables depict a similar picture as that portrayed by Table 5.8. Shown in the three tables is the trade-off between short-term losses and long-term benefits. In all three fishing modes, all the alternatives result in economic losses to the fishing participants in the first 5 years of rebuilding, with earlier mentioned exception of the quota alternative (Alternative 4). In subsequent periods, the economic impacts under each alternative exceed those of the no action alternative. This explains why the overall results shown in Table 5.8 turned out to be positive for all the alternatives.

Although the general trend of ranking under each fishing mode supports the overall ranking displayed in Table 5.8, certain differences can be observed. For the private/rental mode (Table 5.9), Alternative 3A/3B is ranked higher than Alternative 2. Although the difference in benefits is relatively small, this may signify that for anglers in the private/rental mode, a 2-fish bag limit may be more limiting than an 11-inch TL size limit, again with the notation that the 7-fish or 10-fish bag limit is not a limiting factor. For the headboat mode (Table 5.11), Alternatives 2 and 5 have identical results.

Tables 5.9, 5.10 and 5.11 show the distribution of economic impacts among the three modes of fishing. It can be observed from looking at the no action alternative that the headboat mode is the dominant segment of the recreational vermilion snapper fishery. As can be expected, this segment would incur most of losses in the early years and gain most of the benefits in the latter years of the rebuilding. For example, of a total of $35.24 million of benefits generated by Alternative 4, about 64 percent is accounted for by the headboat segment, 30 percent by the charter boat mode, and 6 percent by the private/rental mode. Within this segment, net revenues far outweigh consumer surplus. In fact, the charter boat mode would generate more consumer surplus than the headboat mode.

Table 5.9. Summary of economic impacts of various management measures on the recreational private rental mode relative to the no action alternative (million dollars). **Except for Alternative 1, each alternative shows changes in values relative to the no action alternative.** Economic impacts refer to changes in angler consumer surplus. A 7 percent discount rate is used for present value calculation.

Measure		Consumer Surplus	Net Revenue	Total	Rank
2004 - 2008					
Alternative 1:	no action	1.29	n.a.	1.29	2
Alternative 2:	2-fish bag limit	-0.10	n.a.	-0.10	4
Alternative 3A:	11-inch size limit, 10-fish bag	-0.18	n.a.	-0.18	5
Alternative 3B:	11-inch size limit, 7-fish bag	-0.18	n.a.	-0.18	5
Alternative 4:	0.487 mp quota	0.63	n.a.	0.63	1
Alternative 5:	May 1-June 21 closure	-0.07	n.a.	-0.07	3
2009 - 2013					
Alternative 1:	no action	0.71	n.a.	0.71	5
Alternative 2:	2-fish bag limit	0.38	n.a.	0.38	4
Alternative 3A:	11-inch size limit, 10-fish bag	0.49	n.a.	0.49	3
Alternative 3B:	11-inch size limit, 7-fish bag	0.49	n.a.	0.49	3
Alternative 4:	0.487 mp quota	1.35	n.a.	1.35	1
Alternative 5:	May 1-June 21 closure	0.60	n.a.	0.60	2
2004 - 2013					
Alternative 1:	no action	2.00	n.a.	2.00	5
Alternative 2:	2-fish bag limit	0.28	n.a.	0.28	4
Alternative 3A:	11-inch size limit, 10-fish bag	0.31	n.a.	0.31	3
Alternative 3B:	11-inch size limit, 7-fish bag	0.31	n.a.	0.31	3
Alternative 4:	0.487 mp quota	1.98	n.a.	1.98	1
Alternative 5:	May 1-June 21 closure	0.53	n.a.	0.53	2

Source of basic data: Carter (2004).

Table 5.10. Summary of economic impacts of various management measures on the recreational charter boat mode relative to the no action alternative (million dollars). **Except for Alternative 1, each alternative shows changes in values relative to the no action alternative.** Economic impacts refer to changes in angler consumer surplus and net revenues of charter boats. Recreational vessel net revenues refer to gross receipts less operating costs, including salaries and wages of hired personnel. A 7 percent discount rate is used for present value calculation.

Measure		Consumer Surplus	Net Revenue	Total	Rank
2004 - 2008					
Alternative 1:	no action	2.97	7.51	10.48	2
Alternative 2:	2-fish bag limit	-0.30	-0.25	-0.55	4
Alternative 3A:	11-inch size limit, 10-fish bag	-0.46	-0.72	-1.18	5
Alternative 3B:	11-inch size limit, 7-fish bag	-0.46	-0.72	-1.18	5
Alternative 4:	0.487 mp quota	1.45	1.99	3.44	1
Alternative 5:	May 1-June 21 closure	-0.16	-0.25	-0.41	3
2009 - 2013					
Alternative 1:	no action	1.65	4.61	6.26	4
Alternative 2:	2-fish bag limit	0.79	2.02	2.81	3
Alternative 3A:	11-inch size limit, 10-fish bag	1.07	1.59	2.66	4
Alternative 3B:	11-inch size limit, 7-fish bag	1.07	1.59	2.66	4
Alternative 4:	0.487 mp quota	3.13	4.06	7.19	1
Alternative 5:	May 1-June 21 closure	1.39	2.02	3.41	2
2004 - 2013					
Alternative 1:	no action	4.62	12.12	16.74	5
Alternative 2:	2-fish bag limit	0.49	1.77	2.26	3
Alternative 3A:	11-inch size limit, 10-fish bag	0.61	0.87	1.48	4
Alternative 3B:	11-inch size limit, 7-fish bag	0.61	0.87	1.48	4
Alternative 4:	0.487 mp quota	4.58	6.05	10.63	1
Alternative 5:	May 1-June 21 closure	1.23	1.77	3	2

Source of basic data: Carter (2004).

Table 5.11. Summary of economic impacts of various management measures on the recreational headboat mode relative to the no action alternative (million dollars). **Except for Alternative 1, each alternative shows changes in values relative to the no action alternative.** Economic impacts refer to changes in angler consumer surplus and net revenues of headboats. Recreational vessel net revenues refer to gross receipts less operating costs, including salaries and wages of hired personnel. A 7 percent discount rate is used for present value calculation.

Measure		Consumer Surplus	Net Revenue	Total	Rank
2004 - 2008					
Alternative 1:	no action	2.19	23.94	26.13	2
Alternative 2:	2-fish bag limit	-0.11	-0.79	-0.9	3
Alternative 3A:	11-inch size limit, 10-fish bag	-0.34	-2.29	-2.63	4
Alternative 3B:	11-inch size limit, 7-fish bag	-0.34	-2.29	-2.63	4
Alternative 4:	0.487 mp quota	1.07	6.34	7.41	1
Alternative 5:	May 1-June 21 closure	-0.11	-0.79	-0.9	3
2009 - 2013					
Alternative 1:	no action	1.21	14.69	15.9	4
Alternative 2:	2-fish bag limit	1.02	6.42	7.44	2
Alternative 3A:	11-inch size limit, 10-fish bag	0.79	5.05	5.84	3
Alternative 3B:	11-inch size limit, 7-fish bag	0.79	5.05	5.84	3
Alternative 4:	0.487 mp quota	2.30	12.92	15.22	1
Alternative 5:	May 1-June 21 closure	1.02	6.42	7.44	2
2004 - 2013					
Alternative 1:	no action	3.40	38.63	42.03	4
Alternative 2:	2-fish bag limit	0.91	5.63	6.54	2
Alternative 3A:	11-inch size limit, 10-fish bag	0.45	2.76	3.21	3
Alternative 3B:	11-inch size limit, 7-fish bag	0.45	2.76	3.21	3
Alternative 4:	0.487 mp quota	3.37	19.26	22.63	1
Alternative 5:	May 1-June 21 closure	0.91	5.63	6.54	2

Source of basic data: Carter (2004).

5.5.2.6 Commercial fishery

Inclusive of the status quo, there are eight management measure alternatives under consideration to achieve the required reduction in commercial harvest in order to rebuild the vermilion snapper stock. Alternative 1 is the no action alternative. Alternative 2 provides for a trip limit of 1,625 pounds of vermilion snapper. Alternative 3 imposes a minimum size limit of 12 inches TL. Alternative 4A imposes an 11-inch TL minimum size limit together with a trip limit of 2,300 pounds of vermilion snapper. Alternative 4B imposes an 11-inch TL minimum size limit together with a trip limit of 2,250 pounds of vermilion snapper. Alternative 5 imposes a quota equivalent to a 67 percent allocation of TAC, thereby potentially subjecting the commercial fishery to quota closures. Alternative 6 provides vermilion snapper seasonal closure of August 1 through September 30 and December 1 through 31. Alternative 7 imposes an 11-inch TL minimum size and a 40-day season closure from April 22 through May 31. A tabular presentation of these measures is also found in Section 4 (Table 4.2.3.3.1).

There are three points worth noting regarding the analysis of economic impacts on the commercial fishery. First, the analysis includes all vessels that landed vermilion snapper in the period 2000-2002. Most of these vessels participated in many reef fish fisheries and generated a greater part of their revenues from those fisheries. Although there are vessels that target vermilion snapper, they generally also catch other reef fish species. In fact, as indicated in the section on the fishery description, an average vessel that landed vermilion snapper in the 2000-2002 period generated most of its revenues from other species. Given this particular characteristic of the fishery, the revenues considered for economic impact analysis include the vessels' revenues from the sale of both vermilion snapper and other species. These revenues match well with the cost, since a trip cost is incurred from fishing for all species. The inclusion of overall vessel trip revenues and costs allows a more flexible consideration of the economic impacts. For example, if the vermilion snapper fishery is closed due to quota closure or seasonal closure, vessels are considered to take or not to take fishing trips depending on the profitability of those trips, where profitability in this case is measured as revenues from the sale of all other (than vermilion snapper) species caught on a trip, less trip costs.

The second point to consider is that in the analysis of measures other than quota alternatives, commercial harvests of vermilion snapper are not constrained to the implicit commercial allocation. Thus, some measures, such as trip limits or size limits, could result in total commercial harvest exceeding the allocation. The economic implication in this case is that the short-run economic benefits may be larger (or the losses smaller) and the long-run benefits smaller than implied by the rebuilding plans if strictly followed.

The third point to consider pertains to the issue of exceeding or not exceeding the TAC during the rebuilding period. It is assumed that the recreational sector does not exceed its allocation throughout the rebuilding period, so deviation of total harvest from the TAC is determined by the commercial harvest. The model assumes that changes in the catch rate of vermilion snapper follow proportionally the changes in stock biomass. However, instead of relying solely on biomass levels as provided in the various rebuilding plans, biomass is allowed to vary according to the same model used in developing the various rebuilding plans, but this time feedback from the fishery in terms of catches and discards is allowed to affect biomass levels. In this way, certain management measures that would result in harvest exceeding the TAC would be associated with biomass levels that would not match those in the rebuilding plans. A major implication here is that some management measures may not allow the achievement of the target biomass, at least within the rebuilding period of 10 years.

Table 5.12 presents a summary of economic impacts of the various commercial management measure alternatives. Economic impacts refer to the changes in net revenues to vessels, with net revenues defined as gross operating revenues to boat owners, captains, and crew after deducting trip costs. Fixed costs are not considered in calculating net revenues. The numbers, except those for the no action alternative, shown in the table are differences between net present values under each management measure and that of the no action alternative. Over a 10-year period, commercial vessels that participate in the vermilion snapper fishery can generate total economic benefits of $68.65 million dollars (2002 dollars), if no rebuilding plan is adopted for the vermilion snapper stock. As mentioned earlier, these benefits include benefits from vermilion snapper and other species caught by vessels that land vermilion snapper.

Although projections indicate the vermilion fishery would still exist over the next 10 years without adopting a rebuilding plan, the stock level, and therefore, harvest and economic benefits from the fishery also decrease over time. As can be observed from Table 5.12, economic benefits from the fishery under the no action alternative would fall from $40.73 million in 2004-2008 to $27.92 million in 2009-2013. As a result of declining benefits over time, vessels may exit the vermilion snapper fishery. If they also exit the reef fish fishery, their loss would also trickle down to the support industries and communities where those industries operate.

The fact that each of the measures considered would reduce commercial harvest in the first few years of the rebuilding is the reason for losses to show up in the 2004-2008 period. As the stock rebuilds, benefits increase in the 2009-2013 time period to eventually exceed the decreasing benefits under the no action alternative. Over the 10-year period, all measures, except the 12-inch TL size limit, would bring about increases in benefits over those of the no action alternative. Considering the size of the vermilion snapper fishery relative to the entire reef fish fishery, it is not surprising that the changes in benefits from rebuilding the vermilion snapper stock would be relatively small, ranging from -1.6 percent for Alternative 3 to about 5 percent for Alternative 6. These relatively small changes in benefits are partly a function of the time period considered. Over a longer period when the stock has rebuilt, regulations could be relaxed so that benefits could consequently increase.

Over the 10-year period, seasonal closure (Alternative 6), quota (Alternative 5), and the Council's Preferred Alternative 7, an 11-inch TL minimum size with a 40-day season closure from April 22 through May 31 result in the greatest net revenues. Size limit alternatives, including the combination of size and trip limits, result in the lowest net revenues. The difference in benefit changes between Alternative 6 and the rest of the alternatives appear to be relatively large. Benefits from Alternative 5 and the Council's Preferred Alternative 7 are nearly identical and well above the remaining alternatives. Among the other alternatives, with the exception of the 12-inch TL size limit, the differences in benefit changes do not appear to be large. Of the top three alternatives (Alternatives 5, 6, and 7), Alternative 6 are also ranked high during the 2004-2008 period when losses would be incurred. It would appear then, that one of these three alternatives can generate the highest economic impacts, at least over the 10-year period.

The 12-inch TL size limit probably deserves additional discussion because it is the only measure that would result in overall negative impacts on the commercial sector for the entire rebuilding period. This particular measure provides for the largest percent decline in harvest so that as expected and shown in Table 5.12, this alternative is associated with the largest initial reduction in harvest and economic benefits. Increases in benefits in the second five years of the rebuilding would not outweigh the relatively large benefit reduction in the early years. Antozzi[2] reported that "one large Gulf dealer expressed the opinion that based on company records, 35 percent to

[2] William Antozzi. Personal communication. National Marine Fisheries Service, Fisheries Economic Office, 9721 Executive Center Drive N., St. Petersburg, FL

55 percent of their vermilion snapper production would be lost if a 12-inch TL size limit is implemented." For such a major component of production to be eliminated in the initial years, there should be more abundant large size in the future to compensate for the early losses, especially since there is some evidence that larger vermilion snapper commands higher prices. Antozzi[2] reported that according to some fish dealers in the Gulf, the pricing structure for vermilion snapper can be as follows:

Size	Price Per Pound Range
½ to 3/4 lb. (twinkie)	$1.25 - $1.75
3/4 to 1 lb. (small)	$1.50 - $2.00
1 to 2 lbs. (medium)	$1.75 - S2.25
2 lbs. and up (large)	$2.00 - $2.50

It is difficult to determine if these prices are also determined by the size of supply, so that this price structure may not hold if more large sized vermilion are available in the market.

Table 5.12. Summary of economic impacts of various management measures on the commercial sector relative to the no action alternative (million dollars). **Except for Alternative 1, each alternative shows changes in values relative to the no action alternative.** Economic impacts refer to changes in vessel net revenues. Commercial vessel net revenues refer to gross operating revenues to boat owners, captains and crew after deducting trip costs but not fixed costs. A 7 percent discount rate is used for present value calculation.

Measure	Net Revenue	Rank
2004 - 2008		
Alternative 1: no action	40.730	1
Alternative 2: 1,625-pound trip limit	-0.943	3
Alternative 3: 12-inch size limit	-2.651	7
Alternative 4A: 11-inch size limit, 2,300-pound trip limit	-1.290	4
Alternative 4B: 11-inch size limit, 2,250-pound trip limit	-1.376	6
Alternative 5: 0.989 mp quota	-1.374	5
Alternative 6: Aug. - Sept. & Dec. closures	-0.263	2
Alternative 7: 11-inch size limit, 4/22-5/31 closure	-1.374	5
2009 - 2013		
Alternative 1: no action	27.918	8
Alternative 2: 1,625-pound trip limit	1.899	5
Alternative 3: 12-inch size limit	1.539	7
Alternative 4A: 11-inch size limit, 2,300-pound trip limit	2.308	4
Alternative 4B: 11-inch size limit, 2,250-pound trip limit	1.889	6
Alternative 5: 0.989 mp quota	2.951	2
Alternative 6: Aug. - Sept. & Dec. closures	3.643	1
Alternative 7: 11-inch size limit, 4/22-5/31 closure	2.845	3
2004 - 2013		
Alternative 1: no action	68.648	6
Alternative 2: 1,625-pound trip limit	0.956	3
Alternative 3: 12-inch size limit	-1.111	7
Alternative 4A: 11-inch size limit, 2,300-pound trip limit	0.748	4
Alternative 4B: 11-inch size limit, 2,250-pound trip limit	0.513	5
Alternative 5: 0.989 mp quota	1.577	2
Alternative 6: Aug. - Sept. & Dec. closures	3.381	1
Alternative 7: 11-inch size limit, 4/22-5/31 closure	1.472	3

Source of basic data: Waters (2004).

5.6 Private and public costs

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

Council costs of document preparation, meetings, public hearings, and information dissemination	$55,000
NOAA Fisheries' administrative costs of document preparation, meetings and review	110,000
Industry cost of permit and reporting program	none
NOAA Fisheries' cost of permit and reporting program	none
Enforcement cost	none

The Council and NOAA Fisheries' costs of document preparation are based on staff time, work outsourcing, travel, printing and any other relevant items where funds were expended directly for this specific action. No additional permits or reporting requirements are proposed in this amendment, so there are no corresponding costs. Since the management measures proposed in this amendment are essentially extensions of existing management measures on reef fish to vermilion snapper, enforcement of measures proposed in this amendment would be conducted as part of the routine effort to enforce existing rules on reef fish and other managed species. Under a fixed budget, however, adoption of this amendment would require a redirection of resources to enforce the new measures.

5.7 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: a) 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 and communities; b) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; c) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or d) raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

Proposed actions on vermilion snapper sustainable fishing parameters (MSY, MFMT, MSST, and OY) have no direct impacts on fishing participants in terms of changing harvest and fishing activities in the near and short term. However, these parameters set the stage for the proposed regulatory measures.

The rebuilding alternatives would require initial harvest reductions ranging from 17.9 percent to 50.5 percent, with the Council's preferred alternative requiring a 25.5 percent reduction. These reductions would occur only in the first few years of the rebuilding period. In subsequent years, harvests would be allowed to increase. Relative to the no action alternative, each rebuilding strategy is expected to provide substantially higher harvest levels once the stock is fully rebuilt.

To implement the required harvest reductions in order to rebuild the vermilion snapper stock, six recreational management measure alternatives and seven commercial management measure alternatives were considered. The economic impacts of these alternatives have been estimated and discussed above.

In 2002, the entire Gulf commercial reef fish harvest sector had an ex-vessel value of approximately $32 million, with the vermilion snapper fishery accounting for about $3.6 million (Waters, 2004). The vermilion snapper fishery is a small segment of the recreational fishery and generates less than $3 million of annual revenues to the for-hire fishery. At these revenue levels, even the most stringent option for the recreational and commercial vermilion snapper fishery would not create impacts that meet the $100 million threshold.

The measures considered in this amendment for both the commercial and recreational sector are basically the same types of measures that have been adopted for the other segments of the reef fish fishery. These measures have been determined not to materially affect the investment, competition, and employment scenario in the commercial and for-hire sectors of the reef fish fishery. If management and conservation measures are enacted, the stock will be rebuilt to allow higher TACs over time, resulting in increases in employment and investment. Similar effects on employment and investment may be expected from support industries.

None of the measures considered in this amendment would interfere or create inconsistency with an action of another agency, including state fishing agencies. The measures considered in this amendment have already been adopted for other segments of the reef fish fishery.

At present, none of the entities affected by this amendment, that are involved in the vermilion snapper fishery, participate in any government sponsored entitlement, grants, user fees, or loan programs. Permit fees are the only fees that may approximate user fees. Although most of the vessels that commercially or recreationally harvest vermilion snapper derive a greater portion of their revenues from fishing for other species, some vessels, particularly in the commercial fishery, may be dependent on vermilion snapper for a good portion of their income. These vessels may not be able to remain in the fishery especially under some measures that would place more stringent regulations on vermilion snapper over a longer period. If forced to leave not only the vermilion snapper, but also the reef fish fishery, these vessels would have to sell or give up their permits, and under a commercial and for-hire reef fish permit moratorium, they could re-enter the fishery only after purchasing permits from existing permit holders. The extent of this effect cannot be ascertained. At any rate, such possibility is inherent in any fishery regulatory actions that would adversely impact the fishing participants. In this manner, it is reasonable to expect that the measures in this amendment would not materially alter the permit fee system established for the commercial and for-hire reef fish fishery. It is then concluded that measures in this amendment do not affect any entitlements, grants, user fees, or loan programs.

The measures in this amendment do not raise novel legal or policy issue. The concept of a rebuilding plan with accompanying management measures such as TACs have been used in the Gulf and South Atlantic in previous actions of the respective councils. Size and bag limits, trip limits, seasonal closures and quotas have already been adopted for a good number of fisheries in the Gulf, so their adoption for the vermilion snapper fishery may be considered as one logical consequence of extending existing regulations to another species that has been determined as overfished.

The foregoing discussions relative to the various issues enumerated in E.O. 12866 support the conclusion that, if enacted, the proposed set of actions in this amendment would not constitute a significant regulatory action.

6 INITIAL REGULATORY FLEXIBILITY ANALYSIS

6.1 Introduction

The purpose of the Regulatory Flexibility Act (RFA) is to establish a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure that 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 that the agency considers alternatives that minimize the expected impacts while meeting the goals and objectives of the FMP and applicable statutes.

With certain exceptions, the RFA requires agencies to conduct an Initial Regulatory Flexibility Analysis (IRFA) for each proposed rule. The IRFA is designed to assess the impacts various regulatory alternatives would have on small entities, including small businesses, and to determine ways to minimize those impacts. An IRFA is conducted to primarily determine whether the proposed action would have a "significant economic impact on a substantial number of small entities." In addition to analyses conducted for the Regulatory Impact Review (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.

The measures that have immediate relevance to the determination of significant impacts on a substantial number of small entities are those that affect harvest and/or operating activities of small entities. In this respect, the measures to reduce harvest of the recreational and commercial sectors are the ones that can affect the status of small entities.

6.2 Description of the reasons why action by the agency is being considered

The need and purpose of the actions are set forth in Section 3 of this document and incorporated herein by reference.

6.3 Statement of the objectives of, and legal basis for, the proposed rule

The primary objective of this action is to optimize the net benefits to the Nation of the reef fish stocks by rebuilding the vermilion snapper component to a stock level capable of supporting optimum yield. The following objectives are encompassed within the primary objective:

- 6.3.1. Define the sustainable fishing parameters for the Gulf of Mexico stock of vermilion snapper.
- 6.3.2 Implement a plan to end overfishing of the Gulf of Mexico stock of vermilion snapper and rebuild the stock within 10 years or less to a level capable of supporting maximum sustainable yield.

6.3.3 Minimize, to the extent practicable, socioeconomic disruptions to the greatest number of individuals within each sector while still achieving the levels of harvest reduction necessary to rebuild the stock.

The Magnuson-Stevens Fishery Conservation and Management Act, as amended, provides the legal basis for the rule.

6.4 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 as one that is independently owned and operated and not dominant in its field of operation, and has annual receipts not in excess of $3.5 million in the case of commercial harvesting entities or $6 million in the case of for-hire entities, or 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, a total of 2,200 permits were issued to qualifying individuals and attached to vessels, and are deemed to comprise the reef fish fishery in the U.S. Gulf of Mexico. As of October 2003, there are 1,158 active commercial reef fish permits. Of these commercial permittees, 441 vessels reported in their logbook submissions to have landed vermilion snapper, with most using vertical line gear. Waters (2004) developed trip and revenue profit profile of vessels that landed vermilion snapper for the period 2000-2004. An average vessel generated revenues of $65,200 of which $7,400 was from vermilion snapper. These figures consider all vessels that landed at least 1 pound of vermilion snapper and all the trips taken by these vessels regardless of whether vermilion snapper was caught. A possibility exists that the actual average revenues could be higher because some species landed and sold by these vessels could have not been reported in logbooks. Only reef fish and coastal pelagics are required to be reported in logbooks.

An earlier survey of commercial reef fish vessels (Waters, 1996) found the following income configuration:

	Gross Income	Net Income
High-volume vessels, vertical lines:		
Northern Gulf:	$110,070	$28,466
Eastern Gulf:	$ 67,979	$23,822
Low-volume vessels, vertical lines:		
Northern Gulf:	$ 24,095	$ 6,801
Eastern Gulf:	$ 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

The measures in this amendment would also affect for-hire vessels. In June 2003, the NOAA Fisheries published a final rule implementing a moratorium on the issuance of permits for the charter vessel/headboat (recreational-for-hire) sector of the reef fish and coastal migratory pelagics fisheries. The objective of that rule was to cap the number of for-hire vessels permitted to fish for reef fish or coastal migratory pelagics in the EEZ of the Gulf of Mexico at the current level of participation while the Council assesses actions necessary to restore overfished reef fish and king mackerel stocks and determine whether a more comprehensive effort management system is appropriate for these fisheries. As of October 2003, there were 1,552 active for-hire vessel permits.

Holland et al. (1999) conducted a survey of charter boats and headboats in Florida. Charter boats have an average length of 37 feet, while headboats average 62 feet. The major activity centers for charter boats in Florida are: a) Miami and Fort Lauderdale on the Atlantic; b) Naples and Fort Myers/Fort Myers Beach on the Peninsula Gulf; c) Destin, Panama City/Panama City Beach and Pensacola on the Panhandle Gulf; and, d) Key West, Marathon and Islamorada in the Florida Keys. The major activity centers for headboats are: a) Miami on the Atlantic; b) Clearwater and Fort Myers/Fort Myers Beach on the Peninsula Gulf; c) Destin and Panama City/Panama City Beach on the Panhandle Gulf; and, d) Islamorada, Key West and Marathon in the Florida Keys.

Sutton et al. (1999) conducted a survey of charter boats and headboats in Alabama, Mississippi, Louisiana and Texas. The average charter boat in the four-state area was 39 feet in length with a total passenger capacity of 12 people while the average headboat was 72 feet in length with a total capacity of 60 passengers. Major activity centers for charter boats in the four-state area are: a) South Padre Island, Port Aransas, and Galveston/Freeport in Texas; b) Grand Isle-Empire-Venice in Louisiana; c) Gulfport-Biloxi in Mississippi; and, d) Orange Beach-Gulf Shores in Alabama. Major activity centers for headboats in the four-state area are: a) South Padre Island, Port Aransas, and Galveston/Freeport in Texas and, b) Orange Beach-Gulf Shores in Alabama.

Based on the works of Holland et al. (1999) and Sutton et al. (1999), Carter (2003) developed earnings profiles for charter and headboats in the Gulf using information on the number of trips by categories (half-day, full-day, overnight), number of passengers, base fees, and angler days. On average, charter boats generated gross revenues ranging from $58,000 in the eastern Gulf to $81,000 in the western Gulf, or an overall average of $64,000. Headboats generated gross revenues ranging from $281,000 in the eastern Gulf to $550,000 in the western Gulf, or an overall average of $400,000.

Fish dealers are also affected by the measures in this amendment, particularly those that purchase vermilion snapper from harvesting vessels. Currently, a federal permit is required for a fish dealer to purchase reef fish from commercial vessels. Based on permits files, there are 227 dealers holding 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. In addition, as part of the commercial reef fish logbook program, reporting vessels must identify the dealers to whom they sold their fish. Commercial reef fish vessels with federal permits are required to sell their harvest only to permitted dealers. Based on vessel logbook records for 1997-2002, there were on average 154 reef fish dealers actively buying and selling in the vermilion snapper market. These dealers were distributed around the gulf states as follows: 7 in Alabama, 96 in Florida, 22 in Louisiana, 7 in Mississippi, and 22 in Texas. These numbers differ from the ones taken from the permit file, because they are averages for the three-year period. Dealers in Florida purchased about $1.6 million of vermilion snapper, followed by dealers in Louisiana with purchases of $1.1 million and dealers in Texas with purchases of $509 thousand. Dealers in Mississippi purchased $125 thousand worth of vermilion snappers, and those in Alabama purchased $31 thousand. These dealers may hold multiple types of permits, and because we do not know 100 percent of their business revenues, it is not possible to determine what percentage of their business comes from vermilion snapper fishing activity.

Average employment information per reef fish dealer is not known. 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 that all processors must be dealers, yet a dealer need not be a processor. Further, processing is a much more labor-intensive exercise than dealing. Therefore, given the employment estimate for the processing sector, it is assumed that the average dealer employment would not surpass the SBA employment benchmark.

Based on the gross revenue and employment profiles presented above, all commercial and for-hire fishing vessels and reef fish dealers potentially affected by the proposed regulations are classified as small entities.

6.5 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

None of the measures considered in this amendment would alter existing reporting and record-keeping requirements. Certain compliance requirements would be introduced, but considering that all the measures considered in this amendment have, in one form or another, been adopted for other fisheries in the Gulf, these new requirements would not require additional professional skills.

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

No duplicative, overlapping, or conflicting federal rules have been identified. The selection of SFA parameters, the rebuilding strategy and measures to reduce harvest are necessary to comply with requirements under the MSFCMA.

6.7 Description of economic impacts on small entities

To the extent that all entities that would be affected by this amendment fall within the definition of small entities, the analysis of economic impacts conducted in the RIR section of this document is deemed sufficient for IRFA purposes. Such analysis is incorporated in this section by reference.

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

At this stage of the process, the Council has chosen their preferred alternatives for the various sets of options in this amendment. For purposes of this section, these preferred alternatives are considered to comprise the proposed rule.

The measures that have immediate relevance to the minimization of economic impacts on small entities are those that affect harvest and/or operating activities of small entities. In this respect, the measures to reduce harvest of the recreational and commercial sectors are the ones that can affect the status of small entities. Measures to rebuild the stock can also indirectly affect the status of small entities by setting the tone for the kind of management measures that need to be implemented.

There are five rebuilding alternatives under consideration. Alternative 1 is the no action alternative and is not considered a viable alternative, because a rebuilding plan has to be instituted for the overfished vermilion snapper stock. Alternative 2 is a 10-year rebuilding plan using a constant harvest strategy. Alternative 3, the Council’s preferred alternative, is a 10-year rebuilding plan using a stepped strategy. Alternative 4 is a 10-year rebuilding plan using a constant fishing mortality strategy. Alternative 5 is a 7-year rebuilding plan using a stepped strategy. As all alternatives require harvest reductions at least in the initial years of the rebuilding, all would result in negative short-term impacts but as the stock rebuilds more positive benefits would be realized. Over the short-run, Alternative 2 results in the least negative impacts, followed by Preferred Alternative 3. Over time, however, Alternative 2 would provide the lowest overall economic impact on small entities. Alternatives 4 and 5 would provide higher positive economic impacts than Preferred Alternative 3 over a period of 10 years, but in the early years of the rebuilding these two alternatives would bring about more negative effects on small entities.

There are six recreational management measure alternatives under consideration. Alternative 1 is the no action alternative, which does not effect any harvest reduction. Alternative 2 provides for a daily bag limit of 2 fish per person within the existing 20-reef fish aggregate bag limit. Alternative 3 imposes a minimum size limit of 11 inches TL with either a 10-fish (Preferred Alternative 3A) or 7-fish (Alternative 3B) daily bag limit per person within the existing 20-reef fish aggregate bag limit. Alternative 4 considers the implicit recreational allocation of TAC as a quota, and would subject the recreational fishery to possible quota closures. Alternative 5 requires vermilion snapper seasonal closure from May 1 to June 21 annually. Alternative 4 provides the most net revenues to for-hire vessels in both the short term and the long term. A good deal of this effect, however, is due to the higher allocation given to the recreational sector. All other alternatives, including Preferred Alternative 3A, would generate short-term reductions but long-term increases in vessel net revenues. In both the short term and the long term, Preferred Alternative 3A provides for the highest negative or lowest positive impacts.

There are eight commercial management measures under consideration. Alternative 1 is the no action alternative. Alternative 2 provides for trip limit options of 1,625 pounds of vermilion snapper. Alternative 3 imposes a minimum size limit of 12 inches TL. Alternative 4A imposes an 11-inch TL minimum size limit together with a trip limit of 2,300 pounds of vermilion snapper. Alternative 4B imposes an 11-inch TL minimum size limit together with a trip limit of 2,250 pounds of vermilion snapper. Alternative 5 imposes a quota equivalent to a 67 percent allocation of TAC, thereby potentially subjecting the commercial fishery to quota closures. Alternative 6 provides for a vermilion snapper seasonal closure of August 1 through September 30 and December 1 through 31 annually. Preferred Alternative 7 imposes an 11-inch TL size limit and a 40-day closed season from April 22 through May 31. All alternatives would result in negative effects in the short term. Over the 10-year period, the seasonal closure (Alternative 6), the quota (Alternative 5), and the 11-inch TL minimum size along with the 40-day closure (Preferred Alternative 7) would result in the largest increase in net revenues. Size limit alternatives would result in the least increase in net revenues. In fact, the 12-inch TL minimum size limit would reduce net revenues over a 10-year period.

7 AFFECTED ENVIRONMENT

7.1 Physical environment

7.1.1 Geological features

The physical environment of reef fish has been described in detail in the draft EIS for the Generic Essential Fish Habitat amendment and is incorporated here by reference (GMFMC, 2003a). The GOM is bounded by Cuba, Mexico, and the United States, and has a total area of 564,000 km^2. Continental shelves occupy about 35 percent of the total GOM area and the west Florida shelf (about 150,000 km^2) is the second largest shelf in the United States after Alaska.

The GOM basin was formed during the Jurassic Period with the initial breakup of Pangea. The basin’s current position became locked during the early Cretaceous period. The Mississippi River has had a great effect on the northern GOM since the late Cenozoic period. Approximately 450 million metric tons of sediment are deposited annually in the GOM, and this river produces more sediment than the combined deposition of all other regional rivers by an order of magnitude.

The GOM can be divided into two major sediment provinces. East of DeSoto Canyon and southward along the Florida coast, sediments are primarily carbonates. Coarse surface deposits include quartz sand, carbonate sand, and mixtures of the two. To the west of DeSoto Canyon, sediments are terrigenous. Coarse sediments make up the very shallow nearshore bottoms from the Texas/Mexican border to off central Louisiana, from the shore to the central third of the shelf. Beyond 80 m, fine sediments are also strongly represented. Fine sediments are limited to the northern shelf under the influence of the Mississippi and Atchafalaya rivers.

The west Florida shelf provides a large area of hard bottom habitat. It is comprised of low relief hard bottoms that are relict reefs or erosional structures. Some high relief can be found along the shelf edge in waters 130 to 300 m deep. Hard bottom provides extensive areas where reef biota such as corals can become established. These hard bottom areas have become important reef fish fishing areas. Some of these areas such as the Tortugas North and South closed areas, the Florida Middle Ground habitat area of particular concern (HAPC), the Steamboat Lumps and Madison and Swanson closed areas limit fishing activities within their boundaries.

Off the Alabama/Mississippi shelf and shelf break, irregular-shaped aggregates of calcareous organic forms called pinnacles are found. These pinnacles average about 9 m in height and are found in waters about 80 to 130 m deep. In addition to the pinnacles, low-relief hardbottom areas can be found in waters less than 40 m adjacent to Florida and Alabama.

While the Louisiana/Texas shelf is dominated by muddy or sandy terrigenous sediments, banks and reefs do occur on the shelf. Rezak et al. (1985) grouped banks into the mid-shelf banks, (defined as those that rise from depths of 80 m of less and have a relief of 4 to 50 m) that are made of relatively bare, bedded Tertiary limestones, sandstones, claystones, siltstones, and relict reefs (defined as those that rise from water depths of 14 to 40 m and have a relief of 1 to 22 m) that are relict carbonate shelf. The Flower Garden Banks National Marine Sanctuary is located about 150 km directly south of the Texas/Louisiana border. This coral reef is perched atop two salt domes rising above the sea floor and ranges from 15 to 40 m deep.

7.1.2 Oceanographic features

As stated in the Council's Generic EFH Amendment, the GOM 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. The Mississippi and Atchafalaya rivers account for over half of the freshwater discharge into the Gulf. Oceanic conditions are primarily affected by the Loop Current, the discharge of freshwater in to Northern Gulf, and a semi-permanent, anticyclonic gyre in the western Gulf.

Oceanic temperature regimes have been extensively mapped by Darnell et al. (1983), Darnell and Kleypas (1987), NOAA (1985), MMS (1997), and Donaldson et al. (1997). Water temperatures range from 12 to 29º C depending on time of year and depth of water. In general, water temperatures decline during cooler months and increase in the summer. The greatest difference is found in nearshore waters where temperatures can be 10-15º C warmer in the summer compared to the winter. Along the shelf edge, this difference is only about 1-4º C. In the summertime, coastal surface and bottom waters are warmer than offshore waters; however, this trend is reversed in the winter.

Salinity varies seasonally and is dependent on the amount of freshwater input. During months of low freshwater input, coastal salinities generally range between 29 and 32 ppt (MMS, 1997). At times of high freshwater input, salinities can decrease to less than 20 ppt. In the open Gulf, salinities are less variable than coastal waters and are generally around 36 ppt (MMS, 1997). The Mississippi and Atchafalaya rivers provide about half the freshwater input into the Gulf; however, the influence of these waters on salinity is generally restricted to surface waters.

Over the entire Gulf, dissolved oxygen averages about 6.5 ppm (Barnard and Froelich, 1981). During warmer months, localized hypoxic events (<2.0 ppm) occur in such places as Mobile Bay, Alabama and Tampa Bay, Florida. Hypoxic events are usually caused by two factors - stratification of marine waters and decomposition of organic matter. A major hypoxic event occurs each year over a large area of the Louisiana continental shelf with seasonally-depleted oxygen levels (< 2 ppm). The oxygen depletion begins in late spring, reaches a maximum in midsummer, and disappears in the fall. The event is caused by nutrient over-enrichment from anthropogenic sources. These excess nutrients lead to increased algal production and increased availability of organic carbon within an ecosystem. When the rate of oxygen use by decomposers exceeds the rate of oxygen resupply from surface waters, hypoxia occurs.

Riverine inputs, wind, and currents are the primary agents of turbidity in Gulf waters. Turbidity levels in the western and northern Gulf are higher than the eastern Gulf because of more sources of freshwater input. Surface turbidity is limited to areas of riverine inputs with the Mississippi and Atchafalaya rivers, the primary inputs for the Gulf. During low water periods, the amount of sediment in suspension averages 0.260 g/l. The amount of suspended sediment increases to 0.640 g/l during high water periods. These turbid waters are delivered to offshore locations by tidal currents and winds. Another type of turbidity found near the bottom is called the nepheloid layer. This is a body of moving, suspended sediment that is formed when the turbulence of bottom waters is high enough to offset the settling (gravity driven) of the sedimentary particles.

Currents vary with locality and may in some areas exceed 2 meters per second. Circulation patterns in the Gulf are dominated by the Loop Current (LC) that enters the Gulf through the Yucatan Straits and exits through the Straits of Florida after looping anticyclonically through the southeastern Gulf. During most years, the LC penetrates north into the eastern Gulf. Associated with this penetration are the shedding of large anticyclonic eddies that propagate to the west after separation. Following an eddy shedding event, the LC often retreats to the south, hugging the northwest coast of Cuba. The boundary of the LC and its associated eddies is a dynamic zone with both strong convergences and divergences that can concentrate planktonic organisms including fish eggs and larvae.

7.2 Biological environment

The biological environment is described in detail in the draft final EIS for the Generic Essential Fish Habitat amendment and is incorporated herein by reference (GMFMC, 2004a).

7.2.1 Vermilion snapper

7.2.1.1 Vermilion snapper life history

The vermilion snapper, *Rhomboplites aurorubens*, is a small, subtropical snapper that occurs from North Carolina to Rio de Janeiro, but is most abundant off the southeastern United States and in the Gulf of Campeche (Vergara, 1978). In the Gulf of Mexico, vermilion snapper are usually found near hard bottom areas off the west-central Florida coast, the Florida Middle Ground, and the Texas Flower Gardens (Smith et al., 1975; Smith, 1976; Nelson, 1988). Faunal surveys in the South Atlantic Bight (SAB) indicated that vermilion snapper are most common over inshore live-bottom habitats and over shelf-edge, rocky-rubble and rock-outcrop habitats (Grimes et al., 1977, 1982; Barans and Henry, 1984; Chester et al., 1984; Sedberry and Van Dolah, 1984).

Hood and Johnson (1999) found that vermilion snapper sampled from the eastern GOM were smaller than those collected during the 1980s from the western GOM. They discounted sampling biases, depth, and movement for accounting for these differences. While they suggested that geographical differences in growth could be responsible for these differences, they also felt that increases in fishing pressure may have reduced the average size of fish caught by the fishery. Schirripa (1996) reported that the average size of fish in the GOM commercial fishery dropped from a high of 371 mm TL in 1984 to a low of 320 mm TL in 1993. Over this same time period, landings increased from 1.72 mp in 1984 to 3.89 mp in 1993 (Schirripa, 1996).

Vermilion snapper are considered long-lived, slow-growing fish (Manooch, 1987). The oldest individual aged from the GOM was 21 years old (Allman, 2001). Initial growth of vermilion snapper is rapid, reaching an average about 210 mm TL (8.3 inches) by age 1 (Zastrow, 1984; Nelson, 1988; Hood and Johnson, 1999; Allman et al., 2001). Vermilion snapper are commonly as large as 350 mm TL (about 14 inches) and can grow to a maximum size of 600 mm TL (23.6 inches). Most fish caught in the fishery are between 4- and 6-years old (Hood and Johnson, 1999; Allman et al., 2001). Hood and Johnson (1999) and Allman et al. (2001) reported that size-at-age is highly variable, making it difficult to estimate age from length. No significant difference in growth rates between males and females have been detected (Hood and Johnson, 1999).

Information on the reproductive biology of vermilion snapper in the GOM is limited. Sex ratio appears to be dependent on location. Sex ratios from the GOM and Puerto Rico are approximately 1:1 (Boardman and Weiler, 1979; Zastrow, 1984; Collins[3], Hood and Johnson, 1999) although Nelson (1988) reported that males outnumbered females 1.2:1. In the SAB, females consistently outnumbered males, and sex ratios ranged from 1.6:1 to 1.7:1 (Grimes and Huntsman, 1980; Collins and Pinckney, 1988; Cuellar et al., 1996; Zhao and McGovern, 1997). Hood and Johnson (1999) found that most females were sexually mature at 200 mm TL (7.9 inches; age 1). They also did not observe any immature males. The smallest male they sampled was 199 mm TL (7.9 inches). Compared to the findings of Nelson (1988), the size at maturity for females was smaller for Hood and Johnson (1999). They suggested that this decrease in size at maturity could be a result of increased fishing pressure on the stock.

Vermilion snapper are thought to spawn in aggregations. Boardman and Weiler (1979) and Grimes and Huntsman (1980) found large numbers of fish in the same reproductive state in single collections. Spawning in the GOM occurs from the late spring to early fall (Nelson, 1988; Hood and Johnson, 1999; and Collins[3]). Vermilion snapper are batch spawners and batch fecundity has been found to have a positive relationship with fish size (Grimes and Huntsman, 1980; Nelson, 1988; Cuellar et al., 1996; Hood and Johnson, 1999; Collins[3]). Annual fecundities are estimated to range from 0.7 to 35 million eggs depending on fish size (Collins[3]).

Vermilion snapper prey on fishes, shrimps, crabs, polychaetes and other benthic invertebrates, cephalopods and planktonic organisms (Grimes, 1979; Allen, 1985, in Froese and Pauly, 2004). In the Northern Gulf, vermilion snapper prey on other fishes as well as benthic and pelagic invertebrates (Nelson, 1988). Sedberry and Cuellar (1993) reported that off the Southeastern U.S., small crustaceans, primarily copepods and decapods (especially planktonic species and larval stages) dominated the diet of small vermilion snapper (<= 50 mm or 2 inches SL). Larger vermilion snapper shifted their diet to larger amphipods, decapods and teleost fishes.

7.2.1.2 Status of the vermilion snapper stock

Schirripa (1998a) concluded that vermilion snapper were not over harvested, but recruitment and catch trends point to possible declining future abundance. SPR from 1986 to1995 was estimated to range from 0.26 to 0.28. Schirripa and Legault (2000) updated the previous stock assessment with data through 1998, with some catch data from 1999. The commercial fishery accounts for 70 to 80 percent of fish landed by weight. Commercial landings increased from around 1 mp in the early 1980s to a peak near 2.7 mp in 1993. Catch declined for three years, and remained in the 2.3-2.6 mp range from 1996 to 1998, comparable to landings in the early 1980s. Longline fisheries took a small fraction, mostly in the 1980s. The recreational harvest jumped from 0.1 to 0.6 million fish in the early 1980s to 1.0-1.5 million fish from 1986 to 1995. Harvest for 1996-1998 decreased to 0.4-0.6 million fish, slightly above harvest of the early 1980s. The headboat fishery accounted for one third to one half of the recreational catch, and charter boats account for most of the rest. The recreational fisheries discard about 15-25 percent of its catch. Schirripa and Legault (2000) suggested that vermilion snapper is a bycatch of the red snapper fishery, and Schirripa (1998b) noted that vermilion snapper catch varied inversely with red snapper catch. Therefore, declining catch may be associated with increasing abundance of red snapper. While CPUE of the commercial vessels has varied without trend since 1990, the recreational headboat CPUE has declined more than 50 percent since 1993.

Schirripa and Legault (2000) assessed stock condition using two VPA models that added abundance indices to the model used in 1998. Both models used a recruitment index from the

[3]Collins, A. 1997. National Marine Fisheries Service, Southeast Fisheries Center, 3500 Delwood Beach Road., Panama City, FL 32407. personal commun.

NOAA Fisheries' Fall Groundfish Survey. One model incorporated CPUE data from both the handline and the headboat fisheries, while the other did not use the handline CPUE data. The handline-headboat CPUE represents data from virtually the entire fishery, while the headboat-only CPUE incorporates data from about 10 percent of the landings. The handline-headboat model indicated that there was a high probability that the fishery was experiencing overfishing and was overfished, while the headboat-only model indicated that there was a low probability of overfishing and that the stock was overfished.

The most recent assessment of the vermilion snapper fishery was undertaken in 2001 using data through 1999, with some commercial catch data for 2000 (Porch and Cass-Calay, 2001). Two models were used; an age-structured virtual population analysis (VPA) model and a surplus production (Pella-Tomlinson) model. In both cases, the most probable model runs indicated that the stock biomass was estimated to be below the minimum stock size threshold (MSST) and the fishing mortality rate was estimated to be above the maximum fishing mortality threshold (MFMT). However, each model was highly uncertain. For the age-based VPA model, vermilion snapper size-at-age was highly variable due to variable growth of this species. This created difficulties in reliably estimating age from length. For the surplus production model, a long time series (>50 years) of catch and age data is needed for reliable estimates, but only 14 years were available for the assessment.

The RFSAP reviewed the Gulf of Mexico vermilion snapper stock assessment (Porch and Cass-Calay, 2001) in 2001. They evaluated both the VPA (seven versions) and the Pella-Tomlinson surplus production models (seven versions) but concluded that VPA or other age based models were inappropriate due to the high variability in size-at-age data for vermilion snapper. From production model runs, they chose the base model because it seemed to fit the empirical data best. Subsequently, as an addendum, Porch and Cass-Calay (2001) used the base model to develop three rebuilding strategies. Each relied on projecting status quo harvest from 2000 through 2001 based on fishing mortality rates equal to the 1999 estimates so that rebuilding could start in 2002. Using a constant harvest strategy, the model predicted that an annual harvest of 1.48 mp would be required from 2002 through 2011. Using constant F strategies, the annual harvest would have had to be reduced to between 0.918 and 1.031 mp in 2002, but would be nearly equivalent to the constant harvest strategy by 2004 (1.48 mp). The range of required reductions in catch was from 35 to 60 percent based on the difference between the 1999 actual harvest and the projected catch reduction in 2002.

The actual harvest since 1999 has not followed the trend predicted from the model. Harvests from 2000 declined below the value predicted by the base Pella-Tomlinson surplus production model while those for 2001 and 2002 were much higher than those predicted by the model. Additionally, the CPUE indices used in the original model have been updated through 2002 (Turner, 2003). CPUE indices from the recreational headboat fishery, which accounts for about 8 percent of total harvest, show a stable trend in the Eastern Gulf and an increasing trend in the Western Gulf from 1999 through 2002, rather than the declining trends seen prior to 1999 (Figs. 4.2.1.1 and 4.2.1.2). The CPUE index for the commercial fishery, which accounts for 80 percent of total harvest, shows a flat and somewhat variable trend (Fig. 4.2.1.3). The commercial CPUE index from the original report (Brown and Cass-Calay, 2001) indicated a gradual decrease from 1994 through 2000, whereas, the recent update through 2003 shows that the trend reversed since 2000 and the second highest CPUE relative index value in the time series occurred in 2003. The combination of harvest increases and recent increases in CPUE indicate that either the vermilion snapper population biomass has increased or that harvest and CPUE are driven by factors other than stock biomass such as economics or interactions with other fisheries (e.g., red snapper). If the current CPUE changes are driven by biomass increases, it is very possible that they could be the result of a strong recruitment year-class, in which case, these harvest gains may be short-lived. In either case, it is now unlikely that the stock status is as poor as the 2001 assessment suggests.

7.2.2 Other reef fish resources

The Reef Fish FMP applies to 40 species. Of these, 10 have had stock assessments performed by NOAA Fisheries (red grouper, gag, goliath grouper, yellowedge grouper, red snapper, vermilion snapper, yellowtail snapper, greater amberjack, gray triggerfish, and hogfish). A brief review of the stock assessment results for most of these species is presented below. More complete descriptions for some of these species are provided in the EFH EIS (GMFMC, 2004a), and Amendment 22 to the Reef Fish FMP (GMFMC, 2004b). Of the 10 reef fish species for which stock assessments have been completed and reviewed, three are classified by NOAA Fisheries as overfished (red snapper, greater amberjack, and vermilion snapper). Red grouper is no longer considered overfished because the stock size is estimated to be above MSST; however, it is still under a rebuilding plan because the stock size has not reached B_{MSY}. Gag were recently reclassified from not overfished but approaching an overfished condition to neither overfished not undergoing overfishing. Gray triggerfish and yellowedge grouper are classified as unknown for both overfished and overfishing status. Yellowtail snapper were classified as not being overfished or undergoing overfishing. Goliath grouper and Nassau grouper are also classified as overfished but not undergoing overfishing (harvest of both species is prohibited). A recent stock assessment reaffirmed this condition for goliath grouper. The status of the remaining reef fish species are classified as unknown.

Red Snapper: Red snapper are found from North Carolina to the Florida Keys, and into the GOM to the Yucatan off Mexico (Robins et al., 1986). Adults are found in submarine gullies and depressions; over coral reefs, rock outcrops, and gravel bottoms; and are associated with oil rigs and other artificial structures (GMFMC, 2003a). Eggs and larvae are pelagic while juveniles are found associated with bottom features or over barren bottom. Spawning occurs over firm sand bottom with little relief away from reefs during the summer and fall. Adult females mature as early as 2 years and most are mature by 4 years (Schirripa and Legault, 1999). Red snapper have been aged up to 53 years, but most caught by the directed fishery are 2- to 4-years old (Wilson and Nieland, 2001).

The management of red snapper has been surrounded by much controversy over the last decade, in particular because a large number of juvenile fish are caught as bycatch in shrimp trawls. Since the late 1980s, the stock has been considered to be in a severely depleted condition and in need of rebuilding. This is one of the few species for which transitional SPR has been used as a measure of stock status, relative to target and limit (threshold) measures of static percent SPR (e.g. Goodyear, 1995, Schirripa, 1998b; 1999).

In recent years, fishers have reported seeing and catching many more and larger fish, and the species appears to be returning to the waters of the eastern Gulf. Yet, the estimate of transitional SPR has remained well below the overfishing limit (Schirripa, 1999). With several years of strong recruitment, the catches may improve. However, since newly recruited year-classes take some time to contribute significantly to the reproductive potential of the stock, it also takes time before these year-classes generate a corresponding increase in transitional SPR. This is particularly true when the spawning stock is composed of a large number of year-classes.

In 1999, a new red snapper stock assessment was prepared by Schirripa and Legault (1999). While the assessment concluded that the stock was still undergoing overfishing and was overfished, there was, and still is, considerable uncertainty about the estimates of B_{MSY}, and therefore, it is difficult to predict to what level B_{MSY} needs to be rebuilt to (GMFMC, 2004b). This is because the stock has never been assessed at any level approaching B_{MSY} (i.e., $B_{CURRENT} << B_{MSY}$). However, this parameter is critical in determining the rebuilding strategy as well as understanding a stock's productivity. The uncertainty shows in the range of B_{MSY} values (two to four billion pounds) recommended by the RFSAP and the RFSAP's recognition that density dependent factors such as space, cannibalism, and predation may heavily influence the stock-recruitment relationship. It will not be until the stock size has been able to increase that these factors can be better understood. Additionally, the RFSAP (1999, 2000) indicated that the effects of bycatch and bycatch reduction on the stock assessment are not well understood.

Even with uncertainty about B_{MSY} and current stock status, projections show that the stock has been rebuilding since 1996 under the current TAC of 9.12 mp. Based on the 1999 stock assessment of red snapper (Schirripa and Legault, 1999), recruitment levels appear to be improving. The 1995 - 1997 estimates of recruitment from the Fall Groundfish Trawl Survey were higher than most years after 1982, and trawl data from the SEAMAP summer survey indicated that mean catch per tow during the late 1990s were generally higher than those reported from the 1980s and early 1990s. This rebuilding should be accelerated from reductions in bycatch fishing mortality rates from BRDs (40 percent as indicated by Nichols (undated)) and economic-induced reductions in shrimp effort (Travis and Griffen, 2004).

Yellowtail snapper: Yellowtail snapper occurs from North Carolina to southern Brazil and is abundant in south Florida. Adults are found around sandy areas near offshore reefs at depths of 10–70 m (32–230 feet). They prey upon fish, shrimp, and crabs near the bottom and in the water column. Spawning occurs in south Florida during the spring and summer with a peak during May-July. About 50 percent of females are mature at 209 mm TL and age 1.7 years. Like vermilion snapper, yellowtail snapper grow quickly initially but size becomes a poor indicator of age because of the high variability is size-at-age data.

The yellowtail snapper stock was assessed through the SEDAR process in 2003 (Muller et al., 2003). The assessment approach used catch-at-age data generated using direct aging of the catch and various pooling strategies for the development of age-length keys. Based on the maximum age of sampled yellowtail snapper (17 years old), and the established nature of the fishery, the stock assessment panel recommended using an M of 0.2, but allowed M to range between 0.15 and 0.25 for sensitivity analyses.

For the stock assessment, data from the yellowtail snapper fisheries were divided into two regions: the Atlantic and the Florida Keys regions. Catch-at-age for the MRFSS recreational, headboat, and commercial sectors were estimated separately for each region. The analyses were further confined to the years 1981-2001. Total landings during these years increased from 1,000 metric tons in 1981 to 1,648 mt in 1993 and then decreased to 802 mt in 2001. Effort followed a similar trend as that of total landings, increasing to a peak and then decreasing. Tuning indices to improve the statistical population models included two fishery-independent indices based on visual surveys conducted by the NOAA Fisheries and the University of Miami. In addition to the fishery-independent indices, several fishery-dependent indices were used to assess CPUEs.

Two types of assessment models were used to assess the condition of stock: surplus production and age-structured, statistical models. However, the surplus production methods were not stable. This was likely due to lack of contrast in the tuning indices or catch rates. Two age-structured, statistical methods were applied to the data. The first was the Integrated Catch-at-Age (ICA) method that used the combined catch-at-age from the three fisheries and tuning indices to estimate the population sizes by age in the most recent year, fishing mortality rates on the earliest fully recruited age of fish, selectivity patterns by age, and catchability coefficients for the tuning indices (76 parameters in this configuration). In the base case run, the full fishing mortality rate in 2001 was 0.21 per year and the spawning biomass in 2001 was 4,943 mt. The numbers of age-1 fish and the spawning biomass a year earlier were used to estimate the biomass-based management benchmarks given a steepness of 0.8 and alternatives of 0.7 and 0.9. Steepness was defined as the proportion of the recruitment at a spawning biomass of 20 percent of the virgin biomass to the recruitment at the virgin biomass. With a recommended steepness value of 0.8, MSY was estimated to be 941 mt, the F_{2001}/F_{MSY} ratio was estimated to be 0.62, and the SSB_{2001}/SSB_{MSY} ratio was estimated to be 1.35. This indicated that the stock was not undergoing overfishing and was not overfished.

The second age-structured method allowed estimating separate fishing mortality rates for the three fisheries simultaneously. This fishery-specific model estimated the population sizes in the first year (1981), recruitment from a stock-recruit relationship, selectivities by fishery for two periods corresponding to before and after the 12-inch TL (305 mm) size limit was implemented in 1983, and catchability coefficients for the tuning indices. This method estimated a higher MSY of 1,366 mt but only a slightly higher F_{MSY} (0.36 per year as compared to 0.33 per year from ICA). The status criteria were F_{2001}/F_{MSY} = 0.65 and SSB_{2001}/SSB_{MSY} = 1.06 and, like with the previous method, indicated the stock was not undergoing overfishing nor was overfished.

Red Grouper: Red grouper are caught mostly in the GOM from Panama City, Florida to the Florida Keys, and primarily south of Tampa Bay. Red grouper catch statistics were no longer lumped with other grouper species in 1986 (Goodyear and Schirripa, 1993). Cuban fishermen caught a significant amount of red grouper from US waters prior to extended jurisdiction in 1976. Handline/power reel fishermen caught most of the red grouper until the early 1980s when longlines became the dominant gear. Florida implemented an 18-inch minimum size limit in 1985 for state waters and the Council implemented a 20-inch minimum size limit in 1990 for the EEZ, which Florida matched in state waters. Goodyear and Schirripa (1993) concluded that red grouper were not overfished through the early 1990s. SPR was estimated to be around 30 percent.
A 1999 assessment of red grouper (Schirripa et al.,1999) updated the previous assessment with data through 1997 and concluded that red grouper were overfished. Since the results of the assessment indicated that the stock could be recovered to B_{MSY} in less than 10 years in the absence of fishing mortality, the Panel recommended a maximum 10-year rebuilding period. A new assessment in 2002 prepared by NOAA Fisheries and reviewed by the RFSAP confirmed the previous assessment's finding that the red grouper stock was below the overfished threshold of 80 percent*B_{MSY} in 1997, but the stock was found to be less severely overfished due to the effect of incorporating the new fecundity-at-age relationship. At a steepness of 0.7, the previous assessment had found the red grouper spawning stock biomass to be at 56 percent of B_{MSY} in 1997. The revised estimate from the 2002 assessment was that the stock was at 62 percent of B_{MSY} in 1997, and at 84 percent of B_{MSY} in 2001. Although this estimate now put the stock above the overfished threshold, the confirmation that it was below the threshold in 1997 left intact the overfished designation and the requirement to rebuild the stock to B_{MSY} in no more than 10 years. Status criteria and a 10-year rebuilding plan are currently being implemented as part of Secretarial Amendment 1 to the Reef Fish FMP.

Gag: Gag are primarily caught on the west coast of Florida from northern Pinellas County to the northern extent of the state (Schirripa and Goodyear, 1994). Misidentification of gag and black grouper caused problems in all data sets except for scientific research data. Schirripa and Goodyear (1994) used species composition obtained by trained staff in MRFSS and headboat observations from 1990-1992 to correct recreational and commercial catch and landing data.

They did not use information from commercial logbooks because some fishermen non-quantifiably changed reporting from black grouper to gag and because of large discrepancies between MRFSS-headboat and commercial logbook data. After re-apportioning gag and black grouper catches based on scientific data collections and observed recreational catch, Schirripa and Goodyear (1994) concluded that gag were not overfished, although the male to female ratio had decreased from the late 1970s to the early 1990s. They estimated SPR at approximately 30 percent. This assessment was updated by Schirripa and Legault (1997) using data through 1996. Schirripa and Legault (1997) and the RFSAP (1998) expressed concern that spawning aggregations of gag may be more vulnerable to harvest than suggested by the standard models and reference points. This concern is reflected in the spawning ground closures implemented by the Council in a 1999 regulatory amendment.

In 2001, a new assessment of gag was conducted using new length-at-age information (Turner et al., 2001). The RFSAP (2001) reconsidered the previous use of a fishing mortality rate of $F_{30\%\ SPR}$ as a proxy for F_{MSY}. This usually works well with fish that do not change sex, since egg production remains fairly proportional to biomass throughout a fish's life. However, gag is a protogynous hermaphrodite, and the relationship between egg production and biomass does not hold. The $F_{30\%\ SPR}$ proxy is based on the potential number of eggs produced by each age-class, which decreases rapidly after a peak at age 8 because older fish turn into males. The F_{MAX} proxy, on the other hand, is based on the average weight of each age-class, which increases a great deal after age 8. Thus, it seems clear that, for gag, an $_{FMAX}$ policy is more compatible with the concept of MSY than is an $F_{30\%\ SPR}$ policy. The RFSAP (2000) recommended that efforts be undertaken to maintain a harvest strategy that maintains F at F_{MAX}, or moves toward F_{OY}. This strategy allows higher yields than fishing at $F_{30\%\ SPR}$, allows male biomass to be about 10 percent of its unfished biomass, and reduces harvest costs to the fishery.

Using the default thresholds of F_{MAX} for overfishing and 85 percent (1-M) of B_{MSY} for overfished status, the VPA was bootstrapped 500 times for use in estimating uncertainty about the current status and benchmark statistics. The results indicated that there was an 85 percent probability the stock biomass was above the MSY level, and only a 41 percent probability that overfishing was occurring. Although the model recommended a maximum ABC of 6.23 mp gutted weight, this high end of the ABC range reflected assumptions about the future status of the stock that are not inherent in the current status and have not yet been demonstrated to be true. Therefore, the RFSAP (2000) recommended a precautionary approach of not allowing landings to exceed the recent levels of about 5 mp.

Goliath grouper: Goliath grouper are found from Bermuda to Brazil and in the Gulf of Mexico (Briggs, 1958). Their center of abundance in the Gulf of Mexico is in the Ten Thousand Islands area of Florida. Adults are usually found in waters less than 100 feet around structures (Bullock and Smith, 1991; Sadovy and Eklund, 1994; 1999) and juveniles are often found in less than six feet of water around mangrove swamps (Thompson and Munro, 1978). Bullock et al. (1992) was able to age goliath grouper to a maximum age of 37 years. This species grows quite large can exceed six feet in length and 700 pounds in weight. There is insufficient evidence to consider jewfish to be protogynous hermaphrodites like other grouper species. Female jewfish in the eastern Gulf of Mexico are reported to be in spawning condition from June to December (Bullock et al., 1992). Peak spawning is considered to occur from July to September when almost all mature female ovaries are ripe.

In 1990, Amendment 2 to the reef fish FMP was implemented to protect the goliath grouper stock. This amendment prohibited the harvest of goliath grouper to provide complete protection for this species in federal waters and was in response to indications that the population abundance throughout its range was greatly depressed. However, no stock assessment had been conducted on this species.

In 2003, a stock assessment on goliath grouper was initiated by NOAA Fisheries as a product of the SEDAR process. Initially, the consensus during a data workshop was that there was not enough information to conduct a stock assessment; however, in a later assessment workshop, participants felt that there was enough information and so a stock assessment was initiated (Kingsley, 2004a). This assessment (Porch et al., 2003) used fishery independent diver visual surveys, a telephone survey of experienced fishermen who had been in the fishery from 1950-1990, fishery dependent data from the Everglades National Park creel survey, both commercial and recreational landings data, and life history information.

Because the information regarding goliath grouper was considered "data poor", an *ad hoc* assessment method was applied to the data. The stock assessment model traced the stock trajectory from an assumed near-virgin stock biomass in 1950 to 1990 when the harvest of goliath grouper was prohibited. Stock condition was then expressed relative to the pristine condition. Model outcomes were bracketed by a range of effectiveness of the current harvest prohibition (90 to 99 percent effective). Using a proxy for MSY of 50 percent SPR, the assessment model indicated that the stock was still overfished. The ratio of $B_{2003}/B_{50\%\ SPR}$ ranged from 0.76 to 0.91 depending on the effectiveness of the harvest prohibition. The stock assessment was not able to determine if overfishing was still occurring on the stock, but the assessment did indicate that the stock size has been increasing since 1990 (Kingsley, 2004a).

Yellowedge Grouper: Yellowedge groupers are caught primarily off the west coast of Florida in deep waters. Recreational landing comprise only a small proportion of the yellowedge harvest (<2 percent). The commercial fishery is mainly conducted with longline and handline gear. Western Florida landings account for about two thirds of the landings, followed by Louisiana and Texas. Alabama and Mississippi landings are negligible. During 1986-1994, longline yields averaged 297 MT per year, and since 1994, yields have been around 340 metric tons per year. For handlines, the total yield of yellowedge has decreased five-fold since 1986. Handline landings off western Florida decreased from an average 137.5 MT from 1984-1988, to 37 MT from 1989-1994, to 12 MT since 1994.

In 2002, the yellowedge grouper stock was assessed using a state-space, age structured production model by Cass-Calay and Bahnick (2002). The assessment used age and growth data from 535 otoliths collected between 1979 and 2001. Ages ranged from 0 to 85 years. CPUE data obtained from the Reef fish Logbook Program, MRFSS, and fishery-independent longline surveys were relatively flat and variable, and so provided no clear information on the stock. In addition, the size distribution appeared stable and the yields from the fishery were without trends. Therefore, the RFSAP (2002) concluded that the status for the yellowedge grouper stock remains essentially undetermined. The RFSAP (2002) did caution that because of the longevity of yellowedge grouper, they may be particularly susceptible to even relatively low fishing mortality rates. Based on the lack of trends in the landings data and longevity of this species, the RFSAP recommended that the commercial yield should not greatly exceed the historical average of 381 MT. They further recommended that the proportion of yellowedge grouper in the deep-water grouper complex be closely monitored for landings greater than the historical average that comprises 73 percent of the deep-water grouper landings.

Greater Amberjack: Amberjacks in the GOM are caught primarily along the west coast of Florida westward to the Mississippi River. Amendment 1 of the Reef Fish FMP concluded that greater amberjack was overfished, and that the fishery harvests had increased in the recent years prior to the amendment. The RFSAP concluded in 1993 that available data were too poor in quality and quantity to use for a stock assessment, but that data existed to monitor the trends in the fishery. McClelland and Cummings (1996) cited severe under-sampling of the amberjack fisheries for length and weight data. They presented results of a VPA analysis for greater amberjack based on updated landing, CPUE, and biological data, and . Declining biological sampling after 1993 diminished the reliability of results after 1994. McClellan and Cummings (1996) concluded that fishing mortality for adult fish (ages 4-7+) during 1987-1995 ranged from 0.10-0.45, with values below 0.15 in 1994 and 1995; that fishing mortality on young fish (ages 1-3) decreased in 1990 after a minimum size limit went into effect. Abundance estimates were variable, with increases in 1993-1995. They found an SPR of 0.43 in 1994.

Turner et al. (2000) re-assessed the greater amberjack stock using data through 1998. They used a calibrated VPA and used data on catch-at-age, selectivity, and indices of abundance from private and charter boats, headboats, and handline fisheries. Turner et al. (2000) considered a variety of assumptions and a combination of the abundance indices that showed variability in the results. The RFSAP selected four of the runs as most likely to represent stock conditions, all of which showed an overfished condition for greater amberjack in 1998. Two of the runs indicated that overfishing also occurred, including the run considered most likely by the RFSAP. The Panel also concluded that management actions (closed seasons, bag limits, and size limits) taken in 1998 might reduce fishing mortality sufficiently to eliminate overfishing. NOAA Fisheries notified the Council in January of 2001 that the stock was overfished. Stock status criteria and a 10-year rebuilding plan have been implemented as part of Secretarial Amendment 2 to the Reef Fish FMP.

Gray triggerfish: The gray triggerfish is widely distributed in tropical and temperate waters throughout the Atlantic. In the Western Atlantic it ranges from Nova Scotia through Bermuda and the GOM to Argentina (Harper and McClellan, 1997). This species is an important component of the GOM reef fishery, particularly for the recreational fishing sector (Goodyear and Thompson, 1993). Prior to the 1980s, gray triggerfish were not considered a desirable catch by most fishers, but there has been an increase in targeting of this and other “under-utilized” species, probably caused by the decline in other reef fish stocks (e.g., red snapper and groupers).

There was an initial increase in average annual landings from 1.46 mp in 1986 to 2.88 mp in 1990, followed by a steady decline to 0.85 mp in 1998. The cause of this decline has not been determined, but it could be attributed to a consistent increase in fishing effort and a possible consequent decrease in stock size. In response to this problem, the first assessment for the gray triggerfish was published in March 2001 (Valle et al., 2001). Problems were encountered in the assessment. The model frequently failed to converge on a satisfactory solution, due to the limited time series of catch and effort data. Nevertheless, the authors considered there was reasonable evidence that the current rate of removal is not sustainable. There was a steady decline in landings since the peak in 1990 to a level (in 1998) below the MSY range. Estimated biomass levels are low and exploitation rates are high. However, in reviewing the assessment, the RFSAP (2001) felt that the data available for gray triggerfish was inadequate to support the assessment methods. Therefore, they were unable to determine the status of the stock.

Hogfish: Hogfish are found from Nova Scotia to the northern coast of South America in the western Atlantic, however, they are mostly associated with sub-tropical and tropical waters (Robins et al, 1986). In coral reef systems, they are mostly associated with shallow, low-relief hard bottom areas (Manooch, 1984). Hogfish are long-lived fish and have been aged up to 23 years (McBride, 2001). Like other wrasses, this species is a protogynous hermaphrodite. Spawning occurs from September to April, with a peak in February and March (Davis, 1976 as cited in Ault et al., 2003).

Both Florida commercial and recreational landings have shown a decline in recent years. In the commercial fishery, landings have declined from approximately 135,000 pounds in 1993 to 45,000 pounds in 2001. Over the same period, landings declined in the recreational fishery from approximately 440,000 pounds to 151,000 pounds. Based on concern about this stock, a stock assessment was conducted on the Florida hogfish fishery in 2003.

Ault et al. (2003) used fishery dependent and independent data to generate indices of abundance. However, these data sets had some problems. For example, anglers do not target hogfish and hogfish are difficult to catch with hook-and-line gear. This makes MRFSS data hard to use to construct a catch-effort index of abundance (Kingsley, 2004b).

The assessment used an age-structured stock-synthesis model and a block-biomass (surplus production) model to assess the stock (Ault et al., 2003). This assessment indicated that the Florida stock was overfished and undergoing overfishing. However, in the SEDAR review of the assessment, it was noted that "because of a number of limitations in the documentation both of the models used, and their relation to the results presented, the Review Panel found it difficult to assess the adequacy and appropriateness of the models and of their results" (Kingsley, 2004b). Therefore, the SEDAR review panel could not determine the stock status. The SEDAR review panel did conclude that recent increases in the numbers of pre-recruits and recruited fish in visual census indicated a recent increase in recruitment. They also concluded that the truncated size distribution of hogfish in the Florida Keys area suggested that these fish were subject to a high fishing mortality.

7.2.3 Habitat use by managed reef fish species

The amended MSFCMA of 1996 included new EFH requirements, and as such, each existing, and any new, FMPs must describe and identify EFH for the fishery, minimize to the extent practicable adverse effects of fishing on that EFH, and identify other actions to encourage the conservation and enhancement of that EFH. In 1999, a coalition of several environmental groups brought suit challenging the agency's approval of the EFH FMP amendments prepared by the Gulf of Mexico, Caribbean, New England, North Pacific, and Pacific Fishery Management Councils (American Oceans Campaign et al. v. Daley et al., Civil Action No. 99-982 (GK) (D.D.C. September 14, 2000). The court found that the agency's decisions on the EFH amendments were in accordance with the MSFCMA, but held that the EA on the amendments were in violation of the National Environmental Policy Act (NEPA) and ordered NOAA Fisheries to complete new, more thorough NEPA analyses for each EFH amendment in question. Consequently, NOAA Fisheries entered into a Joint Stipulation with the plaintiff environmental organizations that called for each affected Council to complete EISs rather than EAs for the action of minimizing adverse effects of fishing to the extent practicable on EFH. See AOC v. Evans/Daley et al., Civil No. 99-982 (GK) (D.D.C. December 5, 2001). However, because the court did not limit its criticism of the EAs to only efforts to minimize adverse fishing effects on EFH, it was decided that the scope of these EISs should address all required EFH components as described in section 303 (a)(7) of the MSFCMA.

To address these requirements the Council has, under separate action, drafted an EIS to analyze within each fishery a range of potential alternatives to: (1) describe and identify EFH for the fishery; (2) identify other actions to encourage the conservation and enhancement of such EFH; and (3) identify measures to minimize to the extent practicable the adverse effects of fishing on such EFH (GMFMC, 2003a). Depending on the preferred alternatives identified in this EIS the Council FMPs may require amendments to comply with the guidelines articulated in the EFH Final Rule to implement the EFH provisions of the MSFCMA (See 50 CFR Part 600, Subpart J).

NOAA Fisheries published the Draft EIS on August 29, 2003, and a Record of Decision was published in July 2004.

As documented in the Council's DEIS for the Generic EFH Amendment (GMFMC, 2003a), many aspects of the biological environment are unknown or unavailable. Lack of data limits the ability of management agencies to develop specific management programs for managed species or the essential habitat needed by those species. The number of managed species and the complex components of the environment exceed the capability of state and federal management and scientific organizations to provide information. In general, data collections and analyses have been limited to selected species or components of the environment. Several federal agencies and all state fishery/natural resource agencies have programs underway to expand necessary information.

- NOAA Fisheries has the lead responsibility for fishery management and protection in the federal waters of the GOM (beyond nine miles off Texas and the west coast of Florida, and three miles off the other states).
- The US Army Corp of Engineers requires permits for many activities in state and federal navigable waters, and has biological assessment capabilities.
- The Mineral Management Service (MMS) has a responsibility to assess biological effects of federally authorized mineral extraction (especially oil and gas in the GOM).
- The US Geological Service has biological research division that emphasizes shallow-water processes, and is also engaged in mapping the benthic habitat of the GOM.
- The US Fish and Wildlife Service (USFWS) is responsible for marine birds, anadromous fish and some marine mammals (e.g., manatees).

7.2.3.1 Vermilion snapper

Vermilion snapper are distributed from North Carolina to Rio de Janeiro but is most abundant off the southeastern United States and in the Gulf of Campeche (Vergara, 1978). In the Gulf of Mexico, vermilion snapper are usually found near hard bottom areas off the west-central Florida coast, the Florida Middle Ground, and the Texas Flower Gardens (Smith et al., 1975; Smith, 1976; Nelson, 1988). Eggs and larvae are pelagic. Juveniles are found around hard bottom areas and reefs.

7.2.3.2 Other reef fish species

The National Ocean Service (NOS) of NOAA collaborated with NOAA Fisheries 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, state trawl surveys, and GUS 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, larva, 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 species' life history stages are summarized in Table 7.1 and can be found in more detail in GMFMC (2004). 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. For example, 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). Figures 7.2.1, 7.2.2, and 7.2.3 provide information on habitat use.

Table 7.1. Summary of habitat utilization by life history stage for species in the Reef Fish FMP. This is Table 3.2.7 in the final draft of the EIS from the Council's EFH generic amendment (GMFMC, 2004a).

Scientific	**Eggs**	**Larvae**	**Post-**	**Early**	**Late**	**Adults**	**Spawning**
Balistes capriscus	Reefs	Drift algae	Drift algae	Drift algae, Mangroves	Drift algae, Mangroves,	Reefs, Sand/ shell bottoms	Reefs, Sand/ shell bottoms
Caulolatilus microps	Pelagic	Pelagic				Hard bottoms, Sand/ shell bottoms, Shelf edge/slope, Soft bottoms	
Diplectrum bivittatum					Hard bottoms	Hard bottoms, Soft bottoms	
Diplectrum formosum						Reefs, SAV, Shoals/ Banks,	
Epinephelus adscensionis	Pelagic	Pelagic				Hard bottoms, Reefs	Hard bottoms, Reefs
Epinephelus drummondhayi	Pelagic	Pelagic				Hard bottoms, Reefs	Shelf edge/slope
Epinephelus	Pelagic	Pelagic			Hard	Hard bottoms	
Epinephelus guttatus	Pelagic	Pelagic		Reefs	Reefs	Hard bottoms, Reefs, Sand/ shell bottoms	Hard bottoms
Epinephelus						Reefs	
Epinephelus itajara	Pelagic	Pelagic	Man-groves	Mangroves, Reefs, SAV	Hard bottoms, Mangroves, Reefs, SAV	Hard bottoms, Shoals/ Banks, Reefs	Reefs, Hard bottoms
Epinephelus morio	Pelagic	Pelagic		Hard bottoms,	Hard bottoms,	Hard bottoms, Reefs	

Scientific	Eggs	Larvae	Post-	Early	Late	Adults	Spawning
Epinephelus mystacinus	Pelagic	Pelagic				Hard bottoms, Shelf edge/slope	Hard bottoms
Epinephelus nigritus	Pelagic	Pelagic			Reefs	Hard bottoms, Shelf edge/slope	
Epinephelus niveatus	Pelagic	Pelagic		Reefs	Reefs	Hard bottoms, Reefs, Shelf edge/slope	
Epinephelus striatus		Pelagic		Reefs, SAV		Hard bottoms, Reefs, Sand/ shell bottoms	Hard bottoms, Reefs, Sand/ shell bottoms
Etelis oculatus	Pelagic	Pelagic				Hard bottoms	
Lachnolaimus maximus				SAV	SAV	Hard bottoms, Reefs	Reefs
Lopholatilus chamaeleonticeps	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	
Lutjanus analis	Reefs	Reefs	Reefs	Mangroves, Reefs, SAV, Emergent marshes	Mangroves, Reefs, SAV, Emergent	Reefs, SAV	Shoals/ Banks, Shelf edge/slope
Lutjanus apodus	Pelagic	Pelagic		Mangroves, SAV	Hard bottoms, Mangroves, Reefs, SAV, Emergent marshes	Hard bottoms, Reefs, SAV	Reefs
Lutjanus buccanella	Pelagic			Hard bottoms	Hard bottoms	Hard bottoms, Shelf edge/slope	Hard bottoms, Shelf edge/slope
Lutjanus campechanus	Pelagic	Pelagic		Hard bottoms, Sand/ shell bottoms, Soft bottoms	Hard bottoms, Sand/ shell bottoms, Soft bottoms	Hard bottoms, Reefs	Sand/ shell bottoms
Lutjanus cyanopterus	Pelagic			Mangroves, Emergent marshes, SAV	Mangroves, Emergent marshes, SAV	Mangroves, Reefs	Reefs

Scientific	Eggs	Larvae	Post-	Early	Late	Adults	Spawning
Lutjanus griseus	Pelagic, Reefs	Pelagic, Reefs	SAV	Mangroves, Emergent marshes, Seagrasses	Mangroves, Emergent marshes, SAV	Emergent marshes, Hard bottoms, Reefs, Sand/ shell bottoms, Soft bottoms	
Lutjanus jocu	Pelagic	Pelagic		SAV	Mangroves, SAV	Reefs, SAV	Reefs
Lutjanus mahogoni	Pelagic	Pelagic		Reefs, Sand/ shell bottoms	Reefs, Sand/ shell bottoms	Hard bottoms, Reefs, Sand/ shell bottoms, SAV	
Lutjanus synagris	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
Lutjanus						Shelf edge	
Mycteroperca bonaci	Pelagic	Pelagic		SAV	Hard bottoms, Reefs	Hard bottoms, Mangroves, Reefs	
Mycteroperca interstitialis	Pelagic	Pelagic		Mangroves	Mangroves, Reefs	Hard bottoms, Reefs	
Mycteroperca microlepis	Pelagic	Pelagic		SAV	Hard bottoms, Reefs, SAV	Hard bottoms, Reefs	
Mycteroperca phenax	Pelagic	Pelagic		Hard bottoms, Mangroves, Reefs	Hard bottoms, Mangroves, Reefs	Hard bottoms, Reefs	Reefs, Shelf edge/slope
Mycteroperca venenosa				SAV	Hard bottoms, SAV	Hard bottoms, Reefs	Hard bottoms
Ocyurus chrysurus	Pelagic			Mangroves, SAV, Soft bottoms	Reefs	Hard bottoms, Reefs, Shoals/ Banks	
Pristipomoides aquilonaris	Pelagic	Pelagic				Hard bottoms, Shelf edge/slope	Shelf edge/slope
Rhomboplites aurorubens	Pelagic			Hard bottoms,	Hard bottoms,	Hard bottoms, Reefs	
Seriola	Pelagic	Pelagic	Pelagic	Drift algae	Drift algae	Pelagic, Reefs	Pelagic
Seriola fasciata				Drift algae	Drift algae	Hard bottoms	Hard bottoms
Seriola rivoliana	Pelagic			Drift algae	Drift algae	Pelagic	Pelagic

Scientific	Eggs	Larvae	Post-	Early	Late	Adults	Spawning
Seriola zonata		Pelagic		Drift algae	Drift algae	Pelagic	Pelagic

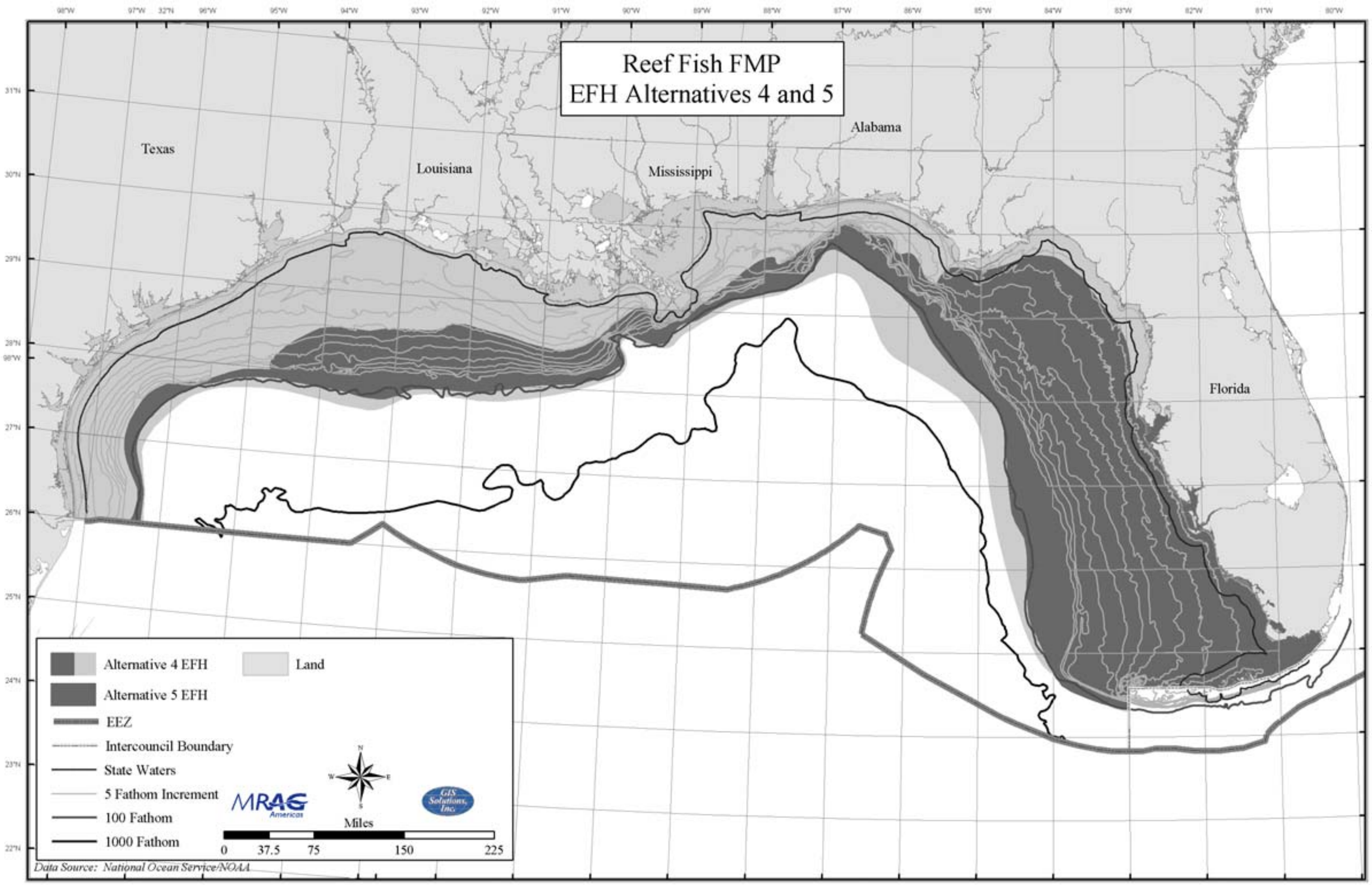


Figure 7.2.1 EFH for reef fish in the Gulf of Mexico (from the Draft Environmental Impact Statement for the Generic Essential Fish Habitat Amendment of the GMFMC).

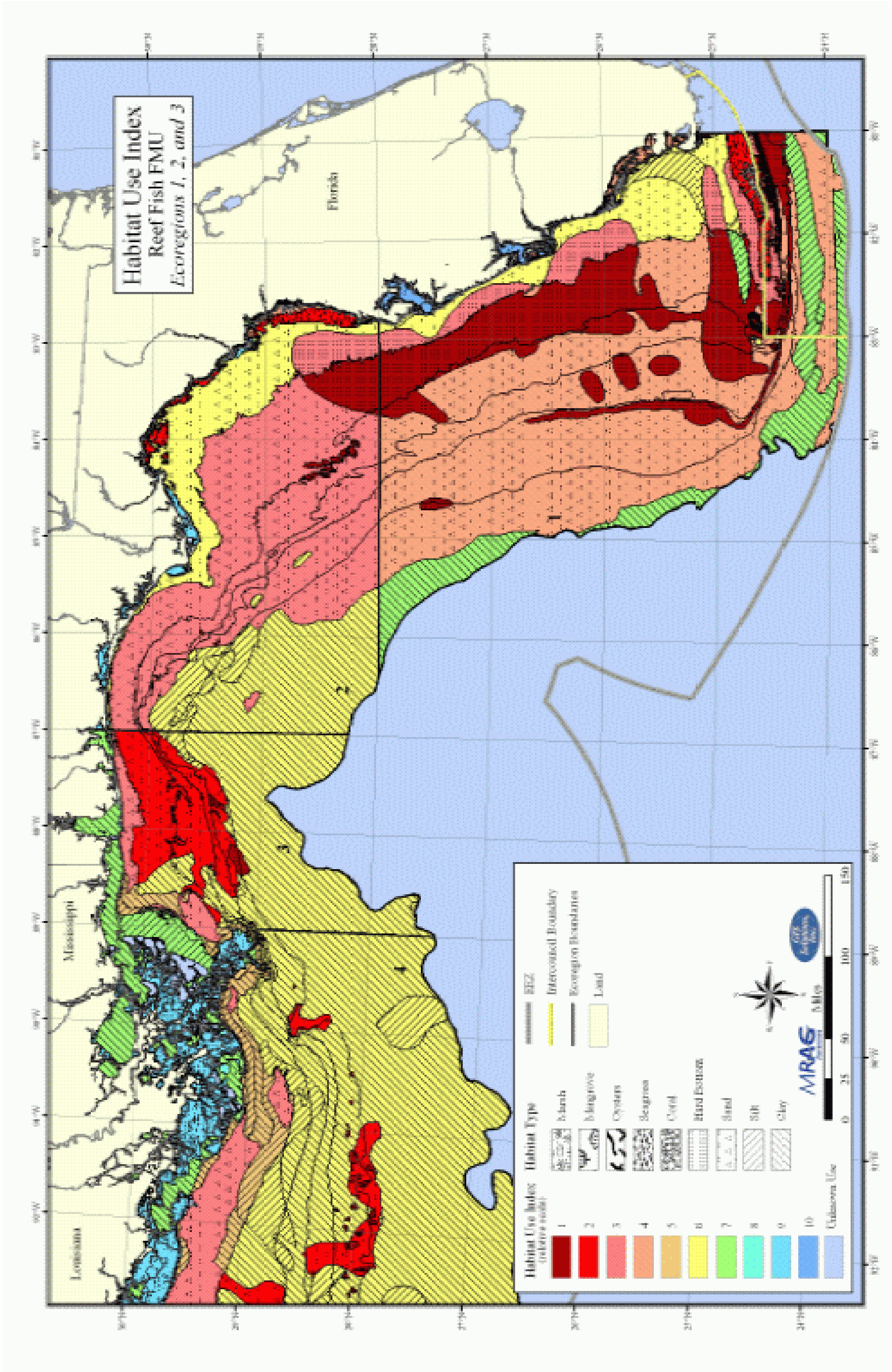


Figure 7.2.2 Habitat use by Reef Fish FMP species in the eastern Gulf of Mexico - low index number represent high levels of habitat use (from the Draft Environmental Impact Statement for the Generic Essential Fish Habitat Amendment of the GMFMC).

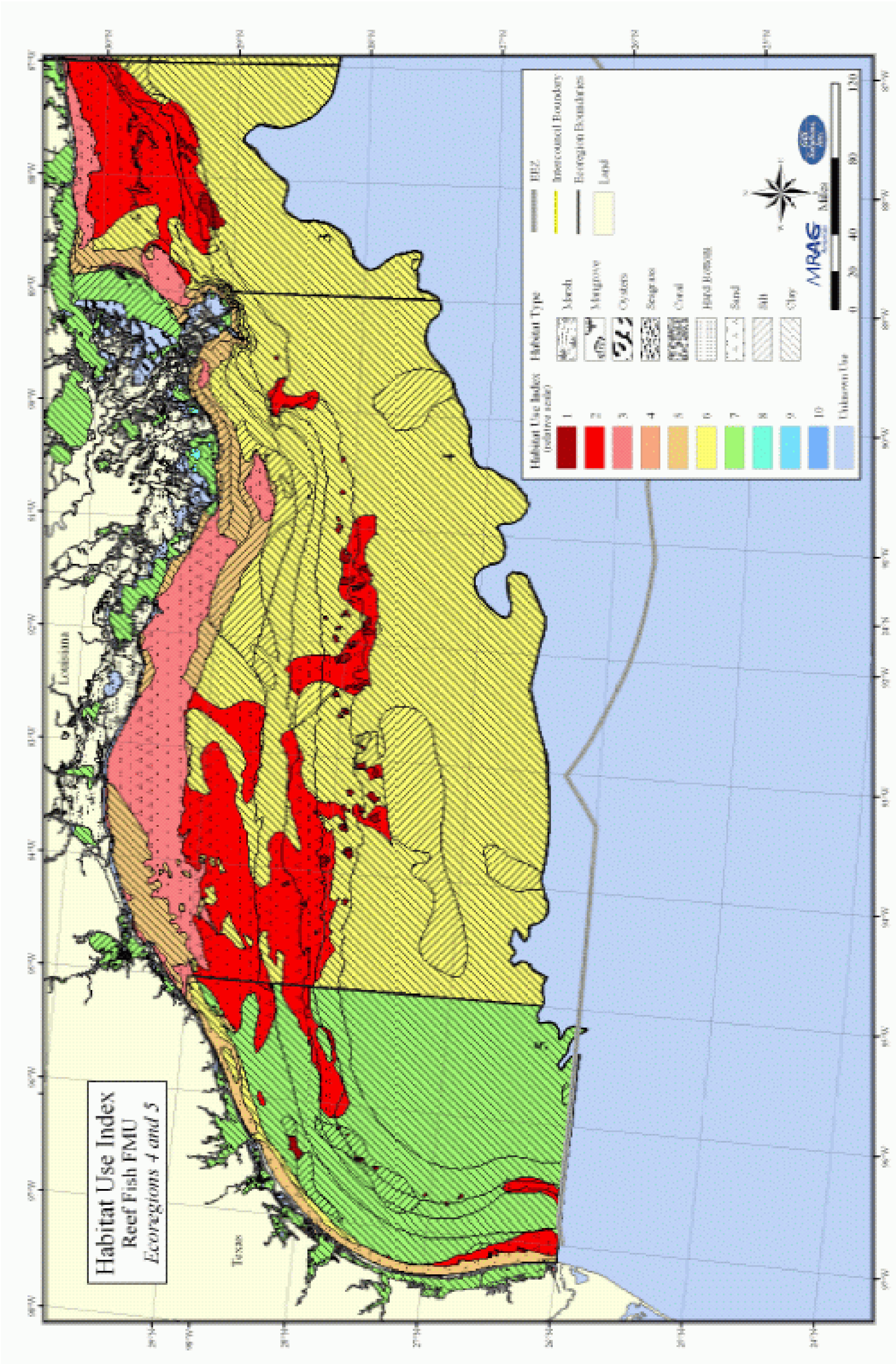


Figure 7.2.2 Habitat use by Reef Fish FMP species in the western Gulf of Mexico - low index number represent high levels of habitat use (from the Draft Environmental Impact Statement for the Generic Essential Fish Habitat Amendment of the GMFMC).

7.2.4 Environmental Sites of Special Interest

7.2.4.1 GOM marine protected areas established by the Council

Tortugas Shrimp Sanctuary - A shrimp nursery ground in the Florida Keys permanently closed to the use of trawls and harvest or possession of shrimp. This results in shrimp growing to about a 47 count/pound before harvest (3,652 square nautical miles).

Cooperative Texas Shrimp Closure - A shrimp nursery ground off Texas cooperatively closed by the Council and the state of Texas for 45 to 60 days out to either 15 or 200 miles. This closure results in shrimp growing to about 39 count/pound (5,475 square nautical miles).

Southwest Florida Seasonal Closure (Shrimp/Stone Crab) - Closure of federal and state waters to shrimping from November 1 through May 20 inshore of the line to protect juvenile stone crab and prevent loss of stone crab traps in trawls (4,051 square nautical miles).

Central Florida Shrimp/Stone Crab Separation Zones - Closure of state and federal waters to either shrimping or crabbing from October 5 to May 20. Crab or shrimp fishing alternate in zones IV and V. (174 square nautical miles).

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).

Florida Middle Grounds HAPC - Pristine coral area protected from use of any fishing gear interfacing with bottom (348 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 highly migratory species is prohibited (219 square nautical miles).

Stressed Area - Permanent closure Gulf-wide of the nearshore waters to use of fish traps, power heads, and roller trawls (i.e., “rock hopper trawls”) (48,400 square nautical miles).

Flower Garden Banks HAPC - Pristine coral area protected by preventing use of any gear that interacts with the bottom. Subsequently, this area was made a marine sanctuary by NOS (41 square nautical miles).

Tortugas North and South Marine Reserves - No-take marine reserves cooperatively implemented by the state of Florida, NOS, the Council, and the National Park Service (see jurisdiction on chart) (185 square nautical miles).

7.2.4.2 Existing GOM fishery management plan area closures

Closure Area	Area (square nautical miles)
<u>Gulf Wide Closures</u>	
Stressed Area Closure*	48,400
Longline/Buoy Gear Area Closure	
Eastern Gulf	24,400
Central/Western Gulf*	47,900
Total	72,300
<u>Florida Closures</u>	
Tortugas Shrimp Sanctuary*	3,652
Southwest Florida Seasonal Closure (Shrimp/Stone Crab)**	
State Waters (1 October - 31 May)	2,562
Federal Waters (1 January - 20 May)	1,489
Total	4,051
Central Florida Shrimp/Stone Crab Separation Zones	174
Florida Middle Grounds HAPC*	348
Tortugas South Marine Reserve	60
Madison/Swanson Marine Reserve	115
Steamboat Lumps Marine Reserve	104
Florida Total	8,594
<u>Texas Closures</u>	
Cooperative Shrimp Closure (15 May - 15 July)	
Initial 15 nautical miles offshore*	5,475
200 miles**	NA
Flower Garden Banks HAPC*	41
Texas Total	5,516
Overall Total	**134,720**

* EFH Closures
** Gear Closures

7.2.4.3 Reef fish habitat sites off the Gulf Coast of Florida

The following is a list of habitat sites identified by Dr. Chris Koenig and Chris Gledhill. Most of these sites are far offshore the Florida west coast. Descriptions of these sites in more detail can be found in the EFH EIS (GMFMC, 2004a) and draft Amendment 22 to the Reef Fish FMP (GMFMC, 2004b). Vermilion snapper are found at many of these sites. These sites often have high relief.

1. 29 Edge/27 Edge, North and West rim of the DeSoto Canyon (several sites within the same area - total area = 367 sq. naut. mi.)

2. "Woodward-Clyde" Pinnacles (42 sq. naut. mi)

3. “3-to-Ss” area (76 sq. naut. mi)

4. Area North of Johnny Walker site (denoted as Mud Banks by Moe, 1963) (28 sq. naut. mi)

5. Madison and Swanson sites (denoted as Whoopie Grounds by Moe, 1963) (115 sq. naut. mi).

6. Twin Ridges site (5 sq. naut. mi).

7. Florida Middle Grounds. (340 sq. naut. mi).

8. 40 Fathom Contour West of the Middle Grounds (denoted as The Edges by Moe, 1963) (several sites within the same area - total area = 436 sq. naut. mi.).

9. “Steamboat lumps”. (104 sq. naut. mi.)

10. “The Elbow”. (107 sq. naut. mi).

11. “Christmas Ridge”. (191 sq. naut. mi).

12. “Hambone Ridge/the Finger”. (153 sq. naut. mi).

13. “Northwest Peaks”. (182 sq. naut. mi).

14. “Riley's Hump”. (11 sq. naut. mi).

7.2.5 Marine mammals and protected species

There are 28 cetacean, one sirenian, and one non-native pinniped (California sea lion) species that have confirmed occurrences in the GOM (Davis and Fargion, 1996). Of these, six marine mammal species are listed as endangered species. Additionally, all five of the sea turtles found in the GOM (Kemp's ridley, loggerhead, green, leatherback, and hawksbill) are protected under the Endangered Species Act (ESA). Fish species listed under the ESA in the GOM include the threatened Gulf sturgeon and the endangered smalltooth sawfish. Thirteen species of fish in the GOM are currently on the candidate list, three of which are reef fish. The following is a brief overview of these species. For more complete descriptions, refer to the draft final EIS to the Council’s Generic EFH amendment (GMFMC, 2004a). NOAA Fisheries recently completed a Biological Opinion for sperm whales, sea turtles, and Gulf sturgeon on the Gulf of Mexico Outer Continental Shelf Oil and Gas Lease Sales 189 and 197. These reports contain the most updated information on GOM protected species at this time.

7.2.5.1 Marine mammals

7.2.5.1.1 Whales

Sperm whales were listed as endangered under the ESA in 1973 (NOAA Fisheries, 2001a). They are also protected by the Convention on International Trade in Endangered Species of wild flora and fauna and the Marine Mammal Protection Act of 1972. Critical habitat has not been designated for sperm whales. There has been speculation, based on a year-round occurrence of strandings, opportunistic sightings and whaling catches, that sperm whales in the GOM may constitute a distinct stock, and they are treated as such in NOAA Fisheries' Marine Mammal Stock Assessment Report (Waring et al., 2000). Sperm whale sightings recorded from the

NOAA vessel Oregon II from 1991 - 1997 are concentrated just beyond the 100 m depth contour in the northern GOM, east of the Mississippi River Delta. These waters are the only known breeding and calving area in the GOM. The GOM sperm whale stock is estimated at 530 sperm whales, calculated from an average of estimates from 1991-1994 surveys (Waring et al., 2000). The minimum population estimate (N_{MIN}) is 411 sperm whales (Waring et al., 2000).

Right whales are found off Canada and the northeast United States in feeding areas during spring through late fall (MMS, 2000). Winter distribution for the majority of the population is unknown, but coastal waters between Georgia and Florida are the only known calving areas for these whales. Existing records of this species in the GOM represent strays from the wintering grounds. There are only two reliable records (strandings on the Texas coast) of blue whales in the GOM, and this species is not thought to be a regular inhabitants of the Gulf (MMS, 2000).

The **sei whale** probably has only an accidental occurrence in the Gulf (though three of the four reliable records were from strandings on the eastern Louisiana coast) (MMS, 2000).

Humpback whales spend winter in warm waters to calve, and then move to colder waters to feed during the summer (MMS, 2000). The few reports of humpback whales in the Gulf are considered to be whales that may have lost their way on return northerly migrations (from the Caribbean) in the western North Atlantic.

The **fin whale** is found in all major oceans in the world. Like other large baleen whales, it migrates seasonally from temperate waters where it mates and calves in the winter to polar feeding grounds in the summer (USM no date). The wintering grounds of the north Atlantic stock are the Caribbean Sea and GOM. Stocks of the North Atlantic were heavily fished and soon depleted. There are now only a few thousand fin whales in the North Atlantic. Pre-exploitation populations have been estimated at over 464,000, with about 18,000 in the North Atlantic, 45,000 in the North Pacific, and 400,000 in the Southern Ocean (NOAA Fisheries, 1991). Current stocks were estimated to include about 119,000 individuals, with about 17,221 in the North Atlantic, 16,625 in the North Pacific, and 85,200 in the Southern Ocean. Sightings and strandings indicate that fin whales continue to use the GOM as part of their wintering habitat (Davis et al., 1995). If the protected populations in the Atlantic increase, the GOM will likely be used more frequently as a wintering ground for these mammals.

7.2.5.1.2 Dolphins

Nine species of dolphins occur in the GOM (Waring et al., 2000). All are members of the family Delphinidae, and none are considered threatened or endangered. Most inhabit deeper waters in the GOM, with the exception of the bottlenose and Atlantic spotted dolphins.

The **bottlenose dolphin** is the most common dolphin in nearshore waters and outer edge of the continental shelf in the GOM. The **Atlantic spotted dolphin** is the only other species that commonly occurs over the continental shelf, typically inhabiting shallow waters within the 250-m isobath.

The **Risso's, Clymene, spinner, striped, and rough-toothed dolphins** are deepwater species endemic to tropical and subtropical waters. Other species found in the GOM include the pantropical **spotted dolphin** and **Fraser's dolphin**.

7.2.5.1.3 Manatees

The **West Indian manatee** is found throughout the coastal waters of Florida (Waring et al., 2000). These large mammals are normally found in near-shore shallow coastal and estuarine waters where they feed on seagrasses and aquatic vegetation. Manatees are also found far up freshwater rivers and streams. On Florida's Gulf coast, they commonly range from the Everglades northward to the Suwanee River, are somewhat less abundant northward in the Big Bend area, and occur even less frequently westward. However, manatees have been occasionally found as far west as Louisiana and Texas (Powell and Rathbun, 1984; Rathbun et al., 1990; Schiro et al., 1998). Manatees are not found in deeper waters where the reef fishery is prosecuted.

7.2.5.2 Sea turtles

Poffenberger[4] reviewed supplementary discard data from reef fish fishery for two survey years (1/8/2001-7/31/2002 and 1/8/2002 - 7/31/2003) and found 16 reported interactions with turtles. These interactions were reported for 14 trips. Five of the trips were with bottom longline gear and nine of them were with handline (vertical) gear. All but three of the turtles were not identified by species (i.e., reported as unknown or unclassified). The reported species were two loggerhead turtles and one green turtle.

The **green sea turtle** was listed under the ESA on July 28, 1978. Green turtles are distributed circumglobally, mainly in waters between the northern and southern 20^{o} C isotherms (Hirth, 1971). Green turtles were traditionally prized for their flesh, fat, eggs, and shell. Fisheries in the United States and the Caribbean are largely to blame for the decline of the species.

In the continental United States, green turtle nesting occurs on the Atlantic coast of Florida. Occasional nesting has been documented along the Gulf coast of Florida, at Southwest Florida beaches, as well as on the beaches of the Florida Panhandle (Meylan et al., 1995). Green turtles are herbivores and appear to prefer marine grasses and algae in shallow bays, lagoons, and reefs (Rebel, 1974). Some of the principal feeding pastures in the GOM include inshore south Texas waters, the upper west coast of Florida and the northwestern coast of the Yucatan Peninsula. The probable food sources in these areas are *Cymodocea*, *Thalassia*, *Zostera*, *Sagittaria*, and *Vallisneria* (Babcock, 1937; Underwood, 1951; Carr, 1952; 1954).

Loggerhead sea turtles occur throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans and are the most abundant species of sea turtle occurring in US waters (NOAA Fisheries, 2001a). The threatened loggerhead is the most abundant species of sea turtle occurring in US waters. The near shore waters of the GOM are believed to provide important developmental habitat for juvenile loggerheads. Studies conducted on loggerheads stranded on the lower Texas coast (south of Matagorda Island) have indicated that stranded individuals were feeding in near shore waters shortly before their death (Plotkin et al., 1993).

The Turtle Expert Working Group (TEWG) report, compiled by a team of population biologists, sea turtle scientists, and managers established by NOAA Fisheries to conduct a status assessment of sea turtle populations (NOAA Fisheries, 1998), made a number of conclusions regarding the loggerhead population. The recovery goal of “measurable increases” for the south Florida subpopulation (south of Canaveral and including southwest Florida) appears to have been met, and this population appears to be stable or increasing. However, index nesting surveys have been done for too short a time; therefore, it is difficult to evaluate trends throughout the region. Recovery rates for the entire subpopulation cannot be determined with certainty at this time.

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[4]Dr. John Poffenberger, Southeast Fisheries Science Center, National Marine Fisheries Service, Miami, Florida. personal communication, 2004.

Hawksbill turtles feed primarily on a wide variety of sponges but also consume bryozoans, coelenterates, and mollusks. Nesting areas in the western North Atlantic include Puerto Rico and the Virgin Islands. In the Western Atlantic, the largest hawksbill nesting population occurs in the Yucatán Peninsula of Mexico, where several thousand nests are recorded annually in the states of Campeche, Yucatán, and Quintana Roo (NOAA Fisheries, 2001a). In the northern GOM, a number of small hawksbills have been encountered in Florida and Texas. Most of the Texas records are probably in the 1-2 year-class range. Many of the individuals captured or stranded were unhealthy or injured (Hildebrand, 1983). Pinellas County, Florida, including Tampa Bay, has the largest share of west coast hawksbill strandings. It is likely that immature hawksbills utilize the various hard-bottom habitats off the west coast as developmental habitat (NOAA Fisheries, 2001a). The lack of sponge-covered reefs and the cold winters in the northern GOM probably prevent hawksbills from establishing a strong presence in that area.

The **Kemp's ridley sea turtle** has declined to the lowest population level (NOAA Fisheries, 2001a). Nesting data indicated that the number of adults declined from a population that produced 6,000 nests in 1966 to a population that produced 924 nests in 1978 and a low of 702 nests in 1985 (NOAA Fisheries, 2000). In recent years, unprecedented numbers of Kemp's ridley carcasses have been reported from Texas and Louisiana beaches during periods of high levels of shrimping effort (NOAA Fisheries, 2000). Analyses conducted by TEWG have indicated that the Kemp's ridley population is in the early stages of recovery (NOAA Fisheries, 1998).

The Recovery Plan for the Kemp's Ridley Sea Turtle (USFWS and NOAA Fisheries, 1992) contains a description of the natural history, taxonomy, and distribution of the Kemp's ridley turtle. Kemp's ridleys nest in daytime aggregations known as arribadas, primarily at Rancho Nuevo, a stretch of beach in Mexico, where most of the adult females nest (Pritchard, 1969). When nesting aggregations at Rancho Nuevo were discovered in 1947, adult female populations were estimated to be in excess of 40,000 individuals (Hildebrand, 1982). Recent observations of increased nesting suggest that the decline in the ridley population has stopped, and there is cautious optimism that the population is now increasing.

The Recovery Plan for **leatherback sea turtles** contains a description of the natural history and taxonomy of this species (NOAA Fisheries and USFWS, 1992). This species is widely distributed throughout the oceans of the world, and are found throughout waters of the Atlantic, Pacific, Caribbean, and the GOM (Ernst and Barbour, 1972). Leatherbacks are predominantly pelagic and feed primarily on jellyfish such as *Stomolophus*, *Chryaora*, and *Aurelia* (Rebel, 1974). They may come into shallow waters if there is an abundance of jellyfish near shore.

The status of the leatherback population is difficult to assess, since major nesting beaches occur over broad areas within tropical waters outside the United States (NOAA Fisheries, 2000). The primary leatherback nesting beaches occur in French Guiana and Suriname in the western Atlantic and in Mexico in the eastern Pacific. Although increased observer effort on nesting beaches has resulted in increased reports of leatherback nesting, declines in nest abundance have been reported from the beaches of greatest nesting densities. Some nesting occurs on Florida's east coast.

7.2.5.3 Fish

7.2.5.3.1 Endangered species

NOAA Fisheries and USFWS listed the **Gulf sturgeon** as a threatened species on September 30, 1991. NOAA Fisheries and FWS share jurisdiction for this species under the ESA (NOAA

Fisheries, 2001b; 2001a). The Gulf sturgeon is a subspecies of the Atlantic sturgeon (USFWS, 1994). The Gulf sturgeon is restricted to the GOM and its drainages, primarily from the Mississippi River to the Suwannee River, in Louisiana, Mississippi, Alabama, and Florida. This subspecies may also occur sporadically as far west as Texas, and in marine waters in Florida south to Florida Bay. While little is known about the abundance of Gulf sturgeon through most of its range, estimates exist for the Suwannee and Apalachicola rivers (NOAA Fisheries, 2001a). The USFWS reported an average of 115 individuals larger than 45 cm TL spending the summer in the Apalachicola River below Jim Woodruff Lock and Dam. For the Suwannee River, population size estimates range from 2,250 to 3,300 individuals.

Habitat destruction and degradation, exacerbated by potential over-exploitation of the species, are primarily responsible for the sturgeon's decline. Dams have prevented access to historic sturgeon migration routes and spawning areas (Wooley and Crateau, 1985). Dredging and other navigation maintenance, possibly including lowering of river elevations and elimination of deep holes and altered rock substrates, may have adversely affected Gulf sturgeon habitats (Wooley and Crateau, 1985). A decrease in groundwater flows has reduced cool water habitats, which are thought to be warm water refugia for sturgeon (S. Carr, personal communication in GMFMC, 2003a); recent droughts in the Apalachicola River system have accelerated the loss of cool water refugia. Increased groundwater withdrawal for irrigation in southwest Georgia may result in a 30 percent reduction of discharge to streams (Hayes et al., 1983).

Breeding populations take years to establish because of the advanced age at sexual maturity. In addition, Gulf sturgeon appear to be home stream spawners with little, if any, natural repopulation from migrants from other rivers (USFWS and GSMFC, 1995).

NOAA Fisheries listed as endangered the US population of **smalltooth sawfish** that once ranged in shallow waters off the GOM and Eastern Seaboard on April 1, 2003. An extensive status review concluded that the US population of smalltooth sawfish, currently found only off south Florida, is in danger of extinction (NOAA Fisheries, 2001c). Sawfish are actually modified rays with a shark-like body and gill slits on their ventral side. This species is one of two species of sawfish that inhabit US waters (NOAA Fisheries, 2001c). Smalltooth sawfish commonly reach 18 ft (5.5 m) in length, and may grow to 25 ft (7 m). Little is known about the life history of these animals. They are thought to live up to 25-30 years and mature after about 10 years. Like many elasmobranchs, smalltooth sawfish are ovoviviparous, meaning the mother holds the eggs inside of her until the young are ready to be born, usually in litters of 15 to 20 pups.

Smalltooth sawfish has been reported in both the Pacific and Atlantic Oceans, but the US population is found only in the Atlantic (NOAA Fisheries, 2001c). Historically, the US population was common throughout the GOM from Texas to Florida, and along the east coast from Florida to Cape Hatteras. The current range of this species has contracted to peninsular Florida, and smalltooth sawfish are relatively common only in the Everglades region at the southern tip of the state. No accurate estimates of abundance trends over time are available for this species. However, available records, including museum records and anecdotal fisher observations, indicate that this species was once common throughout its historic range and that smalltooth sawfish have declined dramatically in US waters over the last century.

Sawfish are extremely vulnerable to overexploitation because of their propensity for entanglement in nets, their restricted habitat, and low rate of population growth (NOAA Fisheries, 2001c). The decline in smalltooth sawfish abundance has likely been caused primarily by bycatch in various fisheries, compounded by habitat degradation. In order to protect this species, the states of Florida and Louisiana have prohibited the take of smalltooth sawfish. Three National Wildlife Refuges in Florida also protect their habitat.

7.2.5.3.3 Candidate list for protection

The **goliath grouper** was added to the candidate species list in 1991 for the region of North Carolina southward to the GOM, which encompasses its entire range in US waters (NOAA Fisheries, 2001d). The American Fisheries Society changed the official name from jewfish to goliath grouper in 2001. Historically, goliath grouper were found in tropical and subtropical waters of the Atlantic Ocean, both coasts of Florida, and from the GOM down to the coasts of Brazil and the Caribbean. Most adults are found in shallow waters, the deepest being about 150 feet. Spawning occur at specific sites in July through September over full moon phases. Fish may move up to 100 km from inshore reefs to the offshore spawning aggregations in numbers of up to 100 or more on ship wrecks, rock ledges, and isolated patch reefs along the southwest coast of Florida. Aggregations declined in the 1980's from 50-100 fish to less than 10 per site. Since the harvest prohibition, aggregations have rebounded somewhat to 20-40 fish per site. When goliath grouper are not in spawning aggregations, they are dispersed along shallow reefs. Historically, they were abundant in very shallow water, often associated with piers and jetties along the Florida Keys and southwest coast of Florida. They are no longer abundant in these shallow areas.

Juvenile goliath grouper have been found along shallow mangrove shorelines, underneath mangrove prop roots (NOAA Fisheries, 2001d). Their historical center of abundance is in the Ten Thousand Islands area of southwest Florida. Although goliath grouper are very vulnerable to cold waters and red tide, they are one of the only groupers that can live in brackish waters. Fish taken from an exploited population were aged from 0 to 37 years, but it is likely that goliath grouper live much longer than 40 years if left unexploited.

The most likely cause of drastic declines was the heavy fishing pressure on aggregations (NOAA Fisheries, 2001d). When large numbers of normally dispersed fish are concentrated at predictable areas and times, they are highly vulnerable to overexploitation. Fishing on spawning aggregations also removes many reproductive individuals before they have had the opportunity to spawn. Many goliath grouper were caught between the ages of 9-15 years, meaning that individuals only lived through only a few reproductive years before being captured. Their slow growth rate, long life span, and large size at sexual maturation have made them especially susceptible to overfishing. Their genetic diversity could be impacted when the fishing mortality rate is greater than the natural mortality rate. There are no quantitative data on fishing mortality rates and biomass levels. As the fishery has been closed since 1990, fishing mortality rates are currently near zero.

The **speckled hind** was added to the candidate species list in 1997 (NOAA Fisheries, 2001e) with fishing mortality as the major threat to this species. Speckled hind inhabit warm, moderately deep waters from North Carolina to Cuba, including Bermuda, the Bahamas and the GOM. The proposed habitat is hard bottom reefs in depths ranging from 180 to 360 feet, where temperatures are from 60º to 85º F.

Like other epinepheline groupers, speckled hind are protogynous hermaphrodites (species that begin life as females and as they mature they become males; NOAA Fisheries, 2001e). Most of the larger, older fish are males. Females reach sexual maturity around four to five years. Spawning takes place offshore from July through September. Fertilized eggs are pelagic, and newly hatched young are commonly found on the surface before migrating to the bottom. Speckled hind generally engulf their prey whole. The fish opens its mouth and extends the gill covers rapidly to draw in a current of water, thus inhaling the food. Other groupers are also known to pursue their prey and strike it. Prey items for the speckled hind include: fishes, crabs, shrimps and mollusks that inhabit the hard bottom.

The **Nassau grouper** was added to the candidate species list in 1991. It is a tropical western Atlantic serranid that is an extremely popular food fish, resulting in its declining status (NOAA Fisheries, 2001f). The Nassau grouper grows to about 100 cm (3 ft) and 25 kg (55 lbs). It is a top-level predator found from inshore to about 100 m. Adults are generally found near shallow high-relief coral reefs and rocky bottoms to a depth of at least 90 m. This species is found in the Florida Keys, but is absent in the GOM where it is apparently replaced by red grouper (Sadovy and Eklund, 1999).

Quantitative data on fishing mortality rates and biomass levels are lacking. Nassau grouper are especially vulnerable to fishing due to their availability in aggregations and due to their low productivity. The fishery has been closed in the GOM since 1997; consequently, fishing mortality rates are currently near zero. GOM Nassau grouper are considered severely depleted due to lack of occurrence in sampling and catches prior to moratorium.

7.2.5.4 Seabirds

Seabirds are a diverse group that spend much of their lives on or over saltwater. Some can live far from land for long extended periods of time, coming back to coastal areas to breed and nest. Seabirds fish in the sea for prey by dipping, plunging, surface seizing, as well as the behaviors of piracy and scavenging.

Three of the four primary orders of seabirds are represented in the GOM, 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). The orders Gaviiformes (loons) and Podicipediformes (grebes) are also found in the Gulf.

Species of seabirds and other coastal species that inhabit or frequent the northern GOM recognized by the US Fish and Wildlife Service as either endangered or threatened include the piping plover, least tern, roseate tern, bald eagle, and brown pelican (the brown pelican is endangered in Mississippi and Louisiana and was de-listed in Florida and Alabama). The southeastern snowy plover is a species of concern to the state of Florida.

The incidental catch of seabirds in various fisheries around the world has generated much concern over the long-term ecological effects of these practices during past two decades. In particular, longline fishing is associated with seabird bycatch. The US developed a National Plan of Action for reducing the Incidental Catch of Seabirds in Longline Fisheries (NPOA-S) as requested in the International Plan of Action for Reducing the Incidental Catch of seabirds in Longline Fisheries (IPOA-S).

The **brown pelican**, one of two pelican species in North America, has been listed as endangered since 1970 in its entire range, but was delisted in Alabama and Florida in 1985 and is now considered recovered. Although no longer listed as endangered in Florida, it is listed as a species of special concern by the State.

Pelicans feed entirely upon fishes that they capture by plunge diving into coastal waters. They seldom venture more than 20 miles out to sea except to take advantage of especially good fishing conditions, and it is rare to find one more than 40 miles out. Sand spits and offshore sandbars are used extensively as daily resting and nocturnal roost areas. The proposed nesting sites are small coastal islands, which provide protection from mammal predators, especially raccoons, and sufficient elevation to prevent wide scale flooding of nests.

Primary factors affecting the eastern subspecies include human disturbance of nesting colonies and, mortality when birds are caught on hooks and subsequently entangled in monofilament line. Oil or chemical spills, erosion, plant succession, hurricanes, storms, heavy tick infestations, and unpredictable food availability are other threats.

7.3 Social and economic environment

Section 5.4 provides a detailed description of the social and economic environment potentially affected by measures in this amendment, and is incorporated herein by reference. In summary, the vermilion snapper fishery is composed of a commercial and recreational sectors. Over the past decade, the commercial fishery has increased its landings and proportionally has been harvesting more fish. Within the commercial sector are fishing vessels, dealers, support industries, and fishing communities. Recreational anglers participate in the vermilion snapper fishery through several fishing modes, such as shore, private/rental, charter boats, and headboats. Charter boats and headboats comprise the for-hire fishery. In addition, there are also areas that may be considered as fishing communities that may either provide place of residence, business or employment associated with the recreational pursuit of the vermilion snapper stock. Some of these areas similarly provide residence or business opportunities for the commercial fishing sector.

The vermilion snapper fishery is part of the general reef fish fishery. Some of the commercial vessels that participate in the vermilion snapper fishery also harvest other reef fish species, such as red snapper, grouper, and amberjack. Although some particular reef fish species, such as red snapper, are targeted by for-hire vessels, these vessels generally target a variety of species, including species outside the reef fish fishery management unit such as mackerel.

7.4 Administrative environment

7.4.1 Federal fishery management

Federal fishery management is conducted under the authority of the Magnuson-Stevens Fishery Conservation and Management Act (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 US anadromous species and continental shelf resources that occur beyond the EEZ.

Responsibility for federal fishery management decision-making is divided between the US Secretary of Commerce 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 of Commerce (Secretary) is responsible for promulgating regulations to implement proposed plans and amendments after ensuring that management measures are consistent with the MSFCMA, and with other applicable laws summarized in Section 9. In most cases, the Secretary has delegated this authority to NOAA Fisheries.

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 NOAA Fisheries. 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 that together to enforce the MSFCMA. These activities are being coordinated by the Council’s Law Enforcement Advisory Panel and the Gulf States Marine Fisheries Commission’s (GSMFC) Law Enforcement Committee have developed a 5-year “Gulf of Mexico Cooperative Law Enforcement Strategic Plan - 2001-2006.”

7.4.2 State fishery management

The purpose of state representation at the council level is to ensure state participation in federal fishery management decision-making and to promote the development of compatible regulations in state and federal waters. The state governments of Texas, Louisiana, Mississippi, Alabama, and Florida have the authority to manage their respective state fisheries. Each of the five Gulf states exercises legislative and regulatory authority over their states’ natural resources through discrete administrative units. Although each agency listed below 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 brief description of each states primary regulatory agency for marine resources is provided below.

7.4.2.1 The Texas Parks & Wildlife Department

The Texas Parks and Wildlife Department (TPWD) manages and conserves the natural and cultural resources of Texas and to provide opportunities for hunting, fishing and outdoor recreation. The agency has ten internal divisions including Coastal Fisheries and Law Enforcement. The Coastal Fisheries Division manages the marine fishery resources of Texas' 1.62 million ha of saltwater, including bays and estuaries and out to nine nautical miles in the GOM. Coastal fisheries management strategies are directed toward optimizing the long-term utilization of the marine resources of Texas. This management is designed to sustain fisheries harvest at levels that are necessary to ensure sustainable stocks of commercially and recreationally important species and to provide for balanced food webs within Texas marine ecosystems. Technical data to assess population levels and develop appropriate fishing regulations are collected through year-round standardized monitoring programs. In addition, life history studies and genetic research provide state-of-the-art knowledge for enhancing fishery stocks. The Coastal Fisheries staff works closely with other department divisions as well as federal and international fishery management agencies to provide opportunities to enjoy and conserve the biological diversity inherent in Texas' marine waters.

The Law Enforcement Division provides a comprehensive statewide law enforcement program to protect Texas' wildlife, other natural resources, and the environment. Texas Game Wardens are responsible for enforcement of the Parks and Wildlife Code, all TPWD regulations, the Texas Penal Code and selected statutes and regulations applicable to clean air and water, hazardous materials and human health. Wardens fulfill these responsibilities through educating the public about various laws and regulations, preventing violations by conducting high visibility patrols, and apprehending and arresting violators.

7.4.2.2 The Louisiana Department of Wildlife and Fisheries

The Louisiana Department of Wildlife and Fisheries (LDWF), Marine Fisheries Division conserves and protects Louisiana's renewable aquatic resources by controlling harvest, and by replenishing and enhancing stocks and habitat. This is accomplished by setting seasons, size and possession limits, gear restrictions, or other means of protecting key resources; replenishing species and enhancing or developing species or habitats, as needed, to provide for the needs of consumptive and non-consumptive users, or environmental health. Research provides insights into the proper functioning of natural systems, education of the public, and promoting the wise use of these resources (LDWF, 2000). Programs within the Marine Fisheries Division include crustacean (shrimp and crabs), mollusk (oyster), finfish, habitat, coastal ecology, and research.

The Enforcement Division is responsible for enforcing laws enacted by the Louisiana Legislature relative to fish and wildlife resources and boating safety regulations, as well as federal regulations pertaining to migratory birds and endangered species. The Saltwater Enforcement Patrol Unit was formed in 1982 to help combat the massive overfishing of Louisiana saltwater resources. Two vessels dedicated to this program provide resource protection, respond to environmental emergencies, and constantly provide search and rescue services throughout the saltwater areas of the state. The Enforcement Division also has special programs such as investigations of commercial fisheries, marine theft prevention, and oyster closure enforcement.

7.4.2.3 The Mississippi Department of Marine Resources

The Mississippi Department of Marine Resources (MDMR) manages all marine life, public trust wetlands, adjacent uplands and waterfront areas, and provides for the balanced commercial, recreational, educational and economic uses of these resources consistent with environmental concerns and social changes. The Department is responsible for maintaining the quality of Mississippi's seafood harvest through the use of fishing regulations and monitoring of the water quality in harvest areas. The principle function of the MDMR's Marine Fisheries Department is the design and initiation of projects which collect and analyze data required for population dynamics estimates and other fisheries management-related projects. The Marine Fisheries Department also develops management recommendations based on specific criteria, and monitors the existing condition of the stocks and fisheries that depend on them. The Marine Fisheries Department also provides information transfer and liaison activities with regional fisheries management entities and other stakeholders. The Marine Fisheries office provides technical support to the Mississippi Commission on Marine Resources in developing fishery management plans, amendments, stock assessments, and technical analysis. The Marine Fisheries Department also provides a representative to serve on fisheries-related boards, committees, and panels. Finally, the Marine Fisheries Department provides for the administrative services, general maintenance, locating suitable funding sources and other fisheries management support services.

Marine law enforcement is conducted by the Mississippi Department of Wildlife, Fisheries, and Park's (DWFP) Marine Law Enforcement Unit. This unit serves as a deterrent to fishing violations, which is a factor in long-term damage to marine resources. Financial penalties imposed for most violations are higher than the average value of daily catches and should be sufficient to deter potential violators. When developing ordinances and regulations to protect the state's marine resources, the MDMR solicits and receives input from DWFP's Marine Law Enforcement Unit. The development of these ordinances routinely incorporates comments from officers on the enforceability of the ordinance or regulation.

7.4.2.4 The Alabama Department of Conservation and Natural Resources

The Alabama Marine Resource Division (AMRD) of the Alabama Department of Conservation and Natural Resources (ADCNR) manages Alabama's marine fisheries resources with assessment and monitoring, applied research, and enforcement programs. The Fisheries Section is responsible for collecting data, and making recommendations to the Administrative Section concerning management of commercial and recreational fisheries in Alabama waters. The Fisheries Section maintains ongoing biological sampling, data analysis, and research programs. The greatest effort is directed toward commercially and recreationally important finfish, shrimp and oyster populations. Section biologists continually monitor and assess, fish, shrimp, and oyster habitat and populations.

The Enforcement Section of the AMRD patrols Alabama's coastal waters, enforcing state and federal laws and regulations relating to the conservation and protection of marine resources. Officers also enforce laws and regulations relating to boating safety and freshwater fishing and hunting, conduct search and rescue missions, and participate in drug interdiction operations. Officers are cross-trained and deputized as NOAA Fisheries and U. S. Customs agents and cooperate extensively with these agencies and other federal agencies in the coordination of joint enforcement operations, investigative and fisheries enforcement expertise, training, public safety, and other natural resource issues.

7.4.2.5 The Florida Fish and Wildlife Conservation Commission

The Florida Fish and Wildlife Conservation Commission's (FWC) Division of Marine Fisheries develops proposals for regulatory and management options for marine fishery resources for consideration by a seven-member commission. In the GOM, state jurisdiction reaches out three leagues (approximately nine nm) from shore. Major responsibilities of the Division include monitoring of catch quotas of marine fisheries stocks, issuance of seafood dealer and commercial fishing licenses, facilitating artificial reef development and deployment, and educational activities. The Fish and Wildlife Research Institute (FWRI) conducts research on a great array of marine issues. FWRI collaborates extensively with other academic, non-profit and private research institutions on marine conservation and management issues. FWRI also collects fishery-independent and dependent data for use in estimating fish abundance and population trends through stock assessments.

The Florida Division of Law Enforcement emphasizes compliance with fishing and hunting regulations, enforcement of state and federal laws that protect threatened and endangered species, enforcement of laws dealing with commercial trade of wildlife and wildlife products, and enforcement of boating safety laws and regulations. Field Operations consists of two bureaus that are divided into North and South Operations. These Bureaus house most of the uniform patrol functions within the Division as they relate to wildlife, saltwater fish, and freshwater fish resources.

8 ENVIRONMENTAL CONSEQUENCES

This section describes the potential direct, indirect, and cumulative effects on the physical, biological, socioeconomic, and administrative environments associated with each management alternative. The CEQ regulations (40 CFR 1508.8) define direct effects as those "which are caused by the action and occur at the same time and place." Indirect effects are defined as those "which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable." Cumulative effects are defined 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 actions. Cumulative impacts could result from individually minor but collectively significant actions taking place over a period of time."

8.1 Biological reference points and status determination criteria

8.1.1 Description of alternatives

Alternative definitions for the biological reference points and status determination criteria are discussed in Section 4.1. These alternatives are based on a peer reviewed stock assessment (Porch and Cass-Calay, 2001), which used two different methodologies to estimate MSY, F_{MSY}, and B_{MSY}. The Pella-Tomlinson surplus production model was used to directly estimate MSY and associated parameters while the VPA model was used to estimate a proxy for MSY based on a 30 percent SPR stock condition. The RFSAP panel reviewed each of the models and recommended the surplus production model be used for stock status determination. A discussion of the models and their limitations can be found in Section 4.1.1 and 7.2.1.2. Alternatives provided for the various biological reference points and status determination criteria and the rationale for the preferred alternative for each are described in detail in Section 4.1, and are based on the above stock assessments and the recommendations from Restrepo et al. (1998).

8.1.2 MSY alternatives

8.1.2.1 Direct and indirect effects on physical environment and their significance

Fishery management actions or inactions that affect the physical environment mostly relate to the interactions of fishing with bottom habitat, either through gear impacts to bottom habitat or through the incidental harvest of bottom habitat. The degree that 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 vermilion snapper habitat, see Section 7.2 and GMFMC, 2003a.

Most vermilion snapper are caught by two fishing gear types: vertical lines and bottom longlines. Vertical lines include handlines, rod-and-reels, and small vertical multi-hook lines known as bandit gear. Vertical-line gear catches most (>95 percent) commercial (Table 5.1), and nearly all recreational vermilion snapper. Vermilion snapper caught by longlines account for about two percent of the fish landed. The amount of fish caught by vertical and longline gear may actually be underestimated in Table 5.1. Prior to 1990, few fish were coded as being caught by either "combined gears" or as "not coded". During this time, vertical-line gear annually caught over 90 percent of the fish, and longline gear about four to six percent (NOAA Fisheries[5]). More recently, Waters (2004) examined 2000 to 2002 net revenues from vessels landing vermilion snapper. More than 99 percent of vermilion snapper landings were from vertical line gear (Table 5.2)

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 vermilion snapper are typically higher in the water column over structure than either red snapper or groupers (Burns et al., 2002), the effects of directed hook-and-line fishing for vermilion snapper on the physical environment are less than those associated with directed fisheries for other reef fish species. If vermilion snapper 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 vermilion snapper occurs.

Longline gear are 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 can be increased, and depends on currents and the amount of line sweep caused by hooked fish (Barnette, 2001).

Very few vermilion snapper are caught by other gears (< 2 percent; Table 5.1) 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 are currently being phased out and their use will end in 2007 (see Section 3). 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 MSY 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 MSY in part to evaluate whether the stock removal (fishing) and fishing mortality rate are within desirable ranges. Therefore, **Alternatives 1-3** should have no direct effect on the physical environment. However, specifying MSY may indirectly affect the physical environment by defining the future level of fishing effort that will

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[5]NOAA Fisheries, Office of Science and Technology, Fisheries Statistics and Economics webpage for commercial fisheries: http://www.st.nmfs.gov/st1/commercial/index.html

1) sustain the stock over the long term, and 2) allow the stock to rebuild from its current depleted state to B_{MSY} in accordance with the NSGs.

Alternative 1 would not establish an MSY value for vermilion snapper, but would maintain vermilion snapper in the overall snapper-grouper fishery as established in Amendment 1 to the Reef Fish FMP. Selecting this alternative could have negative effects on the physical environment. For those fishermen targeting vermilion snapper, as the stock size continues to decrease from overfishing, directed fishing effort may increase, increasing the amount of gear interacting with the bottom. However, at some point during the decline in stock size, directed fishing trips will cease and the fishery will become a bycatch fishery only. For those fishermen who target reef fish in general, or target other reef fish species, any changes to their fishing effort would be dictated by population or regulatory changes for other species.

It is difficult to assess the differences in effects between the **Preferred Alternative 2** and **Alternative 3**. The values for MSY were estimated from very different assessment models that have different assumptions about the behavior of the stock. Therefore, management measures needed to end overfishing and rebuild the stock for these parameters could be different. The RFSAP (2001) reviewed both models and recommended that the Pella-Tomlinson surplus production model be used for status determination criteria.

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. Over the long-term, (> 10 years), fishing effort will be based on F_{MSY} or on an F_{MSY} proxy. Based on data through 1999, recent estimates of fishing mortality indicate that F/F_{MSY} is greater than one, indicating overfishing is occurring. Therefore, effort once the stock is rebuilt 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 stock biomass can rebuild to B_{MSY}. The degree that F is reduced is dependent on the recovery plan selected in Section 4.2 and is discussed in detail in Section 8.2. 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.

8.1.2.2 Direct and indirect effects on biological/ecological environment and their significance

Fishery management actions or inactions 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}. 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. Fishing appears to have shifted the size distribution of vermilion snapper caught by the fishery to smaller sizes in the Gulf of Mexico. Schirripa (1996) reported that the average size of vermilion snapper has decreased from 371 mm TL (14.6 inches) in 1984 to 320 mm TL (12.6 inches) in 1993. Schirripa (1996) also summarized landings data and indicated that commercial and recreational annual landings had increased 3- to 4-fold from the mid-1970s to the early 1990s. Additionally, Hood and Johnson (1999) found that the average size-at-age of vermilion snapper from the eastern Gulf of Mexico captured in 1995-1996 was smaller than that captured in studies occurring in the 1980s. While this might reflect regional differences in growth (eastern versus western Gulf of Mexico), Hood and Johnson (1999) felt that this change could also be caused by increasing fishing pressure; if larger fish are more vulnerable to capture, then faster-growing fish within an age-class would be selectively removed from the population, thus depressing the mean size-at-age for older fish. This same trend has been noted by Zhao et al. (1997) for vermilion snapper in the South Atlantic Bight and was also attributed to increased fishing pressure.

The size and age at which vermilion snapper become mature may also have been depressed by increased fishing pressure. Trippel (1995) suggested that changes in age at maturity of fishes are a stress indicator for fisheries. Hood and Johnson (1999), who sampled fish in the Gulf of Mexico in 1995 and 1996, reported that most females were mature by age 1 and by 200 mm TL. Nelson (1988) reported that the smallest mature female he sampled from the Gulf of Mexico between 1980 and 1982 was 234 mm TL (approximately age 2). This same trend of decreasing age and size at maturity has been noted in the South Atlantic Bight and was attributed to increased fishing effort (Zhao and McGovern, 1997).

Changes in the abundance of vermilion snapper are likely to have ecological effects. Vermilion snapper prey on other fishes as well as benthic and pelagic invertebrates (Nelson, 1988). They likely compete for prey with other predators that have a similar diet, such as red grouper, greater amberjack, and red snapper (Moran, 1988; Nelson, 1988; Bullock and Smith, 1991; Andaloro and Pipitone, 1997). Consequently, it is possible that forage species and competitor species could decrease in abundance in response to an increase in abundance of vermilion snapper.

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, red grouper, and gag stocks are being managed to improve their stock condition. The vermilion snapper population represents a relatively small proportion of the entire snapper-grouper complex in the northern Gulf. Vermilion snapper biomass is expected to increase by four-fold to about 11 mp; whereas, the red snapper population is expected to be several orders of magnitude larger when rebuilt (Schirripa and Legault, 1999). The effects of a rebuilt vermilion snapper stock might be undetectable compared to those associated with rebuilding red snapper. Interactions between these two competing stocks and possibly other reef fish species may change the outcome completely. 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 vermilion snapper 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[6]). 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

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or decrease in the abundance of vermilion snapper 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 MSY criteria 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 MSY 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 MSY may indirectly affect the biological/ecological environment by defining the future level of fishing effort that will 1) sustain the stock over the long term, and 2) allow the stock to rebuild from its current depleted state to B_{MSY} in accordance with the NSGs.

Alternative 1 would not establish an MSY value for vermilion snapper, and so harvest levels would continue at their current rate, at least over the short term. Porch and Cass-Calay (2001) present estimates of annual F values from 1986 to 1999 in Table 12 of their assessment. In general, F values have increased in recent years. The effects of this continued increase in harvest rate would be negative because the stock size would remain depressed. If F continues to increase or remains above F_{MSY}, it could result in the collapse of the vermilion snapper stock.

Preferred Alternative 2 and **Alternative 3** would set MSY values based on specific estimates of F. The only basis of comparison of the values is the most recent peer-reviewed stock assessment (Porch and Cass-Calay, 2001). Each assessment model predicted either MSY (the Pella-Tomlinson surplus production model), or an MSY proxy (the Virtual Population Analysis model; see Section 4.1 for a more complete description of the models). Under most runs, both models indicated that the stock was overfished and undergoing overfishing. Therefore, to achieve the management goals set by establishing an MSY value with its associated F_{MSY} and B_{MSY}, management measures would need to be implemented to reduce F to end overfishing (regardless of how MFMT is defined) and rebuild the vermilion snapper stock. This would provide a biological benefit to the stock by allowing it to grow, thus avoiding a continued stock depletion that could ultimately lead to a stock collapse. Additionally, these reductions in effort could help to reverse the trends in size at capture, size-at-age and size at maturity noted by Schirripa (1996) and Hood and Johnson (1999).

8.1.2.3 Direct and indirect effects on social and economic environment and their significance

Fishery management actions or inactions that affect the social and economic environment mostly relate to the tradeoff between the degree of precaution to protect the stock, and the potential economic gain by harvesting the stock at higher levels of fishing effort. However, with increased stock sizes, the catchability of the stock increases allowing fishing operations to become more efficient providing the fleet size does not change.

Since establishing MSY is an administrative activity which sets the level the fishery can harvest during a rebuilding program and after the stock is rebuilt, **Alternatives 1-3** should not have any direct effects on the operations of participants in the vermilion snapper fishery. All operations and behaviors by participants in the directed fisheries and associated industries and communities could continue as they currently exist. Direct effects would only accrue to management measures that directly restrict harvest or behavior. However, while the establishment of MSY provides no direct effects, the MSY level selected affects the determination of OY, MSST, and MFMT. This eventually leads to the setting of TACs and associated management measures.

Overly conservative parameters can lead to greater conservation than necessary and greater short-term socioeconomic loss from forgone yield due to any management restrictions implemented. Conversely, establishing less conservative parameters can produce greater short-term socioeconomic benefits from increased yield, but lead to long-term losses due to the stock being fished to a level less than the true MSY level.

Selection of **Alternative 1** would allow for the continuation of overfishing and likely lead to a further reduction in harvest as the stock size diminishes. Over the long term, this could result in economic losses. Selecting **Preferred Alternative 2** or **Alternative 3** will cause short-term socioeconomic loss from forgone yield due to any management restrictions implemented. These regulations would need to be established to rebuild the stock to a level where the respective MSY values could be harvested.

8.1.2.4 Direct and indirect effects on administrative environment and their significance

Section 2 outlines the history of management of vermilion snapper in the GOM. 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 vermilion snapper. In addition, NOAA Fisheries monitors both commercial and recreational catches to assess the stock. The purpose of defining alternatives is to establish a management program that will sustain the vermilion snapper stock over the long term. The TAC levels that would be defined by all the alternatives after the stock rebuilds would likely be different from those prescribed during the rebuilding period, and thus would require that administrators make minor adjustments through the Reef Fish FMP. 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 vermilion snapper MSY and would have no direct effects on the administrative environment.

The only foreseeable indirect effect to the administrative environment associated with **Alternatives 2 and 3** relates to potential management measures needed to rebuild the stock biomass to levels that would allow for harvesting this level of MSY. 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 the rebuilding of the stock follows the plan selected in Section 4.2.

8.1.2.5 Mitigation measures

No significant adverse effects are anticipated from any of the alternatives being considered. Therefore, no mitigation measures are proposed for any of these alternatives.

8.1.3 OY alternatives

8.1.3.1 Direct and indirect effects on physical environment and their significance

As discussed in Section 8.1.2.1, fishery management actions or inactions that affect the physical environment mostly relate to the interactions of fishing with bottom habitat. These types of interactions are minimal from the hook-and-line gear used by both the commercial and recreational fisheries. OY simply provides fishery managers with a defined harvest target to consider in developing fishery management measures once the stock is rebuilt. Specifying an

OY should not directly affect the physical environment. Managers use OY in part to evaluate whether the fishing mortality rate is within a desirable range. Therefore, **Alternatives 1-4** should have no direct effect on the physical environment. However, because specifying OY defines the future level of fishing effort that will sustain the stock over the long term while taking into account socioeconomic concerns and protection of the marine habitat, OY alternatives may have indirect effects (see below).

As described in Section 8.1.2.1, the assessment models used to establish **Alternatives 2 -4** would require that fishing effort be reduced over the short term (< 10 years) to eliminate overfishing and rebuild the stock as needed. Over the short term, while the stock is being rebuilt, OY would have little influence on the rate of harvest applied to the stock. This level of harvest would be dictated by the rebuilding plan selected in Section 4.2.2. Once the stock is rebuilt, however, OY could dictate the F value applied to the stock.

The F associated with **Alternative 1** ($F_{20\%SPR}$) is greater than that associated with the other alternatives and is above the current MFMT value. Therefore, adoption of this alternative would allow F to be above that needed to keep the stock from being overfished. The selection of this alternative would maintain or increase the effect of gear to the physical environment through increased fishing effort. **Alternatives 2-4** set OY as a proportion of F_{MSY}. Once the stock is rebuilt, the effects of the alternatives should be positively related to the fishing mortality rate associated with them. Therefore, **Alternative 2** should have less of an effect on the physical environment than **Preferred Alternative 3** ($0.65*F_{MSY}$ vs $0.75*F_{MSY}$), and the **Preferred Alternative 3** should have less of an effect on the physical environment than **Alternative 4** ($0.75*F_{MSY}$ vs $0.85*F_{MSY}$). However, as mentioned in Section 8.1.2.1, the types of interactions from the primary gear (hook-and-line) used by both the commercial and recreational fisheries are minimal, so the effects on the physical environment by these alternatives should also be minimal. Also, vermilion snapper are not commonly targeted, so impacts to the physical environment would be more dependent on reductions in fishing effort for other reef fish species.

8.1.3.2 Direct and indirect effects on biological/ecological environment and their significance

Establishing OY criteria should not directly affect the biological/ecological environment, because these values simply provide fishery managers with a defined harvest target to consider when developing fishery management measures. Therefore, **Alternatives 1-4** should have no direct effect on the biological/ecological environment. However, once the stock has rebuilt, the degree of fishing effort could be dictated by the selection of OY, thereby directly affecting the biological and ecological environment as described in Section 8.1.2.2.

Alternative 1 would establish an OY value for vermilion snapper that would have an associated F value above that given by the most recent stock assessment ($F_{20\%\ SSBR\ or\ SPR}$ vs $F_{30\%\ SPR}$ and F_{MSY}). Therefore, harvest levels could continue at the current rate, which has resulted in a stock status determined to be overfished and undergoing overfishing. The implications to the vermilion snapper biology from overharvesting are described in detail in Section 8.1.2.2.

Alternatives 2-4 would define OY at a level that is less than MSY. Once the stock reaches B_{MSY} and the stock is then managed to achieve OY, the stock size would rebuild above B_{MSY} to B_{OY}. The further below F_{MSY} the optimum fishing mortality rate is constrained, the higher stock biomass would be expected to grow. Maintaining vermilion snapper at a high biomass level would be expected to benefit the stock by enabling it to recover more rapidly if reduced in number due to environmental conditions, poor recruitment, and/or other factors. Also, as discussed in Section 8.1.2.2, reducing F will protect the vermilion snapper stock from changes in the age and size structure caused by overfishing, as suggested by Hood and Johnson (1999).

Predator and prey species, as well as species that compete with vermilion snapper for food and habitat, would be indirectly affected by a management program that reduced fishing mortality on vermilion snapper. However, the relationships among species in marine ecosystems are complex and poorly understood. Therefore, the nature and magnitude of ecological effects are difficult to predict with any accuracy.

Because **Alternative 2** has the lowest value of F associated with its respective harvest ($0.65*F_{MSY}$), it should allow the vermilion snapper stock to attain the highest stock biomass. Thus, this alternative is likely to have the greatest positive effect on the stock. Alternatives 3 and 4 are progressively less conservative than Alternative 2. The Council's **Preferred Alternative 3** defines OY to equal the average yield associated with fishing at $0.75*F_{MSY}$. While this OY definition would not provide as large a buffer between MSY and OY as would the OY definition in Alternative 2, Restrepo et al. (1998) indicate that fishing at this rate would be expected to maintain stock biomass at 125-131 percent of the B_{MSY} level and would reduce risk to 20-30 percent that the stock would drop below B_{MSY} for any given year (Restrepo et al., 1998). **Alternative 4** has the highest F value of these three alternatives ($0.85*F_{MSY}$) and would protect the stock structure the least from fishing effects. However, because this fishing level is less than F_{MSY}, the effect of setting OY based on $0.85*F_{MSY}$ should still be beneficial.

8.1.3.3 Direct and indirect effects on social and economic environment and their significance

All operations and behaviors by participants in the directed fisheries and associated industries and communities can continue as they currently exist. Direct effects would only accrue from management measures that directly restrict harvest or behavior. Because the current level of harvest will be prescribed by the rebuilding plan adopted by the Council in this amendment, OY **Alternatives 1-4** should not have any direct consequences in terms of affecting the operations of participants in the vermilion snapper fishery. However, the OY definition adopted by the Council will indirectly affect harvest in the fishery after the stock has been rebuilt because establishing OY sets a target level the fishery can harvest.

While the establishment of OY provides no direct effects, the level selected eventually influences the setting of TACs and associated management measures. Overly conservative parameters can lead to greater conservation than necessary and greater short-term socioeconomic loss from forgone yield due to any implemented management restrictions. Conversely, establishing insufficiently conservative parameters can produce greater short-term socioeconomic benefits from increased yield, but lead to long-term losses due to the stock being fished to a level less than the true MSY level.

Selection of **Alternative 1** would allow for the continuation of overfishing and likely lead to a further reduction in harvest as the stock size diminishes. Over the long term, this could result in economic losses. For **Alternatives 2-4**, the higher the allowable yield, the better the socioeconomic outcome. But this outcome has to be modified by the long-term sustainability of the stock at a chosen OY and the type of management regime adopted for the fishery. Among the alternatives, the **Preferred Alternative 3** is one of the more conservative from a biological standpoint. It would result in a smaller but also more stable yield. It would also have one of the lowest likelihoods (only **Alternative 2** is lower) that a recovered stock biomass would drop below MSST forcing a recovery plan. **Alternative 4** would allow a greater harvest, but also have a greater risk of the stock biomass dropping below MSST regardless of how MSST is defined.

8.1.3.4 Direct and indirect effects on administrative environment and their significance

Section 2 outlines the history of management of vermilion snapper in the GOM. 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 vermilion snapper. In addition, NOAA Fisheries monitors both commercial and recreational catches to assess the stock. The purpose of **Alternatives 2-4** is to define a harvest level that will sustain the vermilion snapper stock over the long term, while considering the socioeconomic environment and protecting the ecosystem. The TAC levels that would be defined by all the alternatives after the stock rebuilds would likely be different from those prescribed during the rebuilding period, and thus would require that administrators make minor adjustments through framework procedures set by the Reef Fish FMP. 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 continue the current definition of OY for vermilion snapper, continuing overfishing and resulting in further administrative actions to bring the fishery into compliance with the MSFCMA.

The only foreseeable indirect effect to the administrative environment associated with **Alternatives 2-4** relates to potential management measures needed to regulate the harvest once the stock is rebuilt. Maintaining the stock size at or above B_{MSY} will require informing the public of regulatory changes, continuing to monitor the harvest of this stock, and conducting periodic assessments to insure that the stock does not fall below MSST or that the fishery does not exceed MFMT

8.1.3.5 Mitigation measures

No significant adverse effects are anticipated from any of the alternatives being considered. Therefore, no mitigation measures are proposed for any of these alternatives.

8.1.4 MFMT alternatives

8.1.4.1 Direct and indirect effects on physical environment and their significance

As discussed in Section 8.1.2.1, fishery management actions or inactions that affect the physical environment mostly relate to the interactions of fishing with bottom habitat. These types of interactions are minimal from the hook-and-line gear used by both the commercial and recreational fisheries. Establishing MFMT should not directly affect benthic habitat or the water column because it simply provides fishery managers with a defined harvest rate threshold to consider in developing fishery management measures. Managers use MFMT to evaluate whether the fishing mortality rate is within desirable ranges. Therefore, **Alternatives 1-3** should have no direct effect on the physical environment. However, specifying MFMT may indirectly affect the physical environment by defining the future level of fishing effort that will sustain the stock over the long term.

The assessment models used to establish **Alternatives 2 and 3** (as described in Section 8.1.2.1) would require that fishing mortality be reduced over the short term to eliminate overfishing and rebuild the stock as needed. This could reduce the effects of the gear to the physical environment if the reduction in F leads to a reduction in effort. Once the stock is rebuilt, the effects of the alternatives should be positively related to the fishing mortality rate associated with them. Therefore, **Alternative 3** should have less of an effect on the physical environment than **Alternative 1** and **Preferred Alternative 2** (0.90*F_{MSY} vs $F_{30\%SPR}$ and F_{MSY}). Because different assessment models using different assumptions about the stock were used to estimate $F_{30\%SPR}$ and F_{MSY}, it is difficult to compare the effects of selecting either **Alternative 1** or **Preferred Alternative 2**. However, as mentioned in Section 8.1.2.1, the types of interactions from the primary gear (hook-and-line) used by both the commercial and recreational fisheries are minimal, so the effects on the physical environment by all alternatives should not be significant.

8.1.4.2 Direct and indirect effects on biological/ecological environment and their significance

Establishing MFMT should not directly affect the biological/ecological environment because it simply provides fishery managers with a defined F value to consider in developing fishery management measures. Managers use MFMT to evaluate whether the fishing mortality rate is within desirable ranges. Therefore, **Alternatives 1-3** should have no direct effect on the biological/ecological environment.

MFMT provides a reference point to limit F at a point that ensures a stock is fished at a sustainable level and does not undergo overfishing. The implications to vermilion snapper biology from overharvesting are described in detail in Section 8.1.2.2. In addition, the effect of long-term overfishing is that a stock becomes overfished and cannot maintain MSY. More conservative estimates of MFMT such as **Alternative 3** (0.90*F_{MSY}) provide greater stability to the resource and reduce the risk that F and/or environmental factors would cause the biomass to fall below B_{MSY}. However, they may underestimate the yield that can be exploited without compromising the long-term sustainability of the stock. More liberal estimates of MFMT such as **Alternative 1** ($F_{30\%SPR}$) and the **Preferred Alternative 2** (F_{MSY}) would allow for a higher yield, but would also result in a greater risk of long-term overfishing. These definitions would not provide a precautionary buffer between what is considered to be the maximum sustainable rate of fishing and the overfishing threshold. However, effectively managing the vermilion snapper stock to achieve OY after the stock is rebuilt would reduce the likelihood that the fishing mortality rate would exceed MFMT, and thus would not compromise the ability of the stock to produce MSY on a continuing basis.

8.1.4.3 Direct and indirect effects on social and economic environment and their significance

Establishing MFMT sets the threshold fishing mortality rate that the fishery cannot exceed without being considered undergoing overfishing. Therefore, **Alternatives 1-3** should not have any direct consequences in terms of affecting the operations of participants in the vermilion snapper fishery. These effects would be dictated by the rebuilding plan and management measures selected in Sections 4.2 and 4.3. However, if an emphasis is placed on ending overfishing within the rebuilding plan selections, the choice of the more conservative **Alternative 3** could dictate a more stringent regulatory regime being selected in Section 4.3.

While the establishment of MFMT provides no or little direct effects, the level selected eventually influences the setting of TACs and associated management measures such that this threshold is not exceeded. Overly conservative parameters can lead to greater conservation than necessary and greater short-term socioeconomic loss from forgone yield due to any implemented management restrictions. Conversely, establishing insufficiently conservative parameters can produce greater short-term socioeconomic benefits from increased yield, but potentially lead to long-term losses due to the stock being fished to a level less than the true MSY level.

Selecting **Alternative 3** would require using an F value below F_{MSY}, and would have a consequent reduction in short-term socioeconomic benefits. **Alternative 1** and **Preferred Alternative 2** would allow an MFMT consistent with the MSY level provided by the respective stock assessment models described in Section 4.1.1. The Pella-Tomlinson surplus production model that directly estimated F_{MSY} was recommended by the RFSAP (RFSAP, 2001)

8.1.4.4 Direct and indirect effects on administrative environment and their significance

Section 2 outlines the history of management of vermilion snapper in the GOM. 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 vermilion snapper. In addition, the NOAA Fisheries monitors both commercial and recreational catches and assess the stock. The purpose of MFMT **Alternatives 1-3** is to define a harvest rate to ensure that overfishing does not occur. The F levels that would be defined by all the alternatives after the stock rebuilds would likely be different from those prescribed during the rebuilding period, and thus would require that administrators make minor adjustments through framework procedures set the Reef Fish FMP. 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.

The only foreseeable indirect effect to the administrative environment associated with **Alternatives 1-3** relates to potential management measures needed to regulate the harvest once the stock is rebuilt to maintain F below MFMT. Implementing these rules will require informing the public of regulatory changes, continuing to monitor the harvest of this stock, and conducting periodic assessments to ensure that the fishery does not exceed MFMT

8.1.4.5 Mitigation measures

No significant adverse effects are anticipated from any of the alternatives being considered. Therefore, no mitigation measures are proposed for any of these alternatives.

8.1.5 MSST alternatives

8.1.5.1 Direct and indirect effects on physical environment and their significance

As discussed in Section 8.1.2.1, fishery management actions or inactions that affect the physical environment mostly relate to the interactions of fishing with bottom habitat. These types of interactions are minimal from the primary gear (hook-and-line) used by both the commercial and recreational fisheries. Establishing MSST should not directly affect benthic habitat or the water column because it simply provides fishery managers with a defined biomass threshold to consider in developing fishery management measures. Managers use MSST to evaluate whether the stock biomass is at a suitable level. Therefore, **Alternatives 1-4** should have no direct effect on the physical environment.

Specifying MSST may indirectly affect the physical environment by constraining the choice of MFMT. **Alternative 1** would not establish an MSST value for vermilion snapper and so fishery managers would not be able to assess whether the stock is overfished. **Preferred Alternative 2** should have less of an effect on the physical environment than **Alternatives 3 and 4** because the F that would reduce the stock to $0.75{*}B_{MSY}$ is less than that which would reduce the stock to $0.50{*}B_{MSY}$ or $0.65{*} B_{MSY}$, respectively. The effects of **Alternative 4** ($0.65{*}B_{MSY}$) would be intermediate to those associated with alternatives 2 and 3. However, as mentioned in Section 8.1.2.1, the types of interactions from the hook-and-line gear used by both the commercial and recreational fisheries are minimal, so any effects on the physical environment from **Alternatives 1-4** are expected to be minimal.

8.1.5.2 Direct and indirect effects on biological/ecological environment and their significance

Establishing MSST should not directly affect the biological/ecological environment because it simply provides fishery managers with a defined threshold to consider in developing fishery management measures. Managers use MSST to evaluate whether the stock biomass is at a sustainable level. Therefore, **Alternatives 1-4** should have no direct effect on the biological/ecological environment.

MSST provides a reference point that ensures a stock does not become overfished. The implications to the vermilion snapper biology from overharvesting are described in detail in Section 8.1.2.2. **Alternative 1** would not establish an MSST value for vermilion snapper. Should this alternative be chosen, fishery managers would not be able to determine whether this stock is overfished.

MSST does not have any short-term effects on the biological/ecological environment because the stock must first rebuild to B_{MSY}. Once the stock reaches equilibrium, **Alternatives 2-4** differ to the degree they provide a buffer to the stock and its ability to sustain MSY. Because **Preferred Alternative 2** has the biomass level closest to B_{MSY}, the degree that this alternative can buffer the stock from becoming overfished is less than the **Alternatives 3 and 4**. 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 **Alternatives 3 and 4**. 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 vermilion snapper 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 vermilion stock were managed to achieve the preferred OY alternative (yield associated with an F of $0.75{*}F_{MSY}$). **Alternative 4** sets MSST at a value intermediate to those proposed by **Alternatives 2 and 3**.

8.1.5.3 Direct and indirect effects on social and economic environment and their significance

Since establishing MSST sets the level the stock biomass cannot fall below in order to rebuild within the 7- or 10-year time period, **Alternatives 1-4** should not have any direct consequences in terms of affecting the operations of participants in the vermilion snapper fishery. Direct effects would only accrue to management measures that directly restrict harvest or behavior. However, while the establishment of MSST provides no direct effects, the level selected can influence the definition of MFMT, which is ultimately used to define TAC. Overly conservative parameters can lead to greater conservation than necessary and greater short-term socioeconomic loss from forgone yield due to any implemented management restrictions. Conversely, establishing insufficiently conservative parameters can produce greater short-term socioeconomic benefits from increased yield, but lead to long-term losses due to the stock being fished to a level less than the true MSY level.

Selection of **Alternative 1** would not require managers to establish a value for MSST. For **Alternatives 2-4**, the higher the MSST value, the better the long-term socioeconomic outcome. But this outcome has to be modified by the long-term sustainability of the stock and the type of management regime adopted for the fishery. Among the alternatives, **Preferred Alternative 2** is the most conservative from a biological standpoint. It would also have the highest likelihood that the stock biomass, once rebuilt, could drop below MSST forcing a recovery plan if overfishing should occur. However, the amount that the stock would need to recover to would be less than other alternatives, because the threshold would be higher. **Alternative 3** would allow a greater buffer between B_{MSY} and the overfished condition, but also have a greater risk of more stringent reductions in F should a recovery plan need to be instituted. The effects of **Alternative 4** would be intermediate to **Alternatives 2 and 3**.

8.1.5.4 Direct and indirect effects on administrative environment and their significance

Section 2 outlines the history of management of vermilion snapper in the GOM. 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 vermilion snapper. In addition, the NOAA Fisheries monitors both commercial and recreational catches to monitor and assess the stock. The purpose of the MSST **Alternatives 2-4** is to define a stock size that will sustain the vermilion snapper stock over the long term. Therefore, direct effects on the administrative environment are not determined to be significant. **Alternative 1** would not define an MSST level, which would require further administrative actions to bring the fishery into compliance wit the MSFCMA.

The only foreseeable indirect effect to the administrative environment associated with **Alternatives 2-4** relates to potential management measures needed to regulate the harvest once the stock is rebuilt. Implementing these rules will require informing the public of regulatory changes, continuing to monitor the harvest of this stock, and to conduct periodic assessments to ensure that the stock does not fall below MSST.

8.1.5.5 Mitigation measures

No significant adverse effects are anticipated from any of the alternatives being considered. Therefore, no mitigation measures are proposed for any of these alternatives.

8.2 Rebuilding strategies

Alternative strategies for rebuilding the Gulf of Mexico vermilion snapper stock are described in Section 4.2. These rebuilding alternatives are based on a projection model that combines the most recent peer reviewed stock assessment (Porch and Cass-Calay, 2001) with more recent data on catch levels and CPUE indices. Using this projection model, rebuilding alternatives were devised to cover a variety of overall rebuilding schedules (from 7 to 10 years) and strategies (constant catch, constant fishing mortality rate, and stepped up harvest). These alternatives encompass a range of likely effects on the physical, biological/ecological, social and economic, and administrative environments, which are described below. Alternatives for the rebuilding strategies and the rationale for the preferred alternative are described in detail in Section 4.2.2.

8.2.1 Direct and indirect effects on physical environment and their significance

As discussed in Section 8.1.2.1, the reef fish fishery has minimal effects on the physical environment. To a small degree, the predominant hook-and-line fishing gear can entangle, abrade, or break bottom structure, both living and dead. To a slightly greater degree, the cumulative effects of many anchors can have similar effects on popular fishing spots. However, none of those effects are expected to be significant. Consequently, there is no basis to anticipate significant differences among the rebuilding alternatives in their effects on the physical environment. Since the rebuilding alternatives provide a framework for management measures discussed in Sections 4.3 and 8.3, any effects of these strategies would be indirect.

To the degree that there are any differences, the action alternatives are all expected to reduce short- and long-term fishing effort, whereas the no action alternative (**Alternative 1**) would not. Among the action alternatives, differences would only last as long as the duration of the rebuilding plan. Of these, **Alternative 4** would require the greatest short-term effort reduction, but would then hold effort relatively constant through rebuilding. **Alternative 5**, **Preferred Alternative 3**, and **Alternative 2** would require increasingly smaller initial effort reductions, respectively, but also more dramatic ongoing effort reductions through the rebuilding plan. Those alternatives with the greatest short-term effort reductions would most quickly lessen any physical effects on the environment. In all cases, relative effort estimates were calculated for each year from the projection model by dividing the anticipated catch by the anticipated abundance, as compared to the 1998 baseline value.

8.2.2 Direct and indirect effects on biological/ecological environment and their significance

Similar to effects on the physical environment, the rebuilding alternatives will cause only indirect effects through requirements for harvest reduction management measures as discussed in Sections 4.3 and 8.3. In contrast to the physical environment, though, significant beneficial effects are anticipated for the biological/ecological environment as a result of rebuilding the Gulf vermilion snapper stock.

Under **Alternative 1** and assuming constant fishing effort into the foreseeable future, it is estimated that the Gulf vermilion snapper stock will continue to decline. Ultimately, the stock would stabilize at a biomass approximately one-tenth of MSY levels in the early 2020s (Table 4.2.1.1). As a result of this lower abundance, the Gulf vermilion snapper stock would be at greater risk of collapse. Stocks at such low levels often show compressed age structure, which make them more vulnerable to a bad year of recruitment and can put selective pressure on fish to grow more slowly and reproduce at a younger age (Stokes and Law, 2000). These biological changes can make the population more robust to the perils of overfishing, but not enough to offset the increased risk of stock collapse at low abundance. Even if the stock avoids collapse, its ability to perform any ecosystem functions might also be compromised by its low numbers, although this effect could be minimized if other members of the ecosystem contribute to the same functions (Carr et al., 2002).

In contrast, all of the action alternatives would allow the stock to increase to B_{MSY} by either 2010 or 2013 and, assuming a transition to OY management, might exceed that level by at least 20 percent or more (Restrepo et al., 1998). As a result, each would provide significant beneficial effects to the biological/ecological environment. A greater abundance of fish means that the population would be more resilient to overfishing, other human impacts, and non-human disturbances. This resilience would come as a result of greater numbers of fish and a fuller age structure, which makes the population better able to persevere through one or more bad recruitment years. The reduced fishing rates would also moderate any selective pressures towards growing more slowly or reproducing earlier. The more abundant stock will also be better able to perform any ecosystem functions.

Although all rebuilding action alternatives have the same long-term effect of rebuilding to MSY abundance levels, some get there sooner than others (Table 4.2.1.1). **Alternative 5** would rebuild to MSY levels by 2010 although **Alternative 4** would produce a quicker initial increase in stock biomass. **Preferred Alternative 3** would rebuild the stock more slowly, and **Alternative 2** more slowly still.

Rebuilding alternatives also vary in their resiliency if the assessment model has inadvertent inaccuracies or otherwise fails to accurately predict future recruitment. Because of the dynamic nature of wild populations and the difficulty of counting fish in a vast and relatively unexplored ocean, errors of 50 percent are not uncommon in the assessments of even well-studied stocks (NRC, 1998). Management systems can vary tremendously in their ability to achieve productive and sustainable fisheries in the face of such uncertainties (Sladek Nowlis and Bollermann, 2002; Sladek Nowlis, 2004).

A comparison of the rebuilding alternatives illustrates this point. If there were a relatively small (10 percent) overestimate in the productivity of vermilion snapper, and this error was not discovered until 2007 and not corrected until 2008, less robust alternatives could require closure of the fishery for it to rebuild. **Alternative 2** would have driven the stock down to very low levels by the time the error was discovered. As a result, the stock would not be able to recover without a revision of the rebuilding plan. Even if the fishery were closed entirely in 2008 and all forms of bycatch eliminated, the stock would be severely depleted. The same is true for **Preferred Alternative 3**, except that it could recover in 2015 if all forms of fishing and bycatch mortality were eliminated. **Alternative 5** fares slightly better; it could rebuild by 2013 if its catch limits were scaled down by 51 percent after 2008. Without such a correction, it would not recover. **Alternative 4** fares the best in the face of errors. It could rebuild by 2013 if its catch limits were scaled down by just 21 percent starting in 2008, and would rebuild without a correction by 2020. These differences illustrate the important influence of management system characteristics on their ability to succeed even if errors are made. The implications are significant for the biological/ecological and social and economic environments.

8.2.3 Direct and indirect effects on social and economic environment and their significance

The process of rebuilding is anticipated to provide significant long-term benefits to the fishing industry. The benefits of all rebuilding alternatives are the same, and all should increase catches from current levels of 2 to 2.5 mp to predicted optimum levels of over 3 mp. If no action is taken and the fishery continues at recent effort levels, it is predicted that catches would decline below 1 mp within the next 15 years (Table 4.2.1.1).

One measure of long-term social and economic benefits comes in the form of the net present value, or the likely long-term profits expected from the fishery under each rebuilding scenario. For the commercial rebuilding strategies (Table 5.7), **Alternative 4** has the highest net economic return followed by **Alternative 5** and **Preferred Alternative 3.**. **Alternative 2** results in the smallest net economic benefits of any of the alternatives. For the recreational sector (Tables 5.7), **Alternative 5** results in the highest net economic returns followed by **Alternatives 4** and **3.** **Alternative 2** results in the smallest economic returns of any of the recreational rebuilding strategies. Overall, Alternative 5 produces the highest economic returns for the entire fishery (includes both the recreational and commercial sector).

Short-term costs associated with rebuilding alternatives can also be examined in terms of the initial percent catch reduction required relative to recent catch levels (e.g., projected 2003 landings). **Alternative 2** requires the least initial cost (17.9 percent), followed by **Preferred Alternative 3** (25.5 percent), **Alternative 5** (38.7 percent) and **Alternative 4** (50.5 percent) (Table 5.7). Alternatively, one can examine the speed with which each plan would allow catches to return to recent levels (average of 2.3 mp from 2000-02). The alternatives that cause the largest initial costs perform best. **Alternative 4** would allow catches in excess of the 2000-02 average starting in 2009, **Alternative 5** and **Alternative 3** in 2011, and **Alternative 2** in 2014.

Some rebuilding alternatives would require frequent adjustments to regulations. In all cases, it is anticipated that, over the long-term, fishing effort must be reduced to less than half of current levels to achieve optimum yield. Doing so will require new regulations as the stock rebuilds and catch per unit effort increases accordingly. Among the action alternatives, those that have the smallest short-term reductions in catch level are also most likely to require the most frequent adjustment of regulations. According to the projection model and effort calculations as described in Section 8.2.1, effort would have to be most dynamic (and therefore potentially require more adjustments of harvest reduction regulations) for **Alternative 2**, followed by **Preferred Alternative 3**, **Alternative 5**, and **Alternative 4**. For all action alternatives, stricter initial short-term restrictions reduce the likelihood that additional restrictions will be necessary later on in the rebuilding plan and therefore cause less confusion or adjustment on the part of fishing sectors. This phenomenon could also lead to frustration in having ever-tightening regulations despite a growing stock.

Rebuilding alternatives also vary in their robustness to parameter misestimation and other management errors, as discussed in Section 8.2.2. The implications for the social and economic environments could be significant if productivity is under or overestimated.

Two other socioeconomic benefits would come as a result of rebuilding. First, a larger fish stock would increase CPUE, which will in turn reduce fishing costs. Second, reducing the fishing pressure on this stock would reduce or eliminate any selective pressure for vermilion snapper to develop undesirable characteristics, such as slow growth or reduced catchability.

8.2.4 Direct and indirect effects on administrative environment and their significance

The rebuilding alternatives differ in their effects on the administrative environment. **Alternative 1** (no action) would have the least short-term effects on the administrative environment, but could result in significant impacts in the future through litigation over the compliance with the MSFCMA.

All of the action alternatives will cause an adverse short-term administrative impact in order to achieve the rebuilding time frames. In all cases, it is anticipated that long-term fishing effort must be reduced to less than half of current levels to achieve optimum yields. Doing so would require the promulgation of new regulations. However, this short-term adverse impact is within the scope of the current management system and is likely to offset a potentially much larger adverse effect on the administrative environment if no action is taken.

Among the action alternatives, those that have the smallest short-term reductions in catch level are also most likely to pose the greatest administrative burden. According to the projection model and effort calculations as described in Section 8.2.1, effort control would have to be most dynamic (and therefore potentially require more frequent adjustment of harvest reduction regulations) for **Alternative 2**, followed by **Preferred Alternative 3**, **Alternative 5**, and **Alternative 4**. For all action alternatives, stricter initial short-term restrictions reduce the likelihood that additional restrictions will be necessary later on in the rebuilding plan.

8.2.5 Mitigation measures

The analysis of the range of rebuilding alternatives reveals only two significant negative impacts. Regardless of which alternative is selected, rebuilding vermilion snapper is expected to have negative short-term effects on the social and economic environment, and will create a burden on the administrative environment. All of the action alternatives under consideration would cause these short-term negative effects, because they are a necessary cost associated with the benefits of rebuilding vermilion snapper. The alternatives span a range from relatively mild short-term socioeconomic costs with delayed long-term social, economic, and ecological benefits to more severe short-term socioeconomic costs with quicker achievement of long-term benefits. The fundamental trade-off between these costs and benefits makes it impossible to mitigate against all negative impacts but also allows for reasoned decision making among the range of alternatives.

8.3 Harvest reduction alternatives

8.3.1 Description of the alternatives

Sections 4.2.3.2 and 4.2.3.3 describe in detail harvest reduction alternatives the Council is considering for reducing harvest in the recreational and commercial vermilion snapper fisheries. Recreational harvest reduction alternatives include increasing the size limit, developing a bag limit for vermilion snapper within the current 20-reef fish aggregate bag limit, implementing a closed season, establishing a quota, and implementing a combination of size and bag limits. Similar alternatives are proposed for the commercial fishery and include increasing the minimum size limit, establishing a trip limit, implementing a closed season, setting a quota, and implementing a combination of size and trip limits or size and season closures. All of these management alternatives are intended to eliminate overfishing and rebuild the fishery within 10 years. They were developed to be consistent with the Council's preferred rebuilding strategy (Section 4.2.2). Alternatives for the commercial and recreational harvest reduction alternatives and the rationale for the preferred alternative for each are described in detail in Section 4.2.3.

8.3.2 Recreational harvest reduction alternatives

8.3.2.1 Direct and indirect effects on physical environment and their significance

The effects of management measures on the physical environment are discussed in Section 8.1.1.1. It is important to minimize habitat impacts to preserve and maintain essential fish habitat. Hard bottom areas and artificial structures provide shelter for a variety of reef fishes, including vermilion snapper. These habitats also aggregate and concentrate prey species relied upon by vermilion snapper and other reef fishes. Destruction or damage to hard bottom habitat and natural corals could adversely effect vermilion snapper by reducing the amount of suitable shelter where food sources are concentrated.

Hook-and-line is the primary gear used to harvest vermilion snapper and is expected to have a very minor negative effect on hard bottom habitat and no effect on the water column. Hook-and-line gear could break hard bottom structures through snagging or entanglement and abrasions to structures could result from lines or weights (Barnette, 2001). Impacts to both soft and hard corals would be greater than impacts associated with hard-bottom areas for the reasons described above. Impacts to natural habitat surrounding artificial reefs are expected to be negligible, because these structures are generally placed in areas less vulnerable to disturbance, such as sand and mud bottom. Lost fishing gear and tackle that is slow to degrade could result in long-term adverse effects if the gear continues to damage habitat over time. Anchoring over hard-bottom areas would also directly damage benthic habitat. However, at least some of the vermilion snapper fishery, particularly the headboat and charter boat sectors, drift fish up in the water column rather than anchor while fishing thus reducing the amount of bottom contact..

Vermilion snapper are rarely targeted during recreational fishing trips (see Tables 5.4 and 5.5), thus management measures that reduce fishing effort (e.g., number of fishing trips targeting vermilion snapper) are not expected to greatly reduce habitat impacts. In 2002, only 0.04 percent of all recreational fishing trips in the GOM targeted vermilion snapper (see Table 5.4). Increases in gear-related bottom interactions are likely to occur if management alternatives make it more difficult to harvest legal vermilion snapper. If the capacity exists, fishers may increase time spent fishing for vermilion snapper or they may shift away from vermilion snapper and fish for other reef fish species.

Although the effects of recreational harvest reduction **Alternatives 1-5** on the physical environment are expected to be minor for the reasons described above, they are expected to differ to some extent because each alternative would have a different effect dependent on the level of effort applied to the recreational fishery. Because few trips directly target vermilion snapper, any changes in fishing effort associated with each of the recreational management measures are expected to be minor when compared to current conditions (see Alternative 1). These differences are highlighted below.

Alternative 1 would maintain status quo. Maintaining the current 10-inch TL minimum size limit and 20-fish aggregate bag limit would not reduce fishing effort or harvest of vermilion snapper in the short-term, and would cause the stock to further decline in abundance. Alternative 1 would result in intermediate effects to the physical environment when compared to other alternatives that increase or decrease fishing effort and the amount of time spent harvesting vermilion snapper. These effects are considered minor because few anglers target vermilion snapper. In the short term, Alternative 1 would likely have less of an effect on the physical environment in the short-term than alternatives that increase the minimum size limit, because more vermilion snapper are available for harvest at the current 10-inch TL size limit, resulting in less effort and time spent fishing to catch legal-sized fish.

In the long-term, harvest and directed fishing effort would decline as fishers stop targeting vermilion snapper. By the end of the rebuilding period, harvest would be low and there would likely be no directed fishing effort. At that point in time, effects to the physical environment from Alternative 1 would be less than any of the alternatives that rebuild the stock to $B_{MSY,}$ unless anglers spend more time targeting other reef fish species.

Alternative 2 would establish a two-fish bag limit for vermilion snapper within the existing 20-reef fish aggregate bag limit. It would reduce fishing effort more than Alternative 1 (status quo), but because vermilion snapper are not the target species on most trips, the number of fishing-related interactions with bottom habitat would not be greatly reduced. The lower bag limit could deter the small percentage of trips that target vermilion snapper, reducing damage to vermilion snapper habitat. However, most anglers target reef fish species that co-occur with vermilion snapper, so a lower bag limit is likely to contribute little to the benefit or detriment of the habitat. Even if the daily vermilion snapper bag limit is reached, anglers would likely continue to target other reef fish species.

A lower bag limit could result in less habitat disturbance for those trips targeting vermilion snapper, because anglers would likely stop targeting vermilion snapper once reaching their daily bag limit. Over time, as the stock rebuilds, anglers would catch their bag limit more quickly, reducing the effects on habitat. However, a greater abundance of legal fish would likely lead to more directed fishing effort over time and would increase the number of habitat-related interactions with fishing gear and anchors.

Alternative 3 would establish an 11-inch TL minimum size limit and either a 7- (**Alternative 3A**) or 10-fish bag limit (**Preferred Alternative 3B**) for vermilion snapper within the existing 20-reef fish aggregate bag limit. In the short-term, these alternatives would increase impacts to habitat for the few trips targeting vermilion snapper because it would take anglers more time to harvest their bag limit of legal-sized fish and increase the amount of time gear contacts the bottom, but this is likely to have a minimal effect since few trips target vermilion snapper (see Tables 5.4 and 5.5). Additionally, with rapid growth, larger fish would quickly become more available and the effects on habitat would be reduced, unless more fishing trips occur.

The lower bag limit (seven fish) would reduce the amount of time gear contacts the bottom more than a ten fish bag limit, because anglers would reach their bag limit sooner. However, few anglers harvest more than two to four vermilion snapper each trip, therefore the impact on bottom habitat is expected to be similar for each of these options, but still greater than Alternatives 1 and 2.

Alternative 4 would establish a recreational quota of 0.487 mp. This quota is not likely to be reached in the near future, because it is based on the commercial and recreational allocations (67 percent commercial / 33 percent recreational based on 1979-1987 average landings) established in Amendment 1 to the Reef Fish FMP. In recent years (2000-2002), the recreational sector has accounted for only 21 percent of the annual harvest. In the short-term, Alternative 4 is likely to have similar effects on habitat as Alternative 1 (status quo) and would result in greater habitat impacts than the other alternatives because fishing effort would be allowed to increase. In the long-term as the stock rebuilds and the quota is met, habitat effects would likely be reduced. Post-quota closures would reduce fishing effort and gear-related interactions, unless anglers continue to target other reef fish species that co-occur with vermilion snapper. In either case, the long-term effects of a quota closure are likely to be less than those for Alternatives 2 or 3 because the directed fishery would be closed for some period of time.

Alternative 5 would establish a closure for vermilion snapper during May and part of June. This alternative would not have much of an effect on the benthic habitat since few recreational anglers target vermilion snapper. Anglers would still target other reef fish that co-occur with vermilion snapper during the closed season. Alternative 5 will have slightly less of an effect on habitat than Alternatives 1 and 4, because Alternative 5 would reduce effort during the closed season.

The indirect effects of **Alternative 1 - 5** are not expected to be significant. For the reasons stated above, vermilion snapper hook-and-line fishing has a negligible effect on both the benthic habitat and the water column. In addition, as stated in Section 8.2.1, vermilion snapper are the less desirable of the two northern Gulf snapper species, and any changes in the harvest of vermilion snapper brought about by **Alternatives 1 - 5** should not affect the conduct of the red snapper fishery or other reef fish fisheries, such as grouper and coastal pelagics.

8.3.2.2 Direct and indirect effects on biological/ecological environment and their significance

Alternative 1 (status quo) would maintain existing regulations for vermilion snapper, which include a 10-inch TL size limit and 20-reef fish aggregate bag limit. The status of the stock would continue to decline and result in negative effects to the biological and ecological environment if regulations remained unchanged. Vermilion snapper would continue to undergo overfishing and the stock would not be rebuilt to sustainable levels.

Overexploiting the vermilion snapper stock may affect the abundance, size structure, age-distribution, and geographical range of the stock. Growth overfishing could occur if the stock is exploited too heavily, leading to fish being harvested at relatively small sizes (e.g. near the minimum size limit). Recruitment overfishing of the stock may also occur and the population could be reduced to levels that could not produce enough new recruits to replace those dying.

Fisheries tend to remove the oldest and fastest growing fish. This could lead to declines in genetic diversity, as slower growing, smaller fish are selected for during periods of heavy fishing pressure. Declines in genetic diversity may also make the stock less resilient to environmental change (Bohnsack, 1999).

Reducing the age and size structure of the population has implications for how quickly the stock can rebuild and recover. Because fecundity increases with vermilion snapper size, larger fish produce more eggs than smaller fish (see batch fecundity estimates, Porch and Cass-Calay, 2001). If a stock is overexploited, the size and age of fish harvested becomes smaller and the size and age distribution of fish becomes truncated. With fewer larger fish in the population, the reproductive capacity of a stock is reduced.

Maintaining current regulations would also affect bycatch. In the short-term, bycatch would likely be lower for Alternative 1 (status quo) than it would be with management alternatives that increase the minimum size limit. However, as the stock declines in abundance over time, bycatch levels would increase because fewer legal-sized fish would be available for harvest. As the stock was further depleted, bycatch would likely be reduced because less fish would be available for harvest.

Alternative 2 would establish a two fish bag limit within the 20-reef fish aggregate and reduce harvest by 30 percent. Reducing the number of fish harvested would benefit the biological and ecological environment by reducing fishing mortality and allowing more fish to survive to older ages and sizes. The biological benefits of implementing a two fish bag limit are expected to be intermediate to other alternatives, because few anglers harvest more than a few vermilion snapper per trip (see Section 4.2.3.1).

Alternative 2 would be expected to increase vermilion snapper bycatch as the stock rebuilds. However, on trips targeting vermilion snapper, anglers would stop harvesting vermilion snapper once a bag limit is reached and bycatch would be reduced. Most trips do not target vermilion snapper, therefore bycatch would likely increase once bag limits are met, because anglers will continue targeting other reef fish species that occupy similar habitats as vermilion snapper. Any vermilion snapper caught while targeting other reef fish species would then be released, because bag limits would already be met. Overall, because few anglers currently harvest more than 2 to 4 vermilion snapper per trip, only minor increases in bycatch would occur in the short-term. In the long-term, as the stock rebuilds, bycatch would potentially increase as anglers harvest their bag limit more quickly and continue to target other reef fish species.

Alternative 3 would establish an 11-inch TL minimum size limit and a 7- or 10-fish bag limit for vermilion snapper within the 20-reef fish aggregate. This alternative would reduce harvest by 25.6 or 21.5 percent, respectively. Size limits are intended to protect immature fish from harvest and must balance the benefits of harvesting larger fish with losses due to natural mortality. The benefits of establishing a larger size limit are two-fold; larger size limits increase the average size of fish harvested and they allow more fish to survive to older ages and larger sizes. By increasing the size/age structure of the population, the reproductive capacity of a stock may increase for the reasons described in Alternative 1.

An 11-inch TL size limit coupled with a 7-fish bag limit is the most conservative option proposed for Alternative 3 and would result in the greatest benefit to the vermilion snapper stock. Fewer fish would be harvested as anglers reach their daily bag limit more quickly.

Increases in the size limit would increase bycatch. Because fewer fish are available at larger sizes, more fish would be released before legal-sized fish are caught. As the stock grows, bycatch could be as more larger fish become available to harvest. However, the level of bycatch would always be greater than that observed for lower size limits, regardless of stock size. The proposed size limit alternatives take into account mortality of released fish associated with increasing the size limit (see Section 4.2.3). Although minimum size limits would increase bycatch, the increase in stock abundance would exceed losses associated with bycatch.

Alternative 4 establishes a recreational quota of 0.487 mp. The quota would not benefit the biological and ecological environment initially, because recreational landings are currently well below the proposed recreational quota. The recreational fishery currently accounts for 21 percent of the harvest, but quotas for the recreational and commercial vermilion snapper fisheries are based on those specified in Amendment 1 to the Reef Fish FMP (67 percent commercial / 33 percent recreational). Initially, this alternative would have similar impacts to the status quo alternative, because recreational harvest would not be reduced. Over time, as the stock is rebuilt, this alternative would benefit vermilion snapper by closing the fishery once the quota was reached. Vermilion snapper would be protected from harvest once a closure was met, allowing fish to grow to larger sizes and ages. This would expand the size and age structure of the stock and increase the stock's reproductive capacity.

This alternative would have little effect on bycatch in the short term, because harvest levels would remain similar to those of status quo. Bycatch levels would decrease as the stock rebuilds, because more legal-sized fish would be available for harvest. However, if the quota is met, then bycatch levels would likely increase during the closure period. Increases in bycatch levels would be dependent on the duration of the post-quota closure and whether anglers continue targeting reef fish species that co-occur with vermilion snapper during the closure. If anglers target other reef fish species during the closure, then any vermilion snapper caught would be released as bycatch.

Alternative 5 establishes a recreational closed season for seven weeks (May 1 to June 21) each year during the spawning season. Vermilion snapper spawn in the GOM from May through September, with peak spawning occurring in July and August (Hood and Johnson, 1999). Closing the fishery during May and part of June would protect vermilion snapper during the early part of the spawning season. Cueller et al. (1996) estimated that vermilion snapper spawn every five days. Establishing a seven week closure would allow mature fish to spawn as many as 9-10 times before becoming vulnerable to harvest.

This alternative would increase bycatch. During the closure, anglers would continue to target reef fish species. Any vermilion snapper caught during the closure would be released as bycatch. Bycatch during the closure would be reduced slightly if the few trips that target vermilion snapper do not occur. However, if these anglers choose to target other reef fish species during the closure that co-occur with vermilion snapper, than bycatch would not be reduced.

All of the alternatives would result in indirect effects on the ecosystem. Vermilion snapper occupy similar habitat as other reef fishes, such as red grouper, gag, red snapper, and gray triggerfish. These species compete with vermilion snapper for both shelter and food. Predators of vermilion snapper could decline if the abundance of vermilion snapper continues to decrease (Alternative 1), while species preyed upon by vermilion snapper would increase. Species competing with vermilion snapper for similar resources would benefit and potentially increase in abundance if more food and/or shelter is available. In contrast, if vermilion snapper abundance were to increase (Alternatives 2-5), species competing for similar resources could be negatively effected. Reef fish species that are currently considered less desirable for harvest could also become more heavily exploited if overexploitation continues to occur for vermilion snapper. However, because vermilion snapper are rarely targeted during recreational fishing trips, the indirect effects of shifting fishing effort to other species are likely to be minor. Fishing pressure and harvest of various fish species could also be reduced if the vermilion snapper stock were rebuilt.

8.3.2.3 Direct and indirect effects on social and economic environment and their significance

The social and economic effects of the various recreational management measures are discussed in Section 5.5.2.4. **Alternative 1** maintains status quo and the vermilion snapper stock would decline in abundance. Declining harvest levels would directly affect economic benefits. Total economic benefits (consumer surplus + net revenues) are projected to decline in all recreational sectors (private rental, headboat, and charter boat) if management measures remain unchanged (see Section 5.5.2.4).

Alternatives 2, 3, and 5 all result in economic losses in the short-term and positive economic benefits in the long-term when compared to the status quo. **Alternative 4** would result in positive economic benefits in both the short and long-term. Total economic benefits would initially decline for Alternatives 2, 3, and 5 (years 2004-2008) as a result of reductions to the harvest, but would increase over time as the stock rebuilds. Total economic benefits for Alternative 4 would increase because the recreational fishery would be allocated a larger portion of the harvest (33% vs. 21%). In the long-term (10 years), each of the management alternatives would provide economic benefits that exceed those of the status quo by 5 to 35 million dollars (Table 5.7).

Alternative 2 would establish a 2-fish bag limit. This alternative would increase consumer surplus and net revenues during the rebuilding time period by 16 and 14.6 percent (1.67 and 7.4 million dollars), respectively**.** Total economic benefits are projected to increase by 14.9 percent

(9.0 million dollars) when compared to status quo. Increases in economic benefits occur primarily because of large increases in headboat net revenues. Overall, this alternative would result in greater total economic benefits than Alternative 3, but smaller economic benefits than Alternatives 4 and 5 (see Table 5.7).

Alternative 3 would establish an 11-inch TL minimum size limit and a 7- or 10-fish bag limit for vermilion snapper. In the short term (five years), this alternative would result in economic losses for both consumer surplus and vessel net revenues**.** Economic benefits in the long term would be 8.2 percent (5.0 million dollars) greater than economic benefits expected from the status quo alternative. In the long term (10 years), this alternative would result in the lowest economic benefits of any of the alternatives.

Alternative 4 would establish a recreational quota of 0.487 mp. In the short term, this is the only alternative that results in positive economic benefits. Total economic benefits for Alternative 4 are the highest of any of the alternatives, because this alternative reallocates a portion of the harvest to the recreational fishery and assumes that the recreational fishery would harvest 33% (historical allocation), rather than 21% (current allocation), of the total harvest. In the long-term, economic benefits would be 58 percent (35.2 million dollars) greater than the economic benefits expected from Alternative 1.

Alternative 5 would establish a 7-week closed season for vermilion snapper during May and early June. Economic losses in the short-term would be the smallest of any of the alternatives, except Alternative 4. In the long-term, Alternative 5 would result in economic benefits that are 16.5 percent (10.0 million dollars) greater than economic benefits expected from the status quo alternative. Total economic benefits for Alternative 5 are lower than those projected for Alternative 4, but higher than all other alternatives.

All alternatives would negatively affect consumer surplus over the long-term for the private rental mode, except Alternative 4. Positive changes in consumer surplus would be greatest for Alternatives 4, followed by Alternative 5. Alternatives 2 and 3 would result in similar long-term consumer surplus benefits that are lower than Alternatives 4 and 5.

All alternatives would have positive economic effects for the recreational charter boat sector. The greatest increase in consumer surplus and net revenues would occur with a 0.487 million pound quota (Alternative 4). Alternative 3 would result in the lowest long-term economic benefits for the charter boat sector. Alternatives 2 and 5 would result in slightly higher economic benefits than Alternative 3 in the long term, but these benefits are much less than those achieved by Alternative 4.

Results were similar when analyzing economic impacts for the headboat sector. In fact, all the alternatives result in positive economic benefits to the headboat sector. The greatest increases in consumer surplus and net revenues in the long-term would be from Alternative 4. An 11-inch TL size limit with a lower bag limit (Alternative 3) would result in the smallest economic benefits, while a bag limit (Alternative 2) and closed season (Alternative 5) would have intermediate economic benefits. The smallest short-term economic losses would be from closed season and quota alternatives.

If current management measures are maintained (Alternative 1), declining harvest levels could indirectly affect the number of recreational for-hire vessels in the vermilion snapper fishery (see Section 5.5.2.4). If these vessels left the reef fish fishery, support industries and communities where those industries operate could also be effected. Short-term economic conditions would be worse. Associated industries and fishing communities would be most effected by a combination of size and bag limits. Over the long-term, harvest and revenues would increase and positively effect the social and economic structures of support industries and fishing communities. Closed seasons, quotas, and a bag limit would have the greatest indirect benefits in the long-term because these alternatives result in the greatest economic benefits over the rebuilding period.

8.3.2.4 Direct and indirect effects on administrative environment and their significance

Section 2 outlines the history of management of vermilion snapper in the GOM. The recreational harvest of vermilion snapper is regulated by a 10-inch TL minimum size limit and 20-fish aggregate bag limit. The purpose of the recreational management measures detailed in Section 4.2.3.2 is to reduce harvest and rebuild the vermilion snapper stock. All of the alternatives would require administrators to make minor adjustments to the Reef Fish FMP. Adjustments based on Alternatives 2-5 fall within the current scope and capacity of the current management system and therefore will not affect the administrative environment. Alternative 1 would continue to allow overfishing and the stock would remain overfished. This would result in further administrative actions to rebuild the fishery and bring the fishery into compliance with MSFCMA, and would leave the Council and NOAA Fisheries open to legal challenges. Alternative 4 would likely have the greatest impacts on the administrative environment, requiring administrators to carefully monitor the recreational catch to determine compliance with a quota. Recreational quotas are monitored based on data collected from the MRFSS survey. Typically these data are not available for several months after they are collected, making recreational quotas difficult to monitor. A closed season (Alternative 5) is not currently part of the management program for vermilion snapper, but it is for other reef fish species, and therefore it is expected to add only minor increases to the administrative burden through noticing and enforcing closures

8.3.2.5 Mitigation measures

The process of rebuilding vermilion snapper is expected to have a negative short-term effect on the social and economic environment. No alternatives are being considered that would avoid these negative effects because they are a necessary cost associated with rebuilding the vermilion snapper 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 impossible to mitigate these measures and managers must balance the costs and benefits when choosing a recreational management alternative.

8.3.3 Commercial harvest reduction alternatives

8.3.3.1 Direct and indirect effects on physical environment and their significance

Sections 7.1, 8.1.2.1, and 8.3.2.1 describe the physical environment inhabited by vermilion snapper. This species is caught primarily near hard bottom and artificial structures, including shelf breaks, pinnacles, relic shell substrates, gas platforms, corals, and artificial reefs. The commercial vermilion snapper fishery uses various forms of vertical lines (rod-and-reel, electric or hydraulic reels, hand lines, Table 5.1.1) and longlines to harvest vermilion snapper. Vertical lines are used for a majority of the harvest, while longlines represent approximately 2-3 percent of the total annual harvest. Vertical gear and longlines can damage habitat through snagging or entanglement. Longlines can also damage hard bottom structures during retrieval as the line sweeps across the seafloor (Barnette, 2001). Anchoring over hard-bottom areas can also affect benthic habitat by breaking or destroying hard bottom structures. Generally these gears are not believed to have much negative impact on bottom structures and are considerably less destructive than commercial gears, such as traps and trawls (Barnette, 2001).

The effects of commercial harvest reduction **Alternatives 1-7** on the physical environment are expected to be minor for the same reasons described above in section 8.3.2.1; however, they are expected to differ to some extent because each alternative would have different effects on the level of effort applied to the commercial fishery. Alternatives that reduce fishing effort more than others would result in greater benefits to the physical environment, because fishing related interactions with habitat would be reduced. These differences are highlighted below.

Alternative 1 would maintain status quo. Maintaining a 10-inch TL minimum size limit would not reduce fishing effort or harvest of vermilion snapper and would cause the stock to further decline in abundance. As the stock declines, fishermen would likely spend more time fishing to harvest legal vermilion snapper. If the stock declines to a point where vermilion snapper harvest becomes economically unviable, fishermen may cease fishing for vermilion snapper and target other reef fish species. In the short term, Alternative 1 would likely have less of an effect on the physical environment than increasing the size limit (see following discussions for Alternatives 3 and 4). This is because smaller fish are more abundant and more would be available for harvest at smaller size limits. In the long-term, directed fishing effort would likely cease and shift to other reef fish fisheries, resulting in no real change in fishing related interactions with bottom habitat.

Alternative 2 would establish a 1,625-pound trip limit for vermilion snapper and would reduce harvest by 25.2 percent. For trips targeting vermilion snapper, a trip limit would limit habitat disturbance, because fishermen would likely stop targeting vermilion snapper once reaching their daily trip limit; however that effort may shift to other reef fish species. Over time, habitat disturbance could be reduced further as fishermen catch their trip limit more quickly as the stock rebuilds. However, greater abundances of legal fish would likely lead to more directed fishing effort and would increase the number of habitat-related interactions with fishing gear and anchors. Habitat benefits of trip limits could also be diminished if fishermen conduct more trips to compensate for a trip limit.

Alternative 3 would establish a 12-inch TL minimum size limit for commercially caught vermilion snapper. This alternative would reduce harvest by approximately 27 percent. In the short-term, Alternative 3 would likely have a greater effect on habitat than Alternative 1, because a higher size limit would require fishermen to spend more time fishing for legal-sized vermilion snapper. Since few trips target vermilion snapper, the impact of the management measure would likely be minor. As the stock rebuilds, larger fish would become more available and gear effects would be reduced, because it would take less time to harvest legal-sized fish. However, increased abundances of fish could lead to increases in fishing effort, therefore diminishing the benefits to the physical environment.

Alternative 4 would establish an 11-inch TL minimum size limit and either a 2,250 pound (**Alternative 4B**) or 2,300 (**Alternative 4A**) pound trip limit for vermilion snapper. These alternatives would reduce harvest by 25.8 to 26.3 percent. The individual effects of increasing the size limit and establishing a trip limit are discussed above.

Establishing a trip limit could benefit the physical environment by reducing the length of time spent fishing, which results in less gear related interactions with bottom habitat. The 2,250 pound trip limit might reduce fishing time slightly more than a 2,300 pound trip limit. The 11-inch TL size limit would not substantially increase fishing effort because the mean and median sizes of commercially harvested vermilion snapper are greater than 12 inches (Chih, 2003). Benefits to the physical environment from trip limits could be reduced if commercial fishermen conduct more fishing trips or if effort is shifted to other reef fish species.

Alternative 5 would establish a quota for the commercial fishery of 0.989 mp. In recent years, the commercial sector has accounted for 79 percent of the annual harvest and has exceeded the proposed quota by as much as 37 percent. If the quota is exceeded, the fishery would be closed for some period of time during the fishing year. This closure would directly benefit the physical environment by reducing fishing effort and fishing-related interactions with bottom structure. Benefits to the physical environment are expected to be minor since vermilion snapper are not heavily targeted in the commercial reef fish fishery. Other species that co-occur with vermilion snapper could be harvested once the vermilion snapper quota is reached. Therefore, impacts to vermilion snapper habitat would occur, regardless of whether or not vermilion snapper were allowed to be harvested.

Alternative 6 would establish a closed season for vermilion snapper during August, September, and December. A closure would benefit the physical environment by reducing fishing effort and the number of fishing trips targeting vermilion snapper. If fishing effort shifts to before or after the closure, then the benefits to the physical environment could be diminished.

Preferred Alternative 7 would increase the minimum size to 11 inches TL and establish a closed season from April 22 through May 31 and reduce harvest by 26.3 percent. As with Alternative 4, the 11-inch TL size limit would not substantially increase fishing effort (i.e. time spent fishing or targeting vermilion snapper) because the mean and median sizes of commercially harvested vermilion snapper are greater than 12 inches. A closure might benefit the physical environment by reducing the small proportion of fishing effort directed specifically at vermilion snapper; however, the closure is short (40 days) and some of this directed effort may shift to the open season.

The indirect effects of **Alternative 1-7** are not expected to be significant. For the reasons stated above, hook-and-line and longline gear are believed to have a minor effect on both the benthic habitat and the water column, and other gears account for a very small percentage of the harvest. Additionally, as stated in Section 8.2.1 vermilion snapper are the least desirable of the two northern Gulf snapper species, and any changes in the harvest of vermilion snapper brought about by **Alternatives 1-7** should not affect the conduct of the red snapper fishery or other fisheries, such as grouper or coastal pelagics.

8.3.3.2 Direct and indirect effects on biological/ecological environment and their significance

Alternative 1 (status quo) would maintain existing commercial regulations for vermilion snapper, which include a 10-inch TL size limit and a federal reef fish permit for sale of reef fish. If these regulations remain unchanged, the status of the stock would continue to decline and cause negative impacts to the biological and ecological environment. The effects of over exploiting the stock are discussed in detail in Section 8.3.2.1. Stock abundance would decline, the size and age structure of the stock would be reduced and truncated, the genetic health of the stock would be effected, and the geographic range of the stock would be reduced.

Maintaining current regulations would negatively affect bycatch. In the short-term, bycatch would likely be lower than management alternatives that increase the minimum size limit. However, over time, as the stock declines in abundance, bycatch levels would increase because fewer legal-sized fish would be available for harvest. In the long-term, the stock would be depleted and fish would become less available for harvest, therefore reducing bycatch.

Alternative 2 would establish a 1,625-pound trip limit for vermilion snapper. This alternative is expected to reduce harvest by 25.2 percent. In the short term, trip limits would reduce fishing effort, thus reducing the number of fish harvested. Reducing the number of harvested fish would benefit the biological and ecological environment by reducing fishing mortality and allowing more fish to survive to older ages and sizes. Over time as the stock rebuilds, trip limits would have a biological benefit because more legal-sized fish would not be harvested. These benefits would likely be diminished if trip limits increase the frequency of trips targeting vermilion snapper.

Alternative 2 would be expected to decrease bycatch on trips targeting vermilion snapper. Once a trip limit is reached fishermen would stop harvesting vermilion snapper. However, since most trips do not target vermilion snapper, bycatch would likely not change if trip limits are met because fishermen would continue targeting other reef fish species that occupy similar habitats as vermilion snapper. Any vermilion snapper caught while targeting other reef fish species would then be released. Because few trips (8 percent) harvested more than 1,625 pounds of vermilion snapper per trip in 2000-2001, only minor increases in bycatch would be expected.

Alternative 3 would establish a 12-inch TL minimum size limit that would reduce harvest by about 27 percent. Size limits are intended to protect immature fish from harvest and must balance the benefits of harvesting larger fish with losses due to natural mortality. The benefits of establishing a larger size limit are two-fold in that larger size limits increase the average size of fish harvested and allow more fish to survive to older ages and larger sizes.

More than 90 percent of female vermilion snapper are mature by one year of age and 200 mm TL (7.9 inches; Hood and Johnson, 1999). One hundred percent of female GOM vermilion snapper are mature by 325 mm TL (12.8 inches). The current 10-inch TL size limit is well above the size at maturity. Increasing the size limit to 12 inches TL would further protect immature fish that have yet to mature and would allow more fish to spawn prior to harvest. A 12-inch TL size limit would also increase survival and improve both the size and age structure of the stock. Because fecundity increases exponentially with size, larger vermilion snapper are capable of producing more eggs. By increasing the minimum size limit the spawning capacity of the stock would also likely increase.

Increasing the size limit would negatively affect bycatch. Fewer fish are available at larger sizes and more fish would be released for each legal-sized fish caught. As the stock rebuilds, bycatch would potentially be reduced because more larger fish would be available for harvest. However, the level of bycatch would still be greater than that observed for lower size limits, regardless of stock size. The proposed size limit alternatives take into account mortality of released fish associated with increasing the size limit (see Table 4.2.3.1.4). Although minimum size limits would negatively effect bycatch, the increase in stock abundance would exceed losses associated with bycatch.

Alternative 4 would establish an 11-inch TL size limit and either a 2,300 pound (**Alternative 4A**) or 2,250 pound trip limit (**Alternative 4B**). This alternative would reduce harvest by 25.8 or

26.3 percent. An 11-inch TL minimum size limit would likely have only minimal benefits to the biological and ecological environment, since the average size of vermilion snapper currently harvested commercially is greater than 12-inches. Similar to Alternative 3, a larger size limit could allow more mature fish to survive and reach larger sizes. This would likely increase the size and age structure of the stock and allow more fish to spawn before becoming susceptible to harvest.

The trip limits are larger than those proposed for Alternative 3 and would affect a smaller portion of commercial trips. The 2,250 pound trip limit combined with the 11-inch TL minimum size limit is the most conservative option for Alternative 4 and would result in the greatest reduction in harvest. A lower trip limit would further reduce fishing effort and harvest, unless commercial fishermen take more trips to make up for lower trip limits.

Alternative 4 would negatively affect bycatch. As discussed above, size limits will result in more vermilion snapper being released. As the stock rebuilds, bycatch would be reduced because more legal-sized fish would be available for harvest. However, bycatch would still be higher than current levels, regardless of stock size. Trip limits would also increase bycatch if fishermen continued fishing for other reef fish species that co-occur with vermilion snapper after a vermilion snapper trip limit is reached.

Alternative 5 would establish a commercial quota of 0.989 mp. The quota would likely have a significant benefit to the biological and ecological environment, because commercial landings often exceed the proposed commercial quota. Currently the commercial fishery accounts for 79 percent of the harvest, but quotas for the recreational and commercial vermilion snapper fisheries are based on those specified in Amendment 1 (67 percent commercial / 33 percent recreational). In the short-term, this alternative would benefit the stock by reducing commercial landings. The large reduction in harvest would allow more fish to survive and grow to larger sizes and ages. Over time, as the stock rebuilds, this alternative would continue to benefit vermilion snapper by closing the fishery when the quota is reached.

This alternative would have a negative effect on bycatch, because the quota would likely be met. Since vermilion snapper are a secondary species harvested on most fishing trips, bycatch levels would increase because fishermen would continue to target other reef fish species during the closure that co-occur with vermilion snapper. Increases in bycatch levels would be dependent on the duration of the post-quota closure and whether fishermen continued targeting reef fish species that co-occur with vermilion snapper during the closure.

Alternative 6 establishes a closed season. This alternative would close the commercial fishery for three months and would reduce harvest by 24.8 percent. Vermilion snapper spawn in the Gulf from May through September, with peak spawning occurring in July and August (Hood and Johnson, 1999). Closing the fishery during August and September would protect vermilion snapper from harvest at the end of the spawning season. A fall closure would also reduce directed fishing effort for vermilion snapper and would not overlap with the opening of the red snapper fishery at the first of October. The benefits of the closure could be diminished if effort is shifted and vessels target vermilion snapper more frequently before or after the closed season.

This alternative would negatively affect bycatch. Vermilion snapper are caught as a secondary species on most fishing trips that target other reef fish species, such as red snapper. During the closure fishermen would continue to target other reef fish species. Therefore, any vermilion snapper caught while fishing for other reef fish species would be discarded during the closure. For the few trips that target vermilion snapper, bycatch during the closure would be reduced, unless these fishermen choose to target other reef fish species during the closure that co-occur with vermilion snapper.

Indirect effects of these alternatives on the biological and ecological environment are not well understood. Reductions in harvest and increases in stock abundance could lead to changes in the abundance of other reef fish species that compete with vermilion snapper for shelter and food. Predators of vermilion snapper could increase if the abundance of vermilion snapper is increased, while species competing for similar resources as vermilion snapper could potentially decrease in abundance if less food and/or shelter is available. Reef fish species that are currently considered less desirable for harvest could also become more heavily exploited if more restrictive management regulations are established for vermilion snapper. However, because vermilion snapper are rarely targeted during commercial fishing trips, the indirect effects of shifting fishing effort to other species are likely minor.

Preferred Alternative 7 would increase the minimum size to 11 inches TL and establish a closed season from April 22 through May 31 and reduce harvest by 26.3 percent. An 11-inch TL minimum size limit would likely have only minimal benefits to the biological and ecological environment, since the average size of vermilion snapper currently harvested commercially is greater than 12-inches. Similar to Alternative 3, a larger size limit could allow more mature fish to survive and reach larger sizes. This would likely increase the size and age structure of the stock and allow more fish to spawn before becoming susceptible to harvest. Closing the fishery during part of April and all of May would protect vermilion snapper at the beginning of the spawning season. A spring closure would also reduce directed fishing effort for vermilion snapper and would only overlap with the opening of the red snapper fishery during the first 10 days of May. The benefits of such a short closure could be significantly diminished if effort is shifted and vessels target vermilion snapper more frequently before or after the closed season.

8.3.3.3 Direct and indirect effects on social and economic environment and their significance

The social and economic effects of the various commercial harvest reduction alternatives are discussed in Section 5.5.2.6. **Alternative 1** maintains status quo and the vermilion snapper stock would decline in abundance. Declining harvest levels would adversely affect economic benefits. Total economic benefits (net revenues) are projected to decline throughout the rebuilding period (see Section 5.5.2.6). If no management measures are implemented, the commercial vermilion snapper fishery can generate total economic benefits of $68.64 million dollars during the next 10 years. Although the fishery is projected to still exist in10 years if no management actions are adopted, economic benefits would decline over this time period from $40.73 million dollars in 2004-2008 to $27.92 million dollars in 2009-2013.

All Alternatives are expected to result in economic losses in the short-term and all except Alternative 3 are expected to result in positive economic benefits in the long-term. Total economic benefits would initially decline (years 2004-2008), but would increase over time as the stock rebuilds. In the long-term, each of the harvest reduction alternatives would provide economic benefits that exceed those of the status quo by 0.51 to 3.42 million dollars except Alternative 3 which has a net loss of 1.1 million dollars (Table 5.12).

Alternative 2 would establish a 1,625-pound trip limit. Changes in vessel net revenues during the rebuilding period are projected to increase by 1.4 percent (0.956 million dollars) when compared to status quo. When compared to the other alternatives, economic benefits/costs associated with trip limits are intermediate to those of other alternatives. In the long-term,

Alternative 2 would result in greater economic benefits than Alternatives 3 and 4, but smaller economic benefits than Alternatives 5, 6 and 7. This alternative would have a small impact on vessels operating in the fishery. In 2000-2001, eight percent of trips landed more than 1,625 pounds of vermilion snapper.
Alternative 3 would establish a 12-inch TL minimum size limit for vermilion snapper. This is the only alternative that would result in economic losses during the rebuilding time period. In the short term and long term, Alternative 3 would result in the greatest negative economic effects (see Table 5.12). Economic losses in the long term would be 1.1 million dollars when compared to the status quo alternative.

Alternative 4 would establish an 11-inch TL minimum size limit and either a 2,300 pound trip limit (**Alternative 4A**) or a 2,250 pound trip limit (**Alternative 4B**) . During the rebuilding period, economic benefits would be 0.74 to 1.1 percent (0.51 to 0.75 million dollars) greater than those of status quo. This alternative would result in intermediate economic benefits when compared to the other alternatives. Economic benefits for Alternative 4 would be greater than those for Alternative 3, but less than those for the other alternatives. Few trips would be negatively impacted by the proposed trip limits; in 2000-2001, 5.4 percent of all trips landed more than 2,250 pounds of vermilion snapper.

Alternative 5 would establish a commercial quota of 0.989 mp. Economic benefits in the long-term would be 2.3 percent (1.57 million dollars) greater than economic benefits expected from the status quo alternative. Long-term economic benefits from a quota are the second highest of any of the proposed alternatives. The benefits of a quota could be diminished or negated by the effects of derby fishing. However, because vermilion snapper are typically caught incidental to other reef fish species, derby fishing is unlikely to occur.

Alternative 6 would establish a three month closed season for vermilion snapper during August, September, and December. Vessel net revenues in the long-term would be 4.9 percent (3.38 million dollars) greater than those expected from the status quo alternative. In the short-term (5 years), economic impacts from a closed season are the smallest of any of the proposed alternatives. In the long term, closures would provide the greatest long-term economic benefits of any of the alternatives.

Preferred Alternative 7 establishes an 11-inch TL minimum size and a 40-day seasonal closure from April 22 through May 31. The short-term economic cost of Alternative 7 is 3.4 percent, the same as for Alternative 5 (quota) and Alternative 4 (size and trip limits), but worse than most others. Over the long-term, however, Alternative 7 is similar to or outperforms all but Alternative 6 (closed seasons) with a 2.1 percent (1.47 million dollar) gain. The commercial fishing representatives who recommended Alternative 7 over other closed seasons including Alternative 6 felt that a 40 day closure would not significantly harm their markets but that longer closures such as Alternative 6 (61 consecutive days in August and September plus 31 days in December) would affect product value by reducing access to markets once the season re-opened. The model used to develop the economic effects of the commercial harvest reduction alternatives in the RIR (Section 5) does not take into account the potential negative aspects of lost markets during a closed season because there are no data to quantify such effects.

All the alternatives would have indirect effects on ancillary industries and fishing communities associated with the vermilion snapper fishery. In the short-term economic conditions would worsen. Associated industries and fishing communities would likely be most indirectly effected by a 12-inch TL size limit increase, which has the greatest negative economic effects. In the long-term, harvest and revenues would increase (unless a 12-inch TL size limit is implemented) and would positively affect the social and economic structures of industries and fishing communities. Closed seasons and quotas would have the greatest indirect benefits in the long term because these alternatives result in the greatest increases in vessel net revenues during the rebuilding period. These long-term positive economic effects would enhance business opportunities of support industries.

8.3.3.4 Direct and indirect effects on administrative environment and their significance

Section 2 outlines the history of management of vermilion snapper in the GOM. The commercial harvest of vermilion snapper is regulated by a 10-inch TL minimum size limit and commercial fishermen must possess a Gulf reef fish permit to sell their catch. The purpose of the commercial harvest reduction alternatives detailed in Section 4.2.3.3 is to reduce harvest and rebuild the vermilion snapper stock. All of the alternatives would require administrators to make minor adjustments to the Reef Fish FMP. Adjustments based on Alternative 3 fall within the scope and capacity of the current management system and are not expected to significantly affect the administrative environment. Alternative 1 would continue to allow overfishing and the stock would remain overfished, thus resulting in further administrative actions to rebuild the fishery and bring the fishery into compliance with MSFCMA. Alternatives 2, 4, 5, 6 and 7 would likely have the greatest effects on the administrative environment. Trip limits and closed seasons are not currently part of the management program for vermilion snapper and would require administrators to carefully monitor fishing activities to determine compliance with regulations. Alternative 5 would require administrators to carefully monitor the commercial catch to determine compliance with a quota.

8.3.3.5 Mitigation measures

The process of rebuilding vermilion snapper is expected to have a significant negative short-term impact 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 the vermilion snapper fishery. The commercial harvest reduction alternatives have varying degrees of economic costs and administrative burdens. Some alternatives have short-term economic costs and administrative burdens, but would provide smaller and more delayed long-term benefits. Other alternatives have greater short-term effects, but provide more immediate long-term benefits. Therefore, it is impossible to mitigate these measures and managers must balance the costs and benefits when choosing a commercial management alternative.

8.4 Cumulative effects analysis

Principles of Cumulative Effects Analysis

Cumulative effects were evaluated in light of eight guiding principles promulgated by the Council on Environmental Quality in its 1997 handbook, <u>Considering Cumulative Effects Under the National Environmental Policy Act</u>. The handbook notes that although agencies routinely address direct and indirect effects of their proposed actions on the environment, analyzing cumulative effects is more challenging, mainly due to the difficulty in defining geographic (spatial) and time (temporal) boundaries. The eight principles are as follows:

1. Cumulative effects are caused by the aggregate of past, present, and reasonably foreseeable

future actions.

2. Cumulative effects are the total effect, including both direct and indirect effects, on a given resource, ecosystem, and human community of all actions taken, no matter who (federal, non-federal, or private) has taken the actions.

3. Cumulative effects need to be analyzed in terms of the specific resource, ecosystem, and human community being affected.

4. It is not practical to analyze the cumulative effects of an action on the universe; the list of environmental effects must focus on those that are truly meaningful.

5. Cumulative effects on a given resource, ecosystem, and human community are rarely aligned with political or administrative boundaries.

6. Cumulative effects may result from the accumulation of similar effects or the synergistic interaction of different effects.

7. Cumulative effects may last for many years beyond the life of the action that caused the effects.

8. Each affected resource, ecosystem, and human community must be analyzed in terms of its capacity to accommodate additional effects, based on its own time and space parameters.

The CEQ regulations (40 CFR 1508.7) define cumulative impacts 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." Past actions on vermilion snapper are summarized in Section 2.0 and are summarized here.

Actions that effect fishing such as bag limits, size limits, trip limits, and seasonal limits will have effects on how fishing is conducted, and so will likely have effects on the physical environment. Status determination criteria and rebuilding plan alternatives, because they are setting harvest goals, could affect fishing behavior if further regulations are needed. The Council is currently evaluating a red snapper IFQ system for the directed commercial red snapper fishery. This fishery also catches a large portion of vermilion snapper which are found in similar habitats as red snapper. If this system is implemented, commercial vessels may become more efficient in how they harvest red snapper because vessel operators will more flexibility in choosing when and where they fish (NRC, 1999). This increased efficiency could minimize the amount of gear used by the fishery and reduce the impacts on the bottom.

Cumulative effects of setting the various biological reference points and stock status determination criteria proposed in Section 4.1, and the rebuilding plan alternatives proposed in Section 4.2.2 should have a generally positive effect to the biological/ecological environment. This is because these measures call for an increase in the stock size to a level allowing a sustainable harvest. Management measures proposed in Section 4.2.3 should also provide a biological benefit to the stock in that they help to reduce F allowing the stock size to increase. However, bag, size, trip, and seasonal limits are likely to increase the number of regulatory discards from the fishery, particularly during the initial portion of the rebuilding period when these measures are the most restrictive. As summarized in Section 4.2.3, discard mortality of these regulatory discards occur.

Vermilion snapper are only one of a suite of species that fishermen catch in the reef fish complex. Even with bag, size, trip, and seasonal limits, fishermen are likely to continue fishing for other species even though any of the above limits may be exceeded for vermilion snapper. This will further exacerbate the degree of regulatory discards and associated mortality. While the effect of this mortality is difficult to predict, bycatch reporting methodologies being proposed in Amendment 22 to the Reef Fish FMP should help provide reliable information on any negative effects. Additionally, data collected through these reporting programs should provide information on other competitors, predators, and prey species of vermilion snapper. The models used to develop the harvest reduction alternatives take this increase in mortality associated with discards into account but more reliable information on release mortality by season and region will improve the results.

While not as severe as the shrimp bycatch mortality of juvenile red snapper, vermilion snapper are caught as bycatch of the shrimp fishery. Several amendments to the Shrimp FMP either have or are likely to be implemented that either will reduce the bycatch mortality or collect information on this bycatch. Amendment 9 to the Shrimp FMP implemented the use of bycatch reduction devices (BRDs) in shrimp trawls in the western Gulf of Mexico. Shrimp Amendment 10 extends the requirement of BRDs into the eastern Gulf of Mexico and has been approved. Recently implemented Shrimp Amendment 11 requires shrimp vessels fishing in the EEZ to have permits (considered the first step to effort limitation). The Council is also working on two additional amendments to the shrimp plan. Amendment 13 includes alternatives to better obtain bycatch and effort data. Amendment 14 contains alternatives for vessel monitoring systems (VMS) which could allow for closed areas, and effort reduction that could ultimately reduce bycatch.

Current management actions in the Reef Fish FMP, as summarized in Section 2, should allow the stock to rebuild. The ultimate stock size that it rebuilds to is dependent on the biology of vermilion snapper. The stock condition is currently considered uncertain as evidenced by the caution provided by the RFSAP about the limitations of the most recent stock assessment models (RFSAP, 2001). As the vermilion snapper stock is being rebuilt, the increase in the stock size may affect other stocks. Rebuilding plans are in effect for greater amberjack (Secretarial Amendment 2) and being put in place for red grouper (Secretarial Amendment 1) and red snapper (Amendment 22). Because red snapper, red grouper, greater amberjack, and to a certain extent, vermilion snapper are upper level predators preying primarily on fish, benthic invertebrates, and in some cases, squid (Moran, 1988; Nelson, 1988; Bullock and Smith,1991; Andalora and Pipitone, 1997), the degree of competition for food resources between these species may increase as stock abundance increases. In addition, vermilion snapper may begin to compete for habitat with red snapper and red grouper (primarily in the eastern Gulf of Mexico) as their respective stocks rebuild. Public testimony from hearings conducted to examine vermilion and red snapper management measures suggests that vermilion and red snapper may compete directly for resources as adults and that adult red snapper prey on juvenile vermilion snapper. To assess potential competition, complex models would need to be developed. Currently, one of the best models for the Gulf of Mexico that could address these issues is the Ecopath model being developed by FWRI and NMFS. The development of this model is in the early stages and at present, the precision of the model is low. Therefore, an analysis of these potential cumulative effects is not possible at this time.

Cumulative effects of the vermilion snapper fishery on the biological/ecological environment are derived from the interaction of the alternatives with existing and proposed regulations, and with the interaction of the alternatives with other fishing activities affecting the same environment. There are a number of existing and proposed regulations that facilitate rebuilding of vermilion snapper. For example, the current list of allowable gear is relatively selective, thus facilitating the management of reef fish independently of other fisheries. Additionally, the Council is putting together a ballot process that, if approved by a majority of fishing interests, would lead to the development of a red snapper IFQ system. By granting individual fishermen rights to a certain share of the quota, this system could reduce bycatch in the red snapper fishery which includes vermilion snapper, and facilitate the effort reductions in the red snapper fishery that are likely to be necessary. In sum, existing regulations offer the potential to make the chosen rebuilding plan alternative easier to achieve.

To the extent that a rebuilding strategy for vermilion snapper is successful, regulations undertaken in the short-run can result in improving fishing opportunities in the future and have a positive effect on the social and economic environment. If future benefits from rebuilding the vermilion snapper stock are large enough to offset negative impacts due to past and current actions, the compound effects of regulations would result in improving fishing participation in the vermilion snapper fishery. The potentially large pay-off in terms of potential future yield from the vermilion snapper fishery, offers a good chance that the net effect of past, present and future regulations affecting the vermilion snapper fishery would be positive.

If a constant catch regulatory regime is implemented, a rebuilding stock would only result in this sector exceeding its TAC by larger and larger amounts if further regulations are not put into effect. The ability of these regulations to control the harvest becomes more difficult toward the end of the rebuilding period as the stock biomass increases. But if such were the case, it would be better to just increase TAC over time as done by constant F rebuilding strategies. While the initial reductions in harvest required by this strategy would cause more restrictive regulatory measures to be implemented, these regulations can be relaxed as the stock begins to increase. It should be noted that under the status quo, the stock biomass and fishery harvest decline over time, bringing down with that decline corresponding reductions in benefits to the fishery and its support industries and communities.

Each of the harvest reduction alternatives would reduce harvest in the first few years of the rebuilding period, but would gradually raise TACs over time. Although the resulting TAC in later years is comparable to some of the peak historical landings in the fishery, those landing levels are expected not to be reached again if harvest reduction measures are not imposed. With the rebuilding alternatives, stock biomass would be brought up to a level that could sustain harvest at around historical peak landings.

Cumulative effects on the administrative environment should be minimal for the alternatives presented for biological reference points and rebuilding plans. Permits are currently issued to various fishermen, and commercial and recreational reef fish (including vermilion snapper) landings are monitored by NOAA Fisheries. However, the proposed harvest reduction actions in this amendment would require that NOAA Fisheries educate fishermen on the new rules, monitor landings to ensure the rebuilding paths are being followed (this includes bycatch reporting measures in place and those being proposed in Amendment 22), and assess the stock periodically to ensure that the appropriate stock status is being maintained. Should the proposed actions be implemented, the administrative environment could become more complex.

Overall, cumulative effects from the actions proposed in this amendment are dependent on future actions within the reef fish fishery, and to a certain extent, the shrimp fishery. The alternatives for biological reference points and rebuilding plans generally effect the physical, biological, ecological, and economic environments more than the social and administrative environments. While increasing the stock size is beneficial to the vermilion snapper stock and reef fish fishery, how this increase will affect interactions between the stock and other fish populations is highly speculative. Alternatives to reduce effort in the vermilion snapper fishery, while they positively effect the physical, biological, and ecological environments, would generally affect the economic, social, and administrative environments more than the other aspects of the fishery.

8.5 Unavoidable adverse effects

8.5.1 Biological reference points and status determination criteria alternatives

MSY, OY, MSST, and MFMT are intended to provide fishery managers with measures of a fishery's status and performance. As such, they provide guidance on how large the stock must be to sustain harvests over the long term. For overfished stocks such as vermilion snapper, these estimates have little short-term value in that the rebuilding strategies set the goals for attaining these levels of harvest and the harvest reduction measures dictate how the harvest will be reduced in order to achieve these goals.

The effects of the biological reference points and status determination criteria alternatives are primarily positive. These reference points and criteria provide managers with targets for rebuilding plans and evaluating the health and status of a stock. Unavoidable adverse effects to the socioeconomic environment could result if reference points or status criteria are overly conservative and result in forgone yield Unavoidable adverse effects could also result from insufficiently conservative parameters that allow a greater socioeconomic benefit from increased yields, but inadequately protect the stock from overexploitation.

8.5.2 Rebuilding scenario alternatives

All the rebuilding alternatives, other than status quo, have an overall positive effect on the stock because they increase stock size and should have a negligible effect on the physical environment. Short-term adverse effects are the result of unavoidable administrative, economic and possibly social interactions from initial reductions in harvest. These unavoidable adverse effects can be mitigated to some degree by the type of rebuilding scenario selected but cannot be eliminated. In the long term, effects to the socioeconomic environment become positive as the fishery is allowed to expand through controlled management measures. These effects are described in more detail in Section 8.2 and are incorporated here by reference.

8.5.3 Harvest reduction alternatives

All harvest reduction alternatives, except status quo, have unavoidable short-term adverse effects on the administrative, economic, and social structure of the reef fish fishery. These adverse effects can be mitigated to some degree by the type of rebuilding scenario and harvest reduction measure selected, but cannot be fully eliminated. In the long term, effects to the socioeconomic environment becomes positive (except for the 12-inch TL commercial size limit, Alternative 3) as the fishery is allowed to expand through controlled management measures. These effects are described in more detail in Section 8.3 and are incorporated here by reference.

8.6 Relationship between short-term uses and long-term productivity

For this analysis, short term is defined as the period during which the stock is being rebuilt, 2004-2013 or 2004-2010, and long term is defined as the time period after the stock has been rebuilt (after 2010 or 2013). Alternatives that establish vermilion snapper biological reference points and status determination criteria do not affect short- or long-term productivity of the vermilion snapper stock; they simply establish the criteria by which the stock will be determined to be overfished or undergoing overfishing. Periodic assessments will change these criteria, which may influence allowable harvest amounts.

Rebuilding alternatives for vermilion snapper affect the short-term productivity of the stock. The rebuilding alternative selected could improve the productivity of the stock slowly (e.g., Alternative 2) or quickly (e.g., Alternative 5) during the early phases of rebuilding. Plans that rebuild the fishery more quickly require more stringent harvest reductions and result in greater economic and social impacts. These are unavoidable tradeoffs in the early phases of rebuilding. Typically, larger reductions in the early phases of rebuilding result in the greatest economic gain over the time frame of the rebuilding program. A more detailed discussion of this issue is provided in Section 5.5.2 and is incorporated by reference. All the plans eventually produce the same stock abundance and productivity.

Harvest reduction alternatives do not alter stock productivity; rather they implement a particular rebuilding plan. The harvest reduction measure used may effect the amount of discards (minimum sizes, closed seasons or possibly bag limits) or may create some form of derby fishing (quotas or season closures). Release mortality rates and estimates of discards are accounted for when estimating harvest reductions from various management measures. Although harvest reduction measures do result in increase bycatch, increases in stock abundance from these measures are expected to exceed losses from bycatch.

8.7 Irreversible and irretrievable commitments of resources

Freeman (1992) defines irreversible commitments as “those that cannot be reversed, except perhaps in the long term.” These would include such instances where ore was removed from a mine or a species went extinct. Irretrievable commitments are “those that are lost for a period of time” such as when the right-of-way of a road running through a forest is lost from timber production.

Amendment 23 would not result in any irreversible or irretrievable commitments of resources. The purpose of the amendment is to set biological reference points and status determination criteria, establish a rebuilding scenario that is consistent with current fishery management standards and reduce harvests appropriately to implement the chosen rebuilding scenario. The results of the actions proposed in this amendment should actually increase the fishery resources in the Gulf without significant adverse effects on other Gulf resources.

8.8 Any other disclosures

CEQ guidance on environmental consequences (40 CFR §1502.16) indicate that 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, f, and h are addressed in Sections 4, 5, 8.1, 8.2, and 8.3. The other elements are not applicable to the actions taken in this document. Because this amendment concerns the management of a marine fish stock, it is not in conflict with the objectives of federal, regional, state, or local land use plans, policies, and controls (Item f). However, it should be noted that the goals of this amendment are to rebuild the Gulf vermilion snapper stock. These are goals that the federal government shares with regional and state management agencies (see Section 7.4).

Because this amendment addresses biological reference points and status determination criteria, rebuilding scenarios and harvest reductions, the energy requirements and conservation potential of various alternatives and mitigation measures (Item e) are not a major factor. It is possible that as the stock size increases and effort to harvest TAC decreases, fishermen will require less fuel to pursue their fishery. It is also possible that they will shift their effort towards groupers or red snapper as those stocks increase in abundance and expand. Some of this, however, would require changes in current law. Therefore, any fuel savings derived from rebuilding the vermilion snapper resource may be lost.

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 it's fishery, and should not affect land-based, urban environments.

8.9 Bycatch practicability analysis

8.9.1 Background and summary

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

NOAA Fisheries outlines at 50 CFR 600.350(d)(3)(I) ten factors that should be considered in determining whether a management measure minimizes bycatch or bycatch mortality to the extent practicable. 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; and
10. Social effects.

Vermilion snapper are generally harvested as a secondary species on trips targeting other reef fishes, such as red snapper (Schirripa, 1996). The directed recreational and commercial vermilion snapper fisheries are prosecuted primarily with vertical-line gear, with longlines, traps and trawls accounting for less than one percent of the annual commercial harvest.

Currently the fishery is managed with a 10-inch TL minimum size limit that was implemented in January 1998. A 20-fish aggregate reef fish bag limit also applies for the recreational fishery. Commercial fishermen must possess a federal reef fish permit in order to sell reef fish. Charter boats and headboats must possess a for-hire permit to harvest reef fish in the GOM.

8.9.2 Extent and composition of bycatch in the directed vermilion snapper fishery

8.9.2.1 Finfish bycatch

8.9.2.1.1 Commercial fishery

An observer program was initiated in 1993 to quantify and document release mortality and bycatch levels aboard commercial reef fish vessels (Scott-Denton, 1995). The observer program began in December 1993 and ended in July 1995. Thirteen trips were made aboard fish trap vessels, 12 aboard long-line vessels, and 16 trips aboard bandit rig vessels. Nine of the 16 trips made aboard bandit rig vessels were targeting red grouper and vermilion snapper off the western coast of Florida. Data collected on fish trap trips indicated that red grouper, lane snapper, and white grunts comprised the majority (62.5 percent) of the catch. Vermilion snapper only comprised 0.8 percent of the catch. A total of 148 vermilion snapper were caught; 34 were kept, 33 were released alive, and 88 were used as bait. It is unknown whether fish kept as bait were legal-sized, undersized, or already dead. During longline trips, vermilion snapper comprised even less of the total catch, accounting for only 0.1 percent. Red grouper were the most commonly caught species representing 59 percent of the catch. A total of seven vermilion snapper were caught; one was kept and six were used as bait. On bandit-rig trips off Florida, vermilion snapper were the most commonly caught species, accounting for 42.5 percent of the catch (in numbers). Of the 1,195 vermilion snapper caught, 868 were kept (72.6 percent), 239 were released alive (20 percent), and 88 were used as bait (7.3 percent). During the seven bandit-rig trips off Louisiana, vermilion snapper were the third most commonly caught species. Red snapper accounted for 85.7 percent of the total catch, gray triggerfish accounted for 4.0 percent of the catch, and vermilion snapper accounted for 3.8 percent of the total catch. Of the 27 vermilion snapper caught, 25 were kept (92.5 percent), one was released alive (3.7 percent) and the status of one fish was unknown (3.7 percent).

A similar observer study of bycatch from bandit rig vessels was conducted by Russell Research Associates, Inc. off Louisiana in 1995. A total of 607 fish were caught. Red snapper were the most commonly caught (60.9 percent, n = 376) and vermilion snapper were the second most frequently caught (20.3 percent, n = 123). Of the 123 vermilion snapper caught, 122 were kept and one was used as bait.

Data was collected by the Coastal Fisheries Logbook Program (CFLP) discard supplement between August 1, 2001 and July 31, 2003. The CFLP is intended to collect information on the type and amount of discards from vessels possessing a GOM reef fish, South Atlantic snapper-grouper, king mackerel, Spanish mackerel, or shark permit (Poffenberger[4]). A 20 percent sample of all vessels was selected to report for each year (either 8/1/01 - 7/31/02 or 8/1/02 - 7/31/03). Data from the CFLP indicates that vermilion snapper were the third most commonly discarded species in the GOM reef fish fishery during this survey period. Only red snapper and red grouper were discarded more often between August 1, 2001 and July 31, 2003. During this time period a total of 15,512 vermilion snapper were discarded (less than two percent of the total annual commercial harvest). Sixty-eight percent of discards (n = 10,614 fish) were from handlines and 1.3 percent were from longlines (n = 215 fish). Another 30.1 percent of the discards were caught with fish traps (n= 4,683 fish), which are scheduled to be phased out in the GOM by February 2007. Approximately two percent of all vermilion snapper discarded were "dead", 21.4 percent were classified as a "majority of the fish were dead", 29.4 percent were "all discarded alive", 41.7 percent were classified as "a majority of the fish were alive", five percent were "kept and not sold", and zero percent were reported as "unknown". Ninety-five percent (n = 14,742) of the vermilion snapper were regulatory discards (most likely undersized fish). Only two vermilion snapper were discarded because of market conditions. Reasons for discarding vermilion snapper were not reported for 768 fish (5 percent of the observed discards). On average, 65.9 vermilion snapper were discarded during each handline trip, 107.5 during each longline trip, and 104.1 during each fish trap trip.

8.9.2.1.2 Recreational fishery

The MRFSS estimates the number of fish caught and released by recreational anglers. During the late 1980s and early 1990s, vermilion snapper release rates from charter and private boats fluctuated between 3 percent and 15 percent of the annual catch. During the mid-1990s, release rates increased, peaking in 1993 at 32 percent (344,957 releases). Release rates have declined since that time. Between 1997 and 2000, release rates fluctuated between 11 and 14 percent of the annual catch (24,746-65,673 releases; NMFS, 2004). In 2002, an estimated 80,736 vermilion snapper were released alive in the GOM (NMFS, 2004). Release rates do not appear to be related to implementation of larger size limits; in January 1998, the size limit for vermilion snapper was increased from 8 to 10 inches TL, yet release rates remained fairly constant between 1997 and 2000 (Table 10, Porch and Cass-Calay, 2001). .

8.9.2.2 Finfish bycatch mortality

Section 4.2.3.1 summarizes vermilion snapper release mortality studies. Estimates of release mortality have ranged from 15 to 40 percent. The RFSAP recommended using 20 percent release mortality for the recreational fishery and 33 percent release mortality for the commercial fishery. Release mortality is assumed to be higher for the commercial fishery, because it generally harvests fish in deeper water. The Council later adopted these release mortality estimates as the best available scientific information.

At least one study has indicated that release mortality may be reduced by deflating the air bladder of vermilion snapper (Collins et al., 1999). Although differences were not significantly different, survival of fish with deflated air bladders was slightly higher than those without deflated air bladders (90-95 percent survival vs. 82 percent survival). Several studies have also suggested that ascent speed may be important (Fable, 1995; Collins et al., 1999). Slowing the speed of ascent would potentially reduce fish stress and may increase the long term survival of fish (Fable, 1995)**.**

8.9.2.3 Other bycatch

Little is known about the impact of the directed vermilion snapper fishery on non-finfish species. Those species potentially affected by the fishery are described in Section 7.2, and include a number of marine mammals, sea turtles, and seabirds.

Under Section 118 of the Marine Mammal Protection Act (MMPA), NOAA Fisheries must publish, at least annually, a List of Fisheries that places all U.S. commercial fisheries into one of three categories based on the level of incidental serious injury and mortality of marine mammals that occur in each fishery. The final rule for the 2003 List of Fisheries classifies the GOM reef fish bottom longline/hook-and-line fisheries as Category III fisheries. This classification indicates that the annual mortality and serious injury of a marine mammal stock resulting from each fishery is less than or equal to one percent of the maximum number of marine mammals, 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 [68 FR 41725].

Sea turtles can be captured with handline and bottom longline gear. However, the frequency with which such interactions occur in the directed vermilion snapper fishery is likely minimal. Poffenberger[4] reviewed supplementary discard data from the reef fish fishery for two survey years (8/1/2001-7/31/2002 and 8/1/2002-7/31/2003) and found there were a total of 16 reported interactions with turtles. These interactions were reported for 14 out of 2,681 (0.5 percent) trips reporting discards during the two survey years in the GOM. Five of the trips were with bottom longline gear and nine were with handline (vertical) gear. Only three of the turtles were identified by species. The reported species were two loggerhead turtles and one green turtle. The fate of the turtles was not reported. There is no evidence that the directed vermilion snapper fishery is adversely affecting seabirds.

8.9.3 Practicability of management measures in the directed vermilion snapper fishery relative to their impact on bycatch and bycatch mortality

The directed fishery accounts for a majority of the annual vermilion snapper harvest (~60 percent by number from 1990-1999) and approximately 4 to 22 percent of the annual bycatch. In 1999, the first full-year after implementation of shrimp trawl bycatch reduction devices (BRDs), bycatch from the directed fishery was approximately 20 percent of the total harvest. In comparison, shrimp trawl bycatch accounted for 90 percent (by number) of the red snapper harvest and 99.7 percent of the annual red snapper bycatch prior to the implementation of BRDs (see Amendment 22 to Reef Fish FMP).

The studies and data summarized above suggest that vermilion snapper are one of the most frequently discarded species in the GOM commercial reef fish fishery. Vermilion snapper were primarily discarded because of regulations. The fishery is currently regulated by a 20-reef fish aggregate bag limit (recreational only) and a 10-inch TL minimum size limit (commercial and recreational), therefore, most discards likely result from catches smaller than the minimum size limit.

Minimum size limits have long been used to maximize yield of fish recruiting to the fishery and to protect immature fish. Size limits must balance the benefits of harvesting fish at larger sizes against losses due to natural and discard mortality. Schirripa (1996) concluded that yield per recruit in the vermilion snapper fishery would be maximized at a minimum size of 10-inches TL, based on assumed release mortality rates of 25 and 33 percent and a natural mortality rate of 0.25.

The current minimum size limit (10-inches TL) adequately protects immature fish and is above the size at sexual maturity. Male vermilion snapper are sexually mature by 8 inches TL (~200 mm) and 90 percent of female vermilion snapper are sexually mature by 8-inches TL (200 mm; Hood and Johnson, 1999).

The 20-reef fish aggregate bag limit is intended to prevent large recreational catches of reef fish species. This bag limit appears to have no or little effect on bycatch because recreational anglers typically harvest only a few vermilion snapper per trip (see Section 4.2.3.1).

Federal reef fish permits for the commercial fishery and for-hire permits for charter boats and headboats both limit effort. Moratoria are currently in place for both of these permits and are set to expire in late 2005. These permits reduce bycatch by limiting the amount of directed fishing effort in the GOM reef fish fishery.

8.9.4 Alternatives to minimize bycatch

Amendment 18 to the Reef Fish FMP will evaluate additional measures designed to further reduce bycatch and bycatch mortality in the directed reef fish fishery. Bycatch reduction measures that will potentially be considered in Amendment 18 include seasonal closures, the use of circle hooks, reduction or elimination of minimum sizes, and educating fishing participants on how to reduce bycatch and bycatch mortality.

Additionally, the initial referendum for the GOM red snapper Individual Fishing Quota (IFQ) program passed by a majority vote. In March 2004, the Council voted to proceed with development of a red snapper IFQ plan amendment. Such a program, if approved and implemented, has the potential to substantially reduce bycatch by providing fishermen more flexibility to decide where and when to fish. This IFQ program ultimately has ramifications for vermilion snapper, which co-occur with red snapper and are caught as secondary species on trips targeting red snapper.

Management measures being proposed or already implemented for the shrimp trawl fishery could further reduce the indirect bycatch of vermilion snapper. Management measures include BRD requirements for trawls in the eastern GOM (Shrimp FMP Amendment 10), vessel permit requirements for shrimp vessels operating in the GOM (Shrimp FMP Amendment 11), and options to reduce shrimp effort (e.g. limited entry program, area and seasonal closures; Shrimp FMP Amendment 14). Further bycatch reduction might be achieved through attrition. Increasing fuel prices and competition from imported shrimp have made the domestic wild shrimp fleet less profitable in recent years and could reduce the size of the fleet.

The following section provides an analysis of the potential effects and practicability of reducing bycatch and bycatch mortality in the vermilion snapper fishery based on the ten factors provided at 50 CFR 600.350(d)(3)(I). This analysis takes into account the status of the stock, and the impacts that bycatch from the directed fishery have on that stock. The intent of this analysis is to determine if existing management measures (10-inch TL size limit, 20-fish aggregate bag limit and federal permits) minimize bycatch to the fullest extent practical.

8.9.4.1 Population effects for the bycatch species

Reductions in bycatch can benefit fish stocks if survival of fish is increased (i.e. bycatch mortality is reduced). Bycatch reduction measures can also be detrimental to fish stocks if they increase directed fishing mortality and do not adequately protect the fish stock from harvest (e.g. smaller size limits reduce bycatch, but may not adequately protect immature fish). Therefore, management measures must balance the benefits of reducing bycatch with the potential effects on the status of the stock.

The 10-inch TL minimum size limit was implemented in 1998 (Amendment 15 to the Reef Fish FMP). At that time, fishing mortality was at a level that would have resulted in an overfished stock if it was not reduced. Commercial and recreational length-frequencies indicated that a 2-inch increase to the size limit (from 8 to 10 inches TL) would increase yield-per-recruit (YPR) and reduce fishing mortality (Schirripa, 1996). Increasing the minimum size limit also protected immature fish from harvest, but resulted in increased levels of vermilion snapper bycatch and release mortality. Losses in yield associated with increased bycatch and release mortality were accounted for when developing management measures (Schirripa, 1996) and were determined to be less than the associated benefits resulting from increased stock abundance.

Currently, the vermilion snapper stock is overfished and undergoing overfishing. Maintaining existing regulations or implementing additional regulations to reduce bycatch would prevent the stock from being rebuilt and achieving optimum yield (National Standard 1, 50 CFR 600.310). Implementation of bycatch reduction measures would likely increase fishing mortality and harvest of vermilion snapper, resulting in negative effects to the biological and socioeconomic environments (see Section 8.3). Management measures proposed in Section 4.2.3 all increase vermilion snapper bycatch. Increases in stock abundance from these management measures are all expected to exceed losses associated with increasing bycatch. The benefits of these management measures for the vermilion snapper stock are discussed in section 8.3.

Because few trips target vermilion snapper directly, measures to reduce bycatch would likely have a minor effect on other reef fishes. Red snapper and red grouper are commonly caught as bycatch when targeting vermilion snapper. Both species are undergoing overfishing and red snapper is overfished. Recent assessments of these species have included release mortality when determining stock status (Schirripa and Legault, 1998; SEFSC, 2002). Bycatch from the vermilion snapper fishery would not significantly affect the status of red snapper because the shrimp trawl fishery accounts for 90 percent of the annual harvest and greater than 99 percent of the annual red snapper bycatch. Bycatch mortality would affect overall mortality in the red grouper fishery. The recreational red grouper fishery releases 80-90 percent of their annual catch (estimated 10 percent release mortality), while commercial release mortality is estimated to be 33 to 90 percent, depending on the gear used (SEFSC, 2002). However, because few trips target vermilion snapper, any measures implemented to reduce bycatch in the vermilion snapper fishery would not have a major effect on red grouper.

Gag and gray triggerfish are also commonly caught in the GOM reef fish fishery. The current level of bycatch in the GOM reef fish fishery (which includes vermilion snapper) does not appear to threaten the sustainability of these fisheries, however, discards do contribute to the overall mortality of these fisheries. For instance, release mortality rates for gag are estimated to be 20 percent for the recreational fishery and 30 percent for the commercial fishery (Turner et al., 2001).

8.9.4.2 Ecological effects due to changes in the bycatch of vermilion snapper (effects on other species in the ecosystem)

Changes in bycatch of vermilion snapper are not likely to affect other species in the ecosystem. Vermilion snapper are effective live bait for amberjack, grouper and other large predators, but those species do not typically rely on discards for food, unlike many marine mammals and birds (see Section 8.9.4.4). Discards of vermilion snapper are primarily due to regulations. Reductions in discards could result in increased predation on gelatinous zooplankton, larval fishes, cephalopods, and polycheates, which vermilion snapper are known to prey upon (Grimes, 1979; Nelson, 1988). Increases in larval fish predation would not likely affect other reef fish stocks, since most larval fish do not survive until adulthood. However, predation on zooplankton, cephlapods, and polycheates may have ecosystem effects if other fish species with similar diets compete with vermilion snapper for food. Consequently, forage species and competitor species could decrease in abundance in response to an increase in abundance of vermilion snapper, resulting from a reduction in discards.

8.9.4.3 Changes in the bycatch of other species of fish and the resulting population and ecosystem effects

The relationships among species in marine ecosystems are complex and poorly understood, making it difficult to predict the ecosystem effects resulting from changes in bycatch. Vermilion snapper supports a fairly small fishery when compared to other reef fish fisheries of the GOM. Red snapper, red grouper, and gag stocks support larger fisheries and all species are currently being managed to improve stock condition. All of these species co-occur with vermilion snapper and are commonly caught as bycatch. Reductions in bycatch of reef fishes could lead to increased predation on vermilion snapper. As mentioned above, vermilion snapper are commonly used as bait in the fishery, therefore the benefits of reducing bycatch of vermilion snapper may be negated by increased predation by other reef fish species. Reductions in bycatch could also have ecosystem effects on prey species, such as benthic organisms, zooplankton, and larval fishes, which are commonly preyed upon by snappers and groupers. The level of prey depletion has ecological consequences for fishes. For instance, localized depletion of prey could affect fish growth and survival, and fishes may be forced to move to other habitats to find food.

8.9.4.4 Effects on marine mammals and birds

Section 8.9.2.3 describes the annual report published by NOAA Fisheries that places all U.S. commercial fisheries into one of three categories based on the level of incidental serious injury and mortality of marine mammals that occurs in each fishery (Section 118, MMPA). The GOM reef fish fishery is considered a Category III fishery, meaning that the annual mortality or serious injury of marine mammal stocks resulting from the fishery is 1 percent or less of the maximum number of marine mammals (not including natural mortalities) that may be removed from the stock, while allowing it to reach or maintain its optimum sustainable population (68 FR41725).

Section 7.0 describes marine mammals and seabirds that are found in areas where the GOM reef fish fishery operates. Management measures indirectly affect these marine mammals and seabirds, especially those animals that have learned to feed behind fishing vessels. There is no information to determine how reduced discards might affect populations of these animals. However, disassociation with humans may be ecologically beneficial over the long term. A new Section 7 consultation will be conducted to further elucidate how reduced discards might affect populations of marine mammals and seabirds.

8.9.4.5 Changes in fishing, processing, disposal, and marketing costs

Management measures increase fixed and/or variable costs to fishermen. Fixed costs include renewal of permits required for the harvest and/or sale of reef fish, or the purchase of a permit from another fisherman to gain access to the fishery. The annual cost of renewing a commercial reef fish permit or charter/headboat permit is $50. Additional permits cost $20, if more than one permit is renewed. These permits are intended to limit effort in the reef fish fishery. Without these permits, bycatch would likely be greater because fishing effort and the number of vessels participating in the reef fish fishery would increase. The bycatch reduction achieved by these management measures could benefit fishermen by increasing levels of catch and reducing the amount of time spent fishing. Bycatch could be further minimized if effort is reduced further, but this would result in negative social and economic effects to fishermen restricted from participating in the fishery. During the next year, NOAA Fisheries will be developing amendments to evaluate management measures (e.g. extension of moratorium, limited entry criteria, etc.) for these reef fish permits.

Additional variable costs to fishermen include those fishing trip costs brought about by a management measure. As discussed in Section 8.9.3, the 20-fish aggregate bag limit has little or no effect on bycatch. Costs incurred by fishermen would not change if measures are implemented to reduce bycatch associated with the 20-fish aggregate bag limit.

The 10-inch TL minimum size limit increases costs to fishermen by increasing the amount of time they spend fishing for and sorting legal-sized fish. Both consumer surplus and the economic benefits associated with selling fish are reduced. However, the 10-inch TL minimum size limit is intended to maintain a sustainable fish stock by reducing fishing mortality. Although this management measure increases bycatch, the long-term economic benefits of maintaining a sustainable stock are much greater than reductions in economic benefits associated with this management measure. Lowering the minimum size limit would reduce bycatch and economic costs to fishermen in the short term, but would prevent the stock from rebuilding to sustainable levels. As a result, costs to fishermen would be increased in the long-term.

Since most fishing operations in the reef fish fishery are small, fishing costs borne by the vessels are rarely passed on to the dealers and processors. In such a case, processing costs are minimally affected by management measures imposed on the harvest sector of the vermilion fishery. Marketing costs, however, can be affected by regulations on the harvest sector of the vermilion snapper fishery. In general, for-hire vessel operators/owners spend money for marketing their fishing trips. A size limit or bag limit can render the fishing trip less desirable, and this may prompt some owner/operators to spend more money on marketing. On the commercial side, the vermilion snapper market is essentially a niche market for small snappers, with many dealers using a three- to four-tier pricing system depending on fish size. Any increase in size limit can eliminate some of the market size categories, and this could prompt dealers to incur additional costs in expanding the market for larger fish. A lower size limit can reduce bycatch and marketing costs, but then again, such a measure would prevent the stock from rebuilding to sustainable levels.

8.9.4.6 Changes in fishing practices and behavior of fishermen

Bycatch reduction measures would not likely affect fishing practices and the behavior of recreational fishermen because most anglers do not target vermilion snapper. Bycatch reduction measures could affect the behavior of commercial fishermen who target vermilion snapper. For instance, commercial fishermen could begin targeting fishing areas they previously avoided because of high levels of bycatch Because many vermilion snapper are caught on commercial trips targeting red snapper, the derby style in which the red snapper fishery operates could provide disincentive for fishermen to avoid bycatch hot spots and take greater care of bycatch species.

8.9.4.7 Changes in research, administration, enforcement costs, and management effectiveness

Current management measures have not significantly changed research, administrative, or enforcement costs in the fishery. The implementation of a mandatory discard reporting system for fishermen operating in the GOM reef fish fishery has placed a greater burden on fishermen. This program is intended to monitor the type and amount of marine resource discards encountered by commercial fishing vessels in the GOM. Bycatch reduction measures could potentially reduce the administrative costs associated with processing discard reports, since fewer fish would be caught and reported as bycatch. Additionally, MSFCMA requires that fishery management plans establish standardized methodology for assessing the amount and type of bycatch occurring in the fishery. Management measures for assessing bycatch are being considered in Amendment 22 to the Reef Fish FMP and may increase both administrative and economic costs.

Measures to reduce bycatch would increase administrative costs and management effectiveness. Depending on the type of bycatch measures adopted, their enforcement can range from being a simple addition to existing enforcement tasks to a possible significant redirection of resources to the newly adopted bycatch measures. Measures that reduce bycatch would all likely result in increased fishing mortality and fish harvest, preventing the stock from rebuilding and achieving optimal levels. This would prevent management from maintaining the vermilion snapper stock at sustainable levels and complying with the mandates of the MSFCMA.

8.9.4.8 Changes in the economic, social, or cultural value of fishing activities and nonconsumptive uses of fishery resources

Some people may view bycatch in the GOM reef fish fishery as wasteful, especially since release mortality rates for many reef fish species are high because they are harvested in fairly deep water. For these people, bycatch reduction measures could improve their perception of the reef fish fishery by increasing the importance and value of bycatch species. The economic, social, and cultural benefits of maintaining a healthy stock likely outweigh bycatch and economic losses endured by fishery participants.

8.9.4.9 Changes in the distribution of benefits and costs

Bycatch reduction measures would likely affect the distribution of benefits and costs. Release mortality is higher in the commercial fishery. Additionally, the commercial fishery accounts for a majority of the harvest. Because the vermilion snapper fishery is currently overfished and undergoing overfishing, recreational anglers likely believe that commercial fishermen should share a greater burden of the costs associated with rebuilding and sustaining the fishery.

Additionally, bycatch is greater in the commercial fishery than it is in the recreational fishery. Logbook data and observer studies (see Section 8.9.2.1.1) indicate that commercial fishermen release approximately 20-30 percent of vermilion snapper caught, whereas MRFSS data indicates that recreational anglers release 10-21 percent of their catch. Recreational anglers may believe that commercial fishermen should share a greater burden of the costs associated with bycatch reduction measures, because they account for a greater portion of release mortality. However, any changes in the distribution of costs can also be accompanied by similar changes in the distribution of benefits. For example, if a majority of the costs of rebuilding the stock are imposed on the commercial fishery, they could potentially share more of the benefits once regulations are relaxed and the commercial sector is allowed to harvest according to similar conditions that prevailed from 1990 to 2002 when this sector increased its relative share of the vermilion snapper harvest.

8.9.4.10 Social effects

The social effects of current management measures are not well understood. However, several studies are now under way in the Gulf to collect information on the various social and ethnographic characteristics of some of the fishing communities in the Gulf. These studies will be very helpful in providing better information regarding the social impacts of fishery management actions.

Fishermen who possess commercial or recreational permits likely experience positive effects associated with limited access to the fishery. Fishermen who do not possess a permit likely experience negative effects, because they are unable to harvest reef fish without a permit and cannot afford to purchase a transferable permit from another fisherman. The public is likely experiencing negative effects, knowing that current management measures have been unable to adequately protect the stock from overexploitation. Implementation of bycatch reduction measures would result in positive effects for people who view bycatch as wasteful. However, negative effects would be experienced by fishermen and supporting industries, because bycatch reduction measures would not adequately protect vermilion snapper from increased harvest and fishing mortality.

8.9.5 Conclusion

Measures that further minimize bycatch would result in negative effects to the vermilion snapper stock. Bycatch minimization measures would likely result in increased fishing mortality and harvest, preventing the stock from rebuilding. Because vermilion snapper constitute a small directed fishery, it is not expected that bycatch reduction measures would greatly affect other reef fish species caught as bycatch, such as red snapper. In fact, management measures intended to improve stock condition for other reef fish species likely will have much greater ecological effects. Current effects of bycatch on marine mammals and seabirds are minimal. Fishermen would likely benefit economically from bycatch reduction measures in the short-term, but in the long-term social and economic costs would be greater than if the stock was rebuilt and current levels of bycatch were maintained or even increased. Bycatch reduction measures would also compromise management effectiveness and may prevent managers from meeting the mandates of the MSFCMA.

The analysis of the practicability factors indicates that it is not practical to further minimize bycatch in the directed vermilion snapper fishery. The fishery is overfished and undergoing overfishing. The economic and social costs and benefits associated with management measures intended to sustain the stock outweigh the benefits of trying to further minimize bycatch. Although all of the proposed management measures in Section 4.0 would increase bycatch to varying degrees, increases in stock abundance would exceed losses resulting from bycatch, allowing the stock to rebuild to maximum yield.

Amendment 18 will further explore the practicability of management measures not considered in Amendment 23 for further reducing bycatch and bycatch mortality in the GOM reef fish fishery. Management measures to be considered include: 1) requiring circle hooks, 2) reducing or eliminating minimum size limits, 3) educating fishermen on ways to reduce bycatch and bycatch mortality, and 4) seasonal closures. Numerous management measures are also being considered for reducing bycatch in the shrimp fishery (see Section 8.9.3). These management measures would further minimize the bycatch of many reef fishes, including vermilion snapper.

9 OTHER APPLICABLE LAW

The MSFCMA (16 U.S.C. 1801 et seq.) provides the authority for U.S. fishery management. 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 within which those fisheries are conducted. Major laws affecting federal fishery management decision making are summarized below.

9.1 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, NOAA Fisheries 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 wait period from the time a final rule is published until it takes effect.

9.2 Coastal Zone Management Act

Section 307©)(1) of the Federal Coastal Zone Management Act of 1972, as amended, requires that 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, NOAA Fisheries is required to provide a consistency determination to the relevant state agency at least 90 days before taking final action.

The proposed changes in federal regulations governing vermilion snapper in the EEZ of the GOM will make no changes in federal regulations that are inconsistent with the objectives of either existing or proposed state regulations. While it is the goal of the Council to have complementary management measures with those of the states, federal and state administrative procedures vary, and regulatory changes are unlikely to be fully instituted at the same time.

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. This determination has been submitted to the responsible state agencies under Section 307 of the Coastal Zone Management Act administering approved Coastal Zone Management programs in the states of Alabama, Florida, Mississippi, Louisiana and Texas.

9.3 Data Quality Act

The Data Quality Act (DQA) (Public Law 106-443), which took effect October 1, 2002, requires the government for the first time 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 issue 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, properly reference all supporting materials and data, and should 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 performed. Note that the pre-dissemination review was preformed, is on the record, and available from the agency.

9.4 Endangered Species Act

The Endangered Species Act (ESA) of 1973 (16 U.S.C. Section 1531 et seq.) requires that federal agencies use their authorities to conserve endangered and threatened species and that they ensure actions they authorize, fund, or carry out are not likely to harm the continued existence of those species or the habitat designated to be critical to their survival and recovery. The ESA requires NOAA Fisheries, 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.

An April 28, 1989, biological opinion on the effects of commercial fishing activities in the Southeast Region found that mortalities of endangered and threatened species are uncommon from the hook-and-line and bottom longline gear used in the reef fish fishery and were not likely to jeopardize the continued existence of threatened or endangered species. Assessments of the level of take were not then considered a high priority. Informal Section 7 consultations have been conducted on the original Reef Fish FMP and for Amendments 1, 2, 3, 4, 5, 6, 7 ,8, 9, 11, 12, 13, 14, 15, 16A,16B, 17, 19 (Generic Tortugas Reserves Amendment), 20 (Reef fish, and associated regulatory amendments) and 21 (Madison-Swanson and Steamboat Lumps). They have also been conducted for the FMP's various regulatory amendments, including 21 regulatory amendments submitted from 1990 to 2001, and one Secretarial plan amendment. These consultations all concluded that the fishery management actions were either not likely to adversely affect any threatened or endangered species under NOAA Fisheries jurisdiction or had no effect. They also determined that FMP or amendment actions were not expected to change the prosecution of this fishery in a manner that will significantly alter the potential impacts to endangered and threatened species and their habitats previously considered. Amendments 10 and 18 are not included in the preceding list. A Section 7 consultation was initiated for

Amendment 10, but that Amendment was not submitted to NOAA Fisheries. Amendment 18 is currently under development and a Section 7 consultation will be requested at the appropriate time.

9.5 Executive Orders

9.5.1 E.O. 12612: Federalism

The Executive Order on Federalism requires agencies in formulating and implementing policies that have federalism implications, 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 that are 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 amendment given the overlapping authorities of NOAA Fisheries, the States, and local authorities in managing coastal resources, including fisheries, an 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 actions proposed in this amendment. Therefore, preparation of a Federalism assessment under Executive Order 12612 is not necessary.

9.5.2 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, NOAA Fisheries prepares a Regulatory Impact Review (RIR) for all fishery regulatory actions that either implement a new fishery management plan or significantly amend an existing plan. RIRs provide a comprehensive analysis of the costs and benefits to society associated with 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 is likely to result in an annual effect on the economy of at least $100,000,000 or has other major economic effects.

9.5.3 E.O. 12630: Takings

The Executive Order on Government Actions and Interference with Constitutionally Protected Property Rights, which became effective March 18, 1988, requires that 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. Management measures limiting fishing seasons, areas, quotas, fish size limits, and bag limits do not appear to have any taking implications. There is a takings implication if a fishing gear is prohibited, because fishermen who desire to leave a fishery might be unable to sell their investment, or if a fisherman is prohibited by federal action from exercising property rights granted by a state.

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

This Executive Order requires that federal agencies conduct their programs, policies and activities in a manner to ensure that 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 is a concern in fisheries management.

9.5.5 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 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 NOAA Fisheries and the U.S. Fish and Wildlife Service to develop a joint agency policy for administering the ESA.

9.5.6 E.O. 13084: Consultation and Coordination With Indian Tribal Governments

This Executive Order recognizes and reaffirms the U.S. governments responsibility for continued collaboration and consultation with tribal governments in the development of federal policies that have tribal implications. This Order relates to indigenous fishing.

9.5.7 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 that actions they authorize, fund or carry out 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).

9.5.8 E.O. 13158: Marine Protected Areas

Executive Order 13158 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. The broad definition of MPAs will include many sites in the U.S. EEZ as part of the National MPA System.

9.5.9 E.O. 13186: Responsibilities of Federal Agencies to Protect Migratory Birds

Executive Order 13186 directs each federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations to develop and implement a memorandum of understanding (MOU) with the (USFWS) to conserve those bird populations. The MOU will address actions taken by NOAA Fisheries that have, or are likely to have, a measurable negative effect on migratory bird populations. In the instance of unintentional take of migratory birds, NOAA Fisheries would develop and use principles, standards, and practices that will lessen the amount of unintentional take, developing any such conservation efforts in cooperation with the USFWS. Additionally, the MOU would ensure that NEPA analyses evaluate the effects of actions and agency plans on migratory birds, with emphasis on species of concern.

The required MOU is currently being developed, which will address the incidental take of migratory birds in commercial fisheries under the jurisdiction of NOAA Fisheries. NOAA Fisheries must monitor, report, and take steps to reduce the incidental take of seabirds that occurs in fishing operations. The United States has already developed the U.S. National Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries, and many potential MOU components are already being implemented under that plan. Development of the plan was a collaborative effort between NOAA Fisheries, USFWS, and the Department of State, carried out in large part by the Interagency Seabird Working Group consisting of representatives from those three agencies.

9.6 Marine Mammal Protection Act

The 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 NOAA Fisheries) 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 NOAA Fisheries 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.

The MMPA requires a commercial fisheries to be placed in one of three categories, based on the relative frequency of incidental serious injuries and mortalities of marine mammals in each fishery. Category I designates fisheries with frequent serious injuries and mortalities incidental to commercial fishing; Category II designates fisheries with occasional serious injuries and mortalities; Category III designates fisheries with a remote likelihood or no known serious injuries or mortalities. The GOM reef fish fishery (all gear types) is listed in Category III as there have been no documented interactions between this fishery and marine mammals (68 FR 41725). Because this amendment does not change current fishing practices, the proposed actions should have no effect on marine mammal populations.

9.7 National Environmental Policy Act

The National Environmental Policy Act (NEPA) requires all federal actions to be evaluated for potential environmental and human environment impacts, and for these impacts to be assessed and reported to the public. As it applies to the formulation of fishery management plans, the NEPA process should ensure that the potential environmental ramifications of actions determined necessary to manage a fishery are fully considered. Thus, proposed regulations that may set size or bag limits, limits on the number of permits or vessels, quotas, allowable gears, closed seasons or areas and any other measure is reviewed for its potential affect on the broader marine environment, in addition to its affect on the specific fishery being managed.

Councils initially conduct an Environmental Assessment (EA), which is a concise statement that determines whether the FMP (and subsequently any proposed amendment to the plan) will have a significant impact on the environment. If there is no potential significant impact, a “Finding of No Significant Impact,” or FONSI, is issued. In the case of the initial regulatory amendment to set a red snapper rebuilding plan through 2032, the Council submitted an EA. However, NOAA Fisheries determined that there were significant impacts and that an SEIS was needed. In this determination, the Council must consider the context and intensity of the SFA criteria and the rebuilding plan for both short and long term effects, impacts that may be beneficial or adverse, and effects on locality and society as a whole. Because NOAA Fisheries also determined that the red snapper SFA criteria and rebuilding plan need to be submitted as a plan amendment, a SEIS has been drafted concurrently with the plan amendment and lays out the proposed action(s), alternatives to the proposed action(s), and the environmental consequences for each alternative. The Draft SEIS will be sent to the EPA for a 45-day review period, and subsequently its availability is announced in the *Federal Register*. The public is afforded an opportunity to comment on it, generally concurrently with the public comment period for the plan amendment itself. The SEIS is submitted to the Secretary of Commerce along with the plan amendment for final approval.

9.8 Migratory Bird Treaty Act

Under the Migratory Bird Treaty Act (MBTA), it is unlawful to pursue, hunt, take, capture, kill, possess, trade, or transport any migratory bird, or any part, nest, or egg of a migratory bird, included in treaties between the United States and Great Britain, Mexico, Japan, or the former Union of Soviet Socialists Republics, except as permitted by regulations issued by the Department of the Interior. Violations of the MBTA carry criminal penalties; any equipment and means of transportation used in activities in violation of the MBTA may be seized by the United States government and, upon conviction, must be forfeited to it. To date, the MBTA has been applied to the territory of the United States and coastal waters extending three miles from shore. Furthermore, Executive Order 13186 (see Section 9.5.9) was issued in 2001, which directs federal agencies, including NOAA Fisheries, to take certain actions to further implement the MBTA.

9.9 National Marine Sanctuaries Act

Under the National Marine Sanctuaries Act (NMSA) (also known as Title III of the Marine Protection, Research and Sanctuaries Act of 1972), as amended, the Secretary of Commerce is authorized to designate National Marine Sanctuaries to protect distinctive natural and cultural resources whose protection and beneficial use requires comprehensive planning and management. The National Marine Sanctuary Program is administered by the Sanctuaries and Reserves Division of the NOAA. The Act provides authority for comprehensive and coordinated conservation and management of these marine areas. The National Marine Sanctuary Program currently comprises 13 sanctuaries around the country, including sites in American Samoa and Hawaii. These sites include significant coral reef and kelp forest habitats, and breeding and feeding grounds of whales, sea lions, sharks, and sea turtles. A complete listing of the current sanctuaries and information about their location, size, characteristics, and affected fisheries can be found at http://www.sanctuaries.nos.noaa.gov/oms/oms.html.

9.10 Paperwork Reduction Act

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

If bycatch reporting measures above status quo are implemented through this amendment, NOAA Fisheries will submit any reporting requirements and burdens to the Office of Management and Budget for review.

9.11 Regulatory Flexibility Act

The Regulatory Flexibility Act (RFA) of 1980 (5 U.S.C. 601 et seq.) requires federal agencies to assess the impacts of regulatory actions implemented through notice and comment rulemaking procedures on small businesses, small organizations, and small governmental entities, with the goal of minimizing adverse impacts of burdensome regulations and record-keeping requirements on those entities. Under the RFA, NOAA Fisheries must determine whether a proposed fishery regulation will have a significant economic impact on a substantial number of small entities. If not, a certification to this effect must be prepared and submitted to the Chief Counsel for Advocacy of the Small Business Administration. Alternatively, if a regulation is determined to significantly impact a substantial number of small entities, the act requires the agency to prepare an initial and final Regulatory Flexibility Analyses to accompany the proposed and final rule, respectively. These analyses, which describe the type and number of small businesses affected, the nature and size of the impacts, and alternatives that minimize these impacts while accomplishing stated objectives, must be published in the *Federal Register* in full or in summary for public comment and submitted to the chief counsel for advocacy of the Small Business Administration. Changes to the RFA in June 1996 enable small entities to seek judicial court review of an agency's compliance with the Act's provisions.

9.12 Small Business Act

The Small Business Act of 1953, as amended, Section 8(a), 15 U.S.C. 634(b)(6), 636(j), 637(a) and (d); Public Laws 95-507 and 99-661, Section 1207; Public Laws 100-656 and 101-37 is administered by the Small Business Administration. The objectives of the act are to foster business ownership by individuals who are both socially and economically disadvantaged; and to promote the competitive viability of such firms by providing business development assistance including, but not limited to, management and technical assistance, access to capital and other forms of financial assistance, business training and counseling, and access to sole source and limited competition federal contract opportunities, to help the firms to achieve competitive viability. Because most businesses associated with fishing are considered small businesses, NOAA Fisheries, in implementing regulations, must make an assessment of how those regulations will affect small businesses.

9.13 Essential Fish Habitat

The amended MSFCMA included new EFH requirements, and as such, each existing, and any new, FMPs must describe and identify EFH for the fishery, minimize to the extent practicable adverse effects on that EFH caused by fishing, and identify other actions to encourage the conservation and enhancement of that EFH. In 1999, a coalition of several environmental groups brought suit challenging the agency's approval of the EFH FMP amendments prepared by the Gulf of Mexico, Caribbean, New England, North Pacific, and Pacific Fishery Management Councils (American Oceans Campaign et al. v. Daley et al., Civil Action No. 99-982(GK)(D.D.C. September 14, 2000). The court found that the agency's decisions on the EFH amendments were in accordance with the MSFCMA, but held that the EAs on the amendments were in violation of the NEPA and ordered NOAA Fisheries to complete new, more thorough NEPA analyses for each EFH amendment in question.

Consequently, NOAA Fisheries entered into a Joint Stipulation with the plaintiff environmental organizations that called for each affected Council to complete EISs rather than EAs for the action of minimizing adverse effects of fishing to the extent practicable on EFH. See AOC v.Evans/Daley et al., Civil No. 99-982 (GK)(D.D.C. December 5, 2001). However, because the court did not limit its criticism of the EAs to only efforts to minimize adverse fishing effects on EFH, it was decided that the scope of these EISs should address all required EFH components as described in section 303 (a)(7) of the MSFCMA.

To address these requirements the Council has, under separate action, drafted an EIS to analyze within each fishery a range of potential alternatives to: (1) describe and identify Essential Fish Habitat (EFH) for the fishery; (2) identify other actions to encourage the conservation and enhancement of such EFH; and (3) identify measures to minimize to the extent practicable the adverse effects of fishing on such EFH. The Council approved the EIS at its March 2004 meeting and NOAA Fisheries published the Final EIS in June 2004 and the Record of Decision, signed on July 23, 2004, was to proceed with an amendment of the fishery management plans of the Gulf of Mexico Fishery Management Council to comply with the guidelines articulated in the EFH Final Rule to implement the EFH provisions of the MSFCMA (See 50 CFR Part 600, Subpart J). The Council and NOAA Fisheries are proceeding with a generic amendment to implement the EFH provisions by the December 26, 2005, deadline imposed by the Joint Stipulation.

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14 GLOSSARY

B. Biomass, measured in terms of spawning capacity (weight) or other appropriate units of production.

B_{MSY}. Long-term average biomass that would be achieved if fishing at a constant fishing mortality rate equal to FMSY.

BRP (biological reference point). Benchmarks against which the abundance of the stock or the fishing mortality rate can be measured, in order to determine its status. BRPs can be categorized as limits or targets, depending on their intended use.

Catch. 1) the act of catching a fish. 2) All fish that a fisher catches by any of the gear being used. Catch includes fish which are released, used for bait, or cut off after being fought. Other terms describe the eventual disposition of the catch.

Control Rule. Describes a plan for pre-agreed management actions as a function of variables related to the status of the stock. For example, a control rule can specify how F or yield should vary with B. In the NSGs, the MSY control rule is used to determine the limit fishing mortality, MFMT. Control rules are also known as "decision rules" or "harvest control laws" in some of the scientific literature.

Discards. Discards are those fish in the catch that are released at sea. Discards can be the result of regulations (out of season or too small), economics (the target of a fishery but which are not retained because they are of an undesirable size, sex, or quality, or for other economic reasons), or catch-and-release fishing (targeting a fish for sport but not intending to keep). Discards would be equal to **Catch** if a fisher were only catch-and-release fishing and every fish is released alive.

F. Instantaneous fishing mortality rate. Measures the effective fishing intensity for a given partial recruitment pattern.

F_{MSY}. Fishing mortality rate, which, if applied constantly, would result in MSY.

Harvest. Harvest includes all fish that are kept for any purpose. This includes **Landings** plus that portion of the catch retained for some other purpose such as bait. Harvest would be equal to **Catch** if no fish were **Discarded**.

Landings. Landings are those fish that are brought to shore and kept by the fisher for some purpose such as eating, mounting, giving to friends or selling. Landings would be equal to **Catch** if every fish caught is landed.

Limit Reference Points. Benchmarks used to indicate when harvests should be constrained substantially so that the stock remains within safe biological limits. The probability of exceeding the limits should be low. In much of the NSGs, limits are referred to as thresholds. In much of the international literature (e.g., FAO documents), "thresholds" are used as buffer points that signal when a limit is being approached.

M. Instantaneous natural mortality rate. It includes mortality caused by factors such as disease, starvation, and predation; not from fishing.

MFMT (maximum fishing mortality threshold). Status determination criteria (SDC) for determining if OVERFISHING is occurring. It will usually be equivalent to the F corresponding to the MSY control rule.

MSST. (minimum stock size threshold). The greater of: (a) 1/2BMSY, or (b) the minimum stock size at which rebuilding to BMSY will occur within 10 years of fishing at the MFMT. MSST should be measured in terms of spawning biomass or other appropriate measures of productive capacity.

MSY (maximum sustainable yield). The largest long-term average yield (harvest) that can be taken from a stock or stock complex under prevailing ecological and environmental conditions. Any estimate of MSY depends on the population dynamics of the stock, the characteristics of the fisheries, e.g., gear selectivity, and the control rule used. In much of the traditional fisheries literature, MSY is estimated with a control rule in which F is independent of stock size. In the language of NSGs, estimates of MSY will change depending on the shape of the control rule, but BMSY and FMSY pertain only to a constant-F control rule.

NSGs (national standard guidelines). Advisory guidelines developed by NOAA Fisheries, based on the National Standards of the Magnuson-Stevens Fishery Conservation and Management Act.

Overfished. MSST related. A stock or stock complex is considered overfished when its size falls below the MSST. According to the NSGs, an overfished stock or stock complex is one "whose size is sufficiently small that a change in management practices is required in order to achieve an appropriate level and rate of rebuilding." A rebuilding plan is required for stocks that are overfished.

Overfishing. MFMT related. Occurs if the MFMT is exceeded for 1 year or more. According to the NSGs, "overfishing occurs whenever a stock or stock complex is subjected to a rate or level of fishing mortality that jeopardizes the capacity of the stock or stock complex to produce MSY on a continuing basis."

OY (optimum yield). The amount of fish that will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities and taking into account the protection of marine ecosystems. MSY constitutes a "ceiling" for OY. OY may be lower than MSY, depending on relevant economic, social, or ecological factors. In the case of an overfished fishery, OY should provide for rebuilding to BMSY.

Reference Points. Values of parameters, e.g. BMSY, FMSY, F0.1, that are useful benchmarks for guiding management decisions. Biological reference points are typically limits that should not be exceeded with significant probability, e.g. MSST, or targets for management, e.g. OY.

SDC (status determination criteria). MFMT related. Objective and measurable criteria used to determine if a stock is being overfished or is in an overfished state according to NSGs.

SPR. 1) Spawning output per recruit. Amount of per-capita spawning biomass (or other appropriate measure of reproductive output) obtained at a given value of F, conditional on values of partial recruitment, growth, maturity (and/or fecundity) and natural mortality.

2) Spawning potential ratio. The expected lifetime spawning output per recruit relative to the spawning output that would be realized in the absence of fishing, often expressed as a percentage. References to this second definition are associated with a percentage (%) sign.

APPENDIX A - MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT STANDARDS

SEC. 301. NATIONAL STANDARDS FOR FISHERY CONSERVATION AND MANAGEMENT — 16 U.S.C. 1851

(a) IN GENERAL.--Any fishery management plan prepared, and any regulation promulgated to implement any such plan, pursuant to this title shall be consistent with the following national standards for fishery conservation and management:

98-623

(1) Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.

(2) Conservation and management measures shall be based upon the best scientific information available.

(3) To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.

(4) Conservation and management measures shall not discriminate between residents of different States. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.

104-297

(5) Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.

(6) Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

(7) Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

104-297

(8) Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.

104-297

9) Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.

104-297

(10) Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

97-453

(b) GUIDELINES.-- The Secretary shall establish advisory guidelines (which shall not have the force and effect of law), based on the national standards, to assist in the development of fishery management plans.

APPENDIX B - ALTERNATIVES CONSIDERED BUT REJECTED

1 Biological reference points and status determination criteria

None Rejected

2 Rebuilding scenarios

Alternative 2: Develop a 10-year rebuilding strategy for vermilion snapper using constant harvest as the basis for a rebuilding plan. The required ABC starting in 2004 is 1.338 mp equivalent to a 38.8percent reduction in directed harvest based on the average of the 2000 to 2002 estimated landings. A review of this rebuilding plan will be conducted every five years.

Alternative 3: Develop a 10-year rebuilding strategy for vermilion snapper using a stepped approach to a rebuilding plan that holds harvest constant for an initial 4 year interval consistent with the average of the same four years under a constant fishing mortality rate, then 3-year intervals thereafter. The required ABC starting in 2004 is 1.213 mp equivalent to a 44.5percent reduction in directed harvest based on the average of the 2000 to 2002 estimated landings. A review of this rebuilding plan will be conducted every three years.

Alternative 4: Develop a 10-year rebuilding strategy for vermilion snapper using a constant fishing mortality rate as the basis for a rebuilding plan. The required ABC starting in 2004 is 0.807 mp equivalent to a 63.1percent reduction in directed harvest based on the average of the 2000 to 2002 estimated landings. A review of this rebuilding plan will be conducted every five years.

Alternative 5: Develop a 7-year rebuilding strategy for vermilion snapper using constant harvest as the basis for a rebuilding plan. The required ABC starting in 2004 is 1.159 mp equivalent to a 47percent reduction in directed harvest based on the average of the 2000 to 2002 estimated landings. A review of this rebuilding plan will be conducted every five years.

Alternative 6: Develop a 7-year rebuilding strategy for vermilion snapper using a stepped approach to a rebuilding plan that holds harvest constant for an initial 4 year interval consistent with the average of the same four years under a constant fishing mortality rate. The required ABC starting in 2004 is 0.999 mp equivalent to a 54.3percent reduction in directed harvest based on the average of the 2000 to 2002 estimated landings. A review of this rebuilding plan will be conducted every three years.

Alternative 7: Develop a 7-year rebuilding strategy for vermilion snapper using a constant fishing mortality rate as the basis for a rebuilding plan. The required ABC starting in 2004 is 0.681 mp equivalent to a 68.9percent reduction in directed harvest based on the average of the 2000 to 2002 estimated landings. A review of this rebuilding plan will be conducted every five years.

Discussion: The standard procedure used to determine harvest levels necessary to rebuild the stock and end overfishing within the specified time frame is to calculate reductions based on the difference between the current harvest or some average harvest from recent years and the model-estimated harvest required to reduce F to the appropriate level. This method is well justified when the assessment is only one or two years out of date but it ignores any changes in the resource that may have occurred after the assessment was run. The combination of harvest increases and recent increases in CPUE indicate that either the vermilion snapper population biomass has increased or that harvest and CPUE are driven by other factors such as economics or interactions with other fisheries (e.g. red snapper). In either case, it is now unlikely that the stock status is as poor as the 2001 assessment suggests. Therefore, these rebuilding alternatives were rejected in favor of those in Section 4.2.2 that rely on fishing mortality rates from the 2001 assessment for both past status of the stock as well as projecting future status (See Section 4.2.1 for a detailed description of these methods).

Alternative 5: Develop a 7-year rebuilding strategy for vermilion snapper using constant harvest as the basis for a rebuilding plan. The required ABC starting in 2004 is 1.564 mp equivalent to a 28.8 percent reduction in directed harvest based on the average of the 2000 to 2002 estimated landings. A review of this rebuilding plan will be conducted every five years.

Alternative 7: Develop a 7-year rebuilding strategy for vermilion snapper using a constant fishing mortality rate as the basis for a rebuilding plan. The required ABC starting in 2004 is 0.918 mp equivalent to a 58.2 percent reduction in directed harvest based on the average of the 2000 to 2002 estimated landings. A review of this rebuilding plan will be conducted every five years.

Discussion: Constant harvest, stepped, or constant F strategies were developed for ten and seven year rebuilding periods using the revised method of calculating harvest reductions. In addition, a zero F rebuilding strategy was developed which was expected to require three years to rebuild the stock. By motions at the January, 2004 meeting, the Council voted to reject the seven-year constant harvest alternative. The Council felt that the seven-year constant harvest strategy provided no benefits over the ten-year stepped approach and was more difficult to manage over time because it required harvest to be held constant for the entire rebuilding period. At the same meeting, the Council voted to reject the seven-year constant F strategy because it required far deeper harvest reductions (58.2 percent) than they felt were warranted considering recent changes in the apparent status of the stock.

Alternative 6: Rebuild the vermilion snapper stock in three years using a 0 F strategy. The required ABC starting in 2004 is 0 pounds and equates to a 100 percent reduction in harvest for the first three years.

Discussion: The zero F Alternative was rejected at the March, 2004 Council meeting. The Council felt that the zero F rebuilding strategy was not practicable because it required eliminating all discard mortality from the directed and shrimp fisheries as well as eliminating harvest. Vermilion snapper is not the target for most fishing trips that harvest vermilion snapper, so the zero F strategy would actually increase discard mortality dramatically because all unavoidable commercial and recreational catch would have to be released. The Council believed that the considered alternatives in Section 4.2.2 will rebuild the vermilion snapper stock within the guidelines of the MSFCMA without causing such major economic and social hardships on the directed fishery.

3 Harvest reduction alternatives

3.1 Recreational reductions

Alternative 2: The recreational bag limit for vermilion snapper will be:
A: 3 fish, (20 percent harvest reduction)
C: 1 fish. (47 percent harvest reduction)

Alternative 3: The minimum size for recreationally caught vermilion snapper will be:
A: 11 inches. (20 percent harvest reduction)
B: 12 inches. (37 percent harvest reduction)
C: 13 inches. (52 percent harvest reduction)

Alternative 4: The minimum size for recreationally caught vermilion snapper will be 11 inches TL and the bag limit will be:
A: status quo (20-fish aggregate). (20 percent harvest reduction)
C: 3 fish. (36.2 percent harvest reduction)
D: 2 fish. (44.4 percent harvest reduction)

Alternative 5: The minimum size for recreationally caught vermilion snapper will be 12 inches TL and the bag limit will be:
A: status quo (20-fish aggregate). (37 percent harvest reduction)
B: 10 fish. (39 percent harvest reduction)
C: 3 fish. (50.2 percent harvest reduction)

Alternative 6: Vermilion snapper will become part of the 10-fish aggregate snapper bag limit and the minimum size will be:
A: 11 inches. (21.7 percent harvest reduction)
B: 12 inches. (38.9 percent harvest reduction)
C: 13 inches. (52.6 percent harvest reduction)

Alternative 7: The annual recreational quota in whole weight for vermilion snapper will be:
A: 0.536 mp. (18 percent harvest reduction)
C: 0.401 mp (38.7 percent harvest reduction)
D: 0.324 mp (50.5 percent harvest reduction)

Alternative 6: The recreational closed season for vermilion snapper will be:
A: May 1 to June 7. (18 percent harvest reduction)
C: May 1 to July 31. (41 percent harvest reduction)
D: May 1 to August 31. (52 percent harvest reduction)

3.2 Commercial reductions

Alternative 2: The Commercial trip limit for vermilion snapper will be:
A: 2000 lbs. (19 percent harvest reduction)
C: 1000 lbs. (40 percent harvest reduction)
D: 750 lbs. (48.6 percent harvest reduction)

Alternative 3: The minimum size for commercially caught vermilion snapper will be:
B: 13 inches. (37.7 percent harvest reduction)
C: 15 inches. (52 percent harvest reduction)

Alternative 4: The minimum size for commercially caught vermilion snapper will be 11 inches and the trip limit will be:
A: 3500 lbs. (18 percent harvest reduction)
C: 1350 lbs. (39.6 percent harvest reduction)
D: 900 lbs. (50.7 percent harvest reduction)

Alternative 5: The minimum size for commercially caught vermilion snapper will be 12 inches and the trip limit will be:
A: Status quo (unlimited). (27 percent harvest reduction)
B: 2250 lbs. (39 percent harvest reduction)
C: 1350 lbs. (50 percent harvest reduction)

Alternative 6: The annual commercial quota in whole weight for vermilion snapper will be:
A: 1.090 mp (18 percent harvest reduction)
C: 0.815 mp (39 percent harvest reduction)
D: 0.685 mp (50.5 percent harvest reduction)

Alternative 7: The Commercial Closed Season for vermilion snapper will be:
A: August 1 through September 30. (16.7 percent harvest reduction)
C: August 1 through September 30 and November 1 through January 31. (39.1 percent harvest reduction).
D: August 1 through February 28. (50.8 harvest reduction).

Discussion: The Council chose a ten-year stepped rebuilding strategy that required approximately a 25.5 percent reduction in total harvest during the first four years (2004 - 2008) as their preferred alternative at the March 8 - 12, 2004 meeting. The above sub-alternatives were removed from consideration because they either did not meet the 25.5 percent reduction necessary for the stepped rebuilding strategy or they significantly exceeded the 25.5 percent recreation and commercial harvest reduction levels the Council felt were appropriate given the probable current condition of the vermilion snapper stock. While all harvest reductions cause hardship during the first five years of implementation, those greater than 30 percent were believed too disruptive early in the rebuilding process since the biological gains at the end of the rebuilding time were all the same. All of the tools available for reducing harvest (bag, trip, size, season and quota options) remain as considered Alternatives but are within the range of 21.5 to 30 percent depending on the option.

Several of the Alternatives removed from consideration are within the 21 to 30 percent harvest reductions. For the recreational fishery, rejected Alternative 6 A would have specified an 11-inch TL minimum size limit and that vermilion snapper become part of the current 10 snapper aggregate bag limit. The 21.7 percent harvest reduction from this alternative was considered to be no different than considered Alternative 3 A which specifies an 11-inch TL minimum size and a 10 fish bag limit and is estimated to reduce harvest by 21.5 percent. For the commercial fishery, rejected Alternative 5 A is identical to the preferred Alternative 3 which specifies a 12 minimum size limit.

3.3 Other considerations rejected

There are other tools that can reduce effective harvest, such as closing spawning areas or essential fish habitat for vermilion snapper (various forms of marine protected areas or MPAs) or mandating gear changes such as minimum hook size or number of hooks per line. However, it is impracticable to consider these types of management tools in an amendment that is specific to vermilion snapper. This species represents less than 10 percent of all reef fish harvested in the Gulf and any measures to implement MPAs will affect other species in the reef fish management unit as well as other finfish fisheries such as coastal pelagic resources.

Vermilion snapper occupy most hard bottom habitats throughout the Northern Gulf and much of the Eastern Gulf. Vermilion snapper school over hard bottom habitat in these areas and spawn from April through September (See Section 7.2.1.1). However, vermilion snapper, as well as most other snappers do not seem to have well-established, small geographic niches where spawning occurs as do some of the groupers. Broad areas of hard bottom would have to be closed in order to significantly benefit vermilion snapper spawning or EFH and these areas would encompass habitat used for similar purposes by nearly all other reef fish species.

Increasing the size of terminal end gear would increase the size of vermilion snapper capable of being caught. Likewise, reducing the number of hooks per line would reduce the effective catch rates by decreasing hourly CPUE. However, these methods, like MPAs would affect the harvest of any other species in the fishing area and therefore will not be considered in this amendment which is specific to only one species in the reef fish management unit. These types of management tools are appropriate for broad use for protection of essential fish habitat and reduction of effort and bycatch in the reef fish fishery. Such tools are currently being considered in draft Amendment 18 to the reef fish fishery.

APPENDIX C - SCOPING DOCUMENT

DRAFT SCOPING DOCUMENT FOR A REGULATORY AMENDMENT TO THE REEF FISH FISHERY MANAGEMENT PLAN TO SET VERMILION SNAPPER SUSTAINABLE FISHERIES ACT TARGETS AND THRESHOLDS AND TO HALT OVERFISHING

JULY 2003

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The Gulf of Mexico Fishery Management Council (Council) is preparing through framework to amend the Fishery Management Plan for the Reef Fish Resources of the Gulf of Mexico to halt overfishing of vermilion snapper and set Sustainable Fisheries Act (SFA) status criteria. Listed alternatives are meant to initiate discussion for scoping purposes only, and may not represent the full range of alternatives that will be evaluated in this amendment.

The vermilion snapper resource in the Gulf of Mexico was listed as approaching an overfished state by the National Marine Fisheries Service (NMFS) in the 1998 and the 1999 Report to Congress on the Status of Fisheries of the United States. The Council also received a letter from NMFS on November 17, 1999[7] advising the Council it was required to address overfishing in the vermilion snapper fishery within one year of notification of its status. However, Amendment 15 to the Reef Fish FMP that was implemented in January 1998, permanently increased the vermilion snapper minimum size limit from 8 inches to 10 inches TL. The purpose of this regulatory rule was to increase the yield per recruit (YPR), decrease the harvest by 11 percent, and reduce F. In 2000, Schirripa and Legault (2000) updated the vermilion snapper assessment to include 1998 and some 1999 landings data. The result of this assessment were equivocal in that one set of model parameters indicated the stock was overfished and undergoing overfishing, and another set indicated that the stock was healthy. Unfortunately, due to time constraints, the RFSAP was not able to review this updated assessment and so no recommendations were made.

In October 2001, a new vermilion snapper stock assessment (Porch and Cass-Calay, 2001) was presented to the Reef Fish Stock Assessment Panel (RFSAP). Two models were applied to the assessment; an age-structured virtual population analysis (VPA) model and a surplus production (Pella-Tomlinson) model. In both cases, the stock biomass was estimated to be below the minimum stock size threshold (MSST) and the fishing mortality rate was estimated to be above the maximum fishing mortality rate (MFMT); however, each model was highly uncertain. For the age-based VPA model, vermilion snapper size-at-age was highly variable due to variable growth of this species. This created difficulties in estimating age from length. For the surplus production model, a long time series (>50 years) of catch and age data are needed. Unfortunately, only 14 years were available to the assessment. Regardless of these deficiencies, the RFSAP felt that there was enough information in the landings data and catch-per-unit-effort (CPUE) indices to conclude that the stock had declined. While the Scientific and Statistical Committee (SSC) and Socioeconomic Panel (SEP) endorsed the RFSAP's (2001) report, the Reef Fish Advisory Panel (AP) was not as accepting of the report. The AP felt that behavioral changes in the fishery could account for the changes in the CPUE indices. The Council, taking into account the AP's concerns and uncertainty expressed about the assessment by both scientific panels and the assessment biologists, moved that the Council did not have a high level of confidence in the status of vermilion snapper and requested additional follow-up analyses when data become available. A letter from the Council was sent to NMFS expressing this concern in February, 2002[8]. In April 2002[9], the Council was reminded that NMFS has determined that the Gulf of Mexico vermilion snapper stock is undergoing overfishing and that the Council must take action as soon as possible to address this overfishing determination. Based on the above determination, this Regulatory Amendment proposes to end overfishing by establishing regulations that will reduce the current fishing mortality level. This scoping document presents

[7] Letter to Council Chairperson Robert Shipp from NMFS Regional Administrator William Hogarth dated November 17, 1999.

[8] Letter to NMFS Acting Regional Administrator Joseph Powers from Council Chairperson Roy Williams dated February 8, 2002.

[9] Letter to Council Chairperson Roy Williams from NMFS Acting Regional Administrator Joseph Powers dated April 12, 2002.

possible methods to reduce vermilion snapper harvest in the Gulf of Mexico such as bag limits, size limits, and trip limits; however, this document also solicits input from the public for alternative methods to decrease this species' harvest.

In addition, this Regulatory Amendment proposes to establish new biomass-based targets and thresholds for vermilion snapper. These actions are proposed to bring the vermilion snapper fishery into compliance with the provisions of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), Sustainable Fisheries Act (SFA), NMFS National Standard Guidelines (NSG), and NMFS technical guidance on implementing National Standard 1 (Restrepo et al. 1998).

1.0 Possible Management Actions

1.1 Fishing Mortality Reductions

The 2001 stock assessment of vermilion snapper (Porch and Cass-Calay, 2001), was judged by the RFSAP to be highly uncertain. The age-structured VPA model provided estimates of the stock status that varied greatly. The Pella-Tomlinson production model used was limited to 14 years of catch and effort data when this method is optimally used when there are longer time series (50-100 years). Based on these model runs that explored a variety of stock condition scenarios, the ratio of the current fishing mortality rate to the fishing mortality rate that can sustain maximum sustainable yield ($F_{current}/F_{MSY}$) ranged from 0.59 to 2.20 using the Pella-Tomlinson production model and from 0.81 to 3.02 using an age-structured VPA model. In their review of the vermilion snapper assessment (RFSAP 2001), the RFSAP used the base Pella-Tomlinson model run to examine stock status. That run estimated $F_{current}/F_{MSY}$ to be 1.99. The median estimate of $F_{current}/F_{MSY}$ from all seven Pella-Tomlinson model runs was 1.76. Therefore, based on this model, reductions needed in F to halt overfishing are likely between 40 and 50 percent based on catch data through1999. Since 1999, catches have declined in the commercial fishery from 1.99 mp in 1999 to 1.16 mp in 2002, and declined in the recreational fishery from 0.39 mp in 1999 to 0.29 mp in 2002. If these declines in harvest are due to changes in fishing practices as suggested by the AP, the needed reductions in F may be lower than predicted in the 2001 assessment. However, if these declines in harvest are due to a declining population, then the estimated reductions in F should be selected for in the alternatives.

1.1.1 Recreational Bag Limit Alternatives

Alternative 1: No action. Maintain current inclusion of vermilion snapper in the 20-reef fish aggregate bag limit.

Alternative 2: Create a bag limit for vermilion snapper of 5 fish (possible reduction in the recreational harvest of 4.4 -15.4 percent depending on assumed discard mortality rate).

Alternative 3: Create a bag limit for vermilion snapper of 4 fish (possible reduction in the recreational harvest of 7.2-20.7 percent depending on assumed discard mortality rate).

Alternative 4: Create a bag limit for vermilion snapper of 3 fish (possible reduction in the recreational harvest of 11.5-28.9 percent depending on assumed discard mortality rate).

Alternative 5: Create a bag limit for vermilion snapper of 2 fish (possible reduction in the recreational harvest of 19.5-42.0 percent depending on assumed discard mortality rate).

Alternative 6: Create a bag limit for vermilion snapper of 1 fish (possible reduction in the recreational harvest of 35.6-62.9 percent depending on assumed discard mortality rate).

Discussion: The National Marine Fisheries Service (NMFS) provided analyses examining reductions in F from the recreational fishery by reduced bag limits (Brooks, 2003). These analyses utilized data from the MRFSS and Headboat data bases. Bag limits examined ranged from 1 to 5 fish per person at different discard mortality rates and are presented in Tables 1 and 2.

Table 1. Percent reduction of Gulf of Mexico vermilion snapper recreational harvest by different bag limits and different discard mortality rates based on 2001-2002 MRFSS data.

Discard Mortality	Bag Limit = 5	Bag Limit = 4	Bag Limit = 3	Bag Limit = 2	Bag Limit = 1
0 Percent	9.9-15.4	15.3-20.7	23.2-28.9	36.2-42.0	56.7-62.9
10 Percent	9.4-15.1	14.2-19.8	21.3-27.1	32.9-38.7	51.3-57.2
20 Percent	8.9-14.0	13.2-18.2	19.4-24.6	29.7-34.9	45.9-51.2
30 Percent	8.4-12.9	12.1-16.6	17.5-22.2	26.5-31.1	40.7-45.3

Table 2. Percent reduction of Gulf of Mexico vermilion snapper recreational harvest by different bag limits and different discard mortality rates based on 1998-1999 Headboat data.

Discard Mortality	Bag Limit = 5	Bag Limit = 4	Bag Limit = 3	Bag Limit = 2	Bag Limit = 1
0 Percent	6.4-8.3	10.2-13.4	16.4-22.3	27.8-37.3	50.1-60.4
10 Percent	5.7-7.5	9.2-12.1	14.8-20.1	25.1-33.6	45.8-54.4
20 Percent	5.1-6.7	8.2-10.7	13.1-17.8	22.3-29.8	40.7-48.3
30 Percent	4.4-5.8	7.2-9.4	11.5-15.6	19.5-26.1	35.6-42.3

1.1.2 Recreational Size Limit Alternatives

Alternative 1: No action. Maintain current minimum size limit for vermilion snapper at 10 inches total length.

Alternative 2: Increase the minimum size limit to 11 inches total length (achieve a maximum reduction in the recreational harvest of 17.7-39.9 percent with no discard mortality factored into percent reduction estimates).

Alternative 3: Increase the minimum size limit to 12 inches total length (achieve a maximum reduction in the recreational harvest of 41.8-59.8 percent depending on assumed discard mortality rate).

Alternative 4: Increase the minimum size limit to 13 inches total length (achieve a maximum reduction in the recreational harvest of 49.8-72.6 percent depending on assumed discard mortality rate).

Alternative 5: Increase the minimum size limit to 14 inches total length (achieve a maximum reduction in the recreational harvest of 53.3-84.4 percent depending on assumed discard mortality rate).

Discussion: NMFS provided analyses examining reductions in F from the recreational fishery through different minimum size limits (Brooks, 2003). These analyses utilized data from the MRFSS and Headboat data bases. Minimum size limits examined ranged from 11 to 14 inches total length at different discard mortality rates and are presented in Tables 3 and 4. Because the analysts were asked to look at reductions centering around 50 percent, some combinations of size and discard mortality were not examined.

Table 3. Percent reduction of Gulf of Mexico vermilion snapper recreational harvest by different minimum size limits and different discard mortality rates based on 2001-2002 MRFSS data.

Discard Mortality	> 11" TL	> 12" TL	> 13" TL	> 14" TL
0 Percent	17.7-23.2	41.8-45.5	62.3-63.3	76.1-79.4
10 Percent			56.1-57.0	68.5-71.5
20 Percent			49.8-50.6	60.1-63.5
30 Percent				53.3-55.6

Table 4. Percent reduction of Gulf of Mexico vermilion snapper recreational harvest by different minimum size limits and different discard mortality rates based on 1998-1999 Headboat data.

Discard Mortality	> 11" TL	> 12" TL	> 13" TL	> 14" TL
0 Percent	35.8-39.9	55.8-59.8	71.6-72.6	83.2-84.4
10 Percent		50.2-53.9	64.4-65.3	
20 Percent		44.6-47.9	57.2-58.1	
30 Percent			50.1-50.8	

1.1.3 Commercial Size Limit Alternatives

Alternative 1: No action. Maintain current minimum size limit for vermilion snapper at 10 inches total length.

Alternative 2: Increase the minimum size limit to 11 inches total length (achieve a maximum reduction in the commercial harvest of 12.5-23.8 percent with no discard mortality factored into percent reduction estimates).

Alternative 3: Increase the minimum size limit to 12 inches total length (achieve a maximum reduction in the commercial harvest of 27.4-44.7 percent depending on assumed discard mortality rate).

Alternative 4: Increase the minimum size limit to 13 inches total length (achieve a maximum reduction in the recreational harvest of 38.7-59.4 percent depending on assumed discard mortality rate).

Alternative 5: Increase the minimum size limit to 14 inches total length (achieve a maximum reduction in the commercial harvest of 47.7-69.9 percent depending on assumed discard mortality rate).

Alternative 6: Increase the minimum size limit to 14 inches total length (achieve a maximum reduction in the commercial harvest of 54.4-79.8 percent depending on assumed discard mortality rate).

Discussion: NMFS provided analyses examining reductions in F from the commercial fishery through different minimum size limits (Chih, 2003). These analyses utilized commercial landings data from TIP database. Minimum size limits examined ranged from 11 to 15 inches total length at different discard mortality rates and are presented in Table 5.

Table 5. Percent reduction of Gulf of Mexico vermilion snapper commercial harvest by different minimum size limits and different discard mortality rates based on 2001-2002 landings data.

Discard Mortality	> 11" TL	> 12" TL	> 13" TL	> 14" TL	>15" TL
0 Percent	19.7-23.8	40.5-44.7	56.3-59.4	68.9-69.9	78.6-79.8
10 Percent	17.3-20.6	36.1-39.7	50.5-53.0	61.8-62.6	70.5-71.7
20 Percent	14.9-17.5	31.7-34.6	44.6-46.7	54.8-55.3	63.6-62.4
30 Percent	12.5-14.3	27.4-29.6	38.7-40.3	47.7-48.0	54.4-55.6

1.1.4 Commercial Trip Limits

Alternative 1: No action. Do not set commercial trip limits for vermilion snapper.

Alternative 2: Establish a trip limit for commercial reef fish vessels of 500 pounds (achieve an estimated 59 percent reduction in commercial harvest).

Alternative 3: Establish a trip limit for commercial reef fish vessels of 750 pounds (achieve an estimated 49 percent reduction in commercial harvest).

Alternative 4: Establish a trip limit for commercial reef fish vessels of 1500 pounds (achieve an estimated 28 percent reduction in commercial harvest).

Alternative 5: Establish a trip limit for commercial reef fish vessels of 3000 pounds (achieve an estimated 9 percent reduction in commercial harvest).

Alternative 6: Establish some other trip limit for commercial reef fish vessels to achieve an estimated 50 percent reduction in commercial harvest with other management measures.

Discussion: NMFS provided analyses examining reductions in F from the commercial fishery by various possible trip limits (Poffenberger, 2003). Potential reductions in the catches were analyzed for various trip limits if they had been in effect during 2000 and 2001 (Table 6). The mandatory logbook data collected by the Southeast Fisheries Science Center (SEFSC) were used to determine the potential decreases in vermilion snapper catches. Logbook data indicated that handline and bandit rigs were the principal type of gear used to catch vermilion snapper (88% of the reported catches from 1993-2001). Because one gear type accounted for most of the catch, gear types were combined for the analyses.

Table 6. Percent reduction of Gulf of Mexico vermilion snapper commercial harvest by different trip limits. The table is reprinted from Poffenberger (2003)

Table 1. Estimated effects of various scenarios of trip limits on the catches of vermilion snapper for trips in the Gulf of Mexico, 2000 - 2001.

	2000		2001		Average for 2000 - 2001			
Trip Limit (pounds whole weight)	No Trips	Pounds over the trip limit	No Trips	Pounds over the trip limit	Average number of trips	Average pounds over limit	% of trips over limit	% reduction in catch from limit
500	738	858,507	827	1,064,584	783	961,546	21.9	59.3
750	591	692,722	641	882,434	616	787,578	17.2	48.6
1000	473	560,887	514	738,284	494	649,586	13.8	40.1
1250	382	454,891	435	620,330	409	537,611	11.4	33.1
1500	308	368,829	353	522,095	331	445,462	9.2	27.5
1750	254	298,321	291	441,095	273	369,708	7.6	22.8
2000	205	240,822	251	373,232	228	307,027	6.4	18.9
2250	165	193,997	218	315,290	192	254,644	5.4	15.7
2500	133	156,918	182	265,035	158	210,977	4.4	13.0
2750	108	127,246	144	224,555	126	175,901	3.5	10.8
3000	90	102,804	120	190,841	105	146,823	2.9	9.1
3250	69	82,698	108	162,048	89	122,373	2.5	7.5
3500	58	66,944	94	136,707	76	101,826	2.1	6.3
2750	49	53,590	86	113,781	68	83,686	1.9	5.2
4000	42	42,253	77	93,123	60	67,688	1.7	4.2
4250	37	32,561	60	75,808	49	54,185	1.4	3.3
4500	29	24,512	53	61,318	41	42,915	1.1	2.6
2750	24	18,051	44	48,639	34	33,345	0.9	2.1
5000	17	12,934	41	37,941	29	25,438	0.8	1.6
5250	11	9,382	34	33,484	23	21,433	0.6	1.3
5500	7	7,235	30	25,448	19	16,342	0.5	1.0
5750	7	5,485	23	18,680	15	12,083	0.4	0.7
6000	5	4,003	20	13,286	13	8,645	0.4	0.5

Source: Southeast Fisheries Science Center, Logbook Program, Miami, FL.

1.2 MSY, OY, MFMT (overfishing), and MSST (overfished) Alternatives for Vermilion snapper

The M-SFCMA, as amended by the SFA of 1996, provides new requirements for marine fisheries managed by the Gulf Council and other regional fishery management councils. The Gulf Council responded to these new requirements by developing a Generic SFA Amendment that included among other actions, the specification of higher standards for overfishing and overfished criteria that would restore fishery stocks to maximum sustainable yield (MSY) levels. However, after the Generic SFA Amendment was submitted to NMFS, the agency determined that biomass-based proxies for MSY, optimum yield (OY), and MSST were superior to the fishery mortality-based reference points, such as spawning potential ratio (SPR), that were used in the Council's amendment. Therefore, NMFS disapproved the Council's SPR-based reference points of MSY, OY, and MSST. The agency approved the SPR-based thresholds that the Council chose to define overfishing - MFMT.

In order to understand how overfishing and overfished criteria are developed, it is important to understand MSY. According to the NSGs developed by NMFS, MSY is defined as the "largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological and environmental conditions." Associated with MSY is a stock size (biomass at MSY or B_{MSY}) that is the "long term average size of the stock or stock complex, measured in terms of spawning biomass or other appropriate units, that would be achieved under an MSY control rule in which the fishing mortality rate (F) is constant." The MSY control rule means a harvest strategy that would be expected to result in a long-term average catch approximating MSY and to maintain the stock at B_{MSY}.

MSST and MFMT are two important parameters dictated by the NSGs for use in the MSY control rules regarding overfished and overfishing status for a stock. If the current stock size is below MSST, then the stock is overfished. If the current F is above MFMT, then overfishing is occurring on the stock. In selecting an MSST, the NSGs advise that "to the extent possible, the stock size threshold should be equal to whichever of the following is greater: one-half the MSY stock size (B_{MSY}), or the minimum stock size at which rebuilding to the MSY level would be expected to occur with 10 years if the stock or stock complex were exploited at the MFMT."

NMFS technical guidance for the precautionary approach to the setting of OY recommends setting MSST so that is related to the natural mortality rate (M) of a stock. This guidance suggests that MSST should be equal to $0.5*B_{MSY}$ or $(1-M)*B_{MSY}$ - whichever yields the largest MSST. The theory behind using M as an indicator of at what level to set MSST is that a stock fished at F_{MSY} (the F that will achieve MSY) should fluctuate around B_{MSY} on a scale related to M (i.e., populations with small values for M are generally more stable, but less productive than populations that have higher values of M).

As an example of how these measures could be applied, the Gulf of Mexico vermilion snapper stock has an estimated value of M equal to 0.25 (Schirripa, 1998). Therefore, the MSST value recommended by NMFS technical guidance would be 1-M or $0.75*B_{MSY}$ because this MSST level is greater than $0.5*B_{MSY}$. For a species like dolphin where M is greater than 0.5 (estimated M between 0.68 and 0.80), the MSST value recommended by NMFS technical guidance would be $0.5*B_{MSY}$.

The other parameter needed for the status determination of a stock is MFMT. This is a fishing mortality threshold that should not exceed F_{MSY}. Fishing at a level above MFMT for a period of one or more years would constitute overfishing. In general, MFMT is set at F_{MSY} or some proxy of F_{MSY}. The MFMT values established by the Council in the SFA Generic Amendment were approved by NMFS and were associated with the F that would generate a yield associated with a certain SPR level thought to approximate MSY. For Gulf of Mexico vermilion snapper, the MFMT value is the F value needed to maintain a population at 30 percent static SPR ($F_{30\%\ SPR}$).

The SFA also requires that the Council establish an OY reference point. The OY is a target reference point that should be set no higher than MSY (a limit reference point). This value could be set through either an analysis of the risk associated with various yield levels and selecting the appropriate risk averse strategy, or by selecting a particular yield level where the probability of exceeding the limit (or MSY) is below some level. One method recommended in NMFS Technical Guidance is to set OY at the yield corresponding to the F value that is 75 percent of F_{MSY} (i.e., $0.75*F_{MSY}$) (Restrepo et al. 1998).

An analysis of the corresponding OY associated with fishing at this F value found that OY would be 94 percent or better of MSY once the stock has achieved equilibrium. Because F refers to the proportion of fish that are removed by fishing each year, the proportion of fish being removed from the stock at F_{OY} ($0.75*F_{MSY}$) is less than the proportion removed at F_{MSY}. At this lower harvest rate, the stock size could increase above B_{MSY}. Thus, OY could be more than 75 percent of MSY because the stock has a chance to rebuild to a level higher than B_{MSY} [B_{OY} was estimated to between 125-131 percent of B_{MSY} in Restrepo et al.'s (1998) analyses].

The following are potential alternatives for defining MSY, OY, MSST, and MFMT for vermilion snapper. They are included in this document for discussion purposes only and may change in response to comments received during the scoping and/or preliminary analytical process.

1.2.1 MSY Alternatives

Alternative 1: Maximum Sustainable Yield (MSY) for vermilion snapper is the yield associated with $F_{30\%\ SPR}$ (proxy for F_{MSY}) when the stock is at equilibrium.

Alternative 2: MSY for vermilion snapper is the yield associated with $F_{25\%\ SPR}$ when the stock is at equilibrium.

Alternative 3: MSY for vermilion snapper is the yield associated with $F_{35\%\ SPR}$ when the stock is at equilibrium.

Alternative 4: MSY for vermilion snapper is the yield associated with $F_{40\%\ SPR}$ when the stock is at equilibrium.

Alternative 5: No action, do not establish a MSY for vermilion snapper.

1.2.2 OY Alternatives

Alternative 1: Optimum Yield (OY) for vermilion snapper is the yield associated with an $F_{40\%\ SPR}$ when the stock is at equilibrium.

Alternative 2: OY for vermilion snapper is the yield associated with an $F_{35\%\ SPR}$ when the stock is at equilibrium.

Alternative 3: OY for vermilion snapper is the yield associated with an $F_{30\%\ SPR}$ when the stock is at equilibrium.

Alternative 4: OY for vermilion snapper is the yield corresponding to a fishing mortality rate (F_{OY}) defined as: F_{OY}=0.65*F_{MSY} proxy from Section 1.2.1 when the stock is at equilibrium.

Alternative 5: OY for vermilion snapper is the yield corresponding to a fishing mortality rate (F_{OY}) defined as: F_{OY}=0.75*F_{MSY} proxy from Section 1.2.1 when the stock is at equilibrium.

Alternative 6: OY for vermilion snapper is the yield corresponding to a fishing mortality rate (F_{OY}) defined as: F_{OY}=0.85*F_{MSY} proxy from Section 1.2.1 when the stock is at equilibrium.

Alternative 7: OY for vermilion snapper is the yield corresponding to a fishing mortality rate (F_{OY}) defined as: F_{OY}=0.90*F_{MSY} proxy from Section 1.2.1. when the stock is at equilibrium.

Alternative 8: No action - retain current OY statement where OY is any harvest level for each species which maintains, or is expected to maintain, over time a survival rate of biomass into the stock of spawning age to achieve at least a percent spawning stock biomass per recruit (SSBR) population level, relative to the SSBR that would occur with no fishing.

1.2.3 Overfishing Threshold Alternatives (MFMT)

Alternative 1: Set MFMT = $F_{30\%\ SPR}$. The vermilion snapper stock would be considered undergoing overfishing if the probability that $F_{current}$ is larger than $F_{30\%\ SPR}$ is:

A. greater than 50 percent.
B. greater than 40 percent.
C. greater than 30 percent.

Alternative 2: Set MFMT = $F_{25\%\ SPR}$. The vermilion snapper stock would be considered undergoing overfishing if the probability that $F_{current}$ is larger than $F_{25\%\ SPR}$ is:

A. greater than 50 percent.
B. greater than 40 percent.
C. greater than 30 percent.

Alternative 3: Set MFMT = $F_{35\%\ SPR}$. The vermilion snapper stock would be considered undergoing overfishing if the probability that $F_{current}$ is larger than $F_{35\%\ SPR}$ is:

A. greater than 50 percent.
B. greater than 40 percent.
C. greater than 30 percent.

Alternative 4: No action, retain the current definitions.

1.2.4 Overfished Threshold Alternatives (MSST)

Alternative 1: Set the minimum stock size threshold (MSST) to (1-M)*B_{MSY} or 75 percent of B_{MSY}. Vermilion snapper stocks in the Gulf of Mexico will be considered overfished if the probability that $B_{current}$ is less than MSST is:

A. greater than 50 percent.
B. greater than 40 percent.
C. greater than 30 percent.

Alternative 2: Set the minimum stock size threshold (MSST) to (1-0.5)*B_{MSY}. Vermilion snapper stocks in the Gulf of Mexico will be considered overfished if the probability that $B_{current}$ is less than MSST is:

A. greater than 50 percent.
B. greater than 40 percent.
C. greater than 30 percent.

Alternative 3: Set the minimum stock size threshold (MSST) to (1-0.35)*B_{MSY}. Vermilion snapper stocks in the Gulf of Mexico will be considered overfished if the probability that $B_{current}$ is less than MSST is:

A. greater than 50 percent.
B. greater than 40 percent.
C. greater than 30 percent.

Alternative 4: No action, retain the current definitions.

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APPENDIX D - SUMMARY OF SCOPING HEARINGS

Orange Beach, Alabama
August 18, 2003

In Attendance: 18 members of the public were in attendance
Bobbi Walker
Wayne Swingle
Lorna Evans

Robert Turpin, Gulf Breeze, Florida, asked if the Gulf population of vermilion snapper was a separate stock.

Mr. Swingle responded yes and stated that there may be sub-populations of vermilion snapper that ongoing otolith micro-chemistry research by LSU may determine.

Mr. Turpin asked if vermilion snapper were overfished or undergoing overfishing.

Mr. Swingle related that vermilion snapper were undergoing overfishing. He related that it would require a 30 to 50 percent fishing mortality reduction. He explained because the age to length data were unreliable a stock reduction model was used for the stock assessment which used landings versus effort and calculated the MSY curve. He added that the landings records only went back 14 years which was not long enough to do a good stock production model.

Mr. Turpin asked if there were regressions available for the fecundity at the different size levels.

Mr. Swingle responded that as the fish got larger it produced more eggs exponentially. He added that some vermilion snapper sexually matured at 6", some at 8" and all by 10".

Mr. Turpin then asked what the mean, median, and mode size structures were of the recreational and commercial catches. He stated that he had collected underwater data on artificial reefs off the Escambia County, Florida coast, and he had recently noticed a drastic reduction in the number of vermilion snapper. He believed this to be a shift of effort.

Mr. Swingle reported that some scientists believed that when red snapper declined the vermilion snapper filled that ecological niche and expanded, and as the red snapper stock expanded the vermilion snapper population declined.

Ms. Walker asked if Mr. Turpin had witnessed any sort of cannibalistic activity between the red snapper and the vermilion snapper.

Mr. Turpin related that recently he had noticed a decline in population of the juvenile vermilion snapper in the schools of bait fish on the artificial reefs. He added that the relationship between OY and MSY should be related to the degree of uncertainty in the models.

Ms. Walker asked if Mr. Turpin had seen a decrease in the adult population of vermilion snapper as well as the juvenile.

Mr. Turpin responded yes and it was very distinctive.

Jamee Lowry, Perdido Fish House, Inc., Pensacola, Florida, questioned why the Council would consider increasing the size limit by 1" if there was no substantial data to give the age or size of the fish.

Ms. Walker responded that the vermilion snapper were sexually mature at 10". She added that there was a problem with the determination of age and length because there could be a 10" snapper that was 3 different ages.

Ms. Lowry stated that she depended on this fishery to make a living and hoped that any decision made would be made on good scientific data. She questioned why the fishermen were not given government aid like the farmers were.

Ms. Walker responded that government aid was a Congressional issue.

Ms. Lowry related that the vermilion snapper population moved according to the weather. She supported a 2,500 pound trip limit for the commercial fishermen.

Mike Parker, Parker Seafood, Pensacola, Florida, stated that he supported a quota system and was opposed to a 500 to 750 pound trip limit. He suggested a 2,500 to 3,000 pound trip limit and a 12-inch limit.

Randy Boggs, Reel Surprise Charters, Orange Beach, Alabama, felt the Council should be careful using highly uncertain data. He supported Alternative 1 for bag limits, status quo. He recommended that the Council increase the size limit to 12" because a 10" fish did not have a substantial amount of meat on it. He recommended that the commercial size limit be increased to 12". He supported the 500 to 750 pound trip limit for the commercial sector. He believed that the harvest was too high in the commercial sector (as high as 6,000 pounds) which only flooded the market. He pointed out that the commercial sector landed 1.99 mp and the recreational sector landed 0.92 mp. He did not want to see any group of fishermen shut down but he believed the fishery had to be considered. He believed that vermilion snapper was a predominantly headboat fishery. He did not target vermilion.

Ms. Walker asked what Mr. Boggs' opinion was on the discard mortality rate of a vermilion snapper smaller than 10".

Mr. Boggs related that fishing with circle hooks, deflating an inflated bladder, and using a slow reel ration (1:1), all contribute to saving the fish.

Steve Foust, Aquastar Charters, Pensacola, Florida, supported a larger size limit rather than decreasing the bag limit. He recommended a 12" size limit. He supported a 1,500 to 2,000 commercial trip limit. He felt the commercial fishermen that landed 6,000 pounds of vermilion snapper were destroying the fishery.

Ms. Walker asked Mr. Foust what his opinion was on the discard mortality rate of the vermilion snapper.

Mr. Foust responded that if the fish was brought up at a slow rate it would swim right back down to the bottom.

Dan Ratliff, Shirley R Charters, Orange Beach, Alabama, stated that any limits put on this fishery would affect his customers. He related that he targeted the larger fish like red snapper, amberjack, and kingfish and has only had 2 customers in 8 years request fishing for the vermilion snapper. He reported that vermilion snapper were bycatch and he only kept the larger sized vermilion. He stated that the release mortality on his boat was less than 5 percent. He commented that he has seen an increase in the number of vermilion snapper. He supported status quo.

Ms. Walker asked Mr. Ratliff if he would prefer a higher size limit, a smaller bag limit, or a combination of both.

Mr. Ratliff responded that a size limit increase would affect him more than a smaller bag limit.

Donald Waters, Commercial Fisherman, Pensacola, Florida, stated that he was opposed to trip limits. He recommended a one-month closed season. He believed that the vermilion snapper spawned more than once a year. He asked that the Council make a decision that was fair to all of the fishermen. He would agree to a 12" size increase.

Mr. Swingle asked if Mr. Waters' suggestion of a one-month closure would apply to the commercial and recreational sectors.

Mr. Waters responded yes.

Ms. Walker asked if it was a common practice in the commercial fishery to use 10" vermilion snapper as bait.

Mr. Waters responded yes and stated that this practice occurred in the recreational sector as well.

Ron Rifley, Commercial Fisherman, Mobile, Alabama, stated that because sexual maturity did not seem to be a factor in the management of vermilion snapper he was opposed to an increased size limit. He related that the discard mortality rate was inconsistent because once the fisherman released that fish it could be eaten by any other fish and most likely a bottle-nosed dolphin. He supported a 2,000 to 2,500 pound trip limit. He suggested a bag limit consistent with the red snapper season. This would be a 5 to 10 beeliner bag limit during the open season and a 15 to 20 beeliner bag limit during the closed season. He believed the vermilion and gray snappers should be taken from the aggregate bag limit.

Matt Kumm, Commercial Fisherman, Fort Walton Beach, Florida, stated that his main target was the mingo (vermilion snapper). He was opposed to raising the size limit because pulling the larger fish from the deeper water would only increase the release mortality rate. He felt this would cause the fishermen to have to kill more fish to catch the same amount. He was opposed to commercial trip limits and supported a seasonal closure. He asked that the Council consider the larger boats that would be put out of business with a small trip limit. He indicated he principally fished at 300 feet and 90 percent of his catch was mingo of 11" to 12".

Ms. Walker asked Mr. Kumm what was the biggest expense on his boat.

Mr. Kumm responded that for a 7 or 8 day trip his expenses were about $1,500, with fuel being the majority of his expense.

Mr. Turpin suggested a two-tiered commercial trip limit similar to the red snapper considering the historical fisherman. He felt this would accommodate the historical participation in the fishery.

The meeting **ADJOURNED AT 9:45 P.M. (CST)**

PUBLIC HEARINGS SUMMARY ON VERMILION SNAPPER SCOPING MEETINGS

Panama City, Florida
August 19, 2003

<u>In Attendance</u>: 31 members of the public were in attendance
Roy Williams
Wayne Swingle
Lorna Evans

<u>Bob Zales</u>, Panama City Charter Boatman's Association, Panama City, Florida, stated that his association had not taken a position on this issue at this time but that would be forwarded to the Council. He believed any sort of bag limit would have a significant social and economic impact on the headboat fishery.

Mr. Williams asked if Mr. Zales saw any advantage to a seasonal closure.

Mr. Zales responded no and stated that the red snapper closure had already had a detrimental affect on the fishermen. He did not believe his association would support any type of seasonal closure. He did not feel there was enough information that was known about vermilion snapper. He reported that vermilion snapper was a prey species for other fish and as the stocks of the larger fish are rebuilt the vermilion snapper would be reduced. He suggested that in recent years fishing effort has declined. He added that the vermilion snapper in the Atlantic matured differently than the Gulf vermilion snapper. He indicated that if the fish matured at 8" there was no justification for a size limit and commented that increasing the size limit would cause the fisherman to kill 10 fish to keep 1.

Mr. Williams asked Mr. Zales about the release mortality rate of the vermilion snapper.

Mr. Zales felt that the release mortality rate would be higher on a headboat than on a charter boat.

<u>David Krebs</u>, Ariel Seafoods, Destin, Florida, stated that the commercial vermilion snapper was the most labor intensive fishery in the Gulf. He felt less people were targeting this fishery. He felt that as red snapper increases there was a decline in the vermilion snapper landings. He asked why there was not a license for the historical fisherman in this fishery. He has seen an increase in the availability of vermilion snapper. He felt the landings patterns have changed as well as the fishing patterns. He felt if the harvest was reduced the market would be lost to foreign imports. He stated that there was less effort in this fishery than 10 years ago. He related that even though there were the same about of boats fishing there was not the same amount of gear in the water. He commented that no matter what time of the year you catch a vermilion it always has roe in it.

<u>Bart Niquet</u>, Niquet Fisheries, Lynn Haven, Florida, stated that the effort in the vermilion snapper fishery has been reduced in the last 3 or 4 years. He related that most of the boats fish for red snapper. He felt that the discard ratio was incorrect. Headboats caught about 5 undersized vermilion to each one kept. He added that to reduce the release mortality rate the prey species would have to be reduced. He stated that any fish thrown back was eaten by sharks and porpoises. He suggested using oil rigs as artificial reefs.

Mr. Williams asked what regulations would Mr. Niquet support.

Mr. Niquet responded that he would prefer a bag limit for the recreational sector, 4 or 5 fish, and a trip limit of 6,000 or 7,000 pounds for the commercial sector. He pointed out that the smaller boats could make multiple trips and land this amount.

Donald Waters, Commercial Fisherman, Pensacola, Florida, related that in 25 years he has seen the beeliner population go up and down. He stated that the abundance of amberjack may have something to do with the decline of population of the vermilion snapper. He felt the data on this fishery was insufficient to make any management decisions, especially to reduce the catch by 50 percent.

Chris Niquet, Niquet Fisheries, Lynn Haven, Florida, stated that by putting a license or IFQ system on vermilion snapper, that would limit the number of people that could enter this fishery. He questioned when a limited entry system would be placed on the recreational fishery. He felt this could be considered discrimination.

Mike Eller, Fish N Fool Charterboat, Destin, Florida, believed there is less effort in the vermilion snapper fishery not less fish. He related that vermilion snapper were not a targeted species by the commercial or recreational sectors. He suggested a 10-fish bag limit and increasing the size limit an inch per year. He pointed out that vermilion snapper were a prey species. He felt the data was flawed and the Council was jumping to the wrong conclusion. He added that increasing the size limit up to 14" to 15" would increase the release mortality rate too much. He reported that during a fishing trip he released his bycatch in another area because the porpoises were ready to eat them. He stressed there was a decrease in effort not a decrease in fish.

Matt Kumm, Commercial Fisherman, Fort Walton Beach, Florida, felt that there should be more research done on the release rate of the mingo. He stated that the depth of the water being fished was a major factor in the survival rate. Out of 300' they were all dead. He pointed out that in order to catch 2,000 pounds the fisherman would have to kill 4,000 pounds. He was concerned that this fishery would become a derby fishery. He related that fuel was a big cost.

Bill Peters, All American Gulf Fishing Company, Fort Walton Beach, Florida, stated that every time the size limit was increased the release mortality rate was increased. He was concerned that a whole industry would be devastated on a 60% chance that the fishery was overfished.

John Law, Captain Law Charters, Panama City, Florida, stated that the business that was generated by the industry was valuable to the state and could not stand any reductions. He pointed out that the moratorium on the charterboat permits should alleviate some of the pressure on the vermilion snapper fishery. He added that the porpoises followed him all day and ate every bit of bycatch he threw back.

Robert Honaker, Anna B, Inc., Ft. Walton Beach, Florida, stated that the data was flawed and more research should be done before any management decisions were made. He related that there has been no change in CPUE for the fishery in the last 10 years. He asked that the Council not place anymore regulations on the fishery, as none were needed.

Matt Peters, All American Gulf Fish Company, Destin, Florida, stated that the vermilion snapper fishery was the only fishery left that could be fished year-round. He related that the NMFS had ruined the red snapper fishery. He felt that the resource was being wasted. He questioned how the commercial fishery could land 6,000 pounds of vermilion snapper if it were overfished. He asked that no more regulations be placed on the fishery. He opined that the document was a pile of garbage.

Hank Hunt, Charterboat Fisherman, Panama City, Florida, agreed with the previous speakers. He did not feel there was enough good data. He added that vermilion snapper were not in this area year-round. He indicated as king mackerel and other predators increased the number of beeliners decreased. He was concerned that the foreign imports would take the market away from the domestic fishery. He felt that the stock would not increase with the increase of the predator species.

Greg Abrams, Abrams Seafood, Panama City, Florida, stated that the Council should take a close look at the butterfish boats. He suggested that if the Council could not find any beeliners in the ocean they would be aboard one of the butterfish boats.

The meeting **ADJOURNED AT 8:30 P.M. (EST)**

PUBLIC HEARINGS SUMMARY ON VERMILION SNAPPER SCOPING MEETINGS

Tampa, Florida
August 20, 2003

In Attendance: 6 members of the public were in attendance

Karen Bell
Wayne Swingle
Lorna Evans

Marianne Cufone, Ocean Conservancy, St. Petersburg, Florida, stated that she intended to submit formal written comments. She highlighted three issues. She felt there was a connection between red snapper and vermilion snapper and the Council needed to consider this connection when making any management decision. She added that the vermilion snapper were bycatch in the red snapper fishery and the red snapper were bycatch in the vermilion snapper fishery. She was concerned that the Council would increase the size limit which would increase mortality levels from regulatory discards. She suggested that the Council use a precautionary approach in managing the vermilion snapper since it was using uncertain data or follow the original recommendations of the stock assessment and manage vermilion snapper as both overfished and experiencing overfishing. She felt this fishery should be managed in a conservative manner.

The meeting **ADJOURNED AT 7:50 P.M. (EST)**

PUBLIC HEARINGS SUMMARY ON VERMILION SNAPPER SCOPING MEETINGS

Port Aransas, Texas
August 25, 2003

In Attendance: 1 member of the public was in attendance

Joe Hendrix
Wayne Swingle
Dave McKinney
Otha Easley
Lela Gray

Pam Baker, Environmental Defense, Corpus Christi, Texas, did not comment, but indicated that she would submit written comments to the Council.

The meeting ADJOURNED AT 8:00 P.M. (CST)

PUBLIC HEARINGS SUMMARY ON VERMILION SNAPPER SCOPING MEETINGS

Galveston, Texas
August 26, 2003

In Attendance: 7 members of the public were in attendance
Lance Robinson
Wayne Swingle
Dave McKinney
Otha Easley
Lela Gray

There were no public comments given at this meeting.
The meeting ADJOURNED AT 8:00 P.M. (CST)

PUBLIC HEARINGS SUMMARY ON VERMILION SNAPPER SCOPING MEETINGS

New Orleans, Louisiana
August 27, 2003

In Attendance: 11 members of the public were in attendance
Myron Fischer
Wayne Swingle
Dave McKinney
Otha Easley
Lela Gray

During Mr. Swingle's presentation, Wayne Werner, Galliano, Louisiana, inquired if there was a time frame that the Council had to finish the vermilion scoping document.

Mr. Swingle responded that the time frame was one year.

Mr. Werner asked if there were any weight to length data on the vermilion snapper.

Mr. Swingle replied that weight to length data were not presented in the vermilion snapper scoping document, but that it did exist within the stock assessment report.

John Thompson, Buras, Louisiana, questioned if the figures presented in the vermilion snapper scoping document were derived from data within the stock assessment reports and catch records.

Mr. Swingle affirmed that they were.

Mr. Werner inquired if there were other fisheries with a natural fishing mortality level that was higher than vermilion snapper.

Mr. Swingle indicated that red snapperÆs mortality rate was 0.1, which resulted in MSST being 90% of BMSY. He explained that long-lived stock take longer to restore compared to stocks that only live five to ten years.

Mr. Werner questioned if there were data on how long-lived vermilion snapper stocks were.

Mr. Swingle replied that vermilion snapper were relatively short-lived.

Mr. Thompson inquired if the mortality rate for vermilion snapper was higher for recreational fishing or commercial fishing.

Mr. Swingle answered that the release mortality rate was higher within the commercial sector primarily because they fished in deeper waters.

Mr. Werner questioned if the MRFSS catch level data showed whether vermilion snapper were targeted for catch, or if other fish like red snapper were actually targeted while vermilion snappers were landed.

Mr. Swingle replied that MRFSS data usually differentiated whether a certain stock was targeted or it was just part of the overall catch.

Pam Baker, Environmental Defense, Corpus Christi, Texas, inquired if the vermilion snapper stock assessment used 20% discard mortality for recreational and 33% discard mortality for the commercial sector like the red snapper stock assessment.

Mr. Swingle explained that a stock reduction model did not use that type of information.

Ms. Baker questioned why the range of 0 to 30 was used for mortality rates in the tables of the vermilion snapper scoping document when they have heard that the mortality rates were actually much higher then that.

Mr. Swingle replied that 0 to 30 were the estimates of discard mortality used by the authors of the stock assessment. He agreed that they could have used values higher than 30%.

Sammy Hauser, Grand Isle, Louisiana, stated that he supported conservation, but was against having numerous restrictions on a fishery. He explained that bag limits and size limits only caused an increase in mortality rates because the fishermen simply discarded the smaller fish when a bigger fish was caught. He stated that several fisheries had already been shut down by size limits, quotas, and closed seasons. He indicated that restrictions only caused the market for that particular fish to plummet and then be saturated by imported fish, making it even harder for the American fishermen to compete. Furthermore, he stated that he was concerned with the increased enforcement problems that he and other fishermen had been having. He stated that it was hard to weigh fish while out at sea, and that there were no allowances given to the fishermen for being even a single pound over the limit for red snapper.

Jill Jensen, Gulf Restoration Network, New Orleans, Louisiana, submitted written comments (See Attachment 1).

Wayne Werner, Galliano, Louisiana, commented that the Council could not prove overfishing was occurring with red grouper, and there were more data on red grouper than vermilion snapper. He felt that the Council would have a hard time proving that overfishing was occurring with vermilion snapper. He indicated that he was troubled by the vermilion snapper scoping document. He explained that the first portion of the document that troubled him were the tables and data showing that the vermilion snapper harvest decreased. He referred to his earlier questions to Mr. Swingle regarding vermilion snapper landing information and if the data used showed whether vermilion snappers were targeted or simply part of the overall catch. He explained that in 1995 red snapper regulations became more restrictive. He mentioned that the decrease in vermilion snapper landings were likely due to the closed red snapper seasons and new size restrictions. He did not believe that over fishing was occurring within the vermilion fishery.

Russell Underwood, Norman B. Company, Lynn Haven, Florida, stated that he had fished in the commercial fishery for the past 23 years. He felt that the Council should manage the vermilion snapper stocks closely and slowly. He believed that the Council did not want to shut this fishery down, and felt that more information was needed on the vermilion snapper fishery before action was taken. He commented that he did not agree with Ms. JensenÆs suggestions to manage red and vermilion snappers as a unit. He explained that the decrease in vermilion snapper landings were possibly tied to the snapper closures because fishermen did not want to go back out to fish for vermilion after they had just come back from the 10-day race for red snappers. He noted that all the fisheries had changed as far as landings. He noted that he caught much more king mackerel last year then he did this year, but that it was due to changes in his life rather then some dramatic decrease in the king mackerel stocks. He asked that the Council consider other reasons for the decrease in vermilion landings before rushing into any management changes. He agreed that small closures in the fishery might be good, but asked that the Council not do anything too restrictive because he did not want the market to close. He thought that another 2,000-pound trip limit would create a derby fishery.

John Thompson, President of the Delta Commercial Fishermen Association, Buras, Louisiana, stated that closures would put everyone out of business. He noted that most of the red snapper fishermen fished for vermilion snapper once the 10-day red snapper fishery closed. He mentioned that the vermilion snapper being caught currently were not small, but 2 to 4 pounds and 12 inches or more. He felt that there were already too many restrictions on the commercial fishermen. He noted that the restrictions on red snapper caused the red snapper market to plummet. He further noted that imported red snappers were frequently undersized, and were impacting the red snapper market prices. He mentioned that undersized vermilion snappers were already being sold in the market. He asked that the Council proceed slowly and discuss management options with commercial vermilion snapper fishermen if vermilion snapper had to be regulated. He felt that the commercial fishermen would be open to helping the Council make good decisions.

Archie Daunte, Grittins Seafood, Golden Meadow, Louisiana, stated that he had been a dealer in the fishery for 16 years. He stated that the Council destroyed the amberjack market. He commented that the Council put a 10-inch size restrictions on vermilion snapper only four years ago, and he felt that the Council had not waited long enough to give the restriction time to work. He felt that the Council should give their management plans more time to work.

The meeting ADJOURNED AT 8:30 P.M. (CST)

PUBLIC HEARINGS SUMMARY ON VERMILION SNAPPER SCOPING MEETINGS

Biloxi, Mississippi
August 28, 2003

In Attendance: 10 members of the public were in attendance

Kay Williams
Wayne Swingle
Dave McKinney
Otha Easley
Lela Gray

There were no public comments given at this meeting.
The meeting ADJOURNED AT 8:00 P.M. (CST)

David Walker, Andalusia, Alabama submitted written comments (See Appendix E, Written Comments).

APPENDIX E - WRITTEN COMMENTS

ENVIRONMENTAL DEFENSE

finding the ways that work

September 5, 2003

Mr. James Fensom, Chair
Gulf of Mexico Fishery Management Council
3018 U.S. Highway 301, N, Suite 1000
Tampa, FL 33610-2266

Via Facsimile: 813-228-2815

Re: Comments on the Draft Scoping Document for a Regulatory Amendment to the Reef Fish Fishery Management Plan to Set Vermilion Snapper Sustainable Fisheries Act Targets and Thresholds and to Halt Overfishing

Dear Mr. Fensom,

Environmental Defense appreciates this opportunity to provide comments on the Gulf of Mexico Fishery Management Council's scoping document for a regulatory amendment to set targets and thresholds for the vermilion snapper fishery and to halt overfishing of the stock occurring under current management. This letter summarizes the problem, describes our concerns about the proposed management options, and offers an alternative recommendation to better manage vermilion snapper.

Vermilion Snapper are Undergoing Overfishing

For more than a decade – starting in 1991 and following assessments of the stock in 1993, 1996, 1998, 2000, and 2001 – the Council's stock assessment panel and other scientific advisors have repeatedly warned of overfishing trends in the vermilion snapper fishery including a drop in landings and catch per unit effort, declining average size of fish landed, evidence that the age at first reproduction has decreased, and signs that the fishery has been consolidated to the most productive fishing grounds.[1] At the same time, the scientists and many Council members recognize uncertainty regarding the stock assessment results and a clear need for additional data. However, the stock assessment panel reports that, even in light of the uncertainty, it feels confident that the health of the vermilion snapper stock is declining.[2] In the National Marine Fisheries Service's 2002 report to Congress on the status of U.S. stocks, Gulf of Mexico vermilion snapper are classified as undergoing "overfishing"[3] and there are signs that the stock may already be overfished.

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[1] See RFSAP. 2001. October 2001 Report of the Reef Fish Stock Assessment Panel – Final Draft November 26, 2001. Gulf of Mexico Fishery Management Council. Tampa. Florida.

[2] Id. at 21.

[3] NMFS. 2003. NOAA Fisheries 2002 Report to Congress – Sustaining and Rebuilding the Status of U.S. Fisheries. U.S. Dept. of Commerce, National Marine Fisheries Service. Office of Sustainable Fisheries.

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Proposed Management Options May Harm the Vermilion Snapper Fishery

To stop overfishing, the Council is seeking to reduce fishing mortality by about 30 – 50 percent by increasing the minimum size limit, lowering the bag limit for recreational fishermen, and/or establishing trip limits for commercial fishermen. The consequences of such regulations should be carefully evaluated because they would have significant environmental, social, and economic effects on vermilion snapper and other reef fish fisheries. However, the analyses presented in the scoping document appear to overstate the potential benefits of the proposed regulations. This happens because "reduced harvest" is featured as a proxy for "reduced fishing mortality" while predictable changes in fishing practices (as a result of implementing the proposed regulations) that create significant new sources of mortality are ignored. We are concerned that the proposed regulations may have the unintended consequence of producing higher landings and fishing mortality.

For example, the analysis of the potential reduction in vermilion snapper landings from a commercial trip limit includes two unlikely assumptions. First, it assumes that fishermen will not take any more trips with a trip limit in-place than they do now. And second, it assumes there is no mortality once the trip limit is filled – in other words, that all fishing trips end when trip limit is reached or that discard mortality is zero.[4] This is surprising because it is clear that discard mortality is higher than zero and experience from the red snapper fishery indicates that the proposed trip limits will not reduce landings because fishermen will increase their capacity to "race" to maximize the number of trips they take. And, as a result, the trip limits may increase total mortality from higher landings and regulatory discards.

In addition, analyses of the potential to reduce landings of vermilion snapper with bag and minimum size limit regulations are also overstated in part because they are described based on a range of discard mortality rates from 0 to 30 percent even through scientific estimates range from 15 to 40 percent[5] and may be higher as a result of predation following release which scientists suspect may be very high.[6] The Council's reef fish committee also recognized this range to be low and requested that discard mortality levels higher than 30 percent be evaluated.[7] A precautionary and scientifically-sound release mortality rate must be defined because regulations that force high rates of regulatory discards can only be effective if the fish survive the catch-and- release experience. Again, experience from the red snapper fishery suggests that high minimum size limits will cause a huge numbers of fish (many which cannot be accurately counted) to be thrown overboard and that the stock may be harmed, rather than helped, as a result.

We recommend that the Council and NMFS require a much more comprehensive analyses of proposed regulations including potential new sources of mortality, the consequences of shifting effort

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[4] Poffenberger, J. 2003. An Analysis of the Potential Reductions in Catches of Vermilion Snapper in the Gulf of Mexico due to Trip Limits on the Commercial Fishery. NMFS. SEFSC. Miami, Florida.

[5] GMFMC. 2003. Options Paper for a Regulatory Amendment to the Reef Fish Fishery Management Plan to Set Vermilion Snapper Sustainable Fisheries Act Targets and Thresholds and to Halt Overfishing. August 2003. Gulf of Mexico Fishery Management Council. Tampa, Florida.

[6] Burns, K., C. Koenig, and F. Coleman. 2002. Evaluation of Multiple Factors Involved in Release Mortality of Undersized Red Grouper, Gag, Red Snapper and Vermilion Snapper. Mote Marine Laboratory Technical Report # 790 (MARFIN Grant No. NA87FF0421). Submitted April 2002. Sarasota, Florida

[7] GMFMC. 2003. Draft Minutes – Gulf of Mexico Fishery Management Council Reef Fish Management Committee. Naples, Florida. July 14, 2003. GMFMC. Tampa, Florida. see p. 7.

to related reef fish species, and the likely possibilities that a "race for fish", dangerous fishing conditions, unnecessary waste of fish, and market disruptions will develop. The Council and NMFS should avoid implementing any regulation that may do more harm than good.

Recommendation to Improve the Vermilions Snapper Fishery With IFQ Management

We recommend that the Council and NMFS evaluate how a program of individual fishing quotas and a scientifically-sound total allowable catch level can be used to better manage the vermilion snapper fishery. Reducing fishing mortality by 30 to 50 percent will be difficult for fishermen, but – unlike trip and size limits which reduce fishermen's efficiency – IFQs are expected to help maintain or improve dockside revenues and will prevent an escalation of fishermen's harvesting costs and loss of profitability.

The Council and NMFS can develop a vermilion snapper IFQ program concurrently with the red snapper IFQ program, or they can take an important step toward ecosystem management (red snapper and vermilion snapper are closely associated ecologically and largely fished by the same fishermen) – supported by NMFS and develop a joint red snapper-vermilion snapper IFQ program.

We urge the Council and NMFS to consider creating a vermilion snapper IFQ program at this time. Taking the correct action now is the best way to prevent repetitions of past mistakes and move Gulf fisheries in the right direction.

Sincerely,

Pamela B Baker

Pamela B. Baker
Fisheries Biologist

cc:
Dr. Roy Crabtree
Dr. Jim Weaver

GULF RESTORATION NETWORK
338 Baronne St., Suite 200
New Orleans, LA 70112

REEFKEEPER INTERNATIONAL
2809 Bird Avenue
Miami, FL 33133

September 5, 2003

Jim Fensom, Chairman
Gulf of Mexico Fishery Management Council
The Commons at Rivergate
3018 U.S. Highway North, Suite 1000
Tampa, FL. 33619-2266

RE: Vermilion Scoping Document to set Vermilion Snapper Sustainable Fisheries Act Targets and Thresholds and to Halt Overfishing

Dear Mr. Fensom,

On behalf of The Gulf Restoration Network (GRN)[1] and ReefKeeper International (RKI),[2] we respectfully offer the following comments on the "Draft Scoping Document for a Regulatory Amendment to the Reef Fish FMP to set Vermilion Snapper Sustainable Fisheries Act Targets and Thresholds and to Halt Overfishing."

Consideration of "Overfished" Status

The GRN and RKI have repeatedly asked that the Secretary of Commerce immediately notify the Gulf of Mexico Fishery Council (Gulf Council) of the overfished status of vermilion snapper and publish notice of this finding in the Federal Register. The best scientific information available indicates that vermilion snapper is overfished with overfishing occurring. Our position has not changed. In 2001, following the most recent stock assessment on vermilion snapper, the Reef Fish Stock Assessment Panel found: (1) vermilion to be "overfished" with "overfishing occurring;" (2) the 1999 fishing mortality rate greatly exceeded the Maximum Fishing Mortality Threshold; and (3) biomass is lower than the Minimum Stock Size Threshold.[3] These findings were then reaffirmed by the Gulf Council's SSC, finding that based on the most recent stock assessment on vermilion snapper, the stock was overfished. NOAA Fisheries' decision in March, 2002 to send the assessment back to its Southeast Science Center for further consideration, with no indication of when new data might be available and with no clear timeline for further progress, is arbitrary and capricious.

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[1] The GRN is a network of fifty groups and individuals dedicated to protecting and preserving the valuable resources of the Gulf of Mexico. We have members in all five Gulf states.
[2] ReefKeeper International is a public interest conservation organization exclusively dedicated to the protection of coral reefs and the sustainability of their marine life.
[3] October 2001 Report of the Reef Fish Stock Assessment Panel. Gulf of Mexico Fishery Management Council at p. 21.

Concerns Regarding the Continued Debate on Status of Vermilion

The scoping process should be conducted such that stakeholders and other knowledgeable members of the public can provide input on potential management actions being considered by fishery managers. Instead, in the case of the vermilion snapper, the scoping document has become a platform for continued debate on what has caused the decline in landings, assuming that this decline is why the fishery was determined to be "undergoing overfishing". The GRN and RKI would like to remind the Gulf Council that both their own RFSAP and the Southeast Fishery Science Center stock assessment team made their determinations based on many factors, not simply decreasing landings. The Vermilion fishery has shown signs of overfishing such as: consolidation of the fishery into the most productive areas, decreases in the mean size of individuals landed by commercial sector, and decreases in the estimated number of age-1 fish in the population and CPUE[4].

Ending Overfishing and Managing at Optimum Yield (OY)

Every fishery management plan (FMP) developed in the Gulf of Mexico, and amendments to those plans must comply with the Sustainable Fisheries Act (SFA) and the national standards provided in the Act. Regardless of the fishing level required to end overfishing (MSY), the Council must manage the fishery, according to National Standard 1, at OY levels.

> Conservation and management measures shall prevent overfishing while achieving, an a continuing basis, the optimum yield from each fishery for the United States fishing industry[5]

Accordingly, the vermilion scoping document which proposes regulatory amendments to the Reef Fish Fishery Management Plan must comply with the SFA requirements, including this national standard . The GRN and RKI, recommend that the Gulf Council add options to the amendment which would set a conservative Total Allowable Catch (TAC) of Vermilion and manage the fishery at OY. When the TAC has been reached, then all targeted fishing for Vermilion fishing should cease.

Comments on Specific Management Measures and Concerns Regarding Release Mortality Options

The analyses of the potential to reduce landings of vermilion snapper with trip limits, minimum size limits and bag limits are misleading. They are described based on a range of discard mortality rates from 0 to 30 percent even though

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[4] October 2001 Report of the Reef Fish Stock Assessment Panel. Gulf of Mexico Fishery Management Council at p. 16

[5] 16 U.S.C. 1851(a)(1).

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[5] 16 U.S.C. 1851(a)(1).

scientific estimates range from 15 to 40 percent[6] and may be higher as a result of unaccounted predation.[7] The Council's reef fish committee recognized this range to be low and requested that discard mortality levels higher than 30 percent be evaluated.[8] GRN and RKI strongly recommend that options be added and analyzed for 40% mortality. A precautionary and scientifically-sound release mortality rate must be defined because regulations like increased size limit, bag limits and trip limits, that force high rates of regulatory discards can only be effective if the fish survive the catch-and- release experience.

Use Precautionary Approach to Set SFA Status Criteria

The GRN and RKI support the utilization of the precautionary approach advocated in the NOAA "Technical Guidance on the Use of Precautionary Approaches to Implementing National Standard 1 of the MSFMCA" in setting the status criteria for vermilion snapper.

The Gulf Council has admitted that it lacks a "high level of confidence" in the assessments of vermilion snapper[9]. Therefore, strict adherence to the precautionary approach to manage for uncertainty is appropriate in selecting status determination criteria and management measures for vermilion snapper. In determining status criteria, the council must be explicitly risk averse, so that the greater uncertainty regarding the status or productive capacity of the stock or stock complex corresponds to greater caution in setting catch limits[10].

Management of Red and Vermilion Snappers (Ecosystem Management)

Vermilion and Red snappers are inextricably tied to one another, economically and ecologically. These fisheries serve as a perfect example of one in need of an "ecosystem management" approach. Every effort should be made by the Gulf Council to include options in the regulatory amendment that examine ways to manage the relationships between the vermilion and red snapper fisheries. The GRN and RKI recommend adding the following options, and others like it, to the scoping document:

1) Establish a hard TAC and "real time" TAC monitoring on vermilion, continue red snapper real-time monitoring now in place, and close both the red snapper and vermilion fisheries as soon as TAC is reached by either fishery.

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[6] GMFMC. 2003. Options Paper for a Regulatory Amendment to the Reef Fish Fishery Management Plan to Set Vermilion Snapper Sustainable Fisheries Act Targets and Thresholds and to Halt Overfishing. August 2003. Gulf of Mexico Fishery Management Council. Tampa, Florida.

[7] Burns, K., C. Koenig, and F. Coleman. 2002. Evaluation of Multiple Factors Involved in Release Mortality of Undersized Red Grouper, Gag, Red Snapper and Vermilion Snapper. Mote Marine Laboratory Technical Report # 790 (MARFIN Grant No. NA87FF0421). Submitted April 2002. Sarasota, Florida

[8] GMFMC. 2003. Draft Minutes – Gulf of Mexico Fishery Management Council Reef Fish Management Committee. Naples, Florida. July 14, 2003. GMFMC. Tampa, Florida. see p. 7.

[9] Letter of Feb. 8, 2002 from Roy Williams, Chair, Gulf Council to Dr. Joseph Powers, NMFS.

[10] National Marine Fisheries Service. 1998. Technical Guidance on the Use of Precautionary Approaches to Implementing National Standard 1 of the MSFMCA (f)(5)(iii).

2) Allow vermilion to be landed only during the commercial red snapper fishing season.

3) Allow vermilion to be landed, only during the commercial fishing season, without size restrictions but with a TAC that when reached forbids retention of **any** vermilion.

Bycatch in the Vermilion and Red Snapper Fishery

The Sustainable Fisheries Act requires that the Gulf Council establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the vermilion and red snapper fisheries, since one is bycatch of the other, and include conservation and management measures that, to the extent practicable,

(A) minimize bycatch; and
(B) minimize the mortality of bycatch which cannot be avoided[11]

Because the current vermilion scoping document will become an amendment to the Reef Fish FMP, hence a part of the FMP itself, it is subject to the SFA requirements of an FMP, noted above. Because NOAA Fisheries and the Gulf Council are currently not in compliance with SFA requirements on reporting and reduction of bycatch, the Vermilion regulatory amendment wil also not in compliance with the SFA. Moreover, neither NOAA Fisheries nor the Gulf Council cannot effectively determine fishing mortality due to lack of bycatch information. (Without a comprehensive standardized reporting methodology in place, there is no way to know the amount of vermilion being taken as bycatch in the red snapper fishery, both recreational and commercial, and other fisheries. It is not unreasonable to think that, in some years, bycatch of vermilion in the Gulf of Mexico and the use of vermilion as bait, may actually exceed the landings for that year. As a result, GRN recommends an option be added to the scoping document requiring cessation of all retention of vermilion, other than during the red snapper season, until SFA requirements regarding bycatch are met by both the Gulf Council and NOAA Fisheries[12].

The following are some additional options that should be included in the scoping document:

1) End any directed fishery of vermilion until bycatch can be considered which will require the implementation of a comprehensive standardized reporting methodology to determine an estimate of the number of pounds attributed to bycatch.

[11] 16 U.S.C. §1853 (a)11; M-S Act §303(a)(11)
[12] GRN and RKI do not accept a NOAA Fisheries National Strategy or the intent of Gulf Council preliminary options draft amendment 18, as fulfilling SFA criteria until the measures to report and reduce bycatch are in effect. Planning on being in compliance is not the same as actually being in compliance.

2) Allow vermilion to be landed only during the commercial red snapper fishing season.

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2) Focus on management responses necessary to minimize bycatch and bycatch mortality of vermilion snapper in the red snapper fishery, to the extent practicable. When appropriate, management measures, such as at-sea monitoring programs on headboats and commercial vessels, should be developed to meet these information needs.

Conclusion

Because there is no comprehensive standardized reporting methodology in place in the Gulf of Mexico, there is no way to know the number of vermilion snapper dying each year in other fisheries, or the number discarded due to economic or regulatory requirements. Until total vermilion snapper mortality can be accounted for in a TAC, the Gulf Council and NOAA Fisheries must proceed with extreme caution in choosing management measures to end overfishing of vermilion snapper. The GRN and RKI believe that the Council must take a precautionary approach, which takes into account the potential for high release mortality rates, unknown bycatch numbers, and interactions with the red snapper fishery in the Gulf of Mexico.

Respectfully submitted,

Jill Jensen
Assistant Director of Fisheries
Gulf Restoration Network

Alexander Stone
Executive Director
Reefkeeper International

Cc: Dr. Roy Crabtree

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September 26, 2003

Dr. Roy E. Crabtree
Regional Administrator
NMFS SERO
9721 Executive Center Dr. North
St. Petersburg, FL 33702
Via Fax/Mail

RE: Red Snapper and Vermilion Snapper

Dear Dr. Crabtree:

Thank you for your letter dated July 29th, that responds in part to our April 25th letter and that maps out the Gulf of Mexico Fishery Management Council's (GMFMC or Council) and NOAA Fisheries' actions to end overfishing of red snapper and vermilion snapper and rebuild red snapper. As you know, our groups are deeply concerned about the status of these stocks and therefore we appreciate your update on current and future plans.

We are encouraged to hear that the Council, with NOAA Fisheries' guidance and assistance, intends to complete a final red snapper rebuilding plan by November of this year, and approve final regulations to end overfishing of vermilion by January, 2004. We look forward to these rules being promulgated and going into effect no later than August 2004, per our discussions. We will be watching the progress closely to see whether the schedule for Council actions set out in your letter is met. In the event the Council does not approve the red snapper rebuilding plan by November of this year, or the proposed regulations to end vermilion overfishing are not approved in January of 2004, we expect NOAA Fisheries to assume control of the process in order to ensure that both actions will be completed not later than August of 2004.

Should the Council fall behind schedule on red snapper, we are pleased that, based on our subsequent conversations, NOAA Fisheries will be ready to take appropriate and swift action on its own to fulfill its legal responsibilities under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) to end overfishing by putting a rebuilding plan in place, and immediately implementing management measures consistent with that plan. Although you did not address it in your letter, we expect that the red snapper rebuilding plan will also include a standardized bycatch reporting methodology that provides a sufficient number of observers to generate statistically significant, accurate, and precise data, and measures to minimize bycatch to the extent practicable. These bycatch measures are required by the MSA and they are long overdue.

Should the Council also miss the important deadlines for the development of regulations to end vermilion snapper overfishing, we anticipate, based on our conversations, that NOAA Fisheries will be ready to take appropriate and swift action to meet its legal responsibilities under the MSA to end this overfishing. In either event, NOAA Fisheries must act swiftly to put in place interim regulations in early 2004 that reflect the final vermilion snapper regulations, so that overfishing ceases as soon as possible.

We also appreciate your commitment to consider interim action in early 2004 to end the overfishing on red snapper. We feel that such action is both appropriate and necessary, especially given recent scientific information regarding bycatch mortality of red snapper. While we recognize this new information is preliminary data from a three-year study currently in its second year and not yet peer reviewed, it should be acknowledged and used in new models. In short, both vermilion and red snapper stocks have experienced overfishing for many years, in contravention of the mandate under the Sustainable Fisheries Act to end overfishing within one year; therefore, swift action is necessary.

Regarding vermilion snapper, following the most recent stock assessment in 2001, the Reef Fish Stock Assessment Panel found vermilion to be overfished. Inexplicably, rather than making a finding of "overfished" and developing a rebuilding plan, the assessment was sent back to the Southeast Science Center. The Southeast Science Center indicated that it was awaiting additional data on age and growth, catch at age, fecundity rates, bycatch estimates, release mortality rates, and effects of changes in fishing behavior on catch per unit effort in order to complete its follow-up analysis.

A decision on the status of vermilion is long overdue and should be based on whatever science is now available. The precautionary approach warrants moving forward with conservation efforts based on the best *available* science. Therefore, upon completion of this analysis, we urge you to move expeditiously to determine whether vermilion is indeed overfished and to develop a rebuilding plan, should it be necessary. We would appreciate it if in the meantime, you could share with our organizations exactly what, if any, "new" data is being used in the reconsideration of the status of vermilion, when this new information will be made available to the public, and who at the Science Center is working on this analysis. We appreciate your prompt attention to these questions.

Again, thank you for providing our organizations with a time frame for actions to end the continued overfishing of both vermilion and red snapper stocks and to put in place a rebuilding plan for red snapper in the Gulf of Mexico. We look forward to continuing to work with you and your staff on these and other issues to ensure that the requirements of the MSA are met as soon as possible, and not later than August 2004.

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Sincerely,

Marianne Cufone, Regional Program Manager
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cc: William Hogarth, Director, NOAA Fisheries
Michael McLemore, NOAA General Counsel
James Fensom, GMFMC
Vernon Minton, GMFMC

CCA

Coastal Conservation Association

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GULF FISHERIES COUNCIL

November 24, 2003

Ms. Bobbi Walker, Chair
Gulf of Mexico Fishery Management Council
The Commons at Rivergate
3018 North U.S. Highway 301, Suite 1000
Tampa, Florida 33619-2272

Dear Ms. Walker:

On behalf of the Coastal Conservation Association (CCA) I would like to offer the following comments on the Council's "Options Paper for a Regulatory Amendment to the Reef Fish Fishery Management Plan to Set Vermilion Snapper Sustainable Fisheries Act Targets and Thresholds and to Halt Overfishing (August 2003)." CCA supports the development of a precautionary recovery plan for vermilion snapper given the uncertainties admitted in the latest stock assessment.

CCA's prime concern in this management effort focuses on the unintended allocation shift in the Gulf of Mexico vermilion snapper fishery. We ask that the Council include options in the Amendment to restore the recreational share of this fishery to the historic levels preceding implementation of Amendment 1.

Although the document lacks clear description of commercial and recreational catches in weight by year, it does discuss this unplanned shift in relative recreational shares of the fishery. Prior to the development of Amendment 1 (1982-1990), the recreational share was approximately 30% to 40% of this fishery. After 1990, and during the decade in which vermilion snapper became overfished, our share in the most recent years dropped to approximately 20%. Recreational catches peaked in 1991 and have since dropped by 63%. Commercial landings continued to increase through 1993 and since then have declined by 43%. The cumulative impacts of regulations on the reef fish fishery, the failure to protect the stock from overfishing and the inherent ability of commercial fishing enterprises to travel further and fish more effective gear in an effort to maintain landings during stock declines have combined to redistribute landings in this fishery to the commercial sector.

CCA asks that the Council include the following in the Options Paper:

1. Explicit documentation of the recreational and commercial landings by weight;

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6919 Portwest Drive, Suite 100 Houston, Texas 77024 (713) 626-4234 Fax (713) 626-5852
www.joincca.org

2. A preferred option to set a formal allocation of vermilion snapper to the recreational and commercial sectors based on the historic distribution of catches between 1982 and 1990; and

3. A preferred option to implement any set of recovery measures to reduce fishing mortality in a manner that reflects this historical distribution of catches and will restore the allocation.

There is ready precedent for this allocation action as it was the approach used by the Council in setting Spanish mackerel, king mackerel and red snapper allocations in past years. CCA has long argued that by failing to adequately address allocation decisions, the Gulf Council creates a vortex of unanticipated changes which invariably reduces the recreational angling community's benefits from these fisheries. We have observed this phenomenon in the amberjack, shark and grouper fisheries of the Gulf.

Ideally, allocation decisions should be made to optimize the net benefits of these fisheries to the entire nation. We support future Council efforts to utilize the existing data on fisheries economics in an effort to develop more fundamentally sound allocation decisions. Until such time as this information is made available to the Council process, we urge you to at least utilize the historical standards for allocation which have been used for other fisheries under your jurisdiction.

We agree with the Council's current selection of preferred options for MSY (Option 7.1.2), OY (Option 7.1.3), MFMT (Option 7.1.4) and MSST (option 7.1.5). These standards are scientifically sound and conservation oriented.

CCA would not support a hard TAC requiring quota monitoring of the recreational sector given the admitted inability of the NMFS' MRFSS to accomplish this task. The Council can make use of the more traditional tools of size limits, bag limits and seasons to accomplish any necessary conservation goal.

Thank you for taking these comments into consideration. As always, our scientific consultant, Dr. Russell Nelson, is available to assist the Council in developing a recovery plan that will accomplish its goals and not serve to eliminate the already diminished recreational fishery for vermilion snapper.

Yours truly,

David Cummins
Attachment

Oral Comment @ Public Hearing for Vermilion Scoping Document
Jill Jensen (8-27-03)

The Gulf Restoration Network is an alliance of fifty groups committed to the advocacy of sustainable fisheries in the Gulf of Mexico. We have members in all five Gulf states.

We will be submitting written comments on the vermilion scoping document

4 Major Points regarding the scoping document

1. Red and Vermilion snappers should be managed as a unit
2. Bycatch of vermilion
3. High Release Mortality of vermilion
4. need for the Precautionary Approach

1) Red and Vermilion Snapper relationships need to be considered in managing this fishery. AN

EXAMPLE:

-establish a hard TAC on vermilion and monitoring of that TAC, continue red snapper real-time monitoring now in place and close both the red snapper and vermilion fisheries as soon as TAC is reached by either fishery.

There are numerous renditions of this option and we recommend that the council include management options where red snapper effort and landings are considered.

2) Bycatch of Vermilion:

Without a comprehensive standardized reporting methodology in place there is no way to know the amount of vermilion being taken as bycatch in the red snapper fishery, both recreational and commercial, and other fisheries. It is not unreasonable to think that in some years bycatch in other fisheries, recreational and commercial, plus the use of vermilion as bait may actually exceed the landings for that year. As a result GRN recommends options be added to the scoping document to cease all retention of vermilion, until SFA requirements regarding bycatch are met by both the council and NOAA Fisheries. The following are suggested scoping options to address the bycatch issue:

1) include an option in the scoping document to end any directed fishery of vermilion until bycatch can be considered.

2) include an option that allows vermilion to be landed, during the red snapper fishing season only

3) include an option that allows vermilion to be landed, only during the red snapper fishing season, without size restrictions but with a conservative TAC that when reached forbids retention of **any** vermilion .

4) add options to the vermilion scoping document to focus on management responses necessary to minimize bycatch and bycatch mortality of vermilion snapper, to the extent practicable. For example,

Add an option to address bycatch information needs, such as at-sea monitoring programs on headboats and commercial vessels.

3) A Release Mortality of at least 30% must be considered as the basis for all management decisions.

options need to be added at this time to include management options and analysis assuming a 40% mortality rate

Re: length

-according to analysis from the SEFSC a limit of 14-15 inches would be necessary for a 50% reduction in fishing pressure at 30% mortality. This would essentially close the fishery.

-We ask the council to consider the shift of effort which could result if size limits essentially close the fishery and effort is shifted on to triggerfish or amberjack

4) **Gulf Council Must use the Precautionary Approach to Set SFA Targets and Thresholds**

As the Gulf Council has stated in the past, it lacks a "high level of confidence" in the assessments of vermilion snapper[1]. Therefore, only strict adherence to the precautionary approach to managing for uncertainty is appropriate in selecting status determination criteria and management measures for vermilion snapper. In determining a status criteria the council must be explicitly risk averse, so that the greater uncertainty regarding the status or productive capacity of the stock or stock complex corresponds to greater caution in setting catch limits[2].

The GRN supports a position that utilizes the precautionary approach advocated in the NOAA "Technical Guidance on the Use of Precautionary Approaches to Implementing National Standard 1 of the MSFMCA" in setting the status criteria for vermilion snapper.

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Reef Fish Amendment 23
Public Hearing Comments of David Walker
August 28, 2003

I am David Walker a commercial fisherman from Alabama who is enormously concerned about any reduction in the vermillion snapper landings. In my opinion the reduced landings for vermillion snapper are due to several valid facts. Increased size limits of vermillion snapper implemented by this council, increased efforts in the red snapper fishery, additional fisheries openings and closures such as shark, king mackerel, amberjack and grouper, weather conflicts and the fact that historically the vermillion snapper fishery has always run in cycles.

When Amendment 15 took effect in 1996 the size limits of vermillion snapper were increased from 8" to 10" and this removed a great deal of our landings. The outcome of Amendment 15 has been greater than anticipated by NMFS. Any additional increase in size limits will certainly increase mortality rate and create a horrendous fishery management nightmare. The increased red snapper size limits have not benefited that fishery it has only lengthened it causing an overfished fishery. Increased size limit of a species that has little or no survival rate will be detrimental to managements rebuilding goals. Numerous unaccounted fish will be wasted if this council decides in favor an increased size limit.

The red snapper derby (trip limits) fishery tribulations have implemented longer seasons which have eliminated much of the vermillion snapper fishery participation during those openings. Many in the reef fishery have focused their efforts towards a more profitable red snapper fishery. Less participation has unquestionably led to reduced landings in vermillion snapper. Without a doubt the current red snapper fishery management is placing havoc on all user groups.

Many other fisheries openings have accounted for the reduced fishing efforts on vermillion snapper. These include the shark and king mackerel fisheries with openings July 1st of each year. Many fishermen suspend their fishing for vermillion snapper during those months and concentrate on those species. Amberjack openings remove additional fishermen from the vermillion snapper fishery to apply their efforts on that species. Grouper openings and closures have had impacts as well. The whole dynamics of our fishery has changed because of these openings and closures. Reef fish fishermen have simply directed their efforts to the most profitable fishery.

During the past several years weather has been more relevant because of the changing dynamics in fisheries management. The timing of a fishing trip has become a challenge itself. Fishermen have been forced into dangerous situations due to regulations implemented by the Gulf Council. The constant altering weather patterns will eternally conflict with fishery openings forcing fishermen to participating less in some fisheries and more in others. Implementing a good <u>IFQ program</u> for red snapper, vermillion snapper and other reef fish could <u>eliminate</u> <u>weather</u> <u>conflicts</u>, problems of <u>regulatory</u> <u>discards</u> and <u>overfishing</u>, and <u>prevent</u> the creation of <u>dangerous</u> <u>derbies</u>.

Well-regarded captains along the Gulf Coast can attest to the fact that the vermillion snapper fishery has always run in cycles. I have been in the reef fish fishery for over 20 years now and I have seen scarce years followed by abundant years and the contrary. The vermillion snapper fishery is possibly the healthiest reef fish fishery in the Gulf of Mexico.

In conclusion, I strongly oppose increased size limits and trip limits because the devastating derby fishery is testimony enough. Derby fisheries are detrimental management flaws that NMFS must eliminate. Vermillion snapper are resilient, reproduce fast and reach sexually maturity at a much smaller size limit than presently allowed. I earnestly advocate developing an IFQ for the vermillion snapper fishery using similar profiles already developed by the Ad-Hoc Red Snapper Advisory Panel. Our nations living marine resources depends on a sincere management leadership that will work in resourceful ways to ensure that the resource will be protected, nurtured and provide an environment in which to thrive well into the future.

Sincerely,

David Walker
401 Diane Drive
Andalusia, AL 36420

CCA

Coastal Conservation Association

TEXAS • LOUISIANA • MISSISSIPPI • ALABAMA • FLORIDA • GEORGIA
SOUTH CAROLINA • NORTH CAROLINA • VIRGINIA • MARYLAND • NEW YORK
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May 5, 2004

Ms. Bobbi Walker, Chair
Gulf of Mexico Fishery Management Council
The Commons at Rivergate
3018 North U.S. Highway 301, Suite 1000
Tampa, Florida 33619-2272

Dear Ms. Walker:

On behalf of the Coastal Conservation Association (CCA) I would like to offer the following comments on the Council's preferred options for the Regulatory Amendment to the Reef Fish Fishery Management Plan to Set Vermilion Snapper Sustainable Fisheries Act Targets and Thresholds and to Halt Overfishing (August 2003)". CCA supports the development of a precautionary recovery plan for vermilion snapper given the uncertainties admitted in the latest stock assessment.

CCA's prime concern in this management effort focuses on the unintended allocation shift in the Gulf of Mexico vermilion snapper fishery. Prior to the development of Amendment 1 (1982-1990) the recreational share of was approximately 30% to 40% of this fishery. After 1990, and during the decade in which vermilion snapper became overfished, our share has been 21%. Recreational catches peaked in 1991 and have since dropped by 63%. Commercial landings continued to increase through 1993 and since then have declined by only 43%. Amendment 1 set criteria for allocation in this fishery with a 33% share designated to the recreational sector. To this date nothing in the record supports any Council action which conflicts directly or indirectly with this established allocation. *De facto* shares in the catch of vermilion snapper have shifted because the Council failed to adopt any regulations to restrict commercial harvest, resulting in overfishing and an overfished condition for the Gulf vermilion snapper stock.

The Council's present preferred option to increase the recreational minimum size to 11" and set a 10 fish bag limit is not necessary, nor is the impact of this action adequately analyzed in the options paper. Removing vermilion snapper from the 20 fish aggregate reef fish bag limit will have an interactive effect on the harvest of otherwise unregulated reef fish species such as triggerfish, porgy and grunts. This action effectively increases the bag limit and potential catch of these species for which there exists minimal information on stock status. The 10 fish bag limit proposed for vermilion may actually ***increase*** the harvest level as the retention of

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www.joincca.org

these fish will no longer be restrained by the catch of other species under the aggregate limit.

CCA requests that the Council utilize this Amendment to re-establish the 33% : 67% recreational to commercial allocation of this fishery. This is only fair. CCA has long argued that by failing to adequately address allocation decisions, the Gulf Council creates a vortex of unanticipated changes, which invariably reduces the recreational angling community's benefits from these fisheries. We have observed this phenomenon in the amberjack, shark and grouper fisheries of the Gulf.

We would recommend a simple approach that would establish a TAC of 1,637,000 pounds in the first of the ten-year recovery plan. A commercial quota of 1,092,000 pounds should be created with any additional trip regulations the Council deems appropriate avoid a derby fishery. The recreational share of the TAC would be 545,000 pounds, a level which has not been approached by the angling community of the Gulf in recent years. We feel that leaving the existing recreational regulations in place will sufficiently control the recreational harvest as we share the benefits of an increasing stock size and our share grows back to the allocated 33%. If future harvest levels by the recreational sector threaten to exceed the 545,000 pounds (or whatever the future TAC allows) we would at that time support the application of new regulations.

We support the Council's current selection of preferred options for MSY, OY, MFMT and MSST. We support the 10 year recovery timeframe as is currently preferred by the Council. These are scientifically sound and conservation oriented standards.

Thank you for taking these comments into consideration. As always, our scientific consultant, Dr. Russell Nelson, is available to assist the Council in developing a recovery plan which will accomplish its goals and not serve to eliminate the already diminished recreational fishery for vermilion snapper.

Yours,

David Cummins

David Cummins
President
Coastal Conservation Association

Trish Kennedy

From: Norma Clark [nmc_2002@yahoo.com]
Sent: Thursday, July 01, 2004 10:20 AM
To: GulfCouncil
Subject: Vermillion Snapper

Dear Gulf of Mexico Fishery Management Council:

I am a resident of Mississippi and am writing out of deep concern for the health of the marine ecosystem, especially the depleted state of the vermilion snapper population. I understand that the Gulf of Mexico Fishery Management Council (GMFMC) is creating a rebuilding plan for vermilion snapper. I urge you to review the available science and edit the current plan to include options that will rebuild and protect this important species of fish, while being mindful of also preventing further harm to the already troubled red snapper.

Currently, the draft management plan for vermilion snapper under review in the GMFMC process does not achieve rebuilding goals required by existing law. The draft plan uses changes in size limits as a primary means of achieving rebuilding. Also, the rebuilding plan does not rebuild the species as soon as possible.
Other management measures, like keeping vermilion season consistent with red snapper season to avoid unnecessary bycatch, closing both vermilion and red snapper fisheries when a quota for either is reached and marine protected areas should be considered and implemented.

Additionally, draft plan makes no attempt to monitor or minimize vermilion snapper bycatch, rather it pushes this off to the future and it also ignores the fact that vermilion snapper is used as bait for other fisheries. This is unacceptable. Bycatch monitoring and minimization must be included in the draft vermilion plan.

I urge the GMFMC, at their July 2004 meeting in Houston, Texas, to review and then act on the best scientific information available and recommend management measures that will rebuild vermilion snapper as soon as possible, without further harming red snapper or other reef fish. The GMFMC must create a precautionary plan that ends overfishing and rebuilds the vermilion snapper population as soon as possible. The plan should consider use of marine protected areas, and quotas that close both vermilion and red snapper when either quota is met. The draft plan should also consider options like use of circle hooks, fishermen education, seasons and other alternatives to size limits to reduce bycatch, and use observers to monitor and report bycatch.

Thank you for considering my views on these important issues to the Gulf of Mexico.

Sincerely,
Norma M. Clark

=====
"Life may not be the party we hoped for, but while we are here we might as well dance!!"

Trish Kennedy

From: BPA@hic.net
Sent: Thursday, July 01, 2004 10:13 AM
To: GulfCouncil
Subject: Vermilion snapper

Dear Gulf of Mexico Fishery Management Council:

I am a resident of the State of Texas and am writing out of deep concern for the health of the marine ecosystem, especially the depleted state of the vermilion snapper population. I understand that the Gulf of Mexico Fishery Management Council (GMFMC) is creating a rebuilding plan for vermilion snapper. I urge you to review the available science and edit the current plan to include options that will rebuild and protect this important species of fish, while being mindful of also preventing further harm to the already troubled red snapper.

Currently, the draft management plan for vermilion snapper under review in the GMFMC process does not achieve rebuilding goals required by existing law. The draft plan uses changes in size limits as a primary means of achieving rebuilding. Also, the rebuilding plan does not rebuild the species as soon as possible. Other management measures, like keeping vermilion season consistent with red snapper season to avoid unnecessary bycatch, closing both vermilion and red snapper fisheries when a quota for either is reached and marine protected areas should be considered and implemented.

Additionally, draft plan makes no attempt to monitor or minimize vermilion snapper bycatch, rather it pushes this off to the future and it also ignores the fact that vermilion snapper is used as bait for other fisheries. This is unacceptable. Bycatch monitoring and minimization must be included in the draft vermilion plan.

I urge the GMFMC, at their July 2004 meeting in Houston, Texas, to review and then act on the best scientific information available and recommend management measures that will rebuild vermilion snapper as soon as possible, without further harming red snapper or other reef fish. The GMFMC must create a precautionary plan that ends overfishing and rebuilds the vermilion snapper population as soon as possible. The plan should consider use of marine protected areas, and quotas that close both vermilion and red snapper when either quota is met. The draft plan should also consider options like use of circle hooks, fishermen education, seasons and other alternatives to size limits to reduce bycatch, and use observers to monitor and report bycatch.

Thank you for considering my views on these important issues to the Gulf of Mexico.

Sincerely,

Mary Ellen Whitworth
1408 Michigan
Houston, Texas 77006

Trish Kennedy

From: BBrody8745@AOL.COM

Sent: Thursday, July 01, 2004 9:31 AM

To: GulfCouncil

Subject: Vermilion Snapper

Dear Gulf of Mexico Fishery Management Council:
I am a resident of Louisiana and am concerned for the health of the marine ecosystem, especially the depleted state of the vermilion snapper population. I understand that the Gulf of Mexico Fishery Management Council (GMFMC) is creating a rebuilding plan for
vermilion snapper. Please review the available science and edit the current plan to include options that will rebuild and protect this important fish, while being mindful of preventing further harm to the already troubled red snapper.

Currently, the draft management plan for vermilion snapper under review in the GMFMC process does not achieve rebuilding goals required by existing law. The draft plan uses changes in size limits as a primary means to achieve rebuilding. Also, the rebuilding plan does not rebuild the species as soon as possible. Other management measures, like keeping vermilion season consistent with red snapper season to avoid unnecessary bycatch, closing both vermilion and red snapper fisheries when a quota for either is
reached, should be considered and implemented. Additionally, the draft plan makes no attempt to monitor or minimize vermilion snapper bycatch, rather it pushes this off to the future and it also ignores the fact that vermilion snapper is used as bait for other fisheries. This is unacceptable. Bycatch monitoring and minimization must be included in the
draft vermilion plan.

I urge the GMFMC, at their July 2004 meeting in Houston, Texas, to review and then act on the best scientific information available and recommend management measures that will rebuild vermilion snapper as soon as possible, without further harming red snapper or other reef fish. The GMFMC must create a precautionary plan that ends overfishing and rebuilds the vermilion snapper population as soon as possible.

The plan should consider use of marine protected areas, and quotas that stop both vermilion and red snapper catching when either quota is met. The draft plan should also consider options like use of circle hooks, fishermen education, seasons and other alternatives to
size limits to reduce bycatch, and use observers to monitor and report bycatch. Thank you for considering my views on these important issues to the Gulf of Mexico.
Sincerely,
Betty Brody, Atty., 1740 St. Charles Ave., #528, New Orleans, LA 70130

Trish Kennedy

From: Wendy Carter [carterwm@bellsouth.net]

Sent: Thursday, July 01, 2004 9:34 AM

To: GulfCouncil

Dear Gulf of Mexico Fishery Management Council:

I am a resident of Louisiana and am writing out of deep concern for the health of the marine ecosystem, especially the depleted state of the vermilion snapper population. I understand that the Gulf of Mexico Fishery Management Council (GMFMC) is creating a rebuilding plan for vermilion snapper. I urge you to review the available science and edit the current plan to include options that will rebuild and protect this important species of fish, while being mindful of also preventing further harm to the already troubled red snapper.

Currently, the draft management plan for vermilion snapper under review in the GMFMC process does not achieve rebuilding goals required by existing law. The draft plan uses changes in size limits as a primary means of achieving rebuilding. Also, the rebuilding plan does not rebuild the species as soon as possible. . Other management measures, like keeping vermilion season consistent with red snapper season to avoid unnecessary bycatch, closing both vermilion and red snapper fisheries when a quota for either is reached and marine protected areas should be considered and implemented.

Additionally, draft plan makes no attempt to monitor or minimize vermilion snapper bycatch, rather it pushes this off to the future and it also ignores the fact that vermilion snapper is used as bait for other fisheries. This id unacceptable. Bycatch monitoring and minimization must be included in the draft vermilion plan.

I urge the GMFMC, at their July 2004 meeting in Houston, Texas, to review and then act on the best scientific information available and recommend management measures that will rebuild vermilion snapper as soon as possible, without further harming red snapper or other reef fish. The GMFMC must create a precautionary plan that ends overfishing and rebuilds the vermilion snapper population as soon as possible. The plan should consider use of marine protected areas, and quotas that close both vermilion and red snapper when either quota is met. The draft plan should also consider options like use of circle hooks, fishermen education, seasons and other alternatives to size limits to reduce bycatch, and use observers to monitor and report bycatch.

Thank you for considering my views on these important issues to the Gulf of Mexico.

Sincerely,

Wendy M. Carter

carterwm@bellsouth.net
(504) 733-3100 Wk
(504) 837-4820 Hm

Trish Kennedy

From: Becky Lynn Boudreaux [bboudrea@uno.edu]

Sent: Friday, July 02, 2004 1:45 PM

To: GulfCouncil

Subject: rebuilding plan for vermilion snapper

Dear Gulf of Mexico Fishery Management Council:

I am a resident of Louisiana and am writing out of deep concern for the health of the marine ecosystem, especially the depleted state of the vermilion snapper population. I understand that the Gulf of Mexico Fishery Management Council (GMFMC) is creating a rebuilding plan for vermilion snapper. I urge you to review the available science and edit the current plan to include options that will rebuild and protect this important species of fish, while being mindful of also preventing further harm to the already troubled red snapper.

Currently, the draft management plan for vermilion snapper under review in the GMFMC process does not achieve rebuilding goals required by existing law. The draft plan uses changes in size limits as a primary means of achieving rebuilding. Also, the rebuilding plan does not rebuild the species as soon as possible. Other management measures, like keeping vermilion season consistent with red snapper season to avoid unnecessary bycatch, closing both vermilion and red snapper fisheries when a quota for either is reached and marine protected areas should be considered and implemented.

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I urge the GMFMC, at their July 2004 meeting in Houston, Texas, to review and then act on the best scientific information available and recommend management measures that will rebuild vermilion snapper as soon as possible, without further harming red snapper or other reef fish. The GMFMC must create a precautionary plan that ends overfishing and rebuilds the vermilion snapper population as soon as possible. The plan should consider use of marine protected areas, and quotas that close both vermilion and red snapper when either quota is met. The draft plan should also consider options like use of circle hooks, fishermen education, seasons and other alternatives to size limits to reduce bycatch, and use observers to monitor and report bycatch.

Thank you for considering my views on these important issues to the Gulf of Mexico.

Sincerely,

Becky Boudreaux
Graduate Research Assistant
University of New Orleans
Center for Hazard Assessment, Response and Technology (CHART)
(504) 280-5760

Trish Kennedy

From: nikki adame [madame@law.tulane.edu]
Sent: Friday, July 02, 2004 10:27 AM
To: GulfCouncil
Subject: Vermilion Snapper Rebuilding Plan is Inadequate

Dear Gulf of Mexico Fishery Management Council:

I am a resident of Texas and am writing out of deep concern for the health of the marine ecosystem, especially the depleted state of the vermilion snapper population. I understand that the Gulf of Mexico Fishery Management Council (GMFMC) is creating a rebuilding plan for vermilion snapper. I urge you to review the available science and edit the current plan to include options that will rebuild and protect this important species of fish, while being mindful of also preventing further harm to the already troubled red snapper.

Currently, the draft management plan for vermilion snapper under review in the GMFMC process does not achieve rebuilding goals required by existing law. The draft plan uses changes in size limits as a primary means of achieving rebuilding. Also, the rebuilding plan does not rebuild the species as soon as possible. Other management measures, like keeping vermilion season consistent with red snapper season to avoid unnecessary bycatch, closing both vermilion and red snapper fisheries when a quota for either is reached and marine protected areas should be considered and implemented.

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I urge the GMFMC, at their July 2004 meeting in Houston, Texas, to review and then act on the best scientific information available and recommend management measures that will rebuild vermilion snapper as soon as possible, without further harming red snapper or other reef fish. The GMFMC must create a precautionary plan that ends overfishing and rebuilds the vermilion snapper population as soon as possible. The plan should consider use of marine protected areas, and quotas that close both vermilion and red snapper when either quota is met. The draft plan should also consider options like use of circle hooks, fishermen education, seasons and other alternatives to size limits to reduce bycatch, and use observers to monitor and report bycatch.

Thank you for considering my views on these important issues to the Gulf of Mexico.

Sincerely,

M. Nicole Adame
764 Dahlia Ct.
El Paso, Texas 79922-2015

Trish Kennedy

From: pamartin [pamartin@acadiacom.net]

Sent: Thursday, July 01, 2004 4:12 PM

To: GulfCouncil

Subject: Vermillion Snapper

Dear Gulf of Mexico Fishery Management Council:

I am a resident of Louisiana, and am writing out of deep concern for the health of the marine ecosystem, especially the depleted state of the vermilion snapper population. I understand that the Gulf of Mexico Fishery Management Council (GMFMC) is creating a rebuilding plan for vermilion snapper. I urge you to review the available science and edit the current plan to include options that will rebuild and protect this important species of fish, while being mindful of also preventing further harm to the already troubled red snapper.

Currently, the draft management plan for vermilion snapper under review in the GMFMC process does not achieve rebuilding goals required by existing law. The draft plan uses changes in size limits as a primary means of achieving rebuilding. Also, the rebuilding plan does not rebuild the species as soon as possible. . Other management measures, like keeping vermilion season consistent with red snapper season to avoid unnecessary bycatch, closing both vermilion and red snapper fisheries when a quota for either is reached and marine protected areas should be considered and implemented.

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I urge the GMFMC, at their July 2004 meeting in Houston, Texas, to review and then act on the best scientific information available and recommend management measures that will rebuild vermilion snapper as soon as possible, without further harming red snapper or other reef fish. The GMFMC must create a precautionary plan that ends overfishing and rebuilds the vermilion snapper population as soon as possible. The plan should consider use of marine protected areas, and quotas that close both vermilion and red snapper when either quota is met. The draft plan should also consider options like use of circle hooks, fishermen education, seasons and other alternatives to size limits to reduce bycatch, and use observers to monitor and report bycatch.

Thank you for considering my views on these important issues to the Gulf of Mexico.

Sincerely,
Pamela Lopes Morgan

Trish Kennedy

From: Melinda LeBoeuf [melindaleboeuf@hotmail.com]
Sent: Thursday, July 01, 2004 3:43 PM
To: GulfCouncil
Subject: Vermilion Snapper

Dear Gulf of Mexico Fishery Management Council:

I am a resident of Shoreacres, Texas and am writing out of deep concern for the health of the marine ecosystem, especially the depleted state of the vermilion snapper population. I understand that the Gulf of Mexico Fishery Management Council (GMFMC) is creating a rebuilding plan for vermilion snapper. I urge you to review the available science and edit the current plan to include options that will rebuild and protect this important species of fish, while being mindful of also preventing further harm to the already troubled red snapper.

Currently, the draft management plan for vermilion snapper under review in the GMFMC process does not achieve rebuilding goals required by existing law. The draft plan uses changes in size limits as a primary means of achieving rebuilding. Also, the rebuilding plan does not rebuild the species as soon as possible. . Other management measures, like keeping vermilion season consistent with red snapper season to avoid unnecessary bycatch, closing both vermilion and red snapper fisheries when a quota for either is reached and marine protected areas should be considered and implemented.

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I urge the GMFMC, at their July 2004 meeting in Houston, Texas, to review and then act on the best scientific information available and recommend management measures that will rebuild vermilion snapper as soon as possible, without further harming red snapper or other reef fish. The GMFMC must create a precautionary plan that ends overfishing and rebuilds the vermilion snapper population as soon as possible. The plan should consider use of marine protected areas, and quotas that close both vermilion and red snapper when either quota is met. The draft plan should also consider options like use of circle hooks, fishermen education, seasons and other alternatives to size limits to reduce bycatch, and use observers to monitor and report bycatch.

Thank you for considering my views on these important issues to the Gulf of Mexico.

Sincerely,

Melinda LeBoeuf
210 Meadowlawn Street
Shoreacres, TX 77571

Trish Kennedy

From: Sarah Ridgway [sridgway@conservefish.org]
Sent: Thursday, July 01, 2004 2:38 PM
To: GulfCouncil
Subject: Protect Vermilion Snapper!

Dear Gulf of Mexico Fishery Management Council:

I am a resident of South Florida and am writing out of deep concern for the health of the marine ecosystem, especially the depleted state of the vermilion snapper population. I understand that the Gulf of Mexico Fishery Management Council (GMFMC) is creating a rebuilding plan for vermilion snapper. I urge you to review the available science and edit the current plan to include options that will rebuild and protect this important species of fish, while being mindful of also preventing further harm to the already troubled red snapper.

Currently, the draft management plan for vermilion snapper under review in the GMFMC process does not achieve rebuilding goals required by existing law. The draft plan uses changes in size limits as a primary means of achieving rebuilding. Also, the rebuilding plan does not rebuild the species as soon as possible. . Other management measures, like keeping vermilion season consistent with red snapper season to avoid unnecessary bycatch, closing both vermilion and red snapper fisheries when a quota for either is reached and marine protected areas should be considered and implemented.

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I urge the GMFMC, at their July 2004 meeting in Houston, Texas, to review and then act on the best scientific information available and recommend management measures that will rebuild vermilion snapper as soon as possible, without further harming red snapper or other reef fish. The GMFMC must create a precautionary plan that ends overfishing and rebuilds the vermilion snapper population as soon as possible. The plan should consider use of marine protected areas, and quotas that close both vermilion and red snapper when either quota is met. The draft plan should also consider options like use of circle hooks, fishermen education, seasons and other alternatives to size limits to reduce bycatch, and use observers to monitor and report bycatch.

Thank you for considering my views on these important issues to the Gulf of Mexico.

Sincerely,
Sarah Ridgway
2616 NW 37th St
Boca Raton, FL 33434

Trish Kennedy

From: Mary Turnipseed [mturnips@hotmail.com]
Sent: Monday, July 05, 2004 8:40 AM
To: GulfCouncil

Dear Gulf of Mexico Fishery Management Council:

I am a resident of Georgia and am writing out of deep concern for the health of the marine ecosystem, especially the depleted state of the vermilion snapper population. I understand that the Gulf of Mexico Fishery Management Council (GMFMC) is creating a rebuilding plan for vermilion snapper. I urge you to review the available science and edit the current plan to include options that will rebuild and protect this important species of fish, while being mindful of also preventing further harm to the already troubled red snapper.

Currently, the draft management plan for vermilion snapper under review in the GMFMC process does not achieve rebuilding goals required by existing law. The draft plan uses changes in size limits as a primary means of achieving rebuilding. Also, the rebuilding plan does not rebuild the species as soon as possible. . Other management measures, like keeping vermilion season consistent with red snapper season to avoid unnecessary bycatch, closing both vermilion and red snapper fisheries when a quota for either is reached and marine protected areas should be considered and implemented.

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I urge the GMFMC, at their July 2004 meeting in Houston, Texas, to review and then act on the best scientific information available and recommend management measures that will rebuild vermilion snapper as soon as possible, without further harming red snapper or other reef fish. The GMFMC must create a precautionary plan that ends overfishing and rebuilds the vermilion snapper population as soon as possible. The plan should consider use of marine protected areas, and quotas that close both vermilion and red snapper when either quota is met. The draft plan should also consider options like use of circle hooks, fishermen education, seasons and other alternatives to size limits to reduce bycatch, and use observers to monitor and report bycatch.

Thank you for considering my views on these important issues to the Gulf of Mexico.

Sincerely,

Mary Turnipseed

Trish Kennedy

From: Micah Walker Parkin [mwalker@all4energy.org]
Sent: Friday, July 02, 2004 6:01 PM
To: GulfCouncil
Subject: vermilion snapper population

Dear Gulf of Mexico Fishery Management Council:

I am a resident of Louisiana and am writing out of deep concern for the health of the marine ecosystem, especially the depleted state of the vermilion snapper population. I understand that the Gulf of Mexico Fishery Management Council (GMFMC) is creating a rebuilding plan for vermilion snapper. I urge you to review the available science and edit the current plan to include options that will rebuild and protect this important species of fish, while being mindful of also preventing further harm to the already troubled red snapper.

Currently, the draft management plan for vermilion snapper under review in the GMFMC process does not achieve rebuilding goals required by existing law. The draft plan uses changes in size limits as a primary means of achieving rebuilding. Also, the rebuilding plan does not rebuild the species as soon as possible. . Other management measures, like keeping vermilion season consistent with red snapper season to avoid unnecessary bycatch, closing both vermilion and red snapper fisheries when a quota for either is reached and marine protected areas should be considered and implemented.

Additionally, draft plan makes no attempt to monitor or minimize vermilion

snapper bycatch, rather it pushes this off to the future and it also ignores
the fact that vermilion snapper is used as bait for other fisheries. This id
unacceptable. Bycatch monitoring and minimization must be included in the
draft vermilion plan.

I urge the GMFMC, at their July 2004 meeting in Houston, Texas, to review
and then act on the best scientific information available and recommend
management measures that will rebuild vermilion snapper as soon as possible,
without further harming red snapper or other reef fish. The GMFMC must
create a precautionary plan that ends overfishing and rebuilds the vermilion
snapper population as soon as possible. The plan should consider use of
marine protected areas, and quotas that close both vermilion and red snapper
when either quota is met. The draft plan should also consider options like
use of circle hooks, fishermen education, seasons and other alternatives to
size limits to reduce bycatch, and use observers to monitor and report
bycatch.

Thank you for considering my views on these important issues to the Gulf of
Mexico.

Sincerely,

Micah Walker Parkin

338 Baronne St., Suite 200

New Orleans, LA 70112 (504) 525-0779 (fax)

(504) 525-0778 or (504) 258-1247 (mobile) mwalker@all4energy.org

Trish Kennedy

From: Alexander Stone [a_stone@reefguardian.org]
Sent: Monday, July 12, 2004 8:23 AM
To: GulfCouncil
Subject: Vermilion Snapper Draft Rebuilding Plan

July 9, 2004

To: Gulf of Mexico Fishery Mgmt Council
The Commons at Rivergate
3018 N. U.S. Highway 301 -- Suite 1000
Tampa, FL 33619-2271

re: Vermilion Snapper Draft Rebuilding Plan

Dear Council Members:

ReefGuardian International commends you for working to develop a rebuilding plan for vermilion snapper. However, we urge you to consider the following points as you develop that plan.

ReefGuardian urges you NOT to rely on minimum size limits as a preferred rebuilding management measure. Yes, it looks good on paper that an increased minimum size limit would allow fish to grow older and be more reproductively productive before being caught. BUT the realities of undersize bycatch and discard mortality strongly argue against relying on minimum size limits to manage this fishery. We urge you NOT to do it.

ReefGuardian uges you NOT to use economic or social arguments to delay the rebuilding of this species. You know the law calls for rebuilding of this stock as soon as possible. In reality, doing that would be the best step you could take towards improving the economic and social context of the vermilion snapper fishery.

ReefGuardian strongly urges you to expand the suite of management measures being considered for this plan. If you don't, you may find all your work go for nothing when it gets rejected either by NOAA Fisheries or a court of law based on NEPA deficiencies. It is therefore imperative that the plan give real consideration and offer management measures based on seasonal closures, spawning aggregation site protection, red snapper/vermilion snapper either-or quota closures, as well as other measures suggested in your administrative record.

In particular, we strongly urge you to give real consideration to connected quota closures for red and vermilion snappers, since each of those fisheries has proven to have high potential for bycatch of the other species. A quota closure, such as has just been activated by NOAA Fisheries for the deepwater grouper complex, is the most likely way to ensure that vermilion snapper -- as well as red -- are placed on proper paths to stock recovery.

Thank you for your attention.

Sincerely,

Alexander Stone
Director
ReefGuardian International
2829 Bird Avenue - Suite 5-162
Miami, FL 33133

Trish Kennedy

From: Nancy [infchoice2@webtv.net]
Sent: Friday, July 16, 2004 2:35 AM
To: GulfCouncil
Subject: Plan for Vermilion Snapper Population

Gulf of Mexico Fishery Management Council The Commons at Rivergate
3018 N. U.S. Highway 301
Suite 1000
Tampa, FL 33619-2271

Dear Gulf of Mexico Fishery Management Council:

I am a resident of Louisiana and am writing out of deep concern for the health of the marine ecosystem, especially the depleted state of the vermilion snapper population. I understand that the Gulf of Mexico Fishery Management Council (GMFMC) is creating a rebuilding plan for vermilion snapper. I urge you to review the available science and edit the current plan to include options that will rebuild and protect this important species of fish, while being mindful of also preventing further harm to the already troubled red snapper.

Currently, the draft management plan for vermilion snapper under review in the GMFMC process does not achieve rebuilding goals required by existing law. The draft plan uses changes in size limits as a primary means of achieving rebuilding. Also, the rebuilding plan does not rebuild the species as soon as possible. . Other management measures, like keeping vermilion season consistent with red snapper season to avoid unnecessary bycatch, closing both vermilion and red snapper fisheries when a quota for either is reached and marine protected areas should be considered and implemented.

Additionally, draft plan makes no attempt to monitor or minimize vermilion snapper bycatch, rather it pushes this off to the future and it also ignores the fact that vermilion snapper is used as bait for other fisheries. This is unacceptable. Bycatch monitoring and minimization must be included in the draft vermilion plan.

I urge the GMFMC, at their July 2004 meeting in Houston, Texas, to review and then act on the best scientific information available and recommend management measures that will rebuild vermilion snapper as soon as possible, without further harming red snapper or other reef fish. The GMFMC must create a precautionary plan that ends overfishing and rebuilds the vermilion snapper population as soon as possible. The plan should consider use of marine protected areas, and quotas that close both vermilion and red snapper when either quota is met. The draft plan should also consider options like use of circle hooks, fishermen education, seasons and other alternatives to size limits to reduce bycatch, and use observers to monitor and report bycatch.

Thank you for considering my views on these important issues to the Gulf of Mexico.

Sincerely,

Nancy Hirschfeld
1301 Howze Beach Road
Slidell, LA 70458-8503

Trish Kennedy

From: daltomar@bellsouth.net

Sent: Sunday, July 25, 2004 9:29 PM

To: GulfCouncil

Subject: snapper

Dear Gulf of Mexico Fishery Management Council:

I am a resident of Mississippi and am writing out of deep concern for the health of the marine ecosystem, especially the depleted state of the vermilion snapper population. I understand that the Gulf of Mexico Fishery Management Council (GMFMC) is creating a rebuilding plan for vermilion snapper. I urge you to review the available science and edit the current plan to include options that will rebuild and protect this important species of fish, while being mindful of also preventing further harm to the already troubled red snapper.

Currently, the draft management plan for vermilion snapper under review in the GMFMC process does not achieve rebuilding goals required by existing law. The draft plan uses changes in size limits as a primary means of achieving rebuilding. Also, the rebuilding plan does not rebuild the species as soon as possible. Other management measures, like keeping vermilion season consistent with red snapper season to avoid unnecessary bycatch, closing both vermilion and red snapper fisheries when a quota for either is reached and marine protected areas should be considered and implemented.

Additionally, the draft plan makes no attempt to monitor or minimize vermilion snapper bycatch, rather it pushes this off to the future and it also ignores the fact that vermilion snapper is used as bait for other fisheries. This is unacceptable. Bycatch monitoring and minimization must be included in the draft vermilion plan.

The GMFMC must create a precautionary plan that ends overfishing and rebuilds the vermilion snapper population as soon as possible. The plan should consider use of marine protected areas, and quotas that close both vermilion and red snapper when either quota is met. The draft plan should also consider options like use of circle hooks, fishermen education, seasons and other alternatives to size limits to reduce bycatch, and use observers to monitor and report bycatch.

Thank you for considering my views on these important issues to the Gulf of Mexico.

Sincerely,

Denise Bonck
169 Homer Ladner Rd.
Poplarville, MS 39470

August 25, 2004

Gulf of Mexico Fisheries Management Council
The Commons at Rivergate
3018 North U.S. Highway 301, Suite 1000
Tampa, Florida 33619-2272

I'm David Walker a commercial fisherman from Alabama who is seriously concerned about this council's possible decision of implementing an increased size limit that will destroy the vermillion snapper fishery. I will emphasize to you valid experienced observational facts that I have witnessed for several years plying the Gulf of Mexico. Increased size limits in vermillion will create a reprehensible grotesque consequence that will take numerous years to counter. Also, closures lasting longer than one week will destroy our markets because of supply conflicts.

I have witness the effects of increased size limits in the red snapper fishery and the consequences are wasting so many fish that the stock may crash. Using wisdom and logic from my personal experiences I advise this council to reject any size limit increase. It would be absurd to allow increase size limits because no reasoning validates such an atrocity. Concrete observational facts support my disapproval of increased size limits and disregard for the truth will impose affliction on all sectors.

If a closure is needed I recommend one on the <u>last week</u> of <u>each month</u> for as many months needed to reach management goals. These closures should coincide with the red snapper derby to reduce regulatory discards. TAC and one week closures each month would be the best solution at this time. Ideally a good IFQ program would better suit our goals in rebuilding the stocks and the council should get this done before vermillion heads towards a crash. I get paid by the pound so proper management is very important to my livelihood. This council is at the crossroads now I only hope you make the appropriate decision. Suspending this issue for the time being will prove wiser that making an unconscious one.

In conclusion, I recommend either you suspend your decision rather than rapidly implementing undesirable management or use one week closures taking place the last week of each month. The truth is that unwarranted decisions will neglect the resource promoting widespread direct or indirect destruction. It's the council's responsibility to implement quality management conducive to NMFS requirements. The vermillion snapper rebuilding plan is in need of an overhaul using acceptable and rationale data to obtain a more desirable result. Council's obligations must remain steadfast in fulfilling it duties to orchestrate improved fisheries management.

Sincerely,

David Walker
401 Diane Drive
Andalusia, Alabama 36420

... to craft your own letter. Let them know you care!

Gulf of Mexico Fishery Management Council
The Commons at Rivergate
3018 N. U.S. Highway 301, Suite 1000
Tampa, FL 33619-2271
gulfcouncil@gulfcouncil.org

RECEIVED
SEP 14 2004
GULF FISHERIES CO

September 1, 2004

Dear Sir or Madam:

I am a resident of one of the states bordering the Gulf of Mexico who is writing out of deep concern for the health of the marine ecosystem in the Gulf, especially the depleted state of the vermilion snapper population. Given that vermilion and red snappers are frequently found and caught together or killed as bycatch when the other is targeted, I also am writing about the impact of vermilion management on red snapper and ask the GMFMC to consider ecosystem interactions when managing individual species.

I understand that the GMFMC is creating a rebuilding plan for vermilion snapper. I urge you to review the available science and edit the current plan to include options that will more effectively rebuild and protect the population of this important species of fish, while also being mindful of preventing further harm to the red snapper. Currently, the draft management plan for vermilion snapper under review does not achieve rebuilding goals in accordance with existing law. The target rebuilding date (within 10 years) is the maximum under the law, but the law also requires that the species be rebuilt as soon as possible.

The draft plan uses changes in size limits as a primary means of rebuilding. Other management measures that should be considered and implemented include keeping vermilion season consistent with red snapper season to avoid unnecessary bycatch, closing both vermilion and red snapper fisheries when a quota for either is reached, and creating marine protected areas for both vermilion and red snapper spawning areas.

Worst of all, the draft plan makes no attempt to monitor or minimize vermilion bycatch, and it ignores use of vermilion as a bait fish for other fisheries. This is unacceptable. Bycatch monitoring and minimization are key components of successful management plans and must be included in the draft vermilion plan.

I urge the GMFMC to review and then act on the best scientific information available and recommend management measures that will rebuild vermilion snapper without further harm to red snapper or other reef fish. Thank you for considering my views on these important issues to the Gulf of Mexico.

Sincerely,

Your Name Here

Mrs. Patricia A. Howell

Patricia Ann Howell
283 McCool St
Ocean Springs, MS 39564-4047

RECEIVED

OCT 12 2004

GULF FISHERIES COUNCIL

BRAND & FRULLA
A PROFESSIONAL CORPORATION
923 FIFTEENTH STREET, N.W.
WASHINGTON, D.C. 20005

TELEPHONE: (202) 662-9700
TELECOPIER: (202) 737-7565

October 8, 2004

VIA FACSIMILE AND FEDERAL EXPRESS

Ms. Bobbi Walker, Chair
Gulf of Mexico Fishery Management Council
The Commons at Rivergate
3018 North U.S. Highway 301, Suite 1000
Tampa, Florida 33619-2272

Re: Draft Amendment 23 to the Reef Fish Fishery Management Plan

Dear Ms. Walker:

We represent Ariel Seafoods, Inc., of Destin, Florida. Ariel Seafoods is one of the Gulf's largest, and longest-standing, buyers of commercially harvested vermilion snapper. We submit this letter on Ariel Seafoods' behalf to oppose the Council's finalization of Amendment 23 to the Reef Fish Fishery Management Plan ("FMP") at the current time, ahead of the planned Spring 2005 stock assessment. This opposition is based on the conflicting scientific information that is currently available, analysis of the legal requirements of the Magnuson-Stevens Fishery Conservation and Management Act ("Magnuson-Stevens Act" or "MSA"), and poor use of limited Council resources that will result from serial amendments to Reef Fish FMP for this economically important, though somewhat overlooked, fishery. In fact, a delay in finalization of the draft amendment to accommodate expected new information is consistent with the requirements of the MSA, as is explained in greater detail below.

We shall first lay out the legal requirements of the Magnuson-Stevens Fishery Conservation and Management Act. 16 U.S.C. § 1801 *et seq.*, that apply to a fishery that has been declared to be overfished, as has the vermilion snapper fishery. In short, the case law all points to the conclusion that the one-year timeframe for developing management measures to end overfishing and begin a rebuilding process requires that the National Marine Fisheries Service ("NMFS") and/or a regional fishery management council have in place a **draft** fishery management plan or amendment, **not** that measures be implemented in that timeframe. Courts understand that development of complex management regimes take time given the legally required processes, and that where, as here, new information is shortly expected which may influence the management choices, the requirement that making councils and NMFS engage in reasoned decision-making may require waiting for that information to be produced.

The second section discusses the unanswered scientific questions that have arisen with respect to even the decision to list this fishery as overfished. This next spring, a new stock assessment is expected to be held that may answer many of these troubling questions. There is no requirement in law or science that compels the Gulf Council to make management decisions ahead of this workshop, or to engage in successive rulemaking processes should the scientific advice coming from the workshop differ. Indeed, the law may, in fact, require the development of a better scientific rationale ahead of finalizing this Amendment.

I. The Applicable Legal Standards

We understand that the reason that the Council considers itself compelled to finalize what appears to be a flawed amendment is because NMFS declared vermilion snapper to be overfished in October 2003, and the one-year deadline for developing a rebuilding plan contained in 16 U.S.C. § 1854(e)(3) is impending. While there is a statutory mandate is to develop an amendment within one year of a declaration that a stock is overfished, *see, e.g., NRDC v. Evans*, 168 F. Supp.2d 1149, 1157 (N.D. Cal. 2001), courts have looked at the circumstances surrounding the plan's development in deciding whether or not NMFSF is in compliance with the law.

For example, the court in *National Audubon Society v. Evans*, 2003 U.S. Dist. LEXIS 23675 (D.D.C. July 3, 2003), found that NMFS was 26 days late in preparing a "draft" Highly Migratory Species FMP. *Id.* at *20. The court held this to be a violation of § 1854(e)(3), but it denied the plaintiff the relief it sought (disapproval of parts of the FMP) because "the Secretary's and NMFS's actions show that they made diligent efforts toward completing the draft HMS FMP prior to" statutory one year deadline. *Id.* at *21. In the present case, the Council **has** completed a draft FMP, which is all the *National Audubon Society* decision said was required to be in place. *See id.* ("The parties have not pointed to any legal authority requiring defendants to complete more than a draft HMS FMP by the statutory deadline.").[1] This Council is indisputably making "diligent efforts" regarding vermilion snapper, and no court is likely to urge faster action, when many stated and pressing scientific disputes surrounding this fishery are set to shortly be resolved by what will undoubtedly become the best scientific information.

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[1] *See also Massachusetts Audubon Soc'y, Inc. v. Daley*, 31 F. Supp. 2d 189, 200 (D. Mass. 1998) (stating that although the one year period had expired, "the Agency is not required to effect species recovery as quickly as possible to the exclusion of other policy goals"); *cf. Southern Offshore Fishing Ass'n v. Daley*, 55 F. Supp. 2d 1336, 1343 (M.D. Fla. 1999) (finding that the § 1854(e)(3) requirement does not trump a court order to maintain the status quo fishing levels), vacated on settlement, 2000 WL 3317/005 (M.D. Fla, Dec. 7, 2000).

Finally, it is important to recognize that NMFS may need to review its overfished determination for vermilion snapper. An arid overfished determination, divorced from an understanding of the context of the fishery and the biological dynamics of the stock, based on an admittedly flawed stock assessment, should not drive conservation measures that will have significant adverse economic results on hook-and-line fishermen with small operations that have few other fishery options, especially when a few short months should be able to ascertain far more reliably how NMFS and the Council should proceed. In the present case, the overfished determination[2] was made on the basis of less than a full-scale assessment of the Gulf component of the stock, ahead of such a detailed review. Given that this full-scale assessment is pending, it would be prudent to hold the amendment in abeyance – perhaps even requesting that the agency revise the status of vermilion snapper to "unknown" – until the complete review of the science is completed.

The Council is obliged to act on the "best scientific information available," but that does not require the Council to ignore the shortcomings of that information detailed below, and other elements of the regulatory situation. Indeed, courts have held even arguably "precautionary" management measures to be in violation of National Standard 2 where, as in this case, the management measures found little support in science. *See Hadaja, Inc. v. Evans*, 263 F. Supp. 2d 346, 353 (D.R.I. 2003) ("While National Standard Two does not compel the use of specific analytic methods or require that an agency gather all possible scientific data before acting, the Standard does prohibit an agency from simply creating a rule based on mere political compromise.") (citing cases).[3]

Accordingly, Ariel Seafoods strongly urges the Council to postpone final action on this amendment until the results of the upcoming stock assessment are available to integrate into the management process. This will offer the Council and the public an opportunity not only to get a better handle on the biological state of the stock, but also to devise more effective management measures, if such prove to be necessary. The admittedly wasteful and counterproductive minimum size or roughly two month shutdown envisioned by Amendment 23 are simply not adequate, rational, proportionate

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[2] A federal district court in Massachusetts determined that judicial review of such a determination generally needed to occur once the tangible consequences of the rebuilding determination were evident. *Tutein v. Daley*, 43 F. Supp.2d 113, 125 (D. Mass. 1999).

[3] This result has been obtained in several cases. *See Hall v. Evans,* 165 F. Supp. 2d 114, 133 (D.R.I. 2001); *The Fishing Company of Alaska v. United States,* 195 F. Supp. 2d 1239, 1248 (W.D. Wash. 2002); *Parravano v. Babbitt,* 837 F. Supp. 1034, 1047 (N.D. Cal. 1993); *Midwater Trawlers Co-Operative v. Dept. of Commerce*, 282 F.3d 710, 720-21 (9th Cir. 2002).

responses to any problem regarding this stock. We note in passing that the Council is required to minimize regulatory discards "to the extent practicable" by National Standard Nine. 16 U.S.C. § 1851(a)(9); *see also id.* § 1853(a)(11). We submit that the minimum size measure fails the test in this instance.

II. Science Supporting this Amendment is Fatally Flawed

Draft Amendment 23 sets forth two alternatives primarily addressed to the commercial fishing sector to reduce the fishing mortality rate on vermilion snapper, the ostensible goal being to "rebuild" the resource. There is, however, little, if any, tangible record evidence that the resource needs to be rebuilt at this time. For example, results of a November 26, 2003, estimation of vermilion snapper abundance indices based on commercial catch data show that abundance of this stock has been stable over the past fourteen years, and even increasing since 2001 to the highest level, save for one year, since 1990. Turner, S., "Updated indices of abundance for vermilion snapper from the Gulf of Mexico," fig. 9 (SEFSC Nov. 26, 2003). The draft amendment itself notes:

> Based on the output from [model runs based on the recent vermilion snapper assessment], reductions needed in F to halt overfishing and rebuild the stock to B_{MSY} are between 35 percent and 60 percent **based on catch data through 1999**. Since then, both CPUE estimates and harvest have risen to levels similar to 1999 (*See* Section 4.2.1). **These changes indicate that the stock biomass has improved or that the fishery may be driven by other factors such as economics or interactions with other fisheries (*e.g.* red snapper).**

Public Hearing Draft for Amendment 23 to the Reef Fish FMP ("Draft Amendment 23"), § 5.4.1, at 57 (emphasis added). It also underscores that the "estimates produced by each model [used in the last stock assessment] were highly uncertain." *Id.* § 4.1.1, at 22. Indeed, it is our understanding that, at the time the assessment was conducted, there was general agreement among the Reef Fish Stock Assessment Panel, the Reef Fish Advisory Panel, the Scientific and Statistical Committee and the Gulf Council as a whole that stock assessment was insufficient and could not be used to make a determination on the status of stock.

In 2003, however, NMFS did declare the stock overfished. It is important to consider the overall fishery context of the declining commercial catch levels for vermilion snapper that supported the determination that the stock was overfished, though. As an historical matter, vermilion snapper landings tend to decline when catch rates and harvest opportunities are high for red snapper, and they tend to increase when the availability of red snapper declines. The precise inverse trend is occurring at present. In the late 1990's/early 2000's, when catch rates for red snapper were high, vermilion snapper catches declined – hence, the basis for the overfishing determination.

Now, over the past few years, red snapper catch opportunities have declined, and vermilion snapper catch rates have increased. These trends are not only evident in overall landings records and catch rates, but in the time series of individual trip tickets that Ariel Seafoods has examined from the last 13 years. This relationship is, as shown above, even highlighted in the draft amendment itself.

Fisheries assessment experts we have consulted have noted that, scientifically, the use of catch-based indices of stock abundance is less than ideal even when the stock so assessed is the species of primary commercial and/or recreational interest. When such fishery dependent indices (such as the "catch-per-unit-of-effort" or "CPUE" proxy used in this case) are put forward as indices of abundance for non-primary or secondary target species like vermilion snapper, these already uncertain estimates become highly vulnerable to an additional wide array of confounding factors, the implications of which need to be considered. Problems in analysis of such secondary species can occur if targeting is not adequately taken into account or the data are of poor quality. This latter problem can arise even in fisheries for which data on targeting is collected when, for example, after a trip, fishermen report the primary species landed as the target species, but in fact they had intended to catch – *i.e.*, "target" – another species. However, with respect to the reef fish fisheries, this data is not even collected, which makes analysis of these confounding relationships impossible to account for.

NMFS should take appropriate note of other cases where "target switching" appears to occur, and CPUE may not be reflective of changes in abundance only, but rather also (to some extent) of targeting. For instance, in Australia, when catches and effort data are standardized (to develop a standardized index of abundance), the catches of some bycatch species are included as covariates to attempt to account for targeting away from the primary species of interest. Possibly the example that is most closely related to the Gulf of Mexico red and vermilion snappers is that of the tiger flathead and jackass morwong which seem to vary out-of-sync, and gemfish and mirror dory which vary in-sync. We understand the latter is relevant because catch rates of mirror dory dropped when fishing for gemfish was severely regulated. However, when account was taken of the catch of gemfish, the trend in mirror dory abundance became less negative.

In short, as Ariel Seafoods understands the issue, so long as the secondary species are not naturally co-occurring with the primary species (so that their CPUEs vary up and down together as a result of environmentally induced fluctuations in availability), but rather are separated spatially or depth-wise to some (partial) extent (so that the fishermen can genuinely target one or the other), fishery-dependent abundance indices for these stocks can be skewed unless the confounding factors above are accounted for adequately. As the most recent assessment noted, this skewing is certainly a likely complication for the two snapper fisheries issue here. Indeed, the issue may be even more complex as other boats may switch between vermilion snapper fishing and triggerfish fishing, amberjack fishing and king mackerel fishing for reasons unrelated to abundance *per se* (*e.g.,* price and availability). It would be instructive to assess the landings and ex-vessel prices of these other species during the times of the supposed drop in the vermilion snapper resource, as well.

Further, and to add factual context, the directed vermilion snapper fishery occurs far offshore, in at least 240 feet of water, while the largest come from around 50 fathoms, so it is geographically separated from the red snapper fishery. Not all vertical line boats in the snapper fisheries are capable (or have the desire or wherewithal) to prosecute this fishery because it is labor intensive, the fish is smaller than red snapper, and the depths and distance at which it is prosecuted are daunting. Finally, the cost associated with a directed vermilion snapper trip is very large, with average expenses of around $3500 to $4000 per vessel/per trip. That is much higher than a directed red snapper trip, even when fishing on the class 1/2000 pound per day permits.

Thus, while all boats will target red snapper over vermilion when they can, only some boats will, to greater or lesser extents, exclusively target vermilion snapper. It is this information which Ariel Seafoods does not believe is being taken into account in the assessment process. Fishermen and shore-side operators who depend on this fishery request that this important aspect of the problem be examined in the upcoming stock assessment, and that precipitous management action be postponed until this highly relevant information is considered, in order to facilitate rational decision-making. *See Motor Vehicle Mfrs. Ass'n. v. State Farm Mut. Auto Ins. Co.*, 463 U.S. 29, 43 (1983) (holding that an agency's action is arbitrary and capricious if it provides no rational connection between the facts found and the choices made, or entirely omits consideration of relevant factors or important aspects of the problem at hand).

There are also other unresolved biological issues that should not be forgotten in considering the potential flaws in the vermilion snapper assessment. First, vermilion snapper do not always grow as they age, which may bias assessment results toward considering the age structure of the stock to be more truncated than it actually is.[4] Second, it appears that vermilion snapper, at the very least, spawn several times during

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[4] Hood, P. B. and A. K. Johnson. 1997. A study of the age structure, growth, maturity schedules and fecundity of gray triggerfish, red porgy, and vermilion snapper from the Eastern Gulf of Mexico. FDEP/FMRI. MARFIN Award No. NAS57FF0289. We note that this study was referenced in the August 1998 Report of the Reef Fish Stock Assessment Panel (Revised) and represents the most recent investigation of age/length relationships for vermilion snapper, but was discarded by the SAP because it did not agree with earlier studies. *See* 1998 SAP Report at 4. We cannot judge the appropriateness of this decision, but it seems that the latest information should be utilized.

a May to September spawning season,[5] and all are sexually mature by age two, with 69 percent of females sexually mature at age zero (84 percent at age one),[6] rendering the stock more resistant to fishing. Indeed, the Panama City laboratory has apparently stated that vermilion snapper have a spawning frequency of 90 times per spawn, or every other day for 180 days a year (although this data has reportedly not been used in the assessment). These biological points render it questionable whether the Council would be well-advised to calibrate its risk-aversion in the manner that it appears poised to do.

Hopefully, the new stock assessment for Gulf of Mexico stock of vermilion snapper will address some of these questions that appear to be unresolved. It is important to note, at this juncture, that NMFS significantly revised its estimate about the level of F reduction needed for red grouper, from a 40-plus percent reduction to about a 10 percent reduction, based on a new assessment that used updated information and refined assessment techniques. The same policy considerations should apply in this instance.

III. Conclusion

There are strong reasons to wait a few months to allow the science on this fishery to consider important unresolved aspects of the fishery and the resource itself. As the draft amendment itself notes, the industry is facing certain losses over the first five years of the management plan, and the costs of some measures, most specifically the minimum size,[7] will never be recovered in the time period in which these measures have been analyzed. Draft Amendment 23, at x, xii. This is a labor intensive, deep

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5 Southeastern Fishery Science Center, The Vermilion Snapper, *available at* www.sefscpanamalab.noaa.gov/biopro/vermilion_snapper.htm (citing Nelson,1988; Hood and Johnson, 1999).

6 Second SEDAR Process, Report of the Vermilion Snapper Assessment Workshop, at 5 (Jan. 6-10, 2003) (assessing the South Atlantic stock).

7 Ariel Seafoods vehemently opposes the use of minimum sizes as a control in both the vermilion and red snapper fisheries. The minimum size is a tool that has no conservation benefit – all fish brought up from the depths at which the fishery operates do not survive. More importantly there is a very weak relationship between the size and age of vermilion snapper, *see* Allman, *et al.,* Report of the Vermilion Snapper Otolith Aging; 1994-2001 Data Summary, at 7 (SEFSC May 21, 2001); Hood & Johnson, *supra* n.3, so that enforcing minimum sizes does not even have the weak virtue of helping to protect spawning populations (as it does when survival rates are high, and immature fish are being protected).

water hook-and-line fishery that simply does not lend itself to massive increases in effort. It, rather, has traditionally served as a relief valve when red snapper catch rates declined. Absent tangible evidence that effort is increasing dramatically and disproportionately to effort shifts in prior instances when substitution was made from red to vermilion snapper, the Council should not shut this relief valve.

Ariel Seafoods looks forward to continuing to work with the Gulf Council as it manages this important stock. The Council should not rush into adopting an ill-considered set of management measures before the full state of the stock is reasonably known. Thank you for considering these comments.

Respectfully submitted,

BRAND & FRULLA, P.C.
David E. Frulla
Shaun M. Gehan
Counsel to Ariel Seafoods, Inc.

cc: Roy Crabtree
Members of the Gulf Council