FINAL

SNAPPER GROUPER AMENDMENT 15A

December 2007

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ABBREVIATIONS AND ACRONYMS

ABC	Allowable biological catch
ACCSP	Atlantic Coastal Cooperative Statistics Program
ACL	Annual Catch Limits
APA	Administrative Procedures Act
ASMFC	Atlantic States Marine Fisheries Commission
B	A measure of stock biomass either in weight or other appropriate unit
B_{MSY}	The stock biomass expected to exist under equilibrium conditions when fishing at F_{MSY}
B_{OY}	The stock biomass expected to exist under equilibrium conditions when fishing at F_{OY}
B_{CURR}	The current stock biomass
CEA	Cumulative Effects Analysis
CEQ	Council on Environmental Quality
CFMC	Caribbean Fishery Management Council
CPUE	Catch per unit effort
CRP	Cooperative Research Program
CZMA	Coastal Zone Management Act
DEIS	Draft Environmental Impact Statement
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EFH-HAPC	Essential Fish Habitat - Habitat Area of Particular Concern
EIS	Environmental Impact Statement
ESA	Endangered Species Act of 1973
F	A measure of the instantaneous rate of fishing mortality
$F_{30\%SPR}$	Fishing mortality that will produce a static SPR = 30%.
$F_{45\%SPR}$	Fishing mortality that will produce a static SPR = 45%.
F_{CURR}	The current instantaneous rate of fishing mortality
F_{MSY}	The rate of fishing mortality expected to achieve MSY under equilibrium conditions and a corresponding biomass of B_{MSY}
F_{OY}	The rate of fishing mortality expected to achieve OY under equilibrium conditions and a corresponding biomass of B_{OY}
FEIS	Final Environmental Impact Statement
FMP	Fishery management plan
FMU	Fishery management unit
FONSI	Finding of No Significant Impact
GFMC	Gulf of Mexico Fishery Management Council
IFQ	Individual fishing quota
M	Natural mortality rate
MARFIN	Marine Fisheries Initiative
MARMAP	Marine Resources Monitoring Assessment and Prediction Program
MBTA	Migratory Bird Treaty Act
MFMT	Maximum Fishing Mortality Threshold
MMPA	Marine Mammal Protection Act of 1972

MRFSS	Marine Recreational Fisheries Statistics Survey
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MSST	Minimum Stock Size Threshold
MSY	Maximum Sustainable Yield
NEPA	National Environmental Policy Act of 1969
NMFS	National Marine Fisheries Service
NMSA	National Marine Sanctuary Act
NOAA	National Oceanic and Atmospheric Administration
OY	Optimum Yield
R	Recruitment
RFA	Regulatory Flexibility Act
RIR	Regulatory Impact Review
SAFE Report	Stock Assessment and Fishery Evaluation Report
SAMFC	South Atlantic Fishery Management Council
SDDP	Supplementary Discard Data Program
SEDAR	Southeast Data, Assessment, and Review
SEFSC	Southeast Fisheries Science Center
SERO	Southeast Regional Office
SFA	Sustainable Fisheries Act
SIA	Social Impact Assessment
SSC	Scientific and Statistical Committee
TAC	Total allowable catch
TL	Total length
T_{MIN}	The length of time in which a stock could rebuild to B_{MSY} in the absence of fishing mortality
USCG	U.S. Coast Guard

AMENDMENT 15A TO THE FISHERY MANAGEMENT PLAN FOR THE SNAPPER GROUPER FISHERY OF THE SOUTH ATLANTIC REGION

INCLUDING A FINAL ENVIRONMENTAL IMPACT STATEMENT, INITIAL REGULATORY FLEXIBILITY ANALYSIS, REGULATORY IMPACT REVIEW AND SOCIAL IMPACT ASSESSMENT/FISHERY IMPACT STATEMENT

Proposed actions: Update select management reference points for the snowy grouper (*Epinephelus niveatus*), red porgy (*Pagrus pagrus*), and black sea bass stocks (*Centropristis striata*); Modify rebuilding schedules for the snowy grouper and black sea bass stocks; and Define rebuilding strategies for the snowy grouper, red porgy, and black sea bass stocks.

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RESPONSES TO COMMENTS

The following section satisfies NEPA's requirement for responding to comments on the draft environmental impact statement (DEIS). NEPA requires that a federal agency shall respond to comments on the DEIS by one or more of the following means: 1) Modify an existing alternative, 2) develop and analyze a new alternative, 3) supplement, improve, or modify the analyses, 4) make factual corrections, or 5) explain why the comments do not warrant further agency response, citing the sources, authorities, or reasons which support the agency's position. In an effort to satisfy the fifth requirement mentioned above, the following section responds to written comments generated during the comment period for the Fishery Management Plan (FMP) and DEIS, in addition to those received as verbal testimony during the public hearings.

The first section summarizes and responds to Environmental Protection Agency (EPA) comments on the DEIS, which received an LO (Lack of Objections) rating from that agency. The remaining sections summarize and respond to comments received from the Ocean Conservancy, North Carolina Division of Marine Fisheries, and the general public.

I. EPA Comments

Comment 1 (No Action MSY & OY): *The summary table (pg. XX) for the alternatives for the three species considered does not always include data for the "MSY value" and "OY value". The MSY and OY weight data for the alternatives presented can therefore not be compared to the current condition. Were such data not available from current fishery management?*

<u>Response</u>: Previous amendments did not specify MSY for snowy grouper or black sea bass. The MSY value for red porgy, however, was specified through Amendment 12 to the Snapper Grouper FMP and is outlined in the no action alternative. No amendments have provided OY values for the species. Thus, the Council decided not to include the MSY values for snowy grouper and black sea bass or the OY values for snowy grouper, black sea bass, and red porgy in the no action alternative. In order to determine the poundage under the current MSY and OY definitions, $F_{30\%SPR}$ and $F_{45\%SPR}$ would need to be calculated for snowy grouper and red porgy and $F_{30\%SPR}$ and $F_{40\%SPR}$ for black sea bass. The analyses in Section 4 compare the expected environmental effects of the action alternatives to the no action alternative; the MSY (snowy grouper and black sea bass) and OY (snowy grouper, black sea bass, and red porgy) for the no-action alternative is calculated using the current estimate of SSB_{MSY}.

Comment 2 (Snowy Grouper MSST): *It is unclear why the preferred MSST Alternative 3 (pg. XXI) is a lower whole weight value compared to the no action (status quo), given that the snowy grouper is currently overfished. It would seem that a higher level (i.e., stock is considered overfished sooner) might allow for a faster recovery of the resource.*

Response: MSST serves as a trigger for when a rebuilding plan would be established. The current definition of MSST is SSB_{MSY}((1-M) or 0.5, whichever is greater) where M equals the natural mortality rate. The MSST value produced by this equation is the greatest of all alternatives. As natural mortality rate for snowy grouper is low (0.12), the MSST value is similar to SSB_{MSY}.

Because M is small, the current definition of MSST would trigger a rebuilding plan if biomass fell slightly below B_{MSY}. However, natural variation in recruitment could cause stock biomass to 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. Therefore, Alternative 1 could result in potential administrative complications associated with setting MSST close to B_{MSY}.

The MSST value of the Council's preferred alternative (Alternative 3) would establish MSST at 75% of SSB_{MSY}; this produces a value lower than the value produced by the no action alternative. Alternative 3 would establish a larger buffer between what is considered to be an overfished and rebuilt condition thereby reducing administrative complications. Furthermore, Alternative 3 would be less risky than Alternative 2, which would allow stock biomass to decrease to as little as 50% of the MSY level before an overfished determination was made, regardless of stock productivity.

The SEDAR 4 (2004) stock assessment indicates snowy grouper is 18% of SSB_{MSY}. Regardless of which MSST definition is chosen, snowy grouper is overfished and biomass is well below the threshold that would trigger a rebuilding plan.

Comment 3 (Recovery Schedules – Black Sea Bass): *A 10-year recovery seems reasonable; however, given that management started in 1991, this would result in a cumulative 25 year recovery period assuming success by 2016. Alternative 3 (8-yr recovery or 23 total yrs by 2014) should also be further considered since it would reduce the recovery time.*

Response: The Council is not extending the current rebuilding schedule but rather is establishing a new rebuilding schedule based on a SEDAR stock assessment. The Council's preferred rebuilding schedule for black sea is 10 years, beginning in 2006. However, the preferred rebuilding strategy alternative is projected to rebuild 2 years sooner than the other alternatives (in 8 years).

Comment 4 (Recovery Schedules – Snowy Grouper): *The current no action recovery schedule is a 15-year schedule that started in 1991 (pg. XXI). The DEIS-identified preferred Alternative 4 proposes a schedule of 34 years, with 2006 being Year 1. Cumulatively, this would equal to a 48 year schedule since 1991. This seems excessive and should be discussed in the FElS with possible reductions in TAC considered to expedite the recovery. We agree that Alternative 2 would not seem reasonable since it proposes no fish mortality (no fishing) and note that Alternative 3 still proposes a long recovery (23.5 yrs starting with 2006 and a total of 37.5 yrs since 1991). We therefore suggest that another alternative between Alternatives 2 and 3 be considered because of its intermediate recovery schedule that is less than 3 and more than 2 (to allow some harvesting), and notably less than 4. Also, is a recovery time as long as 34 or 48 years consistent with MSA?*

Response: The Council is not extending the current rebuilding schedule but rather is establishing a new rebuilding schedule based on a SEDAR stock assessment. The 34-year timeframe to rebuild the snowy grouper stock in the South Atlantic is the greatest allowed by the Magnuson-Stevens Act as the generation time of snowy grouper is 24 years. Rebuilding schedules of 12 and 23.5 years (Alternatives 2 and 3, respectively) would not be expected to rebuild the snowy grouper stock to the biomass at the maximum sustainable yield, even if retention of snowy grouper is entirely prohibited. Snowy grouper is part of a multi-species fishery. The allowable catch was decreased through Amendment 13C to the extent that fishermen are now retaining only bycatch. As release mortality is 100%, it is expected these fish would still be caught and would die when fishermen target co-occurring species. The Council is considering the formation of a Deepwater Snapper Grouper Unit in Amendment 17 to the Snapper Grouper FMP. This unit could contain snowy grouper, golden tilefish, misty grouper, and other similar snapper and grouper species found in deeper waters. The Council believes that such an action would decrease the discard of these species with high release mortality rates.

Comment 5 (Recovery Schedules – Red Porgy): *No recovery schedule was proposed. We assume that the existing schedule is ongoing and is still considered adequate. The FEIS should discuss this.*

Response: In Section 4.2 of the DEIS it is stated that Amendment 12 (2000) established an 18 year rebuilding schedule for red porgy. The rebuilding period began in 1999 and ends in 2017 and is not being changed by the Council. This information is included in the FEIS.

Comment 6 (Ecosystems Management): *We suggest, consistent with the ecosystem management approach, that such co-occurring species be managed together with the snowy grouper for the benefit of the snowy grouper, in order that the recovery time of the grouper be reduced to a more reasonable timeframe.*

Response: The Council is considering the formation of a Deepwater Snapper Grouper Unit in Amendment 17 to the Snapper Grouper FMP. This unit could contain snowy grouper, golden tilefish, misty grouper, and other similar snapper and grouper species found in deeper waters. The Council is also considering creating an aggregate quota and trip limit for the commercial fishing sector of the species complex. One possible option being considered is to have a snowy grouper quota (the indicator species of the unit) and another quota for the remaining species in the unit. Once either quota is met, fishing for and possessing these species would be prohibited. The Council believes that such an action would decrease the discard of these species with high release mortality rates.

II. The Ocean Conservancy Comments

Comment 1: *Recommend against using the maximum amount of time possible under the law (T(max)) to rebuild severely depleted fish stocks such as snowy grouper.*

Response: Rebuilding schedules of 12 and 23.5 years (Alternatives 2 and 3, respectively) would not be expected to rebuild the snowy grouper stock to the biomass at the maximum sustainable yield, even if retention of snowy grouper is entirely prohibited. Snowy grouper is part of a multi-species fishery. Even with no harvest, it is expected that snowy grouper would be caught and released dead by fishermen when co-occurring species were targeted. Snowy grouper is a deep water species and release mortality is estimated to be 100%; therefore, all incidentally captured snowy grouper would die. Actions taken in Amendment 13C substantially reduced the allowable harvest of snowy grouper to a level that would likely be taken as bycatch. The longest rebuilding schedule allows fishermen to retain snowy grouper that are incidentally caught rather than release dead fish. Snowy grouper probably would not be able to rebuild in a shorter timeframe due to bycatch mortality when fishermen targeted co-occurring species.

Comment 2: *Retain the MSST definition for all species at (1-M)*(B_{MSY}).*

Response: The current definition of MSST is SSB_{MSY}((1-M) or 0.5, whichever is greater) where M equals the natural mortality rate. The relatively low estimation of M (0.12) produces a MSST that is similar to SSB_{MSY}. By modifying the current definition of MSST for snowy grouper to 0.75 X B_{MSY}, the Council is hoping to avoid a situation where the natural variation in recruitment causes the stock biomass to 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. Such a situation could create administrative difficulties if the overfished threshold was met and a rebuilding plan was unnecessarily triggered. Regardless of which MSST definition is chosen, snowy grouper is overfished and biomass is well below the threshold that would trigger a rebuilding plan. SEDAR 4 (2004) estimates current biomass at 18% of SSB_{MSY}.

Comment 3: *Set the snowy grouper rebuilding strategy at constant F, changing over a five-year period but hold the year-one TAC of 94,362 pounds constant for the five-year period instead of using the average (essentially changing the Council preferred alternative from 3b to 3a).*

Response: At the December 2007 meeting, the Council added a new sub-alternative and specified that as their preferred alternative. The new alternative specified the 2009 TAC at a level of 102,960 lbs whole weight until modified. The Council's previous preferred specified a TAC in 2009 of 109,309 lbs whole weight.

The Council believes that a more conservative TAC would increase the probability that the biomass would increase and minimize future reductions. In addition, based on the Reauthorized MSA, it would be difficult to justify increasing the TAC before a stock assessment indicates overfishing has ended. A 2010 assessment update for snowy grouper will determine if management measures have been effective in ending overfishing.

The Council is developing Amendment 17, which will set Annual Catch Limits and Accountability Measures to reduce the probability of overfishing. Under the Reauthorized Magnuson-Stevens Act, a TAC based on the yield at F_{MSY} would be considered to be a limit, which could not be exceeded. Amendment 17 would establish management measures for species subject to overfishing to achieve target catch levels below the yield at F_{MSY} and closer to the yield at F_{OY}. These management measures would reduce the probability overfishing would occur.

Comment 4: *Set all TACs for A15a species at the level that corresponds to the OY target and not the MFMT threshold.*

Response: At the December 2007 meeting, the Council added a new sub-alternative for snowy grouper that would not increase the TAC for snowy grouper. The reauthorized MSA will require that ACLs be set for species and will not allow a target catch based on the yield at F_{MSY}. In the future yield at F_{MSY} would be considered to be a limit. Therefore, the Council decided not to increase the TAC for snowy grouper to 109,309 lbs whole weight but instead leave it at the 2008 level at 102,960 lbs whole weight until modified. By leaving TAC at the 2008 level, the allowable fishing mortality rate will decrease below F_{MSY} and there is an increase chance overfishing will end and the stock will begin to rebuild.

The TAC for red porgy, as specified through the rebuilding strategy alternatives is set below the yield when fishing at MSY and approximates F_{OY}. For black sea bass, the TAC in 2009 is established at the yield when fishing at MSY. However, the preferred strategy is a constant catch strategy; the TAC for 2009 (847,000 lbs whole weight) would remain in effect beyond 2009 until modified. Holding catch at constant levels as the stock rebuilds would be expected to gradually reduce the fishing mortality rate as the stock rebuilds. As a result, this alternative is expected to provide the greatest long-term, biological effects to the stock and associated ecosystem throughout the entire rebuilding timeframe of all the alternatives.

III. The North Carolina Division of Marine Fisheries Comment

Comment 1: *The document also assesses cumulative impacts, but only for the three species addressed by Amendment 15A. What is completely ignored are overall cumulative impacts from previous regulations on fishery participants, not in just these three fisheries, but in all the fisheries available to them in the past. This minimal approach to understanding socioeconomic impacts represents inadequate analysis of available data.*

Response: The condition of a fishery today is affected by a number of factors, including regulation. The amendment qualitatively discusses this (Section 4.5.2), and concludes that "it is not possible to differentiate actual or cumulative regulatory effects from external cause-induced effects." It also states "In general, it can be stated, however, that the regulatory environment for all fisheries has become progressively more complex and burdensome, increasing, in tandem with other adverse influences, the pressure on economic losses, business failure, occupational changes, and associated adverse pressures on associated families, communities, and industries. Some reverse of this trend is possible and expected."

The document contains discussion of Amendment 13C to the Snapper Grouper FMP and the socioeconomic impacts of the recent amendment are incorporated by reference (Pg 3-34). In summary, the combined actions were expected to result in an annual decrease of approximately $1.085 million in net operating revenues, or greater than 12 percent of average annual net operating revenues, for the commercial sector by the third year of implementation of the step-down harvest reductions of the amendment. Similar estimates for the recreational sector were not available due to data deficiencies. However, the recreational sector was projected to experience substantial reductions in consumer surplus as a result of the actions in the amendment. Further qualitative discussion is provided on the impacts of Snapper Grouper FMP Amendments 14, 15B, 17, and 16.

The actions in Snapper Grouper Amendment 13C were also incorporated in the modeling assumptions to constitute the status quo in the evaluation of the alternatives considered in the current amendment. Thus, the expected impacts of the current amendment would be in addition to the impacts of those of Snapper Grouper 13C.

Comment 2: *Another serious concern held by the North Carolina Division of Marine Fisheries is the issue of recreational quota overages. It is likely that the recreational allocation of snowy grouper will be quite small. If this is the case, any rebuilding schedule will be compromised until the SAFMC can put into place an adequate method of accounting for recreational landings as close to real time as possible, whether is be a trip* *ticket system for the "for hire" segment or a tag system for anglers not unlike those already in use in the bluefin tuna fishery.*

Response: Amendment 15B is being developed and includes allocation alternatives that would specify a commercial quota and recreational allocation for snowy grouper. Amendment 17 is scheduled for development in 2009 and would include Annual Catch Limits and Accountability Measures as required by the reauthorized Magnuson-Stevens Act to decrease the probability of overfishing. These Accountability Measures could include actions to ensure chronic overfishing by a particular sector does not occur.

Comment 3: *The North Carolina Division of Marine Fisheries remains concerned that there is little confidence the assessments provide for an adequate estimation of the stock status. The data used may have indeed been best available at the time, yet our position on these assessments remains that the data, particularly in the snowy grouper and black sea bass assessments are unsound.*

Response: Status determinations for snowy grouper, black sea bass, and red porgy were derived from the SEDAR process. The SEDAR process involves a series of three workshops designed to ensure each stock assessment reflects the best available scientific information. The findings and conclusions of each SEDAR workshop are documented in a series of reports, which are ultimately reviewed and discussed by the Council and their SSC. SEDAR participants, Council advisory committees, the Council, and NMFS staff reviewed and considered these and other concerns about the adequacy of the data. The Council's Snapper Grouper Committee acknowledged, while stock assessment findings are uncertain, there is no reason to assume such uncertainty leads to unrealistically pessimistic conclusions about stock status. Rather, the stocks could be in worse shape than indicated by the stock assessment. Therefore, uncertainty should not be used as a reason to avoid taking action.

This issue with data was a subject of a recent civil action, NORTH CAROLINA FISHERIES ASSOCIATION, INC., *et al.* v. CARLOS GUTIERREZ, Secretary, United States Department of Commerce, where the plaintiffs claimed that actions taken in Amendment 13C was inconsistent with National Standard 2, which requires that all FMPs and plan amendments "be based upon the best scientific information available". The same assessment information used in Amendment 13C was used in Amendment 15A to specify management reference points, and rebuilding plans for snowy grouper, black sea bass, and red porgy. The Judge concluded "the Secretary was not obliged to 'sit idly by' when faced with overfishing and overfished stocks simply because the data available to him may have been less than perfect. In sum, the Secretary's decision to act on the basis of the existing information easily meets the standard of rationality required of him." The NMFS' Southeast Fisheries Science Center (SEFSC) reviewed and certified Amendment 13C and its supporting analyses as being based on the best available scientific information in April 2006. Finally, the amendment also was subject to a pre-dissemination review in May 2006 in compliance with the Information Quality Act (IQA).

The SSC has determined Amendment 15A is based on the best available science. Amendment 15A is being reviewed by the SEFSC and will be subject to a pre-dissemination review in compliance with the IQA.

IV. Other Comments

Comment 1: *One commenter suggested Amendment 15A should include a prohibition of the sale of the recreational bag limit unless one possesses a snapper grouper permit.*

Response: The Council is developing Amendment 15B, which has alternatives that would prohibit the sale of snapper grouper species under the bag limit unless the fisherman possessed a valid Federal commercial permit for South Atlantic snapper grouper species.

Comment 2: *A comment from one individual and from the North Carolina Fishermen's Association suggested there should be restrictions placed on the number of hooks used by recreational fishermen to target deep water species such as snowy grouper, regional quotas for snowy grouper, a boat limit on the number of snowy grouper that can be retained, and allocations that would restrict the catch of snowy grouper by the recreational sector.*

Response: The Council is developing Amendment 15B, which would include allocation alternatives for snowy grouper and specify a commercial quota and recreational allocation. Amendment 17 will be developed by the Council and would include Annual Catch Limits and Accountability Measures to decrease the probability of overfishing. Amendment 17 could include a variety of management measures to help reduce the chance of overfishing including those suggested by the Commenters. Amendment 17 is scheduled for scoping in 2009.

Comment 3: *One individual suggested that having the smallest amount of change from year to year in trying to rebuild these fisheries would be preferable, than taking a really big shock upfront, so that we get dividends further down the road. The commenter endorsed rebuilding strategy alternatives that spread the changes out over time and have the least shock on both recreational and commercial sectors of the fishery. The commenter believed that the fishery will be best served by utilizing the rebuilding plan options which have the least effect on fishing effort.*

Response: The Council's preferred rebuilding schedule alternatives for snowy grouper, black sea bass, and red porgy are the maximum allowed by the Magnuson-Stevens Act. Also, the Council considered the rebuilding strategy alternatives that would have the greatest benefit to the stock and provide the least amount of short-term negative social and economic effects. Red porgy is no longer overfishing and the stock is rebuilding. An increase in the TAC for 2009 reflects the improved status of the fishery. Snowy grouper and black sea bass are experiencing overfishing and are overfished. Amendment 13C implemented management measures over a three year period with the intent of ending overfishing by 2009. At their December 2007 Council meeting, the Council elected to set the snowy grouper TAC at the 2008 level of 102,960 lbs whole weight rather than increase TAC to 109,360 lbs whole weight in 2009. The Council was concerned that the 2009 TAC was based on the yield at F_{MSY}, which would be considered to be a limit rather than a target under the reauthorized MSA. By keeping catch at 2008 levels, fishing mortality would decrease below F_{MSY} and the probability that overfishing had ended would increase. The 2010 assessment update for snowy grouper will determine if management measures have been effective in ending overfishing. Keeping TAC at 2008 levels for black sea bass could rebuild black sea bass two years ahead of schedule and result in a very large increase in the allowable catch. As a result, this alternative is expected to provide the greatest long-term, biological effects to the stock and associated ecosystem throughout the entire rebuilding timeframe of all the alternatives as well as significant economic benefits.

Comment 4: *One individual commented that 34 years to rebuild snowy grouper seems to be a very long time. They questioned the effect to the management strategy if one half a generation time is used to calculate the rebuilding schedule.*

Response: Rebuilding schedules of 12 and 23.5 years (Alternatives 2 and 3, respectively) would not be expected to rebuild the snowy grouper stock to the biomass at the maximum sustainable yield, even if retention of snowy grouper is entirely prohibited. Snowy grouper is part of a multi-species fishery. Even with no harvest, it is expected that snowy grouper would be caught and released dead by fishermen when co-occurring species were targeted. Snowy grouper is a deep water species and release mortality is estimated to be 100%; therefore, all incidentally captured snowy grouper would die when fishermen targeted co-occurring species. Actions taken in Amendment 13C substantially reduced the allowable harvest of snowy grouper to a level that would likely be taken as bycatch. The longest rebuilding schedule allows fishermen to retain snowy grouper that are incidentally caught rather than release dead fish. Snowy grouper probably would not be able to rebuild in a shorter timeframe due to mortality of snowy grouper caught as bycatch when fishermen targeted co-occurring species.

ABSTRACT

Stock assessments performed through the Southeast Data, Assessment, and Review (SEDAR) process have revealed that the South Atlantic stocks of snowy grouper (*Epinephelus niveatus*), black sea bass (*Centropristis striata*), and red porgy (*Pagrus pagrus*) are overfished. In response, the South Atlantic Fishery Management Council (Council) proposes management reference points and rebuilding plans for snowy grouper, black sea bass, and red porgy. The purpose of specifying rebuilding plans is to achieve conservation goals and rebuilding the overfished stocks, while minimizing to the extent practicable adverse socioeconomic impacts. This Final Environmental Impact Statement (FEIS) has been prepared to analyze the effects of implementing management reference points and rebuilding plans for these overfished species.

Comments on the DEIS was accepted for 45 days from publication of the Notice of Availability (NOA) in the Federal Register.

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SUMMARY

Purpose and Need

Stock assessments performed through the Southeast Data, Assessment, and Review (SEDAR) process have revealed that the South Atlantic stocks of snowy grouper (*Epinephelus niveatus*), black sea bass (*Centropristis striata*), and red porgy (*Pagrus pagrus*) are **overfished.** A stock is overfished when the biomass is below an identified minimum stock size threshold. Due to low biomass levels, an overfished stock has increased vulnerability to environmental variables and cannot produce the maximum sustainable yield. The South Atlantic Fishery Management Council (Council) is required by the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) to implement **rebuilding plans** for these overfished species. The intent of a rebuilding plan is to increase biomass of overfished stocks to a sustainable level (B_{MSY}) within a specified period of time. The purpose of specifying rebuilding plans is to achieve conservation goals, while minimizing to the extent practicable adverse socioeconomic impacts.

Four components have been identified as being necessary for a rebuilding plan: (1) an estimate of **biomass at the maximum sustainable yield (B_{MSY})** (the rebuilding goal), (2) a **rebuilding schedule**, (3) a **rebuilding strategy**, and (4) an estimate of **optimum yield (OY)** expected when stock recovery has been completed (Powers 1996; Restrepo *et al*. 1998). Rebuilding schedules define the timeframe in which the biomass of the overfished stock will be rebuilt. Rebuilding strategies define catch levels and fishing mortality rates for the overfished stock throughout the rebuilding schedule to prevent overfishing and achieve the rebuilding goal. An estimate of OY is the target when a stock is rebuilt and plans can transition from rebuilding to optimal yield management.

In this amendment, the Council is also is considering redefining the minimum stock size threshold (MSST) for the snowy grouper stock to a level that establishes a more appropriate difference between an overfished condition and the rebuilding goal. The MSST definition established in Snapper Grouper FMP Amendment 11 sets MSST to at least one half of spawning stock biomass at the maximum sustainable yield (SSB_{MSY}), but allows for it to be greater than this value if natural mortality (M) is suitably low. If (1-M) is less than or equal to 0.5, then MSST = (1-M)*B_{MSY}. However, M is very low (0.12) for snowy grouper. Therefore, using this formula, MSST would be very close to SSB_{MSY}. The closer MSST is to B_{MSY}, the shorter the time needed to rebuild the stock to B_{MSY} if the fishing mortality (F) is constrained below the maximum fishery mortality threshold (MFMT). However, because MSST would be so close to B_{MSY}, natural variation in recruitment could cause stock biomass to 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. Therefore, the Council is considering alternatives for MSST that would eliminate the potential administrative complications associated with setting MSST close to B_{MSY} by establishing a larger buffer between what is considered to be an overfished and rebuilt condition.

Description of the Alternatives Being Considered

Snowy Grouper

MSY alternatives under consideration for snowy grouper.

Alternatives	MSY equation	F_{MSY} equals	MSY value
Alternative 1 (no action)	The yield produced by $F_{MSY.}$ $F_{30\%SPR}$ is used as the F_{MSY} proxy.	0.14*	not specified
Alternative 2 (preferred)	MSY equals the yield produced by $F_{MSY.}$ MSY and F_{MSY} are defined by the most recent SEDAR.	0.05**	313,056 lbs whole weight**
*Source: Powers 1999 **Source: SEDAR 4 2004			

OY alternatives under consideration for snowy grouper.

Alternatives	OY equation	F_{OY} equals	OY value
Alternative 1 (no action)	OY equals the yield produced by F_{OY}. $F_{45\%SPR}$ is used as the F_{OY} proxy.	0.10*	not specified
Alternative 2	OY equals the yield produced by $F_{OY.}$ If a stock is overfished, F_{OY} equals the fishing mortality rate specified by the rebuilding plan designed to rebuild the stock to SSB_{MSY} within the approved schedule. After the stock is rebuilt, F_{OY} = a fraction of F_{MSY}. Snowy grouper is overfished.	(65%)(F_{MSY})	293,020 lbs whole weight**
Alternative 3 (preferred)		(75%)(F_{MSY})	303,871 lbs whole weight**
Alternative 4		(85%)(F_{MSY})	309,716 lbs whole weight**
*Source: Estimate of $F_{40\%SPR}$ from Potts and Brennan (2001), value for $F_{45\%SPR}$ not available. **Calculated based on Council's preferred MSY value in which F_{MSY} equals 0.05 for Alternatives 2-4 (SEDAR 4 2004).			

MSST alternatives under consideration for snowy grouper.

Alternatives	MSST equation	M equals	MSST value
Alternative 1 (no action)	MSST equals SSB_{MSY}((1-M) or 0.5, whichever is greater).	0.12*	4,105,182 lbs whole weight**
Alternative 2	MSST equals SSB_{MSY}(0.5).	n/a	2,332,490 lbs whole weight**
Alternative 3 (preferred)	MSST equals SSB_{MSY}(0.75).	n/a	3,498,735 lbs whole weight**
*Source: Recommendation from SEFSC based on the results from SEDAR 4 (2004). **Source: Calculated based on Council's preferred MSY value in which SSB_{MSY} equals 4,664,980 lbs whole weight (SEDAR 4 2004).			

Rebuilding Schedule Alternatives for Snowy Grouper

Alternative 1 (no action). A 15-year rebuilding schedule is currently in place, which began in 1991.

Alternative 2. Define a rebuilding schedule as the shortest possible period to rebuild in the absence of fishing mortality (T_{MIN}). This would equal 13 years (SEDAR 4 2004). 2006 is Year 1.

Alternative 3. Define a rebuilding schedule as the mid-point between shortest possible and maximum recommended period to rebuild. This would equal 23.5 years. 2006 is Year 1.

Alternative 4 (preferred). Define a rebuilding schedule as the maximum recommended period to rebuild if T_{MIN} > 10 years. The maximum recommended period equals T_{MIN} + one generation time. This would equal 34 years (SEDAR 4 2004 was the source of the generation time). 2006 is Year 1.

Rebuilding Strategy Alternatives for Snowy Grouper

Alternative 1 (no action). Do not define a yield-based rebuilding strategy for snowy grouper.

Alternative 2. Define a rebuilding strategy for snowy grouper that maintains a constant fishing mortality rate throughout the rebuilding timeframe. The TAC specified for 2009 would remain in effect beyond 2009 until modified.

> **Sub-alternative 2a.** The TAC for 2009 would be 104,711 lbs whole weight. The TAC would change annually according to the rebuilding plan.
> **Sub-alternative 2b.** The TAC for 2009 would be 97,932 lbs whole weight. The TAC would change every 5 years according to the rebuilding plan.

Alternative 3 (preferred). Define a rebuilding strategy for snowy grouper that maintains a modified/constant fishing mortality rate throughout the rebuilding timeframe. The TAC specified for 2009 would remain in effect beyond 2009 until modified.

> **Sub-alternative 3a.** The TAC for 2009 would be 94,364 lbs whole weight. The TAC would change annually according to the rebuilding plan.
>
> **Sub-alternative 3b.** The TAC for 2009 would be 109,309 lbs whole weight. The TAC would change every 5 years according to the rebuilding plan.
>
> **Sub-alternative 3c (preferred).** The TAC for 2009 would be 102,960 lbs whole weight.

Red Porgy

MSY alternatives under consideration for red porgy.

Alternatives	MSY equation	F_{MSY} equals	MSY value
Alternative 1 (no action)	The yield produced by $F_{MSY.}$ $F_{35\%SPR}$ is used as the F_{MSY} proxy.	0.43*	4,380,000 lbs whole weight.
Alternative 2 (preferred)	MSY equals the yield produced by $F_{MSY.}$ MSY and F_{MSY} are defined by the most recent SEDAR Update.	0.20**	625,699 lbs whole weight**
*Source: Vaughan 1999 **Source: SEDAR Update Assessment 2006			

OY alternatives under consideration for red porgy.

Alternatives	OY equation	F_{OY} equals	OY value
Alternative 1 (no action)	OY equals the yield produced by F_{OY}. $F_{45\%SPR}$ is used as the F_{OY} proxy.	0.28*	not specified
Alternative 2	OY equals the yield produced by $F_{OY.}$ If a stock is overfished, F_{OY} equals the fishing mortality rate specified by the rebuilding plan designed to rebuild the stock to SSB_{MSY} within the approved schedule. After the stock is rebuilt, F_{OY} = a fraction of F_{MSY}. Red porgy is overfished.	$(65\%)(F_{MSY})$	587,901 lbs whole weight**
Alternative 3 (preferred)		$(75\%)(F_{MSY})$	608,099 lbs whole weight**
Alternative 4		$(85\%)(F_{MSY})$	619,915 lbs whole weight**
**Source: Estimate of $F_{40\%SPR}$ from Potts and Brennan (2001) **Calculated based on Council's preferred MSY value in which F_{MSY} equals 0.20 for Alternatives 2-4 (SEDAR Update Assessment 2006). B_{MSY} = 7,134,209 lbs whole weight (SEDAR Update Assessment 2006).			

Rebuilding Strategy Alternatives for Red Porgy

Alternative 1 (no action). Do not define a yield-based rebuilding strategy for red porgy.

Alternative 2. Define a rebuilding strategy for red porgy that maintains a constant catch level throughout the rebuilding timeframe. The TAC would be 438,884 lbs whole weight for both 2009 and 2010. The TAC specified for 2010 would remain in effect beyond 2010 until modified.

Alternative 3 (preferred). Define a rebuilding strategy for red porgy that maintains a constant fishing mortality rate throughout the rebuilding timeframe. The TAC specified for 2010 would remain in effect beyond 2010 until modified.

> **Sub-alternative 3a (preferred).** The TAC would be 395,281 lbs whole weight for both 2009 and 2010. The TAC would change every three years according to the rebuilding plan.
>
> **Sub-alternative 3b.** The TAC would be 410,251 lbs whole weight for both 2009 and 2010. The TAC would change every five years according to the rebuilding plan.

Black Sea Bass

MSY alternatives under consideration for black sea bass.

Alternatives	MSY equation	F_{MSY} equals	MSY value
Alternative 1 (no action)	The yield produced by $F_{MSY.}$ $F_{30\%SPR}$ is used as the F_{MSY} proxy.	0.72*	Not specified.
Alternative 2 (preferred)	MSY equals the yield produced by $F_{MSY.}$ MSY and F_{MSY} are defined by the most recent SEDAR.	0.43**	2,777,825 lbs whole weight.**
*Source: Vaughan *et al.* 1996 **Source: SEDAR Update 1 2005			

OY alternatives under consideration for black sea bass.

Alternatives	OY equation	F_{OY} equals	OY value
Alternative 1 (no action)	OY equals the yield produced by F_{OY}. $F_{40\%SPR}$ is used as the F_{OY} proxy.	0.4*	not specified
Alternative 2	OY equals the yield produced by F_{OY}. If a stock is overfished, F_{OY} equals the fishing mortality rate specified by the rebuilding plan designed to rebuild the stock to SSB_{MSY} within the approved schedule. After the stock is rebuilt, F_{OY} = a fraction of F_{MSY}. Black sea bass is overfished.	(65%)(F_{MSY})	2,689,640 lbs whole weight**
Alternative 3 (preferred)		(75%)(F_{MSY})	2,742,551 lbs whole weight**
Alternative 4		(85%)(F_{MSY})	2,766,802 lbs whole weight**

*Source: Powers 1999 **Calculated based on Council's preferred MSY value in which F_{MSY} equals 0.43 (SEDAR Update 1 2005). B_{MSY} = 15,017,000 lbs whole weight (SEDAR Update 1 2005).

Rebuilding Schedule Alternatives for Black Sea Bass

Rebuilding Schedule Alternative 1 (no action). A 10-year rebuilding schedule is currently in place for black sea bass, which began in 1991.

Rebuilding Schedule Alternative 2. The shortest possible time period to rebuild in the absence of fishing mortality (T_{MIN}). This would equal 6 years (SEDAR Update #1 2005). 2006 is Year 1.

Rebuilding Schedule Alternative 3. Mid-point between shortest possible and maximum recommended time period to rebuild to B_{MSY}. This would equal 8 years. 2006 is Year 1.

Rebuilding Schedule Alternative 4 (preferred). Maximum recommended time period to rebuild to B_{MSY} (years) if T_{MIN} < 10 years. The maximum recommended period equals T_{MIN} + one generation time. This would equal 10 years. 2006 is Year 1.

Rebuilding Strategy Alternatives for Black Sea Bass

Alternative 1 (preferred). Define a rebuilding strategy for black sea bass that maintains a constant catch throughout the rebuilding timeframe. The TAC for 2009 would be 847,000 lbs whole weight. The TAC specified for 2009 would remain in effect beyond 2009 until modified.

Alternative 2. Define a rebuilding strategy for black sea bass that maintains a constant fishing mortality rate throughout the rebuilding timeframe. The TAC specified for 2009 would remain in effect beyond 2009 until modified.

Sub-alternative 2a. The TAC for 2009 would be 899,071 lbs whole weight. The TAC would change annually according to the rebuilding plan.

Sub-alternative 2b. The TAC for 2009 would be 633,687 lbs whole weight. The TAC would change every 5 years according to the rebuilding plan.

Alternative 3. Define a rebuilding strategy for black sea bass that modifies the fishing mortality rate throughout the rebuilding timeframe (initial $F=F_{MSY}$ then $F \leq F_{MSY}$). The TAC specified for 2009 would remain in effect beyond 2009 until modified.

Sub-alternative 3a. The TAC for 2009 would be 1,135,616 lbs whole weight. The TAC would change annually according to the rebuilding plan.

Sub-alternative 3b. The TAC for 2009 would be 833,789 lbs whole weight. The TAC would change every 5 years according to the rebuilding plan.

Alternative 4. Define a rebuilding strategy for black sea bass where fishing mortality is modified throughout the rebuilding timeframe. The TAC for 2009 would be 871,231 lbs whole weight. The TAC specified for 2009 would remain in effect beyond 2009 until modified.

Alternative 5 (no action). Do not define a yield-based rebuilding strategy for black sea bass.

Affected Environment

The immediate impact area would be the federal 200-mile limit of the Atlantic off the coasts of North Carolina, South Carolina, Georgia and east Florida to Key West. A larger area could be affected. In light of the available information, the extent of the boundaries would depend upon the degree of fish immigration/emigration and larval transport. Tagging work conducted by the Marine Resources Monitoring, Assessment and Prediction (MARMAP) program indicates that there is movement of species (e.g., gag and greater amberjack) between the Gulf of Mexico and South Atlantic (McGovern and Meister 1999; McGovern *et al.* 2005). Large scale movement of black sea bass and red porgy has not been documented (McGovern and Meister 1999); however, tagging from the mid-Atlantic indicates movement of black sea bass north and south of Cape Hatteras is likely. Tagging studies have not been conducted on snowy grouper; however, it is believed that movement of this species is limited. Snowy grouper, black sea bass, and red porgy have pelagic eggs and larvae that may remain in the water column for extended periods of time and travel long distances before late stage larvae or juveniles assume a demersal existence. For example, eggs and larvae from spawning fish in the Gulf of Mexico or Caribbean may be passively transported into the South Atlantic. Alternatively, early life stages of fishes spawned in the South Atlantic (e.g., black sea bass) could be transported by currents to other areas such as the mid-Atlantic. Furthermore, some fishermen may fish in and out of the federal 200-mile limit off of North Carolina, South Carolina, Georgia, and east Florida.

Section 3.1 provides a description of the essential fish habitat. The biological environment is described in Section 3.2. A description of the human environment is described in Sections 3.4.

Environmental Consequences

Biological

There are no direct effects from redefining and/or updating MSY, OY, and MSST because these parameters simply provide fishery managers with targets and thresholds that will be used to assess the status and performance of the fishery. However, these management reference points indirectly benefit the biological and ecological environments by influencing the development of fishery management measures, which directly affect snowy grouper and other species.

Choice of a rebuilding schedule has a direct effect on the biological, ecological, and physical environment by determining the length of time over which rebuilding efforts can be extended. Shorter schedules generally require overfished stocks be provided a greater amount of (and more immediate) relief from fishing pressure. Conversely, longer schedules generally allow overfished stocks to be harvested at higher rates of fishing mortality as they rebuild. Extending the rebuilding period beyond the shortest possible timeframe increases the risk that environmental or other factors could prevent the stocks from recovering. As a result, the biological/ecological benefits of a shorter schedule are generally greater than those of the intermediate schedule and the benefits of the intermediate schedule are generally greater than those of the maximum recommended schedule.

The shortest rebuilding schedule is the amount of time to allow biomass to increase to the rebuilding target of B_{MSY} in the absence of fishing mortality. However, even if retention of snowy grouper and black sea bass were prohibited, they would still be caught and experience some fishing mortality since they have temporal and spatial coincidence with other species fishermen target. Therefore, since snowy grouper and black sea bass are part of a multi-species fishery, it is not possible to rebuild these stocks in the shortest timeframe unless harvest of co-occurring species is also restricted. Similarly, due to bycatch mortality, the intermediate rebuilding schedule also is not realistic and would not likely allow snowy grouper to rebuild to B_{MSY} by the end of the rebuilding schedule unless greater restrictions were placed on species that co-occur with snowy grouper. Consequently, the longest schedule would support an allowable harvest level that is basically a “bycatch quota”, enabling snapper grouper fishermen to retain incidentally encountered snowy grouper when targeting co-occurring species. In addition, the magnitude of snowy grouper and black sea bass discards would be less for longer rebuilding schedules than for those of shorter duration. The overall effects of all the action alternatives are expected to be beneficial because each defines a plan for rebuilding the overfished stock.

The no-action rebuilding strategy alternative for snowy grouper, red porgy, and black sea bass-would provide the greatest long-term, positive, biological effects to the stock and associated ecosystem of all the alternatives throughout the entire timeframe since it would not specify an increasing allowable catch as biomass of the stock increased. Beneficial biological effects include a more rapid rebuilding of the stock and increase in the average age and size structure compared to the other alternatives. Fishing at a lower fishing mortality rate may increase population robustness to environmental perturbations (NMFS Population Dynamics Team, 2003). Also, older and larger females have greater reproductive potential because fecundity increases exponentially with size. Therefore, there is greater potential to more rapidly increase the number of young each year (recruitment) under the no action alternative. The no action alternative, however, could also have adverse effects to all three stocks as it does not provide a plan on how fishing effort would be regulated during the rebuilding schedule. In the case of snowy grouper, the no action alternative could result in unnecessary discard of dead fish as biomass increased. Since there would be no designation of the Total Allowable Catch (TAC) in the no action alternative for snowy grouper and red porgy, there would be no maximum recreational harvest level to compare landings to ensure harvest levels keep rebuilding on schedule.

Designating a rebuilding strategy would result in beneficial effects to the stock and associated ecosystem by allowing fishery managers to regulate fishing effort throughout the rebuilding timeframe. As the preferred rebuilding strategies gradually increase allowable catch of red porgy as biomass increases, a large increase in the magnitude of dead discards is not expected. Alternatively, the preferred rebuilding strategy for snowy grouper and black sea bass holds catch constant as the biomass increases and could result in an increase in the number of discards as the stock rebuilds, particularly for the recreational sector. However, as release mortality is considered to be low for black sea bass, an increase in discards may not be a great concern.

At their December 2007 meeting, the Council chose as their preferred alternative, a rebuilding strategy that would set TAC at 2008 levels. The Council had formerly selected Alternative 3b, which is based on the yield at F_{MSY}. During the public hearing process, the Council received a number of letters and heard from many constituents. A letter from The Ocean Conservancy questioned the Council's preferred alternative for the rebuilding strategy and setting TAC based on the yield at F_{MSY} rather than F_{OY}.

The Reauthorized MSA requires the Council to set Annual Catch Limits (ACLs) for overfishing species by 2010. Snowy grouper have been under a rebuilding program since the 1990s and SEDAR 4 (2004) indicated the biomass had not increased. The Council is developing Amendment 17 that will set ACLs and Accountability Measures to ensure the recreational and commercial sectors do not exceed their allocations and to reduce the probability of overfishing. Under the Reauthorized MSA, a TAC based on the yield at F_{MSY} would be considered to be a limit, which could not be exceeded. Amendment 17 would establish management measures for species subject to overfishing to achieve target catch levels below the yield at F_{MSY} and closer to the yield at F_{OY}. These management measures would reduce the probability overfishing would occur.

Rather than increase TAC to 109,309 pounds whole weight, the Council determined the TAC for snowy grouper in Amendment 15A should remain at the 2008 level of 102,960 pounds whole weight until modified. A more conservative TAC would increase the probability that the biomass would increase and minimize future reductions. In addition, based on the Reauthorized MSA, it would be difficult to justify increasing the TAC before a stock assessment indicates overfishing has ended.

Economic

Specifying MSY, OY, and MSST has indirect impacts since it establishes the platform for future management, specifically from the perspective of bounding allowable harvest levels. Retaining existing values for the reference points and subsequent allowance of harvest at the respective MSY value may lead to excessive exploitation, precipitating the imposition of restrictive management measures and reductions in economic and social benefits. Once the resource is rebuilt, the specification of MSY/OY and the related increase in total allowable harvest and reduced harvest restrictions would support increased economic and social benefits to the fishery. If sustainable, the larger the harvests, the greater the economic and social benefits to the harvest sector and associated industries.

Defining rebuilding schedules may result in indirect effects. Restrictive management measures could be necessary to rebuild a resource, and direct effects accrue to these measures. Further, defining the rebuilding schedule determines the length of time over which rebuilding efforts can be extended and affects the severity of the measures implemented during the recovery period. Generally, the shorter the recovery period, the more severe the necessary harvest restrictions, and the more severe the harvest restrictions, the greater the short-term adverse economic effects.

All rebuilding strategy alternatives are projected to result in increased net economic benefits for the recreational sector and all fishermen and associated communities in the recreational black sea bass fishery would be expected to gain increased social benefits under all alternatives to the status quo.

In terms of impacts to the commercial sector from the rebuilding strategy alternatives for snowy grouper, the differences in total net operating revenues range from -$0.06 million for **Alternatives 2a and 2b** to -$0.03 million for **Alternative 3a** and **Alternative 3b** relative to the status quo **(Alternative 1 and Alternative 3)**. This analysis assumes status quo conditions for the other actions considered in this amendment. Assuming preferred alternative conditions for the other actions, the differences in total net operating revenues range from $0.15 million for **Alternative 3a** to $0.26 million for **Alternative 2b** relative to the status quo, with the results of the **Alternative 3b** intermediate at $0.20

million. All differences, regardless of the underlying assumptions for the other actions, are less than one percent.

In terms of impacts to the commercial sector from the rebuilding strategy alternatives for red porgy, only minor differences in the total net operating revenues over the period 2007-2016 are projected. Assuming status quo conditions for the other actions considered in this amendment, the differences in total net operating revenues relative to the status quo range from $0.29 million for **Preferred Alternative 3a and Alternative 3b** to $0.33 million for **Alternative 2**.   Assuming preferred alternative conditions for the other actions, the differences in total net operating revenues relative to the status quo range from $0.32 million for **Preferred Alternative 3a** and **Alternative 3b** to $0.36 million for **Alternative 2**.

In terms of impacts to the commercial sector from the rebuilding strategy alternatives for black sea bass, the differences in total net operating revenues relative to Preferred **Alternative 1** range from -$1.07 million for **Alternative 4** to -$0.06 million for **Alternative 2b**.   Assuming preferred alternative conditions for the other actions, the differences in total net operating revenues relative to the status quo range from -$1.01 million for **Preferred Alternative 4** to $0.00 million for **Alternative 2b**. This analysis assumes status quo biomass streams for snowy grouper and red porgy.

1 Introduction

1.1 Purpose and Need

Stock assessments performed through the Southeast Data, Assessment, and Review (SEDAR) process have revealed that the South Atlantic stocks of snowy grouper (*Epinephelus niveatus*), black sea bass (*Centropristis striata*), and red porgy (*Pagrus pagrus*) are **overfished.** A stock is overfished when the biomass is below an identified minimum stock size threshold. Due to low biomass levels, an overfished stock has increased vulnerability to environmental variables and cannot produce the maximum sustainable yield. The South Atlantic Fishery Management Council (Council) is required by the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) to implement **rebuilding plans** for these overfished species. The intent of a rebuilding plan is to increase biomass of overfished stocks to a sustainable level (B_{MSY}) within a specified period of time. The purpose of specifying rebuilding plans is to achieve conservation goals, while minimizing to the extent practicable adverse socioeconomic impacts.

Four components have been identified as being necessary for a rebuilding plan: (1) an estimate of **biomass at the maximum sustainable yield (B_{MSY})** (the rebuilding goal), (2) a **rebuilding schedule**, (3) a **rebuilding strategy**, and (4) an estimate of **optimum yield (OY)** expected when stock recovery has been completed (Powers 1996; Restrepo *et al*. 1998). Rebuilding schedules define the timeframe in which the biomass of the overfished stock will be rebuilt. Rebuilding strategies define catch levels and fishing mortality rates for the overfished stock throughout the rebuilding schedule to prevent overfishing and achieve the rebuilding goal. An estimate of OY is the target when a stock is rebuilt and plans can transition from rebuilding to optimal yield management.

The absence of a rebuilding plan hinders routine review and accountability and reduces the likelihood of achieving conservation objectives. A rebuilding plan provides **annual allowable mortality levels** and an Allowable Biological Catch (ABC) during the rebuilding period, which should not be exceeded if the stock is to rebuild to B_{MSY} by the end of the rebuilding schedule. Landings are compared to the ABC each year and adjustments can be made to keep the stock on the rebuilding trajectory. Without the specification of annual mortality rates and ABCs, there is an increased risk that catches could be exceeded, increased vulnerability of stock to environmental variables, and decreased chance the stock would meet the rebuilding goal on schedule.

In the absence of rebuilding plans, the Council would be less inclined to relax management regulations in line with increasing allowable catch as biomass of a stock increases. In the case of the three species mentioned above, management measures were implemented to significantly reduce harvest in Amendment 13C (2006) for snowy grouper and black sea bass and in Amendment 12 (2000) for red porgy. The allowable catch as outlined in the proposed rebuilding plans for these species could increase during the rebuilding period as biomass increases until the stock is rebuilt. If levels are not increased as stocks rebuild, foregone revenue could be lost.

A recent court opinion highlighted the need to implement these rebuilding plans as soon as possible. In the case of NORTH CAROLINA FISHERIES ASSOCIATION, INC., *et al*. v. CARLOS GUTIERREZ, Secretary, United States Department of Commerce Civil Action No. 06-1815 (D.D.C. 2006), the Court ruled in favor of the Plaintiffs' complaint challenging (among other things) the Defendant's failure to promulgate rebuilding measures for snowy grouper and black sea bass along with the actions to end overfishing in Amendment 13C. The Court ordered that the Amendment 15A Draft Environmental Impact Statement Notice of Availability be published in the Federal Register by October 19, 2007, so that the Council could consider all public comments at the Council's December 2007 Meeting. The Council considered all comments at the December 2007 Meeting approved Amendment 15A to submission to the Secretary of Commerce.

The underlying need, then, for the proposed actions in this amendment is to rebuild overfished stocks to B_{MSY}, and achieve OY from the snapper grouper fishery in the South Atlantic Fishery Management Council's jurisdiction (Figure 1-1). More specifically, these proposed actions would: Update management reference points for snowy grouper, black sea bass, and red porgy; Modify rebuilding schedules for snowy grouper and black sea bass; and Define rebuilding strategies for snowy grouper, black sea bass, and red porgy. The species affected by these actions are in the Snapper Grouper Fishery Management Unit (Table 1-1).

In this amendment, the Council is also is considering redefining the minimum stock size threshold (MSST) for the snowy grouper stock to a level that establishes a more appropriate difference between an overfished condition and the rebuilding goal. The MSST definition established in Snapper Grouper FMP Amendment 11 sets MSST to at least one half of spawning stock biomass at the maximum sustainable yield (SSB_{MSY}), but allows for it to be greater than this value if natural mortality (M) is suitably low. If (1-M) is less than or equal to 0.5, then MSST = (1-M)*B_{MSY}. However, M is very low (0.12) for snowy grouper. Therefore, using this formula, MSST would be very close to SSB_{MSY}. The closer MSST is to B_{MSY}, the shorter the time needed to rebuild the stock to B_{MSY} if the fishing mortality (F) is constrained below the maximum fishery mortality threshold (MFMT). However, because MSST would be so close to B_{MSY}, natural variation in recruitment could cause stock biomass to 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. Therefore, the Council is considering alternatives for MSST that would eliminate the potential administrative complications associated with setting MSST close to B_{MSY} by establishing a larger buffer between what is considered to be an overfished and rebuilt condition.

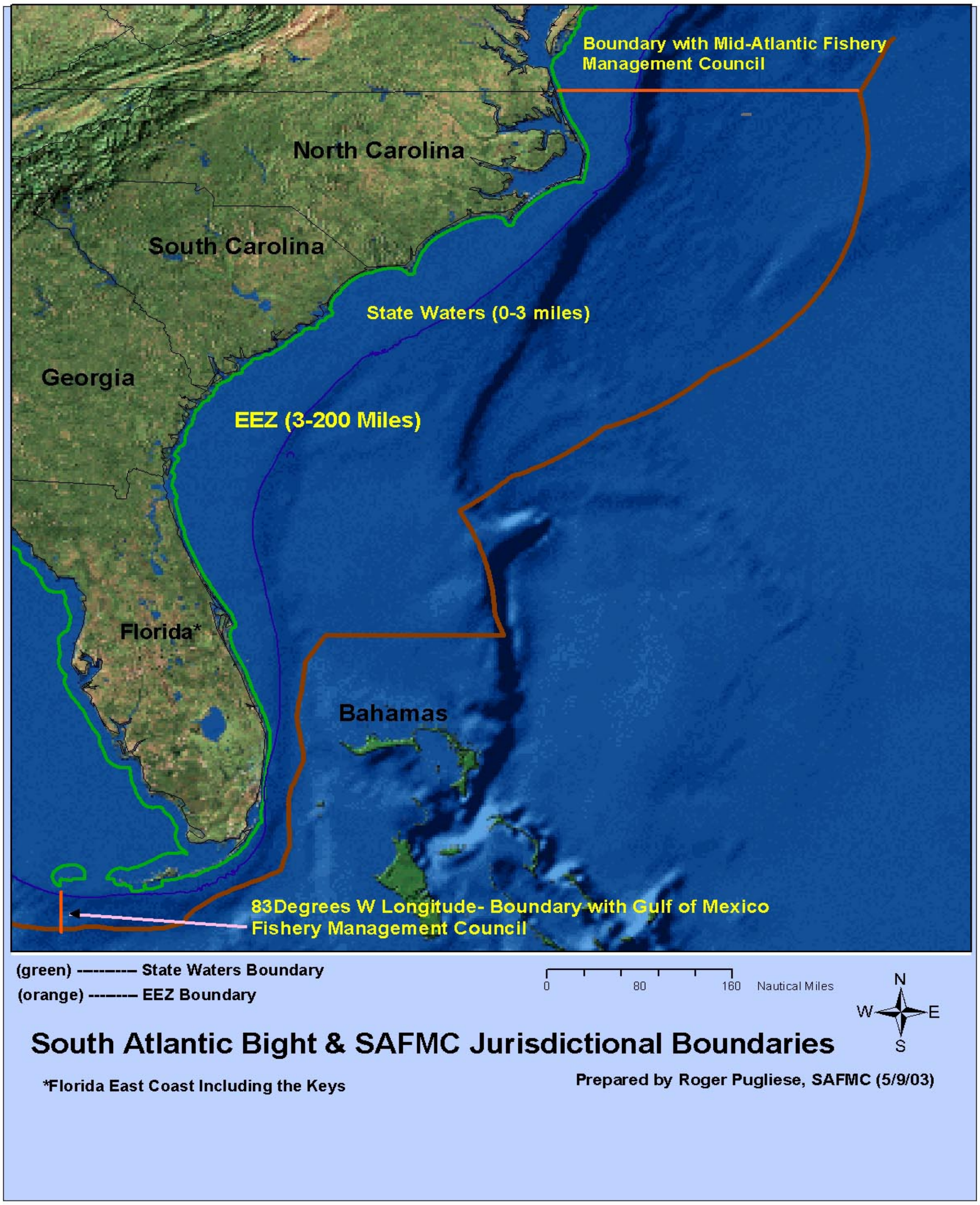


Figure 1-1. Jurisdictional Boundaries of the South Atlantic Fishery Management Council.

Table 1-1. Species in the Snapper Grouper Fishery Management Unit (FMU).

Almaco jack, *Seriola rivoliana*
Atlantic spadefish, *Chaetodipterus faber*
Banded rudderfish, *Seriola zonata*
Bank sea bass, *Centropristis ocyurus*
Bar jack, *Caranx ruber*
Black grouper, *Mycteroperca bonaci*
Black margate, *Anisotremus surinamensis*
Black sea bass, *Centropristis striata*
Black snapper, *Apsilus dentatus*
Blackfin snapper, *Lutjanus buccanella*
Blue runner, *Caranx crysos*
Blueline tilefish, *Caulolatilus microps*
Bluestriped grunt, *Haemulon sciurus*
Coney, *Cephalopholis fulva*
Cottonwick, *Haemulon melanurum*
Crevalle jack, *Caranx hippos*
Cubera snapper, *Lutjanus cyanopterus*
Dog snapper, *Lutjanus jocu*
French grunt, *Haemulon flavolineatum*
Gag, *Mycteroperca microlepis*
Golden tilefish, *Lopholatilus chamaeleonticeps*
Goliath grouper, *Epinephelus itajara*
Grass porgy, *Calamus arctifrons*
Gray (mangrove) snapper, *Lutjanus griseus*
Gray triggerfish, *Balistes capriscus*
Graysby, *Cephalopholis cruentata*
Greater amberjack, *Seriola dumerili*
Hogfish, *Lachnolaimus maximus*
Jolthead porgy, *Calamus bajonado*
Knobbed porgy, *Calamus nodosus*
Lane snapper, *Lutjanus synagris*
Lesser amberjack, *Seriola fasciata*
Longspine porgy, *Stenotomus caprinus*
Mahogany snapper, *Lutjanus mahogoni*
Margate, *Haemulon album*
Misty grouper, *Epinephelus mystacinus*
Mutton snapper, *Lutjanus analis*
Nassau grouper, *Epinephelus striatus*
Ocean triggerfish, *Canthidermis sufflamen*
Porkfish, *Anisotremus virginicus*
Puddingwife, *Halichoeres radiatus*
Queen snapper, *Etelis oculatus*
Queen triggerfish, *Balistes vetula*
Red grouper, *Epinephelus morio*
Red hind, *Epinephelus guttatus*
Red porgy, *Pagrus pagrus*
Red snapper, *Lutjanus campechanus*
Rock hind, *Epinephelus adscensionis*
Rock Sea Bass, *Centropristis philadelphica*
Sailors choice, *Haemulon parra*
Sand tilefish, *Malacanthus plumieri*
Saucereye porgy, *Calamus calamus*
Scamp, *Mycteroperca phenax*
Schoolmaster, *Lutjanus apodus*
Scup, *Stenotomus chrysops*
Sheepshead, *Archosargus probatocephalus*
Silk snapper, *Lutjanus vivanus*
Smallmouth grunt, *Haemulon chrysargyreum*
Snowy grouper, *Epinephelus niveatus*
Spanish grunt, *Haemulon macrostomum*
Speckled hind, *Epinephelus drummondhayi*
Tiger grouper, *Mycteroperca tigris*
Tomtate, *Haemulon aurolineatum*
Yellow jack, *Caranx bartholomaei*
Yellowedge grouper, *Epinephelus flavolimbatus*
Yellowfin grouper, *Mycteroperca venenosa*
Yellowmouth grouper, *Mycteroperca interstitialis*
Yellowtail snapper, *Ocyurus chrysurus*
Vermilion snapper, *Rhomboplites aurorubens*
Warsaw grouper, *Epinephelus nigritus*
White grunt, *Haemulon plumieri*
Whitebone porgy, *Calamus leucosteus*
Wreckfish, *Polyprion americanus*

Management Reference Points

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requires each FMP define four **management reference points.** Reference points are biological signposts against which the status of a stock can be judged and allow managers to measure fishery status and performance. More specifically, by evaluating the current stock biomass (B) and fishing mortality rate (F) in relation to these reference points, fishery managers can determine whether a fishery is overfished or undergoing overfishing, and whether current management measures are sufficient to prevent overfishing and achieve the OY.

> **Definitions**
> *MSST.* The biomass level below which a stock is considered overfished
> *MFMT.* The maximum level of fishing mortality that a stock or complex can withstand, while still producing MSY on a continuing basis.

The four reference points are **MSY, OY, minimum stock size threshold (MSST), and maximum fishing mortality threshold (MFMT)**. MSY and OY were described in the previous section. MSST and MFMT are benchmarks used by fishery managers to indicate if a fishery is overfished and if overfishing is occurring, respectively (see box for definitions). When the rate of mortality on a stock caused by fishing activities exceeds MFMT, overfishing is occurring. When the stock biomass is below MSST, the stock is considered overfished.

In the past for snapper grouper species, the Council has specified either numeric values, proxies, or nothing at all for the four reference points described above. Recent stock assessments have provided numerical values for the benchmarks. The Council is proposing the following changes based on those assessments:

- Updates to existing management reference point estimates for the black sea bass and red porgy stocks;
- Biomass-based management reference points for the snowy grouper stock based on the best available scientific information;
- OY redefinitions for the snowy grouper, black sea bass, and red porgy stocks to be more consistent with the National Standard Guidelines related to that parameter; and,
- MSST redefinitions for the snowy grouper stock at a level that establishes a more appropriate difference between an overfished condition and the rebuilding goal.

For more detail on the Council's reference points…
The Secretary approved the numerical MSY, MSST, and MFMT estimates proposed in Snapper Grouper Amendments 11 (SAFMC 1999) and 12 (SAFMC 2000) for black sea bass and red porgy, respectively. However, OY has not been estimated for black sea bass or red porgy, and none of the four management reference points has been estimated for the remaining snapper grouper stocks. The Snapper Grouper FMP currently defines MSY and OY for all other snapper grouper stocks as the yield produced by fishing at fixed exploitation rates (F_{MSY} and F_{OY}, respectively), which are designed to remove a constant fraction of the stocks each year. When F_{MSY} has not been estimated through a stock assessment, it is approximated as the fishing mortality rate that would reduce the long-term average level of spawning per recruit (static SPR) to 30-40% of the long-term average that would be expected in the absence of fishing. Similarly, F_{OY} is estimated as a rate of fishing that would reduce the long-term average level of static SPR to 40-50% of that which would be expected for a virgin stock. The MSST of snapper grouper stocks is defined as one-half of the stock biomass at MSY (B_{MSY}), or the product of that biomass and one minus the natural mortality rate, whichever is greater. This definition is designed to specify a higher overfished threshold for less productive stocks relative to those stocks that are highly productive and capable of increasing in biomass more quickly. However, when the estimate of the natural mortality rate is small (e.g., snowy grouper and golden tilefish), the overfished threshold can be very close to the rebuilding goal of B_{MSY}. The Council currently defines MFMT as F_{MSY} or the level of fishing mortality that will produce the MSY.

Rebuilding Plans

Black sea bass, snowy grouper, and red porgy are overfished. The Magnuson-Stevens Act requires fishery management councils develop a **rebuilding plan** when a stock is identified as overfished. Rebuilding plans have four components: (1) an **estimate of B_{MSY}** (the rebuilding goal), a **rebuilding schedule**, a **rebuilding strategy**, and an estimate of optimum yield expected when stock recovery has been completed (Powers 1996; Restrepo *et al*. 1998). Rebuilding schedules define the timeframe in which the biomass of the overfished stock will be rebuilt to the biomass at MSY or also called B_{MSY}. Rebuilding strategies specify fishing mortality rates and an Allowable Biological Catch (ABC) during the rebuilding period, which should not be exceeded if the stock is to rebuild to B_{MSY} by the end of the rebuilding schedule.

B_{MSY}. The stock biomass expected to exist under equilibrium conditions when fishing at F_{MSY}.

The Council is considering alternative **rebuilding schedules** for the snowy grouper and black sea bass stocks that are consistent with NOAA Fisheries guidance and more recent scientific information on stock status. The Council established a 10-year rebuilding schedule for black sea bass in 1999 through Amendment 11 (SAFMC 1999) and a 15-year rebuilding schedule for snowy grouper in 1991 through Amendment 4 (SAFMC 1991a). The black sea bass assessment indicates that stock could not rebuild to B_{MSY} on schedule even in the absence of fishing mortality. In addition, the current snowy grouper rebuilding schedule is outdated and inconsistent with agency guidance. An 18 year rebuilding schedule was specified for red porgy in Amendment 9 (SAFMC 2000) and is not modified here.

The Council is also considering **rebuilding strategies** for three overfished stocks (snowy grouper, black sea bass, and red porgy) including strategies incorporating estimates of increased dead discards resulting from management measures in Amendment 13C. Without a rebuilding strategy, the total allowable catch (TAC) for each year would not be designated ahead of time, and there would be no long-term plan for stock recovery. This could lead to overly permissive regulations, especially as stocks rebuild, which might reduce the likelihood of stock rebuilding by the end of the rebuilding schedule. In contrast, overly restrictive regulations could reduce economic opportunities to fishermen as well as reducing the availability of a food source for the public. In the future, as new information becomes available and new assessments are conducted, there is a high degree of likelihood that the strategies will need to be modified.

1.2 History of Management

The snapper grouper fishery is highly regulated; some of the species included in this amendment have been regulated since 1983. The original Fishery Management Plan (1983) included size limits for black sea bass (8"). Trawl gear primarily targeting vermilion snapper were prohibited starting in January 1989. Fish traps (not including black sea bass pots) and entanglement nets were prohibited starting in January 1992. Bag limits (10 vermilion snapper; 5 groupers) and size limits (10" recreational vermilion snapper; 12" commercial vermilion snapper; 12" recreational/commercial red porgy) were also implemented in January 1992. Quotas and trip limits for snowy grouper and golden tilefish were implemented in July 1994; tilefish were also added to the 5-grouper aggregate bag limit. A controlled access program for the commercial fishery was implemented fully beginning in 1999. In February 1999, red porgy regulations were 14" size limit and 5 fish bag limit and commercial closure during March and April; black sea bass size limit increased to 10" and a 20-fish bag limit was included. All harvest of red porgy was prohibited from September 8, 1999 until August 28, 2000. Beginning on August 29, 2000 red porgy regulations included a January through April commercial closure, 1 fish bag limit, and 50 pound commercial bycatch allowance May through December.

Most recently, Amendment 13C implemented the following regulatory actions to end or phase-out overfishing of the snowy grouper, golden tilefish, vermilion snapper, and black sea bass stocks, and to increase catches of red porgy to a level consistent with the approved stock rebuilding plan in federal waters of the South Atlantic.

Snowy Grouper: Decrease the annual commercial quota over three years from 151,000 pounds gutted weight (lbs gw) to 84,000 lbs gw in year 3; decrease the commercial trip limit over three years from 275 lbs gw to 100 lbs gw in year 3; and limit possession to 1 per person per day within the 5-grouper per person per day aggregate recreational bag.

Golden Tilefish:	Reduce the annual commercial quota to 295,000 lbs gw; reduce the commercial trip limit to 4,000 lbs gw, which would decrease to 300 lbs gw if 75 percent of the quota were taken by September 1; and limit possession to 1 per person per day within the 5-grouper per person per day aggregate recreational bag limit.
Vermilion Snapper:	Establish an annual commercial quota of 1,100,000 lbs gw; and increase the recreational minimum size limit from 11-inch total length (TL) to 12-inch TL.
Black Sea Bass:	Establish and decrease an annual commercial quota, over three years from 477,000 lbs gw to 309,000 lbs gw in year 3; require the use of at least 2-inch mesh for the entire back panel of pots; remove pots from the water once the commercial quota is met; change commercial and recreational fishing years from the calendar year to June 1 through May 31; establish a recreational allocation which would decrease over three years from 633,000 lbs gw to 409,000 lbs gw in year 3; increase the recreational size limit from 10-inch TL to 12-inch TL over two years; and reduce the recreational bag limit from 20 to 15 per person per day.
Red Porgy:	Increase the commercial trip limit during May through December to 120 fish; establish a commercial quota of 127,000 lbs gw; and increase the recreational bag limit from 1 to 3 red porgy per person per day.

Specific details on these and all the other regulations implemented in the snapper grouper fishery are shown below in Table 1-2.

Table 1-2. History of management.

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
FMP (1983)	08/31/83	PR: 48 FR 26843 FR: 48 FR 39463	-12" limit – red snapper, yellowtail snapper, red grouper, Nassau grouper -8" limit – black sea bass -4" trawl mesh size -Gear limitations – poisons, explosives, fish traps, trawls -Designated modified habitats or artificial reefs as Special Management Zones (SMZs)
Regulatory Amendment #1 (1986)	03/27/87	PR: 51 FR 43937 FR: 52 FR 9864	-Prohibited fishing in SMZs except with hand-held hook-and-line and spearfishing gear. -Prohibited harvest of goliath grouper in SMZs.
Amendment #1 (1988)	01/12/89	PR: 53 FR 42985 FR: 54 FR 1720	-Prohibited trawl gear to harvest fish south of Cape Hatteras, NC and north of Cape Canaveral, FL. -Directed fishery defined as vessel with trawl gear and ≥200 lbs s-g on board. -Established rebuttable assumption that vessel with s-g on board had harvested such fish in EEZ.
Regulatory Amendment #2 (1988)	03/30/89	PR: 53 FR 32412 FR: 54 FR 8342	-Established 2 artificial reefs off Ft. Pierce, FL as SMZs.
Notice of Control Date	09/24/90	55 FR 39039	-Anyone entering federal wreckfish fishery in the EEZ off S. Atlantic states after 09/24/90 was not assured of future access if limited entry program developed.
Regulatory Amendment #3 (1989)	11/02/90	PR: 55 FR 28066 FR: 55 FR 40394	-Established artificial reef at Key Biscayne, FL as SMZ. Fish trapping, bottom longlining, spear fishing, and harvesting of Goliath grouper prohibited in SMZ.
Amendment #2 (1990)	10/30/90	PR: 55 FR 31406 FR: 55 FR 46213	-Prohibited harvest/possession of goliath grouper in or from the EEZ -Defined overfishing for goliath grouper and other species

Document	**All Actions Effective By:**	**Proposed Rule Final Rule**	**Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.**
Emergency Rule	8/3/90	55 FR 32257	-added wreckfish to the FM -fishing year beginning 4/16/90 -commercial quota of 2 million pounds -commercial trip limit of 10,000 pounds per trip
Fishery Closure Notice	8/8/90	55 FR 32635	-the fishery was closed because the commercial quota of 2 million pounds was reached
Emergency Rule Extension	11/1/90	55 FR 40181	-extended the measures implemented via emergency rule on 8/3/90
Amendment #3 (1990)	01/31/91	PR: 55 FR 39023 FR: 56 FR 2443	-Add wreckfish to the FMU; -Defined optimum yield and overfishing -Required permit to fish for, land or sell wreckfish; -Required catch and effort reports from selected, permitted vessels; -Established control date of 03/28/90; -Established a fishing year for wreckfish starting April 16; -Established a process to set annual quota, with initial quota of 2 million pounds; provisions for closure; -Established 10,000 pound trip limit; -Established a spawning season closure for wreckfish from January 15 to April 15; and -Provided for annual adjustments of wreckfish management measures;
Notice of Control Date	07/30/91	56 FR 36052	-Anyone entering federal snapper grouper fishery (other than for wreckfish) in the EEZ off S. Atlantic states after 07/30/91 was not assured of future access if limited entry program developed.

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
Amendment #4 (1991)	01/01/92	PR: 56 FR 29922 FR: 56 FR 56016	-Prohibited gear: fish traps except bsb traps north of Cape Canaveral, FL; entanglement nets; longline gear inside 50 fathoms; bottom longlines to harvest wreckfish**; powerheads and bangsticks in designated SMZs off S. Carolina. -defined overfishing/overfished and established rebuilding timeframe: red snapper and groupers ≤ 15 years (year 1 = 1991); other snappers, greater amberjack, bsb, red porgy ≤ 10 years (year 1 = 1991) -Required permits (commercial & for-hire) and specified data collection regulations -Established an assessment group and annual adjustment procedure (framework) -Permit, gear, and vessel id requirements specified for bsb traps. -No retention of snapper grouper spp. caught in other fisheries with gear prohibited in snapper grouper fishery if captured snapper grouper had no bag limit or harvest was prohibited. If had a bag limit, could retain only the bag limit. -8" limit – lane snapper -10" limit – vermilion snapper (recreational only) -12" limit – red porgy, vermilion snapper (commercial only), gray, yellowtail, mutton, schoolmaster, queen, blackfin, cubera, dog, mahogany, and silk snappers -20" limit – red snapper, gag, and red, black, scamp, yellowfin, and yellowmouth groupers. -28" FL limit – greater amberjack (recreational only) -36" FL or 28" core length – greater amberjack (commercial only) -bag limits – 10 vermilion snapper, 3 greater amberjack -aggregate snapper bag limit – 10/person/day, excluding vermilion snapper and allowing no more than 2 red snappers -aggregate grouper bag limit – 5/person/day, excluding Nassau and goliath grouper, for which no retention (recreational & commercial) is allowed -spawning season closure – commercial harvest greater amberjack > 3 fish bag prohibited in April south of Cape Canaveral, FL -spawning season closure – commercial harvest mutton snapper >snapper aggregate prohibited during May and June -charter/headboats and excursion boat possession limits extended

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
Amendment #5 (1991)	04/06/92	PR: 56 FR 57302 FR: 57 FR 7886	-Wreckfish: established limited entry system with ITQs; required dealer to have permit; rescinded 10,000 lb. trip limit; required off-loading between 8 am and 5 pm; reduced occasions when 24-hour advance notice of offloading required for off-loading; established procedure for initial distribution of percentage shares of TAC
Emergency Rule	8/31/92	57 FR 39365	-Black Sea Bass: modified definition of bsb pot; allowed multi-gear trips for bsb; allowed retention of incidentally-caught fish on bsb trips
Emergency Rule Extension	11/30/92	57 FR 56522	-Black Sea Bass: modified definition of bsb pot; allowed multi-gear trips for bsb; allowed retention of incidentally-caught fish on bsb trips
Regulatory Amendment #4 (1992)	07/06/93	FR: 58 FR 36155	-Black Sea Bass: modified definition of bsb pot; allowed multi-gear trips for bsb; allowed retention of incidentally-caught fish on bsb trips
Regulatory Amendment #5 (1992)	07/31/93	PR: 58 FR 13732 FR: 58 FR 35895	-Established 8 SMZs off S. Carolina, where only hand-held, hook-and-line gear and spearfishing (excluding powerheads) was allowed.
Amendment #6 (1993)	07/27/94	PR: 59 FR 9721 FR: 59 FR 27242	-commercial quotas for snowy grouper, golden tilefish -commercial trip limits for snowy grouper, golden tilefish, speckled hind, and warsaw grouper -include golden tilefish in grouper recreational aggregate bag limits -prohibited sale of warsaw grouper and speckled hind -100% logbook coverage upon renewal of permit -creation of the *Oculina* Experimental Closed Area -data collection needs specified for evaluation of possible future IFQ system
Amendment #7 (1994)	01/23/95	PR: 59 FR 47833 FR: 59 FR 66270	-12" FL – hogfish -16" limit – mutton snapper -required dealer, charter and headboat federal permits -allowed sale under specified conditions -specified allowable gear and made allowance for experimental gear -allowed multi-gear trips in N. Carolina -added localized overfishing to list of problems and objectives -adjusted bag limit and crew specs. for charter and head boats -modified management unit for scup to apply south of Cape Hatteras, NC -modified framework procedure
Regulatory Amendment #6 (1994)	05/22/95	PR: 60 FR 8620 FR: 60 FR 19683	Established actions which applied only to EEZ off Atlantic coast of FL: Bag limits – 5 hogfish/person/day (recreational only), 2 cubera snapper/person/day > 30" TL; 12" TL – gray triggerfish
Notice of Control Date	04/23/97	62 FR 22995	-Anyone entering federal bsb pot fishery off S. Atlantic states after 04/23/97 was not assured of future access if limited entry program developed.

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
Amendment #8 (1997)	12/14/98	PR: 63 FR 1813 FR: 63 FR 38298	-established program to limit initial eligibility for s-g fishery: Must demonstrate landings of any species in SG FMU in 1993, 1994, 1995 or 1996; AND have held valid SG permit between 02/11/96 and 02/11/97. -granted transferable permit with unlimited landings if vessel landed ≥ 1,000 lbs. of snapper grouper spp. in any of the years -granted non-transferable permit with 225 lb. trip limit to all other vessels -modified problems, objectives, OY, and overfishing definitions -expanded Council's habitat responsibility -allowed retention of snapper grouper spp. in excess of bag limit on permitted vessel with a single bait net or cast nets on board -allowed permitted vessels to possess filleted fish harvested in the Bahamas under certain conditions.
Regulatory Amendment #7 (1998)	01/29/99	PR: 63 FR 43656 FR: 63 FR 71793	-Established 10 SMZs at artificial reefs off South Carolina.
Interim Rule Request	1/16/98		-Council requested all Amendment 9 measures except black sea bass pot construction changes be implemented as an interim request under MSA
Action Suspended	5/14/98		-NMFS informed the Council that action on the interim rule request was suspended
Emergency Rule Request	9/24/98		-Council requested Amendment 9 be implemented via emergency rule
Request not Implemented	1/22/99		-NMFS informed the Council that the final rule for Amendment 9 would be effective 2/24/99; therefore they did not implement the emergency rule

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
Amendment #9 (1998)	2/24/99	PR: 63 FR 63276 FR: 64 FR 3624	-red porgy: 14" length (recreational and commercial); 5 fish rec. bag limit; no harvest or possession > bag limit, and no purchase or sale, in March and April. -bsb: 10" length (recreational and commercial); 20 fish rec. bag limit; required escape vents and escape panels with degradable fasteners in bsb pots -greater amberjack: 1 fish rec. bag limit; no harvest or possession > bag limit, and no purchase or sale, during April; quota = 1,169,931 lbs; began fishing year May 1; prohibited coring. Vermilion snapper: 11" length (recreational) Gag: 24" length (recreational); no commercial harvest or possession > bag limit, and no purchase or sale, during March and April Black grouper: 24" length (recreational and commercial); no harvest or possession > bag limit, and no purchase or sale, during March and April. Gag and Black grouper: within 5 fish aggregate grouper bag limit, no more than 2 fish may be gag or black grouper (individually or in combination) All SG without a bag limit: aggregate recreational bag limit 20 fish/person/day, excluding tomtate and blue runners Vessels with longline gear aboard may only possess snowy, Warsaw, yellowedge, and misty grouper, and golden, blueline and sand tilefish.
Amendment #9 (1998) resubmitted	10/13/00	PR: 63 FR 63276 FR: 65 FR 55203	-Commercial trip limit for greater amberjack
Regulatory Amendment #8 (2000)	11/15/00	PR: 65 FR 41041 FR: 65 FR 61114	-Established 12 SMZs at artificial reefs off Georgia; revised boundaries of 7 existing SMZs off Georgia to meet CG permit specs; restricted fishing in new and revised SMZs
Emergency Interim Rule	09/08/99, expired 08/28/00	64 FR 48324 and 65 FR 10040	-Prohibited harvest or possession of red porgy.
Emergency Action	9/3/99	64 FR 48326	-Reopened the Snapper Grouper Amendment 8 permit application process
Amendment #10 (1998)	07/14/00	PR: 64 FR 37082 and 64 FR 59152 FR: 65 FR 37292	-Identified EFH and established HAPCs for species in the SG FMU.

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
Amendment #11 (1998)	12/02/99	PR: 64 FR 27952 FR: 64 FR 59126	-MSY proxy: goliath and Nassau grouper = 40% static SPR; all other species = 30% static SPR -OY: hermaphroditic groupers = 45% static SPR; goliath and Nassau grouper = 50% static SPR; all other species = 40% static SPR -Overfished/overfishing evaluations: BSB: overfished (MSST=3.72 mp, 1995 biomass=1.33 mp); undergoing overfishing (MFMT=0.72, F1991-1995=0.95) Vermilion snapper: overfished (static SPR = 21-27%). Red porgy: overfished (static SPR = 14-19%). Red snapper: overfished (static SPR = 24-32%) Gag: overfished (static SPR = 27%) Scamp: no longer overfished (static SPR = 35%) Speckled hind: overfished (static SPR = 8-13%) Warsaw grouper: overfished (static SPR = 6-14%) Snowy grouper: overfished (static SPR = 5=15%) White grunt: no longer overfished (static SPR = 29-39%) Golden tilefish: overfished (couldn't estimate static SPR) Nassau grouper: overfished (couldn't estimate static SPR) Goliath grouper: overfished (couldn't estimate static SPR) -overfishing level: goliath and Nassau grouper = F>F40% static SPR; all other species: = F>F30% static SPR Approved definitions for overfished and overfishing. MSST = [(1-M) or 0.5 whichever is greater]*Bmsy. MFMT = Fmsy
Amendment #12 (2000)	09/22/00	PR: 65 FR 35877 FR: 65 FR 51248	-Red porgy: MSY=4.38 mp; OY=45% static SPR; MFMT=0.43; MSST=7.34 mp; rebuilding timeframe=18 years (1999=year 1); no sale during Jan-April; 1 fish bag limit; 50 lb. bycatch comm. trip limit May-December; modified management options and list of possible framework actions.
Amendment #13A (2003)	04/26/04	PR: 68 FR 66069 FR: 69 FR 15731	-Extended for an indefinite period the regulation prohibiting fishing for and possessing snapper grouper spp. within the *Oculina* Experimental Closed Area.
Notice of Control Date	10/14/05	70 FR 60058	-The Council is considering management measures to further limit participation or effort in the commercial fishery for snapper grouper species (excluding Wreckfish).
Amendment #13C (2006)	10/23/06	PR: 71 FR 28841 FR: 71 FR 55096	- End overfishing of snowy grouper, vermilion snapper, black sea bass, and golden tilefish. Increase allowable catch of red porgy.
Notice of Control Date	3/8/07	72 FR 60794	-The Council may consider measures to limit participation in the snapper grouper for-hire fishery

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
Amendment #14 (TBD)	TBD	TBD	-Establish eight deepwater Type II marine protected areas (MPAs) to protect a portion of the population and habitat of long-lived deepwater snapper grouper species. -Sent to NMFS 7/18/07
Amendment #15A (TBD)	TBD	TBD	
Amendment #15B (TBD)	TBD	TBD	

1.3 Management Objectives

The following are the fishery management plan objectives for the snapper grouper fishery as specified by the Council. These were last updated in Snapper Grouper FMP Amendment 8 (June 1996).

1. Prevent overfishing.
2. Collect necessary data.
3. Promote orderly utilization of the resource.
4. Provide for a flexible management system.
5. Minimize habitat damage.
6. Promote public compliance and enforcement.
7. Mechanism to vest participants.
8. Promote stability and facilitate long-run planning.
9. Create market-driven harvest pace and increase product continuity.
10. Minimize gear and area conflicts among fishermen.
11. Decrease incentives for overcapitalization.
12. Prevent continual dissipation of returns from fishing through open access.
13. Evaluate and minimize localized depletion.

2 Alternatives

Section 2.1 outlines the alternatives considered by the Council in this amendment and Section 2.2 compares their environmental consequences (environmental consequences of the alternatives are described in detail in Section 4.0). These alternatives were identified and developed over a number of years, by numerous sources, and through multiple processes, including the scoping process conducted for Amendments 13 and 13B, public hearings and/or comments on Amendments 13, 13B, and 13C, interdisciplinary plan team meetings, and meetings of the Council, the Council's Snapper Grouper Committee, Snapper Grouper Advisory Panel, and Scientific and Statistical Committee. Alternatives the Council considered but eliminated from detailed study during the development of this amendment are described in Appendix A.

Each alternative retained for analysis is designed to accomplish one of the following general categories of actions:

- Update management reference points;
- Modify rebuilding schedules; or
- Define rebuilding strategies.

The management reference point, rebuilding schedule, and rebuilding strategy actions are interrelated. For example, the definition of maximum sustainable yield (MSY) and associated parameters influences the numerical estimates of alternative optimum yield (OY) and minimum stock size threshold (MSST) definitions, as well as the length of alternative rebuilding schedules. Additionally, the allowable biological catch (ABC) schedules associated with alternative rebuilding strategies are influenced by both reference point and rebuilding schedule definitions. The Council is also considering rebuilding strategies for snowy grouper, black sea bass, and red porgy, which account for estimates of increased bycatch resulting from management measures imposed through Amendment 13C.

The environmental impact statement integrated in this amendment employs a "tiering" process in analyzing the environmental consequences of these interrelated actions and alternatives. (Note: The use of the word "tiering" in this document does not refer to tiering as used with environmental documentation procedures). While this tiering process does not affect the type, number, or range of alternatives analyzed to accomplish each action, it affects the calculations used in analyzing the environmental consequences of those alternatives. Using snowy grouper as an example, this process uses the parameters associated with the preferred MSY alternative to estimate the OY and MSST values associated with alternative OY and MSST definitions, as well as the length of the shortest possible and maximum recommended rebuilding schedules for that stock. Additionally, it uses these parameters and the Council's preferred 34-year rebuilding schedule to calculate the annual Allowable Biological Catches (ABCs) associated with alternative snowy grouper rebuilding strategies.

This tiering process is intended to streamline and focus the environmental review process, consistent with CEQ regulations for implementing the National Environmental Policy Act at 40 CFR Section 1500.

2.1 Description of Alternatives

2.1.1 Snowy Grouper

Results from SEDAR 4 (2004) indicated snowy grouper was experiencing overfishing and was overfished. Amendment 13C took the following actions to end overfishing of snowy grouper: Decrease the annual commercial quota over three years from 151,000 pounds gutted weight (lbs gw) to 84,000 lbs gw in year 3; decrease the commercial trip limit over three years from 275 lbs gw to 100 lbs gw in year 3; and limit possession to 1 per person per day within the 5-grouper per person per day aggregate recreational bag. A 15 year rebuilding schedule starting in 1991 was established through Amendment 11 (1999). A new rebuilding schedule will be established through Amendment 15A. The first year of the rebuilding schedule is 2006.

2.1.1.1 Management Reference Point Alternatives

Table 2-1. MSY alternatives under consideration for snowy grouper.

Alternatives	MSY equation	F_{MSY} equals	MSY value
Alternative 1 (no action).	The yield produced by $F_{MSY.}$ $F_{30\%SPR}$ is used as the F_{MSY} proxy.	0.14*	not specified
Alternative 2 (preferred).	MSY equals the yield produced by $F_{MSY.}$ MSY and F_{MSY} are defined by the most recent SEDAR.	0.05**	313,056 lbs whole weight**
*Source: Powers 1999 **Source: SEDAR 4 2004			

Table 2-2. OY alternatives under consideration for snowy grouper.

Alternatives	OY equation	F_{OY} equals	OY value
Alternative 1 (no action).	OY equals the yield produced by F_{OY}. $F_{45\%SPR}$ is used as the F_{OY} proxy.	0.10*	not specified
Alternative 2.	OY equals the yield produced by $F_{OY.}$ If a stock is overfished, F_{OY} equals the fishing mortality rate specified by the rebuilding plan designed to rebuild the stock to SSB_{MSY} within the approved schedule. After the stock is rebuilt, F_{OY} = a fraction of F_{MSY}. Snowy grouper is overfished.	(65%)(F_{MSY})	293,020 lbs whole weight**
Alternative 3 (preferred).		(75%)(F_{MSY})	303,871 lbs whole weight**
Alternative 4.		(85%)(F_{MSY})	309,716 lbs whole weight**

*Source: Estimate of $F_{40\%SPR}$ from Potts and Brennan (2001), value for $F_{45\%SPR}$ not available.
**Calculated based on Council's preferred MSY value in which F_{MSY} equals 0.05 for Alternatives 2-4 (SEDAR 4 2004).

Table 2-3. MSST alternatives under consideration for snowy grouper.

Alternatives	MSST equation	M equals	MSST value
Alternative 1 (no action).	MSST equals SSB_{MSY}((1-M) or 0.5, whichever is greater).	0.12*	4,105,182 lbs whole weight**
Alternative 2.	MSST equals SSB_{MSY}(0.5).	n/a	2,332,490 lbs whole weight**
Alternative 3 (preferred).	MSST equals SSB_{MSY}(0.75).	n/a	3,498,735 lbs whole weight**

*Source: Recommendation from SEFSC based on the results from SEDAR 4 (2004).
**Source: Calculated based on Council's preferred MSY value in which SSB_{MSY} equals 4,664,980 lbs whole weight (SEDAR 4 2004).

Table 2-4. Criteria used to determine the overfished and overfishing status of snowy grouper from SEDAR 4 (2004). Note: Actions taken in Amendment 13C are expected to end overfishing of snowy grouper in 2009.

DETERMINATION	SSB_{CURR} (2003)	MSST (preferred)	F_{CURR} (2002)	MFMT	STATUS
OVERFISHED?	869,503 lbs	3,498,735 lbs			Overfished (SSB_{CURR}/MSST = 0.25)
OVERFISHING?			0.15	0.05*	Overfishing (F_{CURR}/MFMT = 3.00)**

*Amendment 15A is not exploring alternatives for MFMT. F_{MSY} is used as a proxy for MFMT.
All lbs are in whole weight. Note: This is not an action item.
**Overfishing is expected to end in 2009.

2.1.1.2 Rebuilding Schedule Alternatives

Alternative 1 (no action). A 15-year rebuilding schedule is currently in place, which began in 1991.

Alternative 2. Define a rebuilding schedule as the shortest possible period to rebuild in the absence of fishing mortality (T_{MIN}). This would equal 13 years (SEDAR 4 2004). 2006 is Year 1.

Alternative 3. Define a rebuilding schedule as the mid-point between shortest possible and maximum recommended period to rebuild. This would equal 23.5 years. 2006 is Year 1.

Alternative 4 (preferred). Define a rebuilding schedule as the maximum recommended period to rebuild if $T_{MIN} > 10$ years. The maximum recommended period equals T_{MIN} + one generation time. This would equal 34 years (SEDAR 4 2004 was the source of the generation time). 2006 is Year 1.

2.1.1.3 Rebuilding Strategy Alternatives

Alternative 1 (no action). Do not define a yield-based rebuilding strategy for snowy grouper.

Alternative 2. Define a rebuilding strategy for snowy grouper that maintains a constant fishing mortality rate throughout the rebuilding timeframe. The TAC specified for 2009 would remain in effect beyond 2009 until modified.

> **Sub-alternative 2a.** The TAC for 2009 would be 104,711 lbs whole weight. The TAC would change annually according to the rebuilding plan.
> **Sub-alternative 2b.** The TAC for 2009 would be 97,932 lbs whole weight. The TAC would change every 5 years according to the rebuilding plan.

Alternative 3 (preferred). Define a rebuilding strategy for snowy grouper that maintains a modified/constant fishing mortality rate throughout the rebuilding timeframe. The TAC specified for 2009 would remain in effect beyond 2009 until modified.

> **Sub-alternative 3a.** The TAC for 2009 would be 94,364 lbs whole weight. The TAC would change annually according to the rebuilding plan.
>
> **Sub-alternative 3b.** The TAC for 2009 would be 109,309 lbs whole weight. The TAC would change every 5 years according to the rebuilding plan.
>
> **Sub-alternative 3c (preferred).** The TAC for 2009 would be 102,960 lbs whole weight.

Table 2-5. Annual total allowable catch (lbs whole weight) values associated with three rebuilding strategy alternatives for snowy grouper. Note: Except for Alternatives 1 and 3c, values take into consideration increased discard mortality that could result from management measures taken through Amendment 13C. Rebuilding strategy Alternative 2 assumes actions were taken in 2006 to end overfishing. Actions taken through Amendment 13C are reflected in Alternative 3 and were intended to end overfishing in 2009. The fishing year begins January 1st of each year.

Year	Rebuilding Strategy Alt 1 (No Action)	Rebuilding Strategy Alternative 2 (Constant F Strategy) $F = F_{MSY}$		Rebuilding Strategy Alternative 3 (Modified/Constant F Strategy: $F = F_{MSY}$)		
Adjustment Interval	**None**	**2a: 1 Year**	**2b: 5 Year**	**3a: 1 Year**	**3b: 5 Year**	**3c: (Preferred)**
2007	Do not define a yield-based rebuilding strategy.	92,617	104,914	185,188	185,188	185,188
2008		96,855	97,932	139,728	139,728	144,560
2009		104,711	97,932	94,364	109,309	102,960
2010		112,536	97,932	102,129	109,309	Onwards until modified
2011		120,261	131,221	109,858	109,309	
2012		123,872	131,221	117,366	109,309	
2013		129,503	131,221	122,824	109,309	
2014		137,316	131,221	126,296	146,769	
2015		145,151	131,221	136,147	146,769	
2016		153,030	176,326	143,877	146,769	
2017		168,064	176,326	158,510	146,769	
2018		178,550	176,326	169,013	146,769	
2019		186,848	176,326	175,119	188,983	
2020		195,136	176,326	183,386	188,983	
2021		203,315	212,865	189,332	188,983	
2022		207,218	212,865	195,536	188,983	
2023		211,067	212,865	201,543	188,983	
2024		217,212	212,865	207,514	223,418	
2025		225,511	212,865	215,744	223,418	
2026		231,535	244,946	224,012	223,418	
2027		235,439	244,946	230,155	223,418	
2028		244,987	244,946	239,665	223,418	
2029		253,375	244,946	245,727	255,197	
2030		259,392	244,946	249,596	255,197	
2031		263,193	274,529	255,670	255,197	
2032		269,232	274,529	259,503	255,197	
2033		275,381	274,529	265,491	255,197	
2034		279,335	274,529	269,458	278,512	
2035		285,505	274,529	273,266	278,512	
2036		285,003	289,828	279,376	278,512	
2037		288,902	289,828	283,295	278,512	
2038		290,682	289,828	287,164	278,512	
2039		294,723	289,828	291,021	291,021	

2.1.2 Red Porgy

The red porgy stock is not experiencing overfishing and the stock is rebuilding but remains overfished (SEDAR Assessment Update 2006). Amendment 12 (2000) established an 18 year rebuilding schedule. The rebuilding period began in 1999 and ends in 2017. Amendment 13C implemented the following management regulations: Increase the commercial trip limit during May through December to 120 fish; establish a commercial quota of 127,000 lbs gw; and increase the recreational bag limit from 1 to 3 red porgy per person per day.

2.1.2.1 Management Reference Point Alternatives

Table 2-6. MSY alternatives under consideration for red porgy.

Alternatives	MSY equation	F_{MSY} equals	MSY value
Alternative 1 (no action).	The yield produced by $F_{MSY.}$ $F_{35\%SPR}$ is used as the F_{MSY} proxy.	0.43*	4,380,000 lbs whole weight.
Alternative 2 (preferred).	MSY equals the yield produced by $F_{MSY.}$ MSY and F_{MSY} are defined by the most recent SEDAR Update.	0.20**	625,699 lbs whole weight**
*Source: Vaughan 1999 **Source: SEDAR Update Assessment 2006			

Table 2-7. OY alternatives under consideration for red porgy.

Alternatives	OY equation	F_{OY} equals	OY value
Alternative 1 (no action).	OY equals the yield produced by F_{OY}. $F_{45\%SPR}$ is used as the F_{OY} proxy.	0.28*	not specified
Alternative 2.	OY equals the yield produced by $F_{OY.}$ If a stock is overfished, F_{OY} equals the fishing mortality rate specified by the rebuilding plan designed to rebuild the stock to SSB_{MSY} within the approved schedule. After the stock is rebuilt, F_{OY} = a fraction of F_{MSY}. Red porgy is overfished.	(65%)(F_{MSY})	587,901 lbs whole weight**
Alternative 3 (preferred).		(75%)(F_{MSY})	608,099 lbs whole weight**
Alternative 4.		(85%)(F_{MSY})	619,915 lbs whole weight**
**Source: Estimate of $F_{40\%SPR}$ from Potts and Brennan (2001) **Calculated based on Council's preferred MSY value in which F_{MSY} equals 0.20 for Alternatives 2-4 (SEDAR Update Assessment 2006)			

Table 2-8. Criteria used to determine the overfished and overfishing status of red porgy.

DETERMINATION	SSB_{CURR} (2005)	MSST	F_{CURR} (2004)	MFMT	STATUS
OVERFISHED?	4,716,247 lbs	5,529,012 lbs*			Overfished (SSB_{CURR}/MSST = 0.85)
OVERFISHING?			0.095	0.20**	Not Overfishing (F_{CURR}/MFMT = 0.39)

*The value for MSST is from SEDAR Update Assessment (2006) based on an M of 0.225. Amendment 15A is not exploring alternatives for MSST, as Amendment 12 designated the maximum of either 0.5 or 1-M(B_{MSY}). SSB_{MSY} = 7,134,209 whole weight (SEDAR Update Assessment 2006). The Council has not indicated any desire to change this definition.
**Amendment 15A is not exploring alternatives for MFMT. F_{MSY} is used as a proxy for MFMT. This Amendment is not exploring alternatives for rebuilding schedules for red porgy as Amendment 12 established an 18 year rebuilding schedule for red porgy beginning in 1999.
All lbs are in whole weight. Note: This is not an action item.

2.1.2.2 Rebuilding Schedule

Amendment 15A does not specify rebuilding schedule alternatives for red porgy. The Council defined the rebuilding schedule for red porgy in Amendment 12 to the Snapper Grouper FMP. That schedule is 18 years, which is the maximum recommended rebuilding timeframe based on the formula: T_{MIN} (10 years) + one generation time (8 years) (SAFMC 2000). Year 1 was 1999.

2.1.2.3 Rebuilding Strategy Alternatives

Alternative 1 (no action). Do not define a yield-based rebuilding strategy for red porgy.

Alternative 2. Define a rebuilding strategy for red porgy that maintains a constant catch level throughout the rebuilding timeframe. The TAC would be 438,884 lbs whole weight for both 2009 and 2010. The TAC specified for 2010 would remain in effect beyond 2010 until modified.

Alternative 3 (preferred). Define a rebuilding strategy for red porgy that maintains a constant fishing mortality rate throughout the rebuilding timeframe. The TAC specified for 2010 would remain in effect beyond 2010 until modified.

> **Sub-alternative 3a (preferred).** The TAC would be 395,281 lbs whole weight for both 2009 and 2010. The TAC would change every three years according to the rebuilding plan.
>
> **Sub-alternative 3b.** The TAC would be 410,251 lbs whole weight for both 2009 and 2010. The TAC would change every five years according to the rebuilding plan.

Table 2-9. Annual total allowable catch (lbs whole weight) values associated with three rebuilding strategy alternatives for red porgy. Note: After 2010, adjustments in catch would be made by framework or through a regulatory amendment in response to new assessments or assessment updates. Values take into consideration increased discard mortality that could result from management measures taken through Amendment 13C.

Year	Rebuilding Strategy Alternative 1 (No Action)	Rebuilding Strategy Alternative 2 (Constant Catch)	Rebuilding Strategy Alternative 3 (Constant F)	
Adjustment Interval	None	None	3a: 1 year then 3 year (preferred)	3b: 1 year then 5 year
2007	Do not define a yield-based rebuilding strategy.	438,884	261,895	261,895
2008		438,884	395,281	410,251
2009		438,884	395,281	410,251
2010		438,884	395,281	410,251
2011		438,884	440,999	410,251
2012		438,884	440,999	410,251
2013		438,884	440,999	479,594
2014		438,884	485,837	479,594
2015		438,884	485,837	479,594
2016		438,884	485,837	479,594
2017		438,884	485,837	479,594

*Assuming the preferred alternative for each of the previous actions for this species. Projected yields are calculated using data from the Discard Sensitivity Run (which accounts for dead discards). Annual catch levels associated with 3-year and 5 year (average) adjustment intervals are presented. Based on results from SEDAR Assessment Update.

2.1.3 Black Sea Bass

Results from SEDAR 2 (2003) and SEDAR Update 1 (2005) indicated black sea bass was experiencing overfishing and was overfished. Amendment 13C implemented the following management measures to end overfishing: Establish and decrease an annual commercial quota, over three years from 477,000 lbs gw to 309,000 lbs gw in year 3; require the use of at least 2-inch mesh for the entire back panel of pots; remove pots from the water once the commercial quota is met; change commercial and recreational fishing years from the calendar year to June 1 through May 31; establish a recreational allocation which would decrease over three years from 633,000 lbs gw to 409,000 lbs gw in year 3; increase the recreational size limit from 10-inch TL to 12-inch TL over two years; and reduce the recreational bag limit from 20 to 15 per person per day. Amendment 11 (1999) established a 10 year rebuilding schedule which ends in 2008. A new rebuilding schedule will be established through Amendment 15A and year one will be 2006.

2.1.3.1 Management Reference Point Alternatives

Table 2-10. MSY alternatives under consideration for black sea bass.

Alternatives	MSY equation	F_{MSY} equals	MSY value
Alternative 1 (no action).	The yield produced by $F_{MSY.}$ $F_{30\%SPR}$ is used as the F_{MSY} proxy.	0.72*	Not specified.
Alternative 2 (preferred).	MSY equals the yield produced by $F_{MSY.}$ MSY and F_{MSY} are defined by the most recent SEDAR.	0.43**	2,777,825 lbs whole weight.**
*Source: Vaughan *et al*. 1996 **Source: SEDAR Update 1 2005			

Table 2-11. OY alternatives under consideration for black sea bass.

Alternatives	OY equation	F_{OY} equals	OY value
Alternative 1 (no action).	OY equals the yield produced by F_{OY}. $F_{40\%SPR}$ is used as the F_{OY} proxy.	0.4*	not specified
Alternative 2.	OY equals the yield produced by $F_{OY.}$ If a stock is overfished, F_{OY} equals the fishing mortality rate specified by the rebuilding plan designed to rebuild the stock to SSB_{MSY} within the approved schedule. After the stock is rebuilt, F_{OY} = a fraction of F_{MSY}. Black sea bass is overfished.	(65%)(F_{MSY})	2,689,640 lbs whole weight**
Alternative 3 (preferred).		(75%)(F_{MSY})	2,742,551 lbs whole weight**
Alternative 4.		(85%)(F_{MSY})	2,766,802 lbs whole weight**
*Source: Powers 1999 **Calculated based on Council's preferred MSY value in which F_{MSY} equals 0.43 (SEDAR Update 1 2005).			

Table 2-12. Criteria used to determine the overfished and overfishing status of black sea bass. Note: Actions in Amendment 13C will end overfishing of black sea bass in 2009.

DETERMINATION	SSB_{CURR} (2004)	MSST	F_{CURR} (2003)	MFMT	STATUS
OVERFISHED?	4,099,884 lbs	10,511,633 lbs*			Overfished (SSB_{CURR}/MSST = 0.39)
OVERFISHING?			2.64	0.429**	Overfishing (F_{CURR}/MFMT = 6.15)***

*The value for MSST is from SEDAR Update 1 (2005) based on an M of 0.30. Amendment 15A is not exploring alternatives for MSST, as Amendment 11 designated the maximum of either 0.5 or 1-M(B_{MSY}). B_{MSY} = 15,017,000 lbs whole weight (SEDAR Update 1 2005). The Council has not indicated any desire to change this definition.
**Amendment 15A is also not exploring alternatives for MFMT. F_{MSY} is used as a proxy for MFMT. All lbs are in whole weight. Note: This is not an action item.
***Actions were taken in Amendment 13C to end overfishing in 2009.

2.1.3.2 Rebuilding Schedule Alternatives

Rebuilding Schedule Alternative 1 (no action). A 10-year rebuilding schedule is currently in place for black sea bass, which began in 1991.

Rebuilding Schedule Alternative 2. The shortest possible time period to rebuild in the absence of fishing mortality (T_{MIN}). This would equal 6 years (SEDAR Update #1 2005). 2006 is Year 1.

Rebuilding Schedule Alternative 3. Mid-point between shortest possible and maximum recommended time period to rebuild to B_{MSY}. This would equal 8 years. 2006 is Year 1.

Rebuilding Schedule Alternative 4 (preferred). Maximum recommended time period to rebuild to B_{MSY} (years) if $T_{MIN} < 10$ years. The maximum recommended period equals T_{MIN} + one generation time. This would equal 10 years. 2006 is Year 1.

2.1.3.3 Rebuilding Strategy Alternatives

Alternative 1 (preferred). Define a rebuilding strategy for black sea bass that maintains a constant catch throughout the rebuilding timeframe. The TAC for 2009 would be 847,000 lbs whole weight. The TAC specified for 2009 would remain in effect beyond 2009 until modified.

Alternative 2. Define a rebuilding strategy for black sea bass that maintains a constant fishing mortality rate throughout the rebuilding timeframe. The TAC specified for 2009 would remain in effect beyond 2009 until modified.

> **Sub-alternative 2a.** The TAC for 2009 would be 899,071 lbs whole weight. The TAC would change annually according to the rebuilding plan.
>
> **Sub-alternative 2b.** The TAC for 2009 would be 633,687 lbs whole weight. The TAC would change every 5 years according to the rebuilding plan.

Alternative 3. Define a rebuilding strategy for black sea bass that modifies the fishing mortality rate throughout the rebuilding timeframe (initial $F=F_{MSY}$ then $F \leq F_{MSY}$). The TAC specified for 2009 would remain in effect beyond 2009 until modified.

> **Sub-alternative 3a.** The TAC for 2009 would be 1,135,616 lbs whole weight. The TAC would change annually according to the rebuilding plan.
>
> **Sub-alternative 3b.** The TAC for 2009 would be 833,789 lbs whole weight. The TAC would change every 5 years according to the rebuilding plan.

Alternative 4. Define a rebuilding strategy for black sea bass where fishing mortality is modified throughout the rebuilding timeframe. The TAC for 2009 would be 871,231 lbs whole weight. The TAC specified for 2009 would remain in effect beyond 2009 until modified.

Alternative 5 (no action). Do not define a yield-based rebuilding strategy for black sea bass.

Table 2-13. Annual total allowable catch (lbs whole weight) values associated with five rebuilding strategy alternatives for black sea bass. Note: Except for Alternatives 1 and 5, values take into consideration increased discard mortality that could result from management measures taken through Amendment 13C. The fishing year begins June 1st of each year.

Rebuilding Strategy Alternative	**Rebuilding Strategy Alternative 1 (Preferred)**	**Rebuilding Strategy Alternative 2 (Constant F = 0.29)**		**Rebuilding Strategy Alternative 3 (Initial F=F_{MSY} then F<= F_{MSY})**		**Rebuilding Strategy Alternative 4 (Modified F)**	**Rebuilding Strategy Alternative 5 (No Action)**
Year	Constant Landings	2a: 1 year	2b: 3 year average	3a: 1 year	3b: 3 year average	1 year then constant landings	None
2007	1,160,000	348,330	647,424	493,835	847,309	1,159,631	1,160,000
2008	847,000 and onwards until modified	653,659	628,674	871,917	828,559	828,559	847,000 and onwards until modified
2009		899,071	633,687	1,135,616	833,789	871,231	
2010		1,083,573	1,218,338	1,304,582	1,304,582	871,231	
2011		1,211,029	1,218,338	1,304,582	1,304,582	871,231	
2012		1,360,412	1,218,338	1,304,582	1,304,582	871,231	
2013		1,518,823	1,668,010	1,304,582	1,304,582	871,231	
2014		1,670,916	1,668,010	1,304,582	1,304,582	871,231	
2015		1,814,294	1,668,010	1,304,582	1,304,582	871,231	
2016		1,942,812	1,942,812	1,304,582	1,304,582	871,231	
Year Overfishing Ends	2009	2007		2007		2009	2009

2.2 Comparison of Alternatives

2.2.1 Snowy Grouper

2.2.1.1 Management Reference Point Alternatives

There are no direct effects from redefining and/or updating MSY, OY, and MSST because these parameters simply provide fishery managers with targets and thresholds that will be used to assess the status and performance of the fishery. However, these management reference points indirectly benefit the biological and ecological environments by influencing the development of fishery management measures, which directly affect snowy grouper and other species. Tables 2-14 – 2-16 summarize and compare the effects expected from each alternative.

Table 2-14. Summary of effects of MSY alternatives under consideration for snowy grouper.

	Biological Effects	Economic, Social, and Administrative Effects
Alternative 1 (no action). Yield from F_{MSY}.	-	-
Alternative 2 (preferred). F_{MSY} as defined by SEDAR.	+	+

Table 2-15. Summary of effects of OY alternatives under consideration for snowy grouper.

	Biological Effects	Economic, Social, and Administrative Effects
Alternative 1 (no action). Yield from F_{OY}.	-	-
Alternative 2. Yield from F_{OY}. F_{OY}=(65%)(F_{MSY})	+ + +	+
Alternative 3 (preferred). Yield from F_{OY}. F_{OY} =(75%)(F_{MSY})	+ +	++
Alternative 4. Yield from F_{OY}. F_{OY}=(85%)(F_{MSY})	+	+

Table 2-16 Summary of effects of MSST alternatives under consideration for snowy grouper.

	Biological Effects	Economic, Social, and Administrative Effects
Alternative 1 (no action). MSST=SSB_{MSY}((1-M) or 0.5, whichever greater)	+	-
Alternative 2. MSST=SSB_{MSY}(0.5)	-	-
Alternative 3 (preferred). MSST=SSB_{MSY}(0.75)	Intermediate	+

The no action MSY and OY alternatives describe the management reference points that would be retained if no action were taken through this amendment to redefine or update existing parameters. These existing definitions estimate sustainable and optimal fishing mortality rates using proxies, rather than point estimates. The MSY and OY action alternatives would provide more precise estimations of these parameters based on a recent SEDAR stock assessment.

Managing the snowy grouper stock based on higher fishing mortality rates specified in **MSY and OY Alternative 1** than those derived from the recent stock assessment would likely result in indirect, adverse effects to the biological environment. Conversely, MSY and OY action alternatives would likely have beneficial effects as the F_{MSY} and F_{OY} estimates associated with these alternatives would support a lower fishing mortality rate relative to the status quo and would implement more precise estimations of management reference points based on a recent stock assessment. **OY Alternative 2** is the most precautionary OY alternative because it provides the largest buffer between MSY and OY. **Alternative 3** would reduce this safety margin, and **Alternative 4** is the least conservative option of the action alternatives. While higher fishing mortality rates may benefit fishery participants, associated industries, and communities in the short-term by providing increased yields, they are expected to adversely affect the socioeconomic environment over the long-term because such yields are not likely to be sustainable.

The MSST in **Alternative 1** is the most precautionary, **Alternative 2** the least conservative definition, and **Alternative 3** moderately conservative, from a biological perspective. Administratively, the greatest effects are associated with Alternative 1 as natural variation in recruitment could cause stock biomass to more frequently alternate between an overfished and rebuilt condition, requiring fishery managers to apply scarce administrative resources to developing rebuilding plans even when the fishing mortality rate applied to the stock was within the accepted limits. The greater the likelihood of unintentional overexploitation, the greater the potential administrative burden.

Defining the MSY, OY and MSST of a species does not alter the current harvest or use of the resource. Specification of these measures merely establishes benchmarks for fishery and resource evaluation. Direct effects only accrue to actions that alter harvest or other use of the resource. Since there would be no direct effects on resource harvest or use, there would be no direct effects on fishery participants, associated industries or communities. Specifying MSY, OY, and MSST, however, has indirect impacts since it establishes the platform for future management, specifically from the perspective of bounding allowable harvest levels. The MSY specification in **Preferred Alternative 2** would support greater harvests after the stock is rebuilt than the status quo, with accompanying long-term increased positive economic and social benefits. The MSY defined by **Alternative 1** is likely an overestimate since a harvest level this high has only been recorded once during the 1986-2005 data record, suggesting that the MSY is inappropriate for this resource. As such, the adoption of **Alternative 1** and subsequent allowance of harvest at the respective MSY value may lead to excessive exploitation, precipitating the imposition of restrictive management measures and reductions in economic and social benefits.

The OY specifications for **Alternatives 1-4** range from approximately 169% (**Alternative 2**) to 221% (**Alternative 1**) more than the status quo harvest level. Thus, each of these alternative specifications would accommodate an increase from the baseline harvest level. Therefore, once the resource is rebuilt, the total allowable harvest can be increased and harvest restrictions can be reduced, supporting increased economic and social benefits to the fishery. If sustainable, the larger the harvests, the greater the economic and social benefits to the harvest sector and associated industries. However, due to the inability to identify, model, anticipate, and control all factors that affect stocks, some level of precautionary conservatism must be factored into the selection of OY. Since **Alternative 2** would allow the lowest harvest, it represents the most conservative vision of how the resource should be managed, encompassing the least likelihood, relative to the other alternatives, that excessive harvest will occur, and avoidance of the adverse economic and social consequences that would accrue from increased restrictions. **Alternative 2** also, however, would represent the greatest potential foregone harvest opportunities if the harvest level is overly conservative. Conversely, **Alternative 1** represents the least conservative vision, thereby decreasing the possibility of foregone economic and social benefits, but increasing the possibility of excessive harvest. Neither the probabilities of these conditions occurring nor the net impacts can be determined. Overall, **Alternatives 2-4** are more conservative than **Alternative 1**. **Preferred Alternative 3** is intermediate to **Alternatives 2 and 4** and is believed to represent a reasonable compromise to the uncertainty associated with either alternative.

Among the alternative specifications, **Preferred Alternative 3** is intermediate in the specification of the MSST. Thus, it reduces the likelihood that the fishery will be declared overfished, which would be increased with **Alternative 1**, thereby avoiding the adverse economic and social impacts that would precipitate from additional resultant harvest restrictions. **Preferred Alternative 3** also mitigates the potential problems of an insufficiently conservative MSST, which might be the case for **Alternative 2**, thereby avoiding the adverse impacts that would accrue to excessive reduction of the biomass.

In summary, no direct economic or social effects are expected to accrue to any of the alternative benchmark parameter specifications. Indirect effects could accrue if future assessment of the stock relative to the benchmarks identifies a need for restrictive management. The magnitude of these effects, however, will depend on the nature of the specific management measures adopted. These effects will be quantified when such action is prepared in Amendment 15B.

2.2.1.2 Rebuilding Schedule Alternatives

Defining a rebuilding schedule for snowy grouper could indirectly affect the human environment by determining the length of time over which rebuilding efforts can be extended. Table 2-17 summarizes and compares the effects expected from each alternative.

Table 2-17. Summary of effects of rebuilding schedule alternatives and sub-alternatives under consideration for snowy grouper.

	Biological Effects	Economic, Social, and Administrative Effects
Alternative 1 (no action). 15 years (start=1991)	-	-
Alternative 2. 13 years (start=2006).	+ + +	+
Alternative 3. 23.5 years (start=2006)	+	++
Alternative 4 (preferred). 34 years (start=2006).	+	+++

As it is not possible to rebuild the snowy grouper to B_{MSY} with the rebuilding schedule established in 1991, **Rebuilding Schedule Alternative 1** would have negative biological impacts for snowy grouper. **Alternative 2** would have the greatest benefits to the stock. Reduced fishing effort and gear in the water could benefit protected species.

The estimate of incidental catch of snowy grouper when targeting similar species is very close to the 2008 quota established by Amendment 13C (84,000 lbs ww). Therefore, if **Alternative 3** is implemented, the commercial quota would need to be reduced to rebuild to B_{MSY} within the rebuilding period. This would increase the levels of fishing mortality through discards and reduce the biological effects to the stock compared with **Alternative 4**.

Alternative 1 would negatively affect the administrative environment by creating unrealistic expectations about the time needed for stock recovery. The total closure required by **Alternative 2** would benefit the administrative environment. **Alternatives 3 and 4** would burden the administrative environment; however, such routine administrative actions already fall within the scope of the current fishery management process.

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

Defining a rebuilding schedule, however, may result in indirect effects. Restrictive management measures could be necessary to rebuild a resource, and direct effects accrue to these measures. Further, defining the rebuilding schedule determines the length of time over which rebuilding efforts can be extended and affects the severity of the measures implemented during the recovery period. Generally, the shorter the recovery period, the more severe the necessary harvest restrictions, and the more severe the harvest restrictions, the greater the short-term adverse economic effects.

Alternative 1 would maintain the current 15-year rebuilding schedule. This period expired in 2006 without achieving recovery of the resource. Thus, continued restrictions would be required beyond 2006. While the impacts of these restrictions may be no different than those intended to achieve the goals of the alternative rebuilding schedules (**Alternatives 2-4**), the continuation of the status quo would require additional management action to adopt a legally compliant rebuilding schedule, with associated additional costs of amendment preparation. Hence, the primary difference between **Alternative 1** and the other alternatives is that the adoption of **Alternative 1** would impose additional costs on the management process.

Alternative 2 would require total cessation of the directed snowy grouper fishery for 13 years, eliminating all economic and social activity associated with the fishery. Since snowy grouper is encountered during the course of targeting other species and virtually all snowy grouper die due to release mortality, recovery of snowy grouper would not occur at the end of 13 years and additional management action, with associated costs, would be required. Thus, total closure of the fishery, as would occur under **Alternative 2**, would not sufficiently help either the resource or fishermen. **Alternative 3** and **Preferred Alternative 4** would allow increasingly longer recovery times, thus allowing directed harvests to continue while the stock recovers. This would mitigate the adverse effects that would accrue to **Alternatives 1 and 2**, though not totally eliminate short-term adverse economic and social effects. **Alternative 3** would entail smaller losses in revenues and consumer surplus relative to **Alternative 2**, but fishermen would still be forced to discard dead or dying fish and subsequent action would be required to achieve recovery goals, at additional expense. **Preferred Alternative 4** would eliminate these mandatory discards and allow increased harvests beyond current incidental harvest levels. **Preferred Alternative 4** is expected to result in increased economic and social benefits relative to **Alternatives 1-3** since it would not require the discard of incidentally caught dead fish, would support a progressive increase in allowable harvest, and avoids the need for repetitive management development.

2.2.1.3 Rebuilding Strategy Alternatives

Snowy Grouper Rebuilding Strategy Alternative 1 would not define a strategy that allows catch to increase as the stock rebuilds. Failure to specify a yield based strategy and holding the commercial quota at constant levels could provide the greatest biological effect of all the alternatives since harvest would not increase as the stock increases. However, without a rebuilding strategy, the total allowable catch (TAC) for each year would not be designated ahead of time, and there would be no long-term plan for stock recovery. **Alternatives 2 – 4** would have direct, beneficial effects to the biological, economic, and social environments because they would specify the total allowable catch that should be taken annually in a fishery throughout the defined rebuilding schedule. Each action alternative would benefit the environment by enhancing the ability of the stock to recover from years of low recruitment due to excessive fishing pressure and/or natural environmental factors. Tables 2-18 summarizes and compares the effects expected from each alternative.

Table 2-18. Summary of effects of rebuilding strategy alternatives under consideration for snowy grouper.

	Biological Effects	Economic, Social, and Administrative Effects
Alternative 1 (no action). Do not specify strategy.	+++	+
Alternative 2. Constant F at F_{MSY}.		
2a. TAC changes annually.	++	-
2b. TAC changes in 5 year increments	++	+
Alternative 3. Modified, then constant F at F_{MSY}.		
3a TAC changes annually.	+	-
3b. TAC changes in 5 year increments	+	-
3c. **(preferred)** 2009 TAC=102,960.	+++	+

Snowy grouper Rebuilding Strategy Alternative 3c would provide the greatest biological effect of all the alternatives since harvest would not increase as the stock increases. **Snowy grouper Rebuilding Strategy Alternative 1** would not define a strategy that allows catch to increase as the stock rebuilds. Failure to specify a yield based strategy and holding the commercial quota at constant levels could provide a biological effect similar to **Alternative 3c**. However, without a rebuilding strategy, the total allowable catch (TAC) for each year would not be designated ahead of time, and there would be no long-term plan for stock recovery. **Alternative 2** is the next most conservative alternative as it would require greater initial reductions in harvest. **Alternatives 3a and 3b** are less conservative than Alternative 2.

Assuming status quo biomass streams for red porgy and black sea bass, differences in total surplus in the recreational sector relative to the status quo and **Preferred Alternative 3c** (the status quo and Preferred Alternative 3c both assume the same TAC stream, so both produce the same net outcome for fishery participants) over the period 2007-2016 range from approximately -$367,000 for **Alternative 3a** to $22,000 for **Alternative 2b**. Thus, **Alternative 2b** is projected to result in a slightly greater surplus than **Preferred Alternative 3c**. The results are similar in terms of direction and ranking assuming preferred biomass streams for red porgy and black sea bass, with only the magnitude of the results changing.

Only minor differences in the total net operating revenues in the commercial sector over the period 2007-2016 are projected for the alternative rebuilding strategy alternatives for snowy grouper. Assuming either status quo or preferred conditions for the other actions considered in this amendment, the differences in total net operating revenues range from only -$0.07 million for **Alternatives 2a and 2b** to -$0.06 million for **Alternative 3a** and **Alternative 3b** relative to the status quo, **Alternative 1,** and **Preferred Alternative 3c**. All differences, regardless of the underlying assumptions for the other actions, are less than 0.2%.

Because of the relatively inconsequential importance of the snowy grouper fishery to overall fishing activity by the appropriate sectors and associated communities, little if any substantial social impacts would be expected to accrue to the year-to-year changes in allowable harvest as the stock recovers. However, assuming preferred alternatives for the other actions in the amendment, the North Carolina, South Carolina, and "other" fleets are projected to experience slight declines in economic performance under all alternatives to the status quo or **Preferred Alternative 3c**. The Central-Southeast Florida fleet is projected to experience declines under **Alternatives 2a and 2b**. Only the Georgia-Northeast Florida and Keys fleets are projected to fare better than the status quo under all other alternatives. The largest gain for any area would occur under **Alternative 3b**, with the Florida Keys area the beneficiary. It is presumed the economic benefits will translate into commensurate social benefits.

2.2.2 Red Porgy

2.2.2.1 Management Reference Point Alternatives

Table 2-19. Summary of effects of MSY alternatives under consideration for red porgy.

	Biological Effects	Economic, Social, and Administrative Effects
Alternative 1 (no action). Yield from F_{MSY}.	-	-
Alternative 2 (preferred). F_{MSY} as defined by SEDAR.	+	+

Table 2-20. Summary of effects of OY alternatives under consideration for red porgy.

	Biological Effects	Economic, Social, and Administrative Effects
Alternative 1 (no action). Yield from F_{OY}.	-	-
Alternative 2. Yield from F_{OY}. F_{OY} =(65%)(F_{MSY})	+ + +	+
Alternative 3 (preferred). Yield from F_{OY}. F_{OY} =(75%)(F_{MSY})	+ +	++
Alternative 4. Yield from F_{OY}. F_{OY} =(85%)(F_{MSY})	+	+

Managing the red porgy stock based on higher fishing mortality rates specified in **MSY and OY Alternative 1** than those derived from the recent stock assessment would likely result in indirect, adverse effects to the biological environment. Conversely, MSY and OY action alternatives would likely have beneficial effects as the F_{MSY} and F_{OY} estimates associated with these alternatives would support a lower fishing mortality rate relative to the status quo and would implement more precise estimations of management reference points based on a recent stock assessment. **OY Alternative 2** is the most precautionary OY alternative because it provides the largest buffer between MSY and OY. **Alternative 3** would reduce this safety margin, and **Alternative 4** is the least conservative option of the action alternatives.

Defining the MSY, OY, and MSST of a species does not alter the current harvest or use of the resource. Specification of these measures merely establishes benchmarks for fishery and resource evaluation. Direct effects only accrue to actions that alter harvest or other use of the resource. Since there would be no direct effects on resource harvest or use, there would be no direct effects on fishery participants, associated industries or communities. Specifying MSY, OY, and MSST, however, has indirect impacts since it establishes the platform for future management, specifically from the perspective of bounding allowable harvest levels. The MSY of **Alternative 1** would be an unprecedented harvest level in the fishery, which would support increased economic and social benefits to the fishery and associated industries if achievable, but is likely unrealistic. The MSY specification in **Preferred Alternative 2** would also support substantially increased harvests upon resource recovery and produce increased economic and social benefits to the fishery and associated industries.

The OY defined by **Alternative 1** is likely an overestimate and unrealistic benchmark for the resource. The OY estimates associated with **Alternatives 2-4** range from 143% (**Alternative 2**) to 156% (**Alternative 4**) more than the status quo harvest level. Thus, each of these three alternative specifications would accommodate a substantial increase over the baseline harvest level, supporting increased economic and social benefits to the fishery. If sustainable, the larger the harvests, the greater the economic and social benefits to the harvest sector and associated industries. However, due to the inability to identify, model, anticipate, and control all factors that affect stocks, sustainable yield cannot be determined with absolute certainty and some level of precautionary conservatism should be factored into the selection of OY. Since **Alternative 2** would allow the lowest harvest, it represents the most conservative vision of how the resource should be managed, encompassing the least likelihood, relative to the other alternatives, that excessive harvest will occur and avoidance of the adverse economic consequences that would accrue to increased restrictions. **Alternative 2** also, however, would represent the greatest potential foregone harvest opportunities if the harvest level is overly conservative. Conversely, **Alternative 1** represents the least conservative vision, thereby decreasing the possibility of foregone benefits, but increasing the possibility of excessive harvest. Neither the probabilities of these conditions occurring nor their net impacts can be determined. Overall, **Alternatives 2-4** are more conservative than **Alternative 1**. **Preferred Alternative 3** is intermediate to **Alternatives 2 and 4** and is believed to represent a reasonable compromise to the uncertainty associated with either alternative.

In summary, no direct economic or social effects are expected to accrue to any of the alternative benchmark parameter specifications. Indirect effects could accrue if future assessment of the stock relative to the benchmarks identifies a need for restrictive management. The magnitude of these effects, however, will depend on the nature of the specific management measures adopted. These effects will be quantified when such action is prepared in Amendment 15B.

2.2.2.2 Rebuilding Strategy Alternatives

Table 2-21. Summary of effects of rebuilding strategy alternatives under consideration for red porgy.

	Biological Effects	Economic, Social, and Administrative Effects
Alternative 1 (no action). Do not specify strategy.	+++	-
Alternative 2. Constant catch.	+	++
Alternative 3. Constant F.		
3a (preferred). TAC changes in 3 year increments.	+ +	+
3b. TAC changes in 5 year increments.	+ +	+

Red Porgy Rebuilding Strategy Alternative 1 would not define a strategy that allows catch to increase as the stock rebuilds. Failure to specify a yield based strategy and holding the commercial quota at constant levels could provide the greatest biological effect of all the alternatives since harvest would not increase as the stock increases. This alternative has the potential to more rapidly rebuild the stock, increase the average age and size structure than the other alternatives. However, without a rebuilding strategy, the total allowable catch (TAC) for each year would not be designated ahead of time, and there would be no long-term plan for stock recovery. The constant catch strategy **(Alternative 2)** would increase spawning stock slowly in the initial years of the schedule and then more rapidly as time progresses. It requires that catches remain constant as the stock rebuilds and could result in higher bycatch at larger stock sizes. The lower initial fishing mortality rates in **Alternative 3** would provide a greater biological benefit than **Alternative 2**. **Alternative 3** would be expected to more rapidly increase the average size and age of red porgy than **Alternative 2**.

Assuming status quo biomass streams for snowy grouper and black sea bass, differences in total surplus in the recreational sector relative to the status quo over the period 2007-2016 range from approximately $84 million for **Alternative 2** to approximately $70 million for **Preferred Alternative 3a** and **Alternative 3b**, while differences relative to **Preferred Alternative 3a** range from approximately -$71 million for **Alternative 1** (status quo) to approximately $200,000 for **Alternative 3b**. These values change only slightly if the preferred biomass streams for snowy grouper and black sea bass are used (Table 4.18). Thus, the projected economic impacts of **Alternative 2** exceed those of **Preferred Alternative 3a**. Analytically, these results are generated by the fact that a larger total recreational harvest would occur under **Alternative 2**, 4.8 million pounds to 4.7 million pounds, and the negative influence of discounting on the greater annual allocations under **Preferred Alternative 3a** that occur in the later years of the rebuilding schedule.

For the commercial sector, only minor differences in the total net operating revenues over the period 2007-2016 are projected. Assuming status quo conditions for the other actions considered in this amendment, the differences in total net operating revenues relative to the status quo range from $0.29 million for **Preferred Alternative 3a and Alternative**

3b to $0.33 million for **Alternative 2**. Assuming preferred alternative conditions for the other actions, the differences in total net operating revenues relative to the status quo range from $0.28 million for **Preferred Alternative 3a** and **Alternative 3b** to $0.32 million for **Alternative 2**.

Because of the expected gains in economic benefits, all fishermen and associated communities in the recreational red porgy fishery would be expected to gain increased social benefits under all alternatives to the status quo. All fishermen and associated communities in the recreational red porgy fishery would be expected to gain increased net economic benefits, with accompanying increased social benefits, under all alternatives to the status quo. The expected benefits of **Preferred Alternative 3a** are approximately equal to those of **Alternative 3b** and less than those of **Alternative 2**. In the commercial sector, North Carolina and South Carolina fishermen and associated communities would be expected to experience the greatest gains in economic and associated social benefits under all alternatives to the status quo, with fishermen in the Keys benefiting the least. In relative terms (percentage change), fishermen in Georgia-Northeast Florida would be expected to benefit the most under all alternatives to the status quo.

2.2.3 Black Sea Bass

2.2.3.1 Management Reference Point Alternatives

Table 2-22. Summary of effects of MSY alternatives under consideration for black sea bass.

	Biological Effects	Economic, Social, and Administrative Effects
Alternative 1 (no action). Yield from F_{MSY}.	-	-
Alternative 2 (preferred). F_{MSY} as defined by SEDAR.	+	+

Table 2-23. Summary of effects of OY alternatives under consideration for black sea bass.

	Biological Effects	Economic, Social, and Administrative Effects
Alternative 1 (no action). Yield from F_{OY}.	-	-
Alternative 2. Yield from F_{OY}. F_{OY} =(65%)(F_{MSY})	+ + +	+
Alternative 3 (preferred). Yield from F_{OY}. F_{OY} =(75%)(F_{MSY})	+ +	++
Alternative 4. Yield from F_{OY}. F_{OY} =(85%)(F_{MSY})	+	+

Managing the black sea bass stock based on higher fishing mortality rates specified in **MSY and OY Alternative 1** than those derived from the recent stock assessment would likely result in indirect, adverse effects to the biological environment. Conversely, MSY and OY action alternatives would likely have beneficial effects as the F_{MSY} and F_{OY} estimates associated with these alternatives would support a lower fishing mortality rate relative to the status quo and would implement more precise estimations of management reference points based on a recent stock assessment. **OY Alternative 2** is the most precautionary OY alternative because it provides the largest buffer between MSY and OY. **Alternative 3** would reduce this safety margin, and **Alternative 4** is the least conservative option of the action alternatives. While higher fishing mortality rates may benefit fishery participants, associated industries, and communities, in the short-term by providing increased yields, they are expected to adversely affect the socioeconomic environment over the long-term because such yields are not likely to be sustainable.

Defining the MSY, OY and MSST of a species does not alter the current harvest or use of the resource. Specification of these measures merely establishes benchmarks for fishery and resource evaluation. Direct effects only accrue to actions that alter harvest or other use of the resource. Since there would be no direct effects on resource harvest or use, there would be no direct effects on fishery participants, associated industries or communities. Specifying MSY, OY, and MSST, however, has indirect impacts since it establishes the platform for future management, specifically from the perspective of bounding allowable harvest levels. The MSY specification in **Preferred Alternative 2** would support increased harvests relative to the status quo, with accompanying long-term increased positive economic and social benefits, after the resource is rebuilt. The MSY defined by **Alternative 1** is unprecedented during the 1986-2004 data record, suggesting that biological factors and not management induced harvest constraints underlie the absence of consistent harvests at this level. This suggests the MSY indicated by **Alternative 1** may be inappropriate for this resource. As such, the adoption of **Alternative 1** and subsequent allowance of harvest at the respective MSY value may lead to excessive exploitation, precipitating the imposition of restrictive management measures and reductions in economic benefits.

The alternative OY specifications range from 88% (**Alternative 1**) to 227% (**Alternative 4**) more than the status quo harvest level of 847,000 lbs. Thus, each would accommodate an increase from the baseline harvest level, supporting increased economic and social benefits to the fishery. If sustainable, the larger the harvests, the greater the economic and social benefits to the harvest sector and associated industries. However, due to the inability to identify, model, anticipate, and control all factors that affect stocks, sustainable yield cannot be determined with absolute certainty, and some level of precautionary conservatism should be factored into the selection of OY. Since **Alternative 1** would allow the lowest harvest, it represents the most conservative vision of how the resource should be managed, encompassing the least likelihood, relative to the other alternatives, that excessive harvest will occur, and avoidance of the adverse economic consequences that would accrue to increased restrictions. **Alternative 1** also, however, would represent the greatest potential foregone harvest opportunities if the harvest level is overly conservative. Conversely, **Alternative 4** represents the least conservative vision, thereby decreasing the possibility of foregone benefits, but increasing the possibility of excessive harvest. Neither the probabilities of these conditions occurring nor the net impacts can be determined. Overall, **Alternatives 2-4** are less conservative than **Alternative 1**. **Alternative 1** is excessively conservative relative to the preferred MSY, since it would only support harvests at 57% of the preferred MSY, compared to over 90% for **Alternative 2-4**. **Preferred Alternative 3** is intermediate to **Alternatives 2 and 4** and is believed to represent a reasonable compromise to the uncertainty associated with either alternative.

In summary, no direct effects are expected to accrue to any of the alternative benchmark parameter specifications. Indirect effects could accrue if future assessment of the stock relative to the benchmarks identifies a need for restrictive management. The magnitude of these effects, however, will depend on the nature of the specific management measures adopted. These effects will be quantified when such action is prepared in Amendment 15B.

2.2.3.2 Rebuilding Schedule Alternatives

Table 2-24. Summary of effects of rebuilding schedule alternatives under consideration for black sea bass.

	Biological Effects	Economic, Social, and Administrative Effects
Alternative 1 (no action). 10 years (start=1991)	-	-
Alternative 2. 6 years (start=2007).	+ + +	+
Alternative 3. 8 years (start=2007)	+ +	++
Alternative 4 (preferred). 10 years (start=2007).	+	+++

Black Sea Bass Rebuilding Schedule Alternatives 2, 3, and 4 would all have beneficial effects to the black sea bass stocks. **Alternative 2** would have the greatest effects to the stock, somewhat compromised by the expected increased discards over the current condition if harvest is completely prohibited. **Alternative 4** would have the least beneficial effects to the stock, with **Alternative 3** intermediate.

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

Defining a rebuilding schedule, however, may result in indirect effects. Restrictive management measures could be necessary to rebuild a resource, and direct effects accrue from these measures. Further, defining the rebuilding schedule determines the length of time over which rebuilding efforts can be extended and affects the severity of the measures implemented during the recovery period. Generally, the shorter the recovery period, the more severe the necessary harvest restrictions, and the more severe the harvest restrictions, the greater the short-term adverse economic effects.

Alternative 1 would maintain the current 10-year rebuilding schedule. This period expired in 2001 without achieving recovery of the resource. Thus, continued restrictions would be required. While the impacts of these restrictions may be no different than those intended to achieve the goals of the alternative rebuilding schedules (**Alternatives 2-4**), the continuation of the status quo would require additional management action to adopt a legally compliant rebuilding schedule, with associated additional costs of amendment preparation. Hence, the primary difference between **Alternative 1** and **Alternatives 2-4** is that the adoption of **Alternative 1** would impose additional costs on the management process. **Alternative 2** would require total cessation of the directed black sea bass fishery for six years and additional unspecified regulation after that. Since recovery could not be accomplished within the specified time period, **Alternative 2**, similar to **Alternative 1**, would not be legally compliant and would result in, in addition to the economic losses associated with the closure of the directed fishery, the additional expense of management action. Closure of the directed black sea bass fishery would result in the loss of all economic activity associated with this fishery as well as potentially associated fishing activities (revenues and benefits from other species) undertaken by black sea bass fishermen if the closure results in business failure. While hook and line fishing that typically catches black sea bass likely could continue under a black sea bass closure, trap trips, and all revenues associated with such, would be expected to cease. Re-directed effort by trap fishermen to other species may allow some mitigation of these losses, but may also result in excess pressure on these species with additional adverse economic and social effects. Within the recreational sector, closure of the black sea bass fishery jeopardizes some unknown portion of the approximately $420,000-$1.27 million in consumer surplus these fish potentially represent. Finally, while **Alternative 2** would eliminate harvests, continued mortality would occur due to bycatch in other fisheries, such that additional measures to recover black sea bass would be required. Thus, total closure of the fishery under **Alternative 2** would result in substantial adverse economic and social impacts while not allowing the resource to fully recover.

Alternative 3 would allow a longer recovery period and allow directed harvests to continue while the stock recovers. Although some reduction in harvest from the status quo would still be required (amount not specified), some mitigation of the adverse economic and social effects that would accrue to **Alternative 2** would be expected.

Preferred Alternative 4 would allow the longest rebuilding period and should fully mitigate the adverse economic and social impacts expected to accrue to **Alternative 2**. The exact amount of allowable harvests and the economic benefits of **Preferred Alternative 4** depend on the rebuilding strategy adopted, which specifies the level of harvest, whether harvests are held constant over the rebuilding path, or whether harvest is allowed to increase according to a pre-specified schedule. Alternatives for rebuilding strategies under consideration for snowy grouper are presented in Section 4.3.3 and the expected economic impacts are presented in Section 4.3.3.2 and are incorporated herein by reference. Regardless of strategy adopted, **Preferred Alternative 4** is expected to result in increased economic benefits relative to **Alternatives 1-3** since it would not require duplicative action with delayed results, as would occur with **Alternative 1**, closure of the fishery and mandatory discard of incidentally caught fish, as would occur with **Alternative 2**, and would support higher harvest levels than **Alternative 3**.

2.2.3.3 Rebuilding Strategy Alternatives

Table 2-25. Summary of effects of rebuilding strategy alternatives under consideration for black sea bass. Note: The effects of No Action Alternative 5 would be similar to Preferred Alternative 1.

	Biological Effects	Economic, Social, and Administrative Effects
Alternative 1.(preferred). Constant Catch.	+ + + +	+
Alternative 2. Constant F.		
Alternative 2. Constant F at F_{MSY}.		
2a. TAC changes annually.	+ + +	-/+*
2b. TAC changes in 5 year increments	+ + +	++
Alternative 3. Modified F.		
3a. TAC changes annually.	+ +	-/+*
3b. TAC changes in 5 year increments	+ +	-/+*
Alternative 4. Modified F.	+	-
Alternative 5. Do not define a yield-based strategy.	+ + + +	+

*Outcome depends upon whether snapper grouper recreational target effort is allowed to harvest the increased black sea bass allocation (+) or is restrained because of limits on other snapper grouper species.

Black Sea Bass Rebuilding Strategy Alternative 1 would provide the greatest biological effect of all the alternatives since harvest would not increase as the stock increases. **Black Sea Bass Rebuilding Strategy Alternative 5** would not define a strategy that allows catch to increase as the stock rebuilds. Failure to specify a yield based strategy and holding the commercial quota at constant levels could provide a biological effect similar to **Alternative 1**. However, without a rebuilding strategy, the total allowable catch (TAC) for each year would not be designated ahead of time, and there would be no long-term plan for stock recovery. **Alternative 2** is the next most conservative alternative. **Alternative 3** is less conservative than Alternative 2 but more conservative than **Alternative 4**. **Alternative 4** is the least conservative of all the alternatives. The effects of **Preferred Alternative 1** would be similar to no action **Alternative 5**.

Assuming status quo biomass streams for snowy grouper and red porgy, differences in total surplus in the recreational sector relative to the **Preferred Alternative 1** over the period 2007-2016 range from approximately $600,000 for **Alternative 4** to approximately $6.2 million for **Alternative 2b**. These values do not change if the preferred biomass streams for snowy grouper and red porgy are used (Table 4.27).

For the commercial sector, only minor differences in the total net operating revenues over the period 2007-2016 are projected. Assuming status quo conditions for the other actions considered in this amendment, the differences in total net operating revenues relative to **Preferred Alternative 1**, range from -$0.51 million for **Alternative 4** to -$0.03 million for **Alternative 2b**. Only minor changes in these results are projected assuming preferred alternative conditions for the other actions

All fishermen and associated communities in the recreational black sea bass fishery would be expected to gain increased net economic benefits under **Preferred Alternative 1** relative to all the other alternatives except **Alternative 2b**, which is projected to slightly out-perform the status quo. In the commercial sector, fishermen and associated communities in all areas except the “other” states would be expected to experience increased economic and associated social benefits under **Preferred Alternative 1,** relative to the other alternatives.

3 Affected Environment

3.1 Habitat

3.1.1 Inshore/Estuarine Habitat

Many deepwater snapper grouper species utilize both pelagic and benthic habitats during several stages of their life histories; larval stages of these species live in the water column and feed on plankton. Most juveniles and adults are demersal and associate with hard structures on the continental shelf that have moderate to high relief (e.g., coral reef systems and artificial reef structures, rocky hard-bottom substrates, ledges and caves, sloping soft-bottom areas, and limestone outcroppings). Juvenile stages of some snapper grouper species also utilize inshore seagrass beds, mangrove estuaries, lagoons, oyster reefs, and embayment systems. In many species, various combinations of these habitats may be utilized during diurnal feeding migrations or seasonal shifts in cross-shelf distributions. More detail on these habitat types is found in Sections 3.2.1 and 3.2.2 of the Council's Habitat Plan (SAFMC 1998a).

3.1.2 Offshore Habitat

Predominant snapper grouper offshore fishing areas are located in live bottom and shelf-edge habitats, where water temperatures range from 11° to 27° C (52° to 81° F) due to the proximity of the Gulf Stream, with lower shelf habitat temperatures varying from 11° to 14° C (52° to 57° F). Water depths range from 16 to 27 meters (54 to 90 feet) or greater for live-bottom habitats, 55 to 110 meters (180 to 360 feet) for the shelf-edge habitat, and from 110 to 183 meters (360 to 600 feet) for lower-shelf habitat areas.

The exact extent and distribution of productive snapper grouper habitat on the continental shelf north of Cape Canaveral is unknown. Current data suggest from 3 to 30 percent of the shelf is suitable habitat for these species. These live-bottom habitats may include low relief areas, supporting sparse to moderate growth of sessile invertebrates, moderate relief reefs from 0.5 to 2 meters (1.6 to 6.6 feet), or high relief ridges at or near the shelf break consisting of outcrops of rock that are heavily encrusted with sessile invertebrates such as sponges and sea fan species. Live-bottom habitat is scattered irregularly over most of the shelf north of Cape Canaveral, Florida, but is most abundant offshore from northeastern Florida. South of Cape Canaveral, the continental shelf narrows from 56 to 16 kilometers (35 to 10 miles) wide, thence reducing off the southeast coast of Florida and the Florida Keys. The lack of a large shelf area, presence of extensive, rugged living fossil coral reefs, and dominance of a tropical Caribbean fauna are distinctive benthic characteristics of this area.

Rock outcroppings occur throughout the continental shelf from Cape Hatteras, North Carolina to Key West, Florida (MacIntyre and Milliman 1970; Miller and Richards 1979; Parker *et al*. 1983), which are principally composed of boarded limestone and carbonate sandstone (Newton *et al*. 1971), and exhibit vertical relief ranging from less than 0.5 to over 10 meters (33 feet). Ledge systems formed by rock outcrops and piles of irregularly sized boulders are also common. Parker *et al*. (1983) estimated that 24% (9,443 km^2) of the area between the 27 and 101 meters (89 and 331 feet) isobaths from Cape Hatteras to Cape Canaveral is reef habitat. Although the benthic communities found in water depths between 100 and 300 meters (328 and 984 feet) from Cape Hatteras to Key West is relatively small compared to the whole shelf, this area, based upon landing information of fishers, constitutes prime reef fish habitat and probably significantly contributes to the total amount of reef habitat in this region.

Man-made artificial reef structures are also utilized to attract fish and increase fish harvests; however, research on man-made reefs is limited and opinions differ as to whether or not these structures promote an increase of ecological biomass or merely concentrate fishes by attracting them from nearby, natural unvegetated areas of little or no relief.

The distribution of coral and live hard bottom habitat as presented in the SEAMAP Bottom Mapping Project is a proxy for the distribution of the species within the snapper grouper complex. The method used to determine hard bottom habitat relied on the identification of reef obligate species including members of the snapper grouper complex. The Florida Fish and Wildlife Research Institute (FWRI) showing the best available information on the distribution of hard bottom habitat in the south Atlantic region prepared ArcView maps for the four-state project. These maps, which consolidate known distribution of coral, hard/live bottom, and artificial reefs as hard bottom, are included in Appendix E of the Habitat Plan (SAFMC 1998a). These maps are also available on the Internet at the Council's following Internet Mapping System website: http://ocean.floridamarine.org/efh_coral/ims/viewer.htm.

The South Carolina Department of Natural Resources, NOAA/Biogeographic Characterization Branch, and the South Atlantic Fishery Management Council cooperatively generated additional information on managed species' use of offshore fish habitat. Plots of the spatial distribution of offshore species were generated from the Marine Resources Monitoring, Assessment, and Prediction Program (MARMAP) data (Figures 35-41) in the Habitat Plan (SAFMC 1998a). The plots should be considered as point confirmation of the presence of each species within the scope of the sampling program. These plots, in combination with the hard bottom habitat distributions presented in Appendix E of the Habitat Plan (SAFMC 1998a), can be employed as proxies for offshore snapper grouper complex distributions in the south Atlantic region. Maps of the distribution of snapper grouper species by gear type based on MARMAP data can be generated through the Council's Internet Mapping System at the following web address: http://ocean.floridamarine.org/efh_coral/ims/viewer.htm.

3.1.3 Essential Fish Habitat

Essential fish habitat (EFH) is defined in the Magnuson-Stevens Fishery Conservation and Management Act as "those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S. C. 1802(10)). Specific categories of

EFH identified in the South Atlantic Bight which are utilized by federally managed fish and invertebrate species include both estuarine/inshore and marine/offshore areas. Specifically, estuarine/inshore EFH includes: Estuarine emergent and mangrove wetlands, submerged aquatic vegetation, oyster reefs and shell banks, intertidal flats, palustrine emergent and forested systems, aquatic beds, and estuarine water column. Additionally, marine/offshore EFH includes: Live/hard bottom habitats, coral and coral reefs, artificial and manmade reefs, *Sargassum* species, and marine water column.

EFH utilized by snapper grouper species in this region includes coral reefs, live/hard bottom, submerged aquatic vegetation, artificial reefs and medium to high profile outcroppings on and around the shelf break zone from shore to at least 183 meters [600 feet (but to at least 2,000 feet for wreckfish)] where the annual water temperature range is sufficiently warm to maintain adult populations of members of this largely tropical fish complex. EFH includes the spawning area in the water column above the adult habitat and the additional pelagic environment, including *Sargassum*, required for survival of larvae and growth up to and including settlement. In addition, the Gulf Stream is also EFH because it provides a mechanism to disperse snapper grouper larvae.

For specific life stages of estuarine dependent and near shore snapper grouper species, EFH includes areas inshore of the 30 meters (100-foot) contour, such as attached macroalgae; submerged rooted vascular plants (seagrasses); estuarine emergent vegetated wetlands (saltmarshes, brackish marsh); tidal creeks; estuarine scrub/shrub (mangrove fringe); oyster reefs and shell banks; unconsolidated bottom (soft sediments); artificial reefs; and coral reefs and live/hard bottom habitats.

3.1.3.1 Habitat Areas of Particular Concern

Areas which meet the criteria for essential fish habitat-habitat areas of particular concern (EFH-HAPCs) for species in the snapper grouper management unit include medium to high profile offshore hard bottoms where spawning normally occurs; localities of known or likely periodic spawning aggregations; near shore hard bottom areas; The Point, The Ten Fathom Ledge, and Big Rock (North Carolina); The Charleston Bump (South Carolina); mangrove habitat; seagrass habitat; oyster/shell habitat; all coastal inlets; all state-designated nursery habitats of particular importance to snapper grouper (e.g., Primary and Secondary Nursery Areas designated in North Carolina); pelagic and benthic *Sargassum*; Hoyt Hills for wreckfish; the *Oculina* Bank Habitat Area of Particular Concern; all hermatypic coral habitats and reefs; manganese outcroppings on the Blake Plateau; and Council-designated Artificial Reef Special Management Zones (SMZs). Areas that meet the criteria for designating essential fish habitat-habitat areas of particular concern include habitats required during each life stage (including egg, larval, postlarval, juvenile, and adult stages).

In addition to protecting habitat from fishing related degradation though FMP regulations, the Council in cooperation with NOAA Fisheries, actively comments on non-fishing projects or policies that may impact essential fish habitat. The Council adopted a habitat policy and procedure document that established a four-state Habitat Advisory Panel and adopted a comment and policy development process. With guidance from the Advisory Panel, the Council has developed and approved habitat policies on: energy exploration, development, transportation and hydropower re-licensing; beach dredging and filling and large-scale coastal engineering; protection and enhancement of submerged aquatic vegetation; and alterations to riverine, estuarine and nearshore flows (Appendix C).

3.2 Biological/Ecological Environment

3.2.1 Species Most Impacted By This FMP Amendment

3.2.1.1 Snowy Grouper

Snowy grouper occur in the Eastern Pacific and the Western Atlantic from Massachusetts to southeastern Brazil, including the northern Gulf of Mexico (Robins and Ray 1986) (Table 3-1). It is found at depths of 30-525 meters (98-1,722 feet). Adults occur offshore over rocky bottom habitat. Juveniles are often observed inshore and occasionally in estuaries (Heemstra and Randall 1993).

Snowy grouper is protogynous (changing sex from female to male with increasing size and age). The smallest, youngest male examined by Wyanski *et al.* (2000) was 72.7 centimeters (28.8") total length and age 8. The median size and age of snowy grouper was 91.9 centimeters (34.5") and age 16. The largest specimen observed was 122 centimeters (48") total length and 30 kilograms (66 lbs), and 27 years old (Heemstra and Randall 1993). The maximum age reported by Wyanski *et al*. (2000) is 29 years for fish collected off of North Carolina and South Carolina. Radiocarbon techniques indicate snow grouper may live for as long as 40 years (Harris, South Carolina Department of Natural Resources, personal communication). Wyanski *et al.* (2000) report 50% of the females are mature at 54.1 centimeters (21.3") total length and 5 years of age. The smallest mature female was 46.9 centimeters (18.5") total length, and the largest immature female was 57.5 centimeters (22.6") total length.

Females in spawning condition have been captured off western Florida during May, June, and August (Bullock and Smith 1991). In the Florida Keys, ripe individuals have been observed from April to July (Moore and Labinsky 1984). Spawning seasons reported by other researchers are as follows: South Atlantic (north of Cape Canaveral), April through September (Wyanski *et al.* 2000) and April through July (Parker and Mays 1998); and South Atlantic (south of Cape Canaveral), May through July (Manooch 1984). Snowy grouper spawn at depths from 176 to 232 m (577 to 761 ft) off South Carolina and North Carolina (Wyanski *et al.* 2000). Adults feed on fishes, gastropods, cephalopods, and crustaceans (Heemstra and Randall 1993).

3.2.1.2 Golden Tilefish

Golden tilefish are distributed throughout the Western Atlantic, occurring as far north as Nova Scotia, to southern Florida, and in the eastern Gulf of Mexico (Robins and Ray 1986) (Table 3-1). According to Dooley (1978), golden tilefish occurs at depths of 80-540 meters (263-1,772 feet). Robins and Ray (1986) report a depth range of 82-275 meters (270-900 feet) for golden tilefish. It is most commonly found at about 200 meters (656 feet), usually over mud or sand bottom but, occasionally, over rough bottom (Dooley 1978).

Maximum reported size is 125 centimeters (50") total length and 30 kilograms (66 lbs) (Dooley 1978; Robins and Ray 1986). Maximum reported age is 40 years (Harris *et al.* 2001). Radiocarbon aging indicate golden tilefish may live for at least 50 years (Harris, South Carolina Department of Natural Resources, personal communication). A recent SEDAR assessment estimate natural mortality (M) at 0.08 (SEDAR 4 2004). Golden tilefish spawn off the southeast coast of the United States from March through late July, with a peak in April (Table 3-1; Harris *et al*. 2001). Grimes *et al.* (1988) indicate peak spawning occurs from May through September in waters north of Cape Canaveral. Golden tilefish primarily prey upon shrimp and crabs, but also eat fishes, squid, bivalves, and holothurians (Dooley 1978).

3.2.1.3 Red Porgy

Red porgy occurs in the Eastern and Western Atlantic Oceans. In the Western Atlantic, it ranges from New York to Argentina, including the northern Gulf of Mexico (Table 3-1). Adults are found in deepwater near the continental shelf, over rock, rubble or sand bottoms, to depths as great as 280 meters (918 feet). Red porgy are most commonly captured at depths of 25-90 meters (82-295 feet). Young occur in water as shallow as 18 meters (59 feet) (Robins and Ray 1986), and are sometimes observed over seagrass beds (Bauchot and Haureau 1990).

Maximum reported size is 91.0 centimeters (36.0") total length (Robins and Ray 1986) and 7.7 kilograms (17.1 lbs) (Bauchot and Haureau 1990). Maximum reported age of red porgy in the South Atlantic is 18 years and maximum reported length is 73.3 centimeters (28.9 ") total length (Potts and Manooch 2002). Based on histological examination of reproductive tissue, red porgy spawn from December through May off the southeastern United States, with a peak in January and February (Harris and McGovern 1997; Daniel 2003). Based on macroscopic examination of the ovaries, Manooch (1976) reports peak spawning of red porgy during March and April (Table 3-1).

During 1995-2000, females first became mature at 20.1-22.4 centimeters (8.0-8.9") total length, and at age 0. Size and age at 50% maturity was 28.9 centimeters (11.5") total length and 1.5 years, respectively (Harris and McGovern 1997). Red porgy are protogynous (changing sex from female to male with increasing size and age). At 35.1-40.0 centimeters (13.9-15.9") total length, 72% of all individuals collected during 1995-2000 were male; by age 9, 100% of all individuals were males. There was a much greater percentage of males in smaller size classes during recent years, than during the early 1980s (Daniel 2003). Red porgy feed on crustaceans, fishes, and mollusks (Bauchot and Haureau 1990).

3.2.1.4 Black Sea Bass

Black sea bass occur in the Western Atlantic, from Maine to southeastern Florida, and in the eastern Gulf of Mexico (McGovern *et al.* 2002) (Table 3-1). Separate populations were reported to exist to the north and south of Cape Hatteras, North Carolina (Wenner *et al.* 1986). However, genetic similarities suggest this is one stock (McGovern *et al.* 2002). This species is common around rock jetties and on rocky bottoms in shallow water (Robins and Ray 1986) at depths from 2-120 meters (7-394 feet). Most adults occur at depths from 20-60 meters (66-197 feet) (Vaughan *et al.* 1995).

Maximum reported size is 66.0 centimeters (26.1") total length and 3.6 kilograms (7.9 lbs) (McGovern *et al.* 2002). Maximum reported age is 10 years (McGovern *et al.* 2002); however, ages as great as 20 years have been recorded in the Mid Atlantic region (Lavenda 1949; Froese and Pauly 2003). Natural mortality is estimated to be 0.30 (SEDAR 2 2003b). The minimum size and age of maturity for females reported off the southeastern U.S. coast is 10.0 centimeters (3.6") standard length and age 0. All females are mature by 18.0 centimeters (7.1") standard length and age 3 (McGovern *et al.* 2002; Table 3-1). Wenner *et al.* (1986) report peak spawning occurs from March through May in the South Atlantic Bight. McGovern *et al.* (2002) indicate black sea bass females are in spawning condition during March-July, with a peak during March through May (McGovern *et al.* 2002). Some spawning also occurs during September and November. Spawning takes place in the evening. Black sea bass change sex from female to male (protogyny). Females dominate the first 5 year classes and individuals over the age of 5 are more commonly males. The size at maturity and the size at transition of black sea bass was smaller in the 1990s than during the early 1980s off the southeast United States. Black sea bass appear to compensate for the loss of larger males by changing sex at smaller sizes and younger ages (McGovern *et al.* 2002).

The diet of black sea bass is generally composed of shrimp, crab, and fish (Sedberry 1988). Smaller black sea bass eat small crustaceans and larger individuals feed on decapods and fishes.

3.2.2 Science Underlying the Management of Snapper Grouper Species Most Impacted By This FMP Amendment

The status of snowy grouper, golden tilefish, vermilion snapper, black sea bass, and red porgy has been recently assessed through the Southeast Data, Assessment, and Review process. The SEDAR process consists of a series of workshops aimed at ensuring that each assessment is based on the best available scientific information.

First, representatives from NOAA Fisheries Service, state agencies, and the South Atlantic Council, as well as experts from non-governmental organizations and academia, participate in a data workshop. The purpose of a data workshop is to assemble and review available fishery-dependent and fishery-independent data and information on a stock, and to develop consensus about what constitutes the best available scientific information on the stock, how that information should be used in an assessment, and what type of stock assessment model should be employed.

Second, assessment biologists from these agencies and organizations participate in a stock assessment workshop, where data from the data workshop are input into one or more stock assessment models (e.g., production, age-structured, length structured, etc.) to generate estimates of stock status and fishery status. Generally, multiple runs of each model are conducted: base runs and a number of additional runs to examine sensitivity of results to various assumptions (e.g., different natural mortality rates, different data sets/catch periods, etc.).

Finally, a stock assessment review workshop is convened to provide representatives from the Center for Independent Experts the opportunity to peer review the results of the stock assessment workshop. Representatives from NOAA Fisheries Service, the South Atlantic Council, and constituent groups may attend and observe the review but the actual review is conducted by the Center for Independent Experts. The report of the stock assessment review workshop is then reviewed by the Council's Scientific and Statistical Committee (SSC).

The review portion of the SEDAR process has helped improve the acceptance of stock assessments. However, continued lack of basic fishery data has resulted in uncertainty in the assessment results. Each SEDAR Review Panel has identified significant shortcomings in data and research (see Section 4.6 for a detailed list of research and data needs). In addition, not all of the reviews have been completed with 100% consensus. A Minority Report was submitted during the Second SEDAR (Black Sea Bass) by two fishermen who served on the review panel. The Minority Report and the detailed list of Research/Data recommendations indicate concern and uncertainty about the assessment results.

3.2.2.1 Snowy Grouper

The data workshop convened in Charleston, SC during the week of November 3, 2003 to examine data from eight deep-water species for assessment purposes (SEDAR 4 2004). The group determined that data were adequate to conduct assessments on snowy grouper and tilefish. Four indices were available for snowy grouper including a logbook index, headboat index, MARMAP trap index, and MARMAP short longline index. The assessment workshop chose not to use the logbook index for snowy grouper since this species forms aggregations and has been known to be taken in large numbers over wrecks. Commercial and recreational landings as well as life history information from fishery-independent and fishery-dependent sources were used in the assessment.

Estimates were made of several time series of management interest. These include annual exploitation rate, fishing mortality rate, total landings, number of recruits, mature biomass, and total biomass. Results show a population beginning a decline as early as 1966, reaching its lowest levels in the most recent years. Increasing exploitation of snowy grouper begins at about the same time as the population decline, which coincides with an increase in the reported landings of snowy grouper. Stock status at the beginning of 2002 (the end of the assessment period) was analyzed relative to the benchmarks listed above. The maximum fishing mortality threshold (MFMT; limit reference point in F) is assumed equal to E_{MSY} or F_{MSY}, depending on the preferred measure of exploitation. Fishing status was determined relative to these. Overfishing of snowy grouper began in the mid 1970's and has continued since. Current F is 0.154, while F_{MSY} is 0.05. The response to fishing pressure was a steady population decline to levels below SSB_{MSY} starting in the early 1980's.

The Assessment Workshop concluded that snowy grouper was overfished and overfishing was occurring in 2002. In the absence of fishing it was determined that it would take 13 years to rebuild the stock to B_{MSY}. The maximum recommended rebuilding time is 34 years based on the formula: T_{MIN} (13 years) + one generation time (21 years).

The estimated stock status for snowy grouper in 2002 is quite low, median of 18% for SSB(2002)/SSB_{MSY}. This corresponds to a stock status in 2002 relative to the virgin stock size [SSB(2002)/SSBvirgin] of about 5%. The input data for the assessment model do not include a consistent abundance index that covers the whole time period of the model. The headboat CPUE and length composition data extends back to 1972, but changes in the fishery make interpretation of the observed trends in this index difficult. The headboat fishery moved inshore during the data period and consequently selectivity in the fishery changed. In the age-structured modeling, this was accommodated by dividing the headboat index into three time periods: with constant selectivity in 1972–1976, a possibly different constant selectivity in 1992–2002, and selectivity varying between them in 1977–1991. The other abundance indices do not start until 1990 or later. Therefore, the model must rely on data sources other than abundance indices for determining stock status.

Other data that provide information on stock status are the average weight and length from the fisheries landings as well as the observed age and length composition data. The 2002 average weights and lengths from the commercial fisheries suggest the population is at very low levels. The average weight and length in 2002 from the handline fishery suggests the population is near 11% and 3% of SSB_{MSY}, respectively. The average weight and length in 2002 from the longline fishery suggests the population is near 44% and 28% of SSB_{MSY}, respectively. The length composition data from the most recent years (2000-2002) also suggests a depleted population of snowy grouper. The observed length distributions are skewed toward smaller fish compared to an equilibrium, virgin state length composition.

3.2.2.2 Golden tilefish

There were two indices of abundance available for the golden tilefish stock assessment. A fishery-independent index was developed from MARMAP horizontal longlines (SEDAR 4 2004). A fishery-dependent index was developed from commercial logbook data during the data workshop. Commercial and recreational landings as well as life history information from fishery-independent and fishery-dependent sources were used in the assessment. A statistical catch-at-age model and a production model were used to assess the golden tilefish population.

Exploitation status in 2002 was analyzed relative to the maximum fishing mortality threshold (MFMT; limit reference point in *F*). The MFMT was assumed equal to E_{MSY} or Fmsy, depending on the measure of exploitation. Stock status in 2002 was estimated relative to SSB_{MSY} and to maximum spawning size threshold (MSST). The MSST was computed as a fraction *c* of SSB_{MSY}. Restrepo *et al.* (1998) recommend a default definition for that fraction: $c=\max(1 - M, 1/2)$, where *M* is the natural mortality rate. However, this definition does not account for age-dependent *M*, as was used in this assessment. Hence to accommodate the default definition, a constant *M* was computed that would correspond to an age-dependent *M*, by providing the same proportion of survivors at the maximum observed age [$M = -\log(P)/A$, where *P* is the proportion survivors at maximum observed age *A*]. This value of constant *M* was computed uniquely for each of the MCB runs.

Overfishing of golden tilefish (F>MFMT) began in the early 1980’s and has continued in most years since then. The population responded to the fishing with a steady population decline to levels near SSB_{MSY} starting in the mid-1980’s. The median value of $E(2002)/E_{MSY}$ is 1.55, with a 10^{th} to 90^{th} percentile range of [0.77,3.25]. The median value of $F(2002)/F_{MSY}$ is 1.53, with a range of [0.72,3.31]. The median value of $SSB(2002)/SSB_{MSY}$ is 0.95, with a range of [0.61,1.53]. The median value of SSB(2002)/MSST is 1.02, with a range of [0.65,1.67].

It appears likely that overfishing was occurring in 2002; however it is less clear whether the stock was overfished in 2002. The data do not include an abundance index that covers the entire assessment period. To determine stock status, therefore, the assessment must rely in part on other data sources, such as average weight and length from landings as well as the observed age and length composition data. This was explored in the following way: Assuming an equilibrium age-structure, the predicted average weight of landed fish from commercial fisheries is portrayed as a function of stock status. The average weight in 2002 from the handline fishery suggests that the population is near 52% of SSB_{MSY}; the average weight in 2002 from the longline fishery suggests that the population is near 100.1% of SSB_{MSY}. Taken together, these results are consistent with those from the assessment model that the stock is on the border between overfished and not overfished, and that the variability around the point estimate of stock status includes both possibilities. The length composition data from the most recent years (2000 to 2002) also suggests that golden tilefish SSB is near SSB_{MSY}. Observed length distributions are skewed toward smaller fish as compared to an equilibrium virgin length composition, but correspond to the predicted length composition at SSB_{MSY}. Under F=0, the median projection depicts a tilefish stock that recovers to SSB_{MSY} within one year.

3.2.2.3 Black Sea Bass

Data for the SEDAR assessment were assembled and reviewed at a data workshop held during the week of October 7, 2002 in Charleston, South Carolina. The assessment utilized commercial and recreational landings, as well as abundance indices and life history information from fishery-independent and fishery-dependent sources. Six abundance indices were developed at the data workshop. Two CPUE indices were used from the NMFS headboat survey (1978-2001) and the MRFSS recreational survey (1992-1998). Four indices were derived from CPUE observed by the South Carolina MARMAP fishery-independent monitoring program ("Florida" trap index, 1981-1987; blackfish trap index, 1981-1987; hook and line index, 1981-1987; and chevron trap index, 1990-2001).

Age-structured and age-aggregated production models were applied to available data at the assessment workshop (SEDAR 2 2003). The age-structured model was considered the primary model, as recommended by participants in the data workshop. The stock assessment indicated that black sea bass was overfished and overfishing was occurring. Previously, the rebuilding clock for black sea bass was restarted with the effective date of the regulations implementing the SFA Comprehensive Amendment on December 2, 1999. Black sea bass were to be rebuilt to B_{MSY} within 10 years (December 2, 2009). The stock assessment indicated that black sea bass could not be rebuilt to SSB_{MSY} in 10 years in the absence of fishing mortality. The maximum rebuilding time is 18 years based on the formula: T_{MIN} (11 years) + one generation time (7 years).

At the request of the SAFMC, the SEDAR panel convened to update the black sea bass stock assessment, using data through 2003, and to conduct stock projections based on possible management scenarios (SEDAR Assessment Update #1 2005). The update used the same methods and indices as the benchmark assessment. The assessment update indicated that the stock was overfished and overfishing was occurring. Ages 1-3 are being protected by the 10” total length size limit; however, fully exploited Age 4+ fish are subject to intense fishing pressure.

The estimated time series of fishing mortality rate (F) shows an increasing trend between the early 1980s and recent years. Over the assessment period, the fishing mortality rate for ages fully selected by the fishing gear is estimated to have increased from about 0.5 per year to 2.5 per year. The estimated time series of exploitation rate (E) depends on the ages used in the calculations. For ages that are fully selected (ages 4+) or almost fully selected (ages 3+), the pattern of exploitation rate is close to that of fishing mortality rate. However, if younger fish are included (ages 2+), the pattern of exploitation rate shows a different trend, decreasing since the mid-1990s. Exploitation of ages 1+ shows little trend across time, fluctuating around a mean of about 0.23 and decreasing slightly since the mid-1990s. The update indicated that the stock could be rebuilt to the biomass at maximum sustainable yield in 6 years when F = 0.

3.2.2.4 Red Porgy

Red porgy was the subject of the first SEDAR assessment (SEDAR 1 2002, which updated previous assessments conducted by Vaughan *et al*. (1991), Huntsman *et al*. (1994), and Vaughan (1999). Data for the assessment were assembled and reviewed at a data workshop during the week of March 11, 2002, in Charleston, South Carolina. The assessment utilized commercial and recreational landings, as well as abundance indices and life history information from fishery-independent and fishery-dependent sources. Four abundance indices were developed: two indices derived from CPUE in the NMFS headboat survey (1976-1991; 1992-1998), and two derived from CPUE observed by the South Carolina MARMAP fishery-independent monitoring program (“Florida” trap index, 1983-1987; and chevron trap index, 1990-2001).

At the assessment workshop, age-structured and production models were applied to available data. Although the Assessment Workshop determined that the age-structured model provided the most definitive view of the population, both models provide a similar picture of the status of red porgy. SEDAR 1 (2002) indicated that, given the different assumptions used by each type of model and the lack of age structure in the production models, this degree of agreement increased confidence in the assessment results.

Selectivities in the fisheries were estimated to have shifted towards smaller fish, but to have shifted back towards larger fish with recent management measures. The model estimates that SSB had declined to about 10% of its 1972 value and that resulting recruitment had declined to about one-third of its 1972 value. Forward-projection models tend towards greatest uncertainty in the earliest years, and that catch sampling and catch statistics are thought least reliable from that time, as well. The stock in 1972 had many large fish that were gradually removed by the fisheries and not replaced as fishing mortality rates increased (SEDAR 1 2002).

Exploitation rate over time is estimated to have peaked around 1990 at about 35% in weight (about 18% in numbers), and has dropped in recent years to less than 10% in numbers or in weight. The rate is higher in weight than numbers because the smallest fish are not taken in the fishery. Estimates from the base run suggest that the moratorium (September, 1999–August, 2000) and Amendment 12 (September 2000–present) have lowered the fishing mortality rate to about 45% of F_{MSY} in 2001, but that 2001 spawning biomass was still only about 43% of SSB_{MSY}, which is below MSST, which the SAFMC has set at MSST =0.75 B_{MSY}. In terms of the Sustainable Fisheries Act, the results imply that the fishery in 2001 was not undergoing overfishing, but that the red porgy stock was overfished (depleted) in that year. The run using the lower range of the commercial and headboat coefficient of variations (CVs) on landings instead of the upper ranges (run x57) produced essentially the same estimates as the base run.

When the length-to-age information from North Carolina, which tends to assign older ages, was used, the estimate of F_{MSY} increased slightly and the estimate of the ratio F2001/F_{MSY} declined slightly. The estimate of stock status (B2001/B_{MSY}) did not change appreciably; the most marked change was that MSY was estimated somewhat higher than in the base run. Use of North Carolina aging in combination with low CVs (run x59) produced essentially the same results. The sensitivity runs encompassed many changes to input data or model assumptions, yet the model estimates of stock status and fishery status did not change very much. The Stock Assessment Workshop believes that this occurred because the signal in the abundance indices and patterns of size composition over time are so strong that only one interpretation is consistent with the observed data. That interpretation is a severe decline in abundance of the stock over time, with signs of increase from the recent moratorium and Amendment 12 (SEDAR 1 2002).

In May 2006, an update of the red porgy assessment was conducted (Red Assessment Update 2006). Results suggest that spawning stock biomass has increased since the benchmark assessment in 2001. The 2001 estimate of SSB is about 42% of SSB_{MSY}, and the 2005 estimate is about 66% of SSB_{MSY}. This 2005 estimate corresponds to about 85% of MSST, by the Council's usual definition of MSST as $(1 - M)SSB_{MSY}$. The 2004 estimate of fishing mortality rate is about 39% of F_{MSY}, where *F*MSY is the MFMT. These results indicate that the stock is below its biomass limit, but is not undergoing overfishing.

3.2.3 Other Affected Council-Managed Species

Snowy grouper, vermilion snapper, and golden tilefish are targeted by fishermen and are commonly taken on trips together. However, these species occupy different habitats and do not co-occur. Silk snapper and queen snapper are taken as incidental catch when fishermen target snowy grouper. Vermilion snapper, black sea bass, and red porgy are targeted by fishermen, co-occur and are taken on trips together. Gag, red grouper, scamp, blueline tilefish, red snapper, gray triggerfish, greater amberjack, white grunt, and others are also targeted by commercial fishermen and are taken trips with snowy grouper, vermilion snapper, black sea bass, red porgy and golden tilefish. Proposed actions that would specify management reference points, rebuilding schedules, and rebuilding strategies would likely affect other target and non-target snapper grouper species through bycatch and effort shifting. A detailed description of the life history of these species is provided in the Snapper Grouper SAFE report (NMFS 2005).

3.2.4 ESA-Listed Species

The impacts of the South Atlantic snapper grouper fishery on ESA-listed species were evaluated in a biological opinion on the continued authorization of snapper grouper fishing under the South Atlantic Snapper Grouper Fishery Management Plan and Amendment 13C (NMFS 2006). The opinion stated the fishery was not likely to adversely affect Northern right whale critical habitat, seabirds, or marine mammals (see NMFS 2006 for discussion on these species). However, the opinion did state that the snapper grouper fishery would adversely affect sea turtles and smalltooth sawfish. A discussion of these species is below.

3.2.4.1 Sea Turtles

Green, hawksbill, leatherback, loggerhead, and Kemp's ridley sea turtles are all highly migratory and travel widely throughout the South Atlantic. The following sections are a brief overview of the general life history characteristics of the sea turtles found in the South Atlantic region. Several volumes exist that cover more thoroughly the biology and ecology of these species (i.e., Lutz and Musick (eds.) 1997, Lutz *et al*. (eds.) 2002).

Green sea turtle hatchlings are thought to occupy pelagic areas of the open ocean and are often associated with Sargassum rafts (Carr 1987, Walker 1994). Pelagic stage green sea turtles are thought to be carnivorous. Stomach samples of these animals found ctenophores and pelagic snails (Frick 1976, Hughes 1974). At approximately 20 to 25 cm carapace length, juveniles migrate from pelagic habitats to benthic foraging areas (Bjorndal 1997). As juveniles move into benthic foraging areas a diet shift towards herbivory occurs. They consume primarily seagrasses and algae, but are also know to consume jellyfish, salps, and sponges (Bjornal 1980, 1997; Paredes 1969; Mortimer 1981, 1982). The diving abilities of all sea turtles species vary by their life stages. The maximum diving range of green sea turtles is estimated at 110 m (360 ft) (Frick 1976), but they are most frequently making dives of less than 20 m (65 ft.) (Walker 1994). The time of these dives also varies by life stage. The maximum dive length is estimated at 66 minutes with most dives lasting from 9 to 23 minutes (Walker 1994).

The **hawksbill's** pelagic stage lasts from the time they leave the nesting beach as hatchlings until they are approximately 22-25 cm in straight carapace length (Meylan 1988, Meylan and Donnelly 1999). The pelagic stage is followed by residency in developmental habitats (foraging areas where juveniles reside and grow) in coastal waters. Little is known about the diet of pelagic stage hawksbills. Adult foraging typically occurs over coral reefs, although other hard-bottom communities and mangrove-fringed areas are occupied occasionally. Hawksbills show fidelity to their foraging areas over several years (van Dam and Diéz 1998). The hawksbill's diet is highly specialized and consists primarily of sponges (Meylan 1988). Gravid females have been noted ingesting coralline substrate (Meylan 1984) and calcerous algae (Anderes Alvarez and Uchida 1994), which are believed to be possible sources of calcium to aid in eggshell production. The maximum diving depths of these animals are not known, but the maximum length of dives is estimated at 73.5 minutes. More routinely dives last about 56 minutes (Hughes 1974).

Leatherbacks are the most pelagic of all ESA-listed sea turtles and spend most of their time in the open ocean. Although they will enter coastal waters and are seen over the continental shelf on a seasonal basis to feed in areas where jellyfish are concentrated. Leatherbacks feed primarily on cnidarians (medusae, siphonophores) and tunicates. Unlike other sea turtles, leatherbacks' diets do not shift during their life cycles. Because leatherbacks' ability to capture and eat jellyfish is not constrained by size or age, they continue to feed on these species regardless of life stage (Bjorndal 1997). Leatherbacks are the deepest diving of all sea turtles. It is estimated that these species can dive in excess of 1000 m (Eckert *et al*. 1989) but more frequently dive to depths of 50 m to 84 m (Eckert *et al*. 1986). Dive times range from a maximum of 37 minutes to more routines dives of 4 to 14.5 minutes (Standora *et al*. 1984, Eckert *et al*. 1986, Eckert *et al*. 1989, Keinath and Musick 1993). Leatherbacks may spend 74% to 91% of their time submerged (Standora *et al*. 1984).

Loggerhead hatchlings forage in the open ocean and are often associated with Sargassum rafts (Hughes 1974, Carr 1987, Walker 1994, Bolten and Balazs 1995). The pelagic stage of these sea turtles are known to eat a wide range of things including salps, jellyfish, amphipods, crabs, syngnathid fish, squid, and pelagic snails (Brongersma 1972). Stranding records indicate that when pelagic immature loggerheads reach 40-60 cm straight-line carapace length they begin to live in coastal inshore and nearshore waters of the continental shelf throughout the U.S. Atlantic (Witzell 2002). Here they forage over hard- and soft-bottom habitats (Carr 1986). Benthic foraging loggerheads eat a variety of invertebrates with crabs and mollusks being an important prey source (Burke *et al*. 1993). Estimates of the maximum diving depths of loggerheads range from 211 m to 233 m (692-764ft.) (Thayer *et al*. 1984, Limpus and Nichols 1988). The lengths of loggerhead dives are frequently between 17 and 30 minutes (Thayer *et al*. 1984, Limpus and Nichols 1988, Limpus and Nichols 1994, Lanyan *et al*. 1989) and they may spend anywhere from 80 to 94% of their time submerged (Limpus and Nichols 1994, Lanyan *et al*. 1989).

Kemp's ridley hatchlings are also pelagic during the early stages of life and feed in surface waters (Carr 1987, Ogren 1989). Once the juveniles reach approximately 20 cm carapace length they move to relatively shallow (less than 50m) benthic foraging habitat over unconsolidated substrates (Márquez-M. 1994). They have also been observed transiting long distances between foraging habitats (Ogren 1989). Kemp's ridleys feeding in these nearshore areas primarily prey on crabs, though they are also known to ingest mollusks, fish, marine vegetation, and shrimp (Shaver 1991). The fish and shrimp Kemp's ridleys ingest are not thought to be a primary prey item but instead may be scavenged opportunistically from bycatch discards or from discarded bait (Shaver 1991). Given their predilection for shallower water, Kemp's ridleys most routinely make dives of 50 m or less (Soma 1985, Byles 1988). Their maximum diving range is unknown. Depending on the life stage a Kemp's ridleys may be able to stay submerged anywhere from 167 minutes to 300 minutes, though dives of 12.7 minutes to 16.7 minutes are much more common (Soma 1985, Mendonca and Pritchard 1986, Byles 1988). Kemp's ridleys may also spend as much as 96% of their time underwater (Soma 1985, Byles 1988).

3.2.4.2 Marine Fish

The historical range of the **smalltooth sawfish** in the U.S. ranged from New York to the Mexico border. Their current range is poorly understood but believed to have contracted from these historical areas. In the South Atlantic region, they are most commonly found in Florida, primarily off the Florida Keys (Simpfendorfer and Wiley 2004). Only two smalltooth sawfish have been recorded north of Florida since 1963 (the first was captured off of North Carolina in 1999 (Schwartz 2003) and the other off Georgia 2002 [Burgess unpublished data]). Historical accounts and recent encounter data suggest that immature individuals are most common in shallow coastal waters less than 25 m (Bigelow and Schroeder 1953, Adams and Wilson 1995), while mature animals occur in waters in excess of 100 meters (Simpfendorfer pers comm. 2006). Smalltooth sawfish feed primarily on fish. Mullet, jacks, and ladyfish are believed to be their primary food resources (Simpfendorfer 2001). Smalltooth sawfish also prey on crustaceans (mostly shrimp and crabs) by disturbing bottom sediment with their saw (Norman and Fraser 1937, Bigelow and Schroeder 1953).

3.2.4.3 South Atlantic Snapper Grouper Fishery Interactions with ESA-Listed Species

Sea turtles are vulnerable to capture by bottom longline and vertical hook-and-line gear. The magnitude of the interactions between sea turtles and the South Atlantic snapper grouper fishery was evaluated in NMFS (2006) using data from the Supplementary Discard Data Program (SDDP). Three loggerheads and three unidentified sea turtles were caught on vertical lines; one leatherback and one loggerhead were caught on bottom longlines, all were released alive (Table 3-x). The effort reported program represented between approximately 5% and 14% of all South Atlantic snapper grouper fishing effort. These data were extrapolated in NMFS (2006) to better estimate the number of interactions between the entire snapper grouper fishery and ESA-listed sea turtles. The extrapolated estimate was used to project future interactions (Table 3-4).

The SDDP does not provide data on recreational fishing interactions with ESA-listed sea turtle species. However, anecdotal information indicates that recreational fishermen occasionally take sea turtles with hook-and-line gear. The biological opinion also used the extrapolated data from the SDDP to estimate the magnitude of recreational fishing on sea turtles (Table 3-1).

Smalltooth sawfish are also considered vulnerable to capture by bottom longline and vertical hook-and-line gear based on their capture in other southeast fisheries using such gear (Poulakis and Seitz 2004; Simpfendorfer and Wiley 2004). SDDP data does not include any reports of smalltooth sawfish being caught in the South Atlantic commercial snapper grouper fishery. There are no other documented interactions between smalltooth sawfish and the South Atlantic commercial snapper grouper fishery. However, the potential for interaction, led NOAA Fisheries Service to estimate future interactions between smalltooth sawfish and the snapper grouper fishery in the biological opinion (Table 3-2).

Table 3-1. Sea turtle incidental take data from the Supplementary Discard Data Program (SDDP) for the Southeast U.S. Atlantic.

Reporting Period	Month	Logbook Statistical Grid	Species Caught	Number Caught	Discard Condition
Vertical Hook-and-Line Sea Turtle Catch Data					
8/1/01-7/31/02	April	2482	Unidentified	1	Alive
8/1/01-7/31/02	November	3377	Loggerhead	1	Alive
8/1/02-7/31/03	February	2780	Loggerhead	1	Alive
8/1/02-7/31/03	November	3474	Loggerhead	1	Alive
8/1/02-7/31/03	November	3476	Unknown	1	Alive
8/1/02-7/31/03	December	3476	Unknown	1	Alive
Bottom Longline Sea Turtle Catch Data					
8/1/01-7/31/02	August	3674	Leatherback	1	Alive
8/1/03-7/31/04	January	3575	Loggerhead	1	Unknown

Source: SEFSC Supplementary Discard Data Program

Table 3-2. Three year South Atlantic anticipated takes of ESA-listed species for snapper grouper gears.

Species	Amount of Take	Total
Green	Total Take	39
	Lethal Take	14
Hawksbill	Total Take	4
	Lethal Take	3
Kemp's ridley	Total Take	19
	Lethal Take	8
Leatherback	Total Take	25
	Lethal Take	15
Loggerhead	Total Take	202
	Lethal Take	67
Smalltooth sawfish	Total Take	8
	Lethal Take	0

Source: NMFS 2006

3.3 Administrative Environment

3.3.1 The Fishery Management Process and Applicable Laws

3.3.1.1 Federal Fishery Management

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

Responsibility for Federal fishery management decision-making is divided between the U.S. 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 collecting and providing the data necessary for the councils to prepare fishery management plans and for promulgating regulations to implement proposed plans and amendments after ensuring that management measures are consistent with the M-Magnuson-Stevens Act and with other applicable laws summarized in Section 7.0. In most cases, the Secretary has delegated this authority to NOAA Fisheries Service.

The South Atlantic Fishery Management Council is responsible for conservation and management of fishery resources in Federal waters of the U.S. South Atlantic. These waters extend from 3 to 200 miles offshore from the seaward boundary of the States of North Carolina, South Carolina, Georgia, and east Florida to Key West. The Council has thirteen voting members: one from NOAA Fisheries Service; one each from the state fishery agencies of North Carolina, South Carolina, Georgia, and Florida; and eight public members appointed by the Secretary. On the South Atlantic Council there are two public members from each of the four South Atlantic States. Non-voting members include representatives of the U.S. Fish and Wildlife Service, U.S. Coast Guard, State Department, and Atlantic States Marine Fisheries Commission (ASMFC). The South Atlantic Council has adopted procedures whereby the non-voting members serving on the Council Committees have full voting rights at the Committee level but not at the full Council level. Council members serve three-year terms and are recommended by State Governors and appointed by the Secretary of Commerce from lists of nominees submitted by State governors. Appointed members may serve a maximum of three consecutive terms.

Public interests also are involved in the fishery management process through participation on Advisory Panels and through council meetings, which, with few exceptions for discussing personnel matters, are open to the public. The Council uses a Scientific and Statistical Committee to review the data and science being used in assessments and fishery management plans/amendments. In addition, the regulatory process is in accordance with the Administrative Procedures Act, in the form of "notice and comment" rulemaking.

3.3.1.2 State Fishery Management

The state governments of North Carolina, South Carolina, Georgia, and Florida have the authority to manage fisheries that occur in waters extending three nautical miles from their respective shorelines. North Carolina's marine fisheries are managed by the Marine Fisheries Division of the North Carolina Department of Environment and Natural Resources. The Marine Resources Division of the South Carolina Department of Natural Resources regulates South Carolina's marine fisheries. Georgia's marine fisheries are managed by the Coastal Resources Division of the Department of Natural Resources. The Marine Fisheries Division of the Florida Fish and Wildlife Conservation Commission is responsible for managing Florida's marine fisheries. Each state fishery management agency has a designated seat on the South Atlantic Council. 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 South Atlantic states are also involved through the Atlantic States Marine Fisheries Commission (ASMFC) in management of marine fisheries. This commission was created to coordinate state regulations and develop management plans for interstate fisheries. It has significant authority, through the Atlantic Striped Bass Conservation Act and the Atlantic Coastal Fisheries Cooperative Management Act, to compel adoption of consistent state regulations to conserve coastal species. The ASFMC also is represented at the Council level, but does not have voting authority at the Council level.

NOAA Fisheries Service' State-Federal Fisheries Division is responsible for building cooperative partnerships to strengthen marine fisheries management and conservation at the state, inter-regional, and national levels. This division implements and oversees the distribution of grants for two national (Inter-jurisdictional Fisheries Act and Anadromous Fish Conservation Act) and two regional (Atlantic Coastal Fisheries Cooperative Management Act and Atlantic Striped Bass Conservation Act) programs. Additionally, it works with the ASMFC to develop and implement cooperative State-Federal fisheries regulations.

3.3.2 Enforcement

Both the National Oceanic and Atmospheric Administration (NOAA) Fisheries Office for Enforcement (NOAA/OLE) and the United States Coast Guard (USCG) have the authority and the responsibility to enforce South Atlantic Council regulations. NOAA/OLE agents, who specialize in living marine resource violations, provide fisheries expertise and investigative support for the overall fisheries mission. The USCG is a multi-mission agency, which provides at-sea patrol services for the fisheries mission.

Neither NOAA/OLE nor the USCG can provide a continuous law enforcement presence in all areas due to the limited resources of NOAA/OLE and the priority tasking of the USCG. To supplement at-sea and dockside inspections of fishing vessels, NOAA entered into Cooperative Enforcement Agreements with all but one of the states in the Southeast Region (North Carolina), which granted authority to state officers to enforce the laws for which NOAA/OLE has jurisdiction. In recent years, the level of involvement by the states has increased through Joint Enforcement Agreements, whereby states conduct patrols that focus on Federal priorities and, in some circumstances, prosecute resultant violators through the state when a state violation has occurred.

NOAA General Counsel issued a revised Southeast Region Magnuson-Stevens Act Penalty Schedule in June 2003, which addresses all Magnuson-Stevens Act violations in the Southeast Region. In general, this Penalty Schedule increases the amount of civil administrative penalties that a violator may be subject to up to the current statutory maximum of $120,000 per violation.

3.4 Human Environment

3.4.1 Description of the Fishery

A more detailed description of the snapper grouper fishery is contained in Amendment 13C (SAFMC 2006) and is incorporated herein by reference. The following sections summarize key information relevant to this action.

3.4.1.1 Commercial Fishery

3.4.1.1.1 Gear and Fishing Behavior

The commercial snapper grouper fishery utilizes vertical lines, longlines, black sea bass pots/traps, spears, and powerheads (spring-loaded firearms). Vertical lines are used from the North Carolina/Virginia border to the Atlantic side of Key West, Florida. The majority of hook and line fishermen use either electric or hydraulic reels (bandit gear) and generally have 2-4 bandit reels attached. The majority of the bandit fleet fishes year round for snapper grouper with the only seasonal differences in catch associated with the regulatory spawning season closures in March and April for gag. Most fluctuations in fishing effort in this fishery are a result of the weather. Trips can be limited during hurricane season and also during the winter months (December through March). Some fishermen stop bandit fishing to target king mackerel when they are running.

The Council allows the use of bottom longlines in depths greater than 50 fathoms and north of St. Lucie Inlet, Florida. Bottom longline gear is used to target snowy grouper and golden tilefish. Longline boats are typically bigger than bandit boats, their trips are longer, and they cost more to operate because they operate farther offshore. A longline spool generally holds about 15 miles of cable. Longlines are only fished from daylight to dark because sea lice eat the flesh of hooked fish at night. The fishery is operated year long with little or no seasonal fluctuation barring hurricane disruption.

Spears or powerheads are most commonly used off Florida and are illegal for killing snapper grouper in South Carolina and Special Management Zones.

Black sea bass pots are used exclusively to target black sea bass, though bycatch of other snapper grouper is allowed. The pots have mesh size, material, and construction restrictions to facilitate bycatch reduction. All sea bass pots must have a valid identification tag attached and over 87 percent of tags in April, 2003 were for vessels homeported in North Carolina. Fishing practices vary by buoy practices, setting/pulling strategies, number of pots set, and length of set, with seasonal variations. The South Carolina pot fishery is mainly a winter fishery, with short soak times (in some cases about an hour), relatively few pots per boat, and most trips are day trips with pots being retrieved before heading to port. The North Carolina pot fishery is also largely a winter fishery with some fishermen continuing to pot through the summer. North Carolina fishermen tend to use more pots than those in South Carolina. Although most North Carolina pot trips have a duration of one day, more pots are left to soak for several days than in South Carolina. Many participants in the black sea bass fishery are active in other fisheries, including the recreational charter fishery during the summer months. Many snapper grouper permit holders maintain pot endorsements but are not active in the pot fishery.

3.4.1.1.2 Landings, Ex-vessel Value, Price, and Effort

Landings of all species in the snapper-grouper management unit averaged 6.91 million pounds between 2001 and 2005, with an average annual dockside value of $13.03 million (Table 3-3). Fishermen also landed an average of 1.79 million pounds of other species worth $1.90 million on trips that landed at least one pound of species in the management unit. According to the trip reports submitted to the NMFS logbook program, an average of 934 boats averaged 15,962 trips per year on which at least one pound of snapper-grouper species was landed (Table 3-4). An average of 545 boats landed at least 1000 pounds of snapper-grouper species annually; 268 boats landed at least 5000 pounds; 177 boats landed at least 10,000 pounds; and 26 boats landed at least 50,000 pounds of snapper-grouper species.

Table 3-3. Annual landings and dockside (ex-vessel) revenues for trips with at least 1 pound of species in the snapper-grouper fishery management unit in the south Atlantic.

Item	2001	2002	2003	2004	2005	Average
Trips with at least 1 pound of snapper-grouper species						
Snapper-grouper landings (million pounds, whole wgt)	7.60	7.36	6.50	6.69	6.39	6.91
Dockside revenue from snapper-grouper species (million dollars)	$13.95	$13.55	$12.12	$12.69	$12.83	$13.03
Dockside revenue in constant 2005 dollars (millions)*	$15.38	$14.71	$12.87	$13.12	$12.83	$13.78
Price/lb (whole wgt) for snapper-grouper species	$1.83	$1.84	$1.86	$1.89	$2.01	$1.89
Price/lb in constant 2005 dollars*	$2.02	$2.00	$1.98	$1.96	$2.01	$1.99
Producer price index for #2 diesel fuel, adjusted to constant 2005 price levels (index=100 for 2005)	44.1	41.2	53.1	67.8	100.0	61.2
Landings of other species on these trips (million lbs)	1.71	1.76	2.10	1.65	1.71	1.79
Dockside revenue from other species on these trips (million $)	$1.97	$1.96	$1.92	$1.78	$1.89	$1.90
Dockside revenue from other species in constant 2005 dollars (millions)	$2.17	$2.13	$2.04	$1.85	$1.89	$2.02

Source: NMFS logbook database, Southeast Fisheries Science Center.
* The CPI was used to adjust dockside revenues and average annual prices for inflation.

Table 3-4. Fishing effort and distribution of catch for trips with at least 1 pound of species in the snapper-grouper fishery management unit in the south Atlantic.

Item	2001	2002	2003	2004	2005	Average
Trips with at least 1 pound of snapper-grouper species						
Number of trips	17,279	17,199	16,563	15,038	13,730	15,962
Days away from port	29,933	29,580	27,620	24,821	22,781	26,947
Average days per trip	1.7	1.7	1.7	1.7	1.7	1.7
Number of vessels landing snapper-grouper species	1,004	976	932	905	855	934
Number of vessels with more than 100 lbs of snapper-grouper species	869	829	792	749	719	791
Number of vessels with more than 1,000 lbs of snapper-grouper species	594	589	547	523	475	545
Number of vessels with more than 5,000 lbs of snapper-grouper species	288	280	277	261	238	268
Number of vessels with more than 10,000 lbs of snapper-grouper species	196	198	173	165	153	177
Number of vessels with more than 50,000 lbs of snapper-grouper species	26	27	20	32	29	26
Number of permitted vessels	1,264	1,174	1,123	1,066	1,007	1,127
Number of vessels with transferable permits	959	907	879	841	801	877
Number of dealer permits	252	246	271	269	268	261

Source: NMFS logbook database, Southeast Fisheries Science Center, and Southeast Regional Office permits database.

The economic analysis of proposed management alternatives examines logbook reports for trips that landed at least one pound of black sea bass or red porgy or snowy grouper. These trips produced an average of 3.97 million pounds of snapper-grouper species worth $7.73 million, including 0.91 million pounds of snowy grouper, red porgy and black sea bass worth $1.61 million, and 0.40 million pounds of non-snapper-grouper species worth $0.47 million (Table 3-5). Black sea bass, red porgy and snowy grouper represented approximately 21 percent of total pounds landed and 20 percent of total dockside revenues earned on these trips.

Table 3-5. Annual landings and dockside revenues for trips with at least 1 pound of black sea bass, red porgy, or snowy grouper.

Item	2001	2002	2003	2004	2005	Average
Trips with at least 1 pound of black sea bass or red porgy or snowy grouper						
Landings of 15A species (million lbs, whole weight)	1.005	0.875	0.930	0.991	0.750	0.910
Snapper-grouper landings (million lbs) on these trips	4.696	4.174	3.658	3.775	3.567	3.974
Landings of other species on these trips (million lbs)	0.456	0.406	0.455	0.373	0.320	0.402
Total landings on these trips (million lbs)	5.152	4.580	4.113	4.148	3.887	4.376
15A landings as percent of total pounds for these trips	20%	19%	23%	24%	19%	21%
Dockside revenues for 15A species (million $)	$1.775	$1.497	$1.621	$1.728	$1.414	$1.607
Dockside revenues from snapper-grouper species (million dollars)	$8.842	$7.913	$6.956	$7.410	$7.515	$7.727
Dockside revenues from other species on these trips (million $)	$0.569	$0.463	$0.443	$0.463	$0.415	$0.471
Total dockside revenues on these trips (million $)	$9.411	$8.376	$7.399	$7.873	$7.930	$8.198
15A revenues as percent of total revenues for these trips	19%	18%	22%	22%	18%	20%
Total revenues in constant 2005 dollars (millions)	$10.370	$9.095	$7.851	$8.127	$7.923	$8.673

Source: NMFS logbook database, Southeast Fisheries Science Center.

An average of 356 boats made 4,126 trips annually between 2001 and 2005 with at least one pound of snowy grouper or red porgy or black sea bass (Table 3-6). Trips with black sea bass or red porgy or snowy grouper were longer (compare days per trip reported in Tables 3-4 and 3-6) and more productive than all snapper-grouper trips. Although these trips represented only 26 percent of all trips that landed species in the snapper-grouper management unit (compare snapper-grouper trips reported in Tables 3-4 and 3-6), they accounted for 57 percent of the total snapper-grouper harvest (compare snapper-grouper landings reported in Tables 3-3 and 3-5). However, snowy grouper averaged less than 7 percent of the total harvest on these trips, red porgy averaged 1 percent, and black sea bass averaged 13 percent (Table 3-7). Vermilion snapper was the largest volume species with nearly 23 percent of the total harvest on these trips. Gag and other shallow water groupers represented 20 percent of the total harvest. Other species in the snapper-grouper fishery, such as other snappers, triggerfishes, other porgies, grunts and jacks represented 20% of the total harvest. Other deep water species, such as golden tilefish, blueline tilefish, and other deep water groupers represented 8 percent of the total catch on trips with at least one pound of black sea bass, red porgy or snowy grouper.

Table 3-6. Fishing effort and distribution of catch for trips with at least 1 pound of black sea bass, red porgy, or snowy grouper.

Item	2001	2002	2003	2004	2005	Average
Trips with at least 1 pound of black sea bass or red porgy or snowy grouper						
Number of trips	4,994	4,621	3,946	3,710	3,359	4,126
Days away from port	13,040	12,347	10,656	9,761	9,100	10,981
Average days per trip	2.6	2.7	2.7	2.6	2.7	2.7
Number of vessels landing 15A species	388	363	345	348	335	356
Number of vessels with more than 100 lbs of 15A species	304	284	265	257	232	268
Number of vessels with more than 1,000 lbs of 15A species	168	160	140	144	117	146
Number of vessels with more than 5,000 lbs of 15A species	69	61	52	57	35	55
Number of vessels with more than 10,000 lbs of 15A species	36	32	31	28	22	30
Number of vessels with more than 50,000 lbs of 15A species	4	3	5	4	3	4

Source: NMFS logbook database, Southeast Fisheries Science Center.

Table 3-7. Species composition of trips with at least one pound of black sea bass, red porgy, or snowy grouper between 2001 and 2005, in millions of pounds whole weight.

Species	2001	2002	2003	2004	2005	Average	Percent
Trips with at least 1 pound of black sea bass or red porgy or snowy grouper							
Black sea bass	0.603	0.507	0.598	0.707	0.461	0.575	13.1%
Red porgy	0.052	0.057	0.045	0.045	0.040	0.048	1.1%
Snowy grouper	0.350	0.311	0.287	0.239	0.249	0.287	6.6%
Golden tilefish	0.341	0.269	0.224	0.149	0.102	0.217	5.0%
Blueline tilefish	0.113	0.151	0.112	0.061	0.068	0.101	2.3%
Other deep water species	0.039	0.027	0.021	0.015	0.013	0.023	0.5%
Vermilion snapper	1.391	1.094	0.646	0.909	0.976	1.003	22.9%
Shallow water groupers	0.848	0.861	0.899	0.808	0.857	0.854	19.5%
Other snapper-grouper species	0.959	0.897	0.826	0.842	0.801	0.865	19.8%
Other species	0.456	0.406	0.455	0.373	0.320	0.402	9.2%
Total	5.152	4.580	4.113	4.148	3.887	4.376	100.0%

Source: NMFS logbook database, Southeast Fisheries Science Center.

Landings and dockside revenues declined between 2001 and 2005 for species in the snapper-grouper management unit (Table 3-3) and among trips included in the analysis of proposed management alternatives (Table 3-5). Most of the declines appear to be attributable to variation in landings of vermilion snapper (Table 3-7), which experienced a significant decline in 2003 due to unusually cold water temperatures in the summer and fall of 2003. Landings of vermilion snapper recovered in 2004 and 2005, but not to the levels experienced in 2001 and 2002.

Participation in the snapper-grouper fishery has declined over time, due partly to the limited access program for the snapper-grouper fishery that was implemented in 1998. The number of boats with snapper-grouper permits declined from 1,264 in 2001 to 1,007 in 2005 (Table 3-4). There are two types of permits. The number of transferable permits that allow an unlimited harvest per trip declined from 959 in 2001 to 801 in 2005, while the number of vessels with non-transferable permits with a 225 pound trip limit declined from 305 in 2001 to 206 in 2005. Also, it is likely that the number of vessels in the snapper-grouper fishery declined for economic reasons. Average annual prices for species in the snapper-grouper management unit remained relatively constant when adjusted for inflation, whereas fuel prices more than doubled since 2002 (Table 3-3). The net result has been a decline since 2001 in the number of vessels, trips and days fished for species in the snapper-grouper management unit (Table 3-4). Similarly, the number of vessels with any reported landings of red porgy, black sea bass, or snowy grouper declined from 388 in 2001 to 335 in 2005 (Table 3-6). The decline in the number of vessels is evident in all harvest categories except for the highest producing category of 50,000 pounds or more per year (Table 3-6). Despite the decline in the number of vessels active in the fishery, the number of fish dealers with permits to operate in the snapper-grouper fishery increased from 252 in 2001 and 268 in 2005 (Table 3-4).

3.4.1.1.3 The Snapper Grouper Fishery By State

The following discussion provides annual averages from 2001 to 2005. To maintain the confidentiality of individual reporting units, summaries are provided for regions defined as North Carolina, South Carolina, Georgia and northeast Florida combined, and central and south Florida combined. The northeast Florida region consists of trips landed in Nassau, Duval and St. Johns Counties, and the central and south Florida region consists of trips landed from Flagler through Miami-Dade Counties and trips from Atlantic waters off the Florida Keys and landed in Monroe County.

The average quantities of snapper-grouper species harvested from 2001-2005 included 1.85 million pounds worth $3.40 million per year in North Carolina, 1.65 million pounds worth $3.45 million in South Carolina, 0.85 million pounds worth $1.68 million in Georgia and northeast Florida, and 2.55 million pounds worth $4.49 million in central and south Florida (Table 3-8). Snapper-grouper landings by state were not proportional to total days fished in each state. Boats in central and south Florida made 72 percent of the trips that landed species in the snapper-grouper management unit and accounted for 37 percent of the total snapper-grouper harvest. Conversely, boats in other states accounted for relatively larger portions of the total snapper-grouper harvest. Boats in North Carolina made 18 percent of the trips and landed 27 percent of the snapper-grouper harvest. Boats in South Carolina made 6 percent of the trips and landed 24 percent of the harvest. And boats in Georgia and northeast Florida made 4 percent of the trips and landed 12 percent of the snapper-grouper harvest. Boats in South Carolina and Georgia and northeast Florida took fewer but longer trips than their counterparts in North Carolina or central and south Florida. Fishermen in central and south Florida, especially in the Keys, tend to catch relatively larger quantities of non-snapper-grouper species.

Table 3-8. Annual landings and dockside revenues for trips with at least 1 pound of species in the snapper-grouper fishery, 2001-2005 averages by state. Landings are reported as millions of pounds, whole weight, and dockside revenues are reported as millions of dollars.

Item	North Carolina	South Carolina	Georgia and Northeast Florida	Central and South Florida	Total
Trips with at least 1 pound of snapper-grouper species					
Snapper-grouper landings (million lbs)	1.85	1.65	0.85	2.55	6.90
Percent of total snapper-grouper lbs	27%	24%	12%	37%	100%
Snapper-grouper revenues (million $)	$3.40	$3.45	$1.68	$4.49	$13.03
Snapper-grouper revenues in constant 2005 dollars	$3.59	$3.64	$1.74	$4.75	$13.72
Pct of total snapper-grouper revenues	26%	27%	12%	35%	100%
Landings other species (million lbs)	0.27	0.14	0.07	1.29	1.77
Dockside revenues other spp. (million $)	$0.32	$0.18	$0.16	$1.25	$1.91
Dockside revenues other species in constant 2005 dollars	$0.33	$0.19	$0.17	$1.32	$2.01
Number of boats*	170	66	51	662	934
Number of trips	2,838	968	590	11,563	15,959
Percent of trips	18%	6%	4%	72%	100%
Number of days	5,004	4,756	2,427	14,751	26,938
Percent of days	19%	18%	9%	54%	100%
Trips per boat	16.7	14.7	11.7	17.7	17.1
Days per trip	1.8	4.9	4.1	1.3	1.7

Source: NMFS logbook database, Southeast Fisheries Science Center.
***** Some boats land in more than one state.

Species in the snapper-grouper management unit are harvested throughout the jurisdiction of the South Atlantic Council. However, species composition in the fishery changes from north to south, with species addressed in Amendment 15A more likely to be caught in the north (Table 3-9). Red porgy and black sea bass are landed primarily in North Carolina and South Carolina. Snowy grouper are landed in North Carolina, South Carolina and south Florida.

Black sea bass, red porgy and snowy grouper often are caught as secondary species on trips for other species. Black sea bass and red porgy often are caught on trips for vermilion snapper or shallow water groupers. Snowy grouper often are caught on trips for vermilion snapper or golden tilefish. On average from 2001-2005, black sea bass, red porgy or snowy grouper were caught on 77 percent of all snapper-grouper trips in North Carolina, and on those trips accounted for 32 percent of total landings and 29 percent of dockside revenues (Table 3-9). In South Carolina, black sea bass, red porgy or snowy grouper were landed on 87 percent of all snapper-grouper trips, and on those trips accounted for 15 percent of total landings and 14 percent of total revenues. In Georgia and northeast Florida, black sea bass, red porgy or snowy grouper were landed on 55 percent of all snapper-grouper trips, but on those trips accounted for only 3 percent of total landings and 3 percent of total revenues. The three species in Amendment 15A were caught on only 7 percent of all snapper-grouper trips in central and south Florida, and on those trips accounted for 24 percent of total pounds and 32 percent of total revenues.

Table 3-9. Description of fishing activities for trips with at least 1 pound of species addressed in Amendment 15, 2001-2005 averages, by state.

Item	North Carolina	South Carolina	Georgia and Northeast Florida	Central and South Florida	Total
Trips with at least 1 pound of black sea bass or red porgy or snowy grouper					
Number of boats*	139	65	40	122	356
Number of trips	2,193	842	322	769	4,126
Number of days	4,026	4,043	1,637	1,275	10,981
Pct of trips in this area with 15A species	77%	87%	55%	7%	26%
Landings of 15A species (million lbs)	0.557	0.229	0.021	0.104	0.910
Snowy grouper lbs	0.092	0.090	0.008	0.097	0.287
Red porgy lbs	0.026	0.013	0.007	0.002	0.048
Black sea bass lbs	0.440	0.125	0.006	0.005	0.575
Snapper-grouper landings (million lbs)	1.611	1.443	0.597	0.322	3.974
Landings other species (million lbs)	0.133	0.122	0.036	0.110	0.402
Total landings all species on these trips (million lbs)	1.744	1.565	0.633	0.433	4.376
15A landings as percent of total pounds on these trips	32%	15%	3%	24%	21%
Dockside revenues for 15A species (millions)	$0.911	$0.431	$0.035	$0.229	$1.607
Snapper-grouper revenues (million $)	$2.956	$2.983	$1.168	$0.621	$7.727
Revenues other species (million $)	$0.151	$0.149	$0.074	$0.096	$0.471
Total revenues all species on these trips (million $)	$3.107	$3.132	$1.242	$0.717	$8.198
15A revenues as pct of total revenues on these trips	29%	14%	3%	32%	20%
Total revenues in constant 2005 dollars	$3.285	$3.308	$1.317	$0.763	$8.673

Source: NMFS logbook database, Southeast Fisheries Science Center.
***** Some boats land in more than one state.

3.4.1.1.4 The Snapper Grouper Fishery By Gear

The following discussion provides annual averages from 2001 to 2005. To maintain the confidentiality of individual reporting units, summaries are provided for vertical lines, longlines, black sea bass pots, and all other gears combined. The all-other-gear category includes trolling lines, diving gear, and other gears.

The average quantities of snapper-grouper species harvested from 2001-2005 included 5.48 million pounds worth $10.54 million per year with vertical lines, 0.54 million pounds worth $1.01 million with longlines, 0.53 million pounds worth $0.81 million with black sea bass pots, and 0.35 million pounds worth $0.66 million with other gears (Table 3-10). Trips with vertical lines accounted for 78 percent of all trips that landed species in the snapper-grouper management unit and 79 percent of the total snapper-grouper harvest. Trips with longlines accounted for 2 percent of the trips and 8 percent of the snapper-grouper harvest, while trips with black sea bass pots represented 5 percent of the trips and accounted for 8 percent of the harvest. Trips with other gears represented 15 percent of the trips and 5 percent of the harvest. Trips with longlines tend to be longer than trips with other gears.

Table 3-10. Annual landings and dockside revenues for trips with at least 1 pound of species in the snapper-grouper fishery, 2001-2005 averages by primary gear. Note: Landings are reported as millions of pounds, whole weights, and dockside revenues are reported as millions of dollars.

Item	Vertical Lines	Longlines	Traps / Pots	Other Gears	Total
Trips with at least 1 pound of snapper-grouper species					
Snapper-grouper landings (million lbs)	5.48	0.54	0.53	0.35	6.90
Percent of total snapper-grouper lbs	79%	8%	8%	5%	100%
Snapper-grouper revenues (million $)	$10.54	$1.01	$0.81	$0.66	$13.02
Snapper-grouper revenues in constant 2005 dollars	$11.14	$1.08	$0.87	$0.70	$13.79
Pct of total snapper-grouper revenues	81%	8%	6%	5%	100%
Landings other species (million lbs)	0.57	0.37	0.03	0.82	1.79
Dockside revenues other spp. (million $)	$0.73	$0.20	$0.03	$0.95	$1.91
Dockside revenues other species in constant 2005 dollars	$0.78	$0.21	$0.03	$1.00	$2.01
Number of boats*	756	35	53	314	934
Number of trips	12,450	304	802	2,406	15,962
Percent of trips	78%	2%	5%	15%	100%
Number of days	21,698	1,310	1,014	2,925	26,947
Percent of days	80%	5%	4%	11%	100%
Trips per boat	16.7	14.7	11.6	17.5	17.1
Days per trip	1.7	4.3	1.3	1.2	1.7

Source: NMFS logbook database, Southeast Fisheries Science Center.
***** Some boats fish with more than one primary gear.

Except for black sea bass and several deep water species such as snowy grouper, yellowedge grouper and golden tilefish, most of the snapper-grouper harvest is taken by some type of vertical hook-and-line gear. For black sea bass, 86 percent of the catch is taken with pots (Table 3-11). Trips with vertical lines accounted for 70 percent of landings of snowy grouper, while longlines accounted for 29 percent. Because Amendment 15A addresses the fisheries for black sea bass and snowy grouper, it is likely to affect fishermen with black sea bass pots and longlines relatively more than fishermen with vertical lines or other gears.

Black sea bass pots are used primarily to catch black sea bass. Therefore, it is not surprising that 99 percent of all trips with black sea bass pots catch at least 1 pound of species addressed in Amendment 15A (i.e., black sea bass), and that back sea bass account for 90 percent of total landings and 94 percent of total revenues on all snapper-grouper trips with sea bass pots (Table 3-11).

Similarly, longlines are used primarily to catch deep water species such as snowy grouper. Approximately 49 percent of all trips with longlines that caught species in the snapper-grouper management unit also caught snowy grouper, and on these trips, snowy grouper accounted for 17 percent of the total harvest and 25 percent of total revenues (Table 3-11). Longlines also are used in the shark fishery and may catch species in the snapper-grouper management unit as secondary species.

Although vertical lines are the dominant gear in the fishery, they harvest a variety of species not addressed in Amendment 15A. On average from 2001-2005, species addressed in Amendment 15A were caught on 24 percent of all snapper-grouper trips with vertical lines, and accounted for 10 percent of total landings and 10 percent of dockside revenues on those trips (Table 3-11).

Table 3-11. Description of fishing activities for trips with at least 1 pound of black sea bass or red porgy or snowy grouper, by primary gear, 2001-2005 averages.

Item	Vertical Lines	Longlines	Traps / Pots	Other Gears	Total
Trips with at least 1 pound of black sea bass or red porgy or snowy grouper					
Number of boats*	302	23	53	64	356
Number of trips	3,038	148	796	144	4,126
Number of days	8,897	828	1,004	257	10,981
Pct of trips with this gear with A15 species	24%	49%	99%	6%	26%
Landings of A15 species (million lbs)	0.321	0.083	0.498	0.009	0.910
Snowy grouper lbs	0.201	0.083	0.000	0.003	0.287
Red porgy lbs	0.047	0.000	0.000	0.001	0.048
Black sea bass lbs	0.073	0.000	0.497	0.005	0.575
Snapper-grouper landings (million lbs)	3.037	0.352	0.532	0.053	3.974
Landings other species (million lbs)	0.171	0.142	0.021	0.071	0.402
Total landings all species on these trips (million lbs)	3.207	0.494	0.553	0.124	4.376
15A landings as percent of total pounds on these trips	10%	17%	90%	7%	21%
Dockside revenues for A15 species (millions)	$0.620	$0.194	$0.779	$0.016	$1.607
Snapper-grouper revenues (million $)	$6.148	$0.660	$0.813	$0.109	$7.727
Revenues other species (million $)	$0.235	$0.112	$0.019	$0.107	$0.471
Total revenues all species on these trips (million $)	$6.383	$0.772	$0.832	$0.216	$8.198
A15 revenues as pct of total revenues on these trips	10%	25%	94%	7%	20%
Total revenues in constant 2005 dollars	$6.742	$0.825	$0.882	$0.228	$8.673

Source: NMFS logbook database, Southeast Fisheries Science Center.
***** Some boats fish with more than one primary gear.

3.4.1.2 Recreational Fishery

The South Atlantic recreational fishery is comprised of the private sector and for-hire sector. The private sector includes anglers fishing from shore (all land-based structures) and private/rental boats. The for-hire sector is composed of the charterboat and headboat (also called partyboat) sectors. Charterboats generally carry fewer passengers and charge a fee on an entire vessel basis, whereas headboats carry more passengers and payment is per person. The type of service, from a vessel- or passenger-size perspective, affects the flexibility to search different fishing locations during the course of a trip and target different species since larger concentrations of fish are required to satisfy larger groups of anglers. Note: the following information was prepared prior to the partitioning of Amendment 15 into multiple amendments. As such, it includes information on more species than are addressed by Amendment 15a.

3.4.1.2.1 Harvest

Recreational snapper grouper harvest has been variable since 1986 with no discernable trend, varying from a low of 6.5 million pounds in 1998 to a high of 12.4 million pounds in 1988 (Table 3-12). Harvests in 2003 exceeded the historical average. The shore and private sector dominate the fishery, accounting for, on average, over two-thirds of the harvest.

Table 3-12. Harvest of snapper grouper species by mode in the South Atlantic. Source: The Headboat Survey, NOAA Fisheries, SEFSC, Beaufort Lab and MRFSS database, NOAA Fisheries, NMFS, SERO.

Year	Charterboat[1]	Headboat[2]	Shore and Private/Rental Boat[1]	Total
1986	821,343	2,661,961	5,437,568	9,164,407
1987	2,201,804	3,227,294	6,258,376	11,981,897
1988	2,392,740	3,417,107	6,184,386	12,375,317
1989	1,752,468	2,574,910	6,064,567	10,693,382
1990	786,090	2,557,352	4,612,202	8,127,407
1991	1,029,716	2,713,513	6,339,784	10,269,025
1992	1,540,113	2,160,642	7,338,270	11,265,107
1993	1,142,815	2,328,911	5,854,258	9,491,894
1994	2,337,545	2,119,554	6,477,448	11,066,395
1995	1,681,809	1,990,254	5,996,957	9,860,827
1996	1,433,353	1,801,595	6,161,361	9,610,711
1997	1,216,907	1,751,509	4,700,150	7,761,398
1998	975,980	1,582,317	3,857,407	6,496,673
1999	2,341,051	1,603,627	4,966,208	8,995,706
2000	1,108,396	1,553,842	7,401,989	10,086,883
2001	1,347,783	1,655,941	7,984,642	11,062,432
2002	1,363,388	1,433,118	5,184,057	8,042,689
2003	1,580,336	1,375,908	7,284,329	10,240,573
Average 1999-2003	**1,548,191**	**1,524,487**	**6,564,245**	**9,685,657**

[1] Pounds of A and B1 fish estimated from the MRFSS Survey.
[2] The total annual estimate of headboat catch derived from data collected through the NMFS headboat survey.

Average black sea bass harvests from 1999-2004 were approximately 656,000 pounds, with the private sector accounting for almost 62 percent (Table 3-13. The headboat sector also accounts for over 50 percent of the red porgy harvest. The harvest of snowy grouper is relatively minor in the recreational sector and the relative infrequency of encountering this species in the data collection programs results in very high proportional standard errors (PSE) for the harvest estimates (42 percent, data not shown; see SAFMC (2006)). High PSEs indicate high variability of the estimates and the resulting estimates may not be a reliable indicator of actual harvest.

Table 3-13. Average harvest (lbs) of species in this amendment by sector, 1999-2004 (2001-2004 for red porgy). Source: The Headboat Survey, NOAA Fisheries, SEFSC, Beaufort Lab and MRFSS database, NOAA Fisheries, NMFS, SERO.

Sector	Black Sea Bass	Red Porgy*	Snowy Grouper*
Charterboat	82,931	22,447	13,496
Headboat	167,857	40,926	569
Private	404,864	17,019	3,627

*Estimates of the total harvest of these species are based on very small sample sizes in the MRFSS. Also, in the headboat survey harvest of snowy grouper were reported on few trips.

The species addressed by this amendment vary in importance by sector. Total average harvest of red porgy and black sea bass accounted for approximately 12 percent of total headboat harvest (Figure 3-2). For the charterboat sector, black sea bass, red porgy, and snowy grouper comprised 5 percent, 1 percent, and 1 percent harvest, respectively, during the same period (Figure 3-3). For the private sector, black sea bass accounted for the largest share of harvest among the species addressed by this amendment, or 5 percent, and total average harvest (Figure 3-4).

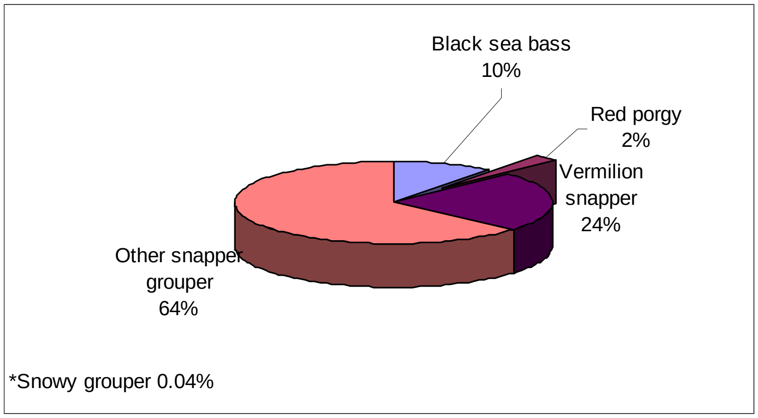


Figure 3-1. Average composition of headboat harvest, 1999-2003. Source: Headboat Survey, NOAA Fisheries, SEFSC, Beaufort Lab.

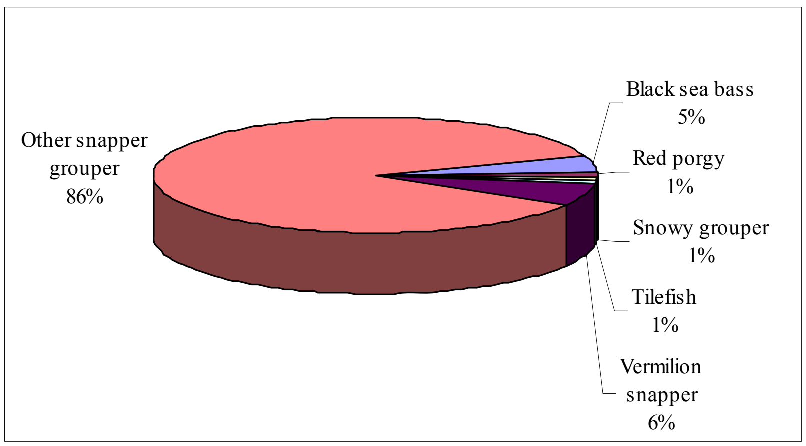


Figure 3-2. Average charterboat harvest, 1999-2003.
Source: MRFSS database, NOAA Fisheries, NMFS, SERO.

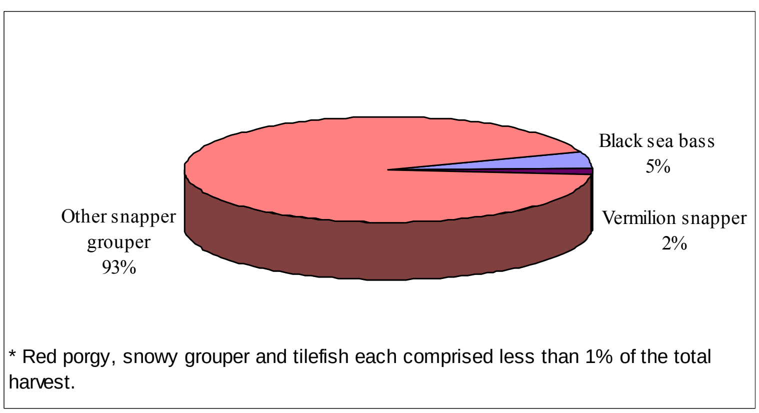


Figure 3-3. Average private recreational sector harvest by species, 1999-2003.
Source: MRFSS database, NOAA Fisheries, NMFS, SERO.

Additional management measures were implemented during 2006 for the recreational sector of the species addressed by this amendment. Details of the management measures and expected impacts are provided in Amendment 13C (SAFMC 2006) and are incorporated herein by reference. These measures established a new baseline condition for the respective fisheries that differs from the description thus far presented. In summary, reduced bag limits were imposed for snowy grouper, the bag limit for red porgy was increased, and a recreational allocation, decreasing over a three-year period, was established for black sea bass, with accompanying minimum size limit and bag limit specifications to restrain harvest to the allocation. Snowy grouper does not experience large recreational harvest (less than 5,000 fish per species per year) so, although some harvest reduction is expected due to the reduced bag limits, the expected reduction is minor relative to total snapper grouper harvest. The new black sea bass action is expected to reduce harvests by 55 percent by the second year (32 percent the first year), or a 306,000-fish reduction from the status quo harvest of approximately 554,000 fish per year. Finally, the new red porgy increased bag limit is expected to increase average annual red porgy harvests by 36 percent, or approximately 8,400 fish, compared to historic average harvests of 23,000 fish.

3.4.1.2.2 Effort

Recreational effort derived from the MRFSS can be characterized as follows:

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

Estimates of average private and charterboat effort for the entire snapper grouper fishery are provided in Table 3-14, and for the species addressed by this amendment in Table 3-16 and Table 3-17. Snapper grouper species were caught on 15.3 percent of all saltwater fishing trips during the period 1999-2003, while less than half these trips actually harvested any of these species (Table 3-14). Although catch and harvest trips involve the same anglers (an angler has to catch the fish in order to keep it), there is no similar complete linkage between target and catch trips (an angler may target a species without success, or catch a species without targeting). Nevertheless, although they do not necessarily encompass the same trips, the target effort for snapper grouper has only been about one fourth that of catch effort.

Similar analysis is not possible for the headboat sector since data are not collected at the angler level. Estimates of effort in the headboat sector are provided in terms of angler days, or the number of standardized 12-hour fishing days that account for the different half-, three-quarter-, and full-day fishing trips by headboats. From 1999-2003, an average of 235,000 angler days were recorded, though the number of days has steadily declined each year during this period, amounting to less than 205,000 days in 2003 (Table 3-15). Despite the inability to associate headboat effort with specific species, the stationary bottom nature of headboat fishing, as opposed to trolling, suggests that all headboat trips and, hence, angler days, are snapper grouper trips by intent, though not necessarily success.

Table 3-14. South Atlantic recreational effort for species in the snapper grouper fishery management unit. Note: This includes all species in the Snapper Grouper Fishery Management Unit. Source: MRFSS, Fisheries Economics Office, SERO, NMFS.

	Target Effort		Catch Effort		Harvest Effort	
Year	Trips	% Total	Trips	% Total	Trips	% Total
Average 1986-2003	761,592	4.29%	2,456,758	13.85%	1,240,388	6.99%
Average 1999-2003	680,552	3.55%	2,883,874	15.29%	1,305,882	6.93%

Table 3-15. Estimated headboat angler days for the U.S. South Atlantic. Source: The Headboat Survey, NOAA Fisheries, SEFSC, Beaufort Lab.

YEAR	FLORIDA/ GEORGIA	NORTH CAROLINA	SOUTH CAROLINA	TOTAL
1986	317,058	31,187	67,227	415,472
1987	329,799	34,843	78,806	443,448
1988	301,775	42,421	76,468	420,664
1989	316,864	32,933	62,708	412,505
1990	322,895	43,240	57,151	423,286
1991	280,022	40,936	67,982	388,940
1992	264,523	41,176	61,790	367,489
1993	236,973	42,786	64,457	344,216
1994	242,781	36,691	63,231	342,703
1995	210,066	40,295	61,739	312,100
1996	199,857	35,142	54,929	289,928
1997	173,273	37,189	60,150	270,612
1998	155,341	37,399	61,342	254,082
1999	164,052	31,596	55,499	251,147
2000	182,249	31,351	40,291	253,891
2001	163,389	31,779	49,265	244,433
2002	151,546	27,601	42,467	221,614
2003	145,011	22,998	36,556	204,565

Tables 3-16 and 3-17 reproduce information on recreational effort provided in Amendment 13C (SAFMC 2006) for red porgy and black sea bass. Although not reflected in the tables, the 1999-2003 estimates were updated to include 2004 data.

The results of the update show that a 10-year historical high in target effort for black sea bass in 2004, approximately 57,000 trips, increased the 1999-2004 average from approximately 30,000 trips (Table 3-16) to 34,000 trips. Similar increases in 2004 were seen in catch and harvest effort, resulting in new averages of approximately 456,000 and 147,000 trips, respectively. Snowy grouper experiences minimal target effort, averaging approximately 500 trips per year, with most years recording zero intercepts, while the 1999-2004 average annual catch and harvest effort estimates are approximately 3,500 and 3,000 trips, respectively. Finally, 2004 showed approximately 1,000 trips targeting red porgy, compared to no trips intercepted in 1999-2003 (Table 3-17). Ten-year historical highs in catch and harvest effort resulted in increases of the average values for these two measures to approximately 25,000 and 19,000 trips, respectively.

Among the species addressed by this amendment, only the black sea bass fishery recorded more than one percent to total recreational effort for any of the effort measures, with black sea bass catch trips accounting for over 2 percent of annual average recreational trips. Average black sea bass harvest effort, however, remained at less than one percent.

Table 3-16. South Atlantic recreational effort for the sea bass unit. Note: The sea bass unit includes black sea bass, rock sea bass, and bank sea bass. Source: MRFSS database, NOAA Fisheries, SERO.

	Target Effort				Catch Effort			
	Sea Bass Unit		Black Sea Bass		Sea Bass Unit		Black Sea Bass	
Year	Trips	% Total	Trips	% Unit	Trips	% Total	Trips	% Unit
Avg 1986-2003	36,306	0.20%	35,379	97.45%	416,247	2.35%	379,417	91.15%
Avg 1999-03	30,618	0.16%	29,831	96.65%	455,186	2.41%	436,915	96.04%
	Catch Effort				Harvest Effort			
	Sea Bass Unit		Black Sea Bass		Sea Bass Unit		Black Sea Bass	
Year	Trips	% Total	Trips	% Unit	Trips	% Total	Trips	% Unit
Avg 1986-2003	416,247	2.35%	379,417	91.15%	170,975	0.96%	162,106	94.81%
Avg 1999-03	455,186	2.41%	436,915	96.04%	136,611	0.72%	132,510	96.93%

Table 3-17. South Atlantic recreational red porgy effort.
Source: MRFSS database, NOAA Fisheries, SERO.

	Red Porgy					
	Target Effort		Catch Effort		Harvest Effort	
Year	Trips	% Total	Trips	% Total	Trips	% Total
Avg 1986-2003	145	0.00%	20,245	0.11%	17,911	0.10%
Avg 2001-03	0	0.00%	20,490	0.10%	15,143	0.07%

3.4.1.2.3 Permits

For-hire vessels in the South Atlantic are required to have a snapper grouper for-hire permit to fish for or possess snapper grouper species in the EEZ. The number of permitted vessels since 1999 is provided in Table 3-18. This sector operates as an open access fishery and not all permitted vessels are necessarily active in the fishery. Some vessel owners have been known to purchase open access permits as insurance for uncertainties in the fisheries in which they currently operate. There has been an increasing trend in the number of permits issued in this fishery, with 1,594 permitted vessels in 2004 compared to 611 in 1999. Some for-hire vessels also hold commercial snapper grouper permits. The majority of snapper grouper for-hire permitted vessels are home-ported in Florida.

Table 3-18. Snapper grouper for-hire permit holders by home port state. Source: Southeast Permits Database, NOAA Fisheries, SERO.

	Number of vessels issued for-hire vessel permits						**Number of vessels with both a for-hire permit and a commercial snapper grouper permit**					
Home Port State	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Florida	361	419	675	776	957	1,084	133	133	144	145	148	151
North Carolina	134	130	180	195	206	232	37	41	39	35	45	42
South Carolina	73	76	137	129	122	108	29	32	39	34	34	33
Georgia	8	9	25	27	36	27	3	3	4	5	4	2
Virginia	3	7	10	11	5	13	2	5	6	6		4
Other States	13	23	33	38	69	48	2	5	3	2	8	3
Gulf States	19	21	35	44	82	82						
Total	**611**	**685**	**1,095**	**1,220**	**1,477**	**1,594**	**206**	**219**	**235**	**227**	**239**	**235**

The for-hire permit does not distinguish between whether the vessel operates as a charterboat or headboat. Based on a 1997 survey, Holland *et al.* (1999) estimated that a total of 1,080 charter vessels and 96 headboats supplied for-hire services in all South Atlantic fisheries during 1997.

3.4.1.2.4 Economic Value and Expenditures

Participation, effort, and harvest are indicators of the value of saltwater recreational fishing. However, a more specific indicator of value is the satisfaction that anglers experience over and above their costs of fishing. The monetary value of this satisfaction is referred to as consumer surplus. The value or benefit derived from the recreational experience is dependent on several quality determinants, which include fish size, catch success rate, and the number of fish kept. These variables help determine the value of a fishing trip and influence total demand for recreational fishing trips.

Estimates of the economic value of a day of saltwater recreational fishing in the South Atlantic indicate that the mean value of access per marine recreational fishing trip is $109.31 for the South Atlantic (Haab *et al.* 2001). While this estimate is not specific to snapper grouper fishing trips, it may shed light on the magnitude of an angler's willingness to pay for this type of recreational experience.

Willingness to pay for an incremental increase in catch and keep rates per trip was also estimated to be $3.01 for bottom fish species by Haab *et al.* (2001). Whitehead *et al.* (2001) estimated the marginal willingness to pay to avoid a one fish red snapper bag limit decrease to be $1.06 to $2.20. Finally, Haab *et al.* (2001) provided a compensating variation (the amount of money a person would have to receive to be no worse off after a reduction of the bag limit) estimate of $2.49 per fish when calculated across all private boat anglers that targeted snapper grouper species in the South Atlantic.

These valuation estimates should not be confused with angler expenditures or economic activity. While expenditures for a specific good or service may represent a proxy or lower bound of value (a person would not logically pay more for something than it was worth to them), they do not represent the net value (benefits minus cost), nor the change in value associated with a change in the fishing experience. However, angler expenditures benefit a number of sectors that provide goods and services for salt-water sport fishing. Gentner *et al.* (2001) provides estimates of saltwater recreational fishing trip expenditures (Table 3-19). These estimates do not include expenditures in Monroe County, Florida, or expenditures in the headboat sector.

Table 3-19. Summary of expenditures on saltwater trips. Source: 1999 MRFSS add-on survey (Gentner *et al.* 2001).

	North Carolina		**South Carolina**		**Georgia**		**Florida**	
Item	**Resident**	**Non Resident**	**Resident**	**Non Resident**	**Resident**	**Non Resident**	**Resident**	**Non Resident**
Shore mode trip expenses	$63.61	$75.53	$54.12	$104.27	$31.78	$115.13	$36.90	$141.30
Private/rental boat trip expenses	$71.28	$92.15	$35.91	$67.07	$161.34	$77.51	$66.59	$94.15
Charter mode trip expenses	$201.66	$110.71	$139.72	$220.97	$152.45	$155.90	$96.11	$196.16
Charter fee-average-per day	$133.76	$70.59	$114.26	$109.97	$73.68	$80.99	$71.37	$100.79

3.4.1.2.5 Financial Operations of the Charter and Headboat Sectors

Holland *et al.* (1999) estimated that the charterboat fee in the South Atlantic ranged from $292 to $2,000. The actual cost depended on state, trip length, and the variety of services offered by the charter operation. Depending on the state, the average fee for a half-day trip ranged from $296 to $360, for a full day trip the range was $575 to $710, and for an overnight trip the range was $1,000 to $2,000. Most (>90 percent) Florida charter operators offered half-day and full-day trips and about 15 percent of the fleet offered overnight trips. In comparison, only about 3 percent of operations in the other South Atlantic states offered overnight trips.

For headboats, the average fee in Florida was $29 for a half-day trip and $45 for a full day trip. For North and South Carolina, the average base fee was $34 per person for a half-day trip and $61 per person for a full day trip. Most of these headboat trips operated in Federal waters in the South Atlantic (Holland *et al.* 1999).

Capital investment in charter vessels averaged $109,301 in Florida, $79,868 for North Carolina, $38,150 for South Carolina and $51,554 for Georgia (Holland *et al.* 1999). Charterboat owners incur expenses for inputs such as fuel, ice, and tackle in order to offer the services required by their passengers. Most expenses incurred in 1997 by charter vessel owners were on crew wages and salaries and fuel. The average annual charterboat business expenditures incurred was $68,816 for Florida vessels, $46,888 for North Carolina vessels, $23,235 for South Carolina vessels, and $41,688 for vessels in Georgia in 1997. The average capital investment for headboats in the South Atlantic was approximately $220,000 in 1997. Total annual business expenditures averaged $135,737 for headboats in Florida and $105,045 for headboats in other states in the South Atlantic.

The 1999 study on the for-hire sector in the Southeastern U.S. presented two sets of average gross revenue estimates for the charter and headboat sectors in the South Atlantic (Holland *et al*. 1999). The first set of estimates were those reported by survey respondents and were as follows: $51,000 for charterboats on the Atlantic coast of Florida; $60,135 for charterboats in North Carolina; $26,304 for charterboats in South Carolina; $56,551 for charterboats in Georgia; $140,714 for headboats in Florida; and $123,000 for headboats in the other South Atlantic states (Holland *et al*. 1999). The authors generated a second set of estimates using the reported average trip fee, average number of trips per year, and average number of passengers per trip (for the headboat sector) for each vessel category for Florida vessels. Using this method, the resultant average gross revenue figures were $69,268 for charterboats and $299,551 for headboats. Since the calculated estimates were considerably higher than the reported estimates (22 percent higher for charterboats and 113 percent higher for headboats), the authors surmised that this was due to sensitivity associated with reporting gross receipts, and subsequent under reporting. Alternatively, the respondents could have overestimated individual components of the calculated estimates. Although the authors only applied this methodology to Florida vessels, assuming the same degree of under reporting in the other states results in the following estimates in average gross revenues: $73,365 for charterboats in North Carolina, $32,091 for charterboats in South Carolina; $68,992 for charterboats in Georgia; and $261,990 for headboats in the other South Atlantic states.

It should be noted that the study's authors were concerned that while the reported gross revenue figures may be underestimates of true vessel income, the calculated values could overestimate gross income per vessel from for-hire activity (Holland *et al.* 1999). Some of these vessels are also used in commercial fishing activities and that income is not reflected in these estimates.

3.4.2 Social and Cultural Environment

A more detailed description of the social and cultural environment of the snapper grouper fishery is contained in Amendment 13C (SAFMC 2006) and is incorporated herein by reference. The following sections summarize key information relevant to this action. Key communities were identified primarily based on permit and employment activity. These data were obtained from the U.S. Bureau of the Census and from state and federal permitting agencies.

Permit trends are hard to determine, since several factors may affect how many vessels are homeported in certain communities, including vessel mobility, shifting stock locations, and resettlement of fishermen due to coastal development. Nevertheless, although vessel location shifts occur, static geographical representations help determine where impacts may be felt.

Data from the US Census Bureau must be used with some caution. Census data may not reflect shifting community demographics. Businesses routinely start up and fail or move and the census data collection cycle may fail to capture key changes. Further, census estimates do not include seasonal visitors and tourists, or those that live less than half the year in a surveyed area. Many of the latter group may work as seasonal employees and not be counted. Census data also misses some types of labor, such as day laborers, undocumented crew members, or family members that help with bookkeeping responsibilities.

Permit requirements for the commercial snapper grouper fishery were established in 1998 by Amendment 8 (SAFMC 1997). This amendment created a limited entry system for the fishery and established two types of permits based on the historic landings associated with a particular permit. Those who could demonstrate a certain amount of landings over a certain time period received permits that did not limit the number of pounds of snapper grouper that could be landed from federal waters (hereafter referred to as "unlimited commercial permits"). These permits were transferable. Vessels with verified landings, but did not meet the threshold were issued permits that allowed them to land 225 pounds of snapper grouper species from federal waters each trip (hereafter referred to as "limited commercial permits"). These permits were not transferable. New entry into the fishery required the purchase of two unlimited permits from existing permit holders for exchange for a new permit. This "two for one" system was intended to gradually decrease the number of permits in the fishery. These restrictions only applied to the commercial snapper grouper permit.

Impacts on fishing communities from coastal development, rising property taxes, decreasing access to waterfront due to increasing privatization of public resources, rising cost of dockage and fuel, lack of maintenance of waterways and ocean passages, competition with imported fish, and other less tangible (often political) factors have combined to put all these communities and their associated fishing sectors under great stress.

While studies on the general identification of fishing communities have been undertaken in the past few years, little social or cultural investigation into the nature of the snapper grouper fishery itself has occurred. A socioeconomic study by Waters *et al.* (1997) covered the general characteristics of the fishery in the South Atlantic, but those data are now almost 10 years old and do not capture important changes in the fishery. Cheuvront and Neal (2004) conducted survey work of the North Carolina commercial snapper grouper fishery south of Cape Hatteras, but did not include ethnographic examination of communities dependent upon fishing.

To help fill information gaps, members of the South Atlantic Council's Snapper Grouper Advisory Panel, Council members, Advisory Panel members, and representatives from the angling public identified communities they believed would be most impacted by the management measures proposed in Amendment 13C on the species addressed by this amendment. Details of their designation of particular communities, and the factors considered in this designation, can be found in Amendment 13C (SAFMC 2006).

Because so many communities in the South Atlantic benefit from snapper grouper fishing, the following discussion focuses on "indicator communities," defined as communities thought to be most heavily impacted by snapper grouper regulations.

3.4.2.1 North Carolina

Figure 3-4. North Carolina communities with substantial fishing activity, as identified by South Atlantic Advisory Panels.

3.4.2.1.1 Statewide

Overview

Of the four states in the South Atlantic region, North Carolina (Figure 3-4) is often recognized as possessing the most "intact" commercial fishing industry; that is, it is more robust in terms of viable fishing communities and fishing industry activity than the other three states. The state offers a wide variety of fishing opportunities, including sound fishing, trolling for tuna, bottom fishing, and shrimping. Perhaps because of the wide variety of fishing opportunities, fishermen have been better able to weather regulations and coastal development pressures, adjusting their annual fishing patterns as times have changed.

Commercial Fishing

There has been a steady decline in the number of federal commercial snapper grouper permits North Carolina since 1999, with 194 unlimited commercial permits in 1999, but only 139 in 2004. Limited permits similarly declined from 36 to16.

State license sale and use statistics for all types of licenses also indicate an overall decrease since 1994. While the overall number of state licenses to sell any species of fish or shellfish increased from 6,781 in 1994 to 9,712 in 2001/2002, the number of license holders actually reporting sales decreased from 6,710 in 1994/1995 to 5,509 in 2001/2002 (SAFMC 2006).

North Carolina fishermen demographics are detailed in Cheuvront and Neal (2004). Ninety eight percent of surveyed fishermen were white and 58 percent had completed some college or have graduated from college. Of those who chose to answer the question, 27 percent of respondents reported a household income of less than $30,000 per year, and 21 percent made at least $75,000 per year. On average, respondents had been fishing for 18 years, and had lived in their communities for 27 years.

Cheuvront and Neal (2004) also provided an overview of how North Carolina commercial snapper grouper fishermen carry out their fishery. Approximately 65 percent of surveyed fishermen indicated year-round fishing. Gag is the fish most frequently targeted by these fishermen, with 61 percent of fishermen targeting gag at some point in the year, despite the prohibition of commercial sales and limit to the recreational bag limit in March and April. Vermilion snapper (36.3 percent) and black sea bass (46 percent) are the next most frequently targeted species. A significant number of fishermen land king mackerel during each month, with over 20 percent of fishermen targeting king mackerel between October and May. During the gag closed season, king mackerel are targeted by about 35 percent of the fishermen. Other snapper/grouper complex species landed by at least 5 percent of the fishermen in any given month were red grouper (39.5 percent), scamp (27.4 percent), snowy grouper (9.7 percent), grunts (14.5 percent), triggerfish (13.7 percent), and golden tilefish (5.6 percent). Non-snapper/grouper complex species landed by at least 5 percent of the fishermen in any given month included Atlantic croaker, yellowfin tuna, bluefin tuna, dolphin, and shrimp.

Recreational Fishing

Recreational fishing is well developed in North Carolina and, due to natural geography, is not limited to areas along the coast. Data show that North Carolina is almost on par with east Florida for total recreational fishing participation effort (data not shown; see SAFMC (2006)). A brief discussion of public boat ramps and local recreational fishing clubs, as well as sources of information used by these anglers, can be found in SAFMC (2006).

The North Carolina state legislature approved the creation of a state recreational saltwater fishing license in 2004. The license created controversy for both the recreational and commercial sectors, each believing that it will hurt or help their access to marine resources. Possession of the license, subject to exemptions, will be required beginning on January 1, 2007 (http://www.ncdmf.net/recreational/NCCRFLfaq.htm).

3.4.2.1.2 Hatteras Village

A detailed history of this community, from its discovery by Italian explorers in the 16th century to establishment of a National Seashore in 1953, can be found in SAFMC (2006).

Overview

Census data indicate there was not a significant increase in population size in Hatteras Village from 1990 to 2000 (SAFMC 2006). The demographics of the island have shifted, as is evidenced in the decreasing percentage of the population that is actively in the workforce, perhaps reflecting a larger number of retirees in the community, and the increasing proportion of residents with higher education, also reflecting a retired, professional segment of the population. Hatteras Village has also experienced a significant increase in the percent of the population in the farming, fishing, and forestry occupations, from 5.6 percent to 10.8 percent. This may be reflective of the increasing number of persons employed in businesses related to recreational fishing, such as charter boat captains and crew, boat repair and sales, marinas, etc. See SAFMC (2006) for the raw data describing community demographics. Figure 3-5 includes two maps detailing the area.

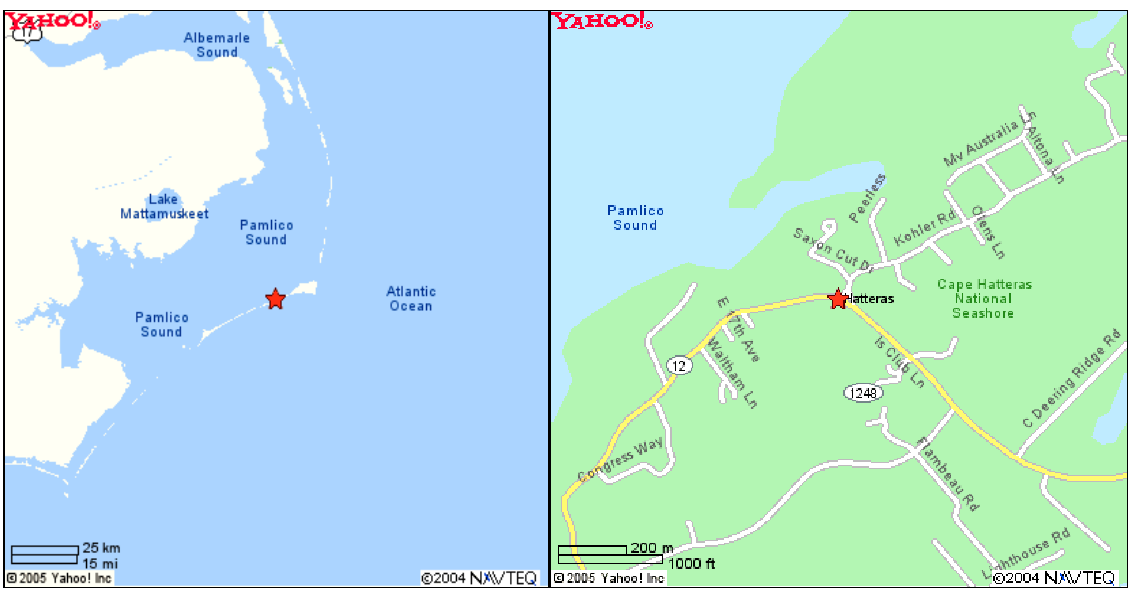


Figure 3-5. Hatteras Island and Village, Outer Banks, North Carolina. Source: Yahoo Maps, http://www.yahoo.com.

Commercial Fishing

Anecdotal information from Hatteras residents indicates the number of fish houses has decreased as tourism has increased (SAFMC 2006). Residents, however, still promote the fisherman's way of life through festivals and special community designations (SAFMC 2006).

Mirroring the statewide trend, the number of unlimited commercial permits held by residents of Hatteras decreased from 1999 (9 permits) to 2004 (5 permits). The number of limited commercial permits has remained at 3 (SAFMC 2006). Twenty people stated they were employed in fishing related industry in the 1998 census, with 18 of these employed by marinas. A listing of the six marinas and eight bait and tackle stores in Hatteras Village can be found in SAFMC (2006).

Recreational Fishing

Hatteras is host to several prestigious fishing tournaments and is homeport for the island's famous charter fishing fleet. The number of charter/headboat permits held by Hatteras residents has dramatically increased, from one permit in 1999 to 28 in 2004.

3.4.2.1.3 Wanchese

A history of this community, and neighboring Manteo, describing its persistence as a small, close-knit community focused on making its living from the sea, can be found in SAFMC (2006).

Figure 3-6. Map of Roanoke Island, North Carolina, showing Wanchese and Manteo. Source: Kitner 2005.

Overview

Figure 3-6 provides a map of Roanoke Island, including Wanchese and Manteo. While Wanchese has maintained its identity as a commercial fishing community, it faces continuing pressure from developers in nearby Manteo and other Outer Banks communities. However, the town has recently approved a zoning document that would prevent unplanned growth and would help preserve working waterfronts and residential areas (Kozak 2005). A partial community profile detailing local traffic patterns, businesses, and prominent families can be found in SAFMC (2006).

The largest industrial area in Wanchese is centered on the Wanchese Seafood Industrial Park, built to enhance business opportunities in the seafood and marine trades. Tenants of the park are able to ship products overnight to major domestic and international markets through the airport in Norfolk, Virginia. The park is utilized by fishermen and seafood dealers, as well as boatbuilding and boat maintenance businesses. The park is full of activity and it is common to find large numbers of people, especially Hispanics, working in the marine trade industries.

Census statistics from 2000 show the population of Wanchese is aging and very homogenous, with little ethnic diversity. There has been a slight increase in the Hispanic population since 1990, mirroring most other communities in North Carolina. Education levels have also increased, and the poverty rate has decreased. A higher percentage of people are employed in fishing-related professions in Wanchese than in almost any other community – 10 percent – although even that number has decreased nearly 50 percent since 1990.

Commercial Fishing

Commercial landings and value for Wanchese/Stumpy Point declined from 31.9 million pounds valued at $26.1 million in 2001 to 28.7 million pounds valued at $23.2 million in 2002. In 2001, Wanchese/Stumpy Point was listed as the 28th most prominent United States port based on the value of the product landed, declining to 30th in 2002. While landings increased in 2003, to 33 million pounds, value further declined to $21 million (31st place), with further declines in both poundage (31 million pounds) and value ($20.5 million) in 2004.

Amendment 8, which limited entry into the commercial snapper grouper fishery, does not appear to have caused a decrease in the number of commercial permits held by residents of Wanchese (SAFMC 2006). In 1999, seven unlimited commercial permits were held, with eight in 2004. Three limited commercial licenses were held in both 1999 and in 2004.

One hundred twenty residents of Wanchese stated they were employed in fishing related industries in the 1998 census (SAFMC 2006). Sixteen of these were listed as employed in fishing, 56 in fish and seafood, and 40 in boatbuilding.

There were 228 commercial vessels registered and 201 state standard commercial fishing licenses issued in the community in 2002 (SAFMC 2006). Wanchese residents also held 12 dealer licenses. The town is an important unloading port for many vessels transiting to and from the Mid-Atlantic and South Atlantic.

Recreational Fishing

As of 2005, nine boatbuilding businesses were located in Wanchese, building either pleasure yachts, recreational fishing vessels or, less often, commercial fishing vessels. There were two bait and tackle businesses and two marinas in town. All these businesses rely on the fishing industry. Manteo also maintains an active private and for-hire recreational fishing community. From 1999 to 2004, there was an increase in the number of charter/headboat licenses held, from two permits to nine permits. As most of the recreational sector for the region operates out of Manteo and Nags Head, these communities would be more affected by recreational fishing restrictions than would Wanchese.

Figure 3-7. Area of Carteret County, North Carolina, showing Morehead City, Atlantic Beach (at the red star), and Beaufort. Source: Yahoo Maps, http://www.yahoo.com.

3.4.2.1.4 Morehead City

In Carteret County, Morehead City, Beaufort, and Atlantic Beach form a triad of different but complementary communities in close geographic proximity (Figure 3-7). A detailed history of Morehead City, from its founding in the 1840s-1850s to its development as a center for sport and tournament fishing in recent years, can be found in SAFMC (2006).

Overview

Morehead City's economy is currently based on tourism, fishing (commercial and recreational), light industry, government, and other service and professional industries. The town has regained its commercial viability as a modern port terminal, and benefits from its location on the "sound-side" of the Atlantic Beach resort trade. Diving has become an important tourist activity; Rodale's Scuba Diving magazine recently named North Carolina as the best wreck diving destination in North America, and Morehead City as the best overall dive destination. Recreational fishing effort is growing quickly, as new marinas, boat storage areas, boat builders, and marine supply stores open in the city.

Detailed statistics detailing community demographics of Morehead City in 1990 and 2000 can be found in SAFMC (2006). The population of Morehead City increased from 1990 to 2000, with sizable increases in the number of people declaring non-white ethnicities. Median income increased from approximately $20,000 to nearly $29,000 from 1990 to 2000. Median home value nearly doubled, and median rent increased 35 percent. The percentage of those completing high school increased by 10 percent, and there was a seven percent increase in those receiving a bachelor's degree or higher. The poverty level decreased. However, the unemployment rate increased. The occupations of farming, fishing, and forestry employ more than one percent of the population of Morehead City.

Commercial Fishing

In 1998, 100 people were employed in fishing related businesses according to census figures, with 40 employed in marinas and 36 employed in fish and seafood businesses (SAFMC 2006). Over 200 state commercial vessel licenses, 150 state standard commercial fishing licenses, and 14 dealer licenses were issued by the state to residents of Morehead City in 2002. The number of unlimited commercial permits held by Morehead City residents was 15 in 1999 and 14 in 2004, while the three limited commercial permits held in 1999 were no longer held by 2004 (SAFMC 2006). As of 2002, the state had issued 211 commercial vessel registrations, 150 standard commercial licenses, and 14 dealer licenses to Morehead City residents. Residents of Morehead City were primarily employed by marinas (40 percent) and fish and seafood (36 percent), with 16 percent employed in boatbuilding businesses.

A narrative detailing the fishing methods, habits, and observations of a bandit-rig fisherman in Morehead City can be found in SAFMC (2006).

Recreational Fishing

The number of charter/headboat permits held by Morehead City residents nearly doubled, from seven in 1999 to 13 in 2004.

3.4.2.1.5 Beaufort

Beaufort is located on the coast near Cape Lookout, and borders the southern portion of the Outer Banks. Its deep harbor is home to vessels of all sizes, and its marinas are a favorite stop-over for transient boaters. A detailed history of Beaufort, from its establishment to its importance as a trade center during the 18th and 19th centuries, to its later involvement in the menhaden fishing industry, can be found in SAFMC (2006).

Overview

Tourism, service industries, retail businesses, and construction are important mainstays of the Beaufort area, with many shops and restaurants catering to people from outside the area. Census data show a slight decrease in population size from 1990 to 2000, from 3,808 inhabitants to 3,771, perhaps due to the aging population. Educational attainment rose over the last decade, and the percentage of individuals below the poverty line fell slightly. The percentage of those in the labor force decreased, another possible indication of an aging population. However, the percentage unemployed also decreased. The number of people working in farming, fishing, and forestry remained about the same from 1990 to 2000. According to census business pattern data from 1998, most of the fishing-related employment in Beaufort (total 300 persons) occurs in the boat building industry, which employs 184 residents (SAFMC 2006). Forty-eight people reported working in marinas, while others are employed in fish processing, fish harvesting, and seafood marketing.

Commercial Fishing

There has been a slight decrease in the number of unlimited commercial permits held by residents of Beaufort, from 5 permits in1999 to 4 permits in 2004. In the last two years, the one limited commercial permit held by a Beaufort resident was no longer reported. As of 2002, the state had issued 430 commercial vessel registrations, 294 standard commercial licenses, and 32 dealer licenses to Beaufort residents.

Recreational Fishing

There has been virtually no change in the number of charter/headboat permits, 1 permit in 2003 and 2004, held by residents.

3.4.2.1.6 Atlantic Beach

Atlantic Beach has been a popular resort town since the 1870s. The first bathing pavilion was built on Bogue Banks in 1887. Tourists flocked to the resorts, and ferry service to Atlantic Beach increased. Other resorts and tourism related development occurred over the next century, and the area remains a popular vacation destination (www.atlanticbeach-nc.com/history_part-1.html).

Overview

Atlantic Beach demographic data from 1990 and 2000 show a slight population decline since 1990, as well as decreases in the percent of the population involved in farming, fishing, and forestry (SAFMC 2006). The median age of the population has increased, perhaps a reflection of the growing number of retirees moving to this area of the coast.

Commercial Fishing

As observed in other areas of North Carolina, since limited access was put into place, the number of commercial permits has decreased from eight unlimited commercial permits in 1999 to four in 2004, and four limited commercial permits to zero (SAFMC 2006). In 1998, 60 residents of Atlantic Beach were employed in fishing related industry, with 93 percent of those employed by the marine sector. In 2002, 56 vessels were registered with the state as commercial fishing vessels, 42 standard commercial fishing licenses were held by Atlantic Beach residents, and there were ten valid dealer licenses issued to community members (SAFMC 2006).

Recreational Fishery

Since 1999, the number of federal charter/headboat permits held by Atlantic City residents has increased from six to 19, though only one permit was recorded in 2002. Of the 60 individuals reporting working in a fishing related industry in 1998, 46 worked in marinas. Two state permits were issued to recreational fishing tournaments to sell licenses in 2002 (SAFMC 2006).

Figure 3-8. General area of Sneads Ferry, North Carolina. Source: Yahoo Maps, http://www.yahoo.com.

3.4.2.1.7 Sneads Ferry

Sneads Ferry is a historical fishing village located on the New River near the northern tip of Topsail Island (Figure 3-8). The river joins the Intracoastal Waterway at Sneads Ferry, with easy access to the Atlantic Ocean. A very active commercial fishing community, Sneads Ferry takes in more fish than any other Onslow County port (http://www.cbcoastline.com/areainfo.htm). It also includes Camp Lejeune, a U.S. Marine base. The Sneads Ferry Shrimp Festival has been held annually since 1971. Now grown to a two-day event, the annual shrimp festival is the town's major fund-raiser. From its proceeds, the town established a 14-acre community park and built a 7200-sq. ft. Shrimp Festival Community Building (www.sneadsferry.com/areahistory/his_sf.htm).

Overview

Census data indicate the population of Sneads Ferry increased by about 10 percent from 1990 to 2000, from 2,031 inhabitants to 2,248. Most new residents were white, and the number of black or African American residents decreased from 159 to 115. Median income increased from about $20,000 to nearly $35,000. Median home value increased from $65,000 to $110,000, but median rent remained about the same. The percentage of those completing high school increased by 10 percent and the percent of residents with at least a Bachelor's degree doubled, from six percent to 12.8 percent. The poverty level decreased from 20.9 percent to 13.5 percent, and the percentage of the population unemployed decreased from 8.3 percent to 2.2 percent. The percentage of residents employed in farming, fishing, and forestry decreased by half from 18.2 percent to 9 percent, while employment in sales and office occupations increased by over 17 percent. It is unclear who may be buying home sites on newly developed land in the town, but the town's current demographics may point to an increase in retirees in Sneads Ferry, as they are better educated, have higher incomes, and are older. The dramatic decline by approximately 50 percent of persons employed in extractive natural resource occupations may be due to increasing job opportunities outside of the community, the changing impacts of regulations, or status of the resources

Commercial Fishing

Sneads Ferry is a small town with little of the large-scale development seen elsewhere on the North Carolina coast. Many houses in the community have fishing vessels docked in front of the house or on the lawn. The white rubber boots worn by commercial fishermen in this community and many other parts of North Carolina are commonly referred to as "Sneads Ferry Sneakers", suggesting the importance of commercial fishing to the area. Most of the fishermen in town are shrimpers and net fishermen who go out daily. There is also a strong contingent of black sea bass pot fishermen resident in the town. The species with the highest consistent landings in the town are black sea bass, button clams, blue crab, flounders, mullet, shrimp, spot, and whiting.

The number of federal charter/headboat permits held by residents increased from six in 1999 to 13 in 2004, while the number of unlimited commercial permits decreased from 22 to 17, and the number of limited commercial permits remained at one (SAFMC 2006). Over 347 commercial fishing vessels were registered with the state in 2002, and 228 residents held state-issued standard commercial fishing licenses. There were also 18 dealer licenses in the community and 169 shellfish licenses. In 1998, 16 persons were employed in fishing related industry, with 75 percent working in fish and seafood.

Recreational Fishing

Recreational fishing in Sneads Ferry is not as prominent an activity as in Morehead City. However, there are a large number of vessels with charter permits for snapper grouper homeported there. Little is currently known about recreational fishing out of Sneads Ferry, aside for its advertisement as an important tourist attraction in many websites that discuss the community. At least five marinas cater to recreational fishermen. There are two other marinas at Camp LeJeune Marine Base, just across the Neuse River. Some smaller river and sound fishing charters operating out of the area and one headboat runs from Sneads Ferry. Other than black sea bass, it does not appear that many snapper grouper species are frequently caught recreationally from Sneads Ferry.

3.4.2.2 South Carolina

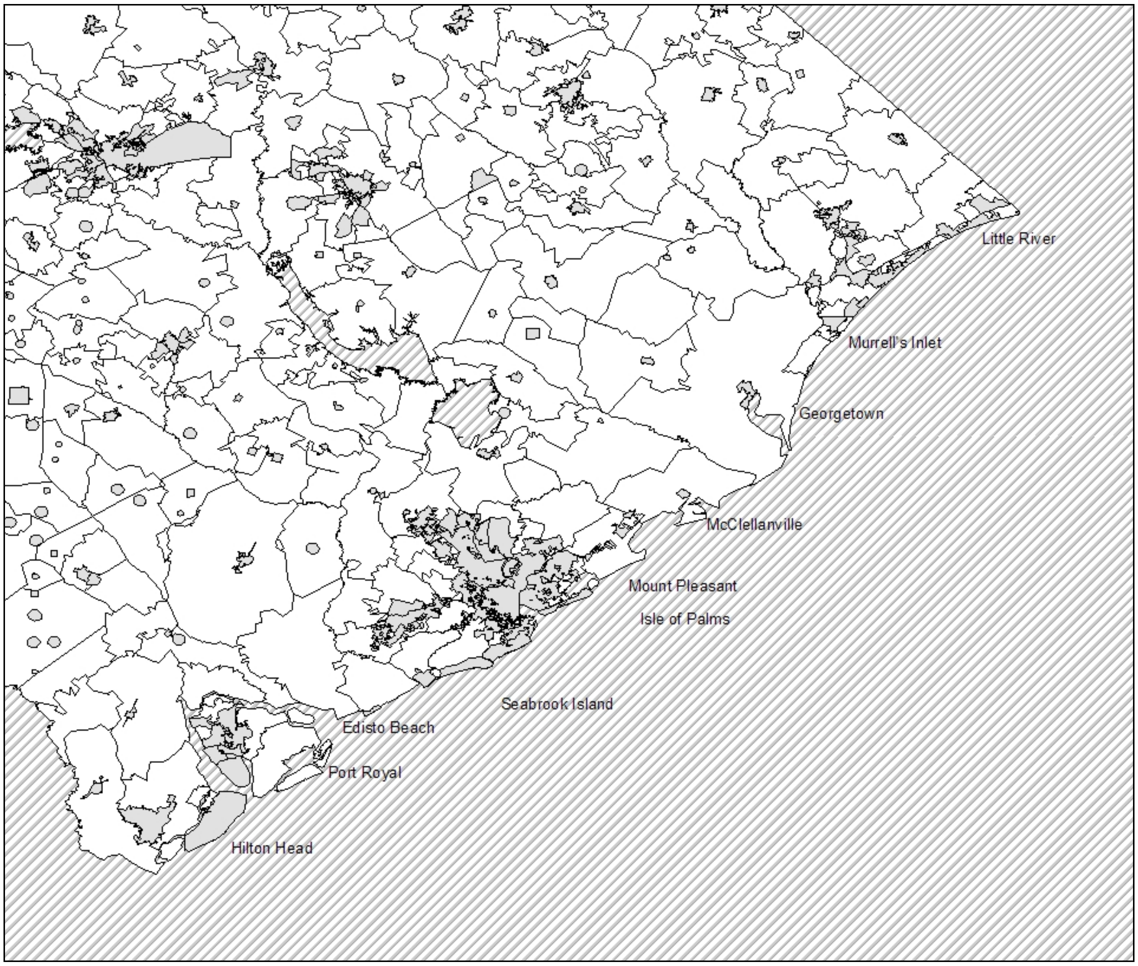


Figure 3-9. South Carolina communities with substantial fishing activity, as identified by South Atlantic Advisory Panels.

3.4.2.2.1 Statewide

Overview

South Carolina communities with substantial fishing activity are less developed than those in North Carolina and, over the past 20 to 30 years, the state has seen much more tourist-oriented development along its coasts than Georgia or North Carolina. In Horry County, the urban area of Myrtle Beach has expanded greatly in the past few decades, and much of the coastal area has been developed as vacation homes, condominiums, and golf courses. The communities most impacted by this development are Little River, Murrells Inlet, Pawleys Island, and Georgetown, although the latter three are located in Georgetown County (Figure 3-9). The same is true of rapid developing Charleston County, and the cities and communities of McClellanville, Mt. Pleasant, Sullivans Island, Wadmalaw and Edisto Islands feel the impact of urban sprawl from the city of

Charleston. Further south along the coast, the Hilton Head Island resort development has been the impetus for changing coastal landscapes in the small towns of Port Royal, Beaufort, St. Helena Island, and Bluffton.

For the purpose of this document, only Little River will be singled out as a community with a high concentration of both commercial and recreational fishing, along with other types of coastal oriented leisure pursuits. Other analyses will consider South Carolina as a whole.

Commercial Fishing

While pockets of commercial fishing activities remain in the state, most are being displaced by the development forces and associated changes in demographics. The number of unlimited commercial permits, however, increased from 74 in 1999 to 87 in 2004, while the number of limited commercial permits decreased by 75 percent from 12 to 4 (SAFMC 2006).

Recreational Fishing

Many areas that used to be dedicated to commercial fishing endeavors are now geared towards the private recreational angler and for hire sector. The number of federal charter/headboat permits held by South Carolina residents increased from 41 in 1999 to 111 in 2004. The majority of saltwater anglers fish for coastal pelagic species such as king mackerel, Spanish mackerel, tunas, dolphins, and billfish. A lesser number focus primarily on bottom fish such as snapper and groupers and often these species are the specialty of the headboats that run out of Little River, Murrells Inlet, and Charleston. There are 35 coastal marinas in the state and 34 sportfishing tournaments (SAFMC 2006).

3.4.2.2.2 Little River

A history of Little River detailing its settlement in the late 1600s, its popularity as a vacation destination in the 1920s, and the concurrent rise in charter fishing, can be found in SAFMC (2006).

Figure 3-10. Little River, South Carolina, and surrounding area.
Source: Yahoo Maps, http://www.yahoo.com.

Overview

Little River and the surrounding area is shown in Figure 3-10. A detailed description of changes in land-use patterns in and near Little River can be found in SAFMC (2006). Nearby Murrells Inlet is gradually transforming into a residential community for Myrtle Beach, and SAFMC (2006) argues this is also true for Little River.

Census data indicate the Little River population more than doubled from 1990 (3,470 persons) to 2000 (7,027 persons) and became more ethnically diverse with more people of American Indian or Alaskan Native, and Hispanic or Latino ethnicities. Median income increased by over 40 percent, from nearly $29,000 to over $40,000. Median home value also increased by over 40 percent, and median rent increased by nearly 35 percent. The percentage of those completing high school and those with a Bachelor's degree remained about the same. The poverty level decreased by nearly two-thirds to 4.7 percent, and the percentage of the population unemployed decreased from 6.6 percent to 3.4 percent. The percentage of residents employed in farming, fishing, and forestry decreased from 3.6 percent to 0.9 percent.

Commercial Fishing

In 1998, 38 residents of Little River were employed in fishing related industry according to the U.S. Census, with 81 percent of those employed by the marina sector. The number of snapper grouper unlimited harvest commercial permits held by community residents remained about the same between 1999 and 2004, from 15 permits to 16 permits, and one resident still held a limited harvest commercial license. Twenty-four Little River residents held state permits, with the most being saltwater licenses (8 permits) or trawler licenses (5 permits) (SAFMC 2006).

Recreational Fishing

As observed in other coastal communities described herein, the number of charter/headboat permits held by community residents increased from nine in 1999 to 16 in 2004. Three headboats operated out of Little River, and this part of the for-hire industry has a long and storied past in the community. Recreational fishing, primarily as headboat effort, came about as a way for commercial fishermen to continue fishing in the summer months. A detailed account of how recreational fishing developed in Little River can be found in Burrell (2000). Most of the private recreational fishing effort in this area occurs out of marinas in North Myrtle Beach, Myrtle Beach, and Murrells Inlet.

3.4.2.3 Georgia

3.4.2.3.1 Statewide

Overview

Only one community in Georgia (Townsend) lands a substantial amount of the snapper grouper species addressed in this amendment. Other parts of the state involved in the commercial harvest of seafood are focused on penaeid shrimp, blue crabs, and other finfish such as flounder, shad, croaker, and mullet.

Brunswick, the other community that has a commercial fishing presence, was once a more thriving commercial fishing community but now tourism and other related activities are competing for waterfront in the town. The most commonly harvested species in Brunswick are blue crab and different species of penaeid shrimp. According to the ACCSP website, there have been no snapper grouper species landed in Brunswick in since 2001. Other parts of the state involved in the commercial harvest of seafood are focused on penaeid shrimp, blue crabs, and other finfish such as flounder, shad, croaker, and some mullet.

Commercial Fishing

Unlike the pattern observed in many other areas, the number of unlimited commercial permits and limited commercial permits held by Georgia residents did not decrease from 1999 to 2004, with eight permits and one permit, respectively. In 2002, 947 vessels were registered with the state as commercial fishing vessels, 612 full-time state commercial fishing licenses were held by Georgia residents, and 147 residents held part-time state commercial fishing licenses. Within the commercial fishing fleet, four hundred and eighty two vessels had shrimp gear on board in that year (SAFMC 2006).

Recreational Fishing

As observed in other areas, the number of charter/headboat permits held by Georgia residents increased markedly from five permits in 1999 to 27 permits in 2004 (SAFMC 2006). Recreational vessels are located at Tybee Island close to Savannah, on the barrier islands off Brunswick, and between Savannah and Brunswick.

3.4.2.3.2 Townsend

A history of the area, describing its economy before the Civil War, the rise and fall of lumbering, and the building of the railroad, can be found in SAFMC (2006). Townsend is a small, rural community. In 2005, the fish house in this community was relocating inland. It is not known if this relocation was successful and whether that fish house will be handling domestically harvested fish in the future.

Overview

The population of Townsend increased by over 1,000 residents from 2,413 in 1990 to 3,538 in 2000. Although there was a large relative increase in the number of Hispanic or Latino residents, from 2 to 27, most of the new inhabitants were white (1,465 in 1990 and 2,437 in 2000). Median income increased from approximately $23,000 to $35,000. Median home value nearly tripled, from $33,000 in 1990 to $98,100 in 2000, and monthly rent nearly doubled, from $213 to $431. In 1990, 26.9 percent of residents had less than a 9th grade education, but by 2000 that number declined to 11.0 percent. The percentage of those completing high school increased by nearly 15 percent, while the percent receiving a bachelor's degree or higher remained about the same, from 8.4 percent to 8.9 percent. The percent of the population with an income below the poverty line deceased by four percent, but remained high at 14.6 percent. The percentage of the population unemployed increased from 3.4 percent to 6.5 percent. There has been a sizeable decline in the percentage of the population employed in manufacturing, from 29.0 percent to 16.2 percent, and the proportion of the population employed in farming, fishing, and industry remained unchanged at approximately three percent.

Commercial Fishing

A comprehensive description of the historic and current fish houses of coastal Georgia and how they operate, focusing on Phillips Seafood of Townsend, can be found in SAFMC (2006). For nearly a decade, only one fish house has consistently handled snapper grouper species. A fish house in Brunswick may have landed these species in the past, but has not reported landings since 2001.

Recreational Fishing

Offshore recreational anglers do not often target or harvest snapper grouper species in Georgia (MRFSS 2003). Of the snapper grouper species harvested, black sea bass, sheepshead, and vermilion snapper are the most commonly harvested fish at five, seven, and two percent, respectively. As of 2004, residents of the Savannah area held 11 charter/headboat permits for snapper grouper, and many of these vessels are docked on Tybee Island. Residents of the area around the city of Brunswick, including Jekyll Island and Sea Island, held four snapper grouper charter/headboat permits. Interestingly, unlike the cities profiled in the Carolinas, the number of federally permitted for-hire vessels has declined dramatically. From 2003 to 2004, the number of snapper grouper permitted for hire vessels declined from 43 to 27 (NMFS 2004). The cause of this decline is unknown.

3.4.2.4 Florida

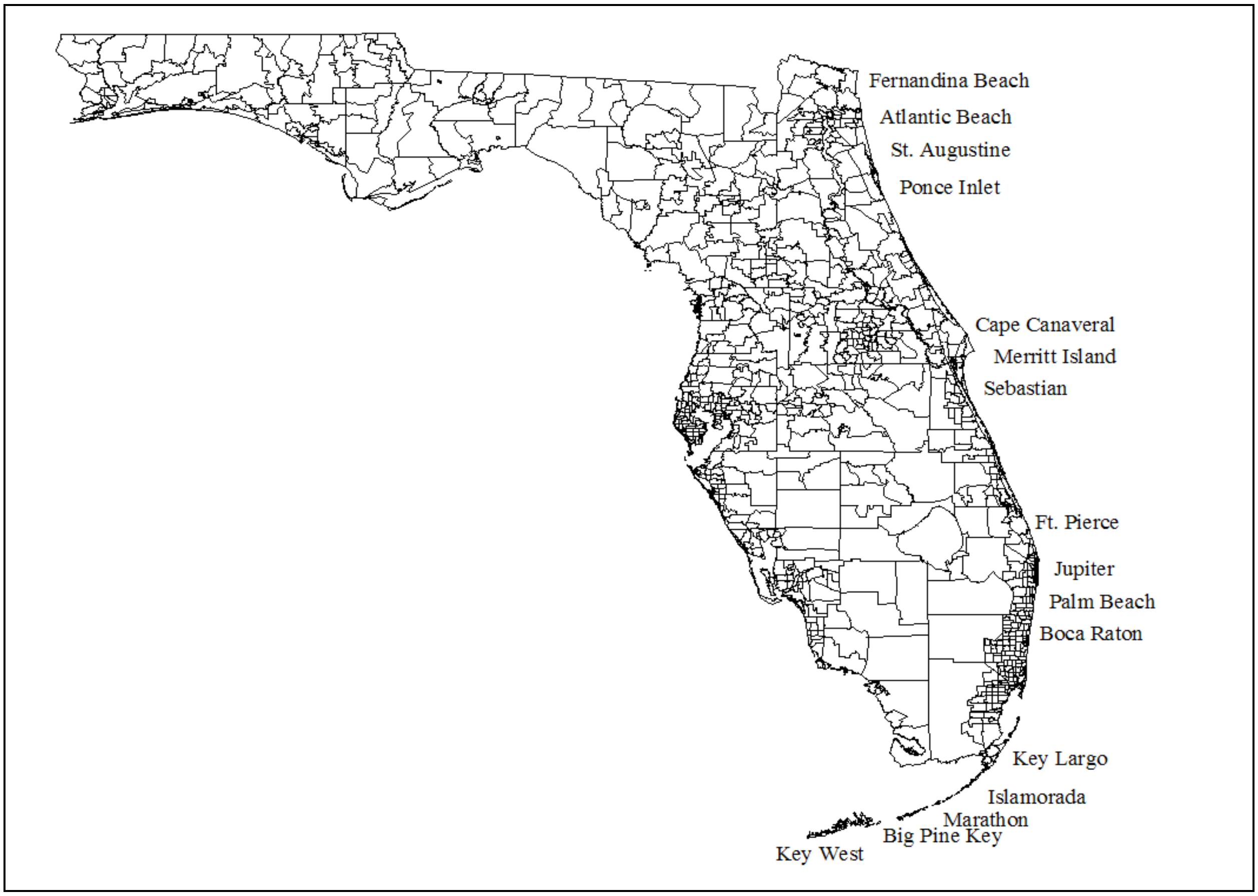


Figure 3-11. Florida communities with substantial fishing activity as identified by South Atlantic Advisory Panels. Source: Jepson and Kitner (In Press).

3.4.2.4.1 Statewide

Overview

Florida stands apart from other states in the South Atlantic region in fishing behaviors, history, and demographics. Florida has one of the fastest growing populations in the United States, estimated to increase each day by 750 to 1,000 new immigrants. Twenty-five percent of all vacation homes in the United States are located in Florida's coastal counties (Coastal Ocean Resource Economics 2005).

Along with being heavily populated on land, coastal waters off Florida are also heavily used by recreational users of all kinds. This growth of a leisured class occupying coastal areas has led, in part, to conflicts over natural resource access and use-rights. One example of this type of struggle was the conflict over the use of gillnets in state waters. The conflict culminated in a state-wide ban on the use of gillnets, which dealt a resounding blow to many Florida fishermen, ending in the loss of many commercial fishing properties and the displacement of many fishermen. There have also been conflicts between the "environmental community" and commercial fishermen over the closing of the *Oculina* Bank off of Florida's central coast, and the creation of both the Florida Keys National Marine Sanctuary and the Tortugas Sanctuary, both in the Keys.

The natural geography of Florida also sets it apart from other South Atlantic states, particularly in the area from central Florida through the Keys. The weather is amenable to fishing almost year round, though hurricanes in 2004 were particularly devastating and took a toll on all fisheries in the state, both east and west coast. There was also a cold water event that started near West Palm Beach in 2003, which moved up the east coast causing a substantial decline in snapper grouper fishing that year. The continental shelf is much narrower in Florida than elsewhere in the region, allowing fishermen to access deep waters quickly and return the same day. Finally, the species of snapper grouper available to fishermen in southern Florida are different than further north, with yellowtail snapper, gag and black grouper, and other alternative species such as stone crab, spiny lobster, dolphin, kingfish, and billfish allow a greater variety of both commercial and recreational fishing opportunities. These fisheries are important to many Florida communities identified by the Snapper Grouper Advisory Panel as shown in Figure 3-11.

Commercial Sector

Considering the high population growth rates and emphasis on a tourism economy in Florida, the commercial fishing sector in Florida is still robust in some areas. Although total landings and dollar values of all species landed on the Florida East coast have decreased from 1998 to 2003 (from nearly 30 million pounds worth approximately $44 million to approximately 23 million pounds worth $33 million dollars; SAFMC 2006), there is still a considerable commercial fishing presence in east Florida.

Recreational Sector

While the commercial fishing industry, though still strong, may be in decline, the recreational sector appears to be stable. Excluding the headboat sector, although the number of participants declined in 2004 to approximately 1.9 million from 2.2 million in 2003 and from a high of 2.6 million in 2001, the number of trips taken in 2003 and 2004 remained at approximately 21 million. As may be recalled from Table 3-17, the headboat sector has exhibited a steady decline. In 2004, many homeports hosted at least one vessel holding both federal charter/headboat permits and federal unlimited commercial permits. Key West and Miami stand out, with 35 and 15 such vessels, respectively.

3.4.2.4.2 Cape Canaveral

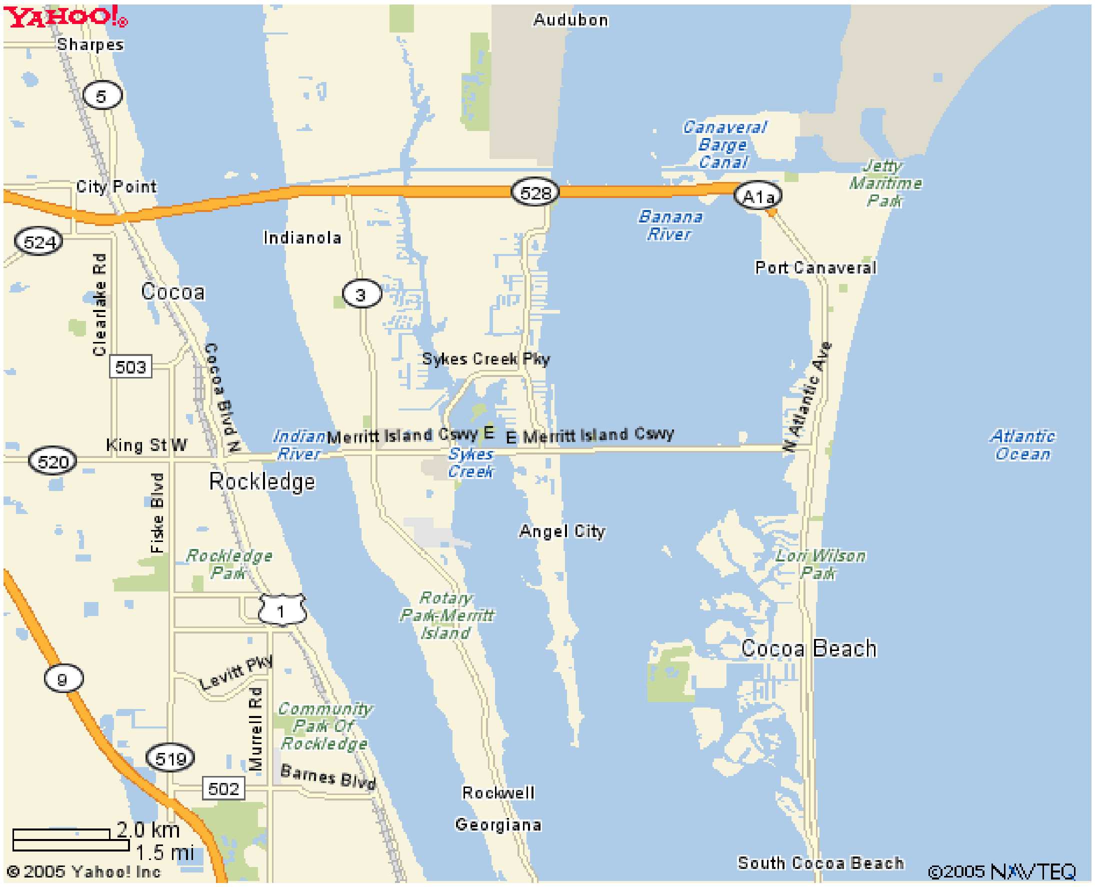


Figure 3-12. Area map of Cape Canaveral, Florida.

A detailed history of Cape Canaveral, Florida, from its first habitation 10,000 years ago, its settlement by the United States in the early 1800s, the establishment of the Banana River Naval Air Station in World War II, to NASA's arrival in 1952, can be found in SAFMC (2006). A map of the area is shown in Figure 3-12.

Overview

Cape Canaveral has a fairly homogenous, aging population, with those 65 years and older growing from 16.1 percent of the population to 23.1 percent since 1990. Overall, educational attainment has increased. The number of persons who speak a language other than English at home has increased 2.5 percent, and fewer people have incomes below the poverty line. Unemployment has decreased, but fewer people are in the labor force today than in 1990, perhaps due to an aging population. The percentage of persons in a service occupation has grown from 14.1 percent to 20.4 percent, while there has been a sizeable decline in the percent of residents employed in forestry, mining, and fishing, from 2.7 percent in 1990 to 0.4 percent in 2000.

Fisheries in central Florida generally operate in two different environments, inshore river or inlet fishing with associated lagoons, which primarily attracts recreational fishing, and offshore areas, where commercial fishing primarily occurs. Popular inshore areas include the Indian, St. Johns, and Banana Rivers and associated lagoons. Commercial exploitation of the rivers and lagoons declined after implementation of the Florida Net Ban of 1994.

Many commercial fish houses have gone out of business or have shifted to selling imported products to supplement their local supplies. At the same time, the number of businesses possessing federal dealer permits has increased from about 180 in 1999 to a little over 200 in 2001. There is some industry speculation that the increasing number of dealer permits reflects increased decentralization in the domestic fishing markets and the need to increase profits by self-marketing.

Commercial Fishing

Cape Canaveral draws fishermen from Cocoa/Cocoa Beach, Merritt Island, Melbourne, and Titusville. These fishermen target many snapper grouper species, as well as coastal migratory pelagics such as mackerel, highly migratory species such as sharks and swordfish, and shellfish such as oysters, quahogs, and shrimp. Snowy grouper and tilefish (particularly golden or sand tilefish) landings exceed 10,000 pounds per year. Total commercial landings decreased, however, from 8.9 million pounds to 6.0 million pounds from 1998 to 2004 (SAFMC 2006).

The number of unlimited commercial permits in this area increased from nine in 1999 to 16 in 2004. The number of limited commercial permits fluctuated over this period, but ultimately declined from four permits in 1999 to one in 2004 (SAFMC 2006).

The number of Florida Saltwater Products Licenses issued to residents of Brevard County (where Cape Canaveral is located) decreased from 872 in 1998/99 to 492 in 2004/05 (SAFMC 2006). This license is needed to sell marine species in the state. There have also been declines in license sales for various crustacean fisheries.

Recreational Fishing

In 2004, Brevard county supported 36 bait and tackle stores, with five in Cape Canaveral, and 70 marinas with over 3,000 wet slips, indicating the importance of recreational fishing to the area. Fourteen fishing tournaments consistently occur in the area. Additional details about these businesses and tournaments can be found in SAFMC (2006).

As in other coastal areas of Florida, there is a fairly heavy presence in Brevard County of charter boat businesses, private marinas, and other associated businesses catering to the recreational fishing sector. The number of federally permitted charter/headboat vessels in Cape Canaveral increased from zero to seven from 1999 to 2004. According to Holland *et al.* (1999), there were approximately 32 charter boats and 2 headboats in the Canaveral/Melbourne area. Current estimates from permit files show at least 38 for-hire vessels with Snapper grouper permits homeported in Cape Canaveral or Port Canaveral, which includes approximate four headboats. That is likely a low estimate for total the total number of for-hire vessels in the area since it does not include vessels in the nearby Merritt Island and in the Cocoa/Cocoa Beach areas.

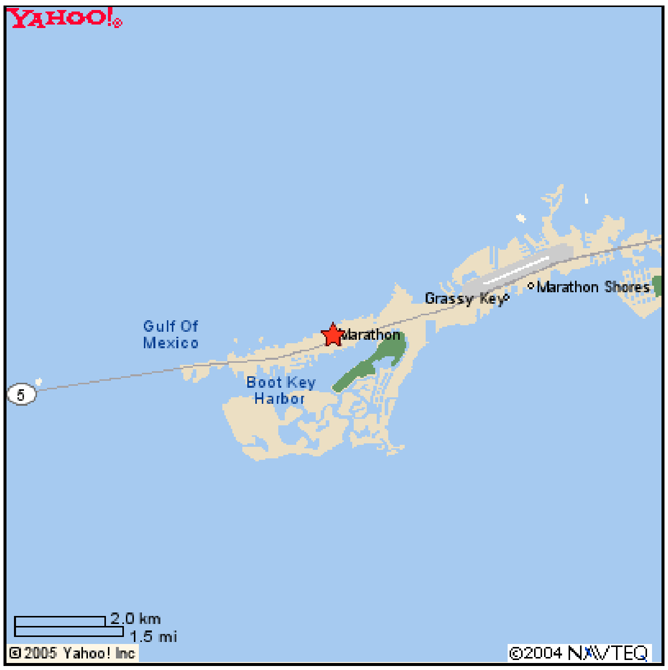


Figure 3-13. Area map of Marathon, Florida.
Source: Yahoo Maps, http://www.yahoo.com.

3.4.2.4.3 Marathon

A history of Marathon, detailing its settlement in the 1800s, the rise of industry, the effects of the Great Hurricane of 1935, the rise of tourism, and the importance of commercial fishing, can be found in SAFMC (2005). Figure 3-13 shows a map of Marathon, which lies in Monroe County.

Overview

Census data from 1990 and 2000 show there was an increase in overall population in Marathon from 8,857 in 1990 to 10,255 in 2000. During this period, the Hispanic population more than doubled, increasing from 1,040 to 2,095. This increase accounts for more than two thirds of the total population increase for the area. During this period of time, the median household income increased from approximately $25,000 to over $36,000.

Marathon has maintained a relatively high percentage of the total population, 4.1 percent in 2000, involved in farming, fishing, and forestry, though the percentage has declined from 8.7 percent in 1990. Since there is little commercial farming and forestry occurring in the area, the majority of percentage can be assumed to relate to fishing activities. The percentage of people that live below the poverty line decreased slightly from 15.1 percent in 1990 to 14.2 percent in 2000.

Commercial Fishing

In 1998, 184 Marathon residents were employed in fishing related industry according to the Census data, with 39 of those in the "fishing" category, 92 employed in "fish and seafood," and 47 employed by marinas (SAFMC 2006). The number of unlimited commercial permits held by community residents decreased from 65 permits to 44 permits between 1999 and 2004. Similarly, the number of limited commercial permits decreased from 43 permits to 31 permits.

Recreational Fishing

While most of the waters around Marathon are open to fishing, some areas have been set aside for eco-tourism and fish-viewing by divers and snorkelers. Sombrero Reef, said to be one of the most beautiful sections of North America's only living coral barrier reef, lies several miles offshore and is protected by the Florida Keys National Marine Sanctuary (http://www.fla-keys.com/marathon).

The importance of recreational boating and fishing to the economy of Marathon is shown by the businesses reliant upon it. As of 2004, there were at least 25 charter boat businesses, two party boat businesses, eight bait and tackle shops, and 27 marinas in the area. The number of vessels holding the federal charter/headboat permit increased from 16 in 1999 to 30 in 2004. In addition, there were seven fishing tournaments in Marathon. Most tournaments are centered on tarpon fishing. However, there are inshore and offshore fishing tournaments as well. These tournaments begin in February and run through June. Hotels and restaurants fill with participants and charters, guides and bait shops reap the economic benefits of these people coming to the area. These tournaments are positive economic pulses in the local economy, one that thrives on the existence of tourism and recreational fishing.

4 Environmental Consequences

4.1 Snowy Grouper

Results from SEDAR 4 (2004) indicated snowy grouper was experiencing overfishing and was overfished. Amendment 13C took the following actions to end overfishing of snowy grouper: Decrease the annual commercial quota over three years from 151,000 pounds gutted weight (lbs gw) to 84,000 lbs gw in year 3; decrease the commercial trip limit over three years from 275 lbs gw to 100 lbs gw in year 3; and limit possession to 1 per person per day within the 5-grouper per person per day aggregate recreational bag. Year 1 was 2006. A 15 year rebuilding schedule starting in 1991 was established through Amendment 4 (SAFMC 1991a). A new rebuilding schedule will be established through Amendment 15A. The first year of the rebuilding schedule is 2006.

4.1.1 Management Reference Point Alternatives

Table 4-1. MSY alternatives under consideration for snowy grouper.

Alternatives	MSY equation	F_{MSY} equals	MSY value
Alternative 1 (no action)	The yield produced by $F_{MSY.}$ $F_{30\%SPR}$ is used as the F_{MSY} proxy.	0.14*	not specified
Alternative 2 (preferred)	MSY equals the yield produced by $F_{MSY.}$ MSY and F_{MSY} are defined by the most recent SEDAR.	0.05**	313,056 lbs whole weight**
*Source: Powers 1999 **Source: SEDAR 4 2004			

Table 4-2. OY alternatives under consideration for snowy grouper.

Alternatives	OY equation	F_{OY} equals	OY value
Alternative 1 (no action)	OY equals the yield produced by F_{OY}. $F_{45\%SPR}$ is used as the F_{OY} proxy.	0.10*	not specified
Alternative 2	OY equals the yield produced by $F_{OY.}$ If a stock is overfished, F_{OY} equals the fishing mortality rate specified by the rebuilding plan designed to rebuild the stock to SSB_{MSY} within the approved schedule. After the stock is rebuilt, F_{OY} = a fraction of F_{MSY}. Snowy grouper is overfished.	(65%)(F_{MSY})	293,020 lbs whole weight**
Alternative 3 (preferred)		(75%)(F_{MSY})	303,871 lbs whole weight**
Alternative 4		(85%)(F_{MSY})	309,716 lbs whole weight**
*Source: Estimate of $F_{40\%SPR}$ from Potts and Brennan (2001), value for $F_{45\%SPR}$ not available. **Calculated based on Council's preferred MSY value in which F_{MSY} equals 0.05 for Alternatives 2-4 (SEDAR 4 2004).			

Table 4-3. MSST alternatives under consideration for snowy grouper.

Alternatives	MSST equation	M equals	MSST value
Alternative 1 (no action)	MSST equals SSB_{MSY}((1-M) or 0.5, whichever is greater).	0.12*	4,105,182 lbs whole weight**
Alternative 2	MSST equals SSB_{MSY}(0.5).	n/a	2,332,490 lbs whole weight**
Alternative 3 (preferred)	MSST equals SSB_{MSY}(0.75).	n/a	3,498,735 lbs whole weight**

*Source: Recommendation from SEFSC based on the results from SEDAR 4 (2004).
**Source: Calculated based on Council's preferred MSY value in which SSB_{MSY} equals 4,664,980 lbs whole weight (SEDAR 4 2004).

Table 4-4. Criteria used to determine the overfished and overfishing status of snowy grouper from SEDAR 4 (2004). Note: Actions taken in Amendment 13C are expected to end overfishing of snowy grouper in 2009.

DETERMINATION	SSB_{CURR} (2003)	MSST (preferred)	F_{CURR} (2002)	MFMT	STATUS
OVERFISHED?	869,503 lbs	3,498,735 lbs			Overfished (SSB_{CURR}/MSST = 0.25)
OVERFISHING?			0.15	0.05*	Overfishing (F_{CURR}/MFMT = 3.00)**

*Amendment 15A is not exploring alternatives for MFMT. F_{MSY} is used as a proxy for MFMT.
All lbs are in whole weight. Note: This is not an action item.
**Overfishing is expected to end in 2009.

4.1.1.1 Biological Effects of Management Reference Point Alternatives

National Environmental Policy Act (NEPA) regulations at 40 CFR §1508.8 (a) define direct effects as those "which are caused by the action and occur at the same time and place". NEPA) regulations at 40 CFR §1508.8 (b) defines indirect effects "which are caused by the action and are later in time or farther removed by distance." According to the NEPA definitions of direct and indirect effects, defining MSY, OY, and MSST for snowy grouper will not directly affect the biological or ecological environment, including ESA-listed species, because these parameters are not used in determining immediate harvest objectives. MSY, OY, and MSST are reference points used by fishery managers to assess fishery performance over the long-term. As a result, redefined management reference points could require regulatory changes in the future as managers monitor long-term performance of the stock with respect to the new reference points. Therefore, these parameter definitions will affect subject stocks and the ecosystem of which they are a part, by influencing decisions about how to maximize and optimize the long-term yield of fisheries under equilibrium conditions and triggering action when stock biomass decreases below a threshold level. The biological effects of the choice of management reference points are described below.

MSY Alternative 1 would retain the SPR based MSY definition established for the snowy grouper stock in Snapper Grouper Amendment 11 (1998). This SPR-based definition specifies a fixed fishing mortality rate, which would reduce the spawning biomass per recruit to 30% of the unfished level.

MSY in **Alternative 1** is defined as the yield produced by F_{MSY} where $F_{30\%SPR}$ is used as the F_{MSY} proxy. The F_{MSY} based on the SPR proxy associated with MSY definition in the no action **Alternative 1** ($F_{MSY} = 0.14$) is much higher than the F_{MSY} (0.05) estimated in the SEDAR 4 (2004) biomass-based assessment. Since MSY is the product of B_{MSY} X F_{MSY}, where B_{MSY} from SEDAR 4 = 4,664,980 lbs whole weight, an estimate of MSY from **Alternative 1** would be higher (~653,000 lbs whole weight) than the MSY from SEDAR 4 (2004) specified in the **Council's Preferred Alternative 2** (313,000 lbs whole weight). Although the MSY defined by **Alternative 1** is probably an overestimate, a harvest level this high was only recorded once during 1986-2004when approximately 718,000 lbs were harvested in 1997. Since regulations were relatively stable during this period, biological factors rather than management induced harvest constraints probably account for the absence of consistent higher harvests. Therefore, MSY indicated by **Alternative 1** is inappropriate for this resource since the allowance of harvest at the respective MSY value could lead to excessive exploitation.

MSY is a function of certain characteristics of the current fish population, such as its age and size structure. Given our current state of knowledge about the stock, **Alternative 2** offers a better estimate of the true MSY. Retaining a F_{MSY} or MSY value that is too high could cause fishery managers to unintentionally allow the stocks to be overexploited. Overexploitation can have many negative effects on the fished stock including a decline in number of individuals, reduced fish size, a decrease in the number of males, a change in the size/age at maturity, decreased reproductive potential, an alteration of the genetic integrity, ecosystem overfishing, and recruitment overfishing. See Amendment 13C for a description of these effects (SAFMC 2006). Although **Alternative 2** is considered to provide the best estimate of MSY, **Alternative 1** could be a legitimate choice if the estimate for **Alternative 2** was not known with certainty, or if regulatory measures were to change the age and size structure of the population. If MSY based on **Alternative 2** really were too low, then biomass would continue to increase and adjustments would be made through future assessments.

The Council's Preferred **MSY Alternative 2** would redefine the MSY of the snowy grouper stock to equal the value recommended in the most recent SEDAR assessment (SEDAR 4 2004). The **Council's Preferred Alternative 2** would improve the scientific basis for managing snowy grouper because it is a biomass estimate based on the best available science. Furthermore, it is more conservative than the SPR-based definition and provides fishery managers a specific reference point against which to evaluate the sustainability of catches over the long-term. Designation of MSY may make it more likely management actions would be taken to reduce fishing pressure on a stock experiencing unsustainable fishing mortality or if the stock is overfished. Therefore, stocks with reference points based on SEDAR assessments are expected to provide the strongest positive environmental effects.

Wyanski *et al*. (2000) indicate snowy grouper off the Southeastern United States are exhibiting many of the symptoms of an exploited population including a decreased mean size, a change in the size at age, a decrease in the size at maturity, and a decrease in the percentage of males due to a combination of heavy fishing pressure and life history attributes (e.g., slow growth, long life span), which increase the stock's vulnerability to fishing pressure.

OY Alternative 1 would retain the OY definition established in the Snapper Grouper FMP Amendment 11; however, the value for OY was never specified due to data limitations. Not designating an OY value or designating one not based upon the best available science could have adverse, indirect effects on the snowy grouper stock. This SPR-based definition specified in Amendment 11, identifies a fixed fishing mortality rate, which would reduce the spawning biomass per recruit to 45% of the unfished level. Potts and Brennan (2001) estimated $F_{40\%SPR}$ as 0.10, which is probably close to the $F_{45\%SPR}$ estimate of F_{OY}. An estimate of OY from **Alternative 1** would be higher (~350,000 lbs whole weight) than the OY from SEDAR 4 (2004) specified in the **Council's Preferred Alternative 3** (304,000 lbs whole weight).

The more conservative the estimate of OY, the larger the sustainable biomass. The biomass of the population would be least when the rate of fishing mortality is equal to F_{MSY} and would be greatest when the fishing mortality rate was equivalent to 65% of F_{MSY}. Therefore, a larger sustainable biomass associated with a fishing mortality rate at 65% of F_{MSY} would be good for the stock, but could have negative economic and social effects, in the short-term, because reductions in harvest would be needed to achieve larger sustainable biomass.

Like **Alternative 1**, **Alternatives 2-4** would specify fixed fishing mortality rates. However, the rates defined by **Alternatives 2-4** relate directly to what is expected to produce MSY (F_{MSY}), consistent with the definition of OY provided at 50 CFR 600.310(b). These alternatives would indirectly benefit the biological and ecological environment by providing a more precise estimation of OY based upon a recent stock assessment.

Alternatives 2-4 are distinguished from one another by the level of risk (and associated tradeoffs) each would assume. **Alternative 2** represents the most precautionary management program of those considered for each unit. This alternative defines OY to equal the average yield associated with fishing at just 65 percent of F_{MSY}. This OY definition would provide the largest buffer between MSY and OY relative to the other alternatives and, consequently, the greatest assurance that management measures designed to achieve OY would be effective in sustaining snowy grouper over the long-term.

The **Council's Preferred OY Alternative 3** defines OY to equal the average yield associated with fishing at 75% of F_{MSY}. This definition reduces slightly the safety margin between MSY and OY relative to **Alternative 2**. Restrepo *et al*. (1998) state "that fishing at 75% of F_{MSY} would result in equilibrium yields at 94% of MSY or higher, and equilibrium biomass levels between 125% and 131% of B_{MSY} – a relatively small sacrifice in yield for a relatively large gain in biomass." A simple deterministic model described in Mace (1994) to evaluate the effects of fishing at 75% of F_{MSY} indicates the ratios between the yield fishing at 75% of F_{MSY} relative to fishing at F_{MSY} are consistent across a broad set of life history characteristics ranging from species such as snowy grouper with low natural mortality rates to more productive species like vermilion snapper and black sea bass. Restrepo *et al*. (1998) determined the ratio of the yield of fishing at 75% of F_{MSY} relative to F_{MSY} would range from 0.949 to 0.983. Restrepo *et al*. (1998) also indicated fishing at this rate under equilibrium conditions is expected to reduce to the risk of overfishing by 20-30%. Snowy grouper are extremely vulnerable to overfishing because they are extremely long-lived, late to mature, protogynous, and form aggregations. Therefore, the biological and ecological effects of this definition for snowy grouper are still expected to be positive.

Alternative 4 defines OY to equal the average yield associated with fishing at 85% of F_{MSY}. This is the least conservative of those OY alternatives considered because it would further reduce the precautionary buffer between OY and MSY. Therefore, this definition would provide the least amount of indirect benefits to the biological and ecological environment of all the alternatives, and could make it more difficult to sustain snowy grouper over the long-term.

MSST Alternatives 1-3 would define an overfished condition for snowy grouper if the stock size was below a specified proportion of B_{MSY}.

Alternative 1 would retain the MSST definition established in the Snapper Grouper FMP Amendment 11. It requires MSST to be at least one half of SSB_{MSY}, but allows for it to be greater than this value if M is suitably low. If (1-M) is less than or equal to 0.5, then the value obtained from this alternative would be the same as that obtained from **Alternative 2**. However, M is very low (0.12) for snowy grouper. **Alternative 1** would result in MSST equal to 4,105,182 lbs whole weight if M=0.12. This MSST estimate is very close to SSB_{MSY} = 4,664,980 lbs whole weight defined by the Council's preferred MSY alternative. Therefore, if this alternative were chosen, then MSST would be very close to SSB_{MSY}.

If all other factors remained constant, adoption of this alternative would build additional conservatism into the management program by nearly eliminating the buffer between MSST and B_{MSY} so that a stock would never be permitted to fall much below B_{MSY} without triggering an "overfished" determination and the mandatory development a rebuilding plan within one year. The closer MSST is to B_{MSY}, the shorter the time needed to rebuild the stock to B_{MSY} if F is constrained below the MFMT. Therefore, **Alternative 1** is likely to ensure the snowy grouper stock could rebuild to B_{MSY} from an overfished condition more quickly than other alternatives. Snowy grouper are extremely vulnerable to overfishing because they are protogynous, slow growing, and long lived. Thus, a higher, more precautionary threshold for determining when the species is overfished would be warranted. However, 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). Additionally, the tradeoff associated with the assurance provided by this conservative definition is that natural variation in recruitment could cause stock biomass to 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.

MSST Alternative 2 is the most risky of those considered, because it would allow stock biomass to decrease to as little as 50% of the MSY level before an overfished determination was made, regardless of stock productivity. Such a low threshold for determining an overfished status could be problematic for a species such as snowy grouper, which is particularly vulnerable to overfishing. This alternative could make it more difficult to rebuild the snowy grouper stock from an overfished condition within the allowed time period, and would likely result in more severe catch restrictions following an overfished determination. However, it would eliminate the potential administrative complications associated with setting MSST close to B_{MSY} by establishing a larger buffer between what is considered to be an overfished and rebuilt condition.

MSST Alternative 3 (Preferred) is a compromise between the previous two alternatives. This alternative would provide a higher threshold than **Alternative 2** for determining when snowy grouper is overfished and associated negative effects on fished species and their ecosystems, while minimizing undue administrative and economic burdens that could be experienced with **Alternative 1**.

4.1.1.2 Economic Effects of Management Reference Point Alternatives

4.1.1.2.1 General Concepts

Defining the MSY, OY, and MSST of a species does not alter the current harvest or use of the resource. Specification of these measures merely establishes benchmarks for fishery and resource evaluation from which additional management actions for the species would be based, should comparison of the fishery and resource with the benchmarks indicate that management adjustments are necessary. The impacts of these management adjustments will be evaluated at the time they are proposed. As benchmarks, these parameters would not limit how, when, where, or with what frequency participants in the fishery engage the resource. This includes participants who directly utilize the resource (principally, commercial vessels, for-hire operations, and recreational anglers), as well as participants associated with peripheral and support industries. All entities could continue normal and customary activities under any of the alternative specifications. Participation rates and harvest levels could continue unchanged.

Since there would be no direct effects on resource harvest or use, there would be no direct effects on fishery participants, associated industries, or communities. Direct effects only accrue to actions that alter harvest or other use of the resource. Specifying MSY, OY, and MSST, however, establishes the platform for future management, specifically from the perspective of bounding allowable harvest levels. The relationship between and implications of the harvests levels implied by the MSY and OY alternatives relative to the status quo are discussed in the following section (Section 4.1.1.2.2).

Fishery management decisions influence public perception of responsible government control and oversight. These perceptions in turn influence public behavior. This behavior may be positive, such as cooperative participation in the management process, public hearings, and data collection initiatives, or negative, such as non-cooperation with data initiatives, legal action, or pursuit of political relief from management action. Positive behavior supports the efficient use of both the natural resource and the economic and human capital resources dedicated to the management process. Negative behavior harms the integrity of the information on which management decisions are based, induces inefficient use of management resources, and may prevent or delay efficient use of the natural resource. The specific benefits and costs of these behaviors cannot be calculated. Although disagreement with the exact specifications contained in the MSY and OY alternatives may occur, any of the alternatives satisfy the technical guidelines and would establish the required platform from which future action can be taken and, thus, should generally induce satisfaction with the management of the resource. However, the alternatives vary in implications for total allowable harvest and constituents who favor more liberal harvests would likely prefer the alternatives in the decreasing order of the potential harvest implied by the alternative specifications, while those who favor more conservative harvests would likely hold the opposing preferences. The net effect of the behavioral responses from these opposing constituent groups cannot be determined.

Administrative costs of fishery management accrue from the time and labor involved in developing new regulations, permitting systems, or other management actions. To the extent that each of the MSY and OY alternatives provide fishery scientists and managers with specific objective and measurable criteria to use in assessing the status and performance of the fishery, the impacts of the various alternatives on administrative costs are indistinguishable. However, the more conservative (lower) the equivalent allowable harvest level, the greater the potential for harvest overages, necessitating additional management action, with associated administrative costs.

In addition to the trigger to subsequent management that MSY and OY may provide, the MSST identifies the stock level below which a resource is determined overfished. Should the evaluation of the resource relative to the benchmark result in said designation, harvest and/or effort controls are mandated as part of the rebuilding program. These harvest and effort controls would directly impact the individuals, social networks, and associated industries associated with the resource or fishery, inducing short-term adverse economic impacts until the resource is rebuilt and less restrictive management is allowable.

Although the MSST is a biological concept, the higher the value, the greater the likelihood that the stock may fall below the MSST, resulting in a designation of being overfished, and trigger the implementation of additional management measures. Among the alternative MSST specifications for snowy grouper, **Alternative 1** represents the most conservative (highest) value and, therefore, would be expected to create the greatest likelihood that the stock could be determined overfished. Conversely, **Alternative 2** would establish the least conservative benchmark, theoretically allowing the largest reduction in the biomass before the resource is declared overfished, and creating the least likelihood that additional regulation be required. **Preferred Alternative 3** is intermediate of the two.

4.1.1.2.2 Comparison of the Fishery with the Management Reference Point Alternatives

Combined recreational and commercial snowy grouper harvests averaged approximately 431,000 lbs from 1986-2005, approximately 322,000 lbs from 2001-2005, and totaled approximately 300,000 lbs in 2005. The South Atlantic snowy grouper resource has been determined to be undergoing overfishing and is overfished. The expected impacts of alternative rebuilding schedules and strategies are presented in Sections 4.1.2 and 4.1.3, respectively. The third-year total allowable snowy grouper harvest implicit in Amendment 13C (SAFMC 2006), as part of the three-year harvest step-down reduction to end overfishing, is approximately 109,000 lbs and is assumed to be the status quo harvest level for the purpose of this proposed amendment. The MSY specification in **Preferred Alternative 2** is approximately 313,000 lbs. Thus, while average historical performance in the fishery exceeded the proposed MSY, the proposed MSY would support greater harvests after the stock is rebuilt than the status quo, with accompanying long-term increased positive economic benefits. Additional details on these benefits are provided in the discussion of rebuilding schedules in Section 4.1.2.2. The MSY defined by **Alternative 1** is roughly estimated as 653,000 lbs. This is likely an overestimate, but is useful to enable a relative comparison of the no action alternative with current and historical landings. A harvest level this high has only been recorded once during the 1986-2005 data record, in 1997 when approximately 718,000 lbs were harvested. Snowy grouper regulations were relatively stable during this period, suggesting that biological factors and not management induced harvest constraints underlie the absence of consistent higher harvests. This further suggests that the MSY indicated by **Alternative 1** is inappropriate for this resource. As such, the adoption of **Alternative 1** and subsequent allowance of harvest at the respective MSY value may lead to excessive exploitation, precipitating the imposition of restrictive management measures and reductions in economic benefits.

The OY defined by **Alternative 1** is estimated as 350,000 lbs. This is likely to be an overestimate, but, as with the MSY defined by **Alternative 1**, is useful to enable a relative comparison of the no action alternative with current and historical landings. The OY specifications for **Alternatives 2-4** range from approximately 293,000 lbs (**Alternative 2**) to approximately 310,000 lbs (**Alternative 4**). These specifications range from 169% (**Alternative 2**) to 221% (**Alternative 1**) more than the status quo harvest level of 109,000 lbs. Thus, each of these alternative specifications would accommodate an increase from the baseline harvest level. Therefore, once the resource is rebuilt, the total allowable harvest can be increased and harvest restrictions can be reduced, supporting increased economic benefits to the fishery. If sustainable, the larger the harvests, the greater the economic benefits to the harvest sector and associated industries. Due to the inability to identify, model, anticipate, and control all factors that affect stocks, sustainable yield cannot be determined with absolute certainty. Therefore, some level of precautionary conservatism must be factored into the selection of OY. Since **Alternative 2** would allow the lowest harvest, it represents the most conservative vision of how the resource should be managed, encompassing the least likelihood, relative to the other alternatives, that excessive harvest will occur, and avoidance of the adverse economic consequences that would accrue to increased restrictions. **Alternative 2** also, however, would represent the greatest potential foregone harvest opportunities if the harvest level is overly conservative. Conversely, **Alternative 1** represents the least conservative vision, thereby decreasing the possibility of foregone benefits, but increasing the possibility of excessive harvest. Neither the probabilities of these conditions occurring nor the net impacts can be determined. Overall, **Alternatives 2-4** are more conservative than **Alternative 1**. **Preferred Alternative 3** is intermediate to **Alternatives 2 and 4** and is believed to represent a reasonable compromise to the uncertainty associated with either alternative.

As discussed in Section 4.1.1.2.1, **Preferred Alternative 3** is intermediate in the specification of the MSST. Thus, it reduces the likelihood that the fishery will be declared overfished, which would be increased with **Alternative 1**, thereby avoiding the adverse economic impacts that would precipitate from additional resultant harvest restrictions. **Preferred Alternative** 3 also mitigates the potential problems of an insufficiently conservative MSST, which might be the case for **Alternative 2**, thereby avoiding the adverse impacts that would accrue to excessive reduction of the biomass.

In summary, no direct effects are expected to accrue to any of the alternative benchmark parameter specifications. Indirect effects could accrue if future assessment of the stock relative to the benchmarks identifies a need for restrictive management. The magnitude of these effects, however, will depend on the nature of the specific management measures adopted. These effects will be quantified when such action is prepared, if necessary.

4.1.1.3 Social Effects of Management Reference Point Alternatives

4.1.1.3.1 General Concepts

Defining the MSY, OY, or MSST for a species or species complex would not cause direct social impacts because it would not place specific controls on the amount or manner in which the resources are harvested. These parameters simply provide management targets and thresholds needed to assess the status and performance of the fishery. All current direct, indirect, consumptive, and non-consumptive uses of the resources will be unaffected. Evaluation of the resource relative to the benchmarks, however, may trigger harvest and/or effort controls, which would directly impact the individuals, social networks, and associated industries related to the fishery, inducing short-term adverse economic impacts until less restrictive management is allowable.

Designation of these benchmarks, therefore, establishes the foundation for subsequent regulatory change. Regulatory change may cause some of the following direct and indirect consequences: increased crew and dockside worker turnover; displacement of social or ethnic groups; increased time at sea (potentially leading to increased risk to the safety of life and boat); decreased access to recreational activities; demographic population shifts (such as the entrance of migrant populations replacing or filling a market niche); displacement and relocation as a result of loss of income and the ability to afford to live in coastal communities; increased efforts from outside the fishery to affect fishing related activities; changes in household income source; and increased gentrification of coastal communities as fishery participants are unable to generate sufficient revenue to remain in the community. Ultimately, one of the most important measurements of social change is how these social forces, in coordination with the strategies developed and employed by local fishermen to adapt to the regulatory changes, combine to affect the local fishery, fishing activities and methods, and the community as a whole.

A major indirect effect of fisheries management on the fishing community and related sectors is increased confusion and differences between the community and the management sector in levels of understanding and agreement on what is best for both the resource and the community. The fact that 'the science' can cause relatively large reductions in harvests is particularly disconcerting to many fishermen and concerned stakeholders. The potential for unemployment and financial uncertainty looms large in their envisioned future. An attitude of defeat and resignation among fishermen has been noted in the snapper-grouper fishery, and it is not known to what extent mental health may be affected by proposed regulatory change. This 'lack of enthusiasm' for fishery management, however defined, coupled with confusion about scientific premises and concepts, has direct and indirect effects on other elements in the fishery, such as enforcement efforts and compliance with current and future regulations. This can lead to inefficient use of resources, ineffectual regulations, and failure to meet management targets, which may precipitate additional restrictions.

Data deficiencies and the complexity of the task make it difficult to determine the biological reference points with certainty. The selection of a particular benchmark has potential implications on resource users depending upon its accuracy relative to the true value. Selection of the wrong alternative, while protecting the resource, may subject the human environment to overly restrictive regulations, increasing the risk to the economic viability of participants in the fishery and associated industries. Alternatively, the erroneous choice of a less conservative alternative when more conservatism is warranted could result in short-term increased economic benefits to fishery participants, but lead to reduced stock sustainability, ultimately leading to more severe social and economic disruptions than would occur under more conservative management. In general, however, the higher the MSY and OY, the greater the allowable, long-term sustainable yield for the fishery and, hence, the greater the long-term social benefits of a sustainable and healthy resource.

4.1.1.3.2 Comparison of Fishery with Management Reference Point Alternatives

Since none of the alternative MSY and OY specifications imply harvest reductions, each implies the potential for increased social benefits once the resource is rebuilt. Among the MSY alternatives, **Alternative 1**, though specifying an MSY greater than status quo harvests, does not appear to accurately represent a sustainable harvest level and may lead to excessive resource exploitation, precipitating corrective action with accompanying adverse social consequences. **Preferred Alternative 2** would allow increased harvest relative to the status quo, is more accurately reflective of harvest patterns in the fishery and, thus, is expected to provide the social benefits of a stable and sustainable fishery.

Among the OY alternatives, **Alternative 1** would allow the largest harvests and provide the greatest long-term social benefits, if the specified difference between OY and MSY is sufficient to capture the environmental variability of the resource. **Preferred Alternative 3**, however, may provide a better hedge against harvest overages, thereby supporting more stable harvests and social benefits. **Alternative 2** would most severely restrict the fishery, if unnecessarily conservative, and generate the least long-term social benefit.

MSST **Alternative 1** provides the most conservative estimate of MSST, hence reducing the amount of total fishing mortality that could be imposed on the fishery without overfishing, and increasing the likelihood that the fishery be declared overfished once rebuilt. Consequently, **Alternative 1** would be the least beneficial to the social environment because it would be the most likely to trigger more restrictive regulation in the future. In contrast, **Alternative 2** would be the most beneficial to the social environment, if consistent with the environmental variability of the resource, because the specification of MSST is least likely to result in more restrictive regulations. The MSST specification in **Preferred Alternative 3** is intermediate to those provided by **Alternatives 1 and 2** and would be expected to support more stable harvests and social benefits.

4.1.1.4 Administrative Effects of Management Reference Point Alternatives

The potential administrative effects of these alternatives differ in that the scenarios defined by each alternative vary in terms of the implied restrictions required to constrain the fisheries to the respective benchmarks. Although recent harvests through 2004 exceeded all of the alternative specifications of MSY and OY, in theory, the smaller the difference the less restrictive and administratively burdensome subsequent management is needed to be. Of the two MSY alternatives, only Preferred MSY **Alternative 2** identifies a specific harvest level. OY **Alternative 4** would allow the largest harvest and, therefore, less restriction. However, since OY is not set equal to MSY, the OY specifications encompass considerations of safety margins to account for environmental variability and ensure long-term stock sustainability. The OY **Preferred Alternative 3** would establish an intermediate safety margin relative to OY **Alternatives 2 and 4**. Overfishing has the potential to burden the administrative environment. However, the magnitude of the burden depends on the action used to reduce fishing mortality. Some management measures to end overfishing might not constitute a burden. If not ended, overfishing can lead to an overfished stock biomass, which triggers a requirement to develop and implement a rebuilding plan. The greater the likelihood of being declared overfished, the greater the potential administrative burden, since more acute management attention would be required. Thus, MSST **Alternative 1** would be the most burdensome, whereas MSST **Alternative 2** is potentially the least administratively burdensome. Preferred MSST **Alternative 3** would be intermediate in potential administrative effects.

4.1.1.5 Council Conclusions on Management Reference Point Alternatives

For snowy grouper MSY = 313,056 pounds whole weight, OY = 303,871 pounds whole weight, and MSST = 3,498,735 pounds whole weight are the **Council's preferred alternatives**. The Council obtained public input during the public hearing and informal review process on the preferred alternatives and the other alternatives as well. (Note: **Appendix A** contains additional alternatives considered but eliminated from detailed consideration.) All comments were evaluated, and the Council did not change their preferred alternatives based on comments received.

The Council received public comments addressing the MSST for snowy grouper. The Ocean Conservancy recommended retaining the current definition for MSST (Alternative 1) which is SSB_{MSY}((1-M) or 0.5, whichever is greater) to be more conservative. By modifying the current definition of MSST for snowy grouper to 0.75 X B_{MSY}, the Council is hoping to avoid a situation where the natural variation in recruitment causes the stock biomass to 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. Such a situation could create administrative difficulties if the overfished threshold was met and a rebuilding plan was unnecessarily triggered. Regardless of which MSST definition is chosen, snowy grouper is overfished and biomass is well below the threshold that would trigger a rebuilding plan. SEDAR 4 (2004) estimates current biomass at 18% of SSB_{MSY}.

The Snapper Grouper Advisory Panel did not have comments specific to the MSY, OY, or MSST definitions for snowy grouper.

The Law Enforcement Advisory Panel did not have comments specific to the MSY, OY, or MSST definitions for snowy grouper.

The Scientific and Statistical Committee (SSC) reviewed the SEDAR Assessment and approved the assessment as being based on the best available science. The SSC recommended using the MSY value from the assessment. The SSC also endorsed the use of 0.75 X F_{MSY} and 0.75 X B_{MSY} as the preferred alternatives for OY and MSST, respectively. In December 2007, the SSC endorsed Amendment 15A as based on best available science.

The Snapper Grouper Committee reviewed the public hearing input and recommendations from the Snapper Grouper AP, Law Enforcement AP, and the SSC. Committee members expressed concern about the data gaps and implications for assessment conclusions but considered that snowy grouper is a long-lived, slow growing species and emphasized the need to be conservative in the face of uncertainty.

Committee members felt **Alternative 2** for MSY was a more conservative estimate and based on the best available science from the SEDAR process. For OY, Committee members felt **Alternative 3** balanced the need to be conservative while not being overly restrictive. When setting the MSST, Committee member felt **Alternative 3** provided adequate separation between OY and the level that would indicate an overfished condition.

The Council concluded the MSY, OY, and MSST alternative recommended by the Committee best meets the conservation objective of defining conservative management reference points.

4.1.2 Rebuilding Schedule Alternatives

Alternative 1 (no action). A 15-year rebuilding schedule is currently in place, which began in 1991.

Alternative 2. Define a rebuilding schedule as the shortest possible period to rebuild in the absence of fishing mortality (T_{MIN}). This would equal 13 years (SEDAR 4 2004). 2006 is Year 1.

Alternative 3. Define a rebuilding schedule as the mid-point between shortest possible and maximum recommended period to rebuild. This would equal 23.5 years. 2006 is Year 1.

Alternative 4 (preferred). Define a rebuilding schedule as the maximum recommended period to rebuild if $T_{MIN} > 10$ years. The maximum recommended period equals T_{MIN} + one generation time. This would equal 34 years (SEDAR 4 2004 was the source of the generation time). 2006 is Year 1.

4.1.2.1 Biological Effects of Rebuilding Schedule Alternatives

Choice of a rebuilding schedule has a direct effect on the biological, ecological, and physical environment by determining the length of time over which rebuilding efforts can be extended. Shorter schedules generally require overfished stocks be provided a greater amount of (and more immediate) relief from fishing pressure. Conversely, longer schedules generally allow overfished stocks to be harvested at higher rates of fishing mortality as they rebuild. Extending the rebuilding period beyond the shortest possible timeframe increases the risk that environmental or other factors could prevent the stocks from recovering. As a result, the biological/ecological benefits of a shorter schedule are generally greater than those of the intermediate schedule and the benefits of the intermediate schedule are generally greater than those of the maximum recommended schedule. However, the overall effects of all the action alternatives are expected to be beneficial because each defines a plan for rebuilding the overfished stock.

Rebuilding Schedule Alternative 1 would retain the existing, 15-year rebuilding schedule established for snowy grouper in Amendment 4, which started in 1991 and ended in 2006 if no action were taken. Snowy grouper is overfished and undergoing overfishing (SEDAR 4 2004; Section 3.2.2.1). The Council took action to end overfishing in Amendment 13C. It is not possible for the stock to rebuild to B_{MSY} by 2006. Therefore, this alternative would not meet the objective of achieving B_{MSY} within the terms allowed by the Magnuson-Stevens Act. This alternative also maintains the existing levels of risk to ESA-listed species (See Section 3.2.4).

As snowy grouper cannot be rebuilt to B_{MSY} under the current rebuilding schedule (**Alternative 1**), **Alternatives 2-4** would establish a new rebuilding schedule alternative based on a new stock assessment with a new understanding of stock status. All of these schedules would achieve rebuilding within time periods allowed by the MSA, and therefore, **Alternatives 2-4** would be expected to benefit the ecological environment by restoring an apex predator to the ecosystem. Results of SEDAR 4 (2004) determined that in the absence of any fishing mortality, the fishery could rebuild to B_{MSY} in 15 years **(Alternative 2).** In addition, SEDAR 4 (2004) estimated the generation time for snowy grouper as 24 years. Therefore, the longest allowable time to rebuild would be 34 years **(Alternative 4). Alternative 3** represents a midpoint between **Alternatives 2 and 4.**

Theoretically, **Alternative 2**, would rebuild the stock to B_{MSY} more quickly than other alternatives because it would require managers to impose the strictest harvest controls. Shorter rebuilding schedules generally provide the greatest biological benefit by allowing biomass, the age and size structure, sex ratio, and community structure to be restored to healthy levels at the fastest possible rate. However, snowy grouper is part of a multi-species fishery. Even if retention of snowy grouper is prohibited, snowy grouper would still be caught since they have temporal and spatial coincidence with other species fishermen target. Consequently, **Alternative 2** would have minimal biological benefits relative to **Alternatives 3 and 4** because the actual mortality of snowy grouper would likely be similar under all three alternatives. However, some targeting behavior is possible under **Alternative 4** despite the small trip limits, which could create some differences in the mortality among the different alternatives.

If no harvest of snowy grouper was allowed, as specified in **Alternative 2**, it is still expected that snowy grouper would be caught and released by commercial fishermen and that this incidental catch would be similar to the commercial quota specified for 2008. As release mortality is nearly 100% for snowy grouper (SEDAR 4 2004), the schedule specified in **Alternative 2** is not considered to be realistic and would not be expected to rebuild the stock to B_{MSY}. It is not possible to eliminate incidental mortality on one species in a multi-species complex, without prohibiting fishermen from targeting all associated species wherever the prohibited species occurs. The Council is considering a multi-species deepwater unit in a future amendment to reduce bycatch of snowy grouper and co-occurring species. Similarly, due to bycatch mortality, the schedule specified in **Alternative 3** also is not realistic and would not likely allow snowy grouper to rebuild to B_{MSY} by the end of the rebuilding schedule unless greater restrictions were placed on other species that co-occur with snowy grouper.

Consequently, the **Council's Preferred Alternative 4** would support an allowable harvest level that is basically a "bycatch quota", enabling snapper grouper fishermen to retain incidentally encountered snowy grouper when targeting co-occurring species. In addition, the magnitude of bycatch would be less for **Preferred Alternative 4** than for **Alternatives 2 and 3**. Based on data from 2003 and 2004, the amount of snowy grouper landed by commercial fishermen when targeting other species that occur with snowy grouper would likely approximate the commercial portion of the ABC during the first few years of the rebuilding projection.

The impacts of **Alternatives 2, 3, and 4** on ESA-listed species will be very similar to those mentioned above for fish species. More restrictive harvest limits are expected to provide the most protection to ESA-listed species due to effort reductions.

4.1.2.2 Economic Effects of Rebuilding Schedule Alternatives

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

Defining a rebuilding schedule, however, may result in indirect effects. Restrictive management measures could be necessary to rebuild a resource, and direct effects accrue to these measures. Further, defining the rebuilding schedule determines the length of time over which rebuilding efforts can be extended and affects the severity of the measures implemented during the recovery period. Generally, the shorter the recovery period, the more severe the necessary harvest restrictions, and the more severe the harvest restrictions, the greater the short-term adverse economic effects.

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

Among the rebuilding schedule alternatives considered for snowy grouper, **Alternative 1** would maintain the current 15-year rebuilding schedule. This period expired in 2006 without achieving recovery of the resource. Thus, continued restrictions would be required beyond 2006. While the impacts of these restrictions may be no different than those intended to achieve the goals of the alternative rebuilding schedules (**Alternatives 2-4**), the continuation of the status quo would require additional management action to adopt a legally compliant rebuilding schedule, with associated additional costs of amendment preparation. Hence, the primary difference between **Alternative 1** and the other alternatives is that the adoption of **Alternative 1** would impose additional costs on the management process. Otherwise, it should be noted that, under the management measures specified in Amendment 13C, which are assumed to constitute the status quo, the commercial quota expected in 2009 as part of a three-year quota stepdown is 84,000 lbs, which represents essentially a bycatch allowance to account for snowy grouper that are caught in the process of harvesting other species and would be expected to die due to release mortality.

Alternative 2 would require total cessation of the directed snowy grouper fishery for 13 years. The snowy grouper recreational fishery is not a substantial fishery, averaging approximately 25,000 lbs per year during 2001-2005 (see Section 3.4.1.2). Over the same period, the average number of individual angler trips recorded targeting the species was only approximately 650 trips per year of the approximately 21 million trips per year taken in the South Atlantic during this period, on average. While the average number of harvest trips for snowy grouper was greater, approximately 3,300 trips, it is clear that these species are not highly targeted and, hence closure of the fishery should not substantially affect trip behavior or associated consumer surplus values and expenditures.

The snowy grouper fishery is more important to the commercial sector, though still a relatively minor fishery historically within the entire snapper-grouper fishery (see Section 3.4.1.1). Snowy grouper harvest averaged only approximately 350,000 lbs per year from 1999-2004 (valued at $736,000) out of total snapper-grouper harvests of approximately 9.5 million lbs (valued at $18.446 million). Over this period, logbook records recorded an average of approximately 16,000 trips per year (Table 3-4) with harvests of at least one pound of snapper-grouper species, while only approximately 1,500 trips per year harvested at least one pound of snowy grouper, with approximately 600 trips recording snowy grouper as the top revenue earner. Average harvests over 2001-2005 were reduced to approximately 297,000 pounds. As a result of Amendment 13C, harvests will be reduced even further to end overfishing and aid in rebuilding the resource. However, while snowy grouper is not considered to be a major fishery, it is taken on trips with other species including vermilion snapper and golden tilefish whose landings are more substantial. Therefore, while not a significant component overall of the total snapper-grouper fishery, all of the economic activity associated with snowy grouper would be eliminated under a complete closure of the fishery. As with any fishery, some fishing operations are likely more dependent upon the resource than others and, as a result, closure of the fishery may jeopardize the economic viability of those operations more dependent upon deepwater harvests. Although some compensatory behavior (substitution of other species) may occur, losses may not be limited to snowy grouper revenues as, to the extent that snowy grouper target trips exist, cancellation of such would include loss of harvests of other species as well. Further, effort transfer could result in excessive pressure on other stocks. Finally, it should be noted that, while **Alternative 2** would eliminate harvests, continued mortality would occur, as discussed above, since snowy grouper is encountered during the course of targeting other species and virtually all die due to release mortality. This release mortality is sufficiently great, absent additional measures to restrict these other fisheries, that recovery of snowy grouper would not occur at the end of 13 years and additional management action, with associated costs, would be required. Thus, total closure of the fishery, as would occur under **Alternative 2**, would not sufficiently help either the resource or fishermen. Also, though not explicitly analyzed, it is assumed that further regulation in other fisheries to reduce incidental harvest of snowy grouper and subsequent release mortality would incur economic losses not justified by the gain realized by the increased protection of snowy grouper.

Alternative 3 and **Preferred Alternative 4** would allow increasingly longer recovery times, thus allowing directed harvests to continue while the stock recovers. This would mitigate the adverse effects that would accrue from **Alternatives 1 and 2**, though not totally eliminate short-term adverse effects. While **Alternative 3** would allow positive harvests (amount not specified but, presumably, up to the bycatch mortality level), recovery would still not occur since the fishery cannot be rebuilt in 23.5 years under current bycatch mortality rates. **Alternative 3** would entail smaller losses in revenues and consumer surplus relative to **Alternative 2**, but fishermen would still be forced to discard dead or dying fish and subsequent action would be required to achieve recovery goals, at additional expense.

Preferred Alternative 4 would eliminate these mandatory discards and allow increased harvests beyond current incidental harvest levels. The exact amount of allowable harvests, and the economic benefits of such, depend on the rebuilding strategy adopted which specifies whether harvests are held constant over the rebuilding path or are allowed to increase according to a pre-specified schedule. Alternatives for rebuilding strategies under consideration for snowy grouper are presented in Section 4.1.3 and the expected economic impacts are presented in Section 4.1.3.2 and are incorporated herein by reference. Regardless of strategy adopted, **Preferred Alternative 4** is expected to result in increased economic benefits relative to **Alternatives 1-3** since it would not require the discard of incidentally caught dead fish, would support a progressive increase in allowable harvest, and avoids the need for repetitive management development.

4.1.2.3 Social Effects of Rebuilding Schedule Alternatives

The shorter the rebuilding schedule, the more severe the necessary harvest restrictions. The more severe the harvest restrictions, the greater the short-term adverse impacts associated with business failure, job or living dislocations, and overall adjustments for the social environment. Commercial and recreational fishermen may be able to adjust to the restrictions by switching to other species or by leaving fishing and seeking other employment or recreational pursuits, thereby mitigating any potential adverse social impacts. If other species are depleted, regulations may prevent switching to another fishery, or if other forms of employment or recreational activities were unavailable or difficult to find, then mitigation opportunities are reduced and net adverse social impacts are potentially more severe.

Since the snowy grouper fishery is not a heavily prosecuted fishery within the entire snapper-grouper complex, neither decrease nor increase of harvests is expected to have substantial economic or social impacts. With recent harvest levels averaging only approximately 322,000 lbs (2001-2005) and MSY estimated at a little more than 300,000 lbs, although certain individual operators are expected to be more dependent upon snowy grouper harvests than others, because of the relatively small size of the fishery little broad community structure or orientation likely does or could exist centered around the fishery. Therefore, the primary potential social effects of snowy grouper management may likely center around public opinion on whether or not snowy grouper management constitutes rational decision. Even if directed effort for snowy grouper were to cease, fishing for other species in the snapper-grouper complex is expected to result in incidental snowy grouper catch. Due to the depth at which it is hooked, virtually all of the snowy grouper catch dies and significant controversy could develop around the issue of disposition of these fish. Specifically, absent additional restrictions on the fisheries for these other species, restrictions which are not believed justified at this time, since snowy grouper will be caught and killed in the attempt to catch these other species, is it rational to require they be discarded, or should they be allowed to be kept? Since it is not expected that target behavior for snowy grouper will increase should incidental catch be allowed to be retained and, therefore no resultant adverse stock effects would accrue, mandatory discard of these fish is likely to result in public conclusion of unnecessary waste and irrational regulation. Thus, it is assumed that the more flexible the alternative is in allowing retention of these fish, as well as, allowing expansion of harvest opportunities while achieving recovery goals, the better the social outcome.

Although **Alternative 1** would allow the retention of current incidental catch, **Alternative 1** is not a reasonable alternative since the resource would not be rebuilt by the end of the specified period (2006) and would require subsequent immediate regulatory action to adopt a legally compliant rebuilding schedule. Since this subsequent action would merely accomplish what the Council has the opportunity to accomplish with the current action, adoption of **Alternative 1** would likely result in a public conclusion that management is not responsibly fulfilling its duties. Potential outcomes of such a conclusion could include a reduction in cooperative participation in the management process or legal redress.

Alternative 2 would require the snowy grouper fishery to close during the duration of the rebuilding schedule. While this would allow the fishery to achieve its long-term sustainable yield in the shortest amount of time possible, all economic activity associated with the fishery would be eliminated during the prescribed 13-year closure period. This would largely impact fishermen and communities in Florida, South Carolina, and North Carolina. Although harvests from 1999-2003 have been approximately the same in Florida and North Carolina, with South Carolina harvests not far behind, fewer vessels prosecute the fishery in North Carolina and South Carolina than in Florida, suggesting a greater individual dependence and impact on vessel operations in these two states compared to Florida (See Section 3.4.1.1). Despite the cessation of harvests and loss of economic activity associated with this fishery, rebuilding goals would not be met within the specified period, requiring additional action. Although closure would create the greatest short-term social and economic disruptions for fishermen and associated industries, since this is not a significant fishery relative to the other snapper-grouper fisheries, except for some individual businesses that may be particularly dependent upon the species, any social and economic disruption should be minor. Since status quo mortality of snowy grouper as a result of bycatch mortality would continue during the closure, the adoption of **Alternative 2** would likely precipitate constituent outcry and claims of needless waste. Such perception could harm the management environment by resulting in reduced cooperation in the management process and failed or less effective management decisions, precipitating more widespread and harmful economic and social impacts.

Alternative 3 would allow a longer rebuilding period, thereby reducing potential short-term social impacts. Although fishermen would likely prefer reducing short-term socio-economic losses while the resource recovers at a more gradual pace rather than total closure, **Alternative 3**, while allowing some retained catch, would still not meet rebuilding goals, thereby requiring additional action, with associated costs, and would suffer from the same charge as **Alternatives 1 and 2** of adopting an action that is known to be inadequate.

Preferred Alternative 4 would allow the longest possible rebuilding timeframe and would be expected to have the least amount of negative social disruptions for fishing communities and fishery participants. Not only would this alternative allow the retention of current incidental catch, total harvest would be allowed to progressively increase, supporting increased commercial revenues and recreational consumer surplus. Thus, **Preferred Alternative 4** would likely be more positively received by fishery participants and associated communities, thereby resulting in the most positive social outcome relative to the other alternatives, since it appears to more rationally incorporate consideration of fishery behavior and incidental harvest realities by not requiring the discard of dead or dying incidentally harvested fish.

4.1.2.4 Administrative Effects of Rebuilding Schedule Alternatives

Theoretically, **Rebuilding Schedule Alternatives 1-4** should benefit the administrative environment by providing agreed upon timeframes in which the fishing mortality rate applied to the resource would be constrained sufficiently to allow stock biomass to rebuild to B_{MSY}. However, the 15-year schedule defined by Rebuilding Schedule **Alternative 1** is unrealistic and, as a result, would negatively affect the administrative environment by creating unrealistic expectations about the amount of time needed for stock recovery. The rebuilding schedules specified by Rebuilding Schedule **Alternatives 2, 3, and 4** provide more realistic estimates of the time that would be required to rebuild stock biomass.

The administrative effects of **Alternative 2** could be more beneficial than those of **Alternative 3**, because **Alternative 2** would require that the fishery be closed for 13 years. Closing the fishery would relieve fisheries administrators and enforcement agents of the burden of implementing, monitoring, and enforcing management measures for the fishery. However, if fishery participants perceive a total closure as an unnecessarily restrictive action, they would likely burden the administrative environment with complaints about the unnecessarily severe socioeconomic effects of the rebuilding schedule. Furthermore, due to the multi-species nature of the snowy grouper fishery, **Alternative 2** would substantially increase bycatch and would not allow the fishery to rebuild to B_{MSY}; thereby, constituting an administrative burden.

Similar to **Alternative 2**, Rebuilding Schedule **Alternative 3** would be an Administrative burden since it would increase bycatch and would not allow the snowy grouper fishery to rebuild to B_{MSY} unless harvest of co-occurring species was also restricted. The Council's **Preferred Rebuilding Schedule Alternative 4** would allow fishing to continue during the rebuilding schedule. While this would mitigate socioeconomic losses to the fishery participants and associated industries, **Alternative 4** would require monitoring aspects of the stock, and enforcement of fishery management measures to ensure that the required fishing mortality rate is not exceeded. Although this would burden the administrative environment, such routine administrative actions already fall within the scope of the current fishery management process.

4.1.2.5 Council's Conclusions on Rebuilding Schedule Alternatives

A rebuilding schedule of 34 years for snowy grouper is the **Council's preferred alternative**. The Council obtained public input during the public hearing and informal review process on the preferred alternatives and the other alternatives as well. (Note: **Appendix A** contains additional alternatives considered but eliminated from detailed consideration.) All comments were evaluated, and the Council did not change their preferred alternatives based on comments received.

The Council received public comments addressing snowy grouper. The EPA indicates extending the rebuilding timeframe for an additional 34 years results in a total of 48 years. This is not correct. The Council is not extending the current rebuilding schedule but rather is establishing a new rebuilding schedule based on a new SEDAR stock assessment, which shows a very different picture of stock status. The EPA suggested another alternative between **Alternative 2** (13 years) and **Alternative 3** (23.5 years). The Ocean Conservancy recommended against using the maximum amount of time to rebuild (**Alternative 4** (34 years)).

The 34-year timeframe to rebuild the snowy grouper stock in the South Atlantic is the greatest allowed by the Magnuson-Stevens Act as the generation time of snowy grouper is 24 years. Rebuilding schedules of 12 and 23.5 years (Alternatives 2 and 3, respectively) would not be expected to rebuild the snowy grouper stock to the biomass at the maximum sustainable yield, even if retention of snowy grouper is entirely prohibited. Snowy grouper is part of a multi-species fishery. The allowable catch was decreased through Amendment 13C to the extent that fishermen are now retaining only bycatch. Since release mortality is 100%, it is expected these fish would still be caught and would die when fishermen target co-occurring species. The Council is considering the formation of a Deepwater Snapper Grouper Unit in Amendment 17 to the Snapper Grouper FMP. This unit could contain snowy grouper, golden tilefish, misty grouper, and other similar snapper and grouper species found in deeper waters. The Council believes that such an action would decrease the discard of these species with high release mortality rates.

Thus, a longer rebuilding schedule allows fishermen to retain snowy grouper that would otherwise be discarded dead. Since it is not expected that target behavior for snowy grouper will increase should incidental catch be allowed to be retained, no resultant adverse stock effects would accrue. The Council felt that a shorter rebuilding schedule would require mandatory discard of these fish and is likely to result in unnecessary waste.

The Snapper Grouper Advisory Panel did not have comments specific to the rebuilding schedules for snowy grouper.

The Law Enforcement Advisory Panel did not have comments specific to rebuilding schedules for snowy grouper.

The Scientific and Statistical Committee (SSC) reviewed Amendment 15A and did not have comments specific to rebuilding schedules for snowy grouper. In December 2007, the SSC endorsed Amendment 15A as based on best available science.

The Snapper Grouper Committee reviewed the public hearing input and recommendations from the Snapper Grouper AP, Law Enforcement AP, and the SSC. Committee members felt **Alternative 4** (34 years) for the rebuilding schedule was appropriate given the multi-species nature of the fishery. **Alternative 2** (13 years) would require fishing mortality be reduced to zero which is not possible due to bycatch mortality of snowy grouper when targeting co-occurring species. Alternative 3 (23.5 years) would allow some mortality but the levels of bycatch and discard mortality would prevent rebuilding in this timeframe. Committee members felt **Alternative 4** balanced the need to be conservative while recognizing that some level of fishing mortality will exist in this multi-species fishery.

The Council concluded the rebuilding schedule alternative recommended by the Committee best meets the objective of rebuilding snowy grouper as soon as possible given the multi-species nature of the fishery.

4.1.3 Rebuilding Strategy Alternatives

Note: **Alternatives 2a, 2b, 3a, and 3b** take into consideration increased discard mortality that could occur after 2008 as described in Section 4.6.1. Alternative rebuilding strategies are designed to have at least a 50% chance of rebuilding the snowy grouper stock to the B_{MSY} consistent with preferred MSY alternative within the time period defined by the Council's preferred rebuilding schedule. As a result, each action alternative would be expected to benefit the stock by enhancing its ability to recover from years of low recruitment due to excessive fishing mortality and/or natural environmental factors. The action alternatives differ from each other only in the immediacy of their impacts and, consequently, in the level of risk which would assume. As described in Section 2.1.1.3, the rebuilding strategy alternatives considered for snowy grouper are:

Alternative 1 (no action). Do not define a yield-based rebuilding strategy for snowy grouper.

Alternative 2. Define a rebuilding strategy for snowy grouper that maintains a constant fishing mortality rate throughout the rebuilding timeframe. The TAC specified for 2009 would remain in effect beyond 2009 until modified.

> **Sub-alternative 2a.** The TAC for 2009 would be 104,711 lbs whole weight. The TAC would change annually according to the rebuilding plan.
> **Sub-alternative 2b.** The TAC for 2009 would be 97,932 lbs whole weight. The TAC would change every 5 years according to the rebuilding plan.

Alternative 3 (preferred). Define a rebuilding strategy for snowy grouper that maintains a modified/constant fishing mortality rate throughout the rebuilding timeframe. The TAC specified for 2009 would remain in effect beyond 2009 until modified.

> **Sub-alternative 3a.** The TAC for 2009 would be 94,364 lbs whole weight. The TAC would change annually according to the rebuilding plan.
>
> **Sub-alternative 3b.** The TAC for 2009 would be 109,309 lbs whole weight. The TAC would change every 5 years according to the rebuilding plan.
>
> **Sub-alternative 3c (preferred).** The TAC for 2009 would be 102,960 lbs whole weight.

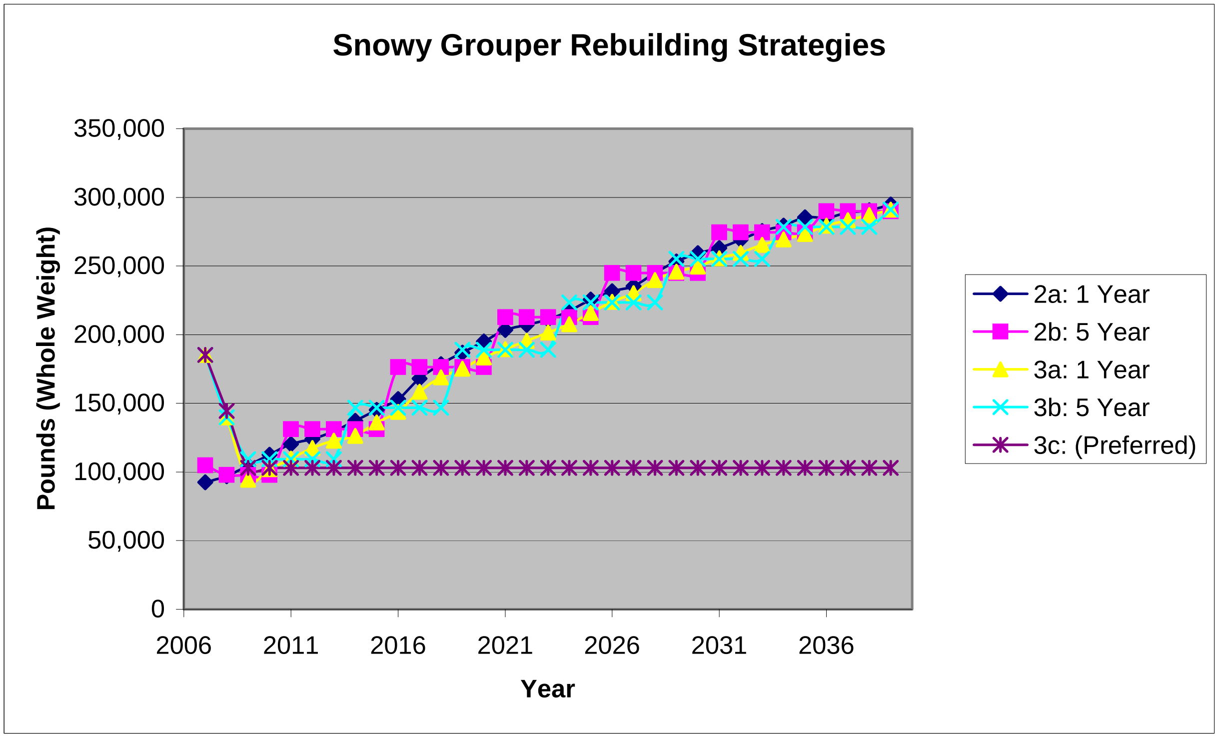
Table 4-5. Annual total allowable catch (lbs whole weight) values associated with three rebuilding strategy alternatives for snowy grouper. Note: Except for Alternatives 1 and 3c, values take into consideration increased discard mortality that could result from management measures taken through Amendment 13C. Rebuilding strategy Alternative 2 assumes actions were taken in 2006 to end overfishing. Actions taken through Amendment 13C are reflected in Alternative 3 and were intended to end overfishing in 2009. The fishing year begins January 1st of each year.

Year	Rebuilding Strategy Alt 1 (No Action)	Rebuilding Strategy Alternative 2 (Constant F Strategy) $F = F_{MSY}$		Rebuilding Strategy Alternative 3 (Modified/Constant F Strategy: $F = F_{MSY}$)		
Adjustment Interval	**None**	**2a: 1 Year**	**2b: 5 Year**	**3a: 1 Year**	**3b: 5 Year**	**3c: (Preferred)**
2007	Do not define a yield-based rebuilding strategy.	92,617	104,914	185,188	185,188	185,188
2008		96,855	97,932	139,728	139,728	144,560
2009		104,711	97,932	94,364	109,309	102,960
2010		112,536	97,932	102,129	109,309	Onwards until modified
2011		120,261	131,221	109,858	109,309	
2012		123,872	131,221	117,366	109,309	
2013		129,503	131,221	122,824	109,309	
2014		137,316	131,221	126,296	146,769	
2015		145,151	131,221	136,147	146,769	
2016		153,030	176,326	143,877	146,769	
2017		168,064	176,326	158,510	146,769	
2018		178,550	176,326	169,013	146,769	
2019		186,848	176,326	175,119	188,983	
2020		195,136	176,326	183,386	188,983	
2021		203,315	212,865	189,332	188,983	
2022		207,218	212,865	195,536	188,983	
2023		211,067	212,865	201,543	188,983	
2024		217,212	212,865	207,514	223,418	
2025		225,511	212,865	215,744	223,418	
2026		231,535	244,946	224,012	223,418	
2027		235,439	244,946	230,155	223,418	
2028		244,987	244,946	239,665	223,418	
2029		253,375	244,946	245,727	255,197	
2030		259,392	244,946	249,596	255,197	
2031		263,193	274,529	255,670	255,197	
2032		269,232	274,529	259,503	255,197	
2033		275,381	274,529	265,491	255,197	
2034		279,335	274,529	269,458	278,512	
2035		285,505	274,529	273,266	278,512	
2036		285,003	289,828	279,376	278,512	
2037		288,902	289,828	283,295	278,512	
2038		290,682	289,828	287,164	278,512	
2039		294,723	289,828	291,021	291,021	

4.1.3.1 Biological Effects of Rebuilding Strategy Alternatives

Since **Snowy grouper Rebuilding Strategy Alternative 3c** would specify a TAC at 2008 levels until modified, it would provide the greatest long-term, biological effects to the stock and associated ecosystem of all the alternatives throughout the entire timeframe. Beneficial biological effects include a more rapid rebuilding of the stock and increase in the average age and size structure compared to the other alternatives. Fishing at a lower fishing mortality rate may increase population robustness to environmental perturbations (Rothschild 1986). Also, older and larger females have greater reproductive potential because fecundity increases exponentially with size. Therefore, there is greater potential to more rapidly increase the number of young each year (recruitment) under **Alternative 3c**. These alternatives would also perpetuate the existing level of risk to ESA-listed species.

Figure 4-1. Annual allowable biological catch (lbs whole weight) values associated with five rebuilding strategy alternatives for snowy grouper. The TAC specified for 2009 would remain in effect beyond 2009 until modified.



Rebuilding Strategy Alternative 1 would not define a yield-based strategy for rebuilding the snowy grouper stock. Allowable catches would remain at levels specified in Amendment 13C (84,000 lbs in 2008), without increasing as the stock rebuilds. (Note: Only the commercial harvest was specified in Amendment 13C and not TAC.) The biological effects of **Alternative 1** would be similar to **Alternative 3c**. **Alternative 1**, however, could also have adverse effects to the snowy grouper stock as (1) it does not produce a TAC that would be used (in conjunction with allocation decisions) to determine the commercial and recreational portion of the harvest, (2) it does not provide a plan on how fishing effort would be regulated during the rebuilding schedule, and (3) it would result in unnecessary discard of dead snowy grouper as biomass increased. Without a designation of the TAC, there would be no maximum recreational harvest level to compare landings to ensure harvest levels keep rebuilding on schedule. However, the overall net biological effect of **Alternative 1** on the snowy grouper stock is beneficial and similar to **Alternative 3c**, particularly since the historical recreational harvest of snowy grouper has been minor compared to the commercial harvest.

Alternatives 2 and 3 would result in beneficial effects to the stock and associated ecosystem by allowing fishery managers to regulate fishing effort throughout the rebuilding timeframe. **Alternatives 2a, 2b, 3a, and 3b** would account for estimates of increased dead discards associated with an increased TAC in 2009. An increase in the magnitude of dead discards would be expected for snowy grouper. However, any estimate of increased bycatch must rely upon many assumptions about how fishermen will change their behavior in response to new management measures. For example, fishermen may decide to stop using longline gear after the golden tilefish quota is met or they may decide to avoid areas where snowy grouper occur due to the small trip limit and quota. Scenarios depicting methods and estimates of increased bycatch depending on varying assumptions is provided in Appendix E. **Alternative 3c** adopts the status quo TAC specified for 2008 from the rebuilding projections associated with the stock assessment and is not adjusted for post quota bycatch mortality. As Alternative 3c would hold catch constant as biomass increases, the fishing mortality (F) would be expected to gradually decrease below F_{MSY}, and increase the probability that overfishing is ended after 2008. Under **Alternative 3c**, the stock would build ahead of schedule.

Alternative 2 holds F at F_{MSY} (0.05) throughout the rebuilding timeframe. The strategy would specify a 32% decrease in landings during 2007 relative to the status quo based on allowable catch specified in Amendment 13C but then would allow landings to increase as the stock rebuilds. **Alternatives 3a** and **3b** also hold F constant at the same level, except during 2007-2008 where F is modified to track the management measures established by Amendment 13C. Since allowable harvest for both alternatives would increase through time, the biological effects are less in the long-term compared to **Alternative 3c**. Because it would bolster stock biomass early in the rebuilding period as opposed to later on, **Alternative 2** would likely have a stronger short-term beneficial effect on the biological and ecological environment than **Alternatives 3a and 3b**. **Alternative 3a** and **3b** would have an effect similar to **Alternative 2** but it would be delayed by several years.

Rebuilding would occur at a faster rate under **Alternative 2** than **Alternatives 3a** and **3b** as it would require lower catches during the initial part of the rebuilding period (2007-2008). However, recently approved management measures through Amendment 13C allow for higher catches during 2007-2008 than assumed by **Alternative 2**. Since catch levels in 2007 and 2008 have been specified through Amendment 13C, **Alternative 2** might not be realistic depending on the actual harvest levels.

Environmental factors such as weather, currents, and water temperature may affect the survival of eggs and larvae, causing poor recruitment even when large numbers of offspring are produced. Thus, alternatives, which allow the population to more rapidly attain a greater number of older, larger fishes in the population, also provides additional protections against recruitment failure due to several years of poor environmental conditions for eggs and larvae, creating a more robust population. Delaying rebuilding could make stocks more susceptible to adverse environmental conditions that might affect recruitment success, or to unanticipated errors in parameter estimates, which could result in excessive fishing.

In theory, the net ecological effects of the choice of **Alternatives 1 - 3** would be positive, as the reef community would more closely represent that which would persist in a natural, or undisturbed state, and the possibility of ecosystem overfishing would be reduced. However, as fishing pressure is reduced on the protected stock(s), fishermen may target other members of the reef fish ecosystem, which have fewer fishing restrictions. Furthermore, changes in effort and community structure could change as biomass increases. This displacement of effort may further disrupt community structure. The natural balance of an ecosystem cannot be fully restored as long as the ecosystem is subjected to fishing-related mortality. Additionally, there is some speculation that a disrupted community cannot be restored to pre-existing conditions, because it may change to a new climax community in a post-disturbed condition with a different suite of species.

The level of fishing effort applied to the fishery can influence fishing gear interactions with the sea floor. Furthermore, fish abundance, species composition, and the interaction of different fish and invertebrate species can have an effect on the habitat that they occupy. However, the number, nature, and extent of such interactions are more greatly influenced by the type of management measures that regulate the extent and distribution of fishing effort.

Alternatives 2a, 2b, 3a, and 3b differ primarily in how they would distribute the rebuilding burden over time. However, the average fishing effort supported by each alternative throughout the rebuilding period is similar. Thus, any differences in the habitat effects associated with the rebuilding strategy alternatives are probably insignificant over the long term. Additionally, regardless of potential differences in the magnitude of effects associated with different rebuilding strategy alternatives, all are expected to only minimally affect the physical environment because the primary gear used in this fishery (hook and line) is believed to have minimal effects on the sea floor.

The overall impacts of **Alternatives 1-3** on ESA-listed species are uncertain. Sea turtle abundance in the South Atlantic changes seasonally and the impact of fishing effort shifts, if any, resulting from these alternatives is difficult to predict. Current monitoring programs will allow NMFS to track and evaluate any increased risk to ESA-listed species. If necessary, an ESA consultation can be re-initiated to address any increased levels of risk.

4.1.3.2 Economic Effects of Rebuilding Strategy Alternatives

4.1.3.2.1 Recreational Sector

A description of the modeling approach used to examine the rebuilding strategy alternatives on the recreational sector is contained in Appendix G and only highlights are. repeated here. The analysis estimates the consumer surplus (the value to an angler of a 1-fish increase in the harvest per trip) and producer surplus (the net revenue to captain and crew per individual passenger trip; the value deviates from traditional definitions of producer surplus as it does not subtract labor expenses) expected to result from the alternative rebuilding strategies. The analysis simultaneously modeled activity in the snowy grouper, red porgy, and black sea bass fisheries. The foundation of the model is that the keep rates of the respective species, and effort directed at the species, change (increase) with the change (increase) in biomass as the stocks recover. Change (increase) in consumer surplus occurs as a result of the improved fishing quality for an individual trip and as a result of change (increase) in total trips. Change in producer surplus occurs as a result of change (increase) in total trips.

The model focused on snapper-grouper target trips, rather than target trips for the individual species, to capture the multi-species nature of fishing trips and due to the absence of significant target effort for the three species examined (approximately 41,000 trips per year, of which approximately 40,000 are for black sea bass, out of approximately 20.7 million total estimated recreational angler trips per year, MRFSS data, 2001-2005; snapper-grouper target trips, averaged approximately 823,000 trips per year over this period).

Two model runs were conducted for the analysis of the expected impacts for each rebuilding strategy alternative. For each species, the first model run incorporated the status quo biomass streams for the other two species, while the second run incorporated the biomass streams associated with the preferred rebuilding strategy alternatives for the other two species.

Finally, a key component of the analysis dealt with the interactive feedback of modeling the three species. Allocation ceilings limit how much effort can be applied, particularly as biomass and harvest rates increase. Two scenarios are examined in the results, the first restricting effort by the allocation of the focus species, and the second restricting effort according to the allocation associated with the most limiting of the three species. Modeling the three species together and allowing cross-species allocation feedback on allowable effort, in combination with other assumptions, notably the rate at which harvest rate changed with biomass change, produced results that indicate that achievement of full benefits of the rebuilding strategies may require management arrangements that separate target and harvest of the respective species. This is particularly true for red porgy and black sea bass, where expected harvest demand increases as a result of biomass growth far each species is severely limited by modeling restrictions imposed by the more restrictive snowy grouper allocations. These limitations and their functional impacts will be discussed as encountered for each species.

The expected impacts of the alternative rebuilding strategies for snowy grouper on the recreational sector are contained in Tables 4-6 through 4-9. The analyses for **Alternative 1** and **Preferred Alternative 3c** used the same TAC stream, 102,960 pounds whole weight until modified. Otherwise, the only difference between the status quo and **Preferred Alternative 3c** is that the status quo would not establish a rebuilding strategy, requiring additional subsequent management action to establish a strategy, whereas **Preferred Alternative 3c** would establish a strategy now. As a result, the expected economic impacts on the fishing sector of both alternatives were identical. Not establishing a rebuilding strategy at this time would result in the incursion of additional administrative costs to develop a rebuilding strategy through a new action. The snowy grouper allocation proved to be the most limiting of the three species. Hence, the modeling results for the three-species perspective (effort constrained by the most limiting of all three species, Tables 4-6 and 4-8) and single-species perspective (Tables 4-7 and 4-9) were identical. Assuming status quo biomass streams for red porgy and black sea bass, differences in total surplus relative to the status quo (and Preferred Alternative 3c) over the period 2007-2016 range from approximately -$367,000 for **Alternative 3a** to $22,000 for **Alternative 2b**. Thus, **Alternative 2b** is projected to result in a slightly greater surplus than **Preferred Alternative 3c**. The results are similar in terms of direction and ranking assuming preferred biomass streams for red porgy and black sea bass, with only the magnitude of the results changing. Since **Preferred Alternative 3c** includes the same TAC stream that was assumed for **Alternative 1**, no change in net economic benefits is projected.

Table 4-6. Summary of the cumulative expected recreational sector impacts (consumer and producer surplus) of the snowy grouper rebuilding strategy alternatives, 2007-2016, 7% discount rate. Note: Effort constrained by allocation of most limiting of all 3 species (black sea bass, red porgy, and snowy grouper). Status quo biomass for other species.

	Consumer Surplus				Producer Surplus				Total Surplus	
	Difference with respect to:				Difference with respect to:				Difference with respect to:	
	Alt 1 (status quo)				Alt 1 (status quo)				Alt 1 (status quo)	
Alternative	Angler Trips	Consumer Surplus			Angler Trips	Producer Surplus			Surplus	
1	0	$0			0	$0			$0	
2a	-22,699	$378,503			-1,805	-$418,696			-$40,194	
2b	-16,611	$414,541			-1,321	-$392,643			$21,898	
3a	-42,352	-$17,528			-3,368	-$349,194			-$366,722	
3b	-8,889	$111,808			-707	-$137,147			-$25,339	
Pre3c	0	$0			0	$0			$0	

Table 4-7. Summary of the cumulative expected recreational sector impacts (consumer and producer surplus) of the snowy grouper rebuilding strategy alternatives, 2007-2016, 7% discount rate. Note: Effort constrained by snowy grouper allocation only. Status quo biomass for other species.

	Consumer Surplus				Producer Surplus				Total Surplus	
	Difference with respect to:				Difference with respect to:				Difference with respect to:	
	Alt 1 (status quo)				Alt 1 (status quo)				Alt 1 (status quo)	
Alternative	Angler Trips	Consumer Surplus			Angler Trips	Producer Surplus			Surplus	
1	0	$0			0	$0			$0	
2a	-22,699	$378,503			-1,805	-$418,696			-$40,194	
2b	-16,611	$414,541			-1,321	-$392,643			$21,898	
3a	-42,352	-$17,528			-3,368	-$349,194			-$366,722	
3b	-8,889	$111,808			-707	-$137,147			-$25,339	
Pre3c	0	$0			0	$0			$0	

Table 4-8. Summary of the cumulative expected recreational sector impacts (consumer and producer surplus) of the snowy grouper rebuilding strategy alternatives, 2007-2016, 7% discount rate. Note: Effort constrained by allocation of most limiting of all 3 species (black sea bass, red porgy, and snowy grouper). Preferred biomass streams for other species.

	Consumer Surplus				Producer Surplus				Total Surplus	
	Difference with respect to:				Difference with respect to:				Difference with respect to:	
	Alt 1 (status quo)				Alt 1 (status quo)				Alt 1 (status quo)	
Alternative	Angler Trips	Consumer Surplus			Angler Trips	Producer Surplus			Surplus	
1	0	$0			0	$0			$0	
2a	-22,699	$378,395			-1,805	-$418,696			-$40,302	
2b	-16,611	$414,436			-1,321	-$392,643			$21,793	
3a	-42,352	-$17,441			-3,368	-$349,194			-$366,636	
3b	-8,889	$111,856			-707	-$137,147			-$25,291	
Pre3c	0	$0			0	$0			$0	

Table 4-9. Summary of the cumulative expected recreational sector impacts (consumer and producer surplus) of the snowy grouper rebuilding strategy alternatives, 2007-2016, 7% discount rate. Note: Effort constrained by snowy grouper allocation only. Preferred biomass streams for other species.

	Consumer Surplus				Producer Surplus				Total Surplus	
	Difference with respect to:				Difference with respect to:				Difference with respect to:	
	Alt 1 (status quo)				Alt 1 (status quo)				Alt 1 (status quo)	
Alternative	Angler Trips	Consumer Surplus			Angler Trips	Producer Surplus			Surplus	
1	0	$0			0	$0			$0	
2a	-22,699	$378,395			-1,805	-$418,696			-$40,302	
2b	-16,611	$414,436			-1,321	-$392,643			$21,793	
3a	-42,352	-$17,441			-3,368	-$349,194			-$366,636	
3b	-8,889	$111,856			-707	-$137,147			-$25,291	
Pre3c	0	$0			0	$0			$0	

4.1.3.2.2 Commercial Sector

A description of the modeling approach used to examine the rebuilding strategy alternatives on the commercial sector is contained in Appendix F. The analysis utilized logbook data from 2001-2005 for trips with species whose catch could be changed by the actions in this amendment (red porgy, black sea bass, and snowy grouper). Operationally, the analysis allowed a fishing trip to occur if expected trip revenues exceeded trip costs and a labor opportunity cost of $50 per person (captain and crew) per day. Opportunity cost does not measure actual payments to labor. Rather it is used in the model as a proxy for the unknown minimum amount that fishermen would be willing to accept for each trip, and is used in the model to determine if trips are still worth taking after accounting for the effects of regulation. The proxy value of $50 per person per day fished is slightly more than the current minimum wage rate of $5.85 per hour for an 8-hour work day, which is the minimum that could be earned in less risky land-based employments.

The analysis estimated the net operating revenues expected to accrue over the rebuilding period from 2007-2016, where net operating revenues are defined as trip revenues minus trip costs, and represent the returns to the fixed factors of production, labor, and the boat owner. The analysis simultaneously modeled activity in the multiple fisheries addressed by this amendment. Two model runs were conducted for the analysis of the expected impacts for each rebuilding strategy alternative. The first model run incorporated status quo conditions (biomass streams, management measures, etc.) for all other actions, while the second run incorporated the conditions associated with the preferred alternatives for the other actions.

The simulation model incorporates the dynamic effects of changes in fish abundance on the fishery during the rebuilding period through a proportional relationship between changes in catch rates and biomass. Annual time series for biomass for the alternative rebuilding plans for snowy grouper, red porgy and black sea bass were obtained from biologists and were input as data to the simulation model. Biomass was assumed constant over time for other species. Net operating revenues were adjusted to constant 2005 dollars with the consumer price index.

The analysis was based on historical fishing behavior, as represented by logbook trip reports during the years 2001-2005. The logbook data used in this analysis reflect the full range of harvesting activities and outcomes for trips in the commercial snapper-grouper fishery, from targeted to incidental capture of various species, and included differences in species composition and fishing activities by area, gear, duration of trip, crew size, good luck and bad luck, and so forth. The use of logbook data to simulate the effects of proposed management actions is most appropriate in the short-term because logbooks report actual fishing behavior during a recent period of time. The use of logbook data becomes less reliable for longer-term analyses because changes in the environmental and regulatory climate provide motivation for fishermen to seek out and adopt new fishing strategies. However, changes in fishing behavior in response to changes in these conditions cannot be modeled for these fisheries at this time. Hence, the analysis was limited to the first 10 years of each rebuilding strategy. A specific indication of the inability of the model to capture behavioral change is the simulated result that fishermen will not harvest all available quota for red porgy as the stocks rebuild. While it is expected that fishermen would alter their effort allocations to harvest the available quota, a systematic way to incorporate this behavior, with associated impacts on operating costs and the harvest of other species, has not been developed. As a result, the potential long-term benefits of the alternative red porgy rebuilding strategies are likely underestimated. It is not known whether this underestimation affects the relative ranking of the respective alternatives.

The expected impacts of the alternative rebuilding strategies for snowy grouper on the commercial sector are contained in Table 4-10. As with the recreational analysis, the same TAC stream was utilized for **Alternative 1** and **Preferred Alternative 3c**, thus resulting in no differences in net economic benefits between the two alternatives. Only minor differences in the total net operating revenues over the period 2007-2016 are projected for the other alternatives relative to the status quo. Assuming either status quo or preferred conditions for the other actions considered in this amendment, the differences in total net operating revenues range from only -$0.07 million for **Alternatives 2a and 2b** to -$0.06 million for **Alternative 3a** and **Alternative 3b** relative to the status quo, **Alternative 1,** and **Preferred Alternative 3c**. All differences, regardless of the underlying assumptions for the other actions, are less than 0.2%. **Preferred Alternative 3c** would not be expected to result in any change in net benefits relative to the status quo (**Alternative 1**).

Identifying the least favorable alternative by gear sector (greatest loss relative to the status quo or smallest gain where no losses are projected; tabular results not shown), the vertical line sector is projected to experience the greatest loss in net operating revenues relative to **Alternative 1** and **Preferred Alternative 3c**, -0.12% as a result of **Alternatives 2a and 2b** assuming status quo conditions for the other actions, and –0.13% under **Alternative 2a** assuming preferred conditions for the other actions. For the longline sector, the appropriate alternatives are **Alternative 3a** (-1.52%) and **Alternative 3b** (-1.51%) for both status quo and preferred conditions. The black sea bass pot sector is projected to gain approximately 0.01% for all alternatives to the status quo and **Preferred Alternative 3c** under both status quo and preferred conditions. Viewed from a different perspective, and examining only the results assuming preferred conditions for the other actions, all alternatives to the status quo and **Preferred Alternative 3c** are projected to result in the greatest losses in the longline sector, ranging from –1.21% (**Alternatives 2a and 2b**) to –1.52% (**Alternative 3a**). The "other" gear sector is projected to experience the largest gain across all alternatives to the status quo and **Preferred Alternative 3c**, ranging from 0.04% (**Alternatives 2a and 2b**) to 0.07% (**Alternative 3a** and **Alternative 3b**).

In a similar examination identifying a fleet by state/area landed, the North Carolina fleet would be projected to experience the greatest losses in net operating revenues relative to the status quo and **Preferred Alternative 3c**, -0.21%, under **Alternatives 2a and 2b** assuming either status quo or preferred conditions for the other actions (tabular results not shown). For the South Carolina fleet, the appropriate alternatives are **Alternative 3a** and **Alternative 3b** (-0.32%) for either status quo or preferred conditions. The Georgia-North Florida fleet (St. John's County, Florida northward) is projected to experience gains under all alternatives to the status quo and **Preferred Alternative 3c**, with the smallest gains accruing to **Alternatives 2a and 2b,** approximately 0.05%, assuming either status quo or preferred conditions. The Central-Southeast Florida fleet is projected to experience the greatest loss under **Alternative 2b** (-0.22%) for both status quo and preferred conditions. The Florida Keys fleet is also projected to experience gains under all alternatives to the status quo and **Preferred Alternative 3c**, with the smallest gain accruing to **Alternative 2b,** 0.10%**,** under both status quo and preferred conditions. Finally, the "other" fleet (vessels landing in places other than North Carolina through East Florida) is projected to experience the largest loss under **Alternative 3a** and **Alternative 3b** (-29.12%) under both status quo and preferred conditions. Viewed from a different perspective, and examining only preferred conditions for the other actions, the "other" fleet is projected to experience the largest losses, ranging from approximately –21% (**Alternatives 2a and 2b**) to –29% (**Alternative 3a** and **Alternative 3b**), while the Florida Keys fleet is projected to experience the largest gains under all alternatives, ranging from 0.09% under **Alternative 2b** to 1.35% under **Alternative 3b**.

Table 4-10. Summary of the expected cumulative commercial sector net operating revenues for the snowy grouper rebuilding strategy alternatives, 2007-2016, 7% discount rate.

	Given status quo alternatives for other actions			Given preferred alternatives for other actions		
Alternative	Net Present Value at 7% (million $)	Change compared to Alt 1	Percentage Change	Net Present Value at 7% (million $)	Change compared to Alt 1	Percentage Change
1	$41.21	$0.00	0.00%	$41.19	$0.00	0.00%
2a	$41.14	-$0.07	-0.17%	$41.12	-$0.07	-0.18%
2b	$41.14	-$0.07	-0.17%	$41.12	-$0.07	-0.17%
3a	$41.15	-$0.06	-0.14%	$41.13	-$0.06	-0.14%
3b	$41.15	-$0.06	-0.13%	$41.14	-$0.06	-0.13%
Pre3c	$41.21	$0.00	0.00%	$41.19	$0.00	0.00%

4.1.3.3 Social Effects of Rebuilding Strategy Alternatives

Social impacts of management accrue incrementally to fishing regulations and conditions that exist each year, and cumulatively as conditions are compounded over multiple years (single year or short-term restrictions may result in minimal social impact, whereas persistent restrictions would be expected to result in more significant impacts). In general, smaller harvest levels entail greater short-term dislocations and adjustments for the social environment. Commercial and recreational fishermen may be able to adjust to harvest reductions by switching to other species or by leaving fishing and seeking other employment or recreational opportunities elsewhere. If other species are depleted, regulations may prevent fishermen from freely switching to another fishery, or if other forms of employment or recreational activities are unavailable or difficult to find, then the adjustments would be more severe than if alternatives were readily available.

The rebuilding strategies considered encompass a constant fishing mortality rate (F) approach, with different periods of catch adjustment. The basic principle of a constant catch strategy is to maintain the allowable harvest at a constant amount for the entire rebuilding period. This is a conservative strategy that creates the least socio-economic disruption in the short-term to the fishing industry and associated businesses, assuming the harvest level is relatively close to current harvests. However, medium- and long-term problems may arise as catch rates increase with the rebuilding resource and ABC is held constant. The increased catch rates would be expected to induce a perception among fishermen that regulation is too restrictive, particularly if increased bycatch mortality occurs, jeopardizing recovery goals. Political pressure to increase allowable catches is likely, although the long-term biological recovery may not be complete.

Constant F strategies recognize the limitations of constant catch strategies by allowing catches to increase as the stock recovers and biomass increases. Starting harvest levels under constant F approaches are typically lower than constant catch levels, resulting in greater initial restrictions and short-term social and economic losses, but higher subsequent harvest levels support greater medium- and long-term benefits.

The alternatives considered vary by the assumption of the starting biomass, severity of the initial decline in allowable harvest, and periodicity of harvest increases, with adjustments occurring either annually or every five years. Annual adjustments in allowable harvest best match allowable catches with changes in available biomass. However, fishery management does not operate in a “real time” manner and the presumption that each year’s biomass can be monitored and allowable biological catch altered annually and appropriately is desirable but difficult to achieve. Rebuilding strategies that adjust the allowable harvest every five years combine the philosophies of constant catch and constant F strategies, but within shorter timeframes. The allowable harvest would remain constant within each 5-year adjustment period and largely represents an average of what would be allowed over the entire period if annual adjustments were made. As such, the allowable harvest levels are higher during the first year than would be allowed with annual adjustments, and lower in later years. Therefore, short-term adverse socio-economic impacts during the first two years of each 5-year adjustment period would be less than during the corresponding year with an annual adjustment in allowable harvest, and more than those in the last two years.

The results of the economic impact analysis presented in Section 4.1.3.2 capture some aspects of the cumulative impacts of the trade-offs of short-term and long-term impacts. For the commercial sector, the economic results suggest that the alternative rebuilding strategies are largely neutral over the cumulative period 2007-2016, resulting in almost identical net operating revenue totals, approximately $41 million. The reason for this is the relatively small allowable snowy grouper harvest regardless of the alternative, inducing small differences between the alternatives, and the relatively minor importance of snowy grouper to total commercial harvest by the vessels involved in the fishery. Since the alternatives are largely neutral in cumulative expected impacts on the commercial sector, differential community impacts are not relevant. However, some regional variability exists in the impacts overall, with communities in the Florida Keys through Central Florida projected to generally receive greater net benefits for all rebuilding strategy alternatives than other regions.

The economic impacts on the recreational sector essentially mirror those of the commercial sector in terms of lack of significant difference, for the same reasons, particularly if placed on the same numeric scale as the commercial results. While one alternative, **Alternative 3a**, is projected to produce results that are an order of magnitude greater than those of the other alternatives, they remain relatively inconsequential considering they represent a 10-year total. Thus, substantial social impacts overall or differential impacts between the alternatives would not be expected. Available data does not support regional economic comparisons, similar to the commercial analysis. Further, the recreational snowy grouper fishery is so inconsequential, accounting for less than 250 fish per year, on average, from 2001-2005 that attempting to anchor impacts to communities would not seem to be a worthwhile endeavor. Nevertheless, almost 50 percent of the recreational fish were landed in Florida over 2001-2005, so Florida communities would likely benefit the most from an expanded stock.

Because of the relatively inconsequential importance of the snowy grouper fishery to overall fishing activity by the appropriate sectors and associated communities, little if any substantial social impacts would be expected to accrue to the year-to-year changes in allowable harvest as the stock recovers. However, assuming preferred alternatives for the other action in the amendment, the North Carolina, South Carolina, and “other” fleets are projected to experience slight declines in economic performance under all alternatives to the status quo and **Preferred Alternative 3c**. The Central-Southeast Florida fleet is projected to experience declines under **Alternatives 2a and 2b**. Only the Georgia-Northeast Florida and Keys fleets are projected to fare better than the status quo or **Preferred Alternative 3c** under all other alternatives. The largest gain for any area would occur under **Alternative 3b**, with the Florida Keys area the beneficiary. It is presumed the economic benefits will translate into commensurate social benefits.

In addition to the above considerations, the preferred rebuilding strategy for the social environment would be expected to be influenced by the fishermen’s perceptions of stock status. If fishermen believe that the resource is overfished, then they probably would be willing to accept short-term socio-economic losses in exchange for long-term increases in harvest rates. Constant F strategies probably would be preferred because the fishermen would more quickly realize the benefits of resource rebuilding through corresponding increases in allowable harvest. However, if fishermen disagree with the stock assessment, then they would be less willing to incur reductions in current harvest rates. In this event, fishermen would prefer the constant catch rebuilding strategy because it minimizes short-term socio-economic losses while additional biological information is collected and assessed. Modified constant F strategies probably would be preferred by fishermen who perceive the stock to be overfished, but who are not certain about the magnitude of potential long-term benefits.

4.1.3.4 Administrative Effects of Rebuilding Strategy Alternatives

The administrative burden of the rebuilding strategy Alternatives would be very similar. The burden would be least for the **Alternative 1** since no additional management actions would be required. However, **Alternative 1** could also constitute an administrative burden because a rebuilding strategy is required as part of a rebuilding plan. Therefore, if Alternative 1 was selected as the preferred, additional actions would be required in the future to specify a rebuilding strategy. The burden would be greatest for Alternatives 2a and 3a, which would change the allowable catch each year.

4.1.3.5 Council's Conclusions on Rebuilding Strategy Alternatives

The Council obtained public input during the public hearing and informal review process on the preferred alternatives and the other alternatives as well. A letter from The Ocean Conservancy questioned the Council's preferred alternative for the rebuilding strategy and setting TAC based on the yield at MFMT rather than Foy. In addition, the Reauthorized Magnuson-Stevens Act makes changes that affect how the Council will set catch levels in the future. (Note: **Appendix A** contains additional alternatives considered but eliminated from detailed consideration.) All comments were evaluated, and the Council changed their preferred alternatives based on comments received.

Therefore, at the December 2007 meeting, the Council added a new sub-alternative and specified that as their preferred alternative. The new alternative specified the 2009 TAC at a level of 102,960 lbss whole weight until modified. The Council's previous preferred specified a TAC in 2009 of 109,309 lbs whole weight. The snowy grouper assessment will be updated in 2010 through the SEDAR process.

The Snapper Grouper Advisory Panel did not have comments specific to the rebuilding strategies for snowy grouper.

The Law Enforcement Advisory Panel did not have comments specific to rebuilding strategies for snowy grouper.

The Scientific and Statistical Committee (SSC) reviewed the SEDAR Assessment and approved the assessment as being based on the best available science. The SSC raised concerns about not including bycatch or post-quota mortality into Amendment 13C actions. Discard and post-quota mortality, from bycatch and discard mortality, has now been incorporated in rebuilding strategy alternatives that change TAC after 2008 . The

SSC concluded the economic analysis for Amendment 15A is thorough and provides estimates of economic impacts using the best available science. In December 2007, the SSC endorsed Amendment 15A as based on best available science.

Although the SSC indicated the social impact assessments in the public hearing version of Amendment 15A was comprehensive and well written, the SSC concluded the assessment of the social effects or ramifications of the proposed actions was inadequate for decision-making. The Snapper Grouper Committee reviewed the public hearing input and recommendations from the Snapper Grouper AP, Law Enforcement AP, and the SSC. Committee members felt the preferred snowy grouper rebuilding strategy alternative taken to public hearings should be modified based on comments received.

The Council agreed with the Committee's recommendation that the preferred alternative should be modified. In Amendment 13C the Council chose to phase-out overfishing of snowy grouper based on concerns about uncertainty and to minimize the negative social and economic impacts to fishing communities. The Council also set TAC based on the yield at F_{MSY}, which resulted in lower reductions than a TAC based on the yield at F_{OY}. The Reauthorized Magnuson-Stevens Act requires the Council to set Annual Catch Limits (ACLs) for overfishing species by 2010. Snowy grouper have been under a rebuilding program since the 1990s and SEDAR 4 (2004) indicated the biomass had not increased. The Council is developing Amendment 17 that will set ACLs and Accountability Measures to ensure the recreational and commercial sectors do not exceed their allocations and to reduce the probability of overfishing. Under the Reauthorized MSA, a TAC based on the yield at MFMT (= F_{MSY}) would be considered to be a limit, which could not be exceeded. Amendment 17 would establish management measures for species subject to overfishing to achieve target catch levels below the yield at F_{MSY} and closer to the yield at F_{OY}. These management measures would reduce the probability overfishing would occur.

Therefore, the TAC for 2009 in Amendment 15A will be at the 2008 level of 102,960 pounds whole weight until modified. A more conservative TAC would increase the probability that the biomass would increase and minimize future reductions. In addition, based on the Reauthorized Magnuson-Stevens Act, it would be difficult to justify increasing the TAC before a stock assessment indicates overfishing has ended.

The Council also indicated the Social Analysis could be improved but stated the deficiency was a function of data limitations rather than an analytical shortcomings. The Council concluded data would need to be collected for at least two years before a more meaningful social analysis could be conducted. The Council indicated the analysis was adequate to move forward at this time.

4.2 Red Porgy

Red porgy is not experiencing overfishing and the stock is rebuilding but remains overfished (SEDAR Assessment Update 2006). Amendment 12 (2000) established an 18 year rebuilding schedule. The rebuilding period begins in 1999 and ends in 2017. Amendment 13C implemented the following management regulations: Increase the commercial trip limit during May through December to 120 fish; establish a commercial quota of 127,000 lbs gw; and increase the recreational bag limit from 1 to 3 red porgy per person per day.

4.2.1 Management Reference Point Alternatives

Table 4-11. MSY alternatives under consideration for red porgy.

Alternatives	MSY equation	F_{MSY} equals	MSY value
Alternative 1 (no action)	The yield produced by $F_{MSY.}$ $F_{35\%SPR}$ is used as the F_{MSY} proxy.	0.43*	4,380,000 lbs whole weight.
Alternative 2 (preferred)	MSY equals the yield produced by $F_{MSY.}$ MSY and F_{MSY} are defined by the most recent SEDAR Update.	0.20**	625,699 lbs whole weight**
*Source: Vaughan 1999 **Source: SEDAR Update Assessment 2006			

Table 4-12. OY alternatives under consideration for red porgy.

Alternatives	OY equation	F_{OY} equals	OY value
Alternative 1 (no action)	OY equals the yield produced by F_{OY}. $F_{45\%SPR}$ is used as the F_{OY} proxy.	0.28*	not specified
Alternative 2	OY equals the yield produced by $F_{OY.}$ If a stock is overfished, F_{OY} equals the fishing mortality rate specified by the rebuilding plan designed to rebuild the stock to SSB_{MSY} within the approved schedule. After the stock is rebuilt, F_{OY} = a fraction of F_{MSY}. Red porgy is overfished.	(65%)(F_{MSY})	587,901 lbs whole weight**
Alternative 3 (preferred)		(75%)(F_{MSY})	608,099 lbs whole weight**
Alternative 4		(85%)(F_{MSY})	619,915 lbs whole weight**
**Source: Estimate of $F_{40\%SPR}$ from Potts and Brennan (2001) **Calculated based on Council's preferred MSY value in which F_{MSY} equals 0.20 for Alternatives 2-4 (SEDAR Update Assessment 2006)			

Table 4-13. Criteria used to determine the overfished and overfishing status of red porgy.

DETERMINATION	SSB_{CURR} (2005)	MSST	F_{CURR} (2004)	MFMT	STATUS
OVERFISHED?	4,716,247 lbs	5,529,012 lbs*			Overfished (SSB_{CURR}/MSST = 0.85)
OVERFISHING?			0.095	0.20**	Not Overfishing (F_{CURR}/MFMT = 0.39)

*The value for MSST is from SEDAR Update Assessment (2006) based on an M of 0.225. Amendment 15A is not exploring alternatives for MSST, as Amendment 12 designated the maximum of either 0.5 or 1-M(B_{MSY}). B_{MSY} = 7,134,209 lbs whole weight (SEDAR Update Assessment 2006). The Council has not indicated any desire to change this definition.
**Amendment 15A is not exploring alternatives for MFMT. F_{MSY} is used as a proxy for MFMT. This Amendment is not exploring alternatives for rebuilding schedules for red porgy as Amendment 12 established an 18 year rebuilding schedule for red porgy beginning in 1999.
All lbs are in whole weight. Note: This is not an action item.

4.2.1.1 Biological Effects of Management Reference Point Alternatives

National Environmental Policy Act (NEPA) regulations at 40 CFR §1508.8 (a) define direct effects "which are caused by the action and occur at the same time and place". NEPA) regulations at 40 CFR §1508.8 (b) define indirect effects as those "which are caused by the action and are later in time or farther removed by distance." According to the NEPA definitions of direct and indirect effects, defining MSY, and OY for red porgy will not directly affect the biological or ecological environment, including ESA-listed species, because these parameters are not used in determining immediate harvest objectives. MSY and OY are reference points used by fishery managers to assess fishery performance over the long-term. As a result, redefined management reference points could require regulatory changes in the future as managers monitor the long-term performance of the stock with respect to the new reference points. Therefore, these parameter definitions indirectly would affect subject stocks and the ecosystem of which they are a part, by influencing decisions about how to maximize and optimize the long-term yield of fisheries under equilibrium conditions and triggering action when stock biomass decreases below a threshold level.

MSY Alternative 1 would retain SPR-based MSY definition established for the red porgy stock in Snapper Grouper Amendment 11 (SAFMC 1998) and Amendment 12 (SAFMC 2000). This SPR-based definition specifies a fixed fishing mortality rate, which would reduce the spawning biomass per recruit to 35% of the unfished level. Specifying MSY provides fishery managers a specific reference point against which to evaluate the sustainability of catches over the long-term. MSY is often treated as a limit that should not be exceeded. Designating a MSY value not based upon the best available science **(Alternative 1)** could have adverse, indirect effects on the red porgy stock in the South Atlantic.

MSY in **Alternative 1** is defined as the yield produced by F_{MSY} where $F_{35\%SPR}$ is used as the F_{MSY} proxy. The Council's **Preferred Alternative 2** would redefine the MSY of the red porgy stock to equal the value recommended by the most recent SEDAR assessment update. **Preferred Alternative 2** would benefit the biological and ecological environment by improving the scientific basis for managing the red porgy stock.

The SPR-based F_{MSY} associated with MSY in the no action **Alternative 1** (F = 0.43) is much higher than the **Preferred Alternative 2** biomass based F_{MSY} (0.20) estimated by the red porgy assessment update. Likewise, the estimate of MSY provided in **Alternative 1** and specified in Amendment 12 is much larger (4,380,000 lbs whole weight) than the estimate of MSY provided in **Preferred Alternative 2** (625,699 lbs whole weight) and specified in SEDAR 1 (2002).

MSY is a function of certain characteristics of the current fish population, such as its age and size structure. Given our current state of knowledge about the stock, **Alternative 2** offers a better estimate of the true MSY. Stocks with reference points based on SEDAR assessments are expected to provide the strongest positive environmental effects. Overestimating reference points could cause fishery managers to unintentionally allow the stocks to be overexploited. Overexploitation can have many negative effects on the fished stock including a decline in number of individuals, reduced fish size, a decrease in the size/age at maturity, decrease in the size/age at transition, growth overfishing, compromised genetic integrity, ecosystem overfishing, and recruitment failure. Although **Alternative 2** is considered to be the best estimate of MSY, **Alternative 1** could be a legitimate choice if the estimate for **Alternative 2** was not known with certainty, or if regulatory measures change the age and size structure of the population. If MSY based on **Alternative 2** really were too low, then biomass would continue to increase and adjustments would be made through future assessments.

Harris and McGovern (1997) report many of the negative effects of overexploitation for red porgy including a significant decrease in the size and age at maturity of red porgy as well as the size and age at transition during the early 1990s, which may have been the result of heavy fishing pressure. A decrease in the mean length of red porgy as well as a decrease in the size at age (Harris and McGovern 1997; Daniel 2003) suggests red porgy was experiencing growth overfishing during the 1980s and 1990s. More recent information from the Red Porgy Assessment Update (2006) indicates that overfishing is not occurring, red porgy remains overfished, and the stock is rebuilding.

OY Alternative 1 would retain the OY definition established in the Snapper Grouper FMP Amendment 11; however, the value for OY was not specified due to data limitations. Not designating an OY value or designating one that is not based upon the best available science (OY **Alternative 1**) would have adverse, indirect effects on the red porgy stock. This SPR-based definition specifies a fixed fishing mortality rate, which would reduce the spawning biomass per recruit to 45% of the unfished level. Like **Alternative 1**, OY **Alternatives 2-4** would specify fixed fishing mortality rates. Potts and Brennan (2001) estimated $F_{40\%SPR}$ as 0.28, which is probably close to the $F_{45\%SPR}$ estimate of $F_{OY.}$ Similarly, the estimate of OY from **Alternative 1** would be higher

(~2,852,000 lbs whole weight) than the OY from SEDAR 1 (2002) specified in the Council's **Preferred Alternative 3** (609,099 lbs whole weight).

The more conservative the estimate of OY, the larger the sustainable biomass. The biomass of the population would be least when the rate of fishing mortality is equal to F_{MSY} and would be greatest when the fishing mortality rate was equivalent to 65% of F_{MSY}. Therefore, a larger sustainable biomass associated with a fishing mortality rate at 65% of F_{MSY} would be good for the stock, but could have negative social and economic effects, in the short-term, because reductions in harvest would be needed to achieve larger sustainable biomass.

Alternatives 2-4 are distinguished from one another by the level of risk (and associated tradeoffs) each would assume. **Alternative 2** represents the most precautionary management program of those considered for each unit. This alternative defines OY to equal the average yield associated with fishing at 65 percent of F_{MSY}. This OY definition would provide the largest buffer between MSY and OY relative to the other alternatives and, consequently, the greatest assurance that management measures designed to achieve OY would be effective in sustaining the stocks over the long-term. These alternatives would indirectly benefit the biological and ecological environment by providing a more precise estimation of OY based upon a recent stock assessment.

The Council's **Preferred Alternative 3** defines OY to equal the average yield associated with fishing at 75% of F_{MSY}. This definition reduces slightly the safety margin between MSY and OY relative to **Alternative 2**. However, Restrepo *et al.* (1998) indicate fishing at this rate under equilibrium conditions is expected to maintain stock biomass at 125-131% of the B_{MSY} level, and reduce the risk of overfishing by 20-30%. Red porgy are vulnerable to overfishing because they are moderately long-lived (max age = 18 years), achieve sizes as great as 36" TL, and are protogynous. Therefore, the biological and ecological effects of this definition for red porgy are still expected to be positive.

Alternative 4 defines OY to equal the average yield associated with fishing at 85% of F_{MSY}. This is the least conservative of those OY alternatives considered because it would further reduce the precautionary buffer between OY and MSY. Therefore, this definition would provide the least amount of indirect benefits to the biological and ecological environment of all the alternatives, and could make it more difficult to sustain red porgy over the long-term.

4.2.1.2 Economic Effects of Management Reference Point Alternatives

4.2.1.2.1 General Concepts

A discussion of the general concepts related to the economic effects of management reference points is provided in Section 4.1.1.2.1 and is included herein by reference.

4.2.1.2.2 Comparison of Fishery with Management Reference Point Alternatives

Combined recreational and commercial red porgy harvests averaged approximately 492,000 lbs from 1986-2005, approximately 141,000 lbs from 2001-2005, and totaled approximately 137,000 lbs in 2005. The South Atlantic red porgy resource has been determined to be overfished and the expected impacts of alternative rebuilding strategies are presented in Sections 4.2.3. The total allowable red porgy harvest implicit in Amendment 13C (SAFMC 2006) is approximately 242,000 lbs and is assumed to be the status quo harvest level for the purpose of this proposed amendment. **Alternative 1** would define MSY to equal 4.38 million lbs, which would be an unprecedented harvest level in a fishery that has shown a peak harvest level of only approximately 1.0 million lbs since 1986. The MSY specification in **Preferred Alternative 2** is approximately 626,000 lbs. Thus, **Preferred Alternative 2** would support substantially increased harvests upon resource recovery, and produce increased economic benefits to the fishery and associated industries.

The OY defined by **Alternative 1** is estimated as 2.852 million lbs. This is likely an overestimate, but is useful to enable a relative comparison of the no action alternative with current and historical landings. The OY estimates associated with **Alternatives 2-4** range from approximately 588,000 lbs (**Alternative 2**) to approximately 620,000 lbs (**Alternative 4**). Similar to the discussion of MSY, the OY specification of **Alternative 1** substantially exceeds any recorded harvest level and, as such, represents an unrealistic benchmark for the resource. The OY specification of **Alternatives 2-4** range from 143% (**Alternative 2**) to 156% (**Alternative 4**) more than the status quo harvest level (242,000 pounds). Thus, each of these three alternative specifications would accommodate a substantial increase over the baseline harvest level. Therefore, once the resource is rebuilt, the total allowable harvest can be increased and harvest restrictions can be reduced, supporting increased economic benefits to the fishery. If sustainable, the larger the harvests, the greater the economic benefits to the harvest sector and associated industries. Due to the inability to identify, model, anticipate, and control all factors that affect stocks, sustainable yield cannot be determined with absolute certainty. Therefore, some level of precautionary conservatism should be factored into the selection of OY. Since **Alternative 2** would allow the lowest harvest, it represents the most conservative vision of how the resource should be managed, encompassing the least likelihood, relative to the other alternatives, that excessive harvest will occur, and avoidance of the adverse economic consequences that would accrue to increased restrictions. **Alternative 2** also, however, would represent the greatest potential foregone harvest opportunities if the harvest level is overly conservative. Conversely, **Alternative 1** represents the least conservative vision, thereby decreasing the possibility of foregone benefits, but increasing the possibility of excessive harvest. Neither the probabilities of these conditions occurring nor their net impacts can be determined. Overall, **Alternatives 2-4** are more conservative than **Alternative 1**. **Preferred Alternative 3** is intermediate to **Alternatives 2 and 4** and is believed to represent a reasonable compromise to the uncertainty associated with either alternative.

In summary, no direct effects are expected to accrue to any of the alternative benchmark parameter specifications. Indirect effects could accrue if future assessment of the stock relative to the benchmarks identifies a need for restrictive management. The magnitude of these effects, however, will depend on the nature of the specific management measures adopted. These effects will be quantified when such action is prepared, if necessary.

4.2.1.3 Social Effects of Management Reference Point Alternatives

4.2.1.3.1 General Concepts

A discussion of the general concepts related to the social effects of management reference points is provided in Section 4.1.1.3.1 and is included herein by reference.

4.2.1.3.2 Comparison of Fishery with Management Reference Point Alternatives

Since none of the alternative MSY and OY specifications imply harvest reductions, each imply the potential for increased social benefits once the resource is rebuilt. MSY **Alternative 1**, however, though greater than status quo harvests, does not appear to accurately represent a sustainable harvest level and may lead to excessive resource exploitation, precipitating corrective action with accompanying adverse social consequences. **Preferred Alternative 2** would allow increased harvest relative to the status quo, is more accurately reflective of harvest patterns in the fishery and, thus, is expected to provide the social benefits of a stable and sustainable fishery.

Similar to the status quo MSY, the OY of **Alternative 1** is inconsistent with historic harvests and may lead to excessive resource exploitation, precipitating corrective action with accompanying adverse social consequences. Among the other OY alternatives, **Alternative 4** would allow the largest harvests and provide the greatest long-term social benefits, if the specified cushion is sufficient to capture the environmental variability of the resource. **Preferred Alternative 3**, however, may provide a better hedge against harvest overages, thereby supporting more stable harvests and social benefits. **Alternative 2** would most severely restrict the fishery, if unnecessarily conservative, and generate the least long-term social benefit.

4.2.1.4 Administrative Effects of Management Reference Point Alternatives

Since none of the alternative MSY or OY specifications would imply additional harvest restrictions, the potential administrative effects of these alternatives are largely equal. In theory, the larger the allowable harvest, the less restrictive and administratively burdensome subsequent management is needed to be. From this perspective, MSY **Alternative 2** and OY **Alternative 4** would allow the largest harvest and, therefore, less restriction. Preferred MSY **Alternative 3** is believed to represent a more accurate portrayal of the stock and harvest potential. Additionally, since the OY specifications encompass considerations of safety margins to account for environmental variability and ensure long-term stock sustainability. Preferred OY **Alternative 3** would establish an intermediate safety margin relative to OY **Alternatives 2 and 4**, thereby reducing the opportunity of overfishing that might occur under larger harvests, and the administrative burden of justifying the potentially excessively conservative management position embodied by OY **Alternative 2**.

4.2.1.5 Council's Conclusions on Management Reference Point Alternatives

For red porgy, MSY = 625,699 lbs whole weight and OY = 608,099 lbs whole weight are the **Council's preferred alternatives**. The Council obtained public input during the public hearing and informal review process on the preferred alternatives and the other alternatives as well. (Note: **Appendix A** contains additional alternatives considered but eliminated from detailed consideration.) All comments were evaluated, and the Council did not change their preferred alternatives based on comments received.

The Council did not receive public comments addressing MSY and OY for red porgy.

The Snapper Grouper Advisory Panel did not have comments on MSY and OY for red porgy.

The Law Enforcement Advisory Panel did not have comments specific to the MSY and OY for red porgy.

The Scientific and Statistical Committee (SSC) reviewed the red porgy SEDAR Assessment and approved the assessment as being based on the best available science. The SSC endorsed the estimates of MSY and OY from the SEDAR stock assessment. In December 2007, the SSC endorsed Amendment 15A as based on best available science.

The Snapper Grouper Committee reviewed the public hearing input and recommendations from the Snapper Grouper AP, Law Enforcement AP, and the SSC. Committee members did not change the preferred MSY and OY alternatives taken to public hearings.

The Council concluded the MSY and OY alternative included in the public hearing document best meet the conservation objective of defining conservative management reference points.

4.2.2 Rebuilding Schedule

The Council defined the rebuilding schedule for red porgy in Amendment 12 to the Snapper Grouper FMP. That schedule is 18 years, which is the maximum recommended rebuilding timeframe based on the formula: T_{MIN} (10 years) + one generation time (8 years) (SAFMC 2000). The schedule began with the implementation of a no harvest emergency rule in September of 1999 (64 FR 48324), and ends December 31, 2017. The rebuilding goal would be defined as 10,190,000 lbs if no action were taken in this amendment to alter red porgy management reference points. The Council's preferred MSY Alternative 2 would redefine SSB_{MSY} as 6,724,099 lbs, based on the output of the age-structured model recommended by SEDAR 1 Assessment (2002).

4.2.3 Rebuilding Strategy Alternatives

Alternative rebuilding strategies are designed to have at least a 50% chance of rebuilding the red porgy stock to the B_{MSY} consistent with the preferred MSY alternative by December 31, 2017. As a result, each action alternative would be expected to benefit the stock by enhancing its ability to recover from years of low recruitment due to excessive fishing mortality and/or natural environmental factors. The action alternatives differ from each other only in the immediacy of their impacts and, consequently, in the level of risk which would assume. The rebuilding strategy alternatives considered for red porgy are listed below.

Alternative 1 (no action). Do not define a yield-based rebuilding strategy for red porgy.

Alternative 2. Define a rebuilding strategy for red porgy that maintains a constant catch level throughout the rebuilding timeframe. The TAC would be 438,884 lbs whole weight for both 2009 and 2010. The TAC specified for 2010 would remain in effect beyond 2010 until modified.

Alternative 3 (preferred). Define a rebuilding strategy for red porgy that maintains a constant fishing mortality rate throughout the rebuilding timeframe. The TAC specified for 2010 would remain in effect beyond 2010 until modified.

> **Sub-alternative 3a (preferred).** The TAC would be 395,281 lbs whole weight for both 2009 and 2010. The TAC would change every three years according to the rebuilding plan.
>
> **Sub-alternative 3b.** The TAC would be 410,251 lbs whole weight for both 2009 and 2010. The TAC would change every five years according to the rebuilding plan.

Table 4-14. Annual total allowable catch (lbs whole weight) values associated with three rebuilding strategy alternatives for red porgy. Note: Values take into account increased discard mortality that could result from management measures taken through Amendment 13C.

Year	Rebuilding Strategy Alternative 1 (No Action)	Rebuilding Strategy Alternative 2 (Constant Catch)	Rebuilding Strategy Alternative 3 (Constant F)	
Adjustment Interval	None	None	3a: 1 year then 3 year (preferred)	3b: 1 year then 5 year
2007	Do not define a yield-based rebuilding strategy.	438,884	261,895	261,895
2008		438,884	395,281	410,251
2009		438,884	395,281	410,251
2010		438,884	395,281	410,251
2011		438,884	440,999	410,251
2012		438,884	440,999	410,251
2013		438,884	440,999	479,594
2014		438,884	485,837	479,594
2015		438,884	485,837	479,594
2016		438,884	485,837	479,594
2017		438,884	485,837	479,594

*Assuming the preferred alternative for each of the previous actions for this species. Projected yields are calculated using data from the Discard Sensitivity Run (which accounts for dead discards). Annual catch levels associated with 3-year and 5 year (average) adjustment intervals are presented. Based on results from SEDAR Assessment Update.

4.2.3.1 Biological Effects of Rebuilding Strategy Alternatives

Rebuilding Strategy Alternative 1 would not define an explicit yield-based strategy for rebuilding the overfished stock. Not designating a strategy (**Alternative 1**) could make it difficult for fishery managers to plan how to regulate fishing effort throughout the rebuilding schedule. **Alternative 1** would retain the management measures that are currently in place. Therefore, the commercial quota would remain constant while the biomass of the stock increased. As a result, **Alternative 1** could provide the greatest biological benefit of all the alternatives since commercial harvest would not increase as the stock increases. Potential adverse impacts could occur in the recreational sector since recreational allocation would not be specified. This alternative has the potential to more rapidly rebuild the stock and increase the average age and size structure than the other alternatives. However, it does not cap the recreational portion of the fishery or provide a plan on how fishing effort would be regulated during the rebuilding schedule. This alternative would also perpetuate the existing levels of risk to ESA-listed species.

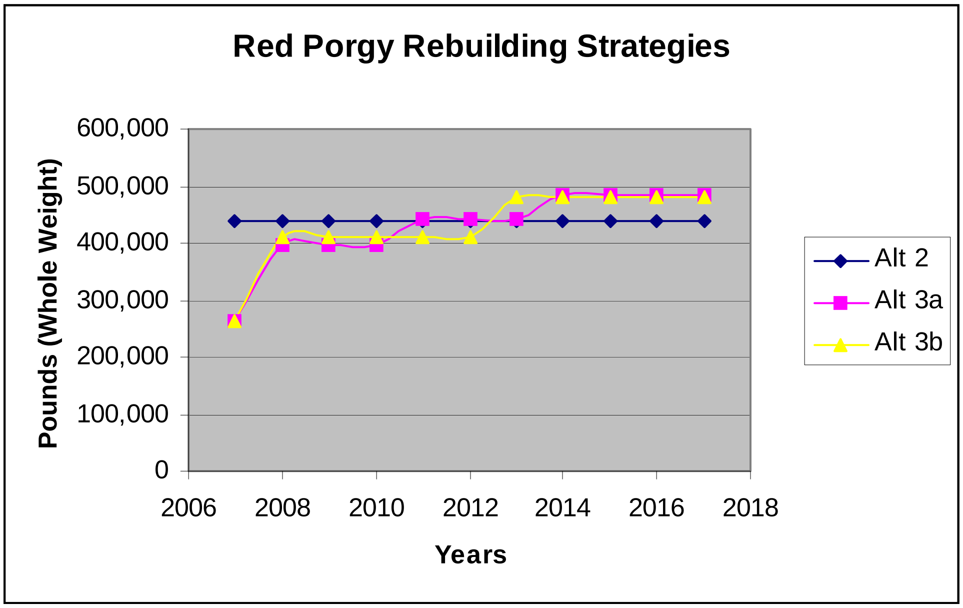


Figure 4-2. Annual allowable biological catch (lbs whole weight) values associated with three rebuilding strategy alternatives for red porgy. Note: After 2010, adjustments in catch would be made by framework or through a regulatory amendment in response to new assessments or assessment updates.

According to the projections provided by SEDAR 1 (2002), spawning stock biomass of red porgy is expected to increase as a result of management measures implemented through Amendment 12. MARMAP estimates of CPUE of red porgy taken at depths > 25 meters on the southeast continental shelf declined during 1983 through 1989 in Florida traps and during 1988 to 1997 in chevron traps (Harris and Machowski 2004). Since 1997, CPUE increased from 0.94 to 2.27 fish caught per hour, but declined in 2003 to the lowest value recorded since 1988 (0.84 fish per trap hour), followed by an increase to 2.38 fish per trap hour in 2004 and 2.97 fish per trap hour in 2005. The mean length of red porgy has also steadily increased since management measures were imposed through Amendment 12. Low CPUE in 2003 was probably the result of a persistent cold water upwelling event that occurred during summer 2003. With the exception of low CPUE during 2003, the increase in red porgy CPUE in recent years suggests the red porgy stock is rebuilding. The red porgy assessment update (2006) confirms that the red porgy stock is rebuilding. Red porgy are vulnerable to overfishing because they are protogynous, live for as long as 18 years, and achieve sizes as great as 36” TL.

All the action rebuilding strategy alternatives would result in beneficial effects to the stock and associated ecosystem by allowing fishery managers to regulate fishing effort throughout the rebuilding timeframe. **Alternatives 2 and 3** would account for estimates of increased dead discards resulting from actions taken in Amendment 13C. An increase in the magnitude of dead discards would be expected for red porgy if there was an increased in effort associated with the increase in TAC. However, any estimate of increased bycatch must rely upon many assumptions about how fishermen will change their behavior in response to new management measures. Six scenarios depicting methods and estimates of increased bycatch depending on varying assumptions is provided in Appendix E.

Alternative 2, a constant catch strategy would allow catches to increase above levels specified by management measures in Amendment 13C. This strategy would increase spawning stock biomass slowly in the initial years of the rebuilding schedule, and more quickly as time progresses. The average size and age of individuals in the fished population would increase at the slowest rate under a constant catch strategy compared to a constant F strategy where $F<F_{MSY}$ (Preferred **Alternative 3**), because the former supports a higher fishing mortality rate (and higher catches) in the beginning of the rebuilding period. As a result, constant catch strategies provide lower overall yield during the entire rebuilding period. Constant catch strategies also provide the least insurance against environmental conditions that might affect the survival of eggs and larvae, since they restore the age structure of the stock more slowly than do constant F strategy. The greater the percentage of older fishes, the greater the chance a population can withstand several years of poor recruitment due to natural environmental conditions, which affect the survival of juveniles. Thus, if stock productivity was accidentally overestimated or catches underestimated, management under a constant catch strategy would be more likely to worsen the condition of the stock than use of other strategies. Additionally, the estimated stock-recruitment relationship is assumed to apply into the future, and past residuals are assumed to represent future uncertainty in recruitment. If either of these factors were to change, rebuilding would be affected, and a more resilient population with more old fish would be more likely to succeed under these additional stressors.

The Council's Preferred Alternative 3, a constant $F<F_{MSY}$ strategy would not require additional harvest reductions relative to the status quo, but rather would allow harvest to increase throughout the rebuilding schedule as the stock rebuilds. Consequently the net biological benefits of **Alternative 1** could be greater than those of **Alternative 3**, because **Alternative 1** could allow the stock to rebuild ahead of schedule. However, **Alternative 1** could result in more bycatch than **Alternative 3** because **Alternative 3** would allow fishermen to retain more fish as the biomass increases, whereas, **Alternative 1** would not.

Preferred Alternative 3 would require lower catches in the early years of the rebuilding period than would the constant catch strategy **Alternative 2**. Fishing at a lower fishing mortality rate may increase population robustness to environmental perturbations (Rothschild 1986). The lower fishing mortality rates supported by Rebuilding Strategy **Alternative 3** has the potential to more rapidly increase the average age and size structure of the overfished population compared to the constant catch strategy. Rebuilding Strategy **Alternative 3** would allow the average size and age structure of red porgy to increase more rapidly relative to Rebuilding Strategy **Alternative 2**, which initially allows higher levels of fishing mortality. Older and larger females have greater reproductive potential because fecundity increases exponentially with size. Therefore, there is greater potential to more rapidly increase the number of young each year (recruitment) under Rebuilding Strategy **Alternatives 3**.

The Council's **Preferred Alternative 3** would be expected to improve the spawning potential of red porgy, the chance of recruitment success and would provide greater resiliency against inadvertent overestimation of productivity or underestimation of stock status. This reduction would allow the average size and age structure of the overfished stock to increase more rapidly relative to Rebuilding Strategy **Alternative 2**, which initially would allow higher levels of fishing mortality.

Environmental factors such as weather, currents, and water temperature may affect the survival of eggs and larvae, causing poor recruitment even when large numbers of offspring are produced. Thus, alternatives, which allow the population to more rapidly attain a greater number of older, larger fishes in the population, also provide additional protections against recruitment failure due to several years of poor environmental conditions for eggs and larvae, creating a more robust population. Delaying rebuilding could make stocks more susceptible to adverse environmental conditions that might affect recruitment success, or to unanticipated errors in parameter estimates, which could result in excessive fishing. Because it would bolster stock biomass early in the rebuilding period as opposed to later on, **Alternative 3** would likely have the strongest positive effect on the biological and ecological environment.

In theory, the net ecological effects of the choice of Rebuilding Strategy **Alternatives 2 and 3** would be positive, as the reef community would more closely represent one which would persist in a natural, or undisturbed state and the possibility of ecosystem overfishing would be reduced. However, as fishing pressure is reduced on co-occurring species, fishermen may target other members of the reef fish ecosystem such as red porgy, which have fewer fishing restrictions. This displacement of effort may further disrupt community structure. The natural balance of an ecosystem cannot be fully restored as long as the ecosystem is subjected to fishing-related mortality. Additionally, there is some speculation that a disrupted community cannot be restored to pre-existing conditions, because it may change to a new climax community in a post-disturbed condition with a different suite of species.

The level of fishing effort applied to the fishery can influence fishing gear interactions with the sea floor. Furthermore, fish abundance, species composition, and the interaction of different fish and invertebrate species can have an effect on the habitat that they occupy. However, the number, nature, and extent of such interactions are more greatly influenced by the type of management measures that regulate the extent and distribution of fishing effort.

Rebuilding Strategy **Alternatives 2 and 3** differ primarily in how they would distribute the rebuilding burden over time. However, the average fishing effort supported by each alternative throughout the rebuilding period is similar. Thus, any differences in the habitat effects associated with the three rebuilding strategy alternatives are probably insignificant over the long-term. Additionally, regardless of potential differences in the magnitude of effects associated with different rebuilding strategy alternatives, all are expected to only minimally affect the physical environment because the primary gear used in this fishery (hook and line) is believed to have minimal effects on the sea floor.

The overall impacts of **Alternative 2 and Preferred Alternative 3** on ESA-listed species are uncertain. Sea turtle abundance in the South Atlantic changes seasonally and the impact of fishing effort shifts, if any, resulting from these alternatives is difficult to predict. Current monitoring programs will allow NMFS to track and evaluate any increased risk to ESA-listed species. If necessary, an ESA consultation can be re-initiated to address any increased levels of risk.

4.2.3.2 Economic Effects of Rebuilding Strategy Alternatives

4.2.3.2.1 Recreational Sector

A description of the modeling approach used to examine the rebuilding strategy alternatives on the recreational sector is contained in Appendix G and Section 4.1.3.2.1 and is not repeated here.

The expected impacts of the alternative rebuilding strategies for red porgy are contained in Tables 4-15 through 4-18. Under the interactive modeling procedure which allowed total snapper-grouper target effort to be constrained by the most limiting of the three species, the snowy grouper allocation, approximately 4,000 pounds from 2008 onward, and resultant number of snapper-group target trips that the allocation would support was the most limiting allocation, resulting in virtually no differences in projected surplus totals among the red porgy rebuilding strategy alternatives (Tables 4-15 and 4-17). While the biomass differences of the alternative rebuilding strategies translate into changes in the estimates of consumer surplus per trip, total target effort applied to the snapper-grouper fishery is constrained by the snowy grouper allocation, which is held constant across all alternatives at either the status quo or preferred alternative biomass projections. Thus, most impact differences resulting from the alternative rebuilding strategies for red porgy are suppressed by the behavioral constraints of the snowy grouper allocation.

As a result of the strong influence the snowy grouper allocation had on the modeling results, the results where effort is constrained only by the red porgy allocation, as shown in Tables 4-16 and 4-18, may be more informative in distinguishing differences among the red porgy rebuilding strategy alternatives. Assuming status quo biomass streams for snowy grouper and black sea bass, differences in total surplus in the recreational sector relative to the status quo over the period 2007-2016 range from approximately $84 million for **Alternative 2** to approximately $70 million for **Preferred Alternative 3a** and **Alternative 3b**, while differences relative to **Preferred Alternative 3a** range from approximately -$71 million for **Alternative 1** (status quo) to approximately $200,000 for **Alternative 3b**. These values change only slightly if the preferred biomass streams for snowy grouper and black sea bass are used (Table 4-18). Thus, the projected economic impacts of **Alternative 2** exceed those of **Preferred Alternative 3a**. Analytically, these results are generated by the fact that a larger total recreational harvest would occur under **Alternative 2**, 4.8 million pounds to 4.7 million pounds, and the negative influence of discounting on the greater annual allocations under **Preferred Alternative 3a** that occur in the later years of the rebuilding schedule.

The strong cross-species influence of the model suggests that as the different species rebuild, management strategies may need to adjust to allow harvest and effort growth for a single species separate from the other species. As seen when comparing the results from Tables 4-15 and 4-17 (effort constrained by the most limiting species) with Tables 4-16 and 4-18 (effort constrained only by the red porgy allocation), a considerably greater amount of snapper-grouper effort, with accompanying value, is possible over 2007-2016 if not limited by the snowy grouper allocation.

Table 4-15. Summary of the cumulative expected recreational sector impacts (consumer and producer surplus) of the red porgy rebuilding strategy alternatives, 2007-2016, 7% discount rate. Note: Effort constrained by allocation of most limiting of all 3 species (black sea bass, red porgy, and snowy grouper). Status quo biomass for other species.

	Consumer Surplus				Producer Surplus				Total Surplus	
	Difference with respect to:				Difference with respect to:				Difference with respect to:	
	Alt 1 (status quo)		Preferred Alt 3a		Alt 1 (status quo)		Preferred Alt 3a		Alt 1 (status quo)	Preferred Alt 3a
Alt	Angler Trips	Consumer Surplus	Angler Trips	Consumer Surplus	Angler Trips	Producer Surplus	Angler Trips	Producer Surplus	Surplus	Surplus
1	0	$0	0	$2,149	0	$0	0	$0	$0	$2,149
2	0	-$4,001	0	-$1,852	0	$0	0	$0	-$4,001	-$1,852
Pre3a	0	-$2,149	0	$0	0	$0	0	$0	-$2,149	$0
3b	0	-$2,149	0	$0	0	$0	0	$0	-$2,149	$0

Table 4-16. Summary of the cumulative expected recreational sector impacts (consumer and producer surplus) of the red porgy rebuilding strategy alternatives, 2007-2016, 7% discount rate. Note: Effort constrained by red porgy allocation only. Status quo biomass for other species.

	Consumer Surplus				Producer Surplus				Total Surplus	
	Difference with respect to:				Difference with respect to:				Difference with respect to:	
	Alt 1 (status quo)		Preferred Alt 3a		Alt 1 (status quo)		Preferred Alt 3a		Alt 1 (status quo)	Preferred Alt 3a
Alt	Angler Trips	Consumer Surplus	Angler Trips	Consumer Surplus	Angler Trips	Producer Surplus	Angler Trips	Producer Surplus	Surplus	Surplus
1	0	$0	-6,742,573	-$30,098,272	0	$0	-536,234	-$40,104,635	$0	-$70,202,907
2	8,342,490	$29,913,801	1,599,917	-$184,471	663,475	$53,846,972	127,241	$13,742,337	$83,760,773	$13,557,865
Pre3a	6,742,573	$30,098,272	0	$0	536,234	$40,104,635	0	$0	$70,202,907	$0
3b	6,773,521	$29,828,498	30,948	-$269,774	538,695	$40,552,081	2,461	$447,445	$70,380,579	$177,672

Table 4-17. Summary of the cumulative expected recreational sector impacts (consumer and producer surplus) of the red porgy rebuilding strategy alternatives, 2007-2016, 7% discount rate. Note: Effort constrained by allocation of most limiting of all 3 species (black sea bass, red porgy, and snowy grouper). Preferred biomass streams for other species.

	Consumer Surplus				Producer Surplus				Total Surplus	
	Difference with respect to:				Difference with respect to:				Difference with respect to:	
	Alt 1 (status quo)		Preferred Alt 3a		Alt 1 (status quo)		Preferred Alt 3a		Alt 1 (status quo)	Preferred Alt 3a
Alt	Angler Trips	Consumer Surplus	Angler Trips	Consumer Surplus	Angler Trips	Producer Surplus	Angler Trips	Producer Surplus	Surplus	Surplus
1	0	$0	0	-$103,760	0	$0	0	$0	$0	-$103,760
2	0	-$3,488	0	-$107,247	0	$0	0	$0	-$3,488	-$107,247
Pre3a	0	$103,760	0	$0	0	$0	0	$0	$103,760	$0
3b	0	$103,760	0	$0	0	$0	0	$0	$103,760	$0

Table 4-18. Summary of the cumulative expected recreational sector impacts (consumer and producer surplus) of the red porgy rebuilding strategy alternatives, 2007-2016, 7% discount rate. Note: Effort constrained by red porgy allocation only. Preferred biomass streams for other species.

	Consumer Surplus				Producer Surplus				Total Surplus	
	Difference with respect to:				Difference with respect to:				Difference with respect to:	
	Alt 1 (status quo)		Preferred Alt 3a		Alt 1 (status quo)		Preferred Alt 3a		Alt 1 (status quo)	Preferred Alt 3a
Alt	Angler Trips	Consumer Surplus	Angler Trips	Consumer Surplus	Angler Trips	Producer Surplus	Angler Trips	Producer Surplus	Surplus	Surplus
1	0	$0	-6,742,573	-$31,317,006	0	$0	-536,234	-$40,104,635	$0	-$71,421,641
2	8,342,490	$29,023,182	1,599,917	-$2,293,823	663,475	$53,846,972	127,241	$13,742,337	$82,870,154	$11,448,514
Pre3a	6,742,573	$31,317,006	0	$0	536,234	$40,104,635	0	$0	$71,421,641	$0
3b	6,773,521	$31,046,956	30,948	-$270,049	538,695	$40,552,081	2,461	$447,445	$71,599,037	$177,396

4.2.3.2.2 Commercial Sector

A description of the modeling approach used to examine the rebuilding strategy alternatives on the commercial sector is contained in Appendix F and Section 4.1.3.2 and is not repeated here. However, due to the significant red porgy harvest restrictions in place from 2001-2005, data from 1995-1998 was used instead. Although landings data during this period was consistent with the landings that would be allowed under the various rebuilding strategies, the model predictions were that not all of the available quota would be harvested. This was due to regulations that will remain in place, such as the January-April closure and the minimum size limit, and an inability of the model to increase effort beyond what occurred during the 1995-1998 period. In reality, it would be expected that fishermen would modify their fishing behavior to capture the full quota; therefore, the results provided below are expected to understate actual benefits. Use of the 1995-1998 data instead of the 2001-2005 data also results in total value of the fishery over the recovery period being substantially greater than the results of the assessments for snowy grouper or black sea bass, approximately $57 million versus $41 million. The change in net operating revenues, in either dollar or percentage terms, should not be affected, however, and should be the focus of attention.

The expected impacts of the alternative rebuilding strategies for red porgy on the commercial sector are contained in Table 4-19. Only minor differences in the total net operating revenues over the period 2007-2016 are projected. Assuming status quo conditions for the other actions considered in this amendment, the differences in total net operating revenues relative to the status quo range from only $0.29 million for **Preferred Alternative 3a and Alternative 3b** to $0.33 million for **Alternative 2**. Assuming preferred alternative conditions for the other actions, the differences in total net operating revenues relative to the status quo range from $0.28 million for **Preferred Alternative 3a** and **Alternative 3b** to $0.32 million for **Alternative 2**.

Identifying the least favorable alternative by gear sector (greatest loss relative to the status quo or smallest gain where no losses are projected; tabular results not shown), the vertical line sector is projected to experience gains in net operating revenues relative to the status quo under all alternatives, with the smallest gain, 0.60%, under **Preferred Alternative 3a and Alternative 3b** assuming status quo conditions for the other actions, and 0.58% assuming preferred conditions for the other actions. The results are the same, with only the percentage gains changing, for all other gear sectors except for the "other" gear sector. For the longline sector, the gains are 0.08% and 0.05% for status quo and preferred alternative conditions for the other actions, respectively, for the trolling sector, 0.16% and 0.16%, for the trap sector, 0.13% and 0.09%, and for the dive sector, 0.15% and 0.15%. For the "other" gear sector, unlike the other sectors, losses in net operating revenues are projected, with the greatest losses associated with Alternative 2, -0.09%, under both status quo conditions and preferred conditions. Viewed from a different perspective and examining only the results assuming preferred conditions for the other actions, **Alternative 2** is projected to produce the greatest loss for the "other" gear sector, -0.09%, and produce the largest gain for the vertical line sector, 0.65%. For **Preferred**

Alternative 3a, the "other" gear sector loses the most, -0.06%, in net operating revenues, while the vertical line sector gains the most, 0.58%. **Alternative 3b** results in similar results to those of **Preferred Alternative 3a**.

In a similar examination identifying a fleet by state/area landed, all states/areas are projected to experience the smallest gains in net operating revenues under **Preferred Alternative 3a and Alternative 3** (tabular results not shown). With the exception of the "other" area, which is projected to result in no change, all states/areas are projected to experience gains in net operating revenues under preferred conditions of the other actions relative to status quo conditions. Viewed from a different perspective and examining only preferred conditions for the other actions, **Alternative 2** is projected to generate the smallest relative gain (percentage change) on the Keys fleet, 0.08%, and the largest relative gain on the Georgia-Northeast Florida fleet, 0.93%. Results are identical for **Preferred Alternative 3a** and **Alternative 3b**, with the Keys experiencing the smallest relative gain, 0.06%, and the Georgia-Northeast Florida fleet projected to gain 0.79%.

Table 4-19. Summary of the expected cumulative commercial sector net operating revenues for the red porgy rebuilding strategy alternatives, 2007-2016, 7% discount rate.

	Given status quo alternatives for other actions			Given preferred alternatives for other actions		
Alternative	Net Present Value at 7% (million $)	Change compared to Alt 1	Percentage Change	Net Present Value at 7% (million $)	Change compared to Alt 1	Percentage Change
1	$57.05	$0.00	0.00%	$56.91	$0.00	0.00%
2	$55.38	$0.33	0.58%	$57.22	$0.32	0.56%
Pre3a	$57.34	$0.29	0.51%	$57.18	$0.28	0.49%
3b	$57.34	$0.29	0.51%	$57.18	$0.28	0.49%

4.2.3.3 Social Effects of Rebuilding Strategy Alternatives

Social impacts of management accrue incrementally to fishing regulations and conditions that exist each year, and cumulatively as conditions are compounded over multiple years (single year or short-term restrictions may result in minimal social impact, whereas persistent restrictions would be expected to result in more significant impacts). In general, smaller harvest levels entail greater short-term dislocations and adjustments for the social environment. Commercial and recreational fishermen may be able to adjust to harvest reductions by switching to other species or by leaving fishing and seeking other employment or recreational opportunities elsewhere. If other species are depleted, regulations may prevent fishermen from freely switching to another fishery, or if other forms of employment or recreational activities are unavailable or difficult to find, then the adjustments would be more severe than if alternatives were readily available.

The rebuilding strategies considered encompass constant catch and constant fishing mortality rate (F) approaches, with different periods of catch adjustment. The basic principle of a constant catch strategy is to maintain the allowable harvest at a constant amount for the entire rebuilding period. This is a conservative strategy that creates the least socio-economic disruption in the short-term to the fishing industry and associated businesses, assuming the harvest level is relatively close to current harvests. However, medium- and long-term problems may arise as catch rates increase with the rebuilding resource and ABC is held constant. The increased catch rates would be expected to induce a perception among fishermen that regulation is too restrictive, particularly if increased bycatch mortality occurs, jeopardizing recovery goals. Political pressure to increase allowable catches is likely, although the long-term biological recovery may not be complete.

Constant F strategies recognize the limitations of constant catch strategies by allowing catches to increase as the stock recovers and biomass increases. Starting harvest levels under constant F approaches are typically lower than constant catch levels, resulting in greater initial restrictions and short-term social and economic losses, but higher subsequent harvest levels support greater medium- and long-term benefits.

The alternatives considered vary by the assumption of the starting biomass and periodicity of harvest increases. Annual adjustments in allowable harvest best match allowable catches with changes in available biomass. However, fishery management does not operate in a "real time" manner and the presumption that each year's biomass can be monitored and allowable biological catch altered annually and appropriately is desirable but difficult to achieve. Rebuilding strategies that adjust the allowable harvest every in multiple year increments combine the philosophies of constant catch and constant F strategies, but within shorter timeframes. The allowable harvest would remain constant within each 3 or 5-year adjustment period and largely represent an average of what would be allowed over the entire period if annual adjustments were made. As such, the allowable harvest levels are higher during the first years than would be allowed with annual adjustments, and lower in later years. Therefore, short-term adverse socio-economic impacts during the first years of each multi-year adjustment period would be less than during the corresponding years with an annual adjustment in allowable harvest, and more than those in the last years.

The results of the economic impact analysis presented in Section 4.2.3.2 capture some aspects of the cumulative impacts of the trade-offs of short-term and long-term impacts. For the commercial sector, the economic results suggest that the alternative red porgy rebuilding strategies are largely neutral over the cumulative period 2007-2016, varying by only approximately $280,000-$330,000 in net operating revenues over the 10-year evaluation period. While not projected to generate the largest gain, **Preferred Alternative 3a** is projected to result in only about $40,000 less than **Alternative 2,** the significance of the difference is reduced by recalling that the results are cumulative 10-year totals and do not capture fishermen behavioral adaptation. Given the indication that all alternatives to the status quo are projected to result in increased benefits with likely associated social benefits and the absence of substantial difference between the amounts, investigation of differential social and community impacts makes little practical sense. Nevertheless, it should be recalled from the discussion of economic impacts that the largest relative gains (percentage change) for all alternatives are projected to occur in the Georgia-Northeast Florida fishery, followed by South Carolina and North Carolina. From an absolute perspective, given the larger size of the fisheries in South Carolina and North Carolina for red porgy, the absolute gain in net social and economic benefits would be expected to be greater in these states and respective communities. Due to the relative closeness of the allowable catch under all alternatives to the status quo, little differential perception of the harvest levels being excessively binding as the catch rate rebounds during the rebuilding period is expected to occur. However, **Alternative 2** includes the lowest catch level in the later years of the rebuilding period, is not adjusted over the rebuilding period and, thus, is more susceptible than **Preferred Alternative 3a and Alternative 3b** to resulting in the adverse social impacts associated with binding limits.

For the recreational sector, all alternatives are projected to generate greater net economic benefits than the status quo, with commensurate social benefits, assuming performance in the red porgy fishery is not constrained by the snowy grouper fishery (see Section 4.2.3.2.1). However the benefits of **Preferred Alternative 3a,** which are virtually identical with those of **Alternative 3b**, are projected to be less than those associated with **Alternative 2**. Thus, while none of the alternatives to the status quo are projected to result in any adverse economic or social impacts, greater benefits would be expected to accrue to **Alternative 2**. Available data does not support regional comparisons, similar to the commercial analysis. The majority of recreational red porgy harvests, similar to the commercial sector, come from North Carolina and South Carolina, so communities in those states would be expected to benefit the most from the recovered resource and increased economic benefits. Similarly, however, while none of the alternatives are projected to result in declining benefits, fishermen and communities in these states would be expected to suffer the most from the foregone benefits associated with adopting the preferred alternative over the potential greater benefits of **Alternative 2**.

In summary, all fishermen and associated communities in the recreational red porgy fishery would be expected to gain increased net economic benefits, with accompanying increased social benefits, under all alternatives to the status quo. The expected benefits of **Preferred Alternative 3a** are approximately equal to those of **Alternative 3b** and less than those of **Alternative 2**. In the commercial sector, North Carolina and South Carolina fishermen and associated communities would be expected to experience greatest gains in economic and associated social benefits in absolute terms under all alternatives to the status quo, with fishermen in the Keys benefiting the least, discounting the relatively inconsequential fisheries in the "other" area. In relative terms (percentage change), fishermen in Georgia-Northeast Florida would be expected to benefit the most under all alternatives to the status quo.

In addition to the above considerations, the preferred rebuilding strategy for the social environment would be expected to be influenced by the fishermen's perceptions of stock status. If fishermen believe that the resource is overfished, then they probably would be willing to accept short-term socio-economic losses in exchange for long-term increases in harvest rates. Constant F strategies probably would be preferred because the fishermen would more quickly realize the benefits of resource rebuilding through corresponding increases in allowable harvest. However, if fishermen disagree with the stock assessment, then they would be less willing to incur reductions in current harvest rates. In this event, fishermen would prefer the constant catch rebuilding strategy because it minimizes short-term socio-economic losses while additional biological information is collected and assessed. Modified constant F strategies probably would be preferred by fishermen who perceive the stock to be overfished, but who are not certain about the magnitude of potential long-term benefits.

4.2.3.4 Administrative Effects of Rebuilding Strategy Alternatives

The administrative burden would be least for the Rebuilding Strategy **Alternative 1**, which would not establish a rebuilding strategy and would not require a change in management regulations. However, **Alternative 1** could also constitute an administrative burden because a rebuilding strategy is required as part of a rebuilding plan. Therefore, if **Alternative 1** was selected as the preferred, additional actions would be required in the future to specify a rebuilding strategy. **Alternative 3a** would have the greatest administrative effect since catch would increase as the stock rebuilds. **Alternative 2**, which would hold catch constant throughout the rebuilding would have an administrative effect similar to **Alternative 1**.

4.2.3.5 Council's Conclusion on Rebuilding Strategy Alternatives

A red porgy rebuilding strategy based on a constant fishing mortality rate throughout the rebuilding timeframe is the **Council's preferred alternative**. The TAC for 2009 and 2010 would be 395,281 pounds whole weight until modified. The Council obtained public input during the public hearing and informal review process on the preferred alternatives and the other alternatives as well. (Note: **Appendix A** contains additional alternatives considered but eliminated from detailed consideration.) The Council did not receive any public comments addressing red porgy rebuilding strategies.

The Snapper Grouper Advisory Panel has repeatedly indicated the status of red porgy is much better than indicated by the stock assessment. The AP has reported that at times it is difficult to get a hook with bait to the bottom with the large number of red porgies present. The Panel endorsed a rebuilding strategy that allows TAC of red porgy to increase.

The Law Enforcement Advisory Panel did not have comments specific to the red porgy rebuilding strategy.

The Scientific and Statistical Committee (SSC) reviewed the SEDAR Assessment and approved the assessment as being based on the best available science. The SSC raised concerns about not including bycatch or post-quota mortality into Amendment 13C actions. Discard and post-quota mortality, from bycatch and discard mortality, has now been incorporated in rebuilding strategy alternatives that change TAC after 2008. The SSC concluded the economic analysis for Amendment 15A is thorough and provides estimates of economic impacts using the best available science. In December 2007, the SSC endorsed Amendment 15A as based on best available science.

Although the SSC indicated the social impact assessments in the public hearing version of Amendment 15A was comprehensive and well written, the SSC concluded that the assessment of the social effects or ramifications of the proposed actions was inadequate for decision-making. The Snapper Grouper Committee reviewed the public hearing input and recommendations from the Snapper Grouper AP, Law Enforcement AP, and the SSC. Committee members did not change the preferred red porgy rebuilding strategy alternative taken to public hearings.

The Council agreed with the Committee's recommendation that the preferred rebuilding strategy alternative should not be modified. The specified rebuilding strategy balances the desire to increase catches while continuing to rebuild the red porgy stock. The Council also indicated the Social Analysis could be improved but stated the deficiency was a function of data limitations rather than an analytical shortcomings. The Council concluded data would need to be collected for at least two years before a more meaningful social analysis could be conducted. The Council indicated the analysis was adequate to move forward at this time.

4.3 Black Sea Bass

Results from SEDAR 2 (2003) and the SEDAR 2 Update I (2005) indicated black sea bass was experiencing overfishing and was overfished. Amendment 13C implemented the following management measures to end overfishing: Establish and decrease an annual commercial quota over three years from 477,000 lbs gw to 309,000 lbs gw in year 3; require the use of at least 2-inch mesh for the entire back panel of pots; remove pots from the water once the commercial quota is met; change commercial and recreational fishing years from the calendar year to June 1 through May 31; establish a recreational allocation which would decrease over three years from 633,000 lbs gw to 409,000 lbs gw in year 3; increase the recreational size limit from 10-inch TL to 12-inch TL over two years; and reduce the recreational bag limit from 20 to 15 per person per day. The annual Stock Assessment and Fishery Evaluation Report (SAFE) will provide some indication if actions were sufficient to end overfishing.

Amendment 11 implemented a 10-year rebuilding plan beginning in 1999. A new rebuilding schedule will be established through Amendment 15A and year one will be 2006 when Amendment 13C regulations were implemented.

4.3.1 Management Reference Point Alternatives

Table 4-20. MSY alternatives under consideration for black sea bass.

Alternatives	MSY equation	F_{MSY} equals	MSY value
Alternative 1 (no action)	The yield produced by $F_{MSY.}$ $F_{30\%SPR}$ is used as the F_{MSY} proxy.	0.72*	Not specified.
Alternative 2 (preferred)	MSY equals the yield produced by $F_{MSY.}$ MSY and F_{MSY} are defined by the most recent SEDAR.	0.43**	2,777,825 lbs whole weight.**
*Source: Vaughan *et al.* 1996 **Source: SEDAR Update 1 2005			

Table 4-21. OY alternatives under consideration for black sea bass.

Alternatives	OY equation	F_{OY} equals	OY value
Alternative 1 (no action)	OY equals the yield produced by F_{OY}. $F_{40\%SPR}$ is used as the F_{OY} proxy.	0.4*	not specified
Alternative 2	OY equals the yield produced by $F_{OY.}$ If a stock is overfished, F_{OY} equals the fishing mortality rate specified by the rebuilding plan designed to rebuild the stock to SSB_{MSY} within the approved schedule. After the stock is rebuilt, F_{OY} = a fraction of F_{MSY}. Black sea bass is overfished.	(65%)(F_{MSY})	2,689,640 lbs whole weight**
Alternative 3 (preferred)		(75%)(F_{MSY})	2,742,551 lbs whole weight**
Alternative 4		(85%)(F_{MSY})	2,766,802 lbs whole weight**
*Source: Powers 1999 **Calculated based on Council's preferred MSY value in which F_{MSY} equals 0.43 (SEDAR Update 1 2005).			

Table 4-22. Criteria used to determine the overfished and overfishing status of black sea bass. Note: Actions in Amendment 13C will end overfishing of black sea bass in 2009.

DETERMINATION	SSB_{CURR} (2004)	MSST	F_{CURR} (2003)	MFMT	STATUS
OVERFISHED?	4,099,884 lbs	10,511,633 lbs*			Overfished (SSB_{CURR}/MSST = 0.39)
OVERFISHING?			2.64	0.429**	Overfishing (F_{CURR}/MFMT = 6.15)***

*The value for MSST is from SEDAR Update 1 (2005) based on an M of 0.30. Amendment 15A is not exploring alternatives for MSST, as Amendment 11 designated the maximum of either 0.5 or 1-M(B_{MSY}). B_{MSY} = 15,017,000 lbs whole weight (SEDAR Update 1 2005). The Council has not indicated any desire to change this definition.
**Amendment 15A is also not exploring alternatives for MFMT. F_{MSY} is used as a proxy for MFMT. All lbs are in whole weight. Note: This is not an action item.
***Actions were taken in Amendment 13C to end overfishing in 2009.

4.3.1.1 Biological Effects of Management Reference Point Alternatives

National Environmental Policy Act (NEPA) regulations at 40 CFR §1508.8 (a) define direct effects "which are caused by the action and occur at the same time and place". NEPA regulations at 40 CFR §1508.8 (b) define indirect effects as those "which are caused by the action and are later in time or farther removed by distance." According to the NEPA definitions of direct and indirect effects, defining MSY, and OY for black sea bass will not directly affect the biological or ecological environment, including ESA-listed species, because these parameters are not used in determining immediate harvest objectives. MSY and OY are reference points used by fishery managers to assess fishery performance over the long-term. As a result, redefined management reference points could require regulatory changes in the future as managers monitor the long-term performance of the stock with respect to the new reference points. Therefore, these parameter definitions will indirectly affect subject stocks and the ecosystem of which they are a part, by influencing decisions about how to maximize and optimize the long-term yield of fisheries under equilibrium conditions.

MSY Alternative 1 would retain SPR-based MSY definition as a proxy for MSY established for black sea bass in Snapper Grouper Amendment 11 (1998). This SPR-based definition specifies a fixed fishing mortality rate, which would reduce the spawning biomass per recruit to 30% of the unfished level. The Council's **Preferred Alternative 2** would redefine MSY of the black sea bass stock to equal the value recommended by the most recent SEDAR assessment (SEDAR Assessment Update 1 2005). **Preferred Alternative 2** would benefit the biological and ecological environment by improving the scientific basis for managing the black sea bass stock.

MSY in **Alternative 1** is defined as the yield produced by F_{MSY} where $F_{30\%SPR}$ is used as the F_{MSY} proxy. The SPR-based estimate of F_{MSY} = 0.72 in **Alternative 1** is much greater than the estimate from the biomass-based assessment in the Council's **Preferred**

Alternative 2 (F_{MSY} = 0.43). Similarly, MSY from **Alternative 1** would be 3.717 million pounds whole weight would be higher than the estimate of MSY from **Preferred Alternative 2** (2.778 million pounds whole weight).

MSY is a function of certain characteristics of the current fish population, such as its age and size structure. Given our current state of knowledge about the stock, **Alternative 2** offers a better estimate of the true MSY. Stocks with reference points based on SEDAR assessments are expected to provide the strongest positive environmental effects. Overestimating reference points could cause fishery managers to unintentionally allow the stocks to be overexploited. Overexploitation can have many negative effects on the fished stock including a decline in number of individuals, reduced fish size, a decrease in the size/age at maturity, decrease in the size/age at transition, growth overfishing, compromised genetic integrity, ecosystem overfishing and recruitment failure. Although **Alternative 2** is considered to be the best estimate of MSY, **Alternative 1** could be a legitimate choice if the estimate for **Alternative 2** was not known with certainty, or if regulatory protections change the age and size structure of the population. If MSY based on **Alternative 2** really were too low, then biomass would continue to increase and adjustments would be made through future assessments.

McGovern *et al*. (2002) report that, although the black sea bass stock appeared to be in better condition in the late 1990s than in the mid-1980s, years of heavy fishing pressure had reduced the size and age at maturity of female black sea bass, as well as the size and age at sexual transition from male to female. Black sea bass SPR increased from 18.9% in 1995 to 25.8% in 2003, also indicating the condition of the black sea bass stock had improved in recent years. However, Wenner *et al*. (1986) indicate that the size at age of black sea bass during 1978-1982 was smaller than during the 1960s (Cupka *et al*. 1973) suggesting that black sea bass were already overexploited when studies conducted by Wenner *et al.* (1986) and McGovern *et al.* (2002) were initiated.

The update of the Black Sea Bass SEDAR assessment (SEDAR Assessment Update #1 2005) shows that population abundance and spawner biomass was lower than what is needed to sustain the population at B_{MSY} and reductions in fishing mortality are needed. However, SEDAR Assessment Update #1 (2005) indicates the size limit, instituted in 1999, may have ensured that a level of spawner biomass persisted even in a heavily fished population.

OY Alternative 1 would retain the OY definition established in the Snapper Grouper FMP Amendment 11; however, the value for OY was not specified due to the data limitations. Not designating an OY value or designating one that is not based upon the best available science (**Alternative 1**) would have adverse, indirect effects on the black sea bass stock. This SPR-based definition specifies a fixed fishing mortality rate, which would reduce the spawning biomass per recruit to 40% of the unfished level. Like OY **Alternative 1**, **Alternatives 2-4** would specify fixed fishing mortality rates. However, the rates defined by **Alternatives 2-4** relate directly to what is expected to produce MSY (F_{MSY}), consistent with the definition of OY provided in the Magnuson-Stevens Act and as discussed in the National Standard Guidelines at 50 CFR 600.310(b). An estimate of

OY from **Alternative 1** would be lower (~2,120,000 lbs whole weight) than the OY from SEDAR Update 1 (2005) specified in the Council's **Preferred Alternative 3** (2,743,000 lbs whole weight). However, as **Alternative 3** is based on a recent assessment, it would provide a better estimate of the OY than **Alternative 1**.

The more conservative the estimate of OY, the larger the sustainable biomass. The biomass of the population would be least when the rate of fishing mortality is equal to F_{MSY} and would be greatest when the fishing mortality rate was equivalent to 65% of F_{MSY}. Therefore, a larger sustainable biomass associated with a fishing mortality rate at 65% of F_{MSY} would be good for the stock, but bad for the fishery, in the short-term, because longer and/or harder short-term reductions in harvest would be needed to achieve larger sustainable biomass.

Alternatives 2-4 are distinguished from one another by the level of risk (and associated tradeoffs) each would assume. **Alternative 2** represents the most precautionary management program of those considered for each unit. This alternative defines OY to equal the average yield associated with fishing at just 65 percent of F_{MSY}. This OY definition would provide the largest buffer between MSY and OY relative to the other alternatives and, consequently, the greatest assurance that management measures designed to achieve OY would be effective in sustaining the stocks over the long-term. These alternatives would indirectly benefit the biological and ecological environment by providing a more precise estimation of OY based upon a recent stock assessment.

The Council's **Preferred Alternative 3** defines OY to equal the average yield associated with fishing at 75% of F_{MSY}. This definition reduces slightly the safety margin between MSY and OY relative to **Alternative 2**. Restrepo *et al*. (1998) state "that fishing at 75% of F_{MSY} would result in equilibrium yields at 94% of MSY or higher, and equilibrium biomass levels between 125% and 131% of B_{MSY} – a relatively small sacrifice in yield for a relatively large gain in biomass." A simple deterministic model described in Mace (1994) to evaluate the effects of fishing at 75% of F_{MSY} indicates that the ratios are consistent across a broad set of life history characteristics ranging from species such as snowy grouper with low natural mortality rates to more productive species like vermilion snapper and black sea bass. Restrepo *et al*. (1998) determined the ratio between the yield of fishing at 75% of F_{MSY} relative to fishing at F_{MSY} would range from 0.949 and 0.983. Restrepo *et al*. (1998) also indicate fishing at this rate under equilibrium conditions is expected to reduce the risk of overfishing by 20-30%. Black sea bass are vulnerable to overfishing because they are moderately long-lived (max age = 20 years), achieve sizes as great as 26" TL, and are protogynous. Therefore, the biological and ecological effects of this definition for black sea bass are still expected to be positive.

Alternative 4 defines OY to equal the average yield associated with fishing at 85% of F_{MSY}. This is the least conservative of those OY alternatives considered because it would further reduce the precautionary buffer between OY and MSY. Therefore, this definition would provide the least amount of indirect benefits to the biological and ecological environment, and could make it more difficult to sustain black sea bass over the long-term.

4.3.1.2 Economic Effects of Management Reference Point Alternatives

4.3.1.2.1 General Concepts

A discussion of the general concepts related to the economic effects of management reference points is provided in Section 4.1.1.2.1 and is included herein by reference.

4.3.1.2.2 Comparison of Fishery with Management Reference Point Alternatives

Combined recreational and commercial black sea bass harvests averaged approximately 1.912 million lbs from 1986-2005, approximately 1.62 million lbs from 2001-2005, and totaled approximately 1.71 million lbs in 2005. The South Atlantic black sea bass resource has been determined to be overfished and undergoing overfishing, and the expected impacts of alternative rebuilding schedules and strategies are presented in Sections 4.3.2 and 4.3.3, respectively. The third-year total allowable black sea bass harvest implicit in Amendment 13C (SAFMC 2006), as part of the three-year harvest step-down reduction to end overfishing, is 847,000 lbs whole weight and is assumed to be the status quo harvest level for the purpose of this proposed amendment. The MSY specification in **Preferred Alternative 2** is approximately 2.778 million lbs. Thus, the proposed MSY will support increased harvests relative to the status quo, with accompanying long-term increased positive economic benefits, after the resource is rebuilt. Additional details on these benefits are provided in the discussion of rebuilding schedules in Section 4.3.2.2. The MSY defined by **Alternative 1** is roughly estimated as 3.717 million lbs, though a harvest this high is unprecedented during the 1986-2004 data record, suggesting that biological factors and not management induced harvest constraints underlie the absence of consistent harvests at this level. This suggests the MSY indicated by **Alternative 1** may be inappropriate for this resource. As such, the adoption of **Alternative 1** and subsequent allowance of harvest at the respective MSY value may lead to excessive exploitation, precipitating the imposition of restrictive management measures and reductions in economic benefits.

The OY defined by **Alternative 1** is estimated as 2,120,000 lbs. This is likely an underestimate but is useful to enable a relative comparison of the no action alternative with current and historical landings. The OY estimates associated with **Alternatives 2-4** range from approximately 2.69 million lbs (**Alternative 2**) to approximately 2.767 million lbs (**Alternative 4**). These specifications range from 88% (**Alternative 1**) to 227% (**Alternative 4**) more than the status quo harvest level of 847,000 lbs. Thus, each of these alternative specifications would accommodate an increase from the baseline harvest level. Therefore, once the resource is rebuilt, the TAC can be increased and harvest restrictions can be reduced, supporting increased economic benefits to the fishery. If sustainable, the larger the harvests, the greater the economic benefits to the harvest sector and associated industries. Due to the inability to identify, model, anticipate, and control all factors that affect stocks, sustainable yield cannot be determined with absolute certainty. Therefore, some level of precautionary conservatism should be factored into the selection of OY. Since **Alternative 1** would allow the lowest harvest, it represents the most conservative vision of how the resource should be managed, encompassing the least likelihood, relative to the other alternatives, that excessive harvest will occur, and avoidance of the adverse economic consequences that would accrue to increased restrictions. **Alternative 1** also, however, would represent the greatest potential foregone harvest opportunities if the harvest level is overly conservative. Conversely, **Alternative 4** represents the least conservative vision, thereby decreasing the possibility of foregone benefits, but increasing the possibility of excessive harvest. Neither the probabilities of these conditions occurring nor the net impacts can be determined. Overall, **Alternatives 2-4** are less conservative than **Alternative 1**. **Alternative 1** is excessively conservative relative to the preferred MSY, since it would only support harvests at 57% of the preferred MSY, compared to over 90% for **Alternative 2-4**. **Preferred Alternative 3** is intermediate to **Alternatives 2 and 4** and is believed to represent a reasonable compromise to the uncertainty associated with either alternative.

In summary, no direct effects are expected to accrue to any of the alternative benchmark parameter specifications. Indirect effects could accrue if future assessment of the stock relative to the benchmarks identifies a need for restrictive management. The magnitude of these effects, however, will depend on the nature of the specific management measures adopted. These effects will be quantified when such action is prepared, if necessary.

4.3.1.3 Social Effects of Management Reference Point Alternatives

4.3.1.3.1 General Concepts

A discussion of the general concepts related to the social effects of management reference points is provided in Section 4.1.1.3.1 and is included herein by reference.

4.3.1.3.2 Comparison of Fishery with Management Reference Point Alternatives

Since none of the alternative MSY and OY specifications imply harvest reductions, each imply the potential for increased social benefits once the resource is rebuilt. MSY **Alternative 1**, however, though supporting harvests greater than status quo, does not appear to accurately represent a sustainable harvest level and may lead to excessive resource exploitation, precipitating corrective action with accompanying adverse social consequences. **Preferred Alternative 2** would allow increased harvest relative to the status quo, is more accurately reflective of harvest patterns in the fishery and, thus, is expected to provide the social benefits of a stable and sustainable fishery.

Among the OY alternatives, **Alternative 4** would allow the largest harvests and provide the greatest long-term social benefits, if the specified cushion is sufficient to capture the environmental variability of the resource. **Preferred Alternative 3**, however, may provide a better hedge against harvest overages, thereby supporting more stable harvests and social benefits. **Alternative 1** would most severely restrict the fishery, may be unnecessarily conservative, and would generate the least long-term social benefit.

4.3.1.4 Administrative Effects of Management Reference Point Alternatives

Since none of the alternative MSY or OY specifications would imply additional harvest restrictions, the potential administrative effects of these alternatives are largely equal. In theory, the larger the allowable harvest, the less restrictive and administratively burdensome subsequent management is needed to be. From this perspective, MSY **Alternative 2** and OY **Alternative 4** would allow the largest harvest and, therefore, less restriction. Preferred MSY **Alternative 3** is believed to represent a more accurate portrayal of the stock and harvest potential. Additionally, since the OY specifications encompass considerations of safety margins to account for environmental variability and ensure long-term stock sustainability, Preferred OY **Alternative 3** would establish an intermediate safety margin relative to OY **Alternatives 2 and 4**, thereby reducing the opportunity of overfishing that might occur under larger harvests, and the administrative burden of justifying the potentially excessively conservative management position embodied by OY **Alternative 2**.

4.3.1.5 Council's Conclusion on Management Reference Point Alternatives

For black sea bass, MSY = 2,777,825 lbs whole weight and OY = 2,742,551 lbs whole weight are the **Council's preferred alternatives**. The Council obtained public input during the public hearing and informal review process on the preferred alternatives and the other alternatives as well. (Note: **Appendix A** contains additional alternatives considered but eliminated from detailed consideration.) The Council did not receive public comments addressing black sea bass MSY and OY.

The Snapper Grouper Advisory Panel did not have comments on MSY and OY for black sea bass.
The Law Enforcement Advisory Panel did not have comments on MSY and OY for black sea bass.

The Scientific and Statistical Committee (SSC) reviewed the black sea bass SEDAR Assessment and approved the assessment as being based on the best available science. The SSC endorsed the estimates of MSY and OY from the SEDAR stock assessments. In December 2007, the SSC endorsed Amendment 15A as based on best available science.

The Snapper Grouper Committee reviewed the public hearing input and recommendations from the Snapper Grouper AP, Law Enforcement AP, and the SSC. Committee members did not change the preferred alternatives taken to public hearings.

The Council concluded the MSY and OY alternative included in the public hearing document best meet the conservation objective of defining conservative management reference points.

4.3.2 Rebuilding Schedule Alternatives

Rebuilding Schedule Alternative 1 (no action). A 10-year rebuilding schedule is currently in place for black sea bass, which began in 1991.

Rebuilding Schedule Alternative 2. The shortest possible time period to rebuild in the absence of fishing mortality (T_{MIN}). This would equal 6 years (SEDAR Update #1 2005). 2006 is Year 1.

Rebuilding Schedule Alternative 3. Mid-point between shortest possible and maximum recommended time period to rebuild to B_{MSY}. This would equal 8 years. 2006 is Year 1.

Rebuilding Schedule Alternative 4 (preferred). Maximum recommended time period to rebuild to B_{MSY} (years) if $T_{MIN} < 10$ years. The maximum recommended period equals T_{MIN} + one generation time. This would equal 10 years. 2006 is Year 1.

4.3.2.1 Biological Effects of Rebuilding Schedule Alternatives

Choice of a rebuilding schedule has a direct effect on the biological, ecological, and physical environment by determining the length of time over which rebuilding efforts can be extended. Shorter schedules generally require that overfished stocks be provided a greater amount of (and more immediate) relief from fishing pressure. Conversely, longer schedules generally allow overfished stocks to be fished at higher rates of fishing mortality as they rebuild. Extending the rebuilding period beyond the shortest possible timeframe increases the risk that environmental or other factors could prevent the stocks from recovering. As a result, the biological/ecological benefits are generally greater than those of the intermediate schedule and the benefits of the intermediate schedule are generally greater than those of the maximum recommended schedule. However, the overall effects of all the actions alternatives are expected to be beneficial because each defines a plan for rebuilding the overfished stock.

Rebuilding Schedule Alternative 1 would retain the existing, 10-year rebuilding schedule established for black sea bass in Amendment 11, which started in 1999 and would end in 2008 if no action were taken. Black sea bass is overfished and undergoing overfishing (SEDAR Update #1 2005; Section 3.2.2.3). The Council took action to end overfishing by 2009 in Amendment 13C. It is not possible for the stock to rebuild to B_{MSY} by 2008. In the absence of fishing, black sea bass could rebuild to B_{MSY} in six years. Therefore, **Alternative 1** would not meet the objective of achieving B_{MSY} within the terms allowed by the MSA. This alternative also maintains the existing levels of risk to ESA-listed species (Section 3.2.4.3).

As black sea bass cannot be rebuilt to B_{MSY} under the current rebuilding schedule (**Alternative 1**), **Alternatives 2-4** would establish a new rebuilding schedule alternative based on a new stock assessment with a new understanding of stock status. All of these schedules would achieve rebuilding within time periods allowed by the MSA, and therefore would be expected to benefit the ecological environment by restoring an apex predator to the ecosystem. Theoretically, **Alternative 2** would rebuild black sea bass to B_{MSY} more quickly than other alternatives because it would require managers to impose strict harvest provisions. Shorter rebuilding schedules generally provide the greatest biological benefit by allowing biomass, the age and size structure, sex ratio, and community structure to be restored to healthy levels at the fastest possible rate. However, black sea bass is part of a multi-species fishery. Even if retention of black sea bass is prohibited (**Alternative 2**), it would still be caught and experience mortality since they have temporal and spatial coincidence with other species fishermen target. Therefore, due to bycatch, rebuilding schedule **Alternative 2** cannot rebuild black sea bass to B_{MSY} unless fishing is also restricted for species that have temporal and spatial coincidence with black sea bass.

Alternative 3 is intermediate between **Alternatives 2 and 4**. Furthermore, there is little difference in the amount of time specified to rebuild black sea to B_{MSY} in **Alternatives 3 and 4**. **Alternative 3** specifies an 8-year rebuilding period for black sea bass; whereas, **Alternative 4** specifies a 10-year rebuilding period for black sea bass. The shorter rebuilding schedule identified in **Alternative 3** would require a greater cut in harvest and would pose a larger economic and social burden on the public. Alternatively, the Council's **Preferred Alternative 4** would more slowly rebuild the stock and community to healthy levels within an allowable timeframe but would be less detrimental to the fishing community dependent on the resource.

The impacts of **Alternatives 2, 3, and 4** on ESA-listed species will be very similar to those mentioned above for fish species. More restrictive harvest limits are expected to provide the most protection to ESA-listed species due to effort reductions.

4.3.2.2 Economic Effects of Rebuilding Schedule Alternatives

An expanded discussion of the general economic effects of rebuilding schedule alternatives is provided in Section 4.1.2.2 and is incorporated herein by reference.

Among the rebuilding schedule alternatives considered for black sea bass, **Alternative 1** would maintain the current 10-year rebuilding schedule. This period will expire in 2008 without achieving recovery of the resource. Thus, continued restrictions would be required beyond 2008. While the impacts of these restrictions may be no different than those intended to achieve the goals of the alternative rebuilding schedules (**Alternatives 2-4**), continuation of the status quo would require additional management action to adopt a legally compliant rebuilding schedule, with associated additional costs of amendment preparation. Hence, the primary difference between **Alternative 1** and **Alternatives 2-4** (other than the differences, which may be significant, particularly in the case of closure, attributed to implementing **Alternatives 2-4** upon expiration of the schedule specified by **Alternative 1** as opposed to implementing an alternative schedule now) is that the adoption of **Alternative 1** would impose additional costs on the management process. Under the status quo, the fishery would be allowed to continue status quo harvests of approximately 847,000 lbs (third year TAC under a 3-year scheduled reduction; see SAFMC 2006) until further action is taken.

Alternative 2 would require total cessation of the directed black sea bass fishery for six years and additional unspecified regulation after that. Because of black sea bass bycatch mortality in other fisheries, closure of the directed fishery would be insufficient to achieve rebuilding, absent restrictions in these other fisheries. These additional restrictions are not under consideration at this time. Since recovery could not be accomplished within the specified time period, **Alternative 2**, similar to **Alternative 1**, would not be legally compliant and would result in, in addition to the economic losses associated with the closure of the directed fishery, the additional expense of management action. Closure of the directed black sea bass fishery would result in the loss of all economic activity associated with this fishery as well as potentially associated fishing activities (revenues and benefits from other species) undertaken by black sea bass fishermen if the closure results in business failure. The black sea bass commercial fishery averaged approximately $1 million per year in ex-vessel revenues from 1999-2004 (Snapper Grouper Amendment 13C, SAFMC 2006), though this figure will decrease with the implementation of Amendment 13C. Most black sea bass harvest comes from the trap fishery, with trap harvests dominated by black sea bass. Hook and line trips that harvest black sea bass primarily harvest other snapper-grouper species. Thus, while hook and line fishing that typically catches black sea bass likely could continue under a black sea bass closure, trap trips, and all revenues associated with such, would be expected to cease. Re-directed effort by trap fishermen to other species may allow some mitigation of these losses, but may also result in excess pressure on these species with additional adverse economic effects.

Within the recreational sector, while not a major target species (less than 1% of total recreational effort; see Table 3-18), black sea bass averaged over 400,000 catch trips per year from 1999-2003, resulting in average harvests of approximately 650,000 lbs, and is allocated almost 500,000 lbs per year under Amendment 13C. Although black sea bass directed trips could continue under a catch and release fishery, as well as the substitution of other species, such that all consumer surplus (CS) need not be lost, at approximately 1.18 lbs per fish and $1-$3 consumer surplus per fish (see Section 3.4.1.2.4), closure of the black sea bass fishery jeopardizes some unknown portion of the approximately $420,000-$1.27 million in CS these fish potentially represent ((500,000 lbs/1.18 lbs/fish.*$1-3 CS/fish)).

Finally, as noted above, while **Alternative 2** would eliminate harvests, continued mortality would occur due to bycatch in other fisheries, such that additional measures to recover black sea bass would be required. Thus, total closure of the fishery, as would occur under **Alternative 2**, would result in substantial adverse economic impacts while not allowing the resource to fully recover.

Alternative 3 would allow a longer recovery period and allow directed harvests to continue while the stock recovers. Although some reduction in harvest from the status quo would still be required (amount not specified), some mitigation of the adverse economic effects that would accrue to **Alternative 2** would be expected.

Preferred Alternative 4 would allow the longest rebuilding period and should fully mitigate the adverse economic impacts expected to accrue to **Alternative 2**. The exact amount of allowable harvests and the economic benefits of **Preferred Alternative 4** depend on the rebuilding strategy adopted, which specifies the level of harvest, whether harvests are held constant over the rebuilding path, or whether harvest is allowed to increase according to a pre-specified schedule. Alternatives for rebuilding strategies under consideration for black sea bass are presented in Section 4.3.3 and the expected economic impacts are presented in Section 4.3.3.2 and are incorporated herein by reference. Regardless of strategy adopted, **Preferred Alternative 4** is expected to result in increased economic benefits relative to **Alternatives 1-3** since it would not require duplicative action with delayed results, as would occur with **Alternative 1**, closure of the fishery and mandatory discard of incidentally caught fish, as would occur with **Alternative 2**, and would support higher harvest levels than **Alternative 3**.

4.3.2.3 Social Effects of Rebuilding Schedule Alternatives

An expanded discussion of the general social effects of rebuilding schedule alternatives is provided in Section 4.1.2.3 and is incorporated herein by reference. It should be noted, however, that the effects of these actions would occur primarily in North and South Carolina, particularly North Carolina, since black sea bass is a heavily sought species during the late fall and winter months. The black sea bass pot fishery is one of the larger and more viable winter fisheries in the Carolinas, and few alternative winter fisheries exist for effort shift. Further, although re-entry into the fishery could occur upon recovery, it is uncertain that commercial fishery participants could maintain viable operations long enough to reap these benefits. Non-consumptive use or interactions could continue unabated, however.

Although **Alternative 1** would allow current harvests to continue, **Alternative 1** is not a reasonable alternative since the resource would not be rebuilt by the end of the specified period and subsequent additional regulatory action would be required to adopt a legally compliant rebuilding schedule. Since this subsequent action would merely accomplish what the Council has the opportunity to accomplish with the current action, adoption of **Alternative 1** would likely result in a public conclusion that management is not responsibly fulfilling its duties. Potential outcomes of such a conclusion could include a reduction in cooperative participation in the management process or legal redress.

Alternative 2 would require the black sea bass fishery to close during the duration of the rebuilding schedule. All economic activity associated with the fishery would be eliminated during the prescribed 6-year closure period. This would substantially impact fishermen and communities in North Carolina and South Carolina and, in particular, North Carolina since North Carolina accounts for about 60% of the commercial vessels that harvest black sea bass and 75% of the ex-vessel revenues (see Tables 3-9, 3-11a, and 3-11b). While Florida is a more significant sector of the black sea bass recreational fishery, harvests are still dominated by the Carolinas. Given the increasing absence of alternative fishery opportunities, closure would be expected to result in serious economic hardship and social change for dependent businesses and communities. Despite the cessation of harvests and loss of economic activity associated with this fishery during the specified closure, rebuilding goals would not be met within the specified period, requiring additional action. Further, despite closure of the directed fishery, continued mortality of black sea bass as a result of bycatch would continue, and the adoption of **Alternative 2** would likely precipitate constituent outcry and claims of needless waste. Such perception could further harm the management environment by resulting in reduced cooperation in the management process and failed or less effective management decisions, precipitating more widespread and harmful economic and social impacts.

By allowing a longer rebuilding period, **Alternative 3** would be expected to result in increased net positive social benefits relative to **Alternatives 1 and 2**. Since the allowable harvests under **Alternative 3** have not been specified, it is unknown how much they may be able to exceed those of either alternative. However, harvests should be greater, supporting financially stronger businesses and recreational demand, and reduce erosion of importance and character of associated fishing communities.

Since **Preferred Alternative 4** would allow the longest possible rebuilding timeframe, allowing larger harvests, this alternative would be expected to result in the greatest net social benefits. Not only would this alternative allow the retention of current incidental catch mortality, total harvest may be allowed to progressively increase, depending upon the rebuilding strategy selected, supporting increased commercial revenues and recreational consumer surplus. Thus, the foundation of fishing entities and associated industries that prosecute the fishery can be maintained and possibly strengthen, preserving the character of the communities they support.

4.3.2.4 Administrative Effects of Rebuilding Schedule Alternatives

Theoretically, Rebuilding Schedule **Alternatives 1-4** should benefit the administrative environment by providing an agreed upon timeframes in which the fishing mortality rate applied to the resource would be constrained sufficiently to allow stock biomass to rebuild to B_{MSY}. However, the 10-year schedule (beginning in 1999) defined by Rebuilding Schedule **Alternative 1** is unrealistic and, as a result, would negatively affect the administrative environment by creating unrealistic expectations about the amount of time needed for stock recovery. Rebuilding Schedule **Alternative 2** is also not realistic as it would require the closure of other fisheries that take black sea bass as bycatch. The rebuilding schedules specified by Rebuilding Schedule **Alternatives 3, and 4** provide more realistic estimates of the time required to rebuild stock biomass.

The administrative effects of Rebuilding Schedule **Alternative 2** are likely to be more beneficial than those of **Preferred Rebuilding Schedule Alternative 3**, because Rebuilding Schedule **Alternative 2** would require that the fishery be closed for 6 years. Closing the fishery would relieve fisheries administrators and enforcement agents of the burden of implementing, monitoring, and enforcing management measures for the fishery. However, if fishery participants perceive a total closure as an unnecessarily restrictive action, they would likely burden the administrative environment with complaints about the unnecessarily severe socioeconomic effects of the rebuilding schedule.

Rebuilding Schedule **Alternative 3** and the Council's Rebuilding Schedule **Preferred Alternative 4** would allow fishing to continue during the rebuilding schedule. While this would mitigate socioeconomic losses to the fishery participants and associated industries, this would require monitoring aspects of the stock, and enforcement of fishery management measures to ensure that the required fishing mortality rate is not exceeded. Although this would burden the administrative environment, such routine administrative actions already fall within the scope of the current fishery management process.

4.3.2.5 Council's Conclusions for Rebuilding Schedule Alternatives

A rebuilding schedule of 10 years for black sea bass is the **Council's preferred alternative**. The Council obtained public input during the public hearing and informal review process on the preferred alternatives and the other alternatives as well. (Note: **Appendix A** contains additional alternatives considered but eliminated from detailed consideration.) All comments were evaluated, and the Council did not change their preferred alternatives based on comments received.

The Council received a number of <u>public comments</u> addressing black sea bass rebuilding schedule. The EPA raise concerns about the rebuilding timeframe. The EPA indicates extending the rebuilding timeframe for an additional 10 years results in a total of 23 years. This is not correct. The Council is not extending the current rebuilding schedule but rather is establishing a new rebuilding schedule based on a new SEDAR stock assessment that shows a very different picture of stock status. The Council's preferred alternative will rebuild black sea bass while not requiring a large number of discards.

The <u>Snapper Grouper Advisory Panel</u> did not have any comments on the black sea bass rebuilding schedule.

The <u>Law Enforcement Advisory Panel</u> did not have any comments on the black sea bass rebuilding schedule.

The Scientific and Statistical Committee (SSC) reviewed the black sea bass SEDAR Assessment and approved the assessment as being based on the best available science. In December 2007, the SSC endorsed Amendment 15A as based on best available science.

The Snapper Grouper Committee reviewed the public hearing input and recommendations from the Snapper Grouper AP, Law Enforcement AP, and the SSC. Committee members felt **Alternative 4** (10 years) for the black sea bass rebuilding schedule was appropriate given the multi-species nature of the fishery. **Alternative 2** (6 years) would require that fishing mortality be reduced to zero which is not possible since some black sea bass would continue to be caught and die when fishermen target co-occurring species. Committee members felt **Alternative 4** balanced the need to be conservative while recognizing that some level of fishing mortality will exist in this multi-species fishery.

The Council concluded the rebuilding schedule alternative recommended by the Committee best meets the objective of rebuilding snowy grouper as soon as possible given the multi-species nature of the fishery.

4.3.3 Rebuilding Strategy Alternatives

Alternative rebuilding strategies are designed to have at a 50% chance of rebuilding the black sea bass stock to the B_{MSY} consistent with preferred MSY alternative within the time period defined by the Council's preferred rebuilding schedule. As a result, each alternative would be expected to benefit the stock by enhancing its ability to recover from years of low recruitment due to excessive fishing mortality and /or natural environmental factors. The action alternatives differ from each other only in the immediacy of their impacts and, consequently, in the level of risk which would assume. The rebuilding strategy alternatives considered for black sea bass are:

Alternative 1 (preferred). Define a rebuilding strategy for black sea bass that maintains a constant catch throughout the rebuilding timeframe. The TAC for 2009 would be 847,000 lbs whole weight. The TAC specified for 2009 would remain in effect beyond 2009 until modified.

Alternative 2. Define a rebuilding strategy for black sea bass that maintains a constant fishing mortality rate throughout the rebuilding timeframe. The TAC specified for 2009 would remain in effect beyond 2009 until modified.

> **Sub-alternative 2a.** The TAC for 2009 would be 899,071 lbs whole weight. The TAC would change annually according to the rebuilding plan.
>
> **Sub-alternative 2b.** The TAC for 2009 would be 633,687 lbs whole weight. The TAC would change every 5 years according to the rebuilding plan.

Alternative 3. Define a rebuilding strategy for black sea bass that modifies the fishing mortality rate throughout the rebuilding timeframe (initial $F=F_{MSY}$ then $F \leq F_{MSY}$). The TAC specified for 2009 would remain in effect beyond 2009 until modified.

> **Sub-alternative 3a.** The TAC for 2009 would be 1,135,616 lbs whole weight. The TAC would change annually according to the rebuilding plan.
>
> **Sub-alternative 3b.** The TAC for 2009 would be 833,789 lbs whole weight. The TAC would change every 5 years according to the rebuilding plan.

Alternative 4. Define a rebuilding strategy for black sea bass where fishing mortality is modified throughout the rebuilding timeframe. The TAC for 2009 would be 871,231 lbs whole weight. The TAC specified for 2009 would remain in effect beyond 2009 until modified.

Alternative 5 (no action). Do not define a yield-based rebuilding strategy for black sea bass.

Table 4-23. Annual total allowable catch (lbs whole weight) values associated with five rebuilding strategy alternatives for black sea bass. Note: Except for Alternatives 1 and 5, values take into consideration increased discard mortality that could result from management measures taken through Amendment 13C. The fishing year begins June 1st of each year.

Rebuilding Strategy Alternative	Rebuilding Strategy Alternative 1 (Preferred)	Rebuilding Strategy Alternative 2 (Constant F = 0.29)		Rebuilding Strategy Alternative 3 (Initial F=F_{MSY} then F<= F_{MSY})		Rebuilding Strategy Alternative 4 (Modified F)	Rebuilding Strategy Alternative 5 (No Action)
Year	Constant Landings	2a: 1 year	2b: 3 year average	3a: 1 year	3b: 3 year average	1 year then constant landings	None
2007	1,160,000	348,330	647,424	493,835	847,309	1,159,631	1,160,000
2008	847,000 and onwards until modified	653,659	628,674	871,917	828,559	828,559	847,000 and onwards until modified
2009		899,071	633,687	1,135,616	833,789	871,231	
2010		1,083,573	1,218,338	1,304,582	1,304,582	871,231	
2011		1,211,029	1,218,338	1,304,582	1,304,582	871,231	
2012		1,360,412	1,218,338	1,304,582	1,304,582	871,231	
2013		1,518,823	1,668,010	1,304,582	1,304,582	871,231	
2014		1,670,916	1,668,010	1,304,582	1,304,582	871,231	
2015		1,814,294	1,668,010	1,304,582	1,304,582	871,231	
2016		1,942,812	1,942,812	1,304,582	1,304,582	871,231	
Year Overfishing Ends	2009	2007		2007		2009	2009

4.3.3.1 Biological Effects of Rebuilding Strategy Alternatives

Rebuilding Strategy Alternative 1 would keep the TAC and other management measures at levels specified in Amendment 13C, without increasing as the stock rebuilds. As allowable catches would not increase over time, it is possible the stock could be rebuilt two years ahead of schedule (2015) at which point, the TAC could increase to OY (Figure 4-3). However, this increase in allowable catch is not specified under **Alternative 1** as the TAC for 2009 would remain in effect beyond 2009 until modified. As a result, **Alternative 1** would provide the greatest long-term, biological effects to the stock and associated ecosystem of all the alternatives throughout the entire timeframe. Beneficial biological effects include a more rapid rebuilding of the stock and increase in the average age and size structure compared to the other alternatives. Fishing at a lower fishing mortality rate may increase population robustness to environmental perturbations (Rothschild 1986). Also, older and larger females have greater reproductive potential because fecundity increases exponentially with size. Therefore, there is greater potential to more rapidly increase the number of young each year (recruitment) under **Alternative 1**. This alternative would also perpetuate the existing levels of risk to ESA-listed species.

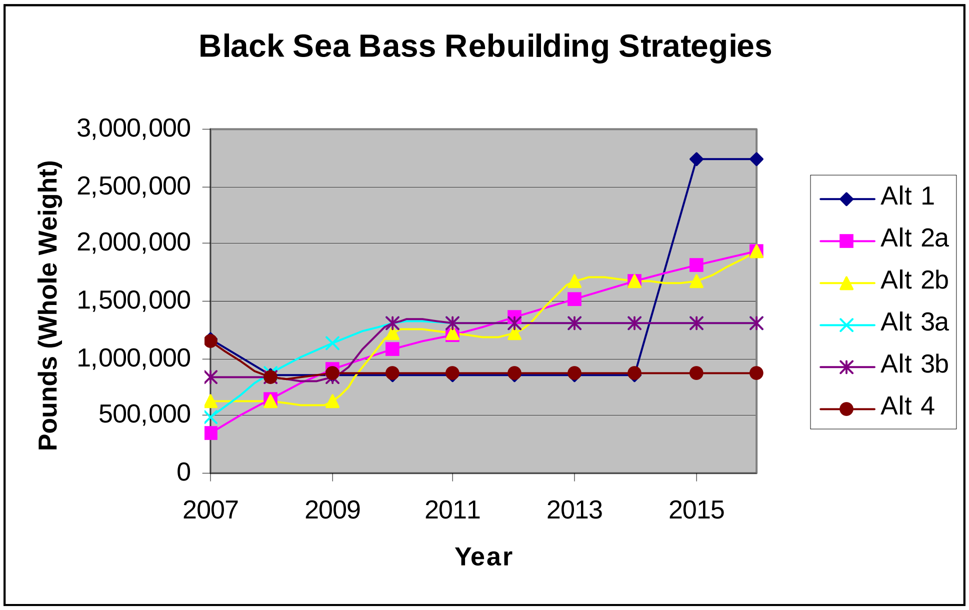


Figure 4-3. Annual allowable biological catch (lbs whole weight) values associated with four rebuilding strategy alternatives for black sea bass. Note: Alternative 1 shows catch increasing to OY in 2015 since stock would be rebuilt to B_{MSY}.

Rebuilding Strategy Alternative 5 would not define a yield-based strategy for rebuilding the black sea bass stock. Similar to **Alternative 1**, allowable catches would remain at levels specified in Amendment 13C, without increasing as the stock rebuilds. This could provide positive biological effects as described for **Alternative 1**. **Alternative 5**, however, could also have adverse effects to the black sea bass stock as it does not provide a plan on how fishing effort would be regulated during the rebuilding schedule. Without a rebuilding strategy, the total allowable catch (TAC) for each year would not be designated ahead of time, and there would be no long-term plan for stock recovery. This could lead to overly permissive regulations, especially as stocks rebuild, which might reduce the likelihood of stock rebuilding by the end of the rebuilding schedule. In contrast, overly restrictive regulations could reduce economic opportunities to fishermen as well as reducing the availability of a food source for the public.

Alternative 1 and 5 could result in unnecessary discard of black sea bass as biomass increased. However, release mortality of black sea bass is low and actions were taken to reduce bycatch with increased mesh size in pots through Amendment 13C.

Alternatives 2, 3, and 4 would result in beneficial effects to the stock and associated ecosystem by allowing fishery managers to regulate fishing effort throughout the rebuilding timeframe. The alternatives would account for estimates of increased dead discards resulting from actions taken in Amendment 13C. However, any estimate of increased bycatch must rely upon many assumptions about how fishermen will change their behavior in response to new management measures. Scenarios depicting methods and estimates of increased bycatch depending on varying assumptions is provided in Appendix E.

Alternative 2, a constant fishing mortality strategy, is the most conservative strategy. It would end overfishing immediately and require an initial harvest reduction of 51% (2007-2009 average) to 73% (based on 2007 value). **Alternative 3** would also end overfishing immediately, but would require a smaller initial reduction in harvest (35% - 62%) than **Alternative 2**. Rebuilding Strategy **Alternative 4**, a modified fishing mortality strategy, does not end overfishing immediately. Instead, it gradually steps down the allowable catch and fishing mortality over three years to a level in 2008 represented by the average catch from 2006 to 2008 provided in Rebuilding Strategy **Alternative 3**. Rebuilding Strategy **Alternative 4** would not require additional harvest regulations relative to the status quo, but rather would provide for increasing fishing mortality throughout the rebuilding schedule. Harvest would then increase to 21% of the historical harvest in 2009 and stay at this level throughout the remainder of the rebuilding period. Since allowable harvest for **Alternatives 2, 3, and 4** would increase through time, the biological effects are less in the long-term compared to **Alternative 1**. Because it would bolster stock biomass early in the rebuilding period as opposed to later on, **Alternative 2** would likely have the greatest short-term beneficial effect of these three alternatives on the biological and ecological environment. **Alternative 4** would have an effect similar to **Alternatives 2 and 3** but it would be delayed by several years.

Environmental factors such as weather, currents, and water temperature may affect the survival of eggs and larvae, causing poor recruitment even when large numbers of offspring are produced. Thus, alternatives which allow the population to more rapidly attain a greater number of older, larger fishes in the population, also provides additional protections against recruitment failure due to several years of poor environmental conditions for eggs and larvae, creating a more robust population. Delaying rebuilding could make stocks more susceptible to adverse environmental conditions that might affect recruitment success, or to unanticipated errors in parameter estimates, which could result in excessive fishing.

In theory, the net ecological effects of the choice of **Alternatives 1 - 4** would be positive, as the reef community would more closely represent that which would persist in a natural, or undisturbed state and the possibility of ecosystem overfishing would be reduced. However, as fishing pressure is reduced on the protected stock(s), fishermen may target other members of the reef fish ecosystem, which have fewer fishing restrictions. This displacement of effort may further disrupt community structure. The natural balance of an ecosystem cannot be fully restored as long as the ecosystem is subjected to fishing-related mortality. Additionally, there is some speculation that a disrupted community cannot be restored to pre-existing conditions, because it may change to a new climax community in a post-disturbed condition with a different suite of species.

The level of fishing effort applied to the fishery can influence fishing gear interactions with the sea floor. Furthermore, fish abundance, species composition, and the interaction of different fish and invertebrate species can have an effect on the habitat that they occupy. However, the number, nature, and extent of such interactions are more greatly influenced by the type of management measures that regulate the extent and distribution of fishing effort.

Alternatives 1-4 differ primarily in how they would distribute the rebuilding burden over time. However, the average fishing effort supported by each alternative throughout the rebuilding period is similar. Thus, any differences in the habitat effects associated with the three rebuilding strategy alternatives are probably insignificant over the long-term. Additionally, regardless of potential differences in the magnitude of effects associated with different rebuilding strategy alternatives, all are expected to only minimally affect the physical environment because the primary gear used in this fishery (hook and line) is believed to have minimal effects on the sea floor.

The overall impacts of **Alternatives 1-4** on ESA-listed species are uncertain. Sea turtle abundance in the South Atlantic changes seasonally and the impact of fishing effort shifts, if any, resulting from these alternatives is difficult to predict. Current monitoring programs will allow NMFS to track and evaluate any increased risk to ESA-listed species. If necessary, an ESA consultation can be re-initiated to address any increased levels of risk.

4.3.3.2 Economic Effects of Rebuilding Strategy Alternatives

4.3.3.2.1 Recreational Sector

A description of the modeling approach used to examine the rebuilding strategy alternatives on the recreational sector is contained in Appendix G and Section 4.1.3.2.1 and is not repeated here.

The expected impacts of the alternative rebuilding strategies for black sea bass are contained in Tables 4-24 through 4-27. Under the interactive modeling procedure which allowed total snapper-grouper target effort to be constrained by the most limiting of the three species, with the exception of the first year of the rebuilding strategy for Alternative 2a, the snowy grouper allocation, approximately 4,000 pounds from 2008 onward, and resultant number of snapper-grouper target trips that the allocation would support was the most limiting allocation, resulting in virtually no differences in projected surplus totals among the black sea bass rebuilding strategy alternatives (Tables 4-24 and 4-26). While the biomass differences of the alternative rebuilding strategies translate into changes in the estimates of consumer surplus per trip, total target effort applied to the snapper-grouper fishery is constrained by the snowy grouper allocation, which is held constant across all alternatives at either the status quo or preferred alternative biomass projections. Thus, most impact differences resulting from the alternative rebuilding strategies for black sea bass are suppressed by the behavioral constraints of the snowy grouper allocation.

As a result of the strong influence the snowy grouper allocation has on the modeling results, the results where effort is constrained only by the black sea bass allocation, as shown in Tables 4-25 and 4-27, may be more informative in distinguishing differences among the red porgy rebuilding strategy alternatives. Assuming status quo biomass streams for snowy grouper and red porgy, differences in total surplus in the recreational sector relative to the **Preferred Alternative 1** over the period 2007-2016 range from approximately $593,000 for **Alternative 4** to approximately $6.2 million for **Alternative 2b**. These values do not change if the preferred biomass streams for snowy grouper and red porgy are used (Table 4-27).

The strong cross-species influence of the model suggests that as the different species rebuild, management strategies may need to adjust to allow harvest and effort growth for a single species separate from the other species. As seen when comparing the results from Tables 4-24 and 4-26 (effort constrained by the most limiting species) with Tables 4-25 and 4-27 (effort constrained only by the red porgy allocation), a considerably greater amount of snapper-grouper effort, with accompanying value, is possible over 2007-2016 if not limited by the snowy grouper allocation.

Table 4-24. Summary of the cumulative expected recreational sector impacts (consumer and producer surplus) of the black sea bass rebuilding strategy alternatives, 2007-2016, 7% discount rate. Note: Effort constrained by allocation of most limiting of all 3 species (black sea bass, red porgy, and snowy grouper). Status quo biomass for other species. * Effect of no action Alternative 5 would be similar to Preferred Alternative 1.

	Difference with respect to:			Difference with respect to:			Difference with respect to:
	Preferred Alt 1 (status quo)			Preferred Alt 1 (status quo)			Preferred Alt 1 (status quo)
Alt	Angler Trips	Consumer Surplus		Angler Trips	Producer Surplus		Surplus
Pre1*	0	$0		0	$0		$0
2a	-32,398	$225,907		-2,577	-$274,466		-$48,559
2b	0	$257,026		0	$0		$257,026
3a	0	-$143,000		0	$0		-$143,000
3b	0	-$143,000		0	$0		-$143,000
4	0	-$121,742		0	$0		-$121,742

Table 4-25. Summary of the cumulative expected recreational sector impacts (consumer and producer surplus) of the black sea bass rebuilding strategy alternatives, 2007-2016, 7% discount rate. Note: Effort constrained by black sea bass allocation only. Status quo biomass for other species. . * Effect of no action Alternative 5 would be similar to Preferred Alternative 1.

	Consumer Surplus			Producer Surplus			Total Surplus
	Difference with respect to:			Difference with respect to:			Difference with respect to:
	Preferred Alt 1 (status quo)			Preferred Alt 1 (status quo)			Preferred Alt 1 (status quo)
Alt	Angler Trips	Consumer Surplus		Angler Trips	Producer Surplus		Surplus
Pre1*	0	$0		0	$0		$0
2a	383,034	$5,604,326		30,463	$162,627		$5,766,953
2b	429,597	$5,469,563		34,166	$687,649		$6,157,212
3a	541,400	$3,581,137		43,057	$2,154,862		$5,736,000
3b	577,616	$3,476,182		45,938	$2,590,713		$6,066,895
4	83,828	$74,457		6,667	$518,911		$593,369

Table 4-26. Summary of the cumulative expected recreational sector impacts (consumer and producer surplus) of the black sea bass rebuilding strategy alternatives, 2007-2016, 7% discount rate. Note: Effort constrained by allocation of most limiting of all 3 species (black sea bass, red porgy, and snowy grouper). Preferred biomass for other species. * Effect of no action Alternative 5 would be similar to Preferred Alternative 1.

	Consumer Surplus			Producer Surplus			Total Surplus
	Difference with respect to:			Difference with respect to:			Difference with respect to:
	Preferred Alt 1 (status quo)			Preferred Alt 1 (status quo)			Preferred Alt 1 (status quo)
Alt	Angler Trips	Consumer Surplus		Angler Trips	Producer Surplus		Surplus
Pre1*	0	$0		0	$0		$0
2a	-32,398	$241,029		-2,577	-$274,466		-$33,437
2b	0	$272,148		0	$0		$272,148
3a	0	-$85,512		0	$0		-$85,512
3b	0	-$85,512		0	$0		-$85,512
4	0	-$105,604		0	$0		-$105,604

Table 4-27. Summary of the cumulative expected recreational sector impacts (consumer and producer surplus) of the black sea bass rebuilding strategy alternatives, 2007-2016, 7% discount rate. Note: Effort constrained by black sea bass allocation only. Preferred biomass for other species. * Effect of no action Alternative 5 would be similar to Preferred Alternative 1.

	Consumer Surplus			Producer Surplus			Total Surplus
	Difference with respect to:			Difference with respect to:			Difference with respect to:
	Preferred Alt 1 (status quo)			Preferred Alt 1 (status quo)			Preferred Alt 1 (status quo)
Alt	Angler Trips	Consumer Surplus		Angler Trips	Producer Surplus		Surplus
Pre1*	0	$0		0	$0		$0
2a	383,034	$5,605,591		30,463	$162,627		$5,768,218
2b	429,597	$5,470,844		34,166	$687,649		$6,158,494
3a	541,400	$3,581,351		43,057	$2,154,862		$5,736,213
3b	577,616	$3,476,485		45,938	$2,590,713		$6,067,198
4	83,828	$74,435		6,667	$518,911		$593,346

4.3.3.2.2 Commercial Sector

A description of the modeling approach used to examine the rebuilding strategy alternatives on the commercial sector is contained in Appendix F and Section 4.1.3.2 and is not repeated here.

The expected impacts of the alternative rebuilding strategies for snowy grouper on the commercial sector are contained in Table 4-28. Only minor differences in the total net operating revenues over the period 2007-2016 are projected. Assuming status quo conditions for the other actions considered in this amendment, the differences in total net operating revenues relative to **Preferred Alternative 1**, range from only -$0.51 million for **Alternative 4** to -$0.03 million for **Alternative 2b**. Only minor changes in these results are projected assuming preferred alternative conditions for the other actions

Identifying the least favorable alternative to **Preferred Alternative 1**, by gear sector (greatest loss in percentage terms relative to the status quo or smallest gain where no losses are projected; tabular results not shown), the vertical line sector is projected to experience the greatest loss in net operating revenues, -0.21%, under **Alternative 3b** assuming either status quo or preferred conditions for the other actions. For the longline sector, no difference from the status quo is projected under either status quo or preferred conditions. For the trolling sector, **Alternative 4** is projected to result in the greatest losses, -0.76% and -0.77%, under status quo and preferred conditions, respectively. For the trap (pot) sector, **Alternative 4** is also projected to result in the greatest losses, approximately 13% under both status quo and preferred conditions. Viewed from a different perspective and examining only the results assuming preferred conditions for the other actions, **Alternative 2a** is projected to produce the greatest loss for the vertical line and dive sectors, -0.14%, and produce the largest gain for the “other” gear sector, 0.38%. For **Alternative 2b**, the dive sector losses the most, -0.14%, in net operating revenues while the “other” gear sector gains the most, 0.78%. **Alternative 3a** would result in the pot sector losing the most, -5.59%, and the “other” gear sector gaining to 0.46%. Under **Alternative 3b,** the pot sector still would experience the greatest loss, -4.64%, while the “other” gear sector gains increase slightly to 0.99%. Finally, under **Alternative 4**, the pot sector is projected to experience the greatest loss, -13.18%, while the longline sector is the only sector not projected to experience a loss, but would also not be expected to experience increased net revenues.

In a similar examination identifying a fleet by state/area landed, the North Carolina fleet would be projected to experience the greatest losses in net operating revenues relative to **Preferred Alternative 1**, under **Alternative 4,** approximately –2.34%**,** under both status quo and preferred conditions for the other actions (tabular results not shown). For the South Carolina fleet, **Alternative 4** also is projected to generate the greatest losses in net operating revenues, approximately -0.83% for both status quo and preferred conditions. For the Georgia-North Florida fleet (St. John’s County, Florida northward), **Alternatives 3a and 3b** are projected to generate the greatest losses, -0.06% to -0.07%, assuming status quo or preferred conditions. The Central-Southeast Florida fleet is projected to experience the greatest loss under **Alternative 4,** -0.22%, under status quo conditions, and –0.21% under preferred conditions. The Florida Keys fleet is projected to experience a change in net operating revenues of -0.01% for **Alternatives 2a and 2b** under status quo conditions for the other actions, and –0.01% for **Alternatives 2a and 3a** under preferred conditions. Finally, the "other" fleet (vessels landing in places other than North Carolina through East Florida) is projected to experience the largest loss under **Alternative 4,** -1.74%, under status quo conditions for the other actions, and –2.45% under preferred conditions. Viewed from a different perspective and examining only preferred conditions for the other actions, all alternatives to **Preferred Alternative 1** are projected to generate the largest gains on the "other" fleet, except for **Alternative 4**, which would favor the Keys fleet. The largest relative losses (percentage change) for **Alternatives 2a and 2b**, -0.18% and –0.15%, respectively, are projected to accrue to the South Carolina fleet, whereas the North Carolina fleet is projected to accrue the largest relative losses for **Alternatives 3a and 3b**, -1.20% and –1.03%, respectively. **Alternative 4** would have the greatest adverse impact on the "other" fleet, -2.45%.

Table 4-28. Summary of the expected cumulative commercial sector net operating revenues for the black sea bass rebuilding strategy alternatives, 2007-2016, 7% discount rate. Note: Effect of no action Alternative 5 would be similar to Preferred Alternative 1.

	Given status quo alternatives for other actions			Given preferred alternatives for other actions		
Alternative	Net Present Value at 7% (million $)	Change compared to PreAlt 1	Percentage Change	Net Present Value at 7% (million $)	Change compared to PreAlt 1	Percentage Change
Pre1	$41.21	$0.00	0.00%	$41.14	$0.00	0.00%
2a	$41.16	-$0.05	-0.12%	$41.09	-$0.05	-0.12%
2b	$41.17	-$0.03	-0.08%	$41.10	$0.04	-0.08%
3a	$40.95	-$0.26	-0.63%	$40.88	-$0.26	-0.63%
3b	$40.98	-$0.23	-0.56%	$40.91	-$0.23	-0.56%
4	$40.70	-$0.51	-1.25%	$40.62	-$0.51	-1.25%

4.3.3.3 Social Effects of Rebuilding Strategy Alternatives

Social impacts of management accrue incrementally to fishing regulations and conditions that exist each year, and cumulatively as conditions are compounded over multiple years (single year or short-term restrictions may result in minimal social impact, whereas persistent restrictions would be expected to result in more significant impacts). In general, smaller harvest levels entail greater short-term dislocations and adjustments for the social environment. Commercial and recreational fishermen may be able to adjust to harvest reductions by switching to other species or by leaving fishing and seeking other employment or recreational opportunities elsewhere. If other species are depleted, regulations may prevent fishermen from freely switching to another fishery, or if other forms of employment or recreational activities are unavailable or difficult to find, then the adjustments would be more severe than if alternatives were readily available.

The rebuilding strategies considered encompass constant catch and constant fishing mortality rate (F) approaches, with different periods of catch adjustment. The basic principle of a constant catch strategy is to maintain the allowable harvest at a constant amount for the entire rebuilding period. This is a conservative strategy that creates the least socio-economic disruption in the short-term to the fishing industry and associated businesses, assuming the harvest level is relatively close to current harvests. However, medium- and long-term problems may arise as catch rates increase with the rebuilding resource and ABC is held constant. The increased catch rates would be expected to induce a perception among fishermen that regulation is too restrictive, particularly if increased bycatch mortality occurs, jeopardizing recovery goals. Political pressure to increase allowable catches is likely, although the long-term biological recovery may not be complete.

Constant F strategies recognize the limitations of constant catch strategies by allowing catches to increase as the stock recovers and biomass increases. Starting harvest levels under constant F approaches are typically lower than constant catch levels, resulting in greater initial restrictions and short-term social and economic losses, but higher subsequent harvest levels support greater medium- and long-term benefits.

The alternatives considered vary by the assumption of the starting biomass, severity of the initial decline in allowable harvest, and periodicity of harvest increases, with adjustments occurring either annually or every three years. Annual adjustments in allowable harvest best match allowable catches with changes in available biomass. However, fishery management does not operate in a “real time” manner and the presumption that each year’s biomass can be monitored and allowable biological catch altered annually and appropriately is desirable but difficult to achieve. Rebuilding strategies that adjust the allowable harvest every three years combine the philosophies of constant catch and constant F strategies, but within shorter timeframes. The allowable harvest would adjust each year or remain constant within each 3-year adjustment period and largely represents an average of what would be allowed over the entire period if annual adjustments were made. As such, the allowable harvest levels are higher during the first year than would be allowed with annual adjustments, and lower in later years. Therefore, short-term adverse socio-economic impacts during the first year of each 3-year adjustment period would be less than during the corresponding year with an annual adjustment in allowable harvest, and more than those in the last year.

The results of the economic impact analysis presented in Section 4.3.3.2 capture some aspects of the cumulative impacts of the trade-offs of short-term and long-term impacts. For the commercial sector, the economic results suggest that the alternative black sea bass rebuilding strategies are largely neutral over the cumulative period 2007-2016, varying by less than $593,000 over the 10-year evaluation period. **Preferred Alternative 1** is projected to best economic outcome of all the action alternatives. The North Carolina and South Carolina sea bass fleets dominate the fishery and, as might be expected, the losses in net operating revenues associated with the alternatives to **Preferred Alternative 1** are projected to predominantly fall on these fleets, in both absolute and relative (percentage change) terms. Thus, these fleets and the communities they operate in would be expected to suffer economic and social losses under all alternatives relative to the status quo, **Preferred Alternative 1**.

For the recreational sector, all action alternatives are projected to generate greater net economic benefits than **Preferred Alternative 1**, with commensurate social benefits, assuming performance in the sea bass fishery is not constrained by the snowy grouper fishery (see Section 4.3.3.2.1). However, should the performance in the black sea bass fishery, only **Alternative 2b** is projected to generate greater economic value to the recreational sector than **Preferred Alternative 1**. The increase is minor, however, less than $300,000 spread over a 10-year evaluation period. Available data does not support regional economic comparisons, similar to the commercial analysis. The majority of recreational black sea bass harvests, similar to the commercial sector, come from North Carolina and South Carolina, so communities in those states would be expected to benefit the most from the recovered resource and increased economic benefits.

In summary, all fishermen and associated communities in the recreational black sea bass fishery would be expected to gain increased net economic benefits under **Preferred Alternative 1** relative to all the other action alternatives except **Alternative 2b**, which is projected to slightly out-perform the status quo. In the commercial sector, fishermen and associated communities in all areas except the "other" states would be expected to experience increased economic and associated social benefits under **Preferred Alternative 1,** relative to the other alternatives.

In addition to the above considerations, the preferred rebuilding strategy for the social environment would be expected to be influenced by the fishermen's perceptions of stock status. If fishermen believe that the resource is overfished, then they probably would be willing to accept short-term socio-economic losses in exchange for long-term increases in harvest rates. Constant F strategies probably would be preferred because the fishermen would more quickly realize the benefits of resource rebuilding through corresponding increases in allowable harvest. However, if fishermen disagree with the stock assessment, then they would be less willing to incur reductions in current harvest rates. In this event, fishermen would prefer the constant catch rebuilding strategy because it minimizes short-term socio-economic losses while additional biological information is collected and assessed. Modified constant F strategies probably would be preferred by fishermen who perceive the stock to be overfished, but who are not certain about the magnitude of potential long-term benefits.

4.3.3.4 Administrative Effects of Rebuilding Strategy Alternatives

The administrative burden would be least for Rebuilding Strategy **Alternative 1** since catch would be held constant for most of the rebuilding period. The administrative burden for Rebuilding Strategy **Alternatives 3 and 4** would be very similar because they hold catch constant throughout most of the rebuilding period. The burden would be greatest for Alternative 2a, which changes the allowable catch each year. **Alternative 5** could constitute an administrative burden because a rebuilding strategy is required as part of a rebuilding plan and additional actions would be required in the future to specify a rebuilding strategy.

4.3.3.5 Council's Conclusion on Rebuilding Strategy Alternatives

A black sea bass rebuilding strategy based on constant landings throughout the rebuilding timeframe is the **Council's preferred alternative**. The TAC for 2008 would be 847,000 lbs whole weight until modified. The Council obtained public input during the public hearing and informal review process on the preferred alternatives and the other alternatives as well. (Note: **Appendix A** contains additional alternatives considered but eliminated from detailed consideration.)

The Council received some public comments addressing the black sea bass rebuilding strategy. The Ocean Conservancy suggested setting the TAC at the OY target level and not the MFMT. A fisherman recommended having the smallest amount of change in TAC needed to rebuilding the stock. For black sea bass, the TAC in 2009 is established at the yield when fishing at MSY. However, the preferred strategy is a constant catch strategy; the TAC for 2009 (847,000 lbs whole weight) would remain in effect beyond 2009 until modified. Holding TAC at constant levels as the stock rebuilds would be expected to gradually reduce the fishing mortality rate as the stock rebuilds. Therefore, after 2009, the TAC would be based on fishing mortality rates less than fishing at MSY.

The Snapper Grouper Advisory Panel did not have any comments on the black sea bass rebuilding strategy.

The Law Enforcement Advisory Panel did not have any comments on the black sea bass rebuilding strategy.

The Scientific and Statistical Committee (SSC) reviewed the black sea bass SEDAR Assessment and approved the assessment as being based on the best available science. The SSC raised concerns about not including bycatch or post-quota mortality into Amendment 13C actions. Discard and post-quota mortality, from bycatch and discard mortality, has now been incorporated in rebuilding strategy alternatives that change TAC after 2008. The SSC concluded the economic analysis for Amendment 15A is thorough and provides estimates of economic impacts using the best available science.

In December 2007, the SSC concluded that Amendment 15A was based on the best available science. However, the SSC indicated the social impact assessments in the public hearing version of Amendment 15A was comprehensive and well written, the SSC concluded that the assessment of the social effects or ramifications of the proposed actions was inadequate for decision-making. In essence, the social information was determined by the SSC to be incomplete and inadequate in facilitating a ranking of regulatory options.

The Snapper Grouper Committee reviewed the public hearing input and recommendations from the Snapper Grouper AP, Law Enforcement AP, and the SSC. Committee members did not change the preferred rebuilding strategy alternatives taken to public hearings.

The Council agreed with the Committee's recommendation that the preferred alternative should not be modified. The specified black sea bass rebuilding strategy balances the desire to increase catches while continuing to rebuild the red porgy stock. The Council also indicated the Social Analysis could be improved but stated the deficiency was a function of data limitations rather than an analytical shortcomings. The Council concluded data would need to be collected for at least two years before a more meaningful social analysis could be conducted. The Council indicated the analysis was adequate to move forward at this time.

4.4 Research Needs

Snowy grouper, golden tilefish, black sea bass, and red porgy have been assessed through the SEDAR process. After completion of these assessments, research needs have been identified through by the SEDAR workgroup and made available. These needs have been identified and prioritized in the MARFIN request for proposals. Furthermore, a summary of current research will be provided in the Snapper Grouper SAFE Report (NMFS 2005a), which is considered to be a "living" document that will be updated as new data become available.

Biological research needs that have been identified through the SEDAR process are as follows:

4.4.1 Snowy Grouper

- Develop standardized techniques for aging snowy grouper. Resolve discrepancies in aging from different institutions. Additional research is needed to verify and validate age determinations.
- Sampling programs are needed to quantify discard rates. Research is also needed to identify management measures that will reduce discard mortality.
- Expand fishery-independent sampling of snowy grouper.
- Representative age, length, and sex composition data are needed for all fisheries (commercial, MRFSS, headboat), gear, seasons, and areas.
- Additional life history and biological research is needed to cover the full geographic range of the species.
- Fecundity information by age and length.
- Further research is needed into the implication of sex change for fishery management.

4.4.2 Black Sea Bass

- Age sampling from commercial, headboat, and MRFSS that is representative.
- Increased fishery independent sampling.
- Update fecundity information by age and length.
- Age structured models that will take into consideration historical landings.
- Estimates of release mortality by depth and fishery.
- Determine if changes in fishing operations, including species composition of the landings, might reflect catchability of black sea bass that has not been taken into account by the assessment.
- Index of recruitment.
- Estimate the magnitude, direction, geographic extent, timing, and management implications of mixing north and south of Cape Hatteras.
- Behavioral dynamics associated with reproduction should be investigated with respect to the effects of size selective harvesting.

4.4.3 Red Porgy

- Develop standardized techniques for aging red porgy. Resolve discrepancies in age estimates by different institutions.
- Quantify discard rates in commercial and recreational fishery.
- Estimate discard mortality rates with respect to depth and fishery.
- Obtain sex information on fish taken by commercial fishermen.
- At-sea observers for monitoring discards and developing CPUE indices.
- Status of red porgy in water deeper than 50 fathoms. Are there differences in aspects of the life history of red porgy in shallow and deeper waters.

4.4.4 Sociocultural Research Needs

Sociocultural research needs that have been identified by the Council's Scientific and Statistical Committee are as follows:

1. Identification, Definition and Standardization of Existing Datasets to meet short-term social analysis needs (e.g. behavioral networks based on annual rounds). Centrally locate these datasets so they are accessible to researchers and managers (realizing the constraints imposed by confidentiality);

2. Development of New Variables to meet long-term social analytical needs (e.g., community health, individual health, decision-making patterns, cumulative impacts of endogenous, exogenous, and regulatory factors);

3. Longitudinal Data – Monitoring Needs, including historical, ethnographic, and quantitative data over time;

4. Traditional Ecological Knowledge/Local Fisheries Knowledge (TEK/LFK) constructions along with Scientific Ecological Knowledge (SEK);

5. State Data (license/permit data; social survey type data) and Coordination between agencies/levels;

6. Better integration of social, biological and economic variables in modeling efforts; and

7. Better efforts to include humans and human behavior in the ecosystem-based framework (e.g., representation of humans as keystone predators in the system);

Economic research needs that have been identified by the Council's Scientific and Statistical Committee are as follows:

The following issues were identified as being impediments to conducting economic research:

- Confidentiality of state data and data collected through federal research projects.
- Data collected through certain agency grants cannot be distributed without dealing with confidentiality issues.
- The inability to display confidential data.

Commercial

1. Explore the feasibility of developing computable general equilibrium models, which can incorporate the entire economy and important ecosystem components (Medium priority, High cost).
2. Develop an input output model for the South Atlantic commercial fisheries. This model should be similar to the NOAA Fisheries Service model for other regions on shore based communities (Medium priority, High cost).
3. Consider alternative ways to collect data on both a social and economic basis e.g. partnerships to develop projects (High priority, Medium cost).
4. Ensure availability, improve upon and collect basic data: catch, employment, effort, price, cost/earnings (Very High priority, high cost).
5. Opportunity costs - Rely on the studies completed in the past on the next best jobs. Include collection of data to estimate worker satisfaction bonus.
6. Integrated biological, social and economic models including dynamic optimization models.
7. Demand analysis – include the effects of imports. Studies of value added product e.g. branding and marketing strategies.
8. Include data collection and analysis on the processing sector, retail sector.
9. Research on the economic and social effects of capacity reduction.
10. Employment in the primary and secondary sectors of the fishing industry that also includes research on household budgets.
11. Cumulative impacts – economic and social.
12. Models to predict fishing behavior in the face of fishing regulations. This would include description of fishing rounds on a seasonal basis and fishing behavioral networks.
13. Non-consumptive and non-use benefits of marine protected species and essential fish habitat/habitat areas of particular concern. Also, measure the socio-cultural benefits of these species.
14. Research on live product/whole weight conversion factors on a seasonal basis possibly through the TIP program or through other biological sampling programs.

Recreational

1. Assess the feasibility of developing benefits transfer models from existing data and the MRFSS. Complete recreational demand models that are more relevant for fisheries management. These models should focus on policy relevant variables (bag, size limits, individual species and species groups).
 (High priority, low/medium cost)
2. Develop random utility models for predicting participation changes, economic value and behavior of recreational fishermen. (High priority, high cost for data collection).
3. Develop targeted input-output model to estimate the effects of policy changes on the economic impacts of recreational fishing. Will provide information on jobs, wages, income on affected sectors such as lodging, restaurants, bait and tackle shops, marinas, boats (Medium priority, high cost).
4. Include categories/motivations of recreational anglers in models outlined in items 1 and 2 (Medium priority, high cost).
5. Collect data on motivations/behavioral patterns of recreational fishermen. (Medium priority, high cost).
6. Characterize participants in subsistence fisheries. (Low priority, high cost).
7. Develop Valuation models and I/O models for tournament fishing. (Medium priority, high cost).
8. Develop Cost-earnings model for the for-hire sector (charter and headboat). (High priority, high cost). NOAA Fisheries Service is currently conducting a study.
9.

Ecosystem based management

1. Conduct analyses to facilitate the economic valuation of ecosystem services (Very High priority, High cost).
2. Explore the use of Ecopath and Ecosim (Very High priority, High cost).

4.5 Cumulative Effects

As directed by the National Environmental Policy Act (NEPA), federal agencies are mandated to assess not only the indirect and direct impacts, but the cumulative impacts of proposed actions as well. NEPA defines a cumulative impact as *"the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time"* (40 C.F.R. 1508.7). Cumulative effects can either be additive or synergistic. A synergistic effect is when the combined effects are greater than the sum of the individual effects.

Various approaches for assessing cumulative effects have been identified, including checklists, matrices, indices, and detailed models (MacDonald 2000). The Council on Environmental Quality (CEQ) offers guidance on conducting a Cumulative Effects Analysis (CEA) in a report titled "Considering Cumulative Effects under the National Environmental Policy Act". The report outlines 11 items for consideration in drafting a CEA for a proposed action.

1. Identify the significant cumulative effects issues associated with the proposed action and define the assessment goals.
2. Establish the geographic scope of the analysis.
3. Establish the timeframe for the analysis.
4. Identify the other actions affecting the resources, ecosystems, and human communities of concern.
5. Characterize the resources, ecosystems, and human communities identified in scoping in terms of their relation to regulatory thresholds.
6. Characterize the stresses affecting these resources, ecosystems, and human communities and their relation to regulatory thresholds.
7. Define a baseline condition for the resources, ecosystems, and human communities.
8. Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human communities.
9. Determine the magnitude and significance of cumulative effects.
10. Modify or add alternatives to avoid, minimize, or mitigate significant cumulative effects.
11. Monitor the cumulative effects of the selected alternative and adapt management.

This CEA for the biophysical environment will follow a modified version of the 11 steps. Cumulative effects for the socio-economic environment will be analyzed separately.

4.5.1 Biological

SCOPING FOR CUMULATIVE EFFECTS

1. Identify the significant cumulative effects issues associated with the proposed action and define the assessment goals.

The CEQ cumulative effects guidance states that this step is done through three activities. The three activities and the location in the document are as follows:

I. The direct and indirect effects of the proposed actions (**Section 4.0**);

II. Which resources, ecosystems, and human communities are affected (**Section 3.0**). The species primarily affected by the actions in this amendment include snowy grouper, black sea bass, and red porgy, Other species in the snapper grouper fishery management unit may be affected, (Table 1-1); and

III. Which effects are important from a cumulative effects perspective (**information revealed in this CEA**).

2. Establish the geographic scope of the analysis.

The immediate impact area would be the federal 200-mile limit of the Atlantic off the coasts of North Carolina, South Carolina, Georgia and east Florida to Key West. Since the boundaries are solely political in nature and do not prohibit immigration and emigration of fish, and fish larvae, the geographic scope of the CEA must be expanded. Tagging work conducted by the Marine Resources Monitoring, Assessment and Prediction (MARMAP) program indicates that there is movement of species (i.e. gag and greater amberjack) between the Gulf of Mexico and South Atlantic (McGovern and Meister 1999; McGovern *et al.* 2005). Large scale movement of black sea bass and red porgy has not been documented (McGovern and Meister 1999). Tagging studies have not been conducted on snowy grouper; however, it is believed that movement of these species is limited. However, snowy grouper, black sea bass, and red porgy have pelagic eggs and larvae that may remain in the water column for extended periods of time and travel long distances before late stage larvae or juveniles assume a demersal existence.

In light of the available information, the extent of the boundaries would depend upon the degree of fish immigration/emigration and larval transport, whichever has the greatest geographical range. The CEA cannot put geographical boundaries in terms of coordinates, but recognize that the proper geographical boundary to consider effects on the biophysical environment is larger than the entire South Atlantic Exclusive Economic Zone (EEZ). The ranges of affected species are described in Section 3. The most measurable and substantial effects would be limited to the South Atlantic region.

3. Establish the timeframe for the analysis.

Establishing a timeframe for the CEA is important, when the past, present, and reasonably foreseeable future actions are discussed. It would be advantageous to go back to a time when there was a natural, or some modified (but ecologically sustainable) condition. However, data collection for many fisheries began when species were already fully exploited. Therefore, the timeframe for analyses should be initiated when data collection began for the various fisheries. In determining how far into the future to analyze cumulative effects, the length of the effects will depend on the species. Ending overfishing will result in rebuilding snowy grouper, red porgy, and black sea bass, which are overfished. Amendment 15A would establish rebuilding timeframes that could be as long as 34 years for snowy grouper. Red porgy currently has an 18 year rebuilding schedule in place. Therefore, analyses of effects should extend beyond the time when these overfished stocks are rebuilt. Monitoring should continue indefinitely for all species to ensure that management measures are adequate for preventing overfishing in the future.

4. Identify the other actions affecting the resources, ecosystems, and human communities of concern (the cumulative effects to the human communities are discussed in Section 4).

Listed are other past, present, and reasonably foreseeable actions occurring in the South Atlantic region. These actions, when added to the proposed management measures, may result in cumulative effects on the biophysical environment.

I. Fishery-related actions affecting snowy grouper, golden tilefish, black sea bass, and red porgy.

A. Past

The reader is referred to **<u>Section 1.2 History of Management</u>** for past regulatory activity for the fish species. These include bag and size limits, spawning season closures (red porgy), trip limits, commercial quotas, gear prohibitions and limitations, area closures, and a commercial limited access system. Snapper Grouper Amendment 13C was implemented on October 23, 2006. Amendment 13C established quotas, trip limits, and bag limits to end overfishing of snowy grouper, golden tilefish, and black sea bass. Red porgy harvest will be allowed to increase consistent with the rebuilding program.

B. Present

Update select management reference points for the snowy grouper (*Epinephelus niveatus*), red porgy (*Pagrus pagrus*), and black sea bass stocks (*Centropristis striata*); Modify rebuilding schedules for the snowy grouper and black sea bass stocks; Define rebuilding strategies for the snowy grouper, red porgy, and black sea bass stocks;

C. Reasonably Foreseeable Future

The Council has submitted Snapper Grouper Amendment 14 to the Secretary of Commerce. Amendment 14 would restrict some fishing activities at MPA sites with the potential to protect a portion of the population and habitat of long-lived, slow growing, deepwater snapper grouper species (speckled hind, snowy grouper, Warsaw grouper, yellowedge grouper, misty grouper, golden tilefish, and blueline tilefish) from directed fishing pressure to achieve a more natural sex ratio, age, and size structure within the proposed MPAs, while minimizing adverse social and economic effects.

The Council is developing Snapper Grouper Amendments 15B, 16, and 17. Amendment 15B would update management reference points for the golden tilefish; Define allocations for snowy grouper and red porgy; Modify sales restrictions; Establish a method to monitor and assess bycatch in the snapper grouper fishery; Implement measures to minimize the impact of incidental take on sea turtles and smalltooth sawfish; Modify permit renewal and transferability requirements.

Amendment 16 would end overfishing for vermilion snapper and gag grouper. It is expected that this amendment will be submitted to the Secretary of Commerce by June 2008.

Amendment 17 would establish Annual Catch Limits (ACL) for snapper grouper species undergoing overfishing and for recently assessed species. Other actions that would be included in Amendment 17 include: (1) SFA parameters for red snapper, greater amberjack, and mutton snapper; (2) interim allocations (if Comprehensive Allocation Amendment is not finalized); (3) management measures to limit recreational and commercial sectors to their ACLs; (4) accountability measures; (5) an action to remove species from the fishery management unit as appropriate; and (6) extend snapper grouper management regulations into the Mid-Atlantic Fishery Management Council's jurisdiction.

A Comprehensive ACL Amendment would establish ACLs for species in the Snapper Grouper Fishery Management Unit (FMU) not specified in Amendment 17.

A Comprehensive Allocation Amendment would define allocations for all species in the Snapper Grouper FMU.

II. Non-Council and other non-fishery related actions, including natural events affecting snowy grouper, golden tilefish, black sea bass, and red porgy.

A. Past
B. Present
C. Reasonably foreseeable future

In terms of natural disturbances, it is difficult to determine the effect of non-Council and non-fishery related actions on stocks of snowy grouper, black sea bass, and red porgy. Annual variability in natural conditions such as water temperature, currents, food availability, predator abundance, etc. can affect the abundance of young fish, which survive the egg and larval stages each year to become juveniles (i.e. recruitment). This natural variability in year class strength is difficult to predict as it is a function of many interactive and synergistic factors that cannot all be measured (Rothschild 1986). Furthermore, natural factors such as storms, red tide, cold water upwelling, etc. can affect the survival of juvenile and adult fishes; however, it is very difficult to quantify the magnitude of mortality it may have on a stock. Juvenile black sea bass and occasionally snowy grouper occur in estuarine areas along the southeastern United States (Robins and Ray 1986; Heemstra and Randall 1993). Alteration of estuarine habitats could affect survival of juveniles. However, estimates of the abundance of fish, which utilize this habitat, as well as determining the impact habitat alteration may have on juveniles is problematic.

AFFECTED ENVIRONMENT

5. Characterize the resources, ecosystems, and human communities identified in scoping in terms of their response to change and capacity to withstand stresses.

In terms of the biophysical environment, the resources/ecosystems identified in earlier steps of the CEA are the fish populations directly or indirectly affected by the regulations. This step should identify the trends, existing conditions, and the ability to withstand stresses of the environmental components.

The trends in the condition of snowy grouper, black sea bass, and red porgy are described by recent stock assessments (SEDAR 1 2002, SEDAR 2 SAR1 2003, SEDAR 4 2004). The SEDAR stock assessment indicates biomass of snowy grouper declined from about 2.5 times the biomass at MSY (B_{MSY}) in 1970 to 50% of B_{MSY} in 1985 (SEDAR 4 2004). In 2002, biomass was only about 18% of B_{MSY}. Fishing mortality (F) was close to the fishing mortality that would produce MSY (F_{MSY}) in 1975. In the early 1980s, F was more than 4 times greater than F_{MSY}. Since the early 1980s, F has fluctuated around 3 times F_{MSY}.

A fishery has existed for black sea bass off the southeastern United States since the middle 1800s. Landings rose very rapidly in the 1960s and the stock was considered to be severely depressed as far back as 1967 (SEDAR Assessment Update #1). Biomass decreased from about 60% of B_{MSY} in 1984 to about 20% of B_{MSY} in 1994. A slight increase in biomass occurred in recent years to 27% of B_{MSY} in 2004. Fishing mortality rate for black sea bass fully recruited to fishing gear increased from F_{MSY} in 1978 over 6 times F_{MSY} in 2004. However, the exploitation rate (E) of age 1+ fish decreased from 3 times the exploitation rate that will achieve MSY (E_{MSY}) in 1994 to about 1.5 times E_{MSY} in 2004.

Biomass of red porgy decreased steadily from about 2.8 times B_{MSY} in 1972 to around 40% of B_{MSY} during the middle 1990s. Biomass increased to 44% of B_{MSY} in 2001. Fishing mortality (F) increased from about 30% of F_{MSY} in 1972 to greater than 4 times F_{MSY} in 1990. Fishing mortality decreased, with some fluctuation, to 45% of F_{MSY} in 2001.

Snowy grouper are extremely long-lived (>50 years), slow growing, late maturing, making them very susceptible to stresses such as fishing pressure (Wyanski *et al.* 2000, Harris *et al.* 2001). The capacity to recover from heavy fishing depends on factors such as age at maturity, generation time, environmental conditions, available habitat, harvesting pressure, age at removal, ability to reach a mature age, and predation. Due to the life history characteristics of snowy grouper, the amount of time needed to recover from periods of heavy fishing pressure would be greater than for black sea bass and red porgy. For example, in the absence of fishing pressure, it is estimated that snowy grouper would rebuild to B_{MSY} in 13 years (SEDAR4 2004). In contrast, other affected species such as black sea bass, and red porgy are not as long-lived, are faster growing, and mature at smaller sizes than snowy grouper. Thus, recovery of black sea bass and red porgy would require a shorter period of time than snowy grouper. For example, black sea bass, which lives for a maximum of 10-20 years, matures at 7" total length, and is considered to be seriously overfished, will rebuild to B_{MSY} in only five years in the absence of fishing. Effects on the human environment are described in Section 4.

6. Characterize the stresses affecting these resources, ecosystems, and human communities and their relation to regulatory thresholds concern.

This step is important in outlining the current and probable stress factors to snowy grouper, black sea bass, and red porgy identified in the previous steps. The goal is to determine whether these species are approaching conditions where additional stresses could have an important cumulative effect beyond any current plan, regulatory, or sustainability threshold (CEQ 1997). Sustainability thresholds can be identified for some resources, which are levels of impact beyond which the resources cannot be sustained in a stable state. Other thresholds are established through numerical standards, qualitative standards, or management goals. The CEA should address whether thresholds could be exceeded because of the contribution of the proposed action to other cumulative activities affecting resources.

<u>Fish populations</u>
Quantitative definitions of overfishing and overfished for snowy grouper, black sea bass, and red porgy are identified in Amendments 11 and 12 to the Snapper Grouper FMP (SAFMC 1998d). Numeric values of thresholds overfishing and overfished thresholds are being specified or modified in for various snapper grouper species in Amendment 15A (snowy grouper, black sea bass, red porgy), Amendment 15B (golden tilefish) and Amendment 16 (gag and vermilion snapper). These values includes maximum sustainable yield (MSY), the fishing mortality rate that produces MSY (F_{MSY}), the biomass or biomass proxy that supports MSY (B_{MSY}), the minimum stock size threshold

below which a stock is considered to be overfished (MSST), the maximum fishing mortality threshold above which a stock is considered to be undergoing overfishing (MFMT), and optimum yield (OY). Amendment 15A may also provide new definitions of MSST for snowy grouper.

7. Define a baseline condition for the resources, ecosystems, and human communities concern.

The purpose of defining a baseline condition for the resource and ecosystems in the area of the proposed action is to establish a point of reference for evaluating the extent and significance of expected cumulative effects. The SEDAR assessments show trends in biomass, fishing mortality, fish weight, and fish length going back to the earliest periods of data collection. For some species such as snowy grouper, these assessments reflect initial periods when the stocks were above B_{MSY} and fishing mortality was low. However, some species such as black sea bass were heavily exploited or possibly overfished when data were first collected. As a result, the assessment must make an assumption of the biomass at the start of the assessment period thus modeling the baseline reference points for the species.

DETERMINING THE ENVIRONMENTAL CONSEQUENCES OF CUMULATIVE EFFECTS

8. Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human communities.

The relationship between human activities and biophysical ecosystems within the context of this CEA is solely related to extractive activities and the installment of regulations as outlined in Table 4-29.

Table 4-29. The cause and effect relationship of fishing and regulatory actions within the time period of the Cumulative Effects Analysis (CEA).

Time period/dates	Cause	Observed and/or Expected Effects
1960s-1983	Growth overfishing of many reef fish species.	Declines in mean size and weight of many species including black sea bass.
August 1983	8" total length black sea bass; 4" trawl mesh (SAFMC 1983).	Protected youngest spawning age classes.
Pre-January 12, 1989	Habitat destruction, growth overfishing of vermilion snapper.	Damage to snapper grouper habitat, decreased yield per recruit of vermilion snapper.
January 1989	Trawl prohibition to harvest fish (SAFMC 1988b).	Increase yield per recruit of vermilion snapper; eliminate trawl damage to live bottom habitat.
Pre-January 1, 1992	Overfishing of many reef species including red porgy, vermilion snapper, and snowy grouper.	Spawning stock ratio of these species is estimated to be less than 30% indicating that they are overfished.
January 1992	Prohibited gear: fish traps south of Cape Canaveral, FL; entanglement nets; longline gear inside of 50 fathoms; powerheads and bangsticks in designated SMZs off SC; 10" total length vermilion snapper (recreational only); 12" total length vermilion snapper and red grouper (commercial only); 10 vermilion snapper/person/day, aggregate grouper bag limit of 5/person/day (SAFMC 1991).	Protected smaller spawning age classes of vermilion snapper.
Pre-June 27, 1994	Overfishing of snowy grouper and golden tilefish; high fishing intensity and damage to *Oculina* habitat.	SSR for snowy grouper and golden tilefish below 30% indicates that they are overfished. Noticeable decrease in numbers and species diversity in are of *Oculina* off FL
June 1994	Commercial quotas and trip limits for snowy grouper and golden tilefish. Prohibition of fishing for and retention of snapper grouper species (HAPC renamed OECA in 1994)	Put limit on fishing mortality of snowy grouper and golden tilefish. Initiated the recovery of snapper grouper species in OECA.
1992-1999	Declining trends in biomass and overfishing	Spawning potential ratio for vermilion snapper, black sea bass, and red porgy is less

Time period/dates	Cause	Observed and/or Expected Effects
	continue for a number of snapper grouper species including vermilion snapper, black sea bass and red porgy.	than 30% indicating that they are overfished.
June 24, 1999	Red porgy: 14" total length (recreational and commercial); 5 fish bag limit; March-April closure. Black sea bass: 10" total length (recreational and commercial); 20 fish bag limit. Vermilion snapper: 11" total length (recreational). Aggregate bag limit of no more than 10 fish/person/day (SAFMC 1998a).	Ends overfishing of red porgy, rebuilding of biomass begins. F decreases in 2000 for black sea bass but increases again in 2001. No further declines in black sea bass biomass. F for vermilion snapper remains at lower levels than during 1983-1996 but is still above Fmsy. Egg production increases.
1999-2000	Red porgy is not overfishing but remains overfished.	Needs to be rebuilt to B_{MSY}.
September 22, 2000	Establish 18 year rebuilding timeframe, January-April closure, 1 fish bag limit, 50-lb incidental catch (SAFMC 2000).	Biomass continues to rebuild.
In development	Snapper Grouper FMP Amendment 13B.	Create multi-species units, identify indicator species; modify management reference points; change permit renewal and transferability provisions; bycatch practicability analysis.
Regulations effective October 23, 2006	Snapper Grouper FMP Amendment 13C.	Reduce fishing mortality on snowy grouper, golden tilefish, black sea bass, and vermilion snapper. Allow increase harvest of red porgy.
In development	Snapper Grouper FMP Amendment 14.	Use marine protected areas (MPAs) as a management tool to promote the optimum size, age, and genetic structure of slow growing, long-lived deepwater snapper grouper species (speckled hind, snowy grouper, Warsaw grouper, yellowedge grouper, misty grouper, golden tilefish, and blueline tilefish).
In development	Snapper Grouper FMP Amendment 15A.	Allow increased harvest as biomass of overfished fisheries rebuild. Reduce of deepwater species.

Time period/dates	Cause	Observed and/or Expected Effects
In development	Snapper Grouper FMP Amendment 15B.	Update management reference points for the golden tilefish; Define allocations for snowy grouper and red porgy; Modify sales restrictions; Establish a method to monitor and assess bycatch in the snapper grouper fishery; Implement measures to minimize the impact of incidental take on sea turtles and smalltooth sawfish; Modify permit renewal and transferability requirements.
In development	Snapper Grouper FMP Amendment 17.	Establish a strategy to ensure stock rebuilding stays on schedule should the total allowable catch levels be exceeded; Implement measures to reduce bycatch of deepwater snapper grouper species; Specify the number of black sea bass tags and pots allowed each year and/or require that pots are brought in at the conclusion of each trip; Adjust the golden tilefish management measures.
In development	Snapper Grouper FMP Amendment 16.	End overfishing for vermilion snapper and gag grouper.
In development	Snapper Grouper FMP Amendment 17.	Establish Annual Catch Limits (ACL) for snapper grouper species undergoing overfishing and for recently assessed species. Other actions that would be included in Amendment 17 include: (1) SFA parameters for red snapper, greater amberjack, and mutton snapper; (2) interim allocations (if Comprehensive Allocation Amendment is not finalized); (3) management measures to limit recreational and commercial sectors to their ACLs; (4) accountability measures; (5) an action to remove species from the fishery management unit as appropriate; and (6) extend snapper grouper management regulations into the Mid-Atlantic Fishery Management Council's jurisdiction.
In development	Comprehensive Annual Catch Limit (ACL) Amendment	Establish ACLs for species in the Snapper Grouper Fishery Management Unit (FMU) not specified in Amendment 17.
In development	Comprehensive Allocation Amendment	Define allocations for all species in the Snapper Grouper FMU.

9. Determine the magnitude and significance of cumulative effects.

Management actions in Amendment 13C, implemented October 23, 2006, should reduce fishing mortality in snowy grouper, golden tilefish, and black sea bass and are expected to have a beneficial, cumulative effect on the biophysical environment. These management actions are expected to increase stock biomass, which may affect other stocks. Evidence from MARMAP CPUE and reports from fishermen indicate the red porgy stock is rebuilding as a result of management measures implemented in Snapper Grouper FMP Amendment 12. Because snowy grouper, golden tilefish, and to a certain extent, red porgy, and black sea bass are upper level predators preying primarily on fish, benthic invertebrates, and in some cases, squid (Nelson 1988; Bullock and Smith 1991), the degree of competition for food resources between these species and other co-occurring species may increase as stock abundance increases. In addition, red porgy, black sea bass and other co-occurring species may begin to compete for habitat as they increase in abundance.

Restrictions in the catch of snowy grouper, golden tilefish, and black sea bass could result in fishermen shifting effort to other species. The snapper grouper ecosystem includes many species that occupy the same habitat at the same time. For example, black sea bass co-occur with tomtate, scup, red porgy, white grunt, red grouper, scamp, gag, and others. Therefore, restricted species are likely to still be caught since they will be incidentally caught when fishermen target other co-occurring species. Continued overexploitation of any snapper grouper species could disrupt the natural community structure of the reef ecosystems that support these species. However, some fishermen may choose to use different gear types and target species in different fisheries such as mackerel and dolphin.

Actions in this amendment would specify increased harvest of snowy grouper, black sea bass, and red porgy as the stock rebuild. One action is expected to reduce bycatch, including bycatch of deepwater species.

Complex models are needed to better understand competition between resources and the effect of effort shifting of fishermen to other species and fisheries. The Council is working with a number of partners to develop an Ecopath model for the South Atlantic ecosystem. Full development of this model will assist in better understanding these linkages. The Council is also developing an Ecosystem FMP that will address the cumulative effects of management regulations, fishing effort, and biomass of all species in the marine ecosystem. Delaying implementation of proposed actions until these tools are completed could adversely affect snowy grouper and black sea bass. However, although the cumulative effects of proposed actions cannot be quantified, it is expected that the effects will be positive and synergistic.

10. Modify or add alternatives to avoid, minimize, or mitigate significant cumulative effects.

The cumulative effects on the biophysical environment are expected to be positive. Avoidance, minimization, and mitigation are not applicable.

11. Monitor the cumulative effects of the selected alternative and modify management as necessary.

The effects of the proposed action are, and will continue to be, monitored through collection of data by NMFS, States, stock assessments and stock assessment updates, life history studies, and other scientific observations. The establishment of a standard reporting methodology for bycatch, proposed in this amendment, would improve the monitoring of the cumulative effects of discards.

4.5.2 Socioeconomic

A description of the human environment, including a description commercial and recreational snapper grouper fisheries and associated key fishing communities is contained in Section 3.4 and incorporated herein by reference. A description of the history of management of the snapper grouper fishery is contained in Section 1.2 and is incorporated herein by reference. Participation in and the economic performance of the fishery have been effected by a combination of regulatory, biological, social, and external economic factors. Regulatory measures have obviously affected the quantity and composition of harvests, through the various size limits, seasonal restrictions, trip or bag limits, and quotas. Gear restrictions, notably fish trap and longline restrictions, have also affected harvests and economic performance. The limited access program implemented in 1998/1999 substantially affected the number of participants in the fishery. Biological forces that either motivate certain regulations or simply influence the natural variability in fish stocks have played a role in determining the changing composition of the fishery. Additional factors, such as changing career or lifestyle preferences, stagnant to declining prices due to imports, increased operating costs (gas/diesel, ice, insurance, dockage fees, etc.), and increased waterfront/coastal value leading to development pressure for other than fishery uses have impacted both the commercial and recreational fishing sectors.

Given the variety of factors that affect fisheries, persistent data issues, and the complexity of trying to identify cause-and-effect relationships, it is not possible to differentiate actual or cumulative regulatory effects from external cause-induced effects. For each regulatory action, expected effects are projected. However, these projections typically only minimally, if at all, are capable of incorporating the variety of external factors, and evaluation in hindsight is similarly incapable of isolating regulatory effects from other factors, as in, what portion of a change was due to the regulation versus due to input cost changes, random species availability variability, the sale of a fish house for condominium development, or even simply fishermen behavioral changes unrelated to the regulation.

In general, it can be stated, however, that the regulatory environment for all fisheries has become progressively more complex and burdensome, increasing, in tandem with other adverse influences, the pressure on economic losses, business failure, occupational changes, and associated adverse pressures on associated families, communities, and industries. Some reverse of this trend is possible and expected. The adoption of limited access privilege programs would allow a simplified regulatory environment since trip or seasonal restrictions may no longer be needed and effort issues should be addressed by internal access-rights transfer, while rebuilding plans and the recovery of stocks would allow harvest increases. However, certain pressures would remain, such as total effort and total harvest considerations, increasing input costs, import induced price pressure, and competition for coastal access.

A detailed description of the expected social and economic impacts of the actions in this amendment are contained elsewhere in Section 4, and in Sections 5 and 6, and is incorporated herein by reference. The actions contained in this amendment are expected to result in harvest increases over time, resulting in social and economic gains, though any initial harvest declines at the beginning of the rebuilding schedules would be expected to increase the economic burden and jeopardy of the participants. Where losses are projected, as is always the case, individual losses may be so severe that some entities may not be able to remain in business long enough to reap the benefits of a recovered stock and increased longterm resource stability. Thus, even though the fishery as a whole may benefit, individual participants may suffer. However, as is also the case, failure to take action can result in persistent foregone economic benefits, or more severe corrective action with greater adverse impacts if the period under which recovery is mandated is substantially shortened.

Current and future amendments are expected to add to this cumulative effect. Snapper Grouper Amendment 13C (SAFMC 2006) included a number of actions to end overfishing for four snapper-grouper species (snowy grouper, vermilion snapper, black sea bass, and golden tilefish), while increasing the allowable catch of red porgy. The expected impacts of Snapper Grouper Amendment 13C are described in the amendment and are incorporated by reference. In summary, the combined actions were expected to result in an annual decrease of approximately $1.085 million in net operating revenues, or greater than 12 percent of average annual net operating revenues, for the commercial sector by the third year of implementation of the step-down harvest reductions of the amendment. Similar estimates for the recreational sector were not available due to data deficiencies. However, the recreational sector was projected to experience substantial reductions in consumer surplus as a result of the actions in the amendment.

The actions in Snapper Grouper Amendment 13C were also incorporated in the modeling assumptions to constitute the status quo in the evaluation of the alternatives considered in the current amendment. Thus, the expected impacts of the current amendment would be in addition to the impacts of those of Snapper Grouper 13C.

Snapper Grouper Amendment 14 would restrict fishing at a series of MPA sites. The expected economic impacts of these MPAs are unknown since available data cannot identify the incidence or magnitude of harvests from these areas, not is it possible to forecast how fishing behavior or harvests may change to compensate for these restrictions. In the short-term, some additional economic losses may occur as a result of this amendment, but in the long-term, the stocks are expected to benefit from this increased protection, with spill-over benefits to the fishery.

Snapper Grouper Amendment 15B is expected to contain actions which will decrease the economic burden on fishery participants, resulting in economic and social gains, such as the permit renewal and transfer actions which would make it easier to renew a permit and allow fishing families to gain the economic benefits of incorporation, and actions which will increase the regulatory burden on fishery participants, resulting in potential economic and associated social losses, such as the prohibition on recreational sales and the gear requirements to reduce incidental mortality of protected species. The allocation actions would be expected to benefit participants in any sector that receives an increase in their allocation, while economically harming those participants in any sector that would receive a reduced allocation. The net effect of these actions has not been determined at this time.

Snapper Grouper Amendment 17 is expected to contain a number of actions addressing general snapper grouper harvest overages, black sea bass pot/trap use, and the deepwater snapper grouper fishery. The full suite of actions and alternatives for this amendment has not been determined at this time. While these actions would be expected to aid long-term protection and recovery efforts for snapper grouper, these actions are likely to increase the regulatory burden for some segments and participants of the fishery, with associated increased short-term economic and social hardships for fishery participants and associated industries and communities.

Snapper Grouper Amendment 16 will address overfishing in the gag and vermilion snapper fisheries. The expected impacts of this action have not been determined at this time. However, corrective action in response to overfishing always requires harvest reductions and more restrictive regulation. Thus, additional shortterm social and economic impacts would be expected. These restrictions will hopefully prevent, however, the stocks from becoming overfished, which would require recovery plans, further harvest restrictions, and additional social and economic losses.

4.6 Bycatch Practicability Analysis

The Council is required by Magnuson-Stevens Act §303(a)(11) to establish a standardized bycatch reporting methodology for federal fisheries and to identify and implement conservation and management measures that, to the extent practicable and in the following order, (A) minimize bycatch and (B) minimize the mortality of bycatch that cannot be avoided. The Magnuson-Stevens Act 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" (Magnuson-Stevens Act §3(2)). Economic discards are species 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 species required by regulation to be discarded, but also include fish that may be retained but not sold.

NMFS outlines at 50 CFR §600.350(d)(3)(i) ten factors that should be considered in determining whether a management measure minimizes bycatch or bycatch mortality to the extent practicable. 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, 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.

Agency guidance provided at 50 CFR §600.350(d)(3)(ii) suggests the Councils adhere to the precautionary approach found in the Food and Agriculture Organization of the United Nations (FAO) Code of Conduct for Responsible Fisheries (Article 6.5) when faced with uncertainty concerning these ten practicability factors. According to Article 6.5 of the FAO Code of Conduct for Responsible Fisheries, using the absence of adequate scientific information as a reason for postponing or failing to take measures to conserve target species, associated or dependent species, and non-target species and their environment, would not be consistent with a precautionary approach.

4.6.1 Population Effects for the Bycatch Species

4.6.1.1 Background

Actions in Amendment 15A are intended to prevent overfishing, rebuild overfished stocks, and achieve OY from the South Atlantic snapper grouper fishery. These actions would: Update management reference points for snowy grouper, black sea bass, and red porgy; Modify rebuilding schedules for snowy grouper and black sea bass; and Define rebuilding strategies for snowy grouper, black sea bass, and red porgy.

Logbook data from 2001-2004 indicates the directed commercial fishery for snowy grouper is prosecuted primarily with hook and line gear (70%) followed by bottom longline gear (29%). Other gear types capture 1% of the landings. Snowy grouper is largely a commercial fishery as only 4% of the landings were from recreational sources during 1999-2003 and 8% of the landings were recreational during 2001-2005 (Table 4-30). Golden tilefish are also primarily taken by commercial fishermen and most are caught with bottom longline gear (Table 4-30). The SEDAR Assessment Update #1 (2005) indicated most black sea bass were taken by the recreational sector (57%) during 2002 to 2003. Most commercial landings of black sea bass (87%) are from pots (Table 4-30). Red porgy landings were fairly evenly split between the commercial (49%) and recreational (51%) sectors based on data from 2001-2003; however, landings are dominated by the recreational sector with the inclusion of 2004 and 2005 data.

Table 4-30. Percentage of recreational and commercial landings of species in Amendment 15A for 2001-2005. Note: Recreational landings include headboat and MRFSS data; commercial data are from NMFS Logbook.

Species	% Recreational	% Commercial	% Hook and line	% Longline	% Pots	% Other
Snowy Grouper	8.00	92.00	70.86	28.59	0.00	0.55
Red Porgy	62.80	37.20	97.80	0.97	0.84	0.39
Black Sea Bass	52.00	48.00	12.19	0.01	87.37	0.44

Restrictions currently used to manage these species include quotas (snowy grouper, black sea bass, red porgy), trip limits (snowy grouper), minimum size limits (black sea bass and red porgy), bag limits (snowy grouper and red porgy), and closed seasons (red porgy).

As noted in Section 3.2.4, NMFS recently conducted a biological opinion on the effects of the South Atlantic Snapper Grouper fishery on ESA-listed species. That opinion stated the operation of the South Atlantic Snapper Grouper fishery may adversely affect green, Kemp's ridley, leatherback and loggerhead sea turtles, but was not likely to jeopardize their continued existence. The management measures proposed in Amendment 15A are not expected to create any adverse effects on these species that were not previously considered in NMFS (2006).

4.6.1.2 Commercial Fishery

During 2001 to 2005, approximately 20% of snapper grouper permitted vessels from the Gulf of Mexico and South Atlantic were randomly selected to fill out supplementary logbooks. Data from 2001 are not presented because some values are questionable. During 2002-2005, an average of 61% of the trips in the South Atlantic reported discards (Table 4-31). The average number of trips per year during 2002 to 2005 was 16,808 (Table 4-32).

Table 4-31. Discard logbook gross effort for South Atlantic.
Source: NMFS SEFSC Logbook Program.

YEAR	Trips reporting Discard	Trips reporting no Discard	Sample Trips	% Trips with Discard
2002	2,947	1,449	4,396	67.0%
2003	3,028	2,040	5,068	59.7%
2004	2,091	1,837	3,928	53.2%
2005	1,904	1,162	3,066	62.1%
Grand Total	9,970	6,488	16,458	60.6%
Mean	2,493	1,622	4,115	

Table 4-32. Snapper grouper fishery effort for South Atlantic.
Source: NMFS SEFSC Logbook Program.

YEAR	Trips
2002	17,856
2003	18,125
2004	16,711
2005	14,538
Mean	16,808

For species in Amendment 15A, the number of trips reporting discards was greatest for red porgy followed by black sea bass (Table 4-33). Discards of snowy grouper were rare. The percentage of trips that reported discards ranged from 3.89% for red porgy to 0.05% for snowy grouper

During 2002-2005, the average number of individuals discarded per trip was greatest for black sea bass followed by red porgy for species in Amendment 15A (Table 4-35). Snowy grouper-were rarely discarded.

Since the discard logbook database represents a sample, data were expanded to estimate the number of discarded fish in the whole fishery. The method for expansion was to (1) estimate the probability of discarding a species; (2) estimate the number of fish discarded per trip; and (3) estimate the number discarded in the whole fishery (total discarded = total trips * discard probability * discard number). During 2002-2005, an average of

50,283 black sea bass were discarded per year (Table 4-36). The number of discarded red porgy was lower (~40,000). Snowy grouper were rarely discarded.

Table 4-33. Annual number of trips reporting discard of species in the South Atlantic.
Source: NMFS SEFSC Logbook Program.

YEAR	Warsaw Grouper	Speckled Hind	Snowy Grouper	Golden Tilefish	Yellowedge Grouper	Misty Grouper	Blueline Tilefish	Silk Snapper	Queen Snapper	Black Sea Bass	Vermilion Snapper	Red porgy
2002	10	63	2	0	0	1	0	5	1	116	217	250
2003	18	55	2	0	0	0	1	0	0	115	118	151
2004	1	13	0	0	0	0	2	0	0	65	65	81
2005	1	27	3	0	2	0	2	1	0	63	86	148
Mean	7.5	39.5	1.8	0.0	0.5	0.3	1.3	1.5	0.3	89.8	121.5	157.5

Table 4-34. Percentage of trips that discarded species in the South Atlantic.
Source: NMFS SEFSC Logbook Program.

YEAR	Warsaw Grouper	Speckled Hind	Snowy Grouper	Golden Tilefish	Yellowedge Grouper	Misty Grouper	Blueline Tilefish	Silk Snapper	Queen Snapper	Black Sea Bass	Vermilion Snapper	Red porgy
2002	0.227	1.433	0.045	0.000	0.000	0.023	0.000	0.114	0.023	2.639	4.936	5.687
2003	0.355	1.085	0.039	0.000	0.000	0.000	0.020	0.000	0.000	2.269	2.328	2.979
2004	0.025	0.331	0.000	0.000	0.000	0.000	0.051	0.000	0.000	1.655	1.655	2.062
2005	0.033	0.881	0.098	0.000	0.065	0.000	0.065	0.033	0.000	2.055	2.805	4.827
Mean	0.16	0.93	0.05	0.00	0.02	0.01	0.03	0.04	0.01	2.15	2.93	3.89

Table 4-35. Average number of species discarded per trip in the South Atlantic.
Source: NMFS SEFSC Logbook Program.

YEAR	Warsaw Grouper	Speckled Hind	Snowy Grouper	Golden Tilefish	Yellowedge Grouper	Misty Grouper	Blueline Tilefish	Silk Snapper	Queen Snapper	Black Sea Bass	Vermilion Snapper	Red porgy
2002	2.2	16.3	2.5	0.0	0.0	1.0	0.0	16.4	2.0	224.6	78.1	75.3
2003	2.3	15.4	1.5	0.0	0.0	0.0	1.0	0.0	0.0	188.3	66.1	62.7
2004	1	3.9	0.0	0.0	0.0	0.0	1.0	0.0	0.0	30.0	61.5	51.1
2005	1	4.9	1.3	0.0	2.5	0.0	1.0	5.0	0.0	32.0	96.8	56.2
Mean	1.6	10.1	1.3	0.0	0.6	0.3	0.8	5.4	0.5	118.7	75.6	61.3

Table 4-36. Expanded number of discarded species for the South Atlantic.

YEAR	Warsaw Grouper	Speckled Hind	Snowy Grouper	Golden Tilefish	Yellowedge Grouper	Misty Grouper	Blueline Tilefish	Silk Snapper	Queen Snapper	Black Sea Bass	Vermilion Snapper	Red porgy
2002	89	4,179	20	0	0	4	0	333	8	105,820	68,873	76,444
2003	148	3,019	11	0	0	0	4	0	0	77,453	27,910	33,886
2004	4	217	0	0	0	0	9	0	0	8,283	16,998	17,613
2005	5	625	19	0	24	0	9	24	0	9,574	39,494	39,407
Mean	62	2,010	12	0	6	1	5	89	2	50,283	38,319	41,838

The 50 most commonly discarded species during 2001-2005 are shown in Tables 4-37 through 4-38.

Table 4-37. The 50 most commonly discarded species during 2001-2005 in order of occurrence from highest number of trips to lowest for the South Atlantic. Note: Count is number of trips that reported discarding the species. Sum is the reported number discarded. These values are not expanded. Source: NMFS SEFSC Logbook Program.

Species	Count	Sum
SNAPPER,YELLOWTAIL	1131	10,528
PORGY,RED,UNC	717	44,706
SNAPPER,VERMILION	593	45,388
SCAMP	588	7,433
KING MACKEREL and CERO	583	4,200
GROUPER,GAG	553	3,902
GROUPER,RED	468	2,313
SEA BASS,ATLANTIC,BLACK,UNC	429	94,564
GROUPER,BLACK	355	2,629
SHARK,UNC	331	2,307
AMBERJACK,GREATER	293	1,942
SNAPPER,RED	288	9,091
BONITO,ATLANTIC	233	1,066
TUNA,LITTLE (TUNNY)	221	1,311
SNAPPER,MANGROVE (Duplicate of 3760)	190	1,588
HIND,SPECKLED	173	2,252
BARRACUDA	170	837
MENHADEN	164	24,452
AMBERJACK	152	568
SNAPPER,MUTTON	142	430
SHARK,ATLANTIC SHARPNOSE	136	3,588
DOLPHINFISH	135	795
BLUE RUNNER	117	868
GRUNTS	116	2,993
SEA BASS,ROCK	111	9,385
SHARK,BLACKTIP	110	753
TRIGGERFISH,GRAY	107	1,570
TRIGGERFISHES	105	1,066
FINFISHES,UNC FOR FOOD	105	997
REMORA	99	233
KING MACKEREL	93	811
COBIA	91	155
SCUPS OR PORGIES,UNC	90	1,003
SHARK,DOGFISH,SPINY	86	8,867
SHARK,SANDBAR	78	1,424
GRUNT,WHITE	65	4,478
GROUPERS	62	3,839
SHARK,NURSE	61	176
SPANISH MACKEREL	60	657
CERO	55	160
PARROTFISH	55	99
SHARK,DOGFISH,UNC	47	2,623

Species	Count	Sum
SNAPPER,MANGROVE	47	248
RUDDERFISH (SEA CHUBS)	46	351
BLUEFISH	44	1,632
CREVALLE	43	133
FINFISHES,UNC,BAIT,ANIMAL FOOD	42	4,251
SKATES	38	1,011
GROUPER,WARSAW	38	228
GROUPER,NASSAU	38	55

Table 4-38. The 50 most commonly discarded species during 2001-2005 based on number of fish discarded ordered from highest to lowest for the South Atlantic. Note: Count is number of trips that reported discarding the species. Sum is the reported number discarded. These values are not expanded. Source: NMFS SEFSC Logbook Program.

Species	Count	Sum
SEA BASS,ATLANTIC,BLACK,UNC	429	94,564
SNAPPER,VERMILION	593	45,388
PORGY,RED,UNC	717	44,706
MENHADEN	164	24,452
SNAPPER,YELLOWTAIL	1131	10,528
SEA BASS,ROCK	111	9,385
SNAPPER,RED	288	9,091
SHARK,DOGFISH,SPINY	86	8,867
SCAMP	588	7,433
GRUNT,WHITE	65	4,478
FINFISHES,UNC,BAIT,ANIMAL FOOD	42	4,251
KING MACKEREL and CERO	583	4,200
GROUPER,GAG	553	3,902
GROUPERS	62	3,839
SHARK,ATLANTIC SHARPNOSE	136	3,588
GRUNTS	116	2,993
GROUPER,BLACK	355	2,629
GRUNT,TOMTATE	22	2,628
SHARK,DOGFISH,UNC	47	2,623
GROUPER,RED	468	2,313
SHARK,UNC	331	2,307
HIND,SPECKLED	173	2,252
AMBERJACK,GREATER	293	1,942
BLUEFISH	44	1,632
SNAPPER,MANGROVE (Duplicate of 3760)	190	1,588
TRIGGERFISH,GRAY	107	1,570
BALLYHOO	31	1,500
SHARK,SANDBAR	78	1,424
TUNA,LITTLE (TUNNY)	221	1,311
SHARK,DOGFISH,SMOOTH	32	1,245
BONITO,ATLANTIC	233	1,066
TRIGGERFISHES	105	1,066

Species	Count	Sum
SKATES	38	1,011
SCUPS OR PORGIES,UNC	90	1,003
FINFISHES,UNC FOR FOOD	105	997
BLUE RUNNER	117	868
BARRACUDA	170	837
SHARK,TIGER	28	824
KING MACKEREL	93	811
DOLPHINFISH	135	795
SHARK,BLACKTIP	110	753
SNAPPERS,UNC	27	697
SPANISH MACKEREL	60	657
AMBERJACK	152	568
PINFISH,SPOTTAIL	36	557
CHUBS	27	493
AMBERJACK,LESSER	8	484
SNAPPER,MUTTON	142	430
BIGEYE SCAD	7	395
RUDDERFISH (SEA CHUBS)	46	351

4.6.1.3 Recreational Fishery

For the recreational fishery, estimates of the number of recreational discards are available from MRFSS. There are no estimates from the headboat survey. The MRFSS system classifies recreational catch into three categories:

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

The percentage of fish released was highest for black sea bass (76.8%) and lowest for yellowedge grouper and misty grouper (0.0%). SEDAR 4 (2004) suggested release mortality rates is probably near 100% for snowy grouper and golden tilefish. Estimates of dead discards are based on accepted release mortality rates (Section 4.16.1.4). The number of fish released per year and number of dead discards was greatest for black sea bass (Table 4-39).

Table 4-39. Estimated number (A+B1+B2) of fish caught from MRFSS interviews, estimated number of fish released (B2), percent released, estimate number of dead discards. Source: MRFSS Web Site.

Species	Est Total	Est Released	% Released	Est Dead Discards
Snowy Grouper	43,821	5,523	12.6	5,523
Golden Tilefish	99,795	3,108	3.1	3,108
Speckled Hind	11,638	10,966	94.2	10,966
Warsaw Grouper	7,493	1,660	22.2	1,660
Yellowedge Grouper	3,750	0	0.0	0
Misty Grouper	54	0	0.0	0
Blueline Tilefish	24,067	4,421	18.4	4,421
Silk Snapper	8,542	1,015	11.9	1,015
Queen Snapper	890	319	35.8	319
Black Sea Bass	12,989,352	9,981,240	76.8	1,497,186
Red Porgy	306,713	182,993	59.7	14,639
Vermilion Snapper	1,721,815	691,048	40.1	172,762

4.6.1.4 Finfish Bycatch Mortality

Snowy grouper are primarily caught in water deeper than 300 feet and golden tilefish are taken at depths greater than 540 feet; therefore, release mortality of the species are probably near 100% (SEDAR 4 2004). Release mortality of black sea bass is considered to be low (15%) indicating minimum size limits are probably an effective management tool for black sea bass. McGovern and Meister (1999) report a recapture rate of 10.2% for 10,462 that were tagged during 1993-1998 suggesting that survival of released black sea bass is high. SEDAR 1 (2002) recommended release mortality rates of 35% be used for red porgy caught by commercial fishermen and 8% for red porgy taken by the recreational sector.

4.6.1.5 Practicability of Management Measures in Directed Fisheries Relative to their Impact on Bycatch and Bycatch Mortality

Actions in Amendment 15A, which would reduce bycatch of snapper grouper species, are listed below.

<u>Snowy Grouper</u>

Bycatch of snowy grouper was very low during 2002-2005 (Table 4-36). Since there is no size limit and the current quota was rarely met, there was little incentive to release these species. Snowy grouper and golden tilefish are in the five grouper per person per day aggregate; however, the aggregate limit was rarely met during 2002-2005. Therefore, there were very few recreational discards (Table 4-39). Bycatch of snowy grouper could increase in 2007 after Amendment 13C was implemented since the quotas and bag limits were reduced. The magnitude of increase in bycatch will depend on efforts of fishermen avoid locations where snowy grouper occur and if a quota or trip limit is met. Furthermore, it is possible commercial fishermen may choose to not use longline gear to catch reef fishes after the golden tilefish quota is met because golden tilefish dominate landings with this gear type and there would be no incentive to target snowy grouper with a small trip limit (100 lbs gutted weight). Therefore, if fishermen stopped using longline gear after the golden tilefish quota is met, it is likely there would be very little bycatch of snowy grouper (Table 4-40).

Table 4-40. Composition of reef fish catch with longline gear in the South Atlantic during 2001-2005

COMMON	Percent	Cum Percent
TILEFISH	41.60	41.60
GROUPER,RED	11.97	53.57
GROUPER,SNOWY	10.68	64.25
TILEFISH,BLUELINE	7.89	72.14
BLACK BELLIED ROSEFISH	7.14	79.28
GROUPER,BLACK	3.39	82.67
SNAPPER,MUTTON	3.32	86.00
GROUPER,YELLOWEDGE	3.15	89.14
GROUPER,GAG	2.22	91.36
DOLPHINFISH	1.35	92.72
AMBERJACK,GREATER	1.30	94.01
HIND,SPECKLED	0.87	94.88

The preferred rebuilding strategy for snowy grouper in Section 4.1.3 takes into consideration the increase in the level of discards that may result from actions in FMP Amendment 13C. In addition, snowy grouper bycatch may be reduced through future actions in Amendment 17, which includes alternatives to establish a deepwater unit composed of co-occurring species and would establish management measures for the deepwater unit including an aggregate trip limit and quotas for the deepwater unit. All purchase and sale of species in the unit would be prohibited after any of the individual quotas are met. Although some bycatch of species in the unit could occur when targeting shelf edge species, the establishment of the deepwater is expected to substantially reduce bycatch of snowy grouper.

Black Sea Bass

Black sea bass is the most commonly discarded species in the commercial and recreational sectors (Tables 4-36 and Table 4-39). Most discarded black sea bass in the commercial and recreational fishery during 2002-2005 were less than the current 10" total length minimum size. The increase in the recreational size limit to 12 inches TL (Amendment 13C) is likely to increase the number of regulatory discards. Release mortality is estimated to be only 1-3% in pots (Ruderhausen *et al*. 2007) and SEDAR 2 (2003) estimates release mortality as 15%. Therefore, most of the black sea bass discards are likely to survive. Furthermore, if the commercial quota is met before the end of the fishing year, regulatory discards could increase when fishermen target species that co-occur with black sea bass. However, black sea bass pots, which dominate the commercial catch, will be removed from the water when the quota is met. Therefore, post-quota bycatch mortality of black sea bass is likely to be very low.

Red Porgy

Red porgy is the third most commonly discarded species in the commercial fishery (Table 4-36). The increase in the commercial quota and recreational bag limit in Amendment 13C would lower the number of regulatory discards if effort remains at current levels. However, if the increase in the allowable catch results in increased effort the Total Allowable Catch could be exceeded. The preferred rebuilding strategy for red porgy in Section 4.3.3 takes into consideration the increase in the level of discards that may result if effort were to increase in response to the increase in the allowable catch.

4.6.2 Ecological Effects Due to Changes in Bycatch

The ecological effects of bycatch mortality are the same as fishing mortality from directed fishing efforts. If not properly managed and accounted for, either form of mortality could potentially reduce stock biomass to an unsustainable level. The selection of a rebuilding schedule and strategy in Amendment 15A could affect the magnitude of bycatch that occurs in the future. The longest rebuilding schedules were selected as preferred alternatives for snowy grouper and black sea bass. They are expected to result in fewer regulatory discards than rebuilding schedule alternatives that are shorter in duration. The shortest rebuilding schedule is the amount of time to rebuild in the absence of fishing mortality. However, even if harvest of snowy grouper and black sea bass were prohibited some mortality would be expected because these species would be caught incidentally and discarded when fishermen targeted co-occurring species. Therefore, shorter rebuilding schedules for snowy grouper and black sea bass could result in unnecessary discards, which could compromise rebuilding.

Similarly, rebuilding strategies that constrain harvest while biomass rebuilds could result in a greater amount of discards. As the preferred rebuilding strategies gradually increase allowable catch of snowy grouper and red porgy as the stock rebuilds, a large increase in the magnitude of dead discards is not expected. Alternatively, the preferred rebuilding strategy for black sea bass holds catch constant as the biomass increases and could result in an increase in the number of discards as the stock rebuilds, particularly for the recreational sector. However, as release mortality is considered to be low for black sea bass, an increase in discards may not be a great concern.

Amendment 17 is under development and includes alternatives to specify a deepwater unit of co-occurring species, which would close when either the quota for the indicator species or aggregate (not including the indicator species) is met and is likely to reduce bycatch of snowy grouper, warsaw grouper, and speckled hind without increasing overall harvest. Furthermore, Amendment 17 would eliminate the one fish per trip limit for warsaw grouper and speckled hind as well as the 12 inch total length size limit for silk snapper and queen snapper could further reduce bycatch for those species.

4.6.3 Changes in Bycatch of Other Fish Species and Resulting Population and Ecosystem Effects

Changes in bycatch of other fish species and changes in resulting population ecosystem effects could occur as biomass of overfished snowy grouper, black sea bass, and red porgy increases. Environmental factors such as weather, currents, and water temperature may affect the survival of eggs and larvae, causing poor recruitment even when large numbers of offspring are produced. Thus, alternatives, which allow the population to more rapidly attain a greater number of older, larger fishes in the population, also provide additional protections against recruitment failure due to several years of poor environmental conditions for eggs and larvae, creating a more robust population. Delaying rebuilding could make stocks more susceptible to adverse environmental conditions that might affect recruitment success, or to unanticipated errors in parameter estimates, which could result in excessive fishing mortality.

In theory, the net ecological effects of the choice of rebuilding stocks in Amendment 15A would be positive, as the reef community would more closely represent that which would persist in a natural, or undisturbed state and the possibility of ecosystem overfishing would be reduced. However, as biomass of the protected stock(s) increase, changes may occur in predator-prey relationships and fishermen may target other members of the reef fish ecosystem. Thus, natural balance of an ecosystem cannot be fully restored as long as the ecosystem is subjected to fishing-related mortality. Additionally, there is some speculation that a disrupted community cannot be restored to pre-existing conditions, because it may change to a new climax community in a post-disturbed condition with a different suite of species.

The level of fishing effort applied to the fishery can influence fishing gear interactions with the sea floor. Furthermore, fish abundance, species composition, and the interaction of different fish and invertebrate species can have an effect on the habitat that they occupy. However, the number, nature, and extent of such interactions are more greatly influenced by the type of management measures that regulate the extent and distribution of fishing effort.

4.6.4 Effects on Marine Mammals and Birds

Under Section 118 of the MMPA, NMFS must publish, at least annually, a List of Fisheries (LOF) that places all U.S. commercial fisheries into one of three categories based on the level of incidental serious injury and mortality of marine mammals that occurs in each fishery. Of the gear utilized within the snapper grouper fishery, only the black sea bass pot is considered to pose an entanglement risk to large whales. The southeast U.S. Atlantic black sea bass pot fishery is included in the grouping of the Atlantic mixed species trap/pot fisheries, which the 2006 List of Fisheries classifies as a

Category II. Gear types used in these fisheries are determined to have occasional incidental mortality and serious injury of marine mammals (71 FR 48802, August 22, 2006). For the snapper grouper fishery, the best available data on protected species interactions are from the Southeast Fisheries Science Center (SEFSC) Supplementary Discard Data Program (SDDP) initiated in July of 2001 and sub-samples 20% of the vessels with an active permit. To date, no interactions with marine mammals have been reported from this program (8/1/2001-7/31/2004) (Poffenberger 2004; McCarthy SEFSC database).

Although the gear type used within the black sea bass pot fishery can pose an entanglement risk to large whales, sperm, fin, sei, and blue whales are unlikely to overlap with the black sea bass pot fishery operated within the snapper grouper fishery. This sector of the fishery is executed primarily off North Carolina and South Carolina, in waters ranging from 70-120 feet deep (21.3-36.6 meters). There are no known interactions between the black sea bass pot fishery and large whales. It is believed that possible negative effects resulting from the fishery are extremely unlikely. Thus, the continued operation of the snapper grouper fishery in the southeast U.S. Atlantic EEZ is not likely to adversely affect sperm, fin, sei, and blue whales.

Right and humpback whales may overlap both spatially and temporally with the black sea bass pot fishery. Measures to reduce entanglement risk in pot/trap fisheries for these two species are being addressed under the revised Atlantic Large Whale Take Reduction Plan (70 FR 118; June 21, 2005).

The Bermuda petrel and roseate tern occur within the action area. Bermuda petrels are occasionally seen in the waters of the Gulf Stream off the coasts of North and South Carolina during the summer. Sightings are considered rare and only occurring in low numbers (Alsop 2001). Roseate terns occur widely along the Atlantic coast during the summer but in the southeast region they are found mainly off the Florida Keys (unpublished USFWS data). Interaction with fisheries has not been reported as a concern for either of these species.

4.6.5 Changes in Fishing, Processing, Disposal, and Marketing Costs

For discussion of any changes to fishing, processing disposal, and marketing costs see Sections 4.1.3.2, 4.2.3.2, 4.3.3.2, and 5.

4.6.6 Changes in Fishing Practices and Behavior of Fishermen

As biomass and allowable catch of overfished species increases there could be modifications in the fishing practices of commercial and recreational fishermen that could affect the magnitude of discards. However, fishermen may be able to modify their behavior by avoiding locations where high concentrations of the restricted species occurs.

Fishermen can be educated about the methods to reduce bycatch, and enhance survival of regulatory discards. Yet, it is not clear that changes in behavior could substantially affect the amount of bycatch incurred.

Gear changes such as hook type or hook size could have some affect on a reduction in bycatch mortality. Furthermore, closed seasons, new or reduced quotas, reduced trip limits, and increased size limits could cause some commercial and recreational fishermen to reduce effort. Future measures, such as the establishment of additional species groups (i.e. deep water groupers, shallow water groupers) that close when the quota is met for an indicator species may help to reduce bycatch. An IFQ program would likely influence fishing practices and behavior, thereby contributing to a reduction in bycatch. However, it is difficult to quantify any of the measures in terms of reducing discards until the magnitude of bycatch has been monitored over several years.

4.6.7 Changes in Research, Administration, and Enforcement Costs and Management Effectiveness

Research and monitoring is needed to understand the effectiveness of proposed management measure in reducing bycatch. The preferred Alternative in Amendment 15B, which will follow Amendment 15A, would allow for the implementation of interim programs to monitor and assess bycatch in the South Atlantic reef fish fishery until the Atlantic Coastal Cooperative Statistics Program (ACCSP) Release, Discard and Protected Species (Bycatch) Module can be fully funded. Additional work is needed to determine the effectiveness of measures being developed for gag and vermilion snapper (Amendment 16), MPAs (Amendment 14) and by the Council (IFQs, Ecosystem Fishery Management Plan) to reduce bycatch. Some observer information has recently been provided by MARFIN and Cooperative Research Programs but more is needed. Approximately 20% of commercial fishermen are asked to fill out discard information in logbooks; however, a greater percentage of fishermen could be selected with emphasis on individuals that dominate landings. Furthermore, the use of electronic logbooks could be enhanced to enable fishery managers to obtain information on species composition, size distribution, geographic range, disposition, and depth of fishes that are released. Additional administrative and enforcement efforts will be needed to implement and enforce these regulations.

4.6.8 Changes in the Economic, Social, or Cultural Value of Fishing Activities and Non-Consumptive Uses of Fishery Resources

Preferred management measures, including those likely to decrease discards could result in social and/or economic impacts as discussed in Section 4.

4.6.9 Changes in the Distribution of Benefits and Costs

The extent to which rebuilding schedules and strategies will affect the magnitude~~s~~ of discards is unknown. This depends on if fishermen shift effort to other species, seasons, or fisheries and if effort decreases in response to more restrictive management measures.

4.6.10 Social Effects

The Social Effects of all the management measures, including those most likely to reduce bycatch are described in Section 4.

4.6.11 Conclusion

This section evaluates the practicability of taking additional action to minimize bycatch and bycatch mortality in the South Atlantic snapper grouper fishery using the ten factors provided at 50 CFR 600.350(d)(3)(i). In summary, the preferred alternatives for rebuilding schedules and strategies is likely to reduce the number of dead discards. The longest rebuilding schedules were selected as preferred alternatives for snowy grouper and black sea bass. They are expected to result in fewer regulatory discards than rebuilding schedule alternatives that are shorter in duration. Shorter rebuilding schedules for snowy grouper and black sea bass could result in unnecessary discards, which could compromise rebuilding. Rebuilding strategies that constrain harvest while biomass rebuilds could result in a greater amount of discards. As the preferred rebuilding strategies gradually increases allowable catch of snowy grouper and red porgy as the stock rebuilds, a large increase in the magnitude of dead discards is not expected. Alternatively, the preferred rebuilding strategy for black sea bass holds catch constant as the biomass increases and could result in an increase in the number of discards as the stock rebuilds, particularly for the recreational sector. However, as release mortality for black sea bass is considered to be low, an increase in discards may not be a great concern.

Additional measures to reduce bycatch in the snapper grouper fishery are being developed. Amendment 17 has alternatives to establish a deepwater unit with associated quotas and trip limits that is likely to reduce the number of discards. Amendment 17 could also eliminate the one fish per trip limit for warsaw grouper and speckled hind and along with their inclusion in the deepwater unit is likely to substantially decrease bycatch of these species without increasing harvest. Furthermore, the termination of the 12 inch total length size limit for silk snapper and queen snapper in Amendment 17 will probably reduce most of the bycatch experienced by those species. Establishment of a deepwater unit is likely to also decrease bycatch of other lesser abundant co-occurring species. The establishment of a deepwater unit resulting in closures when the quota met could result in effort shifts to other species such as gag, red porgy, and vermilion snapper, which have limited co-occurrence with juveniles of some of the species in the deepwater unit. Closures of the deepwater unit could also result in effort shifts to other fisheries. However, fishermen may be able to avoid areas where a restricted species occurs thereby reducing the potential for bycatch. Reductions in bycatch and fishing mortality as a result of the establishment of a deepwater unit could result in an increase in the relative abundance, size structure, and age structure. Thus, ecological changes could occur in the community structure of reef ecosystems through actions that would bycatch. These ecological changes could affect the nature and magnitude of bycatch over time.

Amendment 16 is being developed to end overfishing of gag and vermilion snapper, which could propose additional measures to reduce bycatch in the snapper grouper fishery including the establishment of a shallow water grouper unit based on biological, geographic, economic, taxonomic, technical, social, and ecological factors. Like the Deepwater Unit in Amendment 17, a shallow water unit would be represented by an indicator species, gag, which has been recently assessed through the SEDAR process.

A Limited Access Privilege Program (including IFQs) for the snapper grouper fishery is being discussed. Under an IFQ program, commercial fishermen are allocated percentages of a TAC, which is set by fishery managers based on estimates of what level of catch the fisher can sustain. This program has the potential to substantially reduce bycatch by providing fishermen more flexibility to decide where and when to fish. IFQ systems could give fishermen the flexibility to target more favorable harvesting conditions and avoid areas where bycatch of certain species is more likely.

4.7 Unavoidable Adverse Effects

Actions specified in Amendment 15A are not expected to have unavoidable adverse effects.

According to the NEPA definitions of direct and indirect effects, defining MSY, OY, and MSST for snowy grouper will not directly affect the biological or ecological environment, including ESA-listed species, because these parameters are not used in determining immediate harvest objectives. MSY, OY, and MSST are reference points used by fishery managers to assess fishery performance over the long-term. As a result, redefined management reference points could require regulatory changes in the future as managers monitor long-term performance of the stock with respect to the new reference points. Therefore, these parameter definitions will indirectly affect subject stocks and the ecosystem of which they are a part, by influencing decisions about how to maximize and optimize the long-term yield of fisheries under equilibrium conditions and triggering action when stock biomass decreases below a threshold level.

Choice of a rebuilding schedule has a direct effect on the biological, ecological, and physical environment by determining the length of time over which rebuilding efforts can be extended. The longest rebuilding schedules have been selected as preferred alternatives by the Council to rebuild snowy grouper and black sea bass. Shorter schedules generally require overfished stocks be provided a greater amount of (and more immediate) relief from fishing pressure; but can have adverse short-term economic and social pressure on fishermen and individuals dependent upon the resource. The shortest rebuilding schedule is the amount of time required to rebuild snowy grouper and black sea bass in the absence of fishing mortality. However, it is unlikely that snowy grouper or black sea bass could rebuild under the shortest timeframe since some mortality of snowy grouper and black sea bass is expected when fishermen target co-occurring species.

Conversely, longer schedules generally allow overfished stocks to be harvested at higher rates of fishing mortality as they rebuild and have fewer short-term negative social and economic impacts. Extending the rebuilding period beyond the shortest possible timeframe increases the risk that environmental or other factors could prevent the stocks from recovering. As a result, the biological/ecological benefits of a shorter schedule are generally greater than those of the intermediate schedule and the benefits of the intermediate schedule are generally greater than those of the maximum recommended schedule. In contrast, the short-term social/economic benefits of a shorter schedule are generally less than those of the intermediate schedule and greatest for the maximum recommended schedule. However, the overall effects of all the actions alternatives are expected to be beneficial because each defines a plan for rebuilding the overfished stock.

Rebuilding strategy alternatives, which allow the population to more rapidly attain a greater number of older, larger fishes in the population, also provides additional protections against recruitment failure due to several years of poor environmental conditions for eggs and larvae, creating a more robust population. Environmental factors such as weather, currents, and water temperature may affect the survival of eggs and larvae, causing poor recruitment even when large numbers of offspring are produced. Delaying rebuilding could make stocks more susceptible to adverse environmental conditions that might affect recruitment success, or to unanticipated errors in parameter estimates, which could result in excessive fishing. The preferred rebuilding strategy alternatives for snowy grouper, red porgy, and black sea bass are expected to have a positive effect on the biological and ecological environment.

4.8 Effects of the Fishery on the Environment

The biological impacts of the proposed actions are described in Section 4.0, including the impacts on habitat. No actions proposed in this amendment are anticipated to have any adverse impact on EFH or EFH-HAPCs for managed species including species in the snapper grouper complex. Any additional impacts of fishing on EFH identified during the public hearing process will be considered, therefore the Council has determined no new measures to address impacts on EFH are necessary at this time. The Council's adopted habitat policies, which may directly affect the area of concern, are available for download through the Habitat/Ecosystem section of the Council's website: http://map.mapwise.com/safmc/Default.aspx?tabid=56.

NOTE: The Final EFH Rule, published on January 17, 2002, replaced the interim Final Rule of December 19, 1997 on which the original Essential Fish Habitat (EFH) and EFH Habitat Areas of Particular Concern (HAPC) designations were made. The Final Rule directs the Councils to periodically update EFH and HAPC information and designations within fishery management plans. As was done with the original Habitat Plan, a series of technical workshops are being conducted at this time by Council habitat staff to gather new information and review existing information as presented in the Habitat Plan to update information pursuant to the Final EFH Rule.

4.9 Damage to Ocean and Coastal Habitats

The Alternatives and proposed actions are not expected to have any adverse effect on the ocean and coastal habitat.

Management measures implemented in the original Snapper Grouper Fishery Management Plan through Amendment 7 combined have significantly reduced the impact of the snapper grouper fishery on essential fish habitat. The Council has reduced the impact of the fishery and protected essential habitat by prohibiting the use of poisons and explosives; prohibiting use of fish traps and entanglement nets in the EEZ; banning use of bottom trawls on live/hard bottom habitat north of Cape Canaveral, Florida; restricting use of bottom longlines to depths greater than 50 fathoms north of St. Lucie Inlet and only for species other than wreckfish; prohibiting use of bottom longlines south of St. Lucie Inlet; and prohibiting use of black sea bass pots south of Cape Canaveral, Florida. These gear restrictions have significantly reduced the impact of the fishery on coral and live/hard bottom habitat in the South Atlantic region.

Additional management measures in Amendment 8, including specifying allowable bait nets and capping effort, have protected habitat by making existing regulations more enforceable. Establishing a controlled effort program limited overall fishing effort and to the extent there is damage to the habitat from the fishery (e.g., black sea bass pots, anchors from fishing vessels, impacts of weights used on fishing lines and bottom longlines), limited such impacts.

In addition, measures in Amendment 9, that include further restricting longlines to retention of only deepwater species and requiring that black sea bass pots have escape vents and escape panels with degradable fasteners, reduce the catch of undersized fish and bycatch and ensure that the pot, if lost, will not continue to “ghost” fish. Amendment 13C increased the mesh size in the back panel of the black sea bass pots which has reduced bycatch and retention of undersized fish. Also, limiting the overall fishing mortality reduces the likelihood of over-harvesting of species with the resulting loss in genetic diversity, ecosystem diversity, and sustainability.

Measures adopted in the Coral and Shrimp Fishery Management Plans have further restricted access by fishermen that had potential adverse impacts on essential snapper grouper habitat. These measures include the designation of the *Oculina* Bank Habitat Area of Particular Concern and the Rock shrimp closed area (see the Shrimp and Coral FMP/Amendment documents for additional information).

The Council's Comprehensive Habitat Amendment (SAFMC 1998b) contains measures that expanded the *Oculina* Bank HAPC and added two additional satellite HAPCs.

4.10 Relationship of Short-Term Uses and Long-Term Productivity

The relationship between short-term uses and long-term productivity will be affected by this amendment. The preferred rebuilding strategy alternatives would specify an allowable catch of snowy grouper, black sea bass, and red porgy that is low in the short-term; however, as these overfished stocks rebuild, the allowable catch would increase over the long-term. Therefore, actions taken in the Amendment are intended to enhance the long-term productivity and sustainability of three overfished species.

4.11 Irreversible and Irretrievable Commitments of Resources

Irreversible commitments are defined as commitments, which cannot be reversed, except perhaps in the extreme long-term, whereas irretrievable commitments are lost for a period of time. There are no irreversible commitments for this amendment. The proposed actions would result in greater irretrievable losses in consumer surplus and angler expenditures early in the rebuilding period. However, as stocks rebuild to sustainable levels, the allowable catch would increase albeit at different rates under the different rebuilding strategy alternatives. The economic effects of the various rebuilding strategy alternatives are described in Section 4.

4.12 Mitigation Measures

Actions in Amendment 13C adversely affected the immediate, short-term net revenues of some commercial and for-hire fishermen in the South Atlantic. Actions also adversely affected short-term consumer surplus of some recreational anglers in the South Atlantic and may have resulted in cancelled trips and reduced expenditures to the fishery and associated industries. The anticipated reductions in fishing pressure was intended to end or phase-out overfishing and assist in restoring the size and age structure to more natural conditions and allow stock biomass to increase to more sustainable and productive levels. As a result, the amount of fish that can be harvested should increase as the stocks rebuild. Therefore, the short-term adverse effects of ending overfishing in Amendment 13C can be mitigated to some degree in Amendment 15A by allowing increases in the allowable catch as biomass of overfished species increases in the future. Regulations in Amendments 15B and 17 to manage reduced catch levels could further mitigate the short-term negative economic and social effects of Amendment 13C.

5 Regulatory Impact Review

5.1 Introduction

The NOAA Fisheries Service (NMFS) requires a Regulatory Impact Review (RIR) for all regulatory actions that are of public interest. The RIR does three things: (1) it provides a comprehensive review of the level and incidence of impacts associated with a proposed or final regulatory action; (2) it provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problem; and, (3) it ensures that the regulatory agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost-effective way. The RIR also serves as the basis for determining whether the proposed regulations are a 'significant regulatory action' under the criteria provided in Executive Order (E.O.) 12866 and provides information that may be used in conducting an analysis of impacts on small business entities pursuant to the Regulatory Flexibility Act (RFA). This RIR analyzes the expected impacts that this action would be expected to have on the commercial and recreational snapper grouper fisheries. Additional details on the expected economic effects of the various alternatives in this action are included in Section 4.0 and are incorporated herein by reference.

5.2 Problems and Objectives

The purpose and need, issues, problems, and objectives of the proposed Amendment are presented in Section 1.0 and are incorporated herein by reference. In summary, the purpose of this amendment is to establish (1) mandatory management reference points and status determination criteria for snowy grouper, red porgy, and black sea bass; (2) rebuilding schedules for snowy grouper and black sea bass; and (3) rebuilding strategies for snowy grouper, red porgy, and black sea bass. These measures are expected to aid in the prevention of overfishing and the achievement of OY from the South Atlantic snapper grouper fishery.

5.3 Methodology and Framework for Analysis

This RIR assesses management measures from the standpoint of determining the resulting changes in costs and benefits to society. To the extent practicable, the net effects of the proposed measures are stated in terms of producer and consumer surplus, changes in profits, employment in the direct and support industries, and participation by charter boat fishermen and private anglers. In addition, the public and private costs associated with the process of developing and enforcing regulations on fishing for snapper grouper in waters of the U.S. South Atlantic are provided.

5.4 Description of the Fishery

A description of the South Atlantic snapper grouper fishery is contained in Section 3.4 and is incorporated herein by reference.

5.5 Impacts of Management Measures

Details on the economic impacts of all alternatives are included in Section 4 and are included herein by reference. The following discussion includes only the expected impacts of the preferred alternatives.

5.5.1 Snowy Grouper

5.5.1.1 Management Reference Points

Defining the MSY for a species is an administrative action and does not alter the current harvest or use of the resource. Therefore, no direct economic effects would be expected to accrue. The proposed MSY, **Preferred Alternative 2**, would, however, support substantially increased harvests over current levels after the stock is rebuilt, with accompanying increased economic benefits, if the fishery Total Allowable Catch (TAC) is set at MSY, since the proposed MSY is approximately 187% greater than status quo harvest. These benefits cannot be quantified at this time since they will be dependent upon the status and operational characteristics of the fishing fleet at the time of expanded quotas and the manner in which the fishery is managed, i.e., trip limits, size limits, closed seasons, limited access programs, etc. The expected benefits will be quantified at the time an action to increase the quota is prepared.

Defining the OY for a species is also an administrative action and does not alter the current harvest or use of the resource. Therefore, no direct economic effects would be expected to accrue. The proposed OY, **Preferred Alternative 3**, however, is 179% greater than status quo harvests and would, therefore, support increased harvests over current levels, with accompanying increased economic benefits. As previously stated, these benefits cannot be quantified at this time but will be quantified at the time an action to increase the TAC is prepared.

Defining the MSST for a species is also an administrative action and would not result in any direct economic effects. The specific level of an MSST does, however, affect the likelihood of a fishery being declared overfished, which would induce short-term adverse economic impacts from more restrictive management. The proposed MSST, **Preferred Alternative 3**, is intermediate to the alternative MSST specifications, thus reducing, but not eliminating, the likelihood of a declaration of overfishing and accompanying harvest restrictions and short-term adverse economic impacts. The proposed MSST also mitigates the potential problems of an insufficiently conservative MSST, thereby avoiding the adverse economic impacts that would accrue to excessive reduction of the biomass. These impacts, as a result of either a declaration of overfishing or excessive reduction of biomass, cannot be quantified at this time but will be quantified at the time an action to address such condition, should it occur, is prepared.

In summary, no direct effects are expected to accrue to any of the alternative benchmark parameter specifications. Indirect effects could accrue if future assessment of the stock relative to the benchmarks identifies a need for restrictive management. The magnitude of these effects, however, will depend on the nature of the specific management measures adopted. These effects will be quantified when such action is prepared, if necessary.

5.5.1.2 Rebuilding Schedule

Defining a rebuilding schedule is an administrative action and, as such, does not directly affect the economic environment since it would not directly alter the current harvest or use of a resource. Since there would be no direct effect on resource harvest or use, there would be no direct effects on fishery participants, associated industries, or communities. Defining a rebuilding schedule, however, may result in indirect effects. Restrictive management measures could be necessary to rebuild a resource, and direct effects accrue to these measures. Further, defining the rebuilding schedule determines the length of time over which rebuilding efforts can be extended and affects the severity of the measures implemented during the recovery period. Generally, the shorter the recovery period, the more severe the necessary harvest restrictions, and the more severe the harvest restrictions, the greater the short-term adverse economic effects.

The proposed rebuilding schedule, **Preferred Alternative 4**, would allow the longest recovery time, thus allowing directed harvests to continue while the stock recovers. The proposed schedule would eliminate the mandatory discards of the other alternatives and allow increased harvests beyond current incidental harvest levels. The exact amount of allowable harvests, and the economic benefits of such, depend on the rebuilding strategy adopted, which specifies whether harvests are held constant over the rebuilding path or are allowed to increase according to a pre-specified schedule. Alternatives for rebuilding strategies under consideration for snowy grouper are presented in Section 4.1.3 and the expected economic impacts are presented in Section 4.1.3.2 and are incorporated herein by reference. Regardless of strategy adopted, the proposed rebuilding schedule is expected to result in increased economic benefits relative to the status quo and other alternatives since it would not require the discard of incidentally caught dead fish, would support a progressive increase in allowable harvest, and avoids the need for repetitive management development.

5.5.1.3 Rebuilding Strategy

The **Preferred Alternative 3c** rebuilding strategy for snowy grouper utilizes the same TAC stream assumed for the status quo, **Alternative 1**. As a result, the only difference between the expected impacts of **Preferred Alternative 3c** and the status quo is that since the status quo would not establish a rebuilding strategy, which is a required management component, the adoption of **Alternative 1** would require additional management action, with accompanying administrative costs, in order to develop and implement a strategy. The expected cost of an amendment comprised of a couple non-controversial or analytically simple actions, which would be expected to be the case to establish a rebuilding strategy, is approximately $200,000, based on prior example. Thus, the implementation of Preferred Alternative 3c would not be expected to result in any changes in economic benefits to the fishery but would be expected to save approximately $200,000 in administrative costs.

5.5.2 Red Porgy

5.5.2.1 Management Reference Points

Defining the MSY for a species is an administrative action and does not alter the current harvest or use of the resource. Therefore, no direct economic effects would be expected to accrue. The proposed MSY, **Preferred Alternative 2**, would, however, support substantially increased harvests over current levels after the stock is rebuilt, with accompanying increased economic benefits, if the fishery Total Allowable Catch (TAC) is set at MSY since the proposed MSY is 159% greater than status quo harvest. These benefits cannot be quantified at this time since they will be dependent upon the status and operational characteristics of the fishing fleet at the time of expanded quotas and the manner in which the fishery is managed, i.e., trip limits, size limits, closed seasons, limited access programs, etc. The expected benefits will be quantified at the time an action to increase the quota is prepared.

Defining the OY for a species is also an administrative action and does not alter the current harvest or use of the resource. Therefore, no direct economic effects would be expected to accrue. The proposed OY, **Preferred Alternative 3**, however, is approximately 151% greater than status quo harvests and would, therefore, support increased harvests over current levels, with accompanying increased economic benefits. As previously stated, these benefits cannot be quantified at this time but will be quantified at the time an action to increase the TAC is prepared.

In summary, no direct effects are expected to accrue to any of the alternative benchmark parameter specifications. Indirect effects could accrue if future assessment of the stock relative to the benchmarks identifies a need for restrictive management. The magnitude of these effects, however, will depend on the nature of the specific management measures adopted. These effects will be quantified when such action is prepared, if necessary.

5.5.2.2 Rebuilding Strategy

Preferred Alternative 3a rebuilding strategy for red porgy is projected to result in a change in net total surplus in the recreational sector (consumer surplus and net returns to for-hire owners, captains, and crew) of approximately $70.0 to $71.0 million over the period 2007-2016 relative to the status quo, under status quo and preferred biomass streams for snowy grouper and black sea bass, respectively. These results assume red porgy harvests are constrained only by the red porgy allocation and not by the allocation of any other species. In the commercial sector over the same period, the preferred alternative is projected to result in a change of $0.29 million in net operating revenues assuming status quo conditions for the other actions considered in this amendment and $0.28 million assuming preferred conditions.

5.5.3 Black Sea Bass

5.5.3.1 Management Reference Points

Defining the MSY for a species is an administrative action and does not alter the current harvest or use of the resource. Therefore, no direct economic effects would be expected to accrue. The proposed MSY, **Preferred Alternative 2**, would, however, support substantially increased harvests over current levels after the stock is rebuilt, with accompanying increased economic benefits, if the fishery Total Allowable Catch (TAC) is set at MSY, since the proposed MSY is approximately 228% greater than status quo harvest. These benefits cannot be quantified at this time since they will be dependent upon the status and operational characteristics of the fishing fleet at the time of expanded quotas and the manner in which the fishery is managed, i.e., trip limits, size limits, closed seasons, limited access programs, etc. The expected benefits will be quantified at the time an action to increase the quota is prepared.

Defining the OY for a species is also an administrative action and does not alter the current harvest or use of the resource. Therefore, no direct economic effects would be expected to accrue. The proposed OY, **Preferred Alternative 3**, however, is approximately 224% greater than status quo harvests and would, therefore, support increased harvests over current levels, with accompanying increased economic benefits. As previously stated, these benefits cannot be quantified at this time but will be quantified at the time an action to increase the TAC is prepared.

In summary, no direct effects are expected to accrue to any of the alternative benchmark parameter specifications. Indirect effects could accrue if future assessment of the stock relative to the benchmarks identifies a need for restrictive management. The magnitude of these effects, however, will depend on the nature of the specific management measures adopted. These effects will be quantified when such action is prepared, if necessary.

5.5.3.2 Rebuilding Schedule

Defining a rebuilding schedule is an administrative action and, as such, does not directly affect the economic environment since it would not directly alter the current harvest or use of a resource. Since there would be no direct effect on resource harvest or use, there would be no direct effects on fishery participants, associated industries, or communities.

Defining a rebuilding schedule, however, may result in indirect effects. Restrictive management measures could be necessary to rebuild a resource, and direct effects accrue to these measures. Further, defining the rebuilding schedule determines the length of time over which rebuilding efforts can be extended and affects the severity of the measures implemented during the recovery period. Generally, the shorter the recovery period, the more severe the necessary harvest restrictions, and the more severe the harvest restrictions, the greater the short-term adverse economic effects.

The proposed black sea bass rebuilding schedule, **Preferred Alternative 4**, would allow the longest recovery time and should fully mitigate the adverse economic impacts expected to accrue to the other rebuilding schedule alternatives, notably those of **Alternative 2** which would require total cessation of the black sea bass fishery for six years. This fishery averaged approximately $1 million per year in ex-vessel revenues from 1999-2004 from the commercial sector, though this figure will decrease with the implementation of Amendment 13, and approximately $420,000-$1.27 million in consumer surplus from the recreational sector. The exact amount of allowable harvests under the proposed black sea bass rebuilding schedule, and the economic benefits of such, depend on the rebuilding strategy adopted, which specifies whether harvests are held constant over the rebuilding path or are allowed to increase according to a pre-specified schedule. Alternatives for rebuilding strategies under consideration for black sea bass are presented in Section 4.6.3 and the expected economic impacts are presented in Section 4.6.3.2 and are incorporated herein by reference. Regardless of strategy adopted, the proposed rebuilding schedule is expected to result in increased economic benefits relative to the other alternatives since it would not require duplicative action with delayed results, as would occur with **Alternative 1**, closure of the fishery and mandatory discard of incidentally caught fish, as would occur with **Alternative 2**, and would support higher harvest levels than **Alternative 3**.

5.5.3.3 Rebuilding Strategy

The expected impacts of **Preferred Alternative 1** are virtually identical to those of the status quo, **Alternative 5**, since they both incorporate the same yield streams over the next 10 years, so no change in net total surplus would be expected. The only difference between the expected impacts of the two alternatives is that, because **Alternative 5** would not establish a legally required rebuilding strategy, immediate subsequent Council action would be required to establish the required strategy. Thus, the public and private costs associated with development and approval of the action would be increased.

5.6 Public and Private Costs of Regulations

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

Council costs of document preparation,
meetings, public hearings, and information
dissemination ……………………………………………………………….$200,000

NOAA Fisheries administrative costs of document
preparation, meetings and review $200,000

Annual law enforcement costs..unknown

TOTAL $400,000

Law enforcement currently monitors regulatory compliance in these fisheries under routine operations and does not allocate specific budgetary outlays to these fisheries, nor are increased enforcement budgets expected to be requested to address any component of this action.

5.7 Summary of Economic Impacts

Defining the MSY, OY, or MSST for a species is an administrative action, so no direct economic effects would accrue to any of the actions that define these parameters. Indirect effects would accrue to subsequent evaluation of the fisheries relative to their respective benchmarks and the fisheries are subsequently allowed to expand or are required to contract based on this evaluation. The impacts of either increasing or lessening the regulatory restrictions on these fisheries cannot be determined at this time.

Defining a rebuilding schedule is similarly an administrative action, would not alter current harvest practices, and would have no direct economic impacts. Indirect effects, however, would accrue to the schedule since it would establish the bounds of specific management measures put in place to achieve the rebuilding target. In general terms, shorter recovery periods require more restrictive short-term management measures, with accompanying short-term adverse economic impacts. However, the shorter the recovery period, the faster the benefits of a recovered resource are realized.

The impacts of a rebuilding schedule are more clearly examined by the expected impacts of the accompanying rebuilding strategy, which specifies the allowable harvest quantities and path over the rebuilding schedule. The total net cumulative impact on the recreational sector of the proposed rebuilding strategies over the period 2007-2016 could be a gain of as high as $71 million in economic value, or approximately $7 million per year, if harvest of other species, notably snow grouper, does not restrain snapper grouper target effort. If total snapper grouper effort is constrained by snowy grouper harvests, then considerably more modest gains of approximately $100,000 are forecast. This lower estimate is also more consistent with expectations in the commercial sector over the same period, where less than $300,000 in gains in net operating revenues is expected to accrue.

5.8 Determination of Significant Regulatory Action

Pursuant to E.O. 12866, a regulation is considered a 'significant regulatory action' if it is expected to result in: (1) an annual effect of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities; (2) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; (3) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights or obligations of recipients thereof; or (4) raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this executive order. Amendment 15A contains no regulatory actions.

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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 a regulatory flexibility analysis for each proposed rule. Amendment 15A will not include a proposed or final rule. The regulatory flexibility analysis 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. In addition to analyses conducted for the RIR, the regulatory flexibility analysis provides: (1) a statement of the reasons why action by the agency is being considered; (2) a succinct statement of the objectives of, and legal basis for the proposed rule; (3) a description and, where feasible, an estimate of the number of small entities to which the proposed rule will apply; (4) a description of the projected reporting, record-keeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirements of the report or record; (5) an identification, to the extent practical, of all relevant Federal rules which may duplicate, overlap, or conflict with the proposed rule; and (6) a description of any significant alternatives to the proposed rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities.

In addition to the information provided in this section, additional information on the expected economic impacts of the proposed action are included in Sections 4.0 and 5.0 and is included herein by reference.

6.2 Statement of Need for, Objectives of, and Legal Basis for the Rule

The purpose and need, issues, problems, and objectives of the proposed rule are presented in Section 1.0 and are incorporated herein by reference. In summary, the purpose of this amendment is to establish (1) mandatory management reference points and status determination criteria for snowy grouper, red porgy, and black sea bass; (2) rebuilding schedules for snowy grouper and black sea bass; and (3) rebuilding strategies for snowy grouper, red porgy, and black sea bass. These measures are expected to aid in the prevention of overfishing and the achievement of OY from the South Atlantic snapper grouper fishery. The Magnuson-Stevens Fishery Conservation and Management Act provides the statutory basis for the proposed rule.

6.3 Identification of All Relevant Federal Rules Which May Duplicate, Overlap or Conflict with the Proposed Rule

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

6.4 Description and Estimate of the Number of Small Entities to Which the Proposed Rule will Apply

This proposed action is expected to directly impact commercial fishers and for-hire operators. The SBA has established size criteria for all major industry sectors in the U.S. including fish harvesters and for-hire operations. A business involved in fish harvesting is classified as a small business if it is independently owned and operated, is not dominant in its field of operation (including its affiliates), and has combined annual receipts not in excess of $4.0 million (NAICS code 114111, finfish fishing) for all its affiliated operations worldwide. For for-hire vessels, the other qualifiers apply and the annual receipts threshold is $6.5 million (NAICS code 713990, recreational industries).

From 2001-2005, which is the period of data used in the analysis of the expected impacts of this action, an average of 1,127 vessels per year were permitted to operate in the commercial snapper grouper fishery, ranging from a high of 1,264 vessels in 2001 to a low of 1,007 vessels in 2005. Total dockside revenues from snapper grouper species and other species on trips that harvested snapper grouper species averaged $15.8 million (2005 dollars) over this period, resulting in a per vessel average of approximately $14,000. The highest per vessel average occurred in 2005 at approximately $14,600. An average of 26 vessels per year harvested more than 50,000 pounds of snapper grouper species per year, generating at least, at an average of $1.99 (2005 dollars) per pound, dockside revenues of $99,5000. Vessels that operate in the snapper grouper fishery may also operate in other fisheries, the revenues of which cannot be determined with available data and are not be reflected in these totals.

While a vessel that possesses a commercial snapper grouper permit can harvest any snapper grouper species, during the period 2001-2005, only 356 vessels per year on average harvested any of the species addressed by this action, ranging from a high of 388 vessels in 2001 to a low of 335 vessels in 2005. Total dockside revenues from all snapper grouper species and other species on trips that harvested the species addressed by this amendment averaged $8.67 million (2005 dollars) over this period, resulting in a per vessel average of approximately $24,000. The highest per vessel average occurred in 2001 at approximately $26,700. The species addressed by this action accounted for, on average, approximately 20 percent of total revenues. An average of 4 vessels per year harvested more than 50,000 pounds of the species addressed by this amendment per year, generating at least, at an average of $1.99 (2005 dollars) per pound, dockside revenues of $99,5000. Revenues from activity in other fisheries cannot be determined with available data and are not be reflected in these totals.

In 2005, 1,328 vessels were permitted to operate in the snapper grouper for-hire fishery, of which 82 are estimated to have operated as headboats. Within the total number of vessels, 201 also possessed a commercial snapper grouper permit and would be included in the summary information provided on the commercial sector. The for-hire fleet is comprised of charterboats, which charge a fee on a vessel basis, and headboats, which charge a fee on an individual angler (head) basis. The charterboat annual average gross revenue is estimated to range from approximately $62,000-$84,000 for Florida vessels, $73,000-$89,000 for North Carolina vessels, $68,000-$83,000 for Georgia vessels, and $32,000-$39,000 for South Carolina vessels. For headboats, the appropriate estimates are $170,000-$362,000 for Florida vessels, and $149,000-$317,000 for vessels in the other states. Based on these average revenue figures, it is determined, for the purpose of this assessment, that all for-hire operations that would be affected by this action are small entities.

Some fleet activity may exist in both the commercial and for-hire snapper grouper sectors, but the extent of such is unknown and all vessels are treated as independent entities in this analysis.

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

This action does not impose any new reporting, record-keeping or other compliance requirements.

6.6 Substantial Number of Small Entities Criterion

The proposed action would be expected to directly affect all vessels that operate in the commercial snapper grouper fishery and all vessels that have a Federal snapper grouper for-hire permit. All affected entities have been determined, for the purpose of this analysis, to be small entities. Therefore, it is determined that the proposed action will affect a substantial number of small entities.

6.7 Significant Economic Impact Criterion

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

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

All entities that are expected to be affected by the proposed rule are considered small entities so the issue of disproportionality does not arise in the present case.

<u>Profitability</u>: Do the regulations significantly reduce profit for a substantial number of small entities?

Among the individual actions considered, most are administrative in nature and only the actions that would establish rebuilding strategies and, through such, establish annual TAC streams, would be expected to have economic effects. The proposed rebuilding strategies for snowy grouper and black sea bass would result in TAC streams identical to the assumed TAC streams of the status quo. Thus, no adverse impacts on the profits of any small entities would be expected to accrue to these actions. The proposed red porgy rebuilding strategy, however, is projected to result in an increase in net operating revenues to vessels that operate in the red porgy fishery of approximately $292,000, or a 0.51 percent increase relative to the status quo over the 10-year period 2007-2016. Thus, no decrease in profits is expected. Information on the distribution of these projected impacts across individual entities in the fishery is not available.

The expected impacts of the proposed action on for-hire operators depends on how future management measures are adjusted to allow potential snapper grouper recreational target effort increases in response to the increased red porgy allowable harvest to not be constrained by allowable snowy grouper harvest. If snapper grouper target effort isallowed to increase as the allowable red porgy harvest increases, the for-hire sector is projected to receive an increase in cumulative net producer surplus, defined as gross revenues minus non-labor operating costs, of approximately $40 million over the 10-year period 2007-2016, or approximately $4 million per year. Approximately half of this isattributed to each of the charterboat and headboat sectors. It is not possible to identify which of the 1,328 vessels permitted to operate in the snapper grouper for-hire fishery, or the degree to which individual vessels fish for snowy grouper, red porgy, or black sea bass. It is assumed, however, that all vessels harvest at least one of these species. Spread over the entire fleet, the projected annual increase in producer surplus equates to approximately $1,600 per charterboat ($2 million/1,246 vessels) and $24,000 per headboat ($2 million/82 vessels). Average annual net revenue figures for this fleet are not available. Although the revenue figures for the for-hire sector provided above are average gross revenues and not net revenues, using the lower and upper bounds of the gross revenue figures ($32,000-$89,000 for charterboats and $149,000-$362,000 for headboats), the projected increases in producer surplus as a proportion of gross revenues ranges from 2-5 percent for charterboats and 7-16 percent for headboats. For black sea bass, the economic impacts on fishing entities of the proposed snowy grouper and black sea bass rebuilding strategies are identical to those of the status quo.

6.8 Description of Significant Alternatives

Two alternatives, including the status quo, were considered for the action to specify MSY for snowy grouper. The first alternative to the proposed MSY, the status quo, is likely an overestimate since a harvest level this high has only been recorded once during the 1986-2005 data record, suggesting that the MSY is inappropriate for this resource. Allowing harvest at this level may lead to excessive exploitation, precipitating the imposition of restrictive management measures and reductions in economic and social benefits relative to the proposed action.

Four alternatives, including the status quo, were considered for the action to specify OY for snowy grouper. Similar to the status quo MSY, the first alternative to the proposed OY, the status quo, is likely an overestimate and inappropriate for this resource. The second and third alternatives are, respectively, more and less conservative than the proposed action. The second alternative to the proposed OY is more conservative than likely necessary to protect the resource and would be expected to result in greater foregone economic benefits than the proposed action. The third alternative to the proposed OY is believed to be not sufficiently conservative to protect the resource. The proposed OY is believed to be the appropriate choice to minimize foregone economic benefits while protecting the resource.

Three alternatives, including the status quo, were considered for the action to specify the MSST for snowy grouper. The first alternative to the proposed MSST, the status quo, would require the largest minimum stock size and would increase the likelihood that the resource be declared overfished, necessitating harvest reductions and imposing short-term adverse economic impacts. The second alternative to the proposed MSST would require the smallest minimum stock size. While this specification would minimize, among the three alternatives, the likelihood of the stock being declared overfished, this stock level is believed to be insufficiently conservative to provide adequate protection to the resource. The proposed MSST specifies a minimum stock size intermediate to the other alternatives and is believed to be the appropriate choice to minimize the likelihood of triggering restrictive management while protecting the resource.

Four alternatives, including the status quo, were considered for the action to establish a rebuilding schedule for snowy grouper. The first alternative to the proposed rebuilding schedule, the status quo, would maintain the rebuilding schedule that expired in 2006 with the resource remaining overfished. The status quo is, therefore, not an appropriate option.

The second alternative to the proposed snowy grouper rebuilding schedule would require total cessation of all directed snowy grouper harvest for 13 years without appreciably helping the resource since continued bycatch mortality would prevent the resource from being rebuilt during the specified period. Thus, further restrictions beyond the 13-year period would be required, with greater adverse economic impacts than the proposed action.

The third alternative to the proposed snowy grouper rebuilding schedule would allow a longer rebuilding period than the second alternative, thereby reducing the adverse economic impacts associated with the second alternative, but would still require dead some dead bycatch to be discarded, resulting in foregone economic benefits relative to the proposed action. The proposed rebuilding schedule would allow the longest recovery period, eliminate mandatory discards, and allow harvests beyond incidental harvest levels, resulting in increased economic benefits relative to the other alternatives.

Six alternatives, including the status quo, were considered for the action to define a rebuilding strategy for snowy grouper. The first alternative to the proposed rebuilding strategy, the status quo, would not define a rebuilding strategy and would not meet the Council's objectives.

The second and third alternatives to the proposed snowy grouper rebuilding strategy assume lower harvests in 2007 and 2008 than the proposed action, then allow harvest to increase as the stock rebuilds, differing in whether harvest increases are implemented every year, as in the second alternative, or every five years, as in the third alternative. The lower harvest in the early years is expected to result in a higher biomass and larger harvest levels than the proposed action. The second alternative to the proposed action is projected to result in lower net economic benefits than the proposed action in the recreational sector and greater net economic benefits in the commercial sector. The third alternative to the proposed action is projected to result in greater net economic benefits than the proposed action in both the recreational and commercial sectors. This alternative was not selected as the proposed action because it was based on a projection that placed a 68 percent snowy grouper harvest reduction in place in 2006 to end overfishing. Management measures subsequently enacted, however, only provided a 34 percent reduction. Therefore, this alternative would not end overfishing in the specified period because the initial harvest reductions were not realized.

The fourth and fifth alternatives to the proposed snowy grouper rebuilding strategy would require initial harvest reductions relative to the proposed strategy, then prescribe harvest increases as the stock rebuilds, varying by whether the increase occurs annually or every five years. Each alternative is projected to result in lower net economic benefits than the proposed snowy grouper rebuilding strategy.

Two alternatives, including the status quo, were considered for the action to specify MSY for red porgy. The first alternative to the proposed MSY, the status quo, is likely an overestimate since a harvest level this high has never been recorded, suggesting that the MSY is inappropriate for this resource. Allowing harvest at this level may lead to excessive exploitation, precipitating the imposition of restrictive management measures and reductions in economic and social benefits relative to the proposed action.

Four alternatives, including the status quo, were considered for the action to specify OY for red porgy. Similar to the status quo MSY, the first alternative to the proposed OY, the status quo, is likely an overestimate and inappropriate for this resource. The second and third alternatives are, respectively, more and less conservative than the proposed action. The second alternative to the proposed OY is likely more conservative than necessary to protect the resource and would be expected to result in greater foregone economic benefits than the proposed OY. The third alternative to the proposed OY is believed to be insufficiently conservative to protect the resource. The proposed OY is believed to be the appropriate choice to minimize foregone economic benefits while protecting the resource.

Four alternatives, including the status quo, were considered for the action to define a yield-based rebuilding strategy for red porgy. The first alternative to the proposed rebuilding strategy, the status quo, would not define a yield-based rebuilding strategy and would not meet the Council's objective.

The second alternative to the proposed red porgy rebuilding strategy would allow a constant catch harvest strategy, resulting in larger total harvests through 2017. This larger harvest is projected to result in greater net economic benefits than the proposed action in the fishery. This alternative was rejected because a constant catch strategy results in a slower rate of increase in average size and age of fish and affords a lower level of insurance against environmental conditions that might affect the survival of eggs and larvae.

The third alternative to the proposed red porgy rebuilding strategy would allow harvest to increase as the biomass increases, similar to the proposed action, but would increase the harvest every five years instead of every three years as under the proposed action. This alternative is projected to result in virtually identical net economic benefits as the proposed action. This alternative was not selected as the proposed action, however, because the Council considered a three-year adjustment period, which would occur under the proposed action, to be more reasonable given the rebuilding schedule is only 11 years. Additionally, the three-year adjustment schedule would allow slightly greater yields than under a five-year adjustment period in the latter years of the rebuilding period.

Two alternatives, including the status quo, were considered for the action to specify MSY for black sea bass. The first alternative to the proposed MSY, the status quo, is likely an overestimate since a harvest level this high has not occurred during the 1986-2005 data record, suggesting that the MSY is inappropriate for this resource. Allowing harvest at this level may lead to excessive exploitation, precipitating the imposition of restrictive management measures and reductions in economic and social benefits relative to the proposed MSY.

Four alternatives, including the status quo, were considered for the action to specify OY for black sea bass. Similar to the status quo MSY, the first alternative to the proposed OY, the status quo, is likely an overestimate and inappropriate for this resource. The second and third alternatives are, respectively, more and less conservative than the proposed OY. The second alternative to the proposed OY is likely more conservative than necessary to protect the resource and would be expected to result in greater foregone economic benefits than the proposed OY. The third alternative to the proposed OY is believed to be insufficiently conservative to protect the resource. The proposed OY is believed to be the appropriate choice to minimize foregone economic benefits while protecting the resource.

Four alternatives, including the status quo, were considered for the action to establish a rebuilding schedule for black sea bass. The first alternative to the proposed rebuilding schedule, the status quo, would maintain the current rebuilding schedule that will expire in 2008 without rebuilding the resource, requiring a new rebuilding schedule to be developed at that time. The status quo is, therefore, not an appropriate option.

The second alternative to the proposed black sea bass rebuilding schedule would require total cessation of all directed harvest for 6 years and additional unspecified regulation, and accompanying adverse economic impacts, in subsequent years since incidental catch mortality would still occur. Thus, this alternative would not achieve the Council's objectives.

The third alternative to the proposed black sea bass rebuilding schedule would allow a longer rebuilding period than the second alternative, thereby reducing the adverse economic impacts associated with the second alternative, but would require increased harvest reductions than the proposed rebuilding schedule, resulting in greater adverse economic impacts than the proposed rebuilding schedule. The proposed rebuilding schedule would allow the longest recovery period, the largest harvest, and the least burdensome harvest restrictions, resulting in increased economic benefits relative to the other alternatives.

Seven alternatives, including the status quo, were considered for the action to define a rebuilding strategy for black sea bass. The first alternative, the status quo, would not establish a rebuilding strategy for black sea bass and would not achieve the Council's objectives.

The second and third alternatives to the proposed black sea bass rebuilding strategy are the most conservative rebuilding strategies, would maintain a constant fishing mortality rates over the rebuilding period, and vary by whether allowable harvest in increased every year (second alternative) or every three years (third alternative). As a result of being the most conservative strategies, they are projected to result in faster biomass growth than the proposed strategy and greater net economic benefits. These alternatives were not selected as the proposed action, however, because each alternative would have required a 73 percent reduction in yield in the initial year of the rebuilding period, which the Council believed would impose an excessive economic and social hardship on fishery participants.

The fourth and fifth alternatives to the proposed black sea bass rebuilding strategy would both allow greater harvests after the 2009 fishing season than the proposed action, resulting in greater net economic benefits than the proposed action. These alternatives were not selected as the proposed action, however, because they would have required a 62 percent reduction in yield in the initial year of the rebuilding period, which the Council believed would impose an excessive economic and social hardship on fishery participants.

The sixth alternative to the proposed black sea bass rebuilding strategy would both allow greater harvests during the 2009-2014 fishing seasons than the proposed action, resulting in slightly greater net economic benefits than the proposed action. This alternative was not selected as the proposed action, however, because the proposed action would allow the stock to be rebuilt two years earlier than this alternative.

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7 Fishery Impact Statement – Social Impact Assessment

7.1 Introduction

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

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

7.2 Problems and Methods

Social impacts are generally the consequences to human populations that follow from some type of public or private action. Those consequences may include alterations to "...the ways in which people live, work or play, relate to one another, organize to meet their needs and generally cope as members of a society..." (Interorganizational Committee on Guidelines and Principles for Social Impact Assessment, 1994:1). Social impact analyses can be used to determine possible consequences management actions may have on fishing dependent communities. In order to do a full social impact analysis it is necessary to identify community participants who depend upon the fisheries in that area and to identify the amount of dependency they have upon a given fishery. Further it is necessary to understand the other opportunities for employment that exist within the community should fishery management measures become so restrictive that participants must switch their focus to other fisheries or other jobs outside of the fishing industry. Public hearings and scoping meetings may provide input from those concerned with a particular action, but they do not constitute a full overview of the fishery.

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

Today, more fisheries are managed by quotas and/or have restrictions on the number of participants. This limits the opportunities fishermen who fish for the species addressed by this amendment may have had in the past and may make it impossible to shift effort to other fisheries in response to further restrictions imposed by this amendment.

The information available for evaluating the possible impacts of this amendment is summarized in Section 3.4. There is not enough data on communities that may be dependent on these fisheries to fully describe the impacts of any change in fishing regulations on any one community. However, demographic information based on census data of key communities in the region is included to give some insight into the structure of these communities that operate in the snapper grouper fishery. The social impacts on recreational fishermen, the processing sector, the consumer, fishing communities, and society as a whole are not fully addressed due to data limitations. Data to define or determine impacts upon fishing communities are still very limited.

7.3 Social Impact Assessment Data Needs

Changes due to development and the increase of tourism infrastructure have been occurring rapidly in coastal communities of the South Atlantic make community descriptions more problematic. Recognizing that defining and understanding the social and economic characteristics of a fishery is critical to good management of the fishery. Therefore, more comprehensive work needs to be done on all of the fisheries in the region.

One of the critical data needs is complete community profiles of fishing communities in the southeast region in order to gain a better understanding of the fishery and those dependent on the fishery. At this time, due to limited staff and resources, NMFS is conducting research in a few Southeast communities at a time and in-depth community profiling will take several years to complete.

Completion of the community profiles will support more complete descriptions of the impacts that new regulations will have upon fishing communities. For each community chosen for profiling, it will be important to understand the historical background of the community and it's involvement with fishing through time. Furthermore, the fishing communities' dependence upon fishing and fishery resources needs to be established. Kitner (2004) suggests that in order to achieve these goals, data needs to be gathered in three or more ways. First, in order to establish both baseline data and to contextualize the information already gathered by survey methods, an in-depth, ethnographic study of the different fishing sectors or subcultures is needed. Second, existing literature on social/cultural analyses of fisheries and other sources in social evaluation research needs to be assessed in order to offer a comparative perspective and to guide the SIAs. Third, socio-economic data need to be collected on a continuing basis for both the commercial and recreational sectors, including the for-hire sector. Methods for doing this would include regular collection of social and economic information in logbooks for the commercial sector, observer data, and dock surveys.

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

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

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

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

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

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

7.4 Note for CEQ Guidance to Section 1502.22

In accordance with the CEQ Guidance for 40 CFR Section 1502.22 of the NEPA (1986), the Council has made "reasonable efforts, in the light of overall costs and state of the art, to obtain missing information which, in its judgment, is important to evaluating significant adverse impacts on the human environment…" However, at this time the Council cannot obtain complete social and community information that will allow the full analysis of social impacts of the proposed action and its alternatives. There are an insufficient number of sociologists or anthropologists employed at this time (2007) and insufficient funds to conduct the community surveys and needed ethnographies that would allow full analysis.

7.5 E.O. 12898: Environmental Justice

This Executive Order requires federal agencies conduct their programs, policies, and activities in a manner to ensure individuals or populations are not excluded from participation in, or denied the benefits of, or subjected to discrimination because of their race, color, national origin, or income level. 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.

Section 3.4.2 describes five fishing communities in North Carolina, two fishing communities in Florida, and one each in Georgia and South Carolina. These communities were identified as key communities involved in the snapper grouper fishery based on fishing permit and employment data. The demographic information reported for these communities were derived from census data. Census data describes community-wide demographics and cannot be partitioned into just those populations that rely on the snapper grouper fishery. A key reason for this is the census data combines fishing occupations with farming and forestry occupations under the occupation category, and with agriculture, forestry, and hunting under the industry category. For this reason, demographic information on snapper grouper fishing communities is not available for use in evaluating the effects of the proposed actions on low-income and minority populations. Nevertheless, although demographics of the snapper grouper fishery are unknown, these actions would apply to all participants in the fishery, regardless of their race, color, national origin, or income level and, as a result are not considered discriminatory. The current demographic make-up of the respective fishing communities is assumed to be the result of historic cultural and economic conditions and not the result of specific historic or current management action that favored or discriminated against minority or low-income participants. Therefore, no environmental justice issues are anticipated and no modifications to any proposed actions have been made to address environmental justice issues. Additionally, none of the proposed actions are expected to affect any existing subsistence consumption patterns or raise any issues thereof. complete slate of preferred alternatives has been selected

8 Other Applicable Law

8.1 Administrative Procedure Act

All federal rulemaking is governed under the provisions of the Administrative Procedure Act (APA) (5 U.S.C. Subchapter II), which establishes a "notice and comment" procedure to enable public participation in the rulemaking process. Under the APA, NMFS is required to publish notification of proposed rules in the *Federal Register* and to solicit, consider and respond to public comment on those rules before they are finalized. The APA also establishes a 30-day wait period from the time a final rule is published until it takes effect.

8.2 Coastal Zone Management Act

Section 307(c)(1) of the federal Coastal Zone Management Act (CZMA) of 1972 requires that all federal activities that directly affect the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable. While it is the goal of the South Atlantic Council to have management measures that complement those of the states, Federal and state administrative procedures vary and regulatory changes are unlikely to be fully instituted at the same time. Based on the analysis of the environmental consequences of the proposed action in Section 4.0, the Council has concluded this amendment would improve Federal management of snapper grouper species.

8.3 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 threatened and endangered species. They must ensure actions they authorize, fund, or carry out are not likely to harm the continued existence of those species or the habitat designated as critical to their survival and recovery. The ESA requires NOAA Fisheries Service to consult with the appropriate administrative agency (itself for most marine species, the U.S. Fish and Wildlife Service for all remaining species) when proposing an action that "may affect threatened or endangered species or adversely modify critical habitat. Consultations are necessary to determine the potential impacts of the proposed action. They are concluded informally when proposed actions may affect but are "not likely to adversely affect" threatened or endangered species or designated critical habitat.

Formal consultations, including a biological opinion, are required when proposed actions may affect and are "likely to adversely affect" threatened or endangered or species adversely modify designated critical habitat. Biological opinions use the best available commercial and scientific data to evaluate the effects of a proposed action on threatened or endangered species. If a biological opinion finds the proposed action is not likely to jeopardize the continued existence of threatened or endangered species, an Incidental Take Statement (ITS) is issued. An ITS specifies the impact, i.e., the amount or extent, of such incidental taking on threatened or endangered species. In conjunction with an ITS, Reasonable and Prudent Measures (RPM) are issued, which are non-discretionary actions, necessary to help minimize the impact of incidental take. Terms and conditions are issued simultaneously with RPMs, and are specific requirements that implement the RPMs. If a biological opinion finds that the proposed action is likely to jeopardize the continued existence of threatened or endangered species, the consulting agency is required to establish Reasonable and Prudent Alternatives (RPA) to the proposed action. RPAs are economically and technology feasible alternatives to the proposed action, that would allow that activity to occur, without jeopardizing threatened or endangered species.

NOAA Fisheries Service has recently completed a biological opinion on the ESA-listed species (see Section 3.2.4) potentially impacted by the continued operation of the South Atlantic snapper grouper fishery. That opinion found that the management measures proposed under Amendment 13C to the South Atlantic Snapper Grouper Fishery Management Plan were not likely to jeopardize the continued existence of any ESA-listed species or adversely modify critical habitat. An incidental take statement was issued allotting take for green, hawksbill, loggerhead, leatherback, and Kemp's ridley sea turtles, as well as smalltooth sawfish. Reasonable and prudent measures to minimize the impact of these incidental takes were specified, along with terms and conditions to implement them.

8.4 Executive Order 12612: Federalism

E.O. 12612 requires agencies to be guided by the fundamental federalism principles when formulating and implementing policies that have federalism implications. The purpose of the Order is to guarantee the division of governmental responsibilities between the Federal government and the States, as intended by the framers of the Constitution. No federalism issues have been identified relative to the actions proposed in this amendment and associated regulations. The affected states have been closely involved in developing the proposed management measures and the principal state officials responsible for fisheries management in their respective states have not expressed federalism related opposition to the proposed action.

8.5 Executive Order 12866: Regulatory Planning and Review

E.O. 12866, signed in 1993, requires federal agencies to assess the costs and benefits of their proposed regulations, including distributional impacts, and to select alternatives that maximize net benefits to society. To comply with E.O. 12866, NMFS prepares a Regulatory Impact Review (RIR) for all fishery regulatory actions that implement a new FMP or that 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 if it has other major economic effects.

8.6 Executive Order 12962: Recreational Fisheries

E.O. 12962 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, the order establishes a seven member National Recreational Fisheries Coordination Council responsible for, among other things, ensuring that social and economic values of healthy aquatic systems that support recreational fisheries are considered by Federal agencies in the course of their actions, sharing the latest resource information and management technologies, and reducing duplicative and cost-inefficient programs among Federal agencies involved in conserving or managing recreational fisheries. The Council also is responsible for developing, in cooperation with Federal agencies, States and Tribes, a Recreational Fishery Resource Conservation Plan - to include a five-year agenda. Finally, the Order requires NMFS and the U.S. Fish and Wildlife Service to develop a joint agency policy for administering the ESA.

8.7 Executive Order 13089: Coral Reef Protection

E.O. 13089, signed by President William Clinton on June 11, 1998, recognizes the ecological, social, and economic values provided by the Nation's coral reefs and ensures that Federal agencies are protecting these ecosystems. More specifically, the Order requires Federal agencies to identify actions that may harm U.S. coral reef ecosystems, to utilize their program and authorities to protect and enhance the conditions of such ecosystems, and to ensure that their actions do not degrade the condition of the coral reef ecosystem.

Amendment 13A to the Snapper Grouper FMP, which would eliminate all potential adverse impacts to *Oculina* coral in the *Oculina* Experimental Closed Area that are associated with bottom fishing gear, fulfills the intentions of E.O. 13089. As noted in Section 1.1, the use of bottom trawls, bottom longlines, dredges, fish traps, and fish pots is currently prohibited within the *Oculina* Experimental Closed Area and that prohibition would not be affected by the proposed actions.

8.8 Executive Order 13158: Marine Protected Areas

E. O. 13158 was signed on May 26, 2000 to strengthen the protection of U.S. ocean and coastal resources through the use of Marine Protected Areas (MPAs). The E.O. defined MPAs as "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 and cultural resources therein". It directs federal agencies to work closely with state, local and non-governmental partners to create a comprehensive network of MPAs "representing diverse U.S. marine ecosystems, and the Nation's natural and cultural resources". The Council intends has addressed MPAs in Amendment 14.

8.9 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. It also prohibits 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 otters, polar bears, manatees, and dugongs.

Part of the responsibility that NOAA Fisheries Service 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." A conservation plan is then 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 fishery to be placed in one of three categories, based on the relative frequency of incidental serious injuries and mortalities of marine mammals. 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 commercial hook-and-line components of the South Atlantic snapper grouper fishery (i.e., bottom longline, bandit gear, and handline) are listed as Category III as there have been no documented interactions between this fishery and marine mammals (68 FR 41725 , July 15, 2003). The black sea bass pot component of the South Atlantic snapper grouper fishery is considered part of the Atlantic mixed species trap/pot fishery, a Category II fishery, under the MMPA. An interaction with a marine mammal has never been documented in the South Atlantic black sea bass pot fishery. The fishery's classification changed as a precaution because of known interactions with marine mammals by gears very similar to those utilized in the black sea bass fishery.

Under the MMPA, to legally fish in a Category I and/or II fishery, a fisherman must take certain steps. For example, owners of vessels or gear engaging in a Category I or II fishery, are required to obtain a marine mammal authorization by registering with the Marine Mammal Authorization Program (50 CFR 229.4). They are also required to accommodate an observer if requested (50 CFR 229.7(c)) and they must comply with any applicable take reduction plans.

The commercial hook-and-line components of the South Atlantic snapper grouper fishery (i.e., bottom longline, bandit gear, and handline) are listed as part of a Category III fishery (71 FR 48802, August 22, 2006) because there have been no documented interactions between these gears and marine mammals. The black sea bass pot component of the South Atlantic snapper grouper fishery is part of the Atlantic mixed species trap/pot fishery, a Category II fishery, under the MMPA. The Atlantic mixed species trap/pot fishery designation was created in 2003 (68 FR 41725, July 15, 2003), by combining several separately listed trap/pot fisheries into a single group. This group was designated a Category II as a precaution because of known interactions between marine mammals and gears similar to those included in this group. Prior to this consolidation, the black sea bass pot fishery in the South Atlantic was apart of the "U.S. Mid-Atlantic and Southeast U.S. Atlantic Black Sea Bass Trap/Pot" fishery (Category III). There has never been a documented interaction between marine mammals and black sea bass trap/pot gear in the South Atlantic.

8.10 Migratory Bird Treaty Act and Executive Order 13186

The Migratory Bird Treaty Act (MBTA) implemented several bilateral treaties for bird conservation between the United States and Great Britain, the United States and Mexico, the United States and Japan, and the United States and the former Union of Soviet Socialists Republics. Under the 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, except as permitted by regulations issued by the Department of the Interior (16 U.S.C. 703-712). 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.

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 U.S. Fish and Wildlife Service (USFWS) to conserve those bird populations. In the instance of unintentional take of migratory birds, NOAA Fisheries Service would develop and use principles, standards, and practices that will lessen the amount of unintentional take 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.

An 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 Service 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. Under that plan many potential MOU components are already being implemented.

8.11 National Environmental Policy Act

Concerned with the degree of damages incurred by human activity on the sensitive ecological environment in the United States, Congress passed, and Richard Nixon signed into law, the National Environmental Policy Act (NEPA) of 1969, 42 U.S.C. §§ 4321 *et seq.* NEPA sets the national environmental policy by providing a mandate and framework for federal agencies to consider all reasonably foreseeable environmental effects of their actions. In addition, it requires disclosure of information regarding the environmental impacts of any federal or federally funded action to public officials and citizens before decisions are made and actions taken. The analysis and results are presented to the public and other agencies through the development of NEPA documentation. The Environmental Impact Statement is integrated into the Amendment and serves as the documentation to satisfy the requirements of NEPA.

8.12 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 U.S. 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. The two main sanctuaries in the South Atlantic EEZ are Gray's Reef and Florida Keys National Marine Sanctuaries.

8.13 Paperwork Reduction Act

The purpose of the Paperwork Reduction Act is to control paperwork requirements imposed on the public by the federal government. The authority to manage information collection and record keeping requirements is vested with the Director of the Office of Management and Budget. This authority encompasses establishment of guidelines and policies, approval of information collection requests, and reduction of paperwork burdens and duplications.

The Council is not proposing in this amendment measures that would involve increased paperwork and consideration under this Act.

8.14 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, NMFS must determine whether a proposed fishery regulation would 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 Analysis 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 court review of an agency's compliance with the Act's provisions.

8.15 Small Business Act

Enacted in 1953, the Small Business Act requires that agencies assist and protect small-business interests to the extent possible to preserve free competitive enterprise.

8.16 Public Law 99-659: Vessel Safety

Public Law 99-659 amended the Magnuson-Stevens Act to require that a FMP or FMP amendment must consider, and may provide for, temporary adjustments (after consultation with the U.S. Coast Guard and persons utilizing the fishery) regarding access to a fishery for vessels that would be otherwise prevented from participating in the fishery because of safety concerns related to weather or to other ocean conditions.

No vessel would be forced to participate in the snapper grouper fishery under adverse weather or ocean conditions as a result of the imposition of management regulations proposed in this amendment.

The fact that low quotas are being implemented with a January 1st start date may force fishermen to fish in the winter. The public is requested to comment on this issue specifically.

No concerns have been raised by people participating in the fishery nor by the U.S. Coast Guard that the proposed management measures directly or indirectly pose a hazard to crew or vessel safety under adverse weather or ocean conditions. Therefore, this amendment proposes neither procedures for making management adjustments due to vessel safety problems nor procedures to monitor, evaluate, or report on the effects of management measures on vessel or crew safety under adverse weather or ocean conditions.

9 List of Preparers

Name	Title	Agency	Division	Location
Heather Blough	NEPA Specialist	NMFS	SF	SERO
Myra Brouwer	Fishery Scientist	SAFMC	N/A	SAFMC
David Dale	EFH Specialist	NMFS	HC	SERO
Rick DeVictor (Team Lead)	Environmental Impact Scientist	SAFMC	N/A	SAFMC
Tracy Dunn	Enforcement Specialist	NMFS	LE	SERO
Andy Herndon	Biologist	NMFS	PR	SERO
Stephen Holiman	Economist	NMFS	SF	SERO
Palma Ingles	Anthropologist	NMFS	SF	SERO
Jennifer Lee	Council Liaison	NMFS	PR	SERO
Jack McGovern (Team Lead)	Fishery Biologist	NMFS	SF	SERO
Kerry O’Malley	Fishery Scientist	SAFMC	N/A	SAFMC
Janet Miller	Permits	NMFS	SF	SERO
Roger Pugliese	Senior Fishery Biologist	SAFMC	N/A	SAFMC
Kate Quigley	Economist	SAFMC	N/A	SAFMC
Monica Smit-Brunello	Attorney Advisor	NOAA	GC	SERO
Jim Waters	Economist	NMFS	Economics	SEFSC
Julie Weeder	Fishery Management Specialist	NMFS	SF	SERO
Gregg Waugh	Deputy Director	SAFMC	N/A	SAFMC
Erik Williams	Stock Assessment Biologist	NMFS	SF	SEFSC

10 List Of Agencies, Organizations, And Persons To Whom Copies Of The Statement Are Sent

Responsible Agency

Amendment:
South Atlantic Fishery Management Council
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(843) 571-4366 (TEL)
Toll Free: 866-SAFMC-10
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Environmental Impact Statement:
NMFS, Southeast Region
263 13th Avenue South
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List of Agencies, Organizations, and Persons Consulted

SAFMC Law Enforcement Advisory Panel
SAFMC Snapper Grouper Advisory Panel
SAFMC Marine Protected Areas Advisory Panel
SAFMC Coral Advisory Panel
SAFMC Habitat and Environmental Protection Panel
SAFMC Scientific and Statistical Committee
North Carolina Coastal Zone Management Program
South Carolina Coastal Zone Management Program
Georgia Coastal Zone Management Program
Florida Coastal Zone Management Program
Florida Fish and Wildlife Conservation Commission
Georgia Department of Natural Resources
South Carolina Department of Natural Resources
North Carolina Division of Marine Fisheries
North Carolina Sea Grant
South Carolina Sea Grant
Georgia Sea Grant
Florida Sea Grant
Atlantic States Marine Fisheries Commission
Gulf and South Atlantic Fisheries Development Foundation
Gulf of Mexico Fishery Management Council
National Marine Fisheries Service

- Washington Office
- Office of Ecology and Conservation
- Southeast Regional Office
- Southeast Fisheries Science Center

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