FINAL

SNAPPER GROUPER AMENDMENT 13C

February 2006

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ABBREVIATIONS AND ACRONYMS

ALS	Accumulative Landings System
ACCSP	Atlantic Coastal Cooperative Statistics Program
B	A measure of fish biomass either in weight or other appropriate unit
B_{MSY}	The biomass of fish expected to exist under equilibrium conditions when fishing at F_{MSY}
B_{OY}	The biomass of fish expected to exist under equilibrium conditions when fishing at F_{OY}
B_{CURR}	The current biomass of fish
C	Catch expressed as average landings over some appropriate period
CPUE	Catch per unit effort
DEIS	Draft Environmental Impact Statement
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_{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
FMU	Fishery Management Unit
MARMAP	Marine Resources Monitoring Assessment and Prediction Program
MFMT	Maximum Fishing Mortality Threshold
MMPA	Marine Mammal Protection Act of 1972
MRFSS	Marine Recreation 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
OY	Optimum Yield
RIR	Regulatory Impact Review
SEDAR	Southeast Data, Assessment and Review
SFA	Sustainable Fisheries Act
SIA	Social Impact Assessment
SPR	Spawning Potential Ratio
SSR	Spawning (biomass) per Recruit
T_{MIN}	The length of time in which a stock could be rebuilt in the absence of fishing mortality on that stock
TAC	Total Allowable Catch

AMENDMENT 13C TO THE FISHERY MANAGEMENT PLAN FOR THE SNAPPER GROUPER FISHERY OF THE SOUTH ATLANTIC REGION

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

Proposed actions: Define management measures that will end or phase out overfishing of snowy grouper (*Epinephelus niveatus*), golden tilefish (*Lopholatilus chamaeleonticeps*), vermilion snapper (*Rhomboplites aurorubens*), and black sea bass (*Centropristis striata*) in federal waters off the South Atlantic states. Define management measures that will allow for increased catch of red porgy (*Pagrus pagrus*) as the stock continues to rebuild in the South Atlantic.

Lead agency: FMP – South Atlantic Fishery Management Council
EIS - National Marine Fisheries Service (NMFS)

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FEIS filed	_________________
FEIS Comments received by:	_________________

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 eleven 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 second section summarizes and responds to public comments received during the DEIS comment period.

I. EPA Comments

EPA Comment 1 (Preferred Alternative Selections): *The FEIS should summarize under each action the Council's rationale for the preferred alternative(s). Ideally, this would be the focus of the alternatives section.*

Response: The FEIS summarizes the Council's rationale for each preferred alternative in Section 2.0 (Summary of Alternatives). These summaries are located after the tables comparing the environmental effects of the proposed action/alternatives.

EPA Comment 2 (Environmental Justice): *The DEIS carefully considers the social impacts of proposed actions/alternatives. However, a potential environmental justice issue related to the impacts of the preferred commercial management measure for snowy grouper on North Carolina fishers should be more fully evaluated and addressed in the FEIS. If this alternative is implemented and would prevent North Carolina fishers from targeting snowy grouper during their fishing season, then the FEIS should disclose the demographics of impacted fishers to determine if a potential environmental justice issue exists. Regardless of the demographics, we suggest action be taken to ensure North Carolina fishers access to their share of snowy grouper.*

Response: Economic analyses indicate neither the preferred snowy grouper alternative identified in the DEIS, nor the Council's new preferred snowy grouper alternative identified in this FEIS, would disproportionately impact North Carolina fishermen. The trip limits proposed in both alternatives are designed to extend the duration of the snowy grouper fishery into December, providing year-round fishing opportunities to all participants. The 2006 snowy grouper quota is likely to be taken before the trip limits proposed in Amendment 13C become effective. However, 1999-2003 landings data indicate North Carolina and Florida fishermen would have landed nearly the same percentage of their annual catch by the time Amendment 13C is implemented and the snowy grouper fishery is closed. The Council's new preferred alternative, developed in response to public comments on the DEIS, further reduces the risk of potential environmental justice issues by providing for a higher commercial quota the year Amendment 13C is implemented.

EPA Comment 3 (Regulatory Discards): *A minimum size limit regulation can be an effective management tool when the discard mortality rate of the managed species is reasonable. However, it is not an effective way to reduce fishing mortality if the discard mortality rate of the managed species is very high (e.g., near 100%). However, we note that most preferred alternatives in the DEIS do not propose minimum size limit increases. We concur with the conclusion that sampling programs are needed to quantify discard rates of managed species in cases where this information is not available in the literature. We also concur with the Council's plan to address regulatory discards in Snapper Grouper Amendment 13B.*

Response: We agree discard mortality rates should be considered in evaluating the potential effectiveness of minimum size limits. The Council is proposing in Amendment 13C to increase the minimum size limits of two species: vermilion snapper and black sea bass. These minimum size limit increases are proposed for the recreational fisheries, which generally operate in shallower waters where discard mortality rates are lower. The discard mortality rates of the vermilion snapper and black sea bass recreational fisheries are estimated as 25% (SEDAR 2 2003a) and 15% (SEDAR 2 2003b), respectively. While regulatory discards resulting from the proposed minimum size limit increases will increase total fishing mortality, this source of mortality is accounted for in determinations about percent reductions achieved from minimum size limit regulations. Finally, as the EPA comment recognizes, the Council is examining in Snapper Grouper Amendment 13B a multi-species approach to management, which would limit the frequency/occurrence of regulatory discards in the snapper grouper fishery by applying proposed quotas, seasonal closures, and some other regulations to multiple, co-occurring species, rather than to single stocks.

EPA Comment 4 (Red Porgy Recovery): *We are pleased to note the red porgy rebuilding plan implemented in 1999 is proving successful, and provides for increased harvest as stock biomass rebuilds. However, the Council's preferred alternative, which would increase the commercial trip limit from 50 lbs to 210 lbs gw (220 lbs ww) or 120 fish seems to provide for a harvest increase greater than the 109% increase supported by the rebuilding plan. The FEIS should verify whether these numbers are correct. It also would be useful to include information in the no action alternative that would allow for an easier comparison between the weight/number of fish associated with the current trip limit and with the action alternatives.*

Response: The current 50 lb trip limit used to manage the commercial red porgy quota is measured in whole weight. This has been clarified in the FEIS. The methodologies used to calculate the harvest increase associated with alternative trip limits and seasonal closure regulations are described in Appendix F. In summary, the harvest increases associated with alternative trip limits were estimated based on current landings data, rather than on an assumption that landings per trip are equal to the current limit. If current landings were lower than the current trip limit, they were not assumed to increase as a result of an increased trip limit. If current landings were at or above the current trip limit, but less than or equal to the proposed trip limit, then they were assumed to increase to the amount allowed by the proposed trip limit. If current landings exceeded the current trip limit and the proposed trip limit, then they were assumed to remain at the same level following the implementation of a new trip limit regulation. Trip limits were converted from pounds to numbers of fish by dividing the trip limit by the mean weight of red porgy landed during 2001-2003.

EPA Comment 5 (Biological Effects Sections): *Section 4.0 (Environmental Consequences) contains a considerable amount of background information that would be better placed in Section 3.0 (Affected Environment), with relevant points repeated as needed in Section 4.0 to support the analyses. Please take this into consideration when developing future documents. Additionally, the biological analyses in Section 4.0 should be more streamlined and focused.*

Response: We will consider this EPA guidance on the content of Section 3.0 versus Section 4.0 when developing future amendments. We edited the biological analyses in response to this comment.

EPA Comment 6 (Quotas): *We find the Council's decision to prohibit harvest and/or possession of a species over the bag limit after a quota is taken confusing from a fisheries perspective. This implies the harvest and possession of quota-managed species is acceptable even after the quota is taken, as long as fishermen comply with the recreational bag limit. This seems unusual, and should be discussed in the FEIS. Is the intent to provide an incidental bycatch allowance?*

Response: This provision, which allows fishermen to retain an amount of fish equal to the bag limit during a commercial closure, is common practice in South Atlantic fisheries. The Council's intent is to minimize the occurrence of regulatory discards, and the unnecessary waste resulting from discarding species with high (e.g., near 100%) discard mortality rates. The Council considers the effects of this regulation when contemplating alternative recreational bag limits.

Other EPA Comments: *Other, more minor comments attached to the EPA comment memo suggested: edits to the List of Acronyms; inclusion of a Glossary; identification of the scientific names of affected species on the cover page or Introduction of the amendment; clarification of text indicating some regulations might result in effort shifting; improving the summary analyses in Table B; considering the effects of bioaccumulation of mercury in golden tilefish on the golden tilefish market; clarification of the Council's intent; and editorial corrections.*

Response: These comments are addressed in the document through additions, revisions, and/or clarifying text.

II. New alternatives suggested by the public

A. More than one species

1. *All quotas should be cut by 50% this year and by 10% each succeeding year.*
Response: These actions would significantly reduce the commercial fishing effort beyond what is required, resulting in unnecessary economic and social impacts.

2. *Marine sanctuaries must be established now.*
Response: The Council does not have the authority to establish marine sanctuaries. However, the establishment of Marine Protected Areas is being proposed in Amendment 14 to the Snapper Grouper Fishery Management Plan.

3. *Someone suggested a separate bandit and hand-line quota.*
Response: The calculation of a separate bandit and hand-line quota is problematic as the data for these two gear types are often identified as just hook and line gear.

4. *Recreational fishermen should be prohibited from using "commercial gear" i.e., electric reels.*
Response: The Council does not believe further gear restrictions are necessary at this time. The main objective of this amendment is to end overfishing of certain species and the calculation of percent reductions in fishing mortality from the prohibition of the use of electric reels by recreational fishermen is problematic because different types of hook and line are not differentiated in the data base.

5. *Wants no size limits for the recreational and headboat sectors.*
Response: The Council believes, at this point in time, size limits are necessary as they would increase the overall yield per recruit.

6. *September 1 opening for the tilefish fishery as a whole.*
Response: A change in the golden tilefish fishing year is being considered in Amendment 15 to the Snapper Grouper Fishery Management Plan, in part, due to public testimony. Addition of this measure in Amendment 13C would compromise the Council's objective to implement management measures as early as possible in 2006.

7. *Don't have the full range of fishing year changes that are allowed for each species.*
Response: This amendment considers a change in fishing year for black sea bass. An alternative for red porgy considered removal of the January-April spawning season closure. A change in the golden tilefish fishing year is being considered in Amendment 15 to the Snapper Grouper Fishery Management Plan. The Council does not believe a change in fishing year for other species is warranted at this time.

8. *One commenter wanted a closer look at ITQs in this fishery.*
Response: The Council will consider implementing a controlled access system in this fishery when developing Amendment 16 to the Snapper Grouper FMP. Consideration of this measure in Amendment 13C would compromise the Council's objective to implement management measures as early as possible in 2006.

9. *Impose a recreational one-day boat limit of sixty fish total for both black sea bass and vermilion snapper, keeping ten per person on the vermilion snapper and twenty per person on the black sea bass, but not to exceed sixty per boat (excluding headboats).*
Response: These management measures would not be sufficient to end overfishing. The Council believes management measures should include a size limit change. Also, the Council believes that this measure would result in unnecessary economic and social impacts for some fishermen.

10. *Amendment 13C should include alternatives for rebuilding time frames and management reference points.*
Response: Amendment 15 to the Snapper Grouper FMP will include rebuilding timeframes for snowy grouper and black sea bass and rebuilding strategies for snowy grouper, black sea bass, and red porgy. Management reference points for the aforementioned species in addition to red porgy and vermilion snapper will also be addressed in Amendment 15. Inclusion of these items in this amendment would cause delay in the implementation of actions to end overfishing. One of the objectives is to implement actions as early as possible in 2006.

11. *One commenter noted there are other alternatives that should be considered by the Council: fishing year change, state quotas, individual quotas, days-at-sea, mandatory time out of the fishery, and increased maximum size.*
Response: The Council's preferred alternative in this amendment changes the fishing year for black sea bass. One proposed action in FMP Amendment 15 would change the fishing year for golden tilefish. An alternative was considered for red porgy that would remove the January-April spawning season closure. State quotas are difficult to implement and would add further regulations to a management system that many fishermen already consider complicated. Mandatory time out of the fishery was considered by the Council and the reason for rejection of this measure from detailed consideration is contained in Appendix A. The Council will consider implementing a controlled access system in this fishery when developing Amendment 16 to the Snapper Grouper FMP.

B. Black sea bass

1. *One commenter suggested overfishing for black sea bass should be addressed by implementing a black sea bass pot per vessel limit.*

Response: The Council does not feel a pot limit per vessel is necessary at this time and a pot limit would place unnecessary economic and social impacts on some fishermen. The alternative was considered and the reason for rejection is provided in Appendix A. This FMP Amendment would reduce bycatch through implementation of a commercial quota with a requirement that black sea bass pots be returned to shore when the quota is met. The Council also believes effort reduction for black sea bass pots would be addressed during development of Snapper Grouper FMP Amendment 16 and the proposed implementation of a controlled access system.

2. *Someone suggested lowering the bag limit to 5 fish per person per day.*

Response: As the amendment contains alternatives to lower the black sea bass bag limit to 15, 4, 10, and 20 (among other actions), the Council believes they have considered a reasonable range of bag limit reductions.

3. *Recreational fishermen should not be allowed to bring home more than 30 black sea bass.*

Response: The Council believes a boat limit is unnecessary and would create unnecessary economic and social impacts to some fishermen.

4. *Suggests having a number limit per boat for black sea bass which would be the same for charter and headboat sectors.*

Response: The Council believes a boat limit is unnecessary and would create unnecessary economic and social impacts to some fishermen.

5. *Should eliminate fish traps.*

Response: Fish traps are already prohibited in the Council's jurisdiction.

6. *One commenter suggested a black sea bass boat limit of 200 fish per boat.*

Response: The Council believes a boat limit is unnecessary and would create unnecessary economic and social impacts to some fishermen.

7. *The following alternatives were suggested at the Myrtle Beach public hearing for black sea bass:*
   a) an 11 inch size limit and a 15 fish bag limit (also from the Carolina Beach hearing);
   b) create a "stepped up" recreational size limit increase for BSB (from 10 to 11 inches, then in 2 years, 11 to 12 inches).

   Response: The Council's preferred alternative to the recreational black sea bass proposed action, in addition to a soft quota and a fishing year change, contain both of these suggestions.

C. Vermilion snapper

1. *Increase the size limit on vermilion snapper (no other regulations*).

Response: Based on public input, the Council increased the recreational size limit to 12 inches TL without any additional recreational regulations. The Council is not considering a size limit above 12 inches TL due to concerns with mortality of discarded fish. A size limit greater than 12 inches TL would not achieve the biological objectives of the amendment. Appendix A contains alternatives for size limits larger than 12 inches TL that were considered but rejected.

2. *The vermilion snapper trip limits should be determined by catch history and boat size to ensure a year round fishery.*

Response: Amendment 16 to the Snapper Grouper FMP will consider controlled access systems. Such systems might use catch history as a determination of future allocations.

3. *At 90 feet you're lucky to get a vermilion over 12". They don't survive discarding well. Suggests that fishermen keep the first 10 fish you catch.*

Response: The Council believes high-grading could occur and the biological objectives might not be met.

4. *Change the fishing year so the quota will not be met in approximately September. Perhaps start the fishing year in the summer months or in March when gag/blacks are closed.*

Response: The Council does not believe a change in the vermilion fishing year is necessary at this time. Based on public comment, the commercial quota was increased to 1.1 million pounds gutted weight. It is anticipated the commercial quota would allow the fishery to occur year-round based upon past levels of landings.

5. *One person suggested size limits on the vermilion breeding stock. She was referring to fish 3 lbs. and higher. These are the breeders and the hardest to market.*

Response: The Council is concerned that implementing a slot size limit would substantially increase release mortality as larger fish are generally caught in deeper water and the release mortality rates as indicated by SEDAR are 25% and 40% for recreational and commercial, respectively.

6. *Implement a vermilion commercial quota between 821,000 and 1.6 million lbs.*

Response: The Council's preferred alternative would implement a commercial quota of 1.1 million pounds gutted weight.

D. Snowy grouper

1. *The following alternatives were suggested from written comments for snowy grouper:*
   a) size limits;
   b) trip limit during their spawning season of 700 lbs. per vessel;
   c) a 30 fish trip limit; and,
   e) a reasonable limit of 3 snowy grouper at least utilizes the fish and will encourage customers to return.

Response: The Council considers size limits for snowy grouper unreasonable as discard mortality is nearly 100%. The remaining suggestions fall short of the biological objectives of the amendment.

2. *The other point made was that if the snowy grouper fishery is to be shut down, then it should be shut down completely, not just for one sector of the fishery. Concern was also expressed that managers are simply reallocating catch from one sector to the other (commercial to recreational).*

Response: The Council does not feel that the recreational sector should be prohibited when the commercial quota is reached and commercial fishing is prohibited. The Council's strategy for the species in this amendment is, for the most part, to regulate the recreational sector through bag and size limits while a combination of hard quotas and trip limits are implemented for the commercial sectors. The Council will monitor the recreational catch and take action if they believe that the fishing mortality from the recreational sector is at a level that would compromise the sustainability of the particular stock.

3. *Some written comments suggested that the Council should implement additional gear restrictions. One that was suggested was a prohibition of hydraulic or electric reels for those without a commercial permit in terms of snowy grouper. Another suggestion was the prohibition of longlines.*

Response: The Council does not believe that further gear restrictions are appropriate at this time as they would create unnecessary social and economic hardships to some fishermen.

E. Red porgy

1. *Suggests dropping the red porgy size limit (staff note: believe that she meant lowering) and raising the bag limit to 3 fish.*

Response: The Council believes at this point in time, size limits are necessary as they would increase the overall yield per recruit. A reduction or elimination of the size limit, with implementation of a bag limit of three, would not achieve the biological objectives of the amendment.

2. *Increase the bag limit to five per person. Again, have a recreational boat limit of either fifteen or twenty fish and not to exceed that (excluding headboats).*

Response: Implementation of a bag limit of five and a boat limit of fifteen or twenty fish would not achieve the biological objectives of the amendment.

F. Golden tilefish

1. *Institute a 300 pound trip limit for golden tilefish.*

Response: The Council believes that a year-round 300 pound trip limit would place unnecessary economic and social impacts on some fishermen and landings would be significantly below the quota based on historical levels of landings.

III. Comments on size limits

1. *Increasing the legal size of BSB to 11" makes no sense at all when the trap selects for a 10" fish.*

2. *What on earth makes the council think that an increase of one inch in the size limit is going to work any better? Females are recruited into the breeding BSB population when they are under 10 inches in length. By the time they have reached 9.5" 98% of the females are mature.*

3. *The proposed headboat and recreational size limits will be a high-grading nightmare. He felt past a depth of 140 feet, recreational fishermen should keep what they catch.*

Response: Based on public comment, the 10 inch TL minimum size was retained for black sea bass taken in the commercial fishery. The increased mesh size in black sea bass pots is expected to cull out many black sea bass below 11 inches TL. The Council recognizes there are negative consequences with implementation of size limits, including discard mortality and high-grading. However, the Council believes size limits can be an effective management tool if used properly. For black sea bass, the Council believes the beneficial biological effects outweigh the adverse ones in part due to the relatively low release mortality rate (estimated at 15%) for this species.

IV. Comments on bag limits

1. *The one fish recreational bag limit may encourage more high-grading for larger fish.*

Response: The Council recognizes the negative consequences associated with bag limits, including high-grading. However, the Council believes size limits can be an effective management tool if used properly and the beneficial biological effects outweigh the adverse ones.

2. *Clients will not pay for a charter if they only get to keep one snowy grouper (this commenter is a charter captain who strictly fishes deepwater).*

Response: The Council recognizes the economic hardships expected from implementation of these management measures. The Council considered a range of alternatives and believes the preferred maximizes the biological benefits while minimizing the social and economic impacts. The Council based this conclusion, in part, on the fact that average snowy grouper caught per recreational trip is relatively low and recreational landings only account for approximately 4% of the total harvest.

V. Comments on trip limits

A. In General

1. *Trip limits present an economic hardship because folks who bandit fish travel a good distance (80 miles or so) and trips will become cost prohibitive.*

2. *Trip limits increase production costs, reduce catches, and force docks to increase packing fees.*

Response: The Council recognizes the negative consequences associated with implementation of trip limits. However, the Council believes trip limits can be an effective management tool as they reduce the risk of a derby fishery and an early closure of the commercial fishery which could negatively effect the markets and price of fish.

VI. Comments on quotas

1. *Your preferred proposal to begin the fishing year for golden tilefish on January 1 with a 4,000 lb. trip limits open to longliners may seem good to you, but to me it sounds like the quota could easily be caught before I ever get a chance to fish in September.*

Response: As described in Section 4 of this amendment, the trip limit is intended to extend the fishery through December and would reduce or eliminate the likelihood that the quota would result in derby conditions and associated adverse effects. Amendment 15 is being developed and will consider a change in the fishing year; one alternative would begin the fishing on September 1.

2. *The vermilion snapper quota can be met very quickly by the fishermen in the Carolinas.*

Response: After receiving public comment on the DEIS, the Council modified their preferred alternative, resulting in a change of the commercial quota from 821,000 to 1,100,000 lbs gutted weight. This would further reduce the risk of an early fishery closure.

3. *A commenter felt that the snowy grouper quota was reached several times before any reduction was put into place. Commenter felt if this were to happen with tilefish, he and others would be out of the fishery as the fish will be caught before they are able to fish for tilefish.*

Response: As described in Section 4 of this amendment, the trip limit is intended to extend the fishery through December and would reduce or eliminate the likelihood the quota would result in derby conditions and associated adverse effects.

4. *Someone disagreed with the proposed quota on vermilion snapper as this could potentially be unfair to North Carolina fishermen. He was concerned that the weather would keep North Carolina fishermen at the dock during the spring and early summer while Florida fishermen catch the vermilion snapper quota. He reported that the best vermilion snapper fishing in this region is late summer and early fall.*

Response: After receiving public comment on the DEIS, the Council modified their preferred alternative, resulting in a change of the commercial quota from 821,000 to 1,100,000 lbs gutted weight. This would further reduce the risk of an early fishery closure.

VII. Comments on bycatch

1. *Amberjack, queen snapper, barrel fish, rudder fish, tilefish, sharks & yelloweye/vermilion snappers all have deep water groupers as a bycatch. A closed grouper season would result in groupers being caught with no chance of releasing them alive (staff note: referring to snowy grouper).*

2. *There will be bycatch and discard mortality because snowy grouper are caught with vermilion snapper, amberjack and queen triggerfish.*

3. *TACs will create a lot of bycatch.*

4. *One commenter noted that an increase in red porgy allowable catch could return fishing to 50 fathom bottom.*

5. *A commenter was concerned that high-grading could occur with the snowy grouper trip limit. They believed that the same holds true with a commercial boat that wants to return to the dock with 400 pounds instead of 150. Another commenter was concerned that a one fish recreational bag limit for snowy grouper will not reduce mortality as fishermen will high-grade for a larger fish.*

6. *The 12” black sea bass size limit will result in a waste of fish due to discard mortality.*

Response: The Council recognizes bycatch could increase through implementation of the management measures considered in this amendment. Such potential adverse impacts were considered when choosing the range of alternatives. However, the Council believes the net biological effects will be beneficial.

VIII. Support for the creation of zones

1. *Several written comments suggested that creation of subzones within the Council's jurisdiction. One person suggested that the Florida Keys shouldn't be included in the whole east coast as they have no longline boats & very few bandit boats. He stated that the gulfstream conditions, fast current & other unfishable conditions alone are enough to regulate snowy grouper for the 200 miles of coastline that at max 10 boats fish. Another person suggested a subzone for Monroe County as the snowy grouper quota would be filled by the fishermen from North Carolina to Georgia very quickly and they have so few deep drop fishermen. Another person suggested the creation of a subzone south of St. Lucie inlet. They felt that one or two reel bandit fishermen competing with longline vessels for the same TAC is unfair. One commenter suggested an exclusion zone where based upon Loran or Lat/Long coordinates we can retain fish year-round.*

2. *Snowy grouper are mostly targeted in June and July because of distance and ocean conditions other times of the year – therefore Keys fishermen feel they won't get the opportunity to fish on the quota because it will be all caught up by the fishermen in the Northern portion of the range. The fishermen in the Keys should have their own quota.*

3. *The Keys should have a separate quota for snowy grouper.*

4. *Wants to have different regulations by state.*

5. *Doesn't like where the black sea bass regulations are the same off each state. Believes that black fish are overfished off Murrell's Inlet but not the coast of Georgia.*

6. *Council should have mercy on different states. The commenter felt the vermilion snapper fishery has always been marginal for northern and southern Florida and North Carolina has a pretty healthy stock of red porgy and vermilion. Another commenter felt that vermilion snapper should not be regulated throughout the Council's jurisdiction as South Carolina has the most vermilions (he has fished for vermilions in all the states).*

7. *Implement TACs for each state and let each state manage their fishery.*

Response: The Council believes that the complexities of additional regulatory boundaries as a result of implementation of various zones would further compromise user compliance. In addition, the zones could further complicate the data collection effort, as it would be difficult to obtain catch by zone information. The Council, recognizing the inherent difficulties in establishing the additional regulatory boundaries, decided to address the issue in a future amendment.

IX. Legality of proposed actions in reference to the MSFCMA

1. *One commenter was concerned that several of the alternatives up for consideration are insufficient to end overfishing within the legally-required timeframe. They state that the Magnuson-Stevens Fishery Conservation and Management Act requires that "within one year of an identification" of overfishing and/or overfished status, the Councils "shall prepare a fishery management plan," amendment, or proposed regulations to end overfishing and rebuild affected stocks (See 16 U.S.C. § 1854(e)(3)). With regard to the species at issue, all five of these species have been listed as overfished, experiencing overfishing, or both in every NMFS "Status of the Stocks" report to Congress since 1997. In order for the Council to be in full compliance with MSFCMA – as Amendments 13B and 13C are both intended to do – the Council must adopt plan amendment measures that end overfishing for these fish species and set them on the path to rebuilding as quickly as possible.*

Response: Guidelines to the National Standards contained in the Magnuson-Stevens Act state that regulations intended to stop overfishing should be implemented one year after the overfishing is identified. Proposed revisions to these guidelines would require that overfishing be eliminated "as soon as practicable", with the Council providing the rationale for choosing the time period to end overfishing (70 FR 36240, June 22, 2005). The proposed revisions include phase-in periods to end overfishing under certain circumstances; one requirement would be that fishing mortality rate be reduced by a "substantial and measurable amount each year" (70 FR 36240, June 22, 2005).

The Council recognizes that the time period to end overfishing is not explicitly stated in the Magnuson-Stevens Act and that revisions to the guidelines are in the proposal stage. However, the Council believes that sustainability of snowy grouper, golden tilefish, vermilion snapper, black sea bass, and red porgy stocks would not be jeopardized if overfishing was phased-out over a short (e.g., 2-3 year) time period. These species are economically important to both commercial and recreational fishermen, and reductions to end overfishing immediately would result in significant adverse impacts to those affiliated with the fishing for and/or harvest of species in the snapper grouper fishery management unit (e.g., fishing communities, fishing industries, etc.).

2. *It is quite possible that an amendment that only focuses on reducing overfishing, without addressing any of the other legally required elements, is not legally sufficient under the Act. See 16 U.S.C. § 1853 (a). We would strongly urge the Council to reintegrate these proposals into a fully developed amendment that considers a full range of alternatives, including those proposed by SASFA.*

Response: The goal of this amendment is to end overfishing of four recently assessed species. One of the objectives of this amendment is to implement regulations as early as possible in 2006. The Council believes the best course of action to meet these goals is for this amendment to contain management measures that end overfishing and for FMP Amendment 15, (which is one of the Council's highest priorities in 2006) to contain the rebuilding schedules and strategies of the recently assessed overfished species. Certain actions have been separated from this amendment and implemented earlier as Amendment 13A.

X. Enforcement

1. *Enforcement of current regulations needs to be improved.*

2. *Bag limits are useless unless they're enforced. NC State Officers don't seem to pay much attention to BSB, and literally tons of them go up the road to be sold by folks who have the NC "permit to sell" and pay no attention to bag limits.*

Response: NMFS and the states continue to try to improve enforcement of the fisheries under their jurisdiction.

XI. Recreational sale of fish

1. *A commenter suggested that something needs to be done to stop recreational anglers from harvesting over their limits of snapper and grouper and selling their fish illegally with no reporting or documentation of these fish. – Written comment*

2. *Recreational sale should be prohibited as it promotes high-grading and gets counted towards the commercial quota. – Charleston*

3. *The implication of sales of fish caught by recreational fishing vessels could also be explored… - Carolina Beach*

Response: The Council is considering actions to limit or eliminate the sale of recreationally-caught fish in Snapper Grouper FMP Amendment 15.

Abstract

The South Atlantic Fishery Management Council (SAFMC) proposes five management actions to amend the current Snapper Grouper Fishery Management Plan (FMP). Four of the actions serve to address overfishing for snowy grouper, golden tilefish, vermilion snapper, and black sea bass in federal waters off the South Atlantic states. The fifth action considers an increase in the allowable catch of red porgy in the South Atlantic consistent with the stock's rebuilding program.

In satisfying the underlying need to prevent overfishing while achieving optimum yield from each fishery, the Council has considered all reasonable ways to reduce fishing mortality. When considering management measures to end overfishing, the Council's stated objective is to allow as close to a year-round fishery as possible and implement regulations as early as possible in 2006. The Council has indicated their preferred changes to the current regulations (Exhibits 1 and 2). The information below indicates preferred changes only; existing regulations remain the same unless otherwise indicated.

Exhibit 1. Preferred changes to commercial regulations.
All weights are pounds (lbs) gutted weight (gw). After the commercial quota is met, all purchase and sale is prohibited and harvest and/or possession is limited to the bag.

	Annual Quota (pounds gutted weight)	Trip Limit (pounds gutted weight)	Size Limit
Snowy Grouper	151,000 lbs gw (year 1); 118,000 lbs gw (year 2); 84,000 lbs gw (year 3)	275 lbs gw (year 1)[1]; 175 lbs gw (year 2)[1]; 100 lbs gw (year 3)[1]	-------
Golden Tilefish	295,000 lbs gw	4,000 lbs gw 300 lbs gw[2]	-------
Vermilion Snapper	1,100,000 lbs gw	-------	-------
Black Sea Bass[3]	477,000 lbs gw (year 1); 423,000 lbs gw (year 2); 309,000 lbs gw (year 3)	-------	-------
Red Porgy	127,000 lbs gw	120 fish[1,4]	-------

[1]Until quota is met.
[2]Higher trip limit until 75% of quota is taken then reduce to 300 lbs. Do not adjust trip limit downwards unless 75% is captured on or before September 1.
[3]Also require use of 2" mesh for the entire panel of black sea bass pots and change fishing year to June 1 through May 31.
[4]Trip limit effective May through December (fishery closed January through April).

Exhibit 2. Preferred changes to recreational regulations.
All weights are pounds (lbs) gutted weight (gw).

	Bag Limit	**Size Limit**	**Seasonal Closure**	**Annual Allocation (pounds gutted weight)**
Snowy Grouper	1/person/day[1]	-------	-------	-------
Golden Tilefish	1/person/day[1]	-------	-------	-------
Vermilion Snapper	-------	12" total length	-------	-------
Black Sea Bass[2]	15/person/trip	11" total length (year 1); 12" total length (year 2)	-------	633,000 lbs gw (year 1); 560,000 lbs gw (year 2); 409,000 lbs gw (year 3)
Red Porgy	3/person/day	-------	-------	-------

[1]Within the 5 grouper/person/day aggregate recreational bag limit.
[2]Change fishing year to June 1 through May 31.

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SUMMARY

Purpose and Need

Amendment 13C to the South Atlantic Snapper Grouper Fishery Management Plan (FMP), prepared by the South Atlantic Fishery Management Council in partnership with the National Marine Fisheries Service, is intended to eliminate or phase out overfishing of snowy grouper, golden tilefish, vermilion snapper, and black sea bass; and increase red porgy harvest consistent with an updated stock assessment. This integrated document contains all elements of the Amendment as well as the Final Environmental Impact Statement (FEIS). It includes: a description of the proposed management measures; description of the non-preferred alternatives and the alternatives considered but rejected by the Council; analyses of the potential biological, economic, and social impacts of the proposed action; information about the biological, physical, and human environments affected by the proposed actions; and a discussion of the Amendment's consistency with the Magnuson-Stevens Fishery Conservation and Management Act as well as all other existing applicable laws.

The underlying need of the amendment is to end overfishing of snowy grouper, golden tilefish, vermilion snapper, and black sea bass, and increase the catch of red porgy consistent with an updated stock assessment. This supports the goal of achieving optimum yield from each species; thereby, providing the greatest overall benefit to the nation. In developing management measures, the Council has decided it is best to favor regulations that can be implemented as early as 2006 and allow as close to a year-round fishery as possible to occur. More specifically, the Council is considering, for the commercial sector, new or adjusted: catch quotas; size limits; trip limits; seasonal closures; fishing year start dates; and gear restrictions. Management measures for the recreational sector would include new or adjusted: catch allocations; bag limits; size limits; and seasonal closures.

Overfishing for snowy grouper, golden tilefish, vermilion snapper, and black sea bass occurs when the fishing mortality rate exceeds the threshold fishing mortality rate of F_{MSY}. Reductions to end overfishing immediately are provided in Table A along with the reductions expected from proposed management, the recreational/commercial harvest percentages, and SEDAR assessments.

Table A. Reductions in catch needed to immediately end overfishing, reductions expected from proposed management, recreational/commercial harvest percentages, and SEDAR assessments.

	Reduction	Reduction Expected		Harvest Shares		SEDAR		
Species	Needed	Commercial	Recreational	Commercial	Recreational	Assmt Date	Data Thru	SSC Approved
Vermilion snapper	31%	31%	33%	68%	32%	#2(2003)	2001	6/16/03
Black Sea Bass	62%	25-27%	46%	43%	57%	#2(2003)	2001	6/16/03
						Update #1(2005)	2003	5/12/05
Golden Tilefish	34%	35%	0.4-4.2%	97%	3%	#4(2004)	2002	5/25/04
Snowy Grouper	66%	69%	0.5-5%	96%	4%	#4(2004)	2002	5/25/04

Actions specified in Amendment 12 ended overfishing of red porgy and the stock is rebuilding as expected. A constant fishing mortality rebuilding strategy provides for increasing average catch from 2000-2003 by 109% during 2005-2007.

Preferred Commercial Management Measures

The Council's current preferred alternatives are listed below. This document also lists the other considered alternatives in Section 4. Alternatives to the proposed actions the Council considered in developing this amendment but decided not to pursue are described in **Appendix A**.

Snowy Grouper

Reduce the annual commercial snowy grouper quota from 344,508 lbs gutted weight (406,519 lbs whole weight) to 151,000 lbs gutted weight (178,000 lbs whole weight) in year 1; to 118,000 lbs gutted weight (139,000 lbs whole weight) in year 2; and to 84,000 lbs gutted weight (99,000 lbs whole weight) in year 3 onwards until modified. Specify a commercial trip limit of 275 lbs gutted weight (325 lbs whole weight) during year 1; 175 lbs gutted weight (210 lbs whole weight) during year 2; and 100 lbs gutted weight (115 lbs whole weight) during year 3 onwards until modified. These trip limits apply until the quota is met. After the commercial quota is met, all purchase and sale is prohibited and harvest and/or possession is limited to the bag limit.

Golden Tilefish

Reduce the annual commercial golden tilefish quota from 1,001,663 lbs gutted weight (1,121,863 lbs whole weight) to 295,000 lbs gutted weight (331,000 lbs whole weight). After the commercial quota is met, all purchase and sale is prohibited and harvest and/or possession is limited to the bag limit. Specify a commercial trip limit of 4,000 lbs gutted weight (4,480 lbs whole weight) until 75% of the quota is taken when the trip limit is reduced to 300 lbs gutted weight (335 lbs whole weight). Do not adjust the trip limit downwards unless 75% is captured on or before September 1.

Vermilion Snapper

Specify a commercial vermilion snapper quota of 1,100,000 lbs gutted weight (1,221,000 lbs whole weight). After the commercial quota is met, all purchase and sale is prohibited and harvest and/or possession is limited to the bag limit.

Black Sea Bass

Implement the following commercial measures for black sea bass:

- Specify a commercial quota of 477,000 lbs gutted weight (563,000 lbs whole weight) in year 1; 423,000 lbs gutted weight (499,000 lbs whole weight) in year 2; and 309,000 lbs gutted weight (364,000 lbs whole weight) in year 3 onwards until modified. This is based on a Total Allowable Catch (TAC) of 1,110,000 lbs gutted weight (1,310,000 lbs whole weight) in year 1; 983,000 lbs gutted weight (1,160,000 lbs whole weight) in year 2; and 718,000 lbs gutted weight (847,000 lbs whole weight) in year 3 onwards until modified. After the commercial quota is met, all purchase and sale is prohibited and harvest and/or possession is limited to the bag limit.

- Require use of at least 2” mesh for the entire back panel of black sea bass pots. This measure will be effective 6 months after publication of the final rule in the Federal Register.
- Change the fishing year from the calendar year to June 1 through May 31.
- Require that black sea bass pots be removed from the water when the quota is met. The Regional Administrator has authority to grant a 10-day grace period for removal of traps.

Red Porgy
Retain the commercial 14” total length minimum size limit and the seasonal closure (retention limited to the bag limit). Increase the commercial trip limit from 50 lbs whole weight of red porgy to 120 red porgy (210 lbs gutted weight; 220 lbs whole weight) during May through December. Specify a commercial quota of 127,000 lbs gutted weight (132,000 lbs whole weight). After the commercial quota is met, all purchase and sale is prohibited and harvest and/or possession is limited to the bag limit.

Preferred Recreational Management Measures
The Council’s current preferred alternatives are listed below. This amendment document also lists the other considered alternatives in Section 4. Alternatives to the proposed actions the Council considered in developing this amendment but decided not to pursue are described in **Appendix A**.

Snowy Grouper
Limit the possession of snowy grouper to one per person per day within the 5-grouper per person per day aggregate recreational bag limit.

Golden Tilefish
Limit the possession of golden tilefish to one per person per day within the 5-grouper per person per day aggregate bag limit.

Vermilion Snapper
Increase the recreational vermilion snapper minimum size limit from 11” total length to 12” total length.

Black Sea Bass
Specify a recreational allocation of 633,000 lbs gutted weight (746,000 lbs whole weight) in year 1; 560,000 lbs gutted weight (661,000 lbs whole weight) in year 2; and 409,000 lbs gutted weight (483,000 lbs whole weight) in year 3 onwards until modified. This is based on a Total Allowable Catch (TAC) of 1,110,000 lbs gutted weight (1,310,000 lbs whole weight) in year 1; 983,000 lbs gutted weight (1,160,000 lbs whole weight) in year 2; and 718,000 lbs gutted weight (847,000 lbs whole weight) in year 3 onwards until modified. Limit recreational landings to approximate this harvest level by increasing the recreational minimum size limit from 10” total length to 11” total length in year 1 and to 12” total length in year 2 onwards until modified, and reducing the recreational bag limit from 20 to 15 black sea bass per person per day. Change the fishing year from the calendar year to June 1 through May 31.

Red Porgy
Retain the recreational 14" total length minimum size limit and increase the recreational bag limit from 1 to 3 red porgy per person per day.

Other important issues discussed in this Amendment include the uncertainty about stock status and the critical need for more biological and fishery information for snowy grouper, golden tilefish, vermilion snapper, black sea bass, and red porgy, which has been identified through the Southeast Data Assessment and Review (SEDAR) process. Basic research and data needs common to all species include:

- Develop standardized techniques for aging fishes. 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 so as to better reflect stock status.
- 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.

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 MARMAP program indicates 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 vermilion snapper, 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 or golden tilefish; however, it is believed that movement of these species is limited. Snowy grouper, golden tilefish, vermilion snapper, 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 (i.e., 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.

Sections 3.1 and 3.2 provides a description of the essential fish habitat. The biological environment is described in Section 3.3. Descriptions of the human and administrative environments are described in Sections 3.4 and 3.5, respectively.

Environmental Consequences

Biological, social, and economic impacts of the measures proposed in this Amendment are evaluated. The measures proposed which are likely to have the most direct biological impact in the short-term are quotas, increased minimum size, trip limits, and decreased bag limits. Management actions proposed in this Amendment will reduce fishing mortality in snowy grouper, golden tilefish, vermilion snapper, and black sea bass and are expected to have a beneficial, cumulative effect on the biophysical environment. These management actions are intended to increase biomass of these stocks, which may affect other stocks. Because snowy grouper, golden tilefish, and to a certain extent, vermilion snapper, red porgy, and black sea bass are upper level predators preying primarily on fish, benthic invertebrates, and squid, 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, vermilion snapper, black sea bass and other co-occurring species may begin to compete for habitat as their respective stocks rebuild.

The number of regulatory discards could decrease with an increase in the allowable catch of red porgy, a seasonal closure (recreational) for vermilion snapper, and a 2" mesh back panel in black sea bass pots. Other management measures such as new or decreased quotas, decreased trip limits, increased size limits, and reduced bag limits could increase the number of regulatory discards in the directed fisheries.

Restrictions in the catch of snowy grouper, golden tilefish, vermilion snapper, and black sea bass could result in fishermen shifting effort to co-occurring species. For example, black sea bass co-occur with tomtate, scup, red porgy, white grunt, vermilion snapper, red grouper, scamp, gag, and others. Therefore, restricted species are likely to be caught incidental to other fisheries. The level of regulatory discards resulting from the proposed actions is expected to be highest in 2006 because Amendment 13C will likely be implemented in the middle of the year and proposed quotas for all species except black sea bass would be retroactive to January 1.

Regulatory discards will reduce the beneficial, cumulative effect to the biophysical environment. 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. Additionally, the Council is examining a multi-species approach to management that would limit the frequency/occurrence of regulatory discards in Amendment 13B. Data from North Carolina indicate fishermen may switch to inshore net fisheries, which may have a negative impact on protected species. The potential magnitude of this impact will be assessed in a Biological Opinion.

Economic Impacts

The restrictive measures in the snapper grouper fishery referred to in the preceding discussion are proposed to stop overfishing of species in the snapper grouper complex. On the one hand, these regulations would reduce the immediate net revenue and net consumer benefits to fishermen. However, if harvest is constrained to appropriate levels, it is expected that biomass will increase resulting in increased economic benefits to harvesters (commercial and recreational) and non-consumptive users. Also, as populations increase, it is expected that the non-use value (existence value) to society will increase. However, there is no guarantee all current participants in the commercial fishery and related industries that will experience the negative short-term impacts of the proposed regulations will benefit from projected improvements, since individual losses may be sufficiently severe to result in exit from the industry. Similarly, recreational anglers who experience losses of net consumer benefits due to the proposed reductions in bag limits, seasonal closures, increased minimum size regulations, and other measures may elect to cease fishing and pursue other recreational activities before more liberal regulations can be enacted when stocks increase. Such behavior would have additional impacts on associated service and support industries. However, these effects and conditions would also occur with greater short-term adverse impacts if corrective action is not taken at this time, resulting in more severe restrictions than those currently proposed.

Apart from red porgy, the proposed measures will impose additional restrictions on the harvest of four species. The estimated incremental short-term net revenue losses incurred by the commercial harvest sector associated with the proposed restrictions are as follows: $0.28 million during year 1 (4.7% of status quo revenue) for snowy grouper **Preferred Alternative 3**; $0.12 million annually (2.1% of status quo revenue) for golden tilefish **Preferred Alternative 2CE**; $0.25 million annually (4.1% of status quo revenue) for vermilion snapper **Preferred Alternative 10**; and $0.07 million during year 1 (1.2% of status quo revenue) for black sea bass **Preferred Alternative 8**. These annual adverse effects would not occur indefinitely. Long-term net positive benefits would be expected as the stock rebuilds and increased harvests are allowed.

The short-term, cumulative losses from implementation of these proposed harvest restrictions would vary from $0.73 to $1.08 million during the first year and third year of implementation respectively. This represents 12.3% and 18.1% of status quo net dockside revenue respectively. Status quo income represents the total revenue earned from all species from trips where any of these four species are harvested. Of the vessels harvesting these species, 313 to 324 vessels would be expected to incur immediate, short-term losses from the combined effect of the preferred alternatives.

The proposed snowy grouper and golden tilefish measures will disproportionately impact the longline sector, which operates in the South Atlantic. Longline vessels will incur short-term losses of 18.5% to 22.7% of status quo income from the snowy grouper preferred alternative and 16.9% of status quo income from the golden tilefish preferred alternative, compared to maximum 6.2% and 1.2%, respectively, for vessels that utilize other gear to harvest these species. As expected, vessels, which utilize trap gear will incur relatively greater losses from implementation of **Preferred Alternative 8** for black sea bass, 11.2% to 48.3% of status quo revenue, compared to 1.6% to 4.7% for vessels that employ other gear.

The incremental short-term net annual revenue gain in the commercial harvesting sector associated with the **Preferred Alternative 2** for red porgy is estimated at $0.07 million annually.

The expected impacts on the recreational sector of regulations on snowy grouper and golden tilefish are minimal since these species are not frequently harvested by recreational fishermen. The major impacts on the recreational sector of the proposed regulations are associated with management measures for vermilion snapper and black sea bass. Annual, immediate short-term reductions in non-market economic benefits associated with the preferred alternatives are as follows: $5,334 and $68 for the private/charter and headboat sectors, respectively, for **Preferred Alternative 3** for snowy grouper; $3,615 for the charter/private recreational sector for **Preferred Alternative 3** for golden tilefish; $74,803, $274,067, and $348,870 for the private/charter sector, headboat sector, and entire recreational fishery, respectively, for preferred Alternative 2 for vermillion snapper; and $253,550 - $456,267, $184,097 - $302,778, and $437,647 - $759,045 for private/charter, headboat sector, and entire recreational sector, respectively, for **Preferred Alternative 8** for black sea bass.

The increased bag limits proposed by **Preferred Alternative 2** for red porgy would increase the incremental annual net economic benefits by $11,554 and $20,838 for the private/charter and headboat sectors, respectively.

Social Impacts

Social impacts of management measures will depend on the species being managed, the geographic area where the fishery is prosecuted, the health of the community, the gear employed, etc. There could be significant long-term social benefits from the management measures that end overfishing. Long-term benefits are expected for future users of the fishery as well as those who have interests in terms of aesthetic and existence values. When overfishing on these species is stopped and the biomass is rebuilt (see Amendment 15), it is predicted that the fish stocks will be of such an amount that fishermen will have to expend less effort to land the same or similar poundage of fish as they land now.

While any one of the actions proposed in this amendment by itself would have immediate, short-term impacts on both the recreational and commercial sectors, it is not expected that the impact would be severe or threatening to the sustainability of fishing communities in the South Atlantic. Some believe; however, that the impacts of the entire suite of proposed alternatives in Amendment 13C, in conjunction with other state and regional fishery regulations and community changes, will be severe enough to dislocate a substantial number of fishermen and fish houses and cause changes to the economic and social structures of communities. If this occurs, when the stocks are rebuilt, there might not be a similar commercial snapper grouper fishery to take advantage of improved fishing conditions. Whether such impacts can be overcome by the resilience of the fishermen and their communities so that they might share in the future rebuilt stocks remains to be seen. However, such phenomena would also be possible, and likely acerbated, should adequate corrective action not be taken at this time, resulting in more severe management measures in the future.

As with the commercial sector, the long-term benefits of ending overfishing and rebuilding overfished stocks to the broad group of recreational fishermen in the South Atlantic is hard to predict. As less is known about the social structure and aspects of the recreational sector in this region, it is even more difficult to predict what future conditions may be and how recreational fishermen will benefit from more healthy stocks. It is expected that with increasingly healthy stocks, recreational fishermen will catch more fish per trip, and thus reap the benefit of increased angling satisfaction. However, similar to the situation with the commercial fishery, the composition of the recreational sector and associated industries may adjust during the recovery period such that the same individuals and entities that bear the short-term adverse impacts may not receive the future enhanced benefits.

In general, the adverse social impacts from the proposed management measures in this amendment are minimal for the private recreational angler, particularly from regulations affecting the deepwater species (snowy grouper and golden tilefish). Charterboat fishermen may adapt to lower bag limits and increased size limits by pursuing other species. However, effort shifting is not always an option. Some fisheries require the use of different gear or fishing methods, and others might be facing similarly restrictive regulations. Headboat fishermen are less able to change their fishing behaviors and, therefore, may experience greater negative impacts than charterboat fishermen, at least in the short-term.

There are increasingly more people in the U.S. and elsewhere in the world who are satisfied just by knowing there are healthy stocks of fish in the ocean. For these people, this suite of management measures brings both short and long-term benefits, as overfishing will end and stocks will rebuild to optimum levels.

Conclusion

The proposed actions are consistent with the goals and objectives of the Snapper Grouper FMP. It is anticipated the proposed actions will end overfishing and have positive effects on the size/age structure of snowy grouper, golden tilefish, vermilion snapper, and black sea bass and could have beneficial effects on the reef fish ecosystem. These actions should begin to rebuild the overfished stocks of snowy grouper and black sea bass.

There will be immediate adverse economic and social impacts with the proposed reductions in harvest. However, continued overfishing of snowy grouper, golden tilefish, vermilion snapper, and black sea bass is likely to have long-term negative impacts to the biology of the species and subsequently even greater adverse impacts on fishermen and their communities. Furthermore, fishermen would have to expend greater effort in the future as the size and age of target species decreases.

The proposed management actions should result in increased biomass of snowy grouper and black sea bass. The proposed management measures for red porgy are consistent with the results from the red porgy stock assessment, which allows increased harvest as the stock rebuilds. An increase in the size/age structure of golden tilefish and vermilion snapper could result in an increase in the catch per unit effort. Therefore, the proposed management actions are expected to provide long-term social and economic benefits as less effort and expense would need to be expended in the future to harvest these species. Furthermore, the proposed actions support the goal of achieving the optimum yield, which provides the greatest overall benefit to the Nation.

REGULATORY IMPACT REVIEW

This integrated document contains all elements of the Plan Amendment, Final Environmental Impact Statement (FEIS), Draft Biological Assessment (DBA), Initial Regulatory Flexibility Analysis (IRFA), Regulatory Impact Review (RIR), and Social Impact Assessment (SIA)/Fishery Impact Statement (FIS). The table of contents for the RIR is provided separately to aid the reviewer in referencing corresponding sections of the Amendment.

INTRODUCTION

Executive Order (E.O) 12866 requires that a Regulatory Impact Analysis be prepared for all regulatory actions that are of public interest. To meet this mandate the National Marine Fisheries Service (NMFS) requires that the Council prepare a Regulatory Impact Review (RIR) for proposed actions. The RIR does three things: 1) it provides a comprehensive review of the incidence and magnitude 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 rule is a “significant regulatory action”. Pursuant to E.O. 12866, a regulation is considered a "significant regulatory action" if it: (1) has an annual effect on the economy of $100 million or more or adversely affects in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities;

(2) creates a serious inconsistency or otherwise interfere with an action taken or planned by another agency; (3) materially alters the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or (4) raises novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in E.O. 12866.

Information from the RIR is also used to assess the impacts of the proposed actions on small entities. Under the guidelines set forth by the Small Business Administration's Regulatory Flexibility Act (RFA), a determination of significance is required once the Council finalizes its actions. An Initial Regulatory Flexibility Analysis (IRFA) was conducted as detailed in Section 4.15. The criteria used to determine significance under the RFA are not the same as the criteria evaluated for a determination of significance under E.O. 12866.

PROBLEMS AND OBJECTIVES

Problems and objectives addressed by this amendment and the purpose and need for the amendment are included in Section 1.1. A summary statement of the need for taking action follows:

1. The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act requires the Regional Fishery Management Councils and NMFS to implement measures to end overfishing once it is determined that a stock is undergoing overfishing. This action proposes measures to reduce harvests and end overfishing for snowy grouper, golden tilefish, vermilion snapper, and black sea bass.
2. Red porgy is overfished and measures taken in a previous amendment ended overfishing and established a rebuilding strategy that provides for increasing the harvest of red porgy as proposed in this amendment.

METHODOLOGY AND FRAMEWORK FOR ANALYSIS

The RIR assesses management measures from the standpoint of determining the changes in costs and benefits to society. The net effects should be stated in terms of changes in producer surplus or net profits to the commercial harvesting and for-hire sectors, and consumer surplus (the difference between what a person would be willing to pay for a good service and what they actually have to pay) to the recreational users and final consumers of the resource. The commercial fishing sector refers to harvesters, processors, and dealers of snapper grouper species. Final consumers of the resource refer to the individuals that derive benefits from consuming the five species in this amendment. Also, administrative and research costs associated with the design and implementation of these measures should be included in the analyses of benefits and costs.

Ideally, all of these changes in costs and benefits need to be accounted for in assessing the net economic benefits to society from the proposed management actions. Furthermore, non-use values of fisheries should be considered. However, lack of data does not allow for a complete quantitative analysis and these impacts are summarized in Table 1 using both qualitative and quantitative measures. Additional data and models are required in order to develop models for this fishery as follows:

1. A market demand model for snapper grouper species in the South Atlantic that accounts for the effects of imports and domestic supply from the Gulf of Mexico. The cost could exceed $100,000.

2. Econometric models of the relationship between cost of fishing as it relates to population size (catchability), distance, input costs, and other relevant factors for both the recreational and commercial fishing sectors. The costs for data collection and analyses could exceed $300,000.
3. Behavioral models for both the recreational and commercial sectors of the snapper grouper fishery to predict effort shifts across fisheries and the potential for trip cancellation in response to proposed fishery management regulations. Data collection and analyses could exceed $200,000.
4. Contingent valuation models to predict the recreational value of the snapper grouper species as a function of quality of the experience. Surveys and analyses could exceed $300,000 in total costs.
5. Valuation models to determine non-use value and its relationship to population improvements and increases in biodiversity. The costs for data collection and analyses could exceed $200,000.
6. Input-output models to evaluate the impact of the various sectors of the commercial and recreational fisheries on the economy.

The detailed discussions for the proposed action and alternatives are incorporated in the text under economic impacts in Section 4.2. These impacts are summarized in Table B.

Table B1. Summary of expected changes in net benefits.
All weights are pounds (lbs) and gutted weight (gw) or whole weight (ww).

Action 1. Snowy Grouper Commercial Fishery and Non-use Benefits			
Alternatives	**Positive Impacts**	**Negative Impacts**	**Net Impacts**
Alternative 1: No Action. Annual quota = 344,508 lbs gw; trip limit = 2,500 lbs gw; incidental catch allowance = 300 lbs. after quota taken.	Avoids the immediate negative short-term effects to the commercial fishing sector and industries that depend on these sectors.	Would result in adverse long-term effects to the commercial sector as a result of a reduction in stock size.	Net impacts on the commercial harvesting sector are difficult to quantify but expected to be negative as continued overfishing results in more severe harvest restrictions at a future date or further stock depletion.
Alternative 2: Annual quota = 84,000 lbs. Alt 2A: Trip limit = 100 lbs gw Alt 2B: Trip limit = 10 fish	Potential for long-term economic benefits to the commercial harvesting sector and society (non use) from ending overfishing and rebuilding the stock.	Higher relative impact on longline vessels. Estimated immediate short-term net annual revenue loss is **-$0.43 million** (7.1%) and **$0.49 million** (8.1%) to boat owners, captains, and crews for Alts. 2A and 2B, respectively. 2A: **29** trips would be cancelled. 2B: **35** trips would be cancelled.	Net impacts are difficult to quantify, but expected to be positive because this action supports the goal of achieving OY.
Alternative 3 (Preferred): Annual quota = 151,000 lbs gw (year 1); 118,000 lbs gw (year 2); and 84,000 lbs (year 3). Trip limit = 275 lbs gw (year 1); 175 lbs gw (year 2); and 100 lbs gw (year 3 and after).	Potential for long-term economic benefits to the commercial harvesting sector and society (non use) from ending overfishing and rebuilding the stock.	Higher relative impact on longline vessels. Estimated immediate short-term net annual revenue loss is **-$0.28 million** (4.7%), **$0.35 million** (5.9%), and **$0.43 million** (7.1%) to boat owners, captains, and crews for years 1, 2, and 3, respectively. An average of **24** trips would be cancelled.	Net impacts are difficult to quantify, but expected to be positive because this action supports the goal of achieving OY.

Table B1. Continued

Action 1. Snowy Grouper Recreational Fishery and Non-use Benefits			
Alternatives	**Positive Impacts**	**Negative Impacts**	**Net Impacts**
Alternative 1: No Action. Snowy grouper are included in the 5-grouper per person per day aggregate recreational bag limit.	Would not impose the immediate short-term negative effects to recreational fishermen, and associated industries.	Could result in lower net non-use value in the long-term. Also, may result in losses to the recreational harvesting sector in the long-term.	Net impacts are difficult to quantify, but expected to be negative because continued overfishing would either result in more severe harvest restrictions at a future date or eventually make fish much more difficult to find.
Alternative 2: Limit possession to 2 snowy grouper in 5 grouper per person per day aggregate.	Reduced effort on stock is expected to provide long-term benefits as stock rebuilds.	Would reduce immediate annual, short-term, non-market benefits by **$3,457** and **$40** for all private/charter and headboat sectors, respectively.	Net impacts are difficult to quantify, but expected to be positive because the rebuilding stock could provide higher quality recreational fishing opportunities and the immediate adverse economic effects would be minimal.
Alternative 3 (Preferred): Limit possession to 1 snowy grouper in 5 grouper per person per day aggregate.	Would provide greatest incentive to avoid snowy grouper and potentially greater long-term benefits as stock rebuilds.	Would reduce immediate annual, short-term, non-market benefits by **$5,334** and **$68** for all private/charter and headboat sectors, respectively.	Net impacts are difficult to quantify, but expected to be positive because the rebuilding stock could provide higher quality recreational fishing opportunities and the immediate adverse economic effects would be minimal.

Table B1. Continued

Action 2. Golden Tilefish Commercial Fishery and Non-use Benefits			
Alternatives	**Positive Impacts**	**Negative Impacts**	**Net Impacts**
Alternative 1: No Action. Annual commercial quota =1,001,663 lbs gw. Until quota taken, trip limit=5,000 lbs gw. After quota taken, incidental catch allowance=300 lbs gw per trip.	Avoids the immediate negative short-term effects to commercial harvesting sector and industries that depend on this activity.	There could be adverse long-term effects to those same entities if overfishing continues.	Net impacts are difficult to quantify, but expected to be negative as continued overfishing results in more severe harvest restrictions at a future date.
Alternative 2 (Preferred): Annual Quota = 295,000 lbs gw. Alts 2A-2D: Trip limit 3,000 or 4,000 lbs gw until 75% or 85% of quota is taken, then quota reduced to 300 lbs gw. Alt 2E: Trip not reduced in Alt 2A-2D unless specified percent of quota captured on or before Sept. 1. **Alt. 2 C&E (Preferred)**: 4,000 lbs until 75% taken then, if on or before September 1, 300 lbs gw trip limit.	Ending overfishing and a subsequent increase in biomass and CPUE are expected to provide economic benefits to the commercial harvesting sector and society (non-use).	Estimated immediate annual net revenue loss ranges from **$0.09 million** (1.5%) to **$0.16 million** (2.7%) to boat owners, captains, and crews for Alts. 2A and 2DE respectively. Annual net revenue loss associated with alternative 2CE is **$0.12 million** (2.1%) -19 trips canceled. Greatest losses incurred by vessels in the longline fishery.	Net impacts are difficult to quantify, but expected to be positive because the action supports the goal of achieving/maintaining OY.
Alternative 3: Quota = 1,001,663 lbs gw (year1); 450,000 lbs gw (year 2); 295,000 lbs gw (year 3). Trip limit = 5,000 lbs gw (Years 1 and 2). Incidental catch of 300 lbs gw after quota met (Year 1). Alts 3A-3D: Trip limit 3,000 or 4,000 lbs gw until 75% or 85% of quota is taken then quota reduced to 300 lbs gw then 300 lbs gw (Year 3 onwards). Alt 3E: Trip not reduced in Alt 3A-3D unless specified percent of quota captured on or before Sept. 1 (Year 3 onwards).	Immediate negative economic impacts would be delayed. Ending overfishing and a subsequent increase in biomass and CPUE are expected to provide economic benefits to the commercial harvesting sector and society (non-use). In comparison to Alternative 2 there would be some delay in realization of these benefits.	Estimated immediate annual net revenue loss in the third year ranges from **$0.09 million** (1.5%) to **$0.16 million** (2.7%) to boat owners, captains, and crews for Alts. 3A and 3DE respectively. Greatest losses incurred by vessels in the longline fishery.	Net impacts are difficult to quantify, but expected to be positive because the action supports the goal of achieving/maintaining OY.

Table B1. Continued

Action 2. Golden Tilefish Recreational Fishery and Non-use Benefits			
Alternatives	**Positive Impacts**	**Negative Impacts**	**Net Impacts**
Alternative 1: No Action. Golden tilefish are included in the 5-grouper per person per day aggregate recreational bag limit.	Would not impose the immediate short-term negative effects to recreational fishermen and associated industries.	Adverse long-term effects expected if stock continued to decline.	Net impacts are difficult to quantify, but expected to be negative because continued overfishing could result in more severe harvest restrictions at a future date or eventually make fish much more difficult to find.
Alternative 2: Limit possession to 2/person/day within 5 grouper/person/day aggregate.	There would be future benefits if CPUE increases and fishing quality improves.	Would reduce immediate non-market benefits by **$1,449** for charter/private recreational sector. Minimal adverse effects to the headboat sector since golden tilefish not caught since 1999.	Net impacts are difficult to quantify, but expected to be positive as it avoids the need to take more restrictive action in the future and the immediate impacts are minimal.
Alternative 3 (Preferred): Limit possession to 1/person/day within 5 grouper/person/day aggregate.	There would be future benefits if CPUE increases and fishing quality improves.	Would reduce immediate non-market benefits by **$3,615** for charter/private recreational sector. Minimal adverse effects to the headboat sector since golden tilefish not caught since 1999.	Net impacts are difficult to quantify, but expected to be positive as it avoids the need to take more restrictive action in the future and the immediate impacts are minimal.
Alternative 4: Limit possession to 1 golden tilefish per vessel within 5 grouper/person/day aggregate.	There would be future benefits if CPUE increases and fishing quality improves.	Would reduce immediate non-market benefits by >=**$3,615** for the charter/private recreational sector. Minimal adverse effects to the headboat sector since golden tilefish not caught since 1999.	Net impacts are difficult to quantify, but expected to be positive as it avoids the need to take more restrictive action in the future and the immediate impacts are minimal.

Table B1. Continued

Action 3. Vermilion Snapper Commercial Fishery and Non-use Benefits			
Alternatives	**Positive Impacts**	**Negative Impacts**	**Net Impacts**
Alternative 1: No Action. Commercial minimum size limit of 12" TL.	Avoids the immediate negative short-term effects to the commercial harvesting sector and industries that depend on this sector.	Could result in adverse long-term effects to those same entities.	Net impacts are difficult to quantify, but expected to be negative especially as current fishing effort requires larger future harvest reductions.
Alternative 2: Quota = 821,000 lbs gw; retain 12" TL size limit.	Ending overfishing is expected to result in increased benefits from increased CPUE and the increased proportion of large fish in the population.	Immediate, short-term immediate annual net revenue loss is **$0.64 million** (10.8%) to boat owners, captains, and crews. -68 trips canceled. Short-term economic impacts are less than Alternatives 3 through 8.	Net impacts are difficult to quantify, but expected to be positive because the action supports the goal of achieving/maintaining OY.
Alternative 3: Quota = 821,000 lbs gw; retain 12" total length; trip limit = 720 lbs gw.	Increased net user benefits from increased CPUE and the increased proportion of large fish in the population are expected.	Short-term immediate annual net revenue loss is **$0.91 million** (15.2%) to boat owners, captains, and crews. -11 trips canceled.	Net impacts are difficult to quantify, but expected to be positive because the action supports the goal of achieving/maintaining OY.
Alternative 4: Quota = 821,000 lbs gw; increase size limit to 13" total length; and Trip limit = 1,080 lbs gw.	Increased net user benefits from increased CPUE and the increased proportion of large fish in the population are expected.	Immediate, short-term annual net revenue loss is **$0.93 million** (15.6%) to boat owners, captains, and crews. -17 trips canceled.	Net impacts are difficult to quantify, but expected to be positive because the action supports the goal of achieving/maintaining OY.

Table B1. Continued

Action 3. Vermilion Snapper Commercial Fishery and Non-use Benefits			
Alternatives	**Positive Impacts**	**Negative Impacts**	**Net Impacts**
Alternative 5: Quota = 757,000 lbs gw; retain 12" total length size limit.	Similar to Alternative 2. Long-term economic benefits could be realized sooner than in Alternative 2.	Immediate, short-term annual net revenue loss is **$0.79 million** (13.1%) to boat owners, captains, and crews. -82 trips canceled.	Net impacts are difficult to quantify, but expected to be positive because the action supports the goal of achieving/maintaining OY.
Alternative 6: Quota = 757,000 lbs gw; retain 12" total length; trip limit = 720 lbs gw.	Similar to Alternative 3. Long-term economic benefits could be realized sooner than in Alternative 3.	Immediate, short-term annual net revenue loss is **$1.00 million** (16.7%) to boat owners, captains, and crews. -22 trips canceled.	Net impacts are difficult to quantify, but expected to be positive because the action supports the goal of achieving/maintaining OY.
Alternative 7: Quota = 757,000 lbs gw; increase size limit to 13" total length; and Trip limit = 1,080 lbs gw.	Similar to Alternative 4. Long-term economic benefits could be realized sooner than in Alternative 4.	Immediate, short-term annual net revenue loss is **$1.02 million** (17.0%) to boat owners, captains, and crews. -29 trips canceled.	Net impacts are difficult to quantify, but expected to be positive because the action supports the goal of achieving/maintaining OY.
Alternative 8: Quota = 821,000 lbs gw; retain 12" TL size limit. Alt. 8A: Trip limit = 300 lbs gw when 75% of quota is met. Alt. 8B: Trip limit = 200 lbs gw. when 85% of quota is met. Alt 8C: Trip limit is not imposed if percent specified in Alts 8A and 8B is not captured by September 1.	Increased net user benefits from increased CPUE and the increased proportion of large fish in the population are expected.	Immediate, short-term annual net revenue loss is **$0.76 million** (12.7%) and **-$0.71 million** (11.8%) to boat owners, captains, and crews for Alts. 8A and 8B, respectively. -22-25 trips canceled.	Net impacts are difficult to quantify, but expected to be positive because the action supports the goal of achieving/maintaining OY.
Alternative 9: Quota = 757,000 lbs gw; retain 12" TL size limit. Alt. 9A: Trip limit = 300 lbs gw when 75% of quota is met. Alt. 9B: Trip limit = 200 lbs gw when 85% of quota is met. Alt 9C: Trip limit is not imposed if percent specified in Alts 9A and 9B is not captured by September 1.	Long-term economic benefits could be realized sooner than in Alternative 8	Immediate, short-term annual net revenue loss is **$0.90 million** (15.0%) and **-$0.86 million** (14.3%) to boat owners, captains, and crews for Alts. 9A and 9B, respectively. -41-45 trips canceled.	Net impacts are difficult to quantify, but expected to be positive because the action supports the goal of achieving/maintaining OY.
Alternative 10 (Preferred): Quota = 1,100,000 lbs gw; retain 12" TL size limit.	Ending overfishing is expected to result in increased benefits from increased CPUE and the increased proportion of large fish in the population.	Immediate, short-term annual net revenue loss is **$0.25 million** (4.1%) to boat owners, captains, and crews. Twenty-four trips canceled. Short-term economic impacts are less than Alternatives 2 through 8.	Net impacts are difficult to quantify, but expected to be positive because the action supports the goal of achieving/maintaining OY.

Table B1. Continued

Action 3. Vermilion Snapper Recreational Fishery and Non-use Benefits			
Alternatives	**Positive Impacts**	**Negative Impacts**	**Net Impacts**
Alternative 1: No Action. 11" TL minimum size limit; 10 fish/person/day	Would not impose the immediate short-term negative effects to recreational fishermen, and associated industries.	Potential for decreased long-term benefits to those same entities.	Net impacts are difficult to quantify, but expected to be negative as current levels of fishing effort substantially reduces stock abundance so that either more severe harvest restrictions are needed at a future date or fish become more difficult to find.
Alternative 2 (Preferred): Increase size limit to 12" TL.	This is not expected to end overfishing based on SEDAR 2 (2003 a). However, estimates of biomass from the stock assessment were highly uncertain. Therefore, if biomass is near B_{MSY}, management measure proposed in this Alternative 2 would be adequate to end overfishing. Would provide greater long-term benefits than Alternative 1.	Immediate, short-term annual non-market benefits reduced by **$74,803**, **$274,067**, and **$348,870** for private/charter sector, headboat sector, and entire recreational fishery, respectively.	Net impacts are difficult to quantify, but expected to be positive if CPUE increases in the future.
Alternative 3: Increase size limit to 12" TL and reduce bag limit to 6 fish/person/trip.	Expected increased long-term user benefits from increased CPUE and the increased proportion of large fish.	Immediate, short-term annual non-market benefits reduced by **$98,136**, **$375,331**, and **$473,744** for private/charter sector, headboat sector, and entire recreational fishery, respectively.	Net impacts are difficult to quantify, but expected to be positive if because the action supports the goal of achieving/maintaining OY.
Alternative 4: October through December closure.	Would not end overfishing but could provide greater long-term benefits than Alternative 1.	Immediate, short-term annual non-market benefits reduced by **$58,782**, **$132,811**, and **$191,594** for private/charter sector, headboat sector, and entire recreational fishery, respectively.	Net impacts are difficult to quantify, but expected to be positive if CPUE increases in the future.
Alternative 5: October through December closure and reduce bag limit to 6 fish per person per trip.	Would result in increased user benefits from increased CPUE and the increased proportion of large fish.	Immediate, short-term annual non-market benefits reduced by **$99,473**, **$354,400**, and **$453,873** for private/charter sector, headboat sector, and entire recreational fishery, respectively.	Net impacts are difficult to quantify, but expected to be positive if because the action supports the goal of achieving/maintaining OY.

Table B1. Continued

Action 3. Vermilion Snapper Recreational Fishery and Non-use Benefits			
Alternatives	**Positive Impacts**	**Negative Impacts**	**Net Impacts**
Alternative 6: January through February closure.	Would not end overfishing but could provide greater long-term benefits than Alternative 1.	Immediate, short-term annual non-market benefits reduced by **$52,945**, **$17,047**, and **$69,992** for private/charter sector, headboat sector, and entire recreational fishery, respectively.	Net impacts are difficult to quantify, but expected to be positive as CPUE increases in the future.
Alternative 7: January through February closure and reduce bag limit to 5 fish.	Expected increased user benefits from increased CPUE and the increased proportion of large fish.	Immediate, short-term annual non-market benefits reduced by **$97,205**, **$353,709**, and **$450,914** for private/charter sector, headboat sector, and entire recreational fishery, respectively.	Net impacts are difficult to quantify, but expected to be positive if because the action supports the goal of achieving/maintaining OY.
Alternative 8: Alt. 8A: Increase minimum size to 12" total length and reduce bag limit to 6 fish for the for-hire sector and 4 fish for the private sector. Alt. 8B: Increase minimum size to 12" total length and reduce bag limit to 6 fish for the for-hire sector and 5 fish for the private sector.	Would result in increased user benefits from increased CPUE and the increased proportion of large fish.	Headboat sector 8A and 8B: Immediate, short-term annual non-market benefits reduced by **$375,331**. Charter and Private sectors: 8A: Immediate, short-term reduction **$98,413** to **$122,401**. 8B: Immediate, short-term reduction **$98,413** to **$108,879**.	Net impacts are difficult to quantify, but expected to be positive if because the action supports the goal of achieving/maintaining OY.
Alternative 9: January through February closure and increase size limit to 12" TL.	Long-term benefits are expected form increased CPUE and the increased proportion of large fish.	Immediate, short-term annual non-market benefits reduced by **$115,369**, **$283,239**, and **$398,608** for private/charter sector, headboat sector, and entire recreational fishery, respectively.	Net impacts are difficult to quantify, but expected to be positive if because the action supports the goal of achieving/maintaining OY.

Table B1. Continued

Action 4. Black Sea Bass Commercial Fishery and Non-use Benefits			
Alternatives	**Positive Impacts**	**Negative Impacts**	**Net Impacts**
Alternative 1: No Action. 10" TL minimum size limit and numerous pot restrictions (see Section 4.4.2.1)..	Would not impose the immediate short-term negative effects to commercial fishermen, and associated industries.	Could result in adverse long-term negative effects to the commercial sector as a result of a reduction in stock size.	Net impacts are difficult to quantify, but expected to be negative especially as current fishing effort requires larger future harvest reductions..
Alternative 2: Quota = 347,000 lbs gw; increase size limit to 11" total length; require use of 2" mesh back panel in pots; and change fishing year to June 1 to May 31.	Long-term benefits are expected. Ending overfishing would provide long-term economic benefits to the commercial harvesting sector once the stock rebuilds, larger fish are present in the population, and larger TACs are available.	Immediate, short-term annual net revenue loss is **$0.27 million** (4.5%) from the average to boat owners, captains, and crews. No. trips canceled – 152	Net impacts are difficult to quantify, but expected to be positive because the action supports the goal of achieving OY.
Alternative 3: Quota = 309,000 lbs gw; increase size limit to 11" total length; require use of 2" mesh back panel in pots; change fishing year to June 1 to May 31; and H&L trip limit = 235 lbs, pot trip limit = 910 lbs gw.	Long-term economic benefits to the commercial harvesting sector would occur once the stock rebuilds, and larger fish are present in the population.	Immediate, short-term annual net revenue loss is **$0.32 million** (5.3%) to boat owners, captains, and crews. No. trips canceled – 169	Net impacts are difficult to quantify, but expected to be positive because the action supports the goal of achieving OY.
Alternative 4: Quota = 423,000 lbs gw; increase size limit to 11" total length; require use of 2" mesh back panel in pots; and change fishing year to June 1 to May 31.	Long-term economic benefits to the commercial harvesting sector would occur once the stock rebuilds, and larger fish are present in the population.	Immediate, short-term annual net revenue loss is **$0.24 million** (4.0%) to boat owners, captains, and crews. No. trips canceled - 87	Net impacts are difficult to quantify, but expected to be positive because the action supports the goal of achieving OY.

Table B1. Continued

Action 4. Black Sea Bass Commercial Fishery and Non-use Benefits			
Alternatives	**Positive Impacts**	**Negative Impacts**	**Net impacts**
Alternative 5: Quota = 477,000 lbs gw (year 1); 423,000 lbs gw (year 2); 309,000 lbs gw (year 3). Increase minimum size to 11" total length; require 2" mesh in back panel of pot; change fishing year to June 1 to May 31; and H&L trip limit = 595 lbs gw (year 2); 235 lbs gw (year 3). Pot trip limit = 1,675 lbs gw (year 2); 910 lbs gw (year 3).	Long-term economic benefits to the commercial harvesting sector would from ending overfishing, and larger fish are present in the population.	Immediate, short-term annual net revenue loss is **$0.22 million** (3.7%), -**$0.24 million** (4.0%), and **-$0.32 million** (5.3%) to boat owners, captains, and crews for years 1, 2, and 3, respectively. No. trips canceled – 63 to 169	Net impacts are difficult to quantify, but expected to be positive because the action supports the goal of achieving OY.
Alternative 6: No quota; retain 10" minimum size; require 2" mesh in back panel of pots; and prohibit harvest and/or retention of black sea bass over the bag limit during March through June.	Long-term economic benefits to the commercial harvesting sector would occur once the stock size increases, and there is a greater proportion of larger fish in the population.	Immediate, short-term annual net revenue loss is **$0.26 million** (4.4%) to boat owners, captains, and crews. No. trips canceled – 267	Net impacts are difficult to quantify, but could be positive if this measure supports the goal of achieving OY.
Alternative 7: No quota; increase minimum size limit to 11" total length; require 2" mesh in back panel of pots.	Long-term economic benefits to the commercial harvesting sector could occur if these measures result in an increased stock size .	Immediate, short-term annual net revenue loss is **$0.22 million** (3.6%) to boat owners, captains, and crews. No. trips canceled - 54	Net impacts are difficult to quantify, but could be positive if this measure supports the goal of achieving OY.
Alternative 8 (Preferred): Quota = 477,000 lbs gw (year 1); 423,000 lbs gw (year 2); 309,000 lbs gw (year 3). Require 2" mesh in back panel of pot; require pots be removed from water when quota is met; change fishing year to June 1 to May 31.	Long-term economic benefits to the commercial harvesting sector would occur from ending overfishing, and larger fish are present in the population.	Immediate, short-term annual net revenue loss is **$0.07 million** (1.2%) in year 1, **$0.19 million** (3.1%) in year 2, and **$0.28 million** (4.7%) in year 3 to boat owners, captains, and crews. Number of trips canceled is 88 in year 1, 86 in year 2, and 248 in year 3.	Net impacts are difficult to quantify, but expected to be positive because the action supports the goal of achieving OY.

Table B1. Continued

Action 4. Black Sea Bass Recreational Fishery and Non-use Benefits			
Alternatives	**Positive Impacts**	**Negative Impacts**	**Net Impacts**
Alternative 1: No Action. 10" TL, 20 fish/person/day.	Would not impose the immediate short-term negative effects to recreational fishermen and associated industries.	Could result in adverse long-term effects to those same entities.	Net impacts are difficult to quantify, but expected to be negative because continued overfishing could either result in more severe harvest restrictions at a future date or eventually make fish much more difficult to find.
Alternative 2: Recreational allocation = 459,000 lbs gw; increase size limit to 12" TL; bag limit =15 fish/person/day; and change fishing year to June 1 to May 31.	Provides greatest assurance of ending overfishing and long-term economic benefits. Higher bag limit than Alternative 3 allows for greater future economic yield as stock rebuilds.	Would reduce immediate annual, non-market benefits by **$456,267**, **$302,778**, and **$759,045** for private/charter, headboat sector, and entire recreational sector, respectively.	Net impacts are difficult to quantify, but expected to be positive because the action supports the goal of achieving OY.
Alternative 3: Recreational allocation = 409,000 lbs gw; increase size limit to 11" TL; bag limit = 4 fish/person/day; fishing year = June 1 to May 31.	Would result in increased user benefits from the increased proportion of large fish.	Would reduce immediate annual, non-market benefits by **$380,790**, **$217,894**, and **$598,684** for all private/charter, headboat sector, and entire recreational sector, respectively.	Short-term economic impact less than Alternative 2 but greater than Alternatives 4-7. Net impacts are difficult to quantify, but expected to be positive because the action supports the goal of achieving OY.
Alternative 4: Recreational allocation = 560,000 lbs gw; increase size limit to 11" TL; fishing year = June 1 to May 31.	Higher recreational allocation provides less long-term economic benefits than Alternatives 2 and 3 and could compromise stock rebuilding.	Would reduce immediate annual, non-market benefits by **$253,400**, **$183,133**, and **$436,533** for all private/charter, headboat sector, and entire recreational sector, respectively.	Net impacts are difficult to quantify, but expected to be negative because short-term effects are known to be negative and long-term benefits are questionable.
Alternative 5: Recreational allocation = 633,000 lbs gw (year 1); 560,000 lbs gw (year 2); 409,000 lbs gw (year 3). Retain 10" TL size limit in year 1; increase minimum size to 11" TL in years 2 and 3. Retain 20 fish bag limit in years 1 and 2; bag limit = 4 fish in year 3. Fishing year = June 1 to May 31.	Long-term and short-term benefits are similar to Alternative 3 except they are delayed for three years.	In year 2, would reduce non-market benefits by **$253,400**, **$183,133**, and **$436,533** for all private/charter, headboat sector, and entire recreational sector, respectively. In year 3, would reduce annual, non-market benefits by **$380,790** (41%), **$217,894** (48%), and **$598,684** (44%) for all private/charter, headboat sector, and entire recreational sector, respectively.	Net impacts are difficult to quantify, but expected to be positive because the action supports the goal of achieving OY.

Table B1. Continued

Action 4. Black Sea Bass Recreational Fishery and Non-use Benefits			
Alternatives	**Positive Impacts**	**Negative Impacts**	**Net Impacts**
Alternative 6: Retain 10" TL minimum size limit and reduce bag limit to 10 fish/person/day.	Does not end overfishing. Long-term economic impacts would be expected to be less than other alternatives.	Would reduce immediate annual, non-market benefits by **$184,372**, **$26,303**, and **$184,372** for all private/charter, headboat sector, and entire recreational sector, respectively.	Net impacts are difficult to quantify, but could be positive if is this action yields an increase in stock biomass and improves the quality of the fishing experience.
Alternative 7: Increase size limit to 11" TL.	Might not end overfishing. Long-term economic impacts would be expected to be less than all alternatives except Alternative 6.	Would reduce immediate annual, non-market benefits by **$253,400**, **$183,133**, and **$436,533** for private/charter, headboat sector, and entire recreational sector, respectively.	Net impacts are difficult to quantify, but could be positive if is this action yields an increase in stock biomass and improves the quality of the fishing experience.
Alternative 8 (Preferred): Recreational allocation = 633,000 lbs gw (year 1); 560,000 lbs gw (year 2); 409,000 lbs gw (year 3). Increase minimum size to 11" TL in year 1 and 12" TL in year 2. Reduce bag limit from 20 to 15 fish per person per day. Fishing year = June 1 to May 31.	Long-term and short-term benefits are similar to Alternative 3 in year 3.	Would reduce immediate, annual non-market benefits by **$253,550** (year 1) to **$456,267** (year 2), **$184,097** (year 1) to **$302,778** (year 2), and **$437,647** (year 1) to **$759,045** (year 2) for private/charter, headboat sector, and entire recreational sector, respectively.	Net impacts are difficult to quantify, but expected to be positive because the action supports the goal of achieving OY.

Table B1. Continued

Action 5. Red Porgy Commercial and Recreational Management Measures			
Alternatives	**Positive Impacts**	**Negative Impacts**	**Net Impacts**
Alternative 1: No Action. 14" TL min. size limit (rec. and comm.); 50 lbs ww trip limit during May through December (comm.); bag limit of one/person/trip year-round (rec.). Possession is limited to the bag limit from January through April. Sale/purchase is prohibited during January through April.	Would allow stock biomass to rebuild sooner than would the action alternatives and, thus, provide optimum yield more quickly.	Would not allow for an increase in revenue to the commercial sector and an increase in non-market benefits to the recreational sector.	Net impacts are difficult to quantify, but expected to be positive because the action supports the goal of achieving OY, or the amount of fish that will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems.
Alternative 2 (Preferred): Increase the commercial Trip limit to 120 red porgy (210 lbs gw; 220 lbs ww) during May through December. Increase the recreational bag limit to 3 red porgy/person/day. Commercial quota = 127,000 lbs. gw; 132,000 ww.	Estimated net revenue change is **+$0.07** million (+2.1%) to boat owners, captains, and crews. Would increase short-term annual net economic benefits by **$11,554** and **$20,838** for the private/charter and headboat sectors, respectively. Maintains the spawning season closure, which could enhance recruitment and allow for greater long-term economic benefits.	Realization of the long-term economic benefits of stock rebuilding would be delayed compared to Alternative 1, but would be consistent with the approved schedule.	Net impacts are difficult to quantify, but expected to be positive because the action supports the goal of achieving OY, or the amount of fish that will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems.
Alternative 3: Same as Alt. 2 but rec. bag limit = 2 red porgy/person/trip.	Estimated net revenue change is **+$0.07** million (+2.1%) to boat owners, captains, and crews. Would increase annual net economic benefits by **$7,781** and **$15,429** for all private/charter and headboat sectors, respectively.	Realization of the long-term economic benefits of stock rebuilding would be delayed compared to Alternative 1, but would be consistent with the approved schedule	Net impacts are difficult to quantify, but expected to be positive because the action supports the goal of achieving OY, or the amount of fish that will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems.
Alternative 4: Same as Alt. 3 but comm. Trip limit = 65 red porgy (115 lbs gw; 120 lbs ww) year-round.	Estimated net revenue change is **+$0.08** million (+2.2%) to boat owners, captains, and crews. Would increase annual net economic benefits by **$7,781** and **$15,429** for all private/charter and headboat sectors, respectively. Long-term benefits might not be as great without a spawning season closure.	Long-term economic benefits could be impaired if management measures are not adequate to allow stock to rebuild to Bmsy.	Net impacts are difficult to quantify, but could be negative if the spawning season closure was an important factor in stock rebuilding.

Table B1. Continued

Action 5. Red Porgy Commercial and Recreational Management Measures			
Alternatives	**Positive Impacts**	**Negative Impacts**	**Net Impacts**
Alternative 5: Same as Alt. 4 but bag limit = 3 red porgy/person/trip.	Estimated net revenue change is **+$0.08** million (+2.2%) to boat owners, captains, and crews. Would increase annual net economic benefits by **$11,554** and **$20,838** for all private/charter and headboat sectors, respectively. Long-term benefits might not be as great without a spawning season closure.	Long term economic benefits could be impaired if management measures are not adequate to allow stock to rebuild to Bmsy.	Net impacts are difficult to quantify, but could be negative because short-term effects are known to be negative if the spawning season closure was an important factor in stock rebuilding.

The short-term economic effects from the proposed alternatives are not expected to exceed $100 million. The cumulative reduction in revenue to the commercial harvesting sector resulting from the proposed management measures will vary from $0.73 million in year 1 to $1.08 million annually in year 3 onwards until quotas are modified (Table B2). The incremental increase in net dockside revenue from the proposed increase in the red porgy commercial trip limit is estimated at $0.07 million (Table B2). For the recreational sector the cumulative decrease in net non-market benefits (compensating variation) is estimated at $0.08 million in year 1 and $1.12 million in year two onwards until bag and size limits are adjusted. The increase in value from the higher bag limit for red porgy is expected to be $0.03 million (Table B2).

Table B2. Summary of the cumulative short-term economic effects of the proposed actions in Snapper Grouper Amendment 13C.

	Commercial harvesting sector	**Recreational sector**
	Revenues minus trip costs and opportunity costs of labor (millions of dollars)	**Non-market benefits**
Black sea bass, golden tilefish, vermilion snapper, and snowy grouper		
Year 1	-$0.73	-$0.80
Year 2	-$0.92	-$1.12
Year 3	-$1.08	
Red porgy		
	$0.07	$0.03

Given the expected magnitude of these impacts, it is unlikely there would be an adverse affect on the economy, a sector of the economy, productivity, competition, jobs, or communities as a result of the proposed actions.

These proposed alternatives are not expected to have an adverse effect on the environment, public health or safety, or state, local, or tribal governments. Furthermore, the proposed measures will not create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; will not materially alter the budgetary impact of entitlements, grants, user fees, or loan programs; or the rights and obligations of recipients thereof.

In addition, the measures proposed in this amendment are commonly used to address harvest reductions in commercial and recreational fisheries in the South Atlantic and thus are not expected to raise novel legal or policy issues.

Since none of the standards of significance are expected to be reached, this proposed action is determined to not be significant under E.O. 12866.

SOCIAL IMPACT ASSESSMENT/FISHERY IMPACT STATEMENT

This integrated document contains all elements of the Plan Amendment, Final Environmental Impact Statement (FEIS), Draft Biological Assessment (DBA), Initial Regulatory Flexibility Analysis (IRFA), Regulatory Impact Review (RIR), and Social Impact Assessment/Fishery Impact Statement (SIA/FIS). The table of contents for the SIA/FIS is provided separately to aid the reviewer in referencing corresponding sections of the Amendment.

INTRODUCTION

Mandates to conduct Social Impact Assessments (SIAs) come from both the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) and the National Environmental Policy Act (NEPA). 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 *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act* (CEQ 1986), 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 2003).

Under the MSFCMA, fishery management plans (FMPs) must "...achieve and maintain, on a continuing basis, the optimum yield from each fishery" [MSFCMA Section 2 (b) (4)]. Recent amendments to the MSFCMA require that FMPs address the impacts of any management measures on the participants in the affected fishery and those participants in other fisheries that may be affected directly or indirectly through the inclusion of a fishery impact statement [MSFCMA Section 303 (a) (9)]. Most recently, with the addition of National Standard 8, FMPs must now, consistent with the conservation requirements of the Act, consider the impacts upon fishing communities to assure their sustained participation and minimize adverse economic impacts upon those communities to the extent practicable [MSFCMA Section 301 (a) (8)]. Consideration of social impacts is a growing concern as fisheries experience increased participation and/or declines in stocks or other exogenous changes that impact the fishery directly or indirectly. With an increasing need for management action, the consequences of such changes need to be examined to mitigate, to the extent practicable, the negative impacts experienced by the populations concerned.

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 2003). In addition, cultural impacts which may involve changes in values and beliefs which affect people’s way of identifying themselves within their occupation, communities, and society in general are included under this interpretation. Social impact analyses help determine the consequences of policy action in advance by comparing the status quo with the projected impacts. Therefore, it is extremely important that as much information as possible concerning a fishery and its participants be gathered for an assessment. Although public hearings and scoping meetings do provide input from those concerned with a particular action, they do not constitute a full overview of the fishery and its participants.

With a reliable body of quantitative data lacking, qualitative data can be used to provide an estimate of some impacts. Qualitative methods may include but are not limited to informal and ethnographic interviewing, field observations, analysis of descriptive data sets, and cross-cultural comparisons. In addition, when there is a body of empirical findings available from the social science literature, it needs to be summarized and referenced in the analyses.

In attempting to assess the social impacts of the proposed amendment it must be noted that the data available for these analyses still do not represent a comprehensive overview of the fishery; therefore, the analyses do not include all social impacts, positive or negative. Available information pertains primarily to the commercial harvesting sector of the snapper grouper fishery. Thus social impacts on non-commercial harvesters, the processing sector, the consumer, fishing communities, and society as a whole are not fully addressed due to data limitations. The fishery impact statement consists of the description of the commercial sector of the fishery, some basic indicators of recreational activity, and the social impacts under the alternatives considered. Data to define or determine impacts upon fishing communities are, while improving, still limited. This results in uncertainty in predicting the future of the human components of the fisheries.

One last note about the data and methods used in the social analysis sections: the data used in the social analysis are not the same as those used in the economic or biological analysis section, and a reading of the biological, economic, and social data may produce different analyses and outcomes. Different data sets were used to examine the social, economic, and biological impacts of management measures. In all cases, analyses include the best available data, but the quality and magnitude of these data sets may differ. This multi-disciplinary approach; however, affords us the opportunity of a multi-perspective analysis, which aids the growth and improvement of our comprehension.

SOCIAL IMPACT SUMMARY

While it may be tempting to analyze social impacts as divorced from their surroundings, it is not possible. A holistic perspective is needed, and the complexities of fishing communities must be understood. Social change does not happen in a vacuum. It is widely agreed upon that coastal communities in the U.S. are undergoing rapid changes, and in particular, the fisheries of those communities are being affected. Because the social impacts of this proposed amendment vary depending on which sector of the public or specific community one analyzes, the following summary of impacts will be divided into commercial, recreational, and general public impacts.

Commercial

The social impacts of management measures will depend on the species being managed, the geographic area where the fishery is prosecuted, the health of the community, the gear employed, etc. There could be significant, long-term social benefits from management measures, which end overfishing. When overfishing on these species is stopped and biomass is rebuilt (see Amendment 15), it is predicted the fish stocks will be of such an amount fishermen will be able to expend less effort to land the same or similar poundage of fish as they land now.

While any one of the actions proposed in this amendment by itself would have short-term impacts on both the recreational and commercial sectors, it is not expected that the impact would be severe or threatening to the sustainability of fishing communities in the South Atlantic. Some believe; however, the impacts of the entire suite of proposed alternatives in Amendment 13C, in conjunction with other state and regional fishery regulations and community changes, will be severe enough to dislocate a substantial number of fishermen and fish houses and cause changes to the economic and social structures of communities. If this occurs, when the stocks are rebuilt, there might not be a similar commercial snapper grouper fishery to take advantage of improved fishing conditions. Whether such impacts can be overcome by the resilience of the fishermen and their communities so that they might share in the future rebuilt stocks remains to be seen. However, such phenomena would also be possible, and likely exacerbated, should adequate corrective action not be taken at this time, resulting in more severe management measures in the future.

Recreational

As with the commercial sector, the long-term benefits of ending overfishing and rebuilding overfished stocks to the broad group of recreational fishermen in the South Atlantic is hard to predict. As less is known about the social structure and aspects of the recreational sector in this region, it is even more difficult to predict what future conditions may be and how recreational fishermen will benefit from more healthy stocks. It is expected that with increasingly healthy stocks, recreational fishermen will catch more fish per trip, and thus reap the benefit of increased angling satisfaction. However, similar to the situation with the commercial fishery, the composition of the recreational sector and associated industries may adjust during the recovery period such that the same individuals and entities that bear the short-term adverse impacts may not receive the future enhanced benefits.

In general, the short-term, adverse social impacts from the proposed management measures in this amendment are minimal for the private recreational angler, particularly from regulations affecting the deepwater species (snowy grouper and golden tilefish). Charterboats may adapt to lower bag limits and increased size limits by shifting effort from bottom-fishing to another type of fishing. Headboats have the least amount of leeway to change their fishing behaviors and, therefore, may experience the most negative impacts, at least in the short-term. However, if stocks – particularly vermilion snapper and black sea bass – rebuild quickly, the headboats and their customers will experience positive long-term benefits of an increased catch.

The Non-Fishing General Public

There are increasingly more people in the U.S. and elsewhere in the world who are satisfied just knowing that there are healthy stocks of fish in the ocean. For these people, this suite of management measures brings both short and long-term benefits, as overfishing will end and stocks will rebuild to optimum levels.

Table C. Social impact (SIA/FIS) summary of the preferred alternatives.
Weights are in pounds (lbs) and gutted weight (gw) or whole weight (ww).

ACTION	SOCIAL IMPACTS
Snowy Grouper **Commercial:** Quota (gutted weight) = 151,000 lbs gw in year 1, 118,000 lbs gw in year 2, and 84,000 lbs gw in year 3 onwards. Trip limit = 275 lbs gw in year 1, 175 lbs gw in year 2, and 100 lbs gw in year 3 onwards. **Recreational:** Limit possession to one snowy grouper in 5 grouper per person/day aggregate bag limit.	**Commercial:** Allows for relatively rapid rebuilding of stock, and somewhat mitigates negative short-term impacts. Still poses substantial immediate, short-term hardship on many fishermen, fish houses, and related communities particularly in North Carolina and the Florida Keys. Expected long-term net positive benefits associated with ending overfishing; however, benefits may shift to a different user groups if the current users cannot survive the immediate, short-term negative effects. **Recreational:** Minimal immediate, short-term, negative impacts to the for-hire fishery; slight negative impacts to the private angler. Expected long-term net positive benefits associated with ending overfishing. **General Public**: By rebuilding the stock, this measure brings non-use short and long-term benefits to some sectors of the general public.
Golden Tilefish **Commercial:** Quota of 295,000 lbs gw, 4,000 lbs gw trip limit until 75% of the quota is taken when the trip limit is reduced to 300 lbs gw. Do not adjust the trip limit downwards unless 75% is captured on or before September 1. **Recreational:** Limit possession to 1 golden tilefish in 5 grouper per person/day aggregate bag limit.	**Commercial:** Immediate short-term negative impacts may be felt as the quota and the trip limits are reduced. Most of these short-term impacts will be experienced in central Florida and South Carolina. Hook and line fishermen will be impacted to a lesser degree. Using quota and date triggers have the mitigating impact of assuring more equal access to the stock by users of different gear types. Expected long-term net positive benefits associated with ending overfishing; however, benefits may shift to a different user groups if the current users cannot survive the immediate, short-term, negative effects. **Recreational:** Minimal short-term, adverse impacts to the for-hire fishery; slight adverse impacts to the private angler. Expected long-term net positive benefits associated with ending overfishing. **General Public:** Brings non-use short and long-term benefits to some sectors of the general public.

Table C. Continued

ACTION	SOCIAL IMPACTS
Vermilion Snapper **Commercial:** Quota of 1,100,000 lbs gw. **Recreational:** 12" size limit**.**	**Commercial:** Immediate short-term, negative impacts may include the creation of a derby fishery and loss of livelihood if the fishery closes before the year's end. However, this is unlikely since the proposed quota was only exceeded three times during 1992-2004 and is equivalent to the average catch during 1999-2003. Most of these impacts may be experienced in North Carolina, South Carolina, and Georgia. Expected long-term net positive benefits are expected due to ending overfishing. **Recreational**: Some immediate but moderate negative short-term impacts on headboats as adjustments in size limit are met. Expected long-term net positive benefits are expected due ending overfishing. **General Public:** Brings non-use short and long-term benefits to some sectors of the general public
Black Sea Bass **Commercial:** Commercial quota (gutted weight) of 477,000 lbs gw in year 1, 423,000 lbs gw in year 2, and 309,000 lbs gw in year 3 onwards. Require use of at least 2" mesh for the entire back panel of black sea bass pots effective 6 months after publication of the final rule. Require black sea bass pots be removed from the water when the quota is met. Change fishing year from calendar year to June 1 – May 31. **Recreational:** Recreational allocation of 633,000 lbs gw in year 1, 560,000 lbs gw in year 2, and 409,000 lbs gw in year 3 onwards. Increase minimum size limit from 10" to 11" in year 1 and to 12" in year 2. Reduce recreational bag limit from 20 to 15 per person per day. Change fishing year from the calendar year to June 1 through May 31.	**Commercial**: A stepped down approach to implementing a quota will mitigate some of the negative social impacts expected from a quota fishery. As fishing for black sea bass in North and South Carolina tapers off by March, the change in the fishing year will soften potential impacts of a quota closure. However, Florida fishermen may feel more of an impact if they catch sea bass year round. The addition of at least a two-inch back panel should not pose serious adverse impacts. Removing pots from the water should bring positive social impacts by reducing conflict between different factions of pot fishermen. Expected long-term net benefits due to ending overfishing; however, benefits may accrue to a different user groups if the current users cannot survive the immediate, short-term negative effects. **Recreational:** Some immediate short-term impacts to the headboat and charter fishermen may occur until they adjust to a larger size limit; this should be mitigated by the phasing-in of a size increase. The reduction in the bag limit will adversely impact the entire recreational sector but the impact is predicted to be moderate. Expected long-term net positive benefits expected due to ending overfishing. **General Public:** By rebuilding the stock, this measure brings non-use benefits to some sectors of the general public.
Red Porgy **Commercial and recreational** 1) Retain 14" TL size limit and seasonal closure (retention limited to the bag limit); 2) Specify a commercial quota of 127,000 lbs gw and prohibit sale/purchase and prohibit harvest and/or possession beyond the bag limit when quota is taken and/or during January through April; 3) Increase commercial trip limit from 50 lbs ww to 120 red porgy (210 lbs gw) during May through December; 4) Increase recreational bag limit from one to three red porgy per person per day.	**Commercial**: Positive social benefits of allowed increased harvest. **Recreational**: Positive social benefits of allowed increased harvest. **General Public:** No substantial positive or negative benefit. The proposed action provides for a scheduled increase in red porgy harvest consistent with Council's rebuilding program.

SOCIAL IMPACT ASSESSMENT DATA NEEDS

Data needs include three categories: (a) one specific to the snapper grouper fishery itself (what makes it different, similar, and integrated with other forms of fishing) as it has developed in the South Atlantic and proximal geographic regions; (b) how snapper grouper fishermen move through other fisheries in an annual round; and (c) other general data needs. With regard to the first category there is only one survey, which was conducted from 1995 to 1996 that focused on snapper grouper fishermen prior to the implementation of limited entry (Snapper Grouper Amendment 8). There is a great need to update this study to document and evaluate the impact the large body of regulations – including limited entry – has had upon this occupational group. There is also a pointed need to document the historical, cumulative, socio-cultural impacts of the other exogenous events (demographic shifts, price declines/increases, etc.). To the best of our knowledge, impacts of regulations enacted since 1983 on commercial and recreational fishing communities have not been studied and quantified. Care should also be taken to include in the Fishery Impact Statement/Social Impact Assessment recreational fishermen from inland areas of the region that travel to the coast regularly to fish. Such work should be part of a wider effort undertaken to catalog the broader effects of the impacts from all regulations (including those at the state and community level) on fishing communities in the Council's area of jurisdiction.

The more general, but just as critical, data needs are complete profiles of fishing communities in the South Atlantic. These are now being developed but their usefulness is limited. Much of the ongoing research is piecemeal due to the lack of funds and personnel. Furthermore, the fishing communities' dependence upon fishing and fishery resources still needs to be established. To achieve these goals, data must be gathered in three or more ways.

First, to establish both baseline data and to contextualize the information already gathered by survey methods, there is a great need for an in-depth, ethnographic study (i.e., full descriptive data of a culture's everyday life) of the different fishing sectors or subcultures. Second, existing literature on social/cultural analyses of fisheries and other sources in social evaluation research need to be culled to offer a comparative perspective and 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 and similar add-ons to the MRFSS data collection system for recreational fishermen. It is also suggested a social survey add-on, to be administered quarterly, be developed for the headboat survey.

The following is a guide for the types of data needed (for all sectors of the fishery):

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

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

3. Emic culture information may include but is not necessarily limited to: occupational motivation and satisfaction; attitudes and perceptions concerning management; constituent views of their personal future of fishing; psycho-social well-being; and cultural traditions related to fishing (identity and meaning).

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

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.

1.0 INTRODUCTION

1.1 Purpose and Need

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) instructs the Regional Fishery Management Councils and NMFS to prevent overfishing while achieving *optimum yield* from each fishery. When it is determined a stock is undergoing overfishing, measures must be implemented to end overfishing. In cases where stocks are overfished, the Councils and NMFS must implement rebuilding plans.

The ultimate goal of any fishery management program is to achieve the optimum yield from the fishery. The optimum yield is the portion of the fish stock that provides the greatest economic, social, and ecological benefit to the nation. In a fishery where optimum yield is not being achieved on a consistent basis, the full extent of social and economic benefits is not realized. For example, in the snapper grouper fishery, low stock levels translate into a loss of catch possibilities for commercial and recreational fishermen. Revenues are reduced when fishermen have to fish longer and harder, which may eventually cause participants to exit the fishery. Ending overfishing and rebuilding overfished stocks would allow fishermen to catch more fish with less effort, resulting in higher economic returns in the long-term as long as effort in the fishery is limited.

Recent stock assessments indicate snowy grouper, golden tilefish, vermilion snapper, and black sea bass are experiencing overfishing (NMFS 2005b). Snowy grouper, black sea bass, and red porgy are overfished (NMFS 2005b); red porgy are currently under a rebuilding program (Table 1).

Table 1-1. Assessment information for the subject stocks.

	Source & Year Completed	Data Thru	Date SSC Approved	Overfishing?	Overfished?
Red porgy	SEDAR #1 (2002)	2001	6/16/03	No	Yes
Black sea bass	SEDAR #2 (2003) SEDAR Update #1 (2005)	2001 2003	6/16/03 5/12/05	Yes	Yes
Vermilion snapper	SEDAR #2 (2003)	2001	6/16/03	Yes	Unknown
Snowy grouper	SEDAR #4 (2004)	2002	5/25/04	Yes	Yes
Golden tilefish	SEDAR #4 (2004)	2002	5/25/04	Yes	No

Guidelines to the National Standards contained in the Magnuson-Stevens Act state regulations intended to stop overfishing should be implemented one year after the overfishing is identified. Proposed revisions to these guidelines would require overfishing be eliminated “as soon as practicable”, with the Council providing the rationale for choosing the time period to end overfishing (70 FR 36240). The revisions also state phase-in periods to end overfishing would be permitted under certain circumstances; one requirement would reduce fishing mortality by a “substantial and measurable amount each year” (70 FR 36240).

The Council recognizes that the time period to end overfishing is not explicitly stated in the Magnuson-Stevens Act and that revisions to the guidelines are in the proposal stage. However, the Council believes that sustainability of snowy grouper, golden tilefish, vermilion snapper, and black sea bass would not be jeopardized if overfishing was phased-out over a short (e.g., 2-3 year) time period. These species are economically important to both commercial and recreational fishermen, and reductions to end overfishing immediately would result in significant adverse impacts to those affiliated with the fishing for and/or harvest of species in the snapper grouper fishery management unit (e.g., fishing communities, fishing industries, etc.).

Fishery Management Plan (FMP) Amendment 13B and Amendment 15 are being developed to redefine the fishery management unit; evaluate and redefine as needed management reference points; calculate and redefine as needed rebuilding schedules for overfished stocks; and adjust management strategies and measures as needed. However, it is anticipated that management actions proposed in FMP Amendment 13B and Amendment 15 will not be implemented until 2007. As a result, the Council decided at the June 2005 Council meeting to more quickly consider management actions for these five recently assessed stocks in another amendment. The Council's intent is to address overfishing for four species and increase the allowable catch of red porgy consistent with the stock's rebuilding program as potential economic and social benefits in the fishery are not being achieved.

<u>Objectives</u>
In satisfying the underlying need outlined above, the Council may limit harvest by implementing new or adjusting existing: catch quotas; size limits; trip limits; seasonal closures; area closures; fishing year start dates; gear restrictions; catch allocations; and bag limits. During deliberations, the Council has decided that it is best to favor regulations that do the following:

1) *Implement regulations as early as possible in 2006.* The Council began developing FMP Amendment 13 in 2001 to address multiple Magnuson-Stevens Act requirements. During development of Amendment 13B, stock assessments were completed for red porgy, black sea bass, vermilion snapper, golden tilefish, and snowy grouper through the Southeast Data, Assessment, and Review (SEDAR) process. It is anticipated that management actions in FMP Amendment 13B will not be implemented until 2007. As a result, the Council decided at the June 2005 Council meeting to more quickly consider management actions for these five recently assessed stocks through a regulatory amendment. This was changed to a plan amendment at the September 2005 meeting to include a change in the fishing year for black sea bass.

2) *Allow as close to a year-round fishery as possible while maintaining, where possible, historic participation rates and patterns (including allocation ratios) minimizing costs, etc.* The Council would like to avoid derby conditions, where fishermen compete with each other to catch as many fish as possible before the quota is taken and the fishery is closed for the remainder of the fishing year. As such, the Council favors the implementation of trip limits for some species, which forecast a fishery would remain open year-round based upon estimations of the previous year's harvest. In some cases it may be possible to set the quota at a level to ensure a year round fishery (e.g., vermilion snapper).

When considering management measures for snowy grouper, the Council's stated objective is to maintain a year-round fishery to allow for incidental catch. As significant reductions in fishing mortality are required to end overfishing of snowy grouper, the Council believes the fishery will probably develop into an incidental catch fishery. The Council feels a year-round fishery will reduce regulatory discards of snowy grouper.

The Council also believes that a year-round fishery is most appropriate for a heterogeneous snapper grouper fishery. Distance to fishing grounds from shore, weather conditions, deployed gear types, and average boat length alter as one travels along the South Atlantic coast. For example, snowy grouper are typically caught earlier in the year and closer to shore off South Florida compared to North Carolina. In this instance, to make a portion of the quota available to North Carolina fishermen, the Council would like to implement regulations, which have the highest probability of allowing fishing to occur year-round.

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 minimum size limits for black sea bass (8") and vermilion snapper (12"). Trawl gear primarily targeting vermilion snappers 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 were also implemented in January 1992 (10 vermilion snapper; 5-groupers). 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; and the vermilion snapper recreational bag limit was increased to 11". 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 lb whole weight commercial bycatch allowance May through December. These red porgy regulations remain in place.

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

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, vermilion snapper -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 boar 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.

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.
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
Amendment #3 (1990)	01/31/91	PR: 55 FR 39023 FR: 56 FR 2443	-Established management program for wreckfish: Added to FMU*; defined OY and overfishing; required permit to fish for, land or sell; collect data; established control date 03/28/90; fishing year beginning April 16*; process to set annual quota, with initial quota of 2 million lbs*; 10,000 lb. trip limit*; spawning season closure Jan 15-Apr 15. -Add wreckfish to the FMU; -Required permit to fish for wreckfish; -Required catch and effort reports from selected, permitted vessels; -Established a fishing year for wreckfish starting April 16; -Established 10,000 lb. trip limit; -Established a spawning season closure for wreckfish from January 15 to April 15; -Established a wreckfish quota and provisions for closure of wreckfish fishery; -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	-Defined overfishing/overfished and specified rebuilding time periods. Required permits (commercial and for-hire) and specified data collection regulations. Established assessment group and annual adjustments (framework) -Prohibited gear: fish traps except black sea bass pots 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. -Permit, gear, and vessel id requirements specified for black sea bass pots. -No retention of S-G caught in other fisheries with gear prohibited in S-G fishery if captured S-G had no bag limit or harvest was prohibited. If had a bag limit, could retain only the bag limit. -8" limit – lane snapper and black sea bass -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 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 -commercial permit regulations established
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
Regulatory Amendment #4 (1992)	07/06/93	FR: 58 FR 36155	-Black Sea Bass: modified definition of black sea bass pot***; allowed multi-gear trips for black sea bass***; allowed retention of incidentally-caught fish on black sea bass trips***

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.
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 -allowed retention of 1 Warsaw grouper and 1 snowy grouper per vessel (recreational & commercial) per trip; 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 black sea bass 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 S-G FMU in 1993, 1994, 1995 or 1996; AND have held valid s-g permit between 02/11/96 and 02/11/97. -granted transferable permit with unlimited landings if vessel landed ≥ 1,000 lbs. of S-G sop. 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 S-G 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.
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. -black sea bass: 10" length (recreational and commercial); 20 fish rec. bag limit; required escape vents and escape panels with degradable fasteners in black sea bass pots -greater amberjack: 1 fish rec. bag limit; no harvest or possession > bag limit, and no purchase or sale, during March and April; quota = 1,169,931 lbs; began fishing year May 1; prohibited coring. Vermilion snapper: 11" length (recreational) Gag: 24" length (recreational); no 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 S-G 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

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.
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.
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 S-G 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) -rebuilding timeframe: red snapper and groupers ≤ 15 years (year 1 = 1991) other snappers, greater amberjack, black sea bass, red porgy ≤ 10 years (year 1 = 1991) -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 S-G spp. Within the *Oculina* Experimental Closed Area.

2.0 SUMMARY OF ALTERNATIVES

This environmental impact statement explores the differences among a number of management alternatives for the proposed changes to the Snapper Grouper Fishery Management Plan (FMP). Alternatives are developed to identify ways of meeting the purpose and need while addressing a range of objectives. For the Amendment, alternatives were received and developed through interdisciplinary team meetings, Council meetings, written public comments, scoping meetings, and meetings of the Snapper Grouper Advisory Panel. The Council employs a process which, following a review and examination, screens alternatives to provide a reasonable range for detailed analysis. **Appendix A** contains the alternatives eliminated from further study and the reason for their elimination.

The environmental consequences of the alternatives are compared in both Sections 2 and 4. Section 2 provides a summary of this comparison. The reader is referred to Section 4 for the detailed wording of the alternatives and for a detailed discussion on effects of each alternative to the biological, protected species, economic, social, and administrative environments. The affected environments are described in Section 3.

This Amendment contains management alternatives, which will end or phase-out overfishing of snowy grouper, golden tilefish, vermilion snapper, and black sea bass. It also includes alternatives, which allow for an increase in the allowable catch of red porgy consistent with the rebuilding program. Listed below are the preferred alternatives.

Preferred Alternatives in Amendment 13C

<u>Snowy Grouper</u>

A. Commercial – Reduce the annual commercial snowy grouper quota from 344,508 lbs gutted weight (406,519 lbs whole weight) to 151,000 lbs gutted weight (178,000 lbs whole weight) in year 1; to 118,000 lbs gutted weight (139,000 lbs whole weight) in year 2; and to 84,000 lbs gutted weight (99,000 lbs whole weight) in year 3 onwards until modified. Specify a commercial trip limit of 275 lbs gutted weight (325 lbs whole weight) during year 1; 175 lbs gutted weight (210 lbs whole weight) during year 2; and 100 lbs gutted weight (115 lbs whole weight) during year 3 onwards until modified. These trip limits apply until the quota is met. After the commercial quota is met, all purchase and sale is prohibited and harvest and/or possession is limited to the bag limit.

B. Recreational – Limit the possession of snowy grouper to one per person per day within the 5-grouper per person per day aggregate recreational bag limit.

Golden Tilefish

A. Commercial – Reduce the annual commercial golden tilefish quota from 1,001,663 lbs gutted weight (1,121,863 lbs whole weight) to 295,000 lbs gutted weight (331,000 lbs whole weight). After the commercial quota is met, all purchase and sale is prohibited and harvest and/or possession is limited to the bag limit. Specify a commercial trip limit of 4,000 lbs gutted weight (4,480 lbs whole weight) until 75% of the quota is taken when the trip limit is reduced to 300 lbs gutted weight (335 lbs whole weight). Do not adjust the trip limit downwards unless 75% is captured on or before September 1.

B. Recreational – Limit the possession of golden tilefish to one per person per day within the 5-grouper per person per day aggregate bag limit.

Vermilion Snapper

A. Commercial – Specify a commercial vermilion snapper quota of 1,100,000 lbs gutted weight (1,221,000 lbs whole weight). After the commercial quota is met, all purchase and sale is prohibited and harvest and/or possession is limited to the bag limit.

B. Recreational – Increase the recreational vermilion snapper minimum size limit from 11” total length to 12” total length.

Black Sea Bass

A. Commercial – Implement the following commercial measures for black sea bass:

(a) Specify a commercial quota of 477,000 lbs gutted weight (563,000 lbs whole weight) in year 1; 423,000 lbs gutted weight (499,000 lbs whole weight) in year 2; and 309,000 lbs gutted weight (364,000 lbs whole weight) in year 3 onwards until modified. This is based on a Total Allowable Catch (TAC) of 1,110,000 lbs gutted weight (1,310,000 lbs whole weight) in year 1; 983,000 lbs gutted weight (1,160,000 lbs whole weight) in year 2; and 718,000 lbs gutted weight (847,000 lbs whole weight) in year 3 onwards until modified. After the commercial quota is met, all purchase and sale is prohibited and harvest and/or possession is limited to the bag limit.

(b) Require use of at least 2” mesh for the entire back panel of black sea bass pots. This measure will be effective 6 months after publication of the final rule in the Federal Register.

(c) Change the fishing year from the calendar year to June 1 through May 31.

(d) Require black sea bass pots be removed from the water when the quota is met. The Regional Administrator has authority to grant a 10-day grace period for removal of traps.

B. Recreational – Implement the following recreational measures for black sea bass:

(a) Specify a recreational allocation of 633,000 lbs gutted weight (746,000 lbs whole weight) in year 1; 560,000 lbs gutted weight (661,000 lbs whole weight) in year 2; and 409,000 lbs gutted weight (483,000 lbs whole weight) in year 3 onwards until modified. This is based on a Total Allowable Catch (TAC) of 1,110,000 lbs gutted weight (1,310,000 lbs whole weight) in year 1; 983,000 lbs gutted weight (1,160,000 lbs whole weight) in year 2; and 718,000 lbs gutted weight (847,000 lbs whole weight) in year 3 onwards until modified.

(b) Limit recreational landings to approximate these harvest levels by increasing the recreational minimum size limit from 10" total length to 11" total length in year 1 and to 12" total length in year 2 onwards until modified, and reducing the recreational bag limit from 20 to 15 black sea bass per person per day.

(c) Change the fishing year from the calendar year to June 1 through May 31.

Red Porgy

A. Commercial – Retain the commercial 14" total length minimum size limit and the seasonal closure (retention limited to the bag limit). Increase the commercial trip limit from 50 lbs whole weight of red porgy to 120 red porgy (210 lbs gutted weight; 220 lbs whole weight) during May through December. Specify a commercial quota of 127,000 lbs gutted weight (132,000 lbs whole weight). After the commercial quota is met, all purchase and sale is prohibited and harvest and/or possession is limited to the bag limit.

B. Recreational – Retain the recreational 14" total length minimum size limit and increase the recreational bag limit from 1 to 3 red porgy per person per day.

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2.1 Snowy Grouper

Snowy grouper is overfished and undergoing overfishing. A 66% reduction in catch is needed to end overfishing.

2.1.1 Commercial Management Measures

Table 2-1. Summary of effects of commercial management measure alternatives for snowy grouper.
All weights are in pounds (lbs) gutted weight (gw). For Alternatives 2 and 3, prohibit purchase and sale and, prohibit harvest and/or possession after the quota is met.

Alternatives: (Table 2-1)	Biological and Protected Species Effects	Economic, Social, and Administrative Effects
Alternative 1: No Action. Annual quota = 344,508 lbs gw; trip limit = 2,500 lbs gw; incidental catch allowance = 300 lbs gw after quota taken	−Adverse effects to resource associated with continued overfishing. −Would maintain existing risk of protected species interactions.	−No immediate short-term adverse effects to commercial fishermen, fishing communities, and associated industries. Adverse long-term effects to those same entities associated with continued overfishing. . −Legal risk related to no action to address overfishing.
Alternative 2: Annual quota = 84,000 lbs gw <u>Alt 2A:</u> Trip limit = 100 lbs gw <u>Alt 2B:</u> Trip limit = 10 fish	−Both beneficial (reduced fishing mortality possibly restoring natural age/size structure, sex ratio, and ecosystem balance and ecosystem) and adverse effects (possible increase in regulatory discards). Would end overfishing during 2006-2010. It is anticipated that the net effects would be beneficial to stock. Alt. 2B may benefit juvenile fish. −May have potential benefit to protected species if the reduction in allowable harvest results in the reduction of effort.	−Greatest immediate, short-term adverse social and economic effects, particularly to some communities in North and South Carolina. Long-term beneficial effects to fishermen and communities. −Estimated immediate revenue change is **-$.43 million** (-7.1%) and **-$.49 million** (-8.1%) from the average of earnings in previous years to boat owners, captains, and crews for Alts. 2A and 2B, respectively. -166 vessels reported snowy grouper landings in 2004 −Alt. 2B is easier to enforce than Alt. 2A.
Alternative 3 (Preferred): Annual quota = 151,000 lbs gw (year 1); 118,000 lbs gw (year 2); and 84,000 lbs gw (year 3). Trip limit = 275 lbs gw (year 1); 175 lbs gw (year 2); and 100 lbs gw (year 3 and after)	−Would be less beneficial than Alternative 2 but more than Alt. 1. It is anticipated the net effects would be beneficial to the stock. Would end overfishing during 2009-2013. −May have potential benefit to protected species if the reduction in allowable harvest results in the reduction of effort.	−Same immediate, short-term adverse effects relative to Alt. 2. Long-term beneficial effects to fishermen and communities. . −Estimated immediate revenue change is **-$0.28 million** (-4.7%), **-$0.35 million** (-5.9%), and **-$0.43 million** (-7.1%) from the average earnings in previous years to boat owners, captains, and crews for years 1, 2, and 3, respectively. These estimates do not factor in effect of the preferred alternatives for the other actions. −Greatest administrative burden of the three alternatives related to stepped quota.

The Council's **Preferred Alternative 3** was developed in response to public comments on the public hearing draft of Amendment 13C and associated DEIS. This alternative would best minimize the unavoidable short-term adverse socioeconomic effects associated with ending overfishing on the snowy grouper stock. While this stepped approach to ending overfishing is not the most environmentally preferable, it is intended to provide affected fishermen more time to plan how they will manage and accommodate relatively severe harvest restrictions without compromising stock sustainability over the long term. This will help to ensure the long-term viability of the snapper grouper fishery.

2.1.2 Recreational Management Measures

Table 2-2. Summary of effects of recreational management measure alternatives for snowy grouper.

Alternatives: (Table 2-2)	Biological and Protected Species Effects	Economic, Social, and Administrative Effects
Alternative 1: No Action. Snowy grouper are included in the 5-grouper per person per day aggregate recreational bag limit.	−Adverse effects to resource associated with continued overfishing. −Would maintain existing risk of protected species interactions.	−No immediate short-term adverse effects to anglers, fishing communities, and associated industries due to delay in taking action. However, adverse long-term effects to those same entities. − Legal risk related to no action to address overfishing.
Alternative 2: Limit possession to 2 snowy grouper in 5 grouper per person per day aggregate.	−A smaller bag limit would provide little overall fishing mortality reduction because the fish are likely to die from the trauma of capture. However, a smaller bag limit may provide an incentive to avoid snowy grouper. If so, there would be beneficial effects to species. −May have potential benefit to protected species if the reduction in allowable harvest results in the reduction of effort.	−Would reduce non-market benefits by **$3,457** (30%) and **$40** (8%) for all private/charter and headboat sectors, respectively. −No social impact to the private recreational angler, and minimal adverse impact to the for-hire sector. −A smaller bag limit could make compliance determination easier for law enforcement.
Alternative 3 (Preferred): Limit possession to 1 snowy grouper in 5 grouper per person per day aggregate.	−Effects similar to Alternative 2. As a lower bag limit, could have more beneficial impacts than Alt. 2 though immeasurable. −May have potential benefit to protected species if the reduction in allowable harvest results in the reduction of effort.	−Would reduce non-market benefits by **$5,334** (47%) and **$68** (14%) for all private/charter and headboat sectors, respectively. −No social impact to the private recreational angler, but potentially more impact to the for-hire sector due to lessening of fishing opportunities. −A smaller bag limit could make compliance determination easier for law enforcement.

The Council's **Preferred Alternative 3** would reduce recreational harvest to the extent practicable, considering the discard mortality rate of snowy grouper is estimated to range from 90-100%. Because the discard mortality rate of this species is high, bag limit reductions are expected to have negligible impacts on total recreational fishing mortality. However, the recreational fishery was responsible for only about 4% of the total snowy grouper landings during 1999-2003. The intent of this one-fish bag limit is to discourage recreational fishermen from targeting snowy grouper altogether.

2.2 Golden Tilefish

Golden tilefish is not overfished but is experiencing overfishing. A 34% reduction in catch is needed to end overfishing. The 295,000 lbs gutted weight quota is based on MSY from SEDAR 4 (2004).

2.2.1 Commercial Management Measures

Table 2-3. Summary of effects of commercial management measure alternatives for golden tilefish.
All weights are in pounds (lbs) gutted weight. For Alternatives 2 and 3, prohibit purchase and sale and, prohibit harvest and/or possession after the quota is met.

Alternatives: (Table 2-3)	Biological and Protected Species Effects	Economic, Social, and Administrative Effects
Alternative 1: No Action. Annual commercial quota =1,001,663 lbs gw. Until quota taken, trip limit=5,000 lbs gw. After quota taken, incidental catch allowance=300 lbs gw per trip.	−Adverse effects to resource associated with continued overfishing. −Would maintain existing risk of protected species interactions.	−No immediate short-term effects to commercial fishermen, fishing communities, and associated industries. Adverse long-term effects to those same entities. − Legal risk related to no action to address overfishing.
Alternative 2 (Preferred): Annual Quota = 295,000 lbs gw <u>Alts 2A-2D:</u> Trip limit 3,000 or 4,000 lbs. until 75% or 85% of quota is taken, then quota reduced to 300 lbs gw <u>Alt 2E:</u> Trip not reduced in Alt 2A-2D unless specified percent of quota captured on or before Sept. 1. **Alt. 2 CE (Preferred):** 4,000 lbs gw until 75% taken on or before Sept. 1.	−Both beneficial (reduced fishing mortality possibly restoring natural age/size structure, sex ratio, and ecosystem balance and ecosystem) and adverse effects (possible increase in regulatory discards). It is anticipated that the net effects of ending overfishing will be beneficial to stock. −Based on historical catches, it is projected that **85%, 97%, 90%, 100%** of the quota would be met for Alts. 2A, 2B, 2C, and 2D, respectively. As 2D is the only alt. of the four that is projected to create a year-round fishery, discards could be less than the other alternatives. −Greater beneficial effects to protected resources than Alts. 1 and 3 if the reduction in allowable harvest results in the reduction of effort. Greater benefits with Alts. 2A and 2C as quota is projected to be met earlier in year.	−Greatest immediate adverse short-term social and economic effects, particularly to some communities in North and South Carolina. Long-term beneficial effects to those same entities. −Estimated immediate revenue change is **-$0.16 million** (-2.7%), **-$0.13 million** (-2.2%), **-$0.15 million** (-2.6%), and **-$0.12 million** (-2.0%) from the average of earnings in previous years to boat owners, captains, and crews for Alts. 2A, 2B, 2C, and 2D, respectively. These estimations do not factor in the preferred alternatives for the other actions. −66 vessels reported golden tilefish landings in 2004. − Stepped trip limit more difficult to monitor/administer.
Alternative 3: Quota = 1,001,663 lbs gw (year 1); 450,000 lbs gw (year 2); 295,000 lbs gw (year 3). Trip limit = 5,000 lbs gw (Years 1 and 2). Incidental catch of 300 lbs gw after quota met (Year 1). <u>Alts 3A-3D:</u> Trip limit 3,000 or 4,000 lbs gw until 75% or 85% of quota is taken then quota reduced to 300 lbs gw(Year 3 onwards). <u>Alt 3E:</u> Trip not reduced in Alt 3A-3D unless specified percent of quota captured on or before Sept. 1 (Year 3 onwards).	−As overfishing would be phased out over a 3-year period, would be less beneficial than Alternative 2 but more than Alt. 1. −Based on historical catches, the quota would not be met in year 1 and 100% of the quota would be met by December during year 2. In year 3, **85%, 97%, 90%, 100%** of the quota would be met for Alts. 3A, 3B, 3C, and 3D, respectively. As 3D is the only alt. of the four that is projected to be met before **December**, discards could be less than the other alternatives. −Beneficial effects to protected resources expected if the reduction in allowable harvest results in the reduction of effort. Greater benefits with Alts. 3A and 3C as quota is projected to be met earlier.	−Short-term adverse effects to entities listed after Alt. 1, but less compared to Alts. 2 and 4. Long-term beneficial effects to those same entities as long as the delay in ending overfishing does not compromise stock rebuilding. −Estimated short-term loss of **$0.09 million** (3A) to **$0.16 million** (3DE) − Stepped trip limit more difficult to monitor/administer.

The Council's **Preferred Alternative 2** is the most environmentally preferable, as it would immediately end overfishing of the golden tilefish stock. The short-term adverse socioeconomic impacts of this alternative are not considered to threaten the long-term viability of the snapper grouper fishery, which currently harvests less than the annual quota of golden tilefish. On the contrary, the fishery is expected to benefit from this management action through increased catch per unit effort as the mean size and age of golden tilefish increases over time in response to reduced fishing mortality. The proposed trip limit strategy is designed to extend the duration of the fishery as long as possible and ensure fishermen the opportunity to harvest the full annual quota in years where harvest rates are below average through August.

2.2.2 Recreational Management Measures

Table 2-4. Summary of effects of recreational management measure alternatives for golden tilefish.

Alternatives: (Table 2-4)	Biological and Protected Species Effects	Economic, Social, and Administrative Effects
Alternative 1: No Action. Golden tilefish are included in the 5-grouper per person per day aggregate recreational bag limit.	−Adverse effects to resource associated with continued overfishing.	−No immediate adverse economic, social, or administrative effects. Adverse long-term effects associated with continued overfishing, particularly if recreational harvest increased.
Alternative 2: Limit possession to 2/person/day within 5 grouper/person/day aggregate.	−A reduced bag limit would provide little reduction in fishing mortality as the fish are likely to die from the trauma of capture. However, a smaller bag limit may provide an incentive to avoid golden tilefish. If so, there would be beneficial effects to species.	−Would reduce non-market benefits by **$1449** (16%) for the entire recreational sector. −Minimal immediate short-term adverse effects to all sectors of the recreational fishery due to very low landings of golden tilefish. −Smaller bag limit could make compliance checks easier for law enforcement.
Alternative 3 (Preferred): Limit possession to 1/person/day within 5 grouper/person/day aggregate.	−Effects similar to Alt. 2. As this alt. specifies a lower bag limit, could have more beneficial impacts than Alt. 2 though immeasurable.	−Would reduce non-market benefits by **$3615** (41%) for the entire recreational sector. −Minimal immediate short-term adverse effects to all sectors of the recreational fishery due to very low landings of golden tilefish. −Same administrative burdens as described in Alt. 2.
Alternative 4: Limit possession to 1 golden tilefish per vessel within 5 grouper/person/day aggregate.	−Effects similar to Alt. 2 and 3. As a lower limit, could have more beneficial impacts than Alt. 2 and 3 though effects are immeasurable.	−Would reduce non-market benefits by >=**$3615** (>=41%) for the entire recreational sector. −Minimal immediate short-term adverse social impacts to the private recreational sector and potentially moderate impacts to the for-hire sector. −Same administrative burdens as described in Alt. 2.

The Council's **Preferred Alternative 3** would reduce recreational harvest to the extent practicable, considering the discard mortality rate of golden tilefish is estimated to range from 90-100%. Because the discard mortality rate of this species is high, bag limit reductions are expected to have negligible impacts on total recreational fishing mortality. However, the recreational fishery was responsible for only about 2% of the total golden tilefish landings during 1999-2003. The intent of this one-fish bag limit is to discourage recreational fishermen from targeting golden tilefish altogether. The Council favored a one-fish bag limit over a one-fish vessel limit because the biological benefits of both are considered similar, and the one-fish bag limit is considered more equitable to fishery participants.

2.3 Vermilion Snapper

Vermilion snapper is experiencing overfishing but its overfished status is unknown. A 31% reduction in catch is needed to end overfishing.

2.3.1 Commercial Management Measures

Table 2-5. Summary of effects of commercial management measure alternatives for vermilion snapper.
All weights are in pounds (lbs) gutted weight (gw). For alternatives with quotas, prohibit purchase and sale and, prohibit harvest and/or possession after the quota is met.

Alternatives: (Table 2-5)	Biological and Protected Species Effects	Economic, Social, and Administrative Effects
Alternative 1: No Action. Commercial minimum size limit of 12" TL.	−Adverse effects to resource associated with continued overfishing. −Would maintain existing risk of protected species interactions.	−No immediate adverse short-term effects to commercial fishermen, fishing communities, and associated industries. Adverse long-term effects to those same entities. − Legal risk related to no action to address overfishing.
Alternative 2: Quota = 821,000 lbs gw; retain 12" TL size limit.	−Both beneficial (reduced fishing mortality possibly restoring natural age/size structure, and ecosystem balance from projected **31%** reduction of the average landings from 1999-2001) and adverse effects (possible increase in regulatory discards as it is projected, based on historical levels of catch, that the quota would be achieved in **September**). Greater adverse effects could occur if effort increases earlier in the year due to modification in fishing behavior. It is anticipated that the net effects would be beneficial to stock. Would end overfishing (depending on the magnitude of discards). −Could have potential benefits to protected species if effort is reduced. Benefits may be negated if fishing effort shifts into other fisheries or derby conditions arise posing a risk to protected species.	−Adverse immediate short-term social and economic effects, particularly to some communities in North Carolina, South Carolina, and Georgia. Long-term benefits are expected. −Estimated immediate revenue change is **-$0.64 million** (-10.8%) from the average of earnings in previous years to boat owners, captains, and crews. −Greater administrative burden than Alt. 1. −A total of 250 vessels landed vermilion snapper in 2004.
Alternative 3: Quota = 821,000 lbs gw; retain 12" total length; trip limit = 720 lbs gw.	−Greater beneficial effects to stock, ecosystem, and protected species than Alt. 2 as the trip limit is projected to extend the fishing season through **December** each year. Would end overfishing (depending on magnitude of discards).	−Adverse immediate short-term social and economic effects. Long-term benefits are expected. −Estimated immediate revenue change is **-$0.91 million** (-15.2%) from the average of earnings in previous years to boat owners, captains, and crews. −Could be more time-consuming for law enforcement to ensure compliance compared to Alt. 2 due to the trip limit.
Alternative 4: Quota = 821,000 lbs gw; increase size limit to 13" total length; and trip limit = 1,080 lbs gw.	−Greater beneficial effects to stock and ecosystem than Alts. 1 and 2 as the trip limit is projected to extend the fishing season to **December**. The size limit would increase the yield per recruit but would increase discards. Would end overfishing (depending on magnitude of discards). −**31%** reduction of the average landings from 1999-2001. −Benefits to protected species are similar to descriptions for Alternative 3.	−Adverse immediate short-term social and economic effects. Long-term benefits are expected. −Estimated immediate revenue change is **-$0.93 million** (-15.6%) from the average of earnings in previous years to boat owners, captains, and crews. −Greater administrative burden than Alt. 3 but less than Alt. 2.

Alternatives: (Table 2-5)	Biological and Protected Species Effects	Economic, Social, and Administrative Effects
Alternative 5: Quota = 757,000 lbs gw; retain 12" total length size limit.	−As the annual quota is 83,000 lbs gw less than Alt. 2, the beneficial effects of reduced directed mortality would be anticipated to be greater but reduced by an increased incidence of regulatory discards (trip limit is projected to extend the fishing season through **August).** −**31%** reduction of the average landings from 1999-2003. −Would end overfishing (depending on magnitude of discards). −Benefits to protected species in Alternative 5 are similar to descriptions for Alternative 2.	−Adverse immediate short-term social and economic effects, particularly to some communities in North Carolina, South Carolina, and Georgia. Long-term benefits are expected. −Estimated revenue change is **-$0.79 million** (-13.1%) from the average of earnings in previous years to boat owners, captains, and crews. −Similar administrative effects as Alt. 2.
Alternative 6: Quota = 757,000 lbs gw; retain 12" total length; trip limit = 720 lbs gw.	−Greater beneficial effects to stock, ecosystem, and protected species than Alt. 5 as the trip limit is projected to extend the fishing season through **December**. −**31%** reduction of the average landings from 1999-2003. −Would end overfishing (depending on magnitude of discards). −Benefits to protected species in Alternative 6 are similar to descriptions for Alternative 3.	−Adverse immediate short-term social and economic effects. Long-term benefits are expected. −Estimated immediate revenue change is **-$1.00 million** (-16.7%) from the average of earnings in previous years to boat owners, captains, and crews. −Similar administrative effects as Alt. 3.
Alternative 7: Quota = 757,000 lbs gw; increase size limit to 13" total length; and trip limit = 1,080 lbs gw.	Alternative 7 would be expected to have a greater number of regulatory discards than Alternative 6. Furthermore, survival of released vermilion snapper is poor. −**31%** reduction of the average landings from 1999-2003. −Would end overfishing (depending on magnitude of discards). −Benefits to protected species in Alternative 7 are similar to descriptions for Alternative 3.	−Adverse immediate short-term social and economic effects. Long-term benefits are expected. −Estimated immediate revenue change is **-$1.02 million** (-17.0%) from the average of earnings in previous years to boat owners, captains, and crews. −Similar administrative effects as Alt. 4.
Alternative 8: Quota = 821,000 lbs gw; retain 12" TL size limit. <u>Alt. 8A</u>: Trip limit = 300 lbs gw when 75% of quota is met. <u>Alt. 8B</u>: Trip limit = 200 lbs. when 85% of quota is met. <u>Alt 8C</u>: Trip limit is not imposed if percent specified in Alts 8A and 8B is not captured by September 1.	−Establishment of a trip limit (Alts 8A and 8B) when 75% or 85% of the quota was met would help ensure that the fishery was extended through **December** and derby-type conditions did not take place. −**31%** reduction of the average landings from 1999-2001. −Would end overfishing (depending on magnitude of discards).	−Greater immediate short-term adverse effects on communities than Alt. 1 but less than the remaining alternatives., 8C has the least adverse effects of the 3 subalternatives. Long-term benefits are expected. −Estimated revenue change is **-$0.76 million** (-12.7%) and **-$0.71 million** (-11.8%) from the average earnings in previous years to boat owners, captains, and crews for Alts. 8A and 8B, respectively. −Greatest administrative burden, along with Alt. 9, of all alternatives.
Alternative 9: Quota = 757,000 lbs gw; retain 12" TL size limit. <u>Alt. 9A</u>: Trip limit = 300 lbs gw when 75% of quota is met. <u>Alt. 9B</u>: Trip limit = 200 lbs when 85% of quota is met. <u>Alt 9C</u>: Trip limit is not imposed if percent specified in Alts 9A and 9B is not captured by September 1.	−With the exception of the lower quota, Alternative 9 is identical to Alternative 8. −Impacts to protected species from Alternative 9 is similar to those described for Alternatives 2 through 7 with a risk of derby-type conditions arising prior to a trip limit being triggered. Would end overfishing (depending on magnitude of discards).	−Greater immediate short-term adverse effects on communities than Alts. 1 and 8, but less than the remaining alternatives., 8C has the least adverse effects of the 3 subalternatives. Long-term benefits are expected. −Estimated immediate revenue change is **-$0.90 million** (-15.0%) and **-$0.86 million** (-14.3%) from the average earnings in previous years to boat owners, captains, and crews for Alts. 9A and 9B, respectively. −Greatest administrative burden, along with Alt. 8, of all alternatives.

Alternatives: (Table 2-6)	Biological and Protected Species Effects	Economic, Social, and Administrative Effects
Alternative 10 (Preferred): Quota = 1,100,000 lbs gw; retain 12" TL size limit.	−Beneficial effects are expected including reduced fishing mortality restoring natural age/size structure, sex ratio, and ecosystem balance by eliminating high catch years like 2000-2002. Based on average landings from 1999-2003, the fishery would remain open all year. Would cap catch at level of average catch during 1999-2003. −There would be fewer regulatory discards than other alternatives. −Could have potential benefits to protected species if effort is reduced. Benefits may be negated if fishing effort shifts into other fisheries or derby conditions arise posing a risk to protected species.	− Short-term economic adverse effects are less than other alternatives. Potential for adverse immediate short-term social and economic effects if quota is met. Long-term benefits are expected by ensuring extremely high annual catches do not occur. −Estimated immediate revenue change is **-$0.25 million** (-4.1%) from the average of earnings in previous years to boat owners, captains, and crews. −Greater administrative burden than Alt. 1. −A total of 250 vessels landed vermilion snapper in 2004.

The Council's **Preferred Alternative 10** was developed in response to public comments on the public hearing draft of Amendment 13C and associated DEIS. The commercial quota proposed by this alternative is not the most environmentally preferable of those considered. However, it takes into consideration stakeholder concerns about the uncertainty of the 2003 vermilion snapper stock assessment, which prompted Council action to end overfishing of the vermilion snapper stock. The intent is to limit the unavoidable adverse socioeconomic effects associated with vermilion snapper harvest reductions by specifying a quota that simply prevents spikes in harvest similar to those that occurred during 1999-2001 until the 2007 assessment is completed and the Council better understands the status of the vermilion snapper stock. This alternative is not expected to compromise stock sustainability over the long term, as long as the Council revisits management needs following the 2007 assessment.

2.3.2 Recreational Management Measures

Table 2-6. Summary of effects of recreational management measure alternatives for vermilion snapper.

Alternatives: (Table 2-6)	Biological and Protected Species Effects	Economic, Social, and Administrative Effects
Alternative 1: No Action. 11" TL minimum size limit; 10 fish/person/day	−Adverse effects to resource associated with continued overfishing. −Would maintain existing risk of protected species interactions.	−No immediate adverse short-term effects to recreational fishermen and associated industries. Adverse long-term effects to those same entities. − Legal risk related to no action to address overfishing.
Alternative 2 (Preferred): Increase size limit to 12" TL.	−Both beneficial (higher yield per recruit), reduced fishing pressure, and adverse (increase in regulatory discards) effects. A **20%** reduction of the average landings from 1999-2003 is projected from management regulations. −Alternative 2 could have potential benefits to protected species if effort is reduced. Benefits may be negated if fishing effort shifts into other fisheries or derby-type conditions arise posing a risk to protected species.	−Adverse immediate short-term social and economic effects. Long-term benefits are possible. −Would reduce immediate annual non-market benefits by **$74,803** (21%), **$274,067** (30%), and **$348,870** (28%) for all private/charter, headboat sectors, and entire recreational sectors, respectively.

Alternatives: (Table 2-6)	Biological and Protected Species Effects	Economic, Social, and Administrative Effects
Alternative 3: Increase size limit to 12" TL and reduce bag limit to 6 fish/person/trip.	−Similar beneficial and adverse effects as described for Alt. 2. A greater reduction in average landings from 1999-2003 **(31%)** translates into a greater degree of net beneficial impacts than Alt. 2 though regulatory discards could be greater. Overfishing would end (depending on magnitude of discards) upon implementation of regulations.	−Possible significant immediate short-term adverse impacts on longer head boat trips, especially in North Carolina. Long-term benefits are expected. −Would reduce immediate annual non-market benefits by **$98,136** (28%), **$375,331** (42%), and **$473,744** (38%) for all private/charter, headboat sectors, and entire recreational sectors, respectively. −Smaller bag limit could make compliance checks easier for Law Enforcement.
Alternative 4: October to December closure.	−A reduced reduction in average landings from 1999-2003 **(16%)** translates into a lower degree of net beneficial impacts than the rest of the alternatives (besides Alt. 6). Would allow overfishing to continue and have long-term negative effects; however, a reduction in fishing mortality would be beneficial to the stock. Number of discards would be reduced compared to other alternatives. −The October through December closure may benefit sea turtles, primarily off North Carolina and the east coast of Florida.	−Adverse immediate short-term social and economic effects. Long-term benefits are questionable. −Would reduce annual non-market benefits by **$58,782** (17%), **$132,811** (15%), and **$191,594** (15%) for all private/charter, headboat sectors, and entire recreational sectors, respectively. −Although a closed season would represent an additional regulation to enforce, a closure may reduce the overall burden on enforcement by making it simpler to determine whether or not anglers are complying with regulations.
Alternative 5: October to December closure and reduce bag limit to 6 fish per person per trip.	−Similar beneficial and adverse effects as described for Alt. 4, though a greater reduction in average landings from 1999-2003 **(30%)** translates into a greater degree of net beneficial impacts. Overfishing would end upon implementation of regulations (depending on magnitude of discards).	−Adverse immediate short-term social and economic effects. Long-term benefits are expected. −Would reduce immediate annual non-market benefits by **$99,473** (28%), **$354,400** (39%), and **$453,873** (36%) for all private/charter, headboat sectors, and entire recreational sectors, respectively. −Smaller bag limit could make compliance checks easier for Law Enforcement.
Alternative 6: January to February closure.	−Similar beneficial and adverse effects as described for Alt. 4 though the closure would be one month shorter. A **13%** reduction of the average landings from 1999-2003 is projected from management regulations. Would allow overfishing continue and have long-term negative effects; however, a reduction in fishing mortality would be beneficial to the stock.	−Adverse immediate short-term social and economic effects. Long-term benefits are questionable. −Would reduce immediate annual non-market benefits by **$52,945** (15%), **$17,047** (2%), and **$69,992** (6%) for all private/charter, headboat sector, and entire recreational fishery, respectively. −Similar administrative effects as Alt. 4.
Alternative 7: January to February closure and reduce bag limit to 5 fish per person per trip.	−Similar beneficial and adverse effects as described for Alt. 5. A **32%** reduction of the average landings from 1999-2001 is projected from management regulations. Overfishing would end upon implementation of regulations (depending on magnitude of discards).	−Adverse immediate short-term social and economic effects. Long-term benefits are expected. −Would reduce immediate annual non-market benefits by **$97,205** (28%), **$353,709** (39%), and **$450,914** (36%) for all private/charter, headboat sector, and entire recreational fishery, respectively. −Smaller bag limit could make compliance checks easier for Law Enforcement.

Alternatives: (Table 2-6)	Biological and Protected Species Effects	Economic, Social, and Administrative Effects
Alternative 8: **Alt. 8A:** Increase minimum size to 12" total length and reduce bag limit to 6 fish for the for-hire sector and 4 fish for the private sector. **Alt. 8B:** Increase minimum size to 12" total length and reduce bag limit to 6 fish for the for-hire sector and 5 fish for the private sector.	−Similar beneficial and adverse effects as described for Alt. 3. A **31%** and **34%** reduction of the average landings from 1999-2001 is projected from Alts. 8A and 8B, respectively.	−Adverse immediate short-term social and economic effects. Long-term benefits are expected. −Both Alts. 8A and 8B would reduce immediate annual non-market benefits by **$375,331** for all headboat sectors. −The data is not available to estimate the separate effects on the charter and private recreational sectors. The range in immediate reduction for alternative 8A is between **$98,413** (28%) and **$122,401** (35%). The range in immediate reduction for alternative 8B is between **$98,413** (28%) and **$108,879** (31%). −A smaller bag limit could make compliance checks easier for Law Enforcement.
Alternative 9: January to February closure and increase size limit to 12" total length.	−Similar beneficial and adverse effects as described for Alt. 6. A **33%** reduction of the average landings from 1999-2001 is projected from management regulations. Overfishing would end upon implementation of regulations. Higher discard rate for size limit because most fish are small but not that many fish caught at higher bag limit.	−Adverse immediate short-term social and economic effects. Long-term benefits are expected. −Would reduce immediate annual non-market benefits by **$115,369** (33%), **$283,239** (31%), and **$398,608** (32%) for private/charter sector, headboat sector, and entire recreational fishery, respectively.

The Council's **Preferred Alternative 2** was developed in response to public comments on the public hearing draft of Amendment 13C and associated DEIS. The proposed minimum size limit increase is estimated to reduce recreational fishing mortality from 20-21%, which is less than the estimated 31-32% reduction needed to end overfishing of vermilion snapper by the recreational sector. As a result, this alternative is not the most environmentally preferable of those considered by the Council. However, it takes into consideration stakeholder concerns that harvest reductions being considered by the Council are unnecessarily severe. The intent is to limit the unavoidable adverse socioeconomic effects associated with vermilion snapper harvest reductions by implementing partial harvest reductions until the 2007 vermilion snapper assessment is completed and the Council better understands the status of the vermilion snapper stock. This alternative is not expected to compromise stock sustainability over the long term as long as the Council revisits management needs following the 2007 assessment. While regulatory discards resulting from the proposed minimum size limit increase will increase total fishing mortality on the vermilion snapper stock, this source of mortality is accounted for in determinations about the percent reduction achieved from minimum size limit regulations.

2.4 Black Sea Bass

Black sea bass is overfished and experiencing overfishing. A 62% reduction in catch is needed to end overfishing. Commercial quotas and recreational allocations are based on historical catch.

2.4.1 Commercial Management Measures

Table 2-7. Summary of effects of commercial management measure alternatives for black sea bass.
All weights are in pounds (lbs) gutted weight (gw). For alternatives with quotas, prohibit purchase and sale and, prohibit harvest and/or possession after the quota is met.

Alternatives: (Table 2-7)	Biological and Protected Species Effects	Economic, Social, and Administrative Effects
Alternative 1: No Action. 10" TL minimum size limit and numerous pot restrictions (see Section 4.4.2.1).	−Adverse effects to resource associated with continued overfishing. −Would maintain existing risk of protected species interactions.	−No immediate adverse short-term effects to commercial fishermen, fishing communities, and associated industries. Adverse long-term effects to those same entities. −Legal risk related to no action to address overfishing.
Alternative 2: Quota = 347,000 lbs gw; increase size limit to 11" total length; require use of 2" mesh back panel in pots; and change fishing year to June 1 to May 31.	−Both beneficial (reduced fishing mortality possibly restoring natural age/size structure, sex ratio, and ecosystem balance and ecosystem from projected **25%** reduction of the average landings from 2000-2003) and adverse effects (possible increase in regulatory discards as it is projected, based on historical levels of catch, that the quota would be achieved in **December**). Greater adverse effects could occur if effort increases earlier in the year due to modification in fishing behavior. It is anticipated that the net effects would be beneficial to stock. Would end overfishing during 2006-2008. −Alternative 2 could have potential benefits to protected species if effort is reduced. Benefits may be negated if fishing effort shifts into other fisheries or derby-type conditions arise posing a risk to protected species.	−Greatest immediate short-term adverse social and economic effects, particularly to some communities in North and South Carolina. Long-term beneficial effects to those same entities. −Estimated immediate revenue change is **-$0.27 million** (-4.5%) from the average of earnings in previous years to boat owners, captains, and crews. These estimations do not factor in the preferred alternatives for the other actions. −Increased burden to law enforcement and must establish a monitoring program. −A total of 240 vessels harvested black sea bass in 2004.
Alternative 3: Quota = 309,000 lbs gw; increase size limit to 11" total length; require use of 2" mesh back panel in pots; change fishing year to June 1 to May 31; and H&L trip limit = 235 lbs gw, pot trip limit = 910 lbs gw.	−Similar beneficial and adverse effects as Alt. 2. The trip limit is expected to extend the fishing season till December of each year. As this alternative would reduce harvest by **35%**, it is anticipated that the net effects would be beneficial to stock. Would end overfishing during 2006-2008.	- Immediate short-term adverse social and economic effects. Long-term beneficial effects to those same entities. −Estimated immediate revenue change is **-$0.32 million** (-5.3%) from the average of earnings in previous years to boat owners, captains, and crews. These estimations do not factor in the preferred alternatives for the other actions.
Alternative 4: Quota = 423,000 lbs gw; increase size limit to 11" total length; require use of 2" mesh back panel in pots; and change fishing year to June 1 to May 31.	−Beneficial effects would be less than Alt. 2. Higher quota could allow overfishing to continue until 2011. A **22%** reduction is estimated from the size limit. The quota would ensure at least a **8-11%** reduction of the average landings from 1999-2003.	- Immediate short-term adverse social and economic effects. Long-term beneficial effects to those same entities could occur. −Estimated revenue change is **-$0.24 million** (-4.0%) from the average of earnings in previous years to boat owners, captains, and crews. These estimations do not factor in the preferred alternatives for the other actions.

Alternatives: (Table 2-7)	Biological and Protected Species Effects	Economic, Social, and Administrative Effects
Alternative 5: Quota = 477,000 lbs gw (year 1); 423,000 lbs (year 2); 309,000 lbs gw (year 3). Increase minimum size to 11" total length; require 2" mesh in back panel of pot; change fishing year to June 1 to May 31; and H&L trip limit = 595 lbs gw (year 2); 235 lbs gw (year 3). Pot trip limit = 1,675 lbs gw (year 2); 910 lbs gw (year 3).	−Similar beneficial and adverse effects as Alt. 2. The trip limit is expected to extend the fishing season until December of each year. As this alternative would reduce harvest by **35%** in year 3, it is anticipated that the net effects would be beneficial to stock as long as the larger quotas in Years 1 and 2 do not compromise stock rebuilding. Would end overfishing during 2009-2011.	− Immediate short-term adverse social and economic effects. Long-term beneficial effects to those same entities as long as the larger quotas in Years 1 and 2 do not compromise stock rebuilding. −Estimated immediate revenue change is **-$0.22 million** (-3.7%), -**$0.24 million** (-4.0%), and **-$0.32 million** (-5.3%) from the average of earnings in previous years to boat owners, captains, and crews for years 1, 2, and 3, respectively. These estimations do not factor in the preferred alternatives for the other actions.
Alternative 6: No quota; retain 10" minimum size; require 2" mesh in back panel of pots; and prohibit harvest and/or retention of black sea bass over the bag limit during March through June.	−As this alternative is expected to reduce harvest by **28%**, it is anticipated that the net effects would be beneficial to stock if measures end overfishing. However, without a commercial quota or TAC to keep harvest in check, overfishing could continue to occur if reductions provided by the 2" mesh panel and the season closure have been overestimated.	− Immediate short-term adverse social and economic effects. Long-term beneficial effects to those same entities are questionable. −Estimated immediate revenue change is **-$0.26 million** (-4.4%) from the average of earnings in previous years to boat owners, captains, and crews. These estimations do not factor in the preferred alternatives for the other actions.
Alternative 7: No quota; increase minimum size limit to 11" total length; require 2" mesh in back panel of pots.	−As this alternative would reduce harvest by **22%**, it is anticipated that the net effects would be beneficial to stock if actions end overfishing. However, without a commercial quota or TAC to keep harvest in check, overfishing could continue to occur if reductions provided by the 2" mesh panel and the season closure have been overestimated.	− Immediate short-term adverse social and economic effects. Long-term beneficial effects to those same entities are questionable. − Estimated immediate revenue change is **-$0.22 million** (-3.6%) from the average of earnings in previous years to boat owners, captains, and crews. These estimations do not factor in the preferred alternatives for the other actions.
Alternative 8 (Preferred): Quota = 477,000 lbs gw (year 1); 423,000 lbs gw (year 2); 309,000 lbs gw (year 3). Require 2" mesh in back panel of pot; require pots be removed from the water when quota is met; change fishing year to June 1 to May 31.	−Similar beneficial and adverse effects as Alt. 2. As this alternative would reduce harvest by **35%** in year 3, it is anticipated that the net effects would be beneficial to stock as long as the larger quotas in Years 1 and 2 do not compromise stock rebuilding. Would end overfishing during 2009-2011.	− Immediate short-term adverse social and economic effects. Long-term beneficial effects to those same entities as long as the larger quotas in Years 1 and 2 do not compromise stock rebuilding. −Estimated immediate revenue change is **-$0.07 million** (-1.2%), **-$0.19 million** (-3.1%), and **-$0.28 million** (-4.7%) from the average of earnings in previous years to boat owners, captains, and crews for years 1, 2, and 3, respectively.

The Council's **Preferred Alternative 8** was developed in response to public comments on the public hearing draft of Amendment 13C and associated DEIS. This alternative would best minimize the unavoidable short-term adverse socioeconomic effects associated with ending overfishing on the black sea bass stock. While this stepped approach to ending overfishing is not the most environmentally preferable, it is intended to provide affected fishermen more time to plan how they will manage and accommodate relatively severe harvest restrictions without compromising stock sustainability over the long term. This will help to ensure the long-term viability of the snapper grouper fishery.

2.4.2 Recreational Management Measures

Table 2-8. Summary of effects of recreational management measure alternatives for black sea bass.

Alternatives: (Table 2-8)	Biological and Protected Species Effects	Economic, Social, and Administrative Effects
Alternative 1: No Action. 10" TL, 20 fish/person/day	−Adverse effects to resource associated with continued overfishing. −Would maintain existing risk of protected species interactions.	−No immediate adverse short-term effects to recreational fishermen and associated industries. Adverse long-term effects to those same entities.
Alternative 2: Recreational allocation = 459,000 lbs gw; increase size limit to 12" TL; bag limit =15 fish/person/day; and change fishing year to June 1 to May 31.	−Both beneficial (higher yield per recruit) and adverse (increase in regulatory discards) from the increase in size limit and decrease in bag limit. A **46%** reduction is estimated from the size/bag limit. The quota would ensure at least a **26%** reduction of the average landings from 1999-2003. It is anticipated that the net effects would be beneficial to the stock. Would end overfishing during 2006-2008. −Specifying a TAC could have indirect, beneficial impacts as a target would be established and would serve as a benchmark to alter future regulations.	−No significant immediate short-term adverse social impacts to head-boat operators or private fishermen. −Would reduce immediate annual non-market benefits by **$456,267** (49%), **$302,778** (67%), and **$759,045** (55%) for all private/charter, headboat sectors, and entire recreational sectors, respectively. −Long-term beneficial effects to those same entities. −Smaller bag limit could make compliance checks easier for law enforcement.
Alternative 3: Recreational allocation = 409,000 lbs gw; increase size limit to 11" TL; bag limit = 4 fish/person/day; fishing year = June 1 to May 31.	−Similar beneficial and adverse effects as described for Alt. 2. −**35%** reduction of the average landings from 1999-2003. Would end overfishing during 2006-2008.	−Would have a significant immediate short-term adverse social impact on the for-hire industry, especially in North Carolina. −Would reduce immediate annual non-market benefits by **$380,790** (41%), **$217,894** (48%), and **$598,684** (44%) for all private/charter, headboat sectors, and entire recreational sectors, respectively. −Long-term beneficial effects to those same entities. −The administrative burden would be similar to Alt. 2. A smaller bag limit would decrease the burden.
Alternative 4: Recreational allocation = 560,000 lbs gw; increase size limit to 11" TL; fishing year = June 1 to May 31.	−Beneficial and adverse effects would be less than Alt. 2. −A **24%** reduction is estimated from the size limit. The quota ensures at least an **8-11%** reduction of the average landings from 1999-2003. Would end overfishing during 2006-2011.	−Less immediate adverse short-term social effects to headboat operators than Alt. 3 but more than Alt. 1. −Would reduce immediate annual non-market benefits by **$253,400** (27%), **$183,133** (41%), and **$436,533** (32%) for all private/charter, headboat sectors, and entire recreational sectors, respectively. −Long-term beneficial effects to those same entities. −The administrative burden would be similar to Alt. 2.
Alternative 5: Recreational allocation = 633,000 lbs gw (year 1); 560,000 lbs gw (year 2); 409,000 lbs gw (year 3). Retain 10" TL size limit in year 1; increase minimum size to 11" TL in years 2 and 3. Retain 20 fish bag limit in years 1 and 2; bag limit = 4 fish in year 3. Fishing year = June 1 to May 31.	−Similar beneficial and adverse effects as described for Alt. 2. −A **35%** reduction is projected at the end of 3 years. Would end overfishing during 2009-2011.	−In year 2, would reduce non-market benefits by **$253,400** (27%), **$183,133** (41%), and **$436,533** (32%) for all private/charter, headboat sectors, and entire recreational sectors, respectively. −In year 3, would reduce annual non-market benefits by **$380,790** (41%), **$217,894** (48%), and **$598,684** (44%) for all private/charter, headboat sectors, and entire recreational sectors, respectively. −Long-term beneficial effects to those same entities are expected. −There would also be an increased burden for law enforcement to ensure compliance with the quotas and trip limits.

Alternatives: (Table 2-8)	Biological and Protected Species Effects	Economic, Social, and Administrative Effects
Alternative 6: Retain the 10" total length minimum size limit and reduce the bag limit from 20 fish to 10 fish. No recreational allocation.	Provides the least reduction in harvest of any alternative. −Provides the least amount of assurance that overfishing would end, biomass would increase, and the natural population age and size structure would be restored to more natural conditions. −A 3% reduction is estimated from the bag limit. −Management measures in Alternative 6 would provide the least amount of confidence that black sea bass would be restored to more natural conditions despite an increasing population of recreational fishermen.	−Less immediate adverse short-term social effects to headboat operators than Alt. 1. −Would reduce immediate annual net non-market benefits by **$158,069** (17%), **$26,303** (6%), and **$184,372** (13%) for the private/charter, headboat sectors, and the entire recreational sectors, respectively. −Long-term beneficial effects to those same entities. −The administrative burden would be similar to Alt. 2. A smaller bag limit would decrease the burden.
Alternative 7: Increase the minimum size to 11" total length. Does not specify a recreational allocation.	−Similar to Alternative 3, except it does not specify a TAC or recreational allocation. −Increasing the minimum size to 11" total length might end overfishing during 2007-2009 if the total commercial and recreational catch did not exceed a specified TAC.	−Would have a significant immediate short-term adverse social impact on the for-hire industry, especially in North Carolina. −Would reduce immediate annual net non-market benefits by **$253,400** (27%), **$183,133** (41%), and **$436,533** (32%) for the private/charter, headboat sectors, and entire recreational sectors, respectively. −Long-term beneficial effects to those same entities. −The administrative burden would be similar to Alt. 2. A smaller bag limit would decrease the burden.
Alternative 8 (Preferred): Recreational allocation = 633,000 lbs gw (year 1); 560,000 lbs gw (year 2); 409,000 lbs gw (year 3). Increase minimum size to 11" TL in year 1 and 12" TL in year 2. Reduce bag limit from 20 to 15 fish per person per day. Fishing year = June 1 to May 31.	−Similar beneficial and adverse effects as described for Alt. 2. −A **35%** reduction is projected at the end of 3 years based on recreational allocation. A **46%** reduction is estimated from the size/bag limit. Would end overfishing during 2009-2011.	−No significant immediate short-term adverse social impacts to head-boat operators or private fishermen. −Would reduce immediate annual non-market benefits by **$253,550**, **$184,097**, and **$437,647** for the private/charter, headboat, and entire recreational sectors, respectively in year 1. Corresponding impacts for year 2 onwards are as follows: **$456,267**, **$302,778**, and **$759,045**. −Long-term beneficial effects to those same entities. −Smaller bag limit could make compliance checks easier for law enforcement.

The Council's **Preferred Alternative 8** was developed in response to public comments on the public hearing draft of Amendment 13C and associated DEIS. This alternative would best minimize the unavoidable short-term adverse socioeconomic effects associated with ending overfishing on the black sea bass stock. While this stepped approach to ending overfishing is not the most environmentally preferable, it is intended to provide affected fishermen more time to plan how they will manage and accommodate relatively severe harvest restrictions without compromising stock sustainability over the long term. While regulatory discards resulting from the proposed minimum size limit increase will increase total fishing mortality, this source of mortality is accounted for in determinations about the percent reduction achieved from minimum size limit regulations.

2.5 Red Porgy

Red porgy is overfished but is not experiencing overfishing. Work done in association with SEDAR 1 (2002) indicates that catch can be increased by 109%.

Table 2-9. Summary of effects of management measure alternatives for red porgy.
All weights are in pounds (lbs) and gutted weight (gw) or whole weight (ww). For alternatives with quotas, prohibit purchase and sale and, prohibit harvest and/or possession after the quota is met.

Alternatives: (Table 2-9)	Biological and Protected Species Effects	Economic, Social, and Administrative Effects
Alternative 1: No Action. 14" TL min. size limit (rec. and comm.); 50 lbs ww trip limit during May through December (comm.); bag limit of one/person/trip year-round (rec.). Possession is limited to the bag limit from January through April. Sale/purchase is prohibited during January through April.	−Beneficial effects to resource associated with continued rebuilding. Greatest assurance stock will rebuild according to schedule.	−Possible adverse social effects if managers do not allow increased harvest following significant regulations and a stock assessment that indicates that allowable harvest catch may increase according to a rebuilding plan.
Alternative 2: **(Preferred):** Increase the comm. trip limit to 120 red porgy (210 lbs gw; 220 lbs ww) during May through December. Increase the recreational bag limit to 3 red porgy/person/day. Commercial quota = 127,000 lbs gw; 132,000 lbs ww.	− Increase in fishing mortality is in-line with the rebuilding plan and would not jeopardize the sustainability of the stock. Possibility the fishing mortality could exceed Fmsy and overfishing could occur. Would retain the closure and protect spawning fish. −Would increase harvest **109%** from historical levels.	−Estimated revenue change is **+$.07** million (+2.1%) from the average of earnings in previous years to boat owners, captains, and crews. Would increase annual net economic benefits by **$11,554** and **$20,838** for all private/charter and headboat sectors, respectively. −Positive social impacts by switching to numbers of fish and not discarding as many encountered fish. −Increased administrative burden from quota monitoring but law enforcement may benefit from the change to numbers of fish.
Alternative 3: Same as Alt. 2 but rec. bag limit = 2 red porgy/person/trip.	−Slightly less chance than alternative 2 of fishing mortality exceeding Fmsy. Would retain the closure and protect the male/female social structure. −Would increase harvest **109%** from historical levels, but would constrain fishing mortality below the maximum threshold.	−Estimated revenue change is **+$.07** million (+2.1%) from the average of earnings in previous years to boat owners, captains, and crews. Would increase annual net economic benefits by **$7,781** and **$15,429** for all private/charter and headboat sectors, respectively. −Positive social impacts by switching to numbers of fish and not discarding as many encountered fish. −Same administrative effects as Alt. 2.

Alternatives: (Table 2-9)	Biological and Protected Species Effects	Economic, Social, and Administrative Effects
Alternative 4: Same as Alt. 3 but comm. trip limit = 65 red porgy (115 lbs gw; 120 lbs ww) year-round.	−Greater adverse effects to the stock than all the Alts. (except 5)as it would increase eliminate the spawning season closure. −Would increase harvest **109%** from historical levels, but would constrain fishing mortality below the maximum threshold.. −Potential adverse effects to protected resources from more gear in the water.	−Estimated revenue change is **+$.08** million (+2.2%) from the average of earnings in previous years to boat owners, captains, and crews. Would increase annual net economic benefits by **$7,781** and **$15,429** for all private/charter and headboat sectors, respectively. −Positive social impacts by switching to numbers of fish and not discarding as many encountered fish. −Increased administrative burden from the removal of the closed season but law enforcement may have greater benefits by counting less fish than Alts. 2 and 3.
Alternative 5: Same as Alt. 4 but bag limit = 3 red porgy/person/trip.	−Greatest adverse effects to the stock as it would increase harvest the most and eliminate the spawning season closure. −Would increase harvest **109%** from historical levels, but would constrain fishing mortality below the maximum threshold.. −Potential adverse effects to protected resources from more gear in the water.	−Estimated revenue change is **+$.08** million (+2.2%) from the average of earnings in previous years to boat owners, captains, and crews. Would increase annual net economic benefits by **$11,554** and **$20,838** for all private/charter and headboat sectors, respectively. −Positive social impacts by switching to numbers of fish and not discarding as many encountered fish.

The Council's **Preferred Alternative 2** would provide fishery participants an increase in harvest equal to the maximum amount allowable under the current red porgy rebuilding plan. While the maximum allowable harvest increase is not the most environmentally preferable alternative considered, lesser increases are considered unnecessarily restrictive.

3.0 AFFECTED ENVIRONMENT

Inshore/Estuarine Habitat
Many snapper grouper species utilize pelagic and benthic habitats during their life history. Planktonic larval stages 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; i.e., coral reefs, artificial reefs, rocky hard-bottom substrates, ledges and caves, sloping soft-bottom areas, and limestone outcroppings. Juveniles of some snapper grouper species occur in inshore seagrass beds, mangrove estuaries, lagoons, oyster reefs, and bay 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).

Offshore Habitat
The principal snapper grouper fishing areas are located in live bottom and shelf-edge habitats. Temperatures range from 11° to 27° C (52° to 81° F) over the continental shelf and shelf-edge due to the proximity of the Gulf Stream, with lower shelf habitat temperatures varying from 11° to 14° C (52° to 57° F). 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 the lower-shelf habitat.

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 bottom. These hard, live-bottom habitats may be 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 fans. Live-bottom habitat is scattered irregularly over most of the shelf north of Cape Canaveral, but is most abundant off northeastern Florida. South of Cape Canaveral, the continental shelf narrows from 56 to 16 kilometers (35 to 10 miles) and less 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 characteristics.

Rock outcroppings occur throughout the continental shelf from Cape Hatteras, NC to Key West, FL (MacIntyre and Milliman 1970; Miller and Richards 1979; Parker *et al*. 1983). Generally, the outcroppings are composed of bioeroded limestone and carbonate sandstone (Newton *et al*. 1971) and exhibit vertical relief ranging from <0.5 to over 10 meters (33 feet). Ledge systems formed by rock outcrops and piles of irregularly sized boulders are 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 area of bottom between 100 and 300 meters (328 and 984 feet) depths from Cape Hatteras, North Carolina to Key West is small relative to the shelf as a whole, it constitutes prime reef fish habitat according to fishermen and probably contributes significantly to the total amount of reef habitat.

Man-made artificial reefs are also utilized to attract fish and increase fish harvests. Research on man-made reefs is limited and opinions differ as to whether or not artificial structures actually promote an increase of biomass or merely concentrate fishes by attracting them from nearby natural areas.

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 methodology used to determine hard bottom habitat relied on the identification of reef obligate species including members of the snapper grouper complex. ArcView maps were prepared for the four-state project by 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. The 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 over the Internet on the Council's Internet Mapping System http://ocean.floridamarine.org/efh_coral/ims/viewer.htm.

Additional information on managed species use of offshore fish habitat was generated cooperatively by the South Carolina Department of Natural Resources, NOAA/Biogeographic Characterization Branch, and the South Atlantic Fishery Management Council. 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 http://ocean.floridamarine.org/efh_coral/ims/viewer.htm.

3.1 Essential Fish Habitat

Essential fish habitat (EFH) for snapper-grouper species 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 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 an essential fish habitat because it provides a mechanism to disperse snapper grouper larvae.

For specific life stages of estuarine dependent and nearshore snapper grouper species, essential fish habitat 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.

3.2 Essential Fish Habitat – 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; nearshore 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 (egg, larval, postlarval, juvenile, and adult stages.)

3.2.1 Oculina Bank Habitat Area of Particular Concern

3.2.1.1 Geology

The *Oculina* Bank resides in close proximity to the continental shelf edge (i.e., 100-fathom (183 meter; 600 foot) contour). The depth of the western edge of the *Oculina* Bank is approximately

55 meters (180 feet), while the eastern boundary, located less than 4.8 kilometers (3 miles) east is approximately 122 meters (400 feet). The northward end of the bank towards Cape Canaveral is more longitudinally compressed, with *Oculina* coral thriving in a corridor less than 2 miles across.

The geology of the *Oculina* Bank generally consists of sandy, silty, and muddy sediments, punctuated by limestone ridges and pinnacles locally known as “cones”. These cones are concentrated along the 79-meter (260-foot) contour (Scanlon *et al.* 1999). Generally, the sediments found in the deeper portions of the *Oculina* Bank (e.g., at depths greater than 90 meters (295 feet)) have a higher percentage of silt than do the sediments in the shallower areas to the west. Sediment samples taken near pinnacles and in scoured areas generally consist of sands and gravels, and contain less than 20% silt. Strong bottom currents have winnowed the sediments from the pinnacle and scoured areas, leaving behind only the coarser sands and gravels (Scanlon *et al.* 1999).

Oculina coral rubble can be a major component of the sediment. Anthropogenic and natural events can produce significant quantities of *Oculina* rubble. In some cases, this rubble accumulates in piles exceeding 1 meter (3 feet) in depth. This is particularly evident on artificial reefs and shipwrecks, where the apparent natural succession of *Oculina* coral produces a layer of rubble underneath healthy coral thickets (M. Barnette, NMFS, personal observation). While this rubble does not support as diverse a species assemblage of invertebrates and fishes as do healthy coral thickets, it does provide habitat for numerous invertebrate species. However, no detailed assessment or characterization of coral rubble has been accomplished. If the bathymetric relief presented by a pinnacle is sufficient to shelter the lee side from the influence of bottom currents, fine sediments can accumulate. In general, the finer-grained sediments have lower percentages of calcium carbonate than do the sands and gravels (Scanlon *et al*. 1999).

The geological origin and nature of the pinnacles has not been fully explained and documented. However, dredge samples obtained by MacIntyre and Milliman (1970) from the pinnacles consisted mainly of oolitic limestones (made up of small spherical grains, usually of calcium carbonate, cemented together) with some algal limestones and had radiocarbon ages from the late Pleistocene to the early Holocene eras. The presence of shrimp (*Callianassa* sp.) burrows and relict hermatypic coral heads (containing symbiotic algae) suggests a shallow water origin. MacIntyre and Milliman (1970) interpreted the pinnacles to be oolitic dunes that were deposited and petrified in a marine environment during the Holocene transgression. Subsequent erosion by the strong Gulf Stream currents and growth of ahermatypic (those without symbiotic algae) corals has produced the irregular high-relief pinnacles currently found on the *Oculina* Bank. The pinnacles vary in size and shape, but can rapidly rise as much as 18 meters (60 feet) or more from the seabed.

The texture of the cones in the absence of *Oculina* coral is generally smooth and pockmarked. When colonized by *Oculina* coral, the habitat complexity and amount of surface area associated with the cones is greatly increased.

3.2.1.2 Oceanography

Due to its proximity to the shelf edge, as well as to the Gulf Stream, the *Oculina* Bank can experience extremely dynamic conditions. Typically, the Gulf Stream meanders inshore during the warmer summer months, bringing with it warm (e.g., 29º C; 85º F) surface waters and a swift, northward-moving current. A "rip", as well as a distinct color change, indicating the delineation of the faster moving water body, usually marks the Gulf Stream current. This delineation may change daily or hourly. This boundary is sometimes found west of the *Oculina* Bank (i.e., 80º W longitude). Gulf Stream surface currents as great as 4 knots (2 meters/second; 6.7 feet/second) can be experienced.

The direction of the current typically is within a few degrees of due north. Bottom currents in the *Oculina* Bank generally are not as strong as the surface currents, and usually dissipate below the thermocline. However, in 2001, bottom currents approaching 3 knots (1.6 meters/second; 5.1 feet/second) were experienced at a site within the *Oculina* Bank, in 88 meters (290 feet) of water off Sebastian (M. Barnette, NMFS, personal observation). On average, bottom currents of 1 to 1.5 knots (0.5 to 0.8 meters/second; 1.7 to 2.5 feet/second) flow through the *Oculina* Bank (Scanlon *et al.* 1999; M. Barnette, NMFS, personal observation; Koenig 2001). Currents at the sediment-water interface are undoubtedly less strong than those observed just above the sea floor, and are most likely on the order of 0.5 knots (0.2 meters/second; 0.8 feet/second). However, that velocity would be enough to erode silt and sand (Hollister and Heezen 1972; Reineck and Singh 1980).

An interesting oceanographic anomaly produced by the *Oculina* Bank is a surface disturbance produced by current deflection off the limestone pinnacles. Depending on the intensity of the current, the depth to which it extends, as well as the amount of relief offered by a series of pinnacles, dramatic boils are formed on the water's surface. On a calm day, these boils can reveal the pinnacles below to fishermen. This deflection may help transfer and distribute nutrients flowing in colder, slower-moving, bottom currents to the warmer, faster-moving, surface currents.

Periods of strong currents that cause this effect also may carry larvae farther north during their planktonic stage than would normally occur if retained in the slower-moving waters when the Gulf Stream is farther offshore. Work completed by Jon Hare (NOAA, National Ocean Service) may act as supporting evidence of this effect. Researchers released satellite-tracked drifters from four sites in the *Oculina* Experimental Research Reserve. Of the 20 drifters released, 11 remained in the Gulf Stream and were transported north of Cape Hatteras, North Carolina where there is no appropriate juvenile habitat for snapper grouper species to settle out. Seven of the 20 drifters did move onto the shelf and were on the shelf for 35-50 days. Drifters moved onto the shelf during both late winter/early spring releases and summer releases. Release time coincided with the spawning seasons of gag, scamp, and several deep water species (Memo from J. Hare to P. Thompson, 2003).

Frequently in the summer months, the central east coast of Florida can experience dramatic upwelling. Parcels of cold water move inshore from beyond the shelf edge, resulting in tremendous temperature fluctuations. Commonly, the bottom temperature on the *Oculina* Bank averages 16º C (61º F). However, when an upwelling event occurs in the summer months, bottom temperatures can fall to 7º C (45º F) (Reed 1981). In June 2003, upwelling resulted in bottom temperatures of 9º C (48º F). Within the *Oculina* Bank, the thermocline began at a depth of 21 meters (70 feet) (M. Barnette, NMFS, personal observation).

These upwellings can affect the behavior of some species. In many cases, fish species will temporarily vacate a location where water temperatures are unsuitably cold, and move inshore to warmer waters. Noticeable reductions in the abundance of dominant fish species, such as amberjack, scamp, red barbier, roughtongue bass, gag, and Warsaw grouper, has been witnessed at several sites between 73-91 meters (240-300 feet) depth, inside and just on the border of the *Oculina* Bank, at the onset of a cold-water upwelling (M. Barnette, NMFS, personal observation). This behavior also has been observed by fishermen, who sometimes capture typical deep-water species, such as adult Warsaw grouper, in less than 30 m (100 feet) of water.

3.2.1.3 Biology

Amendment 10 to the Snapper Grouper Fishery Management Plan (SAFMC 1998b) describes habitat identified and described by the South Atlantic Council as essential to species in the snapper grouper fishery management unit (FMU). That amendment also describes HAPCs designated by the Council, as encouraged by the EFH Final Rule. The material presented in the Council's Final Habitat Plan for the South Atlantic Region (SAFMC 1998a) elaborates on the life history-habitat associations of species in the snapper grouper FMU, and on fishery-related impacts on EFH. The description of habitat provided in this section is restricted to *Oculina varicosa* coral.

Oculina varicosa is known to exist from the West Indies to North Carolina and Bermuda, occurring as small, random coral heads. However, off central Florida, from Ft. Pierce to Cape Canaveral, and at shelf-edge depths of 55-122 meters (180-400 feet), *Oculina* forms unique populations of dense coral growth on naturally occurring limestone ridges and pinnacles, as well as on artificial reefs and shipwrecks. Within this discrete area (approximately 261 nautical miles^2) known as the *Oculina* Bank HAPC, *Oculina* colonies can grow in excess of 2 meters (6 feet) in diameter in a thicket-like habitat. These coral thickets are the foundation for a diverse marine ecosystem, supporting numerous invertebrates and finfish species. The southern portion of the *Oculina* Bank HAPC includes the *Oculina* Experimental Closed Area. Three percent of that 92-nautical miles^2 area (i.e., 2.76 nautical miles^2) consists of high-relief pinnacle habitat (Scanlon *et al.* 1999).

Oculina varicosa is a stony coral that forms large bush-like colonies up to 2 meters (5 feet) tall and over 2 meters (6 feet) in diameter, with dendritic branches extending from the base. These branches are composed primarily of aragonite, a bone like substance that forms the skeleton.

Aragonite is produced by the process of calcification that takes place within the coral. Two different growth forms of *Oculina varicosa* have been identified: (1) shallow water *Oculina* and (2) deep water *Oculina*.

The shallow-water form occurs at depths of 2-37 meters (6-120 feet) in the Caribbean, Gulf of Mexico, and South Atlantic, to Bermuda (Reed 1980). It is typically golden-brown in color due to the presence of zooxanthellae, a unicellular, dinoflagellate algae that lives symbiotically within the coral tissue. Photosynthesis by the zooxanthellae benefits the coral by providing it with oxygen and carbohydrates to enhance coral growth and utilizing its waste products. However, shallow-water *Oculina* does not form massive coral banks or reefs (Reed 1981).

The deep-water form of *Oculina* does not possess zooxanthellae (ahermatypic). Unlike hermatypic reefs that are solid, ahermatypic *Oculina* thickets are very fragile due to the nature of their construction and natural succession. As an *Oculina* colony grows, newer branches prevent water flow to the center of the colony, which subsequently dies due to decreased food resources and oxygen to the interior branches. Burrowing animals infest the dead coral, hollowing out the center of the tree-like formations. This makes *Oculina* exceedingly fragile, and eventually the colony may collapse on itself, though the new branches continue to grow and the process continues, creating large, unconsolidated thickets.

Oculina varicosa is a gonochoristic species (individuals are either male or female). The reproductive cycle begins in the early summer and spawning occurs during late summer and fall, with no obvious relationship to lunar or tidal phase. Females produce up to 1,250 eggs per individual, a fecundity level that is as high as that of many tropical coral species (Brooke 1998). This coral is a broadcast spawner, releasing sperm and small eggs (< 10 millimeters (0.4”)) into the water column. Unlike many tropical reef corals, *Oculina* does not spawn in a single synchronized event. Instead, *Oculina* colonies continue to release gametes over a period of about one month. *Oculina* larvae, roughly 16 millimeters (0.6”) in length, settle approximately 21 days after spawning (Brooke 1998).

Biodiversity of the deep-water *Oculina* reefs is similar to that of shallow tropical reefs. Quantitative surveys of the macro-invertebrate fauna associated with the *Oculina* coral reveal that this habitat supports very dense and diverse invertebrate communities (Reed *et al.* 1982; Reed and Mikkelsen 1987; Reed 2002). These studies report that 230 species of mollusks, 50 species of decapods, 47 species of amphipods, 21 species of echinoderms, 15 species of pycnogonids, 23 families of polychaetes, and numerous other invertebrate taxa utilize or depend on *Oculina* coral for habitat. Additionally, healthy *Oculina* thickets support numerous finfish species. Roughtongue bass (*Pronotogrammus martinisensis*) and red barbier (*Hemanthias vivanus*) are commonly observed in association with *Oculina* coral. Other species that appear to be abundant in this habitat include gag (*Mycteroperca microlepis*), scamp (*M. phenax*), speckled hind (*Epinephelus drummondhayi*), and pelagics, such as the greater amberjack (*Seriola dumerili*) and almaco jack (*S. rivoliana*) (Koenig *et al.* 2000).

Massive colonies (> 2 meters (6 feet) in diameter) of *Oculina* are usually found on the southern slopes and peaks of high-relief pinnacles that face into the Gulf Stream, where they benefit from the delivery of oxygenated water and planktonic food. Koenig *et al.* (2000) note that the presence of small, dead, standing colonies in low-relief sites suggests that these are marginal sites for survival and growth.

The physical environment on the deep *Oculina* reefs is quite variable. Bottom temperature averages 16º C (61º F), and ranges from 7.4º C (45º F) during cold-water upwelling events, to 26.7º C (80º F) when the warm surface water impinges on the reefs (Reed 1981; Reed 2002). Cold upwelling events also provide nutrient rich water to the reefs.

Due to the nature and structure of *Oculina* coral thickets, they are extremely susceptible to damage. Events that could potentially negatively degrade *Oculina* coral include extreme temperatures, excessive nutrient input, strong currents, disease, anchoring, and fishery-related impacts. However, *Oculina* already experiences a wide range of temperatures, as well as high nutrient and sediment input during annual upwelling events (Reed 1981; Reed 1983), and appears to be quite tolerant of these two potential threats. Deep-water *Oculina* may be susceptible to pathogens that threaten similar shallow-water reef corals, however, there have been no directed studies of coral diseases on the *Oculina* Bank, and few in any other deep-water coral habitats.

Fishery-related impacts resulting from trawl, bottom longline, and fish trap activities have been documented to negatively impact coral habitat (Barnette 2001). It has been theorized that calico scallop and rock shrimp trawling activities have caused the vast majority of damage to *Oculina*, as evidenced in recent trawl tracks and *Oculina* rubble within the HAPC (C. Koenig, Florida State University, personal observation). Vertical gear (e.g., hook and line, bandit gear) also has the potential to adversely impact coral. The use of sinkers to transport bait to the bottom, particularly the heavier weights (> 227 grams (8 ounces)) used in the high current environment typically experienced on the *Oculina* Bank, can impact and break off branches of *Oculina* coral. Additionally, due to the size and shape of *Oculina* thickets, fishing line is easily entangled amongst its branches, which can result in increased fragmentation of *Oculina* colonies.

Oculina coral fragments may continue to survive after an impact (Brooke 1998). However, the likelihood impacted corals could be smothered by sediments, or sufficiently removed from the current's influence as to deprive them of nutrients, is greatly increased. Due to past fishery-related impacts, primarily from trawl gear, it is estimated there is less than 10% of intact *Oculina* coral habitat remaining within the *Oculina* Experimental Closed Area (Koenig *et al*. 2000).

Impacts to *Oculina* coral reduce the amount of surface area available to other species. Fishery-related impacts also may reduce the height the coral extends into the water column, which can have an impact on coral feeding and spawning. High-relief coral colonies can more easily feed due to exposure to nutrient-loaded currents, which also facilitate dispersal of gametes during reproduction.

3.3 Biological/Ecological Environment

3.3.1 Life History Characteristics of Species in Amendment 13C

3.3.1.1 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 are 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).

Table 3-1. Life history characteristics of species in Snapper Grouper Amendment #13C.
(TL = total length; SL = standard length; cm = centimeters; in = inches; kg = kilograms; lbs = pounds; GOM = Gulf of Mexico)

	Natural Mortality Rate (M)	Maximum Reported Size	Maximum Reported Age (years)	Change Sex (female to male)?	If change sex, size below which all female	Size at first maturity	Size/age at which 50% are mature	Size/age at which all are mature	Spawning season	Food	Range/Location
Snowy Grouper	0.12	122 cm (48 in TL)/30 kg (66 lbs.)	40	Y	76.7 cm (30.2 in) TL	46.9 cm (18.5 in) TL	54.1 cm (21.3 in) TL/ 5 years	57.5 cm (22.6 in) TL	April-September	fishes, crabs, shrimps, and cephalopods	North Carolina to Brazil, and throughout GOM
Golden Tilefish	0.08	125 cm (50 in) TL (male)/30 kg (66 lbs.)	50	N					March to July (April to May peak)	Echinoderms, fishes, crabs, crustaceans	Nova Scotia to Florida, GOM
Vermilion snapper	0.25	60.0 cm (23.8 in) TL/3.2 kg (7.1lbs)	14	N				14.0 cm (5.6 in) TL/1 year (males); 18.0 cm (7.1 in) TL/1 year (females)	April to late Sept with peak in June to August (southeastern US)	fishes, shrimps, crabs, polychaetes, cephalopods	North Carolina to Rio de Janeiro
Black Sea Bass	0.30	66.0 cm (26.1 in) TL/3.6 kg (7.9 lbs)	10	Y		10.0 cm (3.6 in) SL/age 0		18.0 cm (7.1 in) SL/age 3	Mar-July with Mar-May peak (some spawning in Sept and Nov) (SE US)	fish, amphipods, decapods, shrimp	Maine to northeastern FL, GOM
Red Porgy	0.225	91.0 cm (36.0 in)/7.7 kg (17.1 lbs)	18	Y		20.1-22.4 cm (8.0-8.9 in) TL/age 0 (females)	28.9 cm (11.5 in) TL/1.5 years	50.1 cm (19.7 in) TL	Dec-May with Jan-Feb peak. Also reported Mar-April peak.	fish, crustaceans, mollusks	New York to Argentina, GOM, Eastern Caribbean

3.3.1.2 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 U.S. 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).

3.3.1.3 Vermilion Snapper

Vermilion snapper occur in the Western Atlantic, from North Carolina to Rio de Janeiro (Table 3-1). It is most abundant off the southeastern United States and in the Gulf of Campeche (Hood and Johnson 1999). The vermilion snapper is demersal, commonly found over rock, gravel, or sand bottoms near the edge of the continental and island shelves (Allen 1985). It occurs in schools at depths from 18 to 122 meters (59 to 400 feet), but is most abundant at depths less than 75 meters (225 feet). This species is not believed to exhibit extensive long range or local movement (SEDAR 2 2003a).

The maximum size of a male vermilion snapper, reported by Allen (1985), was 60.0 centimeters (23.8") total length and 3.2 kilograms (7.1 lbs). Maximum reported age in the South Atlantic Bight was 14 years (Zhao *et al.* 1997; Potts *et al.* 1998). The natural mortality rate is estimated as M = 0.25, with a range of 0.2-0.3.

This species spawns in schools (Lindeman *et al.* 2000) from April through late September in the southeastern U.S. (Cuellar *et al.* 1996). Zhao *et al.* (1997) indicate most spawning in the South Atlantic Bight occurs from June through August. Eggs and larvae are pelagic.

Vermilion snapper are gonochorists (separate sexes throughout life). All vermilion snapper are mature at 2 years of age and 20.0 centimeters (7.9") total length (SEDAR 2 2003b). Cuellar *et al.* (1996) collected vermilion snapper off the southeastern U.S. and found that all were mature. The smallest female was 16.5 centimeters (6.5") fork length and the smallest male was 17.9 centimeters (7.1") fork length (Cuellar *et al.* 1996). All males collected after 1982 along the southeastern United States were mature at 14.0 centimeters (5.6") total length and age 1 (Zhao *et* *al.* 1997). All females collected after 1988 were mature at 18.0 centimeters (7.1") total length and age 1 (Table 3-1).

This species preys on fishes, shrimps, crabs, polychaetes, and other benthic invertebrates, as well as cephalopods and planktonic organisms (Allen 1985). The diet of small (< 50 millimeters (2") standard length) vermilion snapper is dominated by small crustaceans (especially copepods), sergestid decapods, barnacle larvae, stomatopods, and decapods (Sedberry and Cuellar 1993).

3.3.1.4 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 U.S. 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.

3.3.1.5 Red Porgy

The 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 deep water 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 U.S., 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 Hureau 1990).

3.3.2 Other Affected Species

Snapper Grouper Species

Other snapper grouper species may be affected by the proposed actions of the amendment include: gag, red grouper, scamp, blueline tilefish, red snapper, gray triggerfish, greater amberjack, white grunt, and others. These species co-occur with species listed in this amendment and are taken as incidental catch. As restrictions are placed on snowy grouper, golden tilefish, vermilion snapper, and black sea bass, increased effort may shift to these co-occurring species. In general, these species are long-lived, slow growing, and late to mature. A detailed description of the life history of these species is provided in the Snapper Grouper SAFE report. Increased effort on co-occurring species could negatively affect their status with respect to overfishing and overfished.

Protected Species Environment

A number of species listed under the Endangered Species Act (ESA) of 1973, as amended, occur within the affected environment. In addition, designated critical habitat for the North Atlantic right whale lies within the affected environment. Section 7(a)(1) of the ESA requires all Federal agencies to participate in the conservation and recovery of listed threatened and endangered species. Section 7(a)(2) states federal agencies must ensure that any activity they authorize, fund or carry out is not likely to jeopardize the continued existence of listed species or result in destruction or adverse modification of designated critical habitat. To facilitate compliance with Section 7(a)(2), a biological assessment is prepared to evaluate the likely effects of the fishery and proposed action(s) on endangered and threatened species and designated critical habitat(s) occurring within the action area [Section 7(c)]. Listed species and designated critical habitat occurring within the action area are shown in Table 3-2. The following sections describe the protected species environment relative to the snapper grouper fishery. The extent to which these listed species may be impacted by the proposed actions is addressed in Section 4.0.

3.3.2.1 Seabirds

Both 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. Given these species are not commonly found throughout the action area and neither has been described as associating with vessels or having had interactions with the snapper grouper fishery, it is believed possible negative effects resulting from the fishery are extremely unlikely to occur and therefore are discountable. Thus, the continued operation of the snapper grouper fishery in the southeast U.S. Atlantic EEZ is not likely to adversely affect the Bermuda petrel and the roseate tern.

3.3.2.2 Marine Mammals

In the southeast U.S. Atlantic region, sperm, fin, sei, and blue whales are predominantly found seaward of the continental shelf. Sightings of sperm whales are almost exclusively in the continental shelf edge and continental slope areas (Scott and Sadove 1997). Fin whales are generally found along the 100 m isobath with sightings also spread over deeper water including canyons along the shelf break (NMFS 1998). Sei and blue whales also typically occur in deeper waters but neither are commonly observed in the east coast U.S. waters (CeTAP 1982; Wenzel *et al*. 1988; NMFS 1998; NMFS 1998a).

Conversely, northern right, and humpback whales are coastal animals and are regularly sighted in the near shore area along the southeast U.S. Atlantic, November through March. North Atlantic right whales generally occur west of the Gulf Stream; from the southeast U.S. to Canada (Waring *et al.* 2004). Calving occurs during the winter months in the coastal waters off Georgia and Florida (Knowlton *et al.* 1994; Kraus *et al.* 2001). Mid-Atlantic waters are believed to serve primarily as a migratory pathway between the spring and summer feeding/nursery areas and the winter calving grounds. Sightings from aerial surveys throughout the southeast Atlantic region have reported right whales off the Carolinas from December through March including mother calf pairs.

Table 3-2. Listed species and critical habitat in the South Atlantic EEZ.

NMFS Jurisdiction		
Marine mammals	Scientific Name	Status
blue whale	*Balaenoptera musculus*	E
humpback whale	*Megaptera novaeangliae*	E
fin whale	*Balaenoptera physalus*	E
North Atlantic right whale	*Eubalaena glacialis*	E
sei whale	*Balaenoptera borealis*	E
sperm whale	*Physeter macrocephalus*	E
Sea Turtles	Scientific Name	Status
green sea turtle	*Chelonia mydas*	E/T*
hawksbill sea turtle	*Eretmochelys imbricata*	E
leatherback sea turtle	*Dermochelys coriacea*	E
loggerhead sea turtle	*Caretta caretta*	T
Kemp's ridley	*Lepidochelys kempii*	T
Fish	Scientific Name	Status
Smalltooth sawfish	*Pristis pectinata*	E**
Critical Habitat		
North Atlantic right whale critical habitat	Critical habitat has been designated for the North Atlantic right whale in the U.S. Southeast Atlantic from the mouth of the Altamaha River, Georgia to Jacksonville, Florida, out 15 nautical miles (nm) and from Jacksonville, Florida to Sebastian Inlet, Florida, out 5 nm. A portion of this area lies within the EEZ.	
U.S. Fish and Wildlife Service Jurisdiction		
Seabirds	Scientific Name	Status
Bermuda petrel	*Pterodrama cahow*	E
roseate tern	*Sterna dougalli*	E/T***

* Green sea turtles in U.S. waters are listed as threatened except for the Florida breeding population, which is listed as endangered. Due to the inability to distinguish between the populations away from the nesting beaches, green sea turtles are considered endangered wherever they occur in U.S. waters.
** The U.S. distinct population segment (DPS).
*** North American populations are listed as endangered on the Atlantic coast south to North Carolina; threatened elsewhere.
E=endangered, T=threatened

Similarly, humpback whales are thought to use the mid-Atlantic as a migratory pathway between their calving/mating grounds in the West Indies and their feeding grounds in the northwestern Atlantic. December and January are peak times for humpbacks to occur off North Carolina as they migrate southward to their wintering grounds. A second peak occurs during March and April when humpbacks migrate northward to their summer feeding grounds. In addition to being a migratory pathway, the mid-Atlantic region may also be an important winter feeding area especially for juveniles (Swingle *et al*. 1993). Since 1989, observations of juvenile humpbacks in the mid-Atlantic have been increasing during the winter months, peaking from January through March (Swingle *et al*. 1993; Barco *et al*. 2002).

Fishery interaction

Of the gear utilized within the snapper grouper fishery, only black sea bass pot gear 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 2004 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 (69 FR 153; August 10, 2004). 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, due to their distribution and occurrence, sperm, fin, sei, and blue whales are unlikely to overlap with the black sea bass pot fishery operated within the snapper grouper fishery since it is executed primarily off North and South Carolina in waters ranging from 70-120 feet deep (21.3-36.6 meters). This, together with no known interactions between the black sea bass pot fishery and large whales, leads to the belief that possible negative effects resulting from the fishery are extremely unlikely to occur and therefore are discountable. 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.

On the other hand, given their seasonal distribution, right and humpback whales may overlap both spatially and temporally with the black sea bass pot fishery. Pot gear can adversely affect right and humpback whales; however, this threat is being lessened through management under NMFS in conjunction with the Atlantic Large Whale Take Reduction Team. Based on no documented takes in the black sea bass pot fishery and the management of this fishery under the revised Atlantic Large Whale Take Reduction Plan (70 FR 118; June 21, 2005), the fishery is not likely to adversely affect northern right or humpback whales.

3.3.2.3 Sea Turtles

Loggerhead, green, hawksbill, Kemp's ridley, and leatherback sea turtles are all highly migratory and travel widely throughout the affected environment (NMFS and USFWS 1991; NMFS and USFWS 1991a; NMFS and USFWS 1992; USFWS and NMFS 1992; NMFS and USFWS 1993; NMFS and USFWS 1995; TEWG 2000; NMFS SEFSC 2001).

Loggerheads and leatherbacks have been documented as incidentally taken in the snapper grouper fishery, but all species are believed to be vulnerable to certain gear types used in the fishery based upon incidental captures in other southeast Atlantic fisheries using similar gear. In assessing incidental capture of sea turtles within the commercial sector of the snapper grouper fishery, data from the SEFSC's SDDP were used and are considered the best available data. Information to assess incidental capture within the recreational sector operating within the U.S. EEZ consists primarily of anecdotal reports.

Fishery interaction

Hook-and-line gear adversely affects sea turtles via hooking, entanglement, and forced submergence. Several sea turtle interactions with commercial vertical hook-and-line and bottom longline gear have been reported by the SDDP (Table 3-3). The statistical grid showing the area of sea turtle capture is represented in Figure 3-1. Each statistical grid measures 60 by 60 miles.

Table 3-3. Sea turtle catch data from the Supplementary Discard Data Program (SDDP) for the southeast U.S. Atlantic.

Period	Month	Logbook Statistical Grid	Species Caught	Number Caught	Discard Condition
Vertical Hook-and-Line Sea Turtle Catch Data					
1	4	2482	Unidentified	1	Alive
1	11	3377	Loggerhead	1	Alive
2	2	2780	Loggerhead	1	Alive
2	11	3474	Loggerhead	1	Alive
2	11	3476	Unknown	1	Alive
2	12	3476	Unknown	1	Alive
Bottom Longline Sea Turtle Catch Data					
1	8	3674	Leatherback	1	Alive
3	1	3575	Loggerhead	1	Unknown

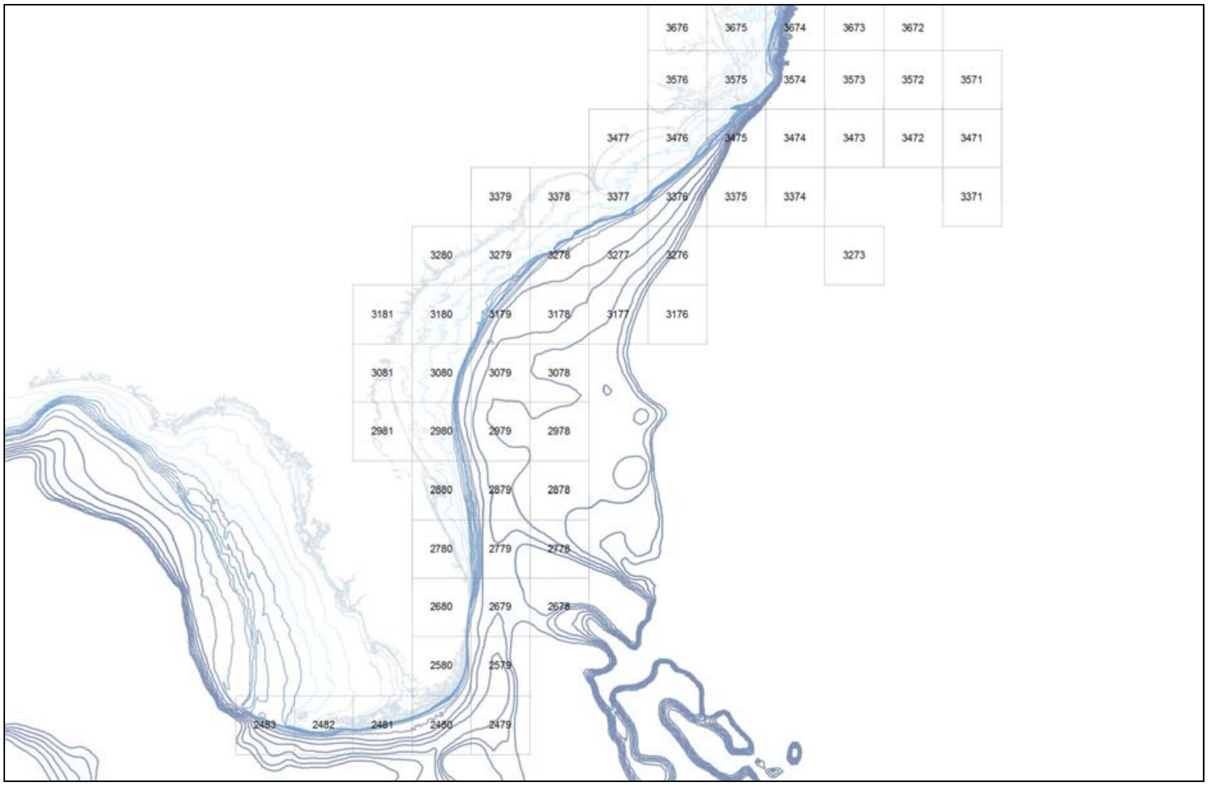


Figure 3-1. South Atlantic Statistical Grid Map, Snapper Grouper Logbook Program.

Based on data from the SDDP, NMFS prepared a preliminary assessment to characterize potential sea turtle bycatch within the entire commercial vertical hook-and-line and bottom longline sectors of the snapper grouper fishery (Table 3-4). Given the paucity of data, extrapolation was used to estimate the total number of snapper grouper commercial vertical hook-and-line and bottom longline sea turtle takes over the past three years of the SDDP(August 2001 - July 2004); the only years for which protected species bycatch data are available. In turn, logbook book data from the same period were used for fishery effort information. Data from the three reporting periods were combined prior to extrapolation to minimize error resulting from our small bycatch sample size and annual variability. The attempt was to infer the number of sea turtles taken on each of these commercial gear types from the past three years. The extrapolation assumes the probability of catching any hardshell sea turtle species or leatherback sea turtle is equal through time and space. Factors potentially affecting sea turtle capture but, for which sufficient data are not available to analyze, include fishing depth, area, time of day, time of year, etc. The relationship between the number of turtles taken and effort is assumed to be linear (i.e., the more hooks fished, the more sea turtles caught). Given the limited data and the broad assumptions applied, the preliminary take estimates are uncertain but not unreasonable.

Table 3-4. Preliminary take estimates of sea turtles by commercial vertical hook-and-line and bottom longline gear in the snapper grouper fishery.
Estimates were generated from data collected by the SDDP and snapper grouper logbook program for the southeast U.S. Atlantic and averaged over the three years that the SDDP has been in effect (August 2001-July 2004).

Commercial gear type	3-year take estimate
Vertical Hook-and-Line	
Hardshell	42
Leatherback	0
Bottom Longline	
Hardshell	20
Leatherback	20

Because captured hardshell sea turtles may be mis-identified since these species can be difficult to tell apart from each other, the preliminary assessment combined all hardshell turtles into one category. Leatherbacks are considered distinguishable from hardshell species and therefore easier to identify. No leatherback takes were estimated for commercial vertical hook-and-line because no takes were reported. However, as this bycatch sample size is small, and since there are documented takes of leatherbacks in vertical line gear in the Gulf of Mexico (NMFS 2005), we are hesitant to assume that no leatherbacks are caught on this gear in the southeastern U.S. Atlantic. Captures, though perhaps rare, are feasible.

As mentioned earlier, information on the recreational fishery and interactions with protected species is scant; however, anecdotal information indicates that recreational fishermen occasionally take sea turtles with hook-and-line gear. Hooked sea turtles have been reported by the public fishing from boats, piers, the beach, banks, and jetties (TEWG 2000). Many sea turtles reported incidentally caught on recreational hook-and-line are from fishermen fishing off piers. Fishing piers are suspected to actually attract sea turtles that learn to forage there for discarded bait and fish carcasses. Offshore reefs, artificial reefs and wrecks in the U.S. EEZ, where recreational fishing is typically concentrated, may create an environment similar to a pier and make sea turtle takes likely (NMFS 2004). Artificial reefs are deployed primarily for the enhancement of recreational fishing opportunities. Shipwrecks are also targeted by fishermen due to the abundance of marine life attracted to them. Over time, lost anchor and monofilament lines may present an entanglement hazard to sea turtles. Dead sea turtles have been observed entangled in both discarded monofilament and anchor line on artificial reefs and shipwrecks off Florida and North Carolina (M. Barnette, NMFS, pers. obs.).

Trap/pot gear may also adversely affect sea turtles as sea turtles are known to become entangled in buoy lines associated with trap/pot gear (NMFS 2001a; NMFS 2001b; NMFS 2001c). Leatherback and loggerhead turtles are thought to be attracted to the bivalves, algae and gelatinous organisms that colonize buoys and lines (NMFS 2001). Sea turtles are found throughout the area where black sea bass pot fishing occurs though; reports of turtles getting fouled in the buoy line are rare. One anecdotal report from a fishermen states that in over 20 years of black sea bass pot fishing, he had observed one loggerhead entangled in a pot buoy line (A. Austin, personal communication). In recent years, there have been no reports of sea turtle/pot gear interactions and, to date, there have been no reports of sea turtle interactions with pot gear from the SDDP.

3.3.2.4 Marine Fish

The smalltooth sawfish occurs mainly off Florida (NMFS 2000; MML 2004). Only one smalltooth sawfish has been recorded north of Florida since 1963 (i.e., a smalltooth sawfish captured off of Georgia in July 2002) but it is unknown whether this individual resided in Georgia waters annually or had migrated north from Florida. Encounter data show smalltooth sawfish tend to move offshore and into deeper water as they grow. Recent data from both encounter reports and satellite tagging suggest mature animals occur regularly in waters in excess of 50 meters (164 feet) (Poulakis and Seitz 2004; Simpfendorfer and Wiley 2004).

Fishery Interaction

The SDDP data and sawfish encounter databases were used to assess incidental capture of smalltooth sawfish within the snapper grouper fishery. SDDP data do not include any reports of smalltooth sawfish being caught by commercial snapper grouper bottom longline or vertical hook-and-line gear. However, smalltooth sawfish are 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).

The two encounter databases that are maintained to provide information on smalltooth sawfish abundance, distribution, and habitat use were also reviewed. Biologists Gregg Poulakis (Florida Fish and Wildlife Commission, Fish and Wildlife Research Institute) and Jason Seitz (Collier County Environmental Services) maintain a database of recent records (1990 to present) from Gulf of Mexico waters off southwest Florida. Mote Marine Lab maintains a statewide encounter database from 1998 to the present. To date, there are no records of smalltooth sawfish encounters with the snapper grouper fishery (pers. comm. Gregg Poulakis, Florida Fish and Wildlife Commission, Fish and Wildlife Research Institute).

Based on no documented takes, the chances of smalltooth sawfish encounters with snapper grouper hook-and-line and bottom longline gear are presumed to be minimal; however, since their occurrence can overlap with the use of these gear types in the fishery, the snapper grouper vertical hook-and-line and bottom longline fishery in the southeast Atlantic EEZ may adversely affect smalltooth sawfish.

There have been no reports of smalltooth sawfish/pot gear interactions from the SDDP or smalltooth sawfish encounter databases. Smalltooth sawfish are unlikely to occur where black sea bass pots are primarily fished (north of Florida). This, together with only one documented interaction between a smalltooth sawfish and a trap/pot line [lobster pot line (Poulakis and Seitz 2004)], it is believed smalltooth sawfish interactions with black sea bass pot gear are extremely unlikely to occur and therefore are discountable. Thus, the continued operation of the snapper grouper black sea bass pot fishery in the southeast U.S. Atlantic EEZ is not likely to adversely affect the smalltooth sawfish.

Critical Habitat

Critical habitat has been designated for the northern right whale in the U.S. Southeast Atlantic from the mouth of the Altamaha River, Georgia to Jacksonville, Florida, out 15 nautical miles and from Jacksonville, Florida to Sebastian Inlet, Florida, out 5 nautical miles. The continued prosecution of the snapper grouper fishery in Federal waters as proposed will not alter the physical and biological features (water depth, water temperature and the distribution of right whale cow/calf pairs in relation to the distance from the shoreline to the 40 meter isobath [Kraus *et al*. 1993]), which were the basis for determining this habitat to be critical. Therefore, northern right whale critical habitat is not expected to be adversely modified by the continued prosecution of the snapper grouper fishery in the southeast U.S. Atlantic EEZ.

NMFS' Southeast Regional Office Division of Sustainable Fisheries will consult with the appropriate agencies seeking concurrence in these assessments.

3.4 Human Environment

Information in this section is provided in three categories. First, there is a description of fishing practices, vessels, and gear types employed in each sector of the fishery. The second section describes the economic conditions, and the final section describes the social characteristics and community profiles of the snapper grouper fishery in the South Atlantic.

3.4.1 Description of Fishing Practices, Vessels, and Gear

3.4.1.1 Commercial Fishery

There are four legal methods of harvest in the commercial snapper grouper fishery. Species can be harvested by black sea bass pot, vertical line (handline, hydraulic, or electric), longline, and by diving (utilizing powerheads or spears except where prohibited in the EEZ). An economic survey of commercial snapper grouper vessels along the South Atlantic coast done in the mid-nineties found "average length of boats was 32.7 feet, with nearly all sampled boats being less than 50 feet in length. Boats with bottom longlines tended to be the longest, had the most powerful engines, the greatest fuel capacities, and the largest holding boxes for fish and ice. Boats with vertical lines, especially in the southern area, tended to be the shortest, had the least powerful engines, the smallest fuel capacities, and the smallest holding boxes for fish and ice" (Waters *et al*. 1997).

<u>Gear types</u>

Vertical Lines

The vertical line sector of the commercial fishery operates throughout the Council's area of jurisdiction from the North Carolina/Virginia border to the Atlantic side of Key West, Florida. According to NMFS Logbook data there were 15,302 trips reported in 2001 in which hook and line gear was identified as the main gear for that trip. This fishery takes place in about 13 to 110 fathoms (78-660 feet) of water both during day and night.

The majority of hook and line fishermen use either electric or hydraulic reels known as "bandit" gear due to its resemblance to one-armed bandit machines used in casinos. Boats generally have 2-4 bandit reels attached. A typical bandit reel is attached to the gunwale of the boat and consists of a fiberglass reel that holds about 1,000 feet of cable; an L-bar or spreader, which keeps the leader from tangling with the main line; a pulley to feed the cable from the reel through the L-bar; a fiberglass arm; and an electronic or hydraulic reel motor (Figure 3-2).

Figure 3-2. Bandit reel used in the South Atlantic snapper grouper fishery.

Captains will "work the break" maneuvering the boat back and forth across an area of high relief running northeast and southwest looking for fish using a color machine and relying on fishing spots that have been previously marked on their plotter. The captain will use the color machine to differentiate bottom type and fish presence and type. A captain can tell what kind of fish may be in the area based on where they appear in the water column, the size of the air bladder that shows up on the screen, and how the fish are congregated.

Fishing begins with a baited line that is thrown out over the gunwale of the boat as the fisherman releases the drag on the spool of the bandit reel and sends the line down in search of the bottom or desired depth. If dropping on a spot for the first time, the fishermen may have to adjust the depth at which he fishes, first finding the bottom and then reeling up the line enough to be fishing above the bottom.

When using bandit gear in the mid-shelf fishery (mostly targeting vermilion snapper and some groupers) fishermen tend to either "sit and soak" or "get up and down". When fishermen sit and soak they are fishing live or dead baits with circle or "jap" hooks and letting their rigs (generally a 20-40 foot leader with 2 hooks) soak near the bottom for anywhere from 15 minutes to an hour.

Fishermen will use this method to catch grouper and some snapper such as red snapper in about 13-50 fathoms (78-300 feet) of water.

Another method is often called "getting up and down" where fishermen are actively fishing 2-3 straight hooks per reel with cut bait. When fishermen fish this way, the line is being tended constantly and brought up to the surface as soon as a bite is felt. Most vermilion snapper, triggerfish, and porgies are caught this way. Fishermen also fish for grouper using this method but with bigger hooks.

When fishing for deepwater snapper grouper species (primarily targeting snowy grouper, but also catching large red porgy, blueline tilefish, Warsaw grouper, and speckled hind) in 50-100 fathoms (300-600 feet) of water they bait multi-hook rigs (with anywhere from 2-10 circle hooks) with squid, Boston mackerel, or other cut bait.

In South Florida, there is also a yellowtail snapper fishery. This is mostly a day boat fishery. Fishermen chum for yellowtail, by grinding or cutting up bait fish and distributing the chum on top of the water with the intention of drawing the yellowtail snapper closer to surface in a school to make them easier to catch. The fish are caught on handlines with "j" hooks and then chill-killed for high quality. Sometimes these fishermen will use a splatter or spider pole to catch the fish when chumming. This is a 10-12 foot bamboo pole with a single line and a barb-less hook attached that is sometimes used when fishermen are "power" chumming (using a lot of chum in a giant chum bag off the back of the boat) because it helps bring the fish to the boat faster.

There is no consistent day/night pattern with the vertical line fishery. What time of day to fish varies from captain to captain and is a matter of personal preference. The majority of the bandit fleet fishes year round for snapper grouper. The only seasonal differences in catch are 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 will stop bandit fishing to target king mackerel when they are running.

Longline
The Council allows the use of bottom longlines only in depths greater than 50 fathoms and only north of St. Lucie Inlet, Florida. In the snapper grouper fishery bottom longlines are used to target golden tilefish and snowy grouper; there is also incidental catch of blueline tilefish and blackbelly rosefish.

Typically, longline boats, which operate in the snapper grouper fishery, are bigger than bandit boats, their trips are longer, and they cost more to operate because they operate farther offshore. From a port such as Charleston, South Carolina vessels will travel 90 miles offshore to reach the fishing grounds, staying out for as many as 9 or 10 days and incurring $2,500 worth of expenses.

The longline is located on a spool about midway back on the stern deck of the boat. In this fishery, a spool generally holds about 15 miles of cable. When fishing begins, the cable is paid out through a fair lead on top of the spool and then another one at the stern of the boat. A poly ball and a high flyer are paid out first to mark the longline at one end.

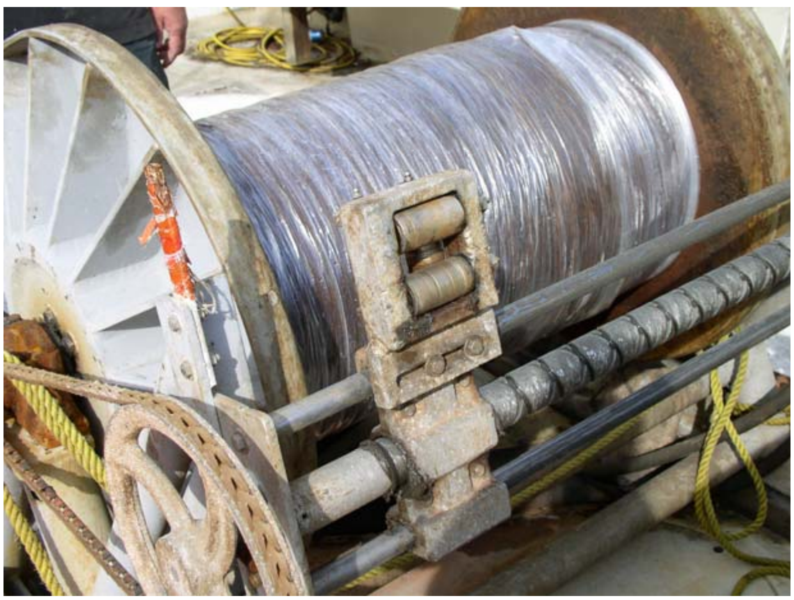


Figure 3-3. A spool on a longline vessel from the South Atlantic snapper grouper bottom longline fishery.

At the stern are usually two crew members who stand near baskets full of made up rigs (previously baited hooks and leaders). As the line pays out, they snap the leaders onto the mainline as fast as possible but generally every two feet.

While the line is paying out the Captain of the boat may steer the boat in a zig-zag fashion or make exaggerated turns to set the gear in the ideal location. Some people will use weights as they make big turns to prevent the mainline from rolling over and drifting on top of itself. When the desired amount of longline is paid out, the crew will break it loose from the drum and snap on another poly-ball and high flyer to indicate then end of the longline.

The amount of mainline that is paid out and the length of soak time of the line varies by boat and by circumstance. Sometimes boats will set out 5 miles of cable at a time making as many as four or more sets a day while some will set out 15 miles at a time and only make two sets a day. Soak time will vary depending on how fishing is going. After the line is set the crew may stop and rest, letting the line soak for thirty minutes or so and then haul back beginning at the end they just finished paying out. Another method would be to go back to the beginning of the longline and start hauling back from that end. The longest amount of time that gear would be fishing in the water would be about two hours.

The gear is hauled back from a haul back station with a boom that swings out over the side of the boat that helps feed the cable through a block and pulley system. As the line is hauled back on the boat, catch is removed from the leaders and the main line is fed back into the level wind and back to the spool.

Longlines are only fished from daylight to dark. There are sea lice that come out at night and eat the flesh of the fish that would hook up on the line, preventing nighttime fishing. This fishery is operated all year long with little or no seasonal fluctuation barring a busy hurricane season.

Black Sea Bass Pots

The South Atlantic Council allows the following mesh sizes for sea bass pots used or possessed in the South Atlantic EEZ: 1) hexagonal mesh (chicken wire) at least 1.5 inches (3.8 cm) between the wrapped sides; 2) square mesh at least 1.5 inches (3.8 cm) between sides; and 3) rectangular mesh at least 1 inch (2.5 cm) between the longer sides and 2 inches (5.1 cm) between the shorter sides. Mesh sizes most commonly used include: 1) 1.5 x 1.5 inch square mesh; 2) 1.5 inch hexagonal mesh (pvc coated chicken wire); and 3) 2 x 2 inch mesh. Coated chicken wire is the least common of the three as it is less durable. Currently there is a 10 inch (25.4 cm) size limit on black sea bass caught and mesh sizes that are less than 2 x 2 inches do not adequately allow the smaller fish to escape. As such, small fish are hauled up to the vessel and released overboard. Some fishermen, using a smaller mesh size, address this problem by using a 2 x 2 inch mesh for the back panel of the pot. This allows the smaller caught fish to escape when the pot is being hauled as the fish are pushed toward the back panel. It is believed the darker the inside of the pot the more inviting the pot is for a fish to enter; thus using a smaller mesh size may be preferred by some fishermen. Current regulations mandate the use of degradable material for hinges and fasteners and the use of two escape vents per pot. All sea bass pots must have a valid identification tag attached.

Fishing practices within the black sea bass pot fishery are diverse. Many fishermen set individual pots with one buoy line per pot. Others, set “doubles”, which are two pots attached to one buoy line. Individual pots may also be connected to a ground line. This configuration is commonly referred to as a “trawl” and has a buoy line on each end. Indications are that only one person in North Carolina may be fishing with “trawls”. Both sinking and floating buoy lines are used in the fishery. Many fishermen off North Carolina use floating line as it is less likely to get hung up on the bottom though some use sinking line. In South Carolina, fishermen report using 1/4 inch poly line attached to a buoy or high flyer. Several South Carolina fishermen reported using sinking line. Buoy lines are typically 200 feet (61 meters) in length. In the South Atlantic EEZ, the use of buoys is not required but, if used, each buoy must display the vessel’s assigned official number and color code.

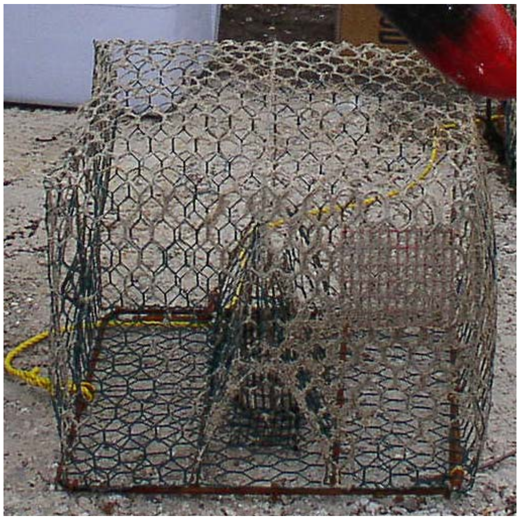


Figure 3-4. A black sea bass pot from the South Atlantic snapper grouper fishery.

Fishermen use different strategies for targeting black sea bass. The most common technique is "precision setting". Fishermen will target marks located with on-board electronics and set pots on suspected aggregations of fish. With this technique, pots are pulled and moved more frequently depending on how well an area is producing. Pots may be clustered with only a few set in one area and numerous set in another depending on the availability of hard bottom and how successful the catch rate. There may be anywhere from a 3 to 5 mile (4.8 to 8 kilometers) distance between pots or just 10 to 15 feet (3 to 4.5 meters). Another strategy is to set out many pots scattered over a wide area or in rows, regardless of bottom habitat, and leave the pots set with the intention of having the fish come to the pot. This technique targets individuals that are more migratory and the pots tend to stay in the water for a more extended period of time.

How pots are fished can vary depending on the fisherman, season or area. Typically, fewer pots (on average 60 or less) are fished during the winter than during the summer with the majority of fishermen taking their pots in every night. In the summer, when fish are more scattered, the fishermen may fish a few hundred pots and leave them out for extended periods of time. During the winter, soak times are shorter with pots being hauled 2 to 3 times a day or more whereas during the summer, soak times are usually longer with pots seldom being hauled more than twice in a day. Whether pots are set individually, as "doubles", or in a "trawl" also influences the soak time. Pots set as "doubles" or in "trawls" usually have longer soak times than individually set pots. In general, how long pots are soaked or whether they are removed daily depends on the number of pots set, gear configuration, season, and the preference of the fisherman. Preferences may also differ by region.

In South Carolina, the pot fishery is mainly a winter fishery. The season begins in November and, depending on the water temperature (the colder the better for bass trapping), generally goes through April. Pots are fished individually with short soak times (in some cases about an hour). The number of pots fished range anywhere from 6 to 30 depending on the fisherman and most fishermen will haul their pots from the water when they return home. In the fall, most pots are set in 70 to 90 feet (21.3 to 27.4 meters) of water and as the season progresses, fishermen tend to move their pots out to about 100 to 120 feet (30.5 to 36.6 meters). Most trips are day trips.

In North Carolina, the fishery is largely a winter fishery as well, however, some fishermen continue to pot fish through the summer. The number of pots fished range from 25 to 60 though more are usually fished in the summer. Fishermen typically set their pots in water depths ranging from 30 to 90 feet (9 to 27.4 meters), though in areas further south, pots are generally set at depths ranging from 70 to 100 feet (21.3 to 30.5 meters). The duration of most trips is one day though some extend over multiple days. Roughly half of the fishermen in North Carolina will pull their gear when heading home while the other half tend to leave their pots soak for several days.

Overall, the number of trips tends to be greater during the winter months than during the summer. Data from the Reef Fish Logbook Program show there were 1,054 trips in 2001 in which sea bass pots were reported as the main gear. Of these trips, 53% were conducted from November through March. Logbook data going back to 1998 show a range of 63 to 72 percent of reported trips occurring during the November through March time period with the number of trips falling off in March.

Assessing the actual fishing effort at any given time within the black sea bass pot fishery is difficult. Many participants in the black sea bass fishery are active in other fisheries. It is not uncommon for participants to pot fish during the colder months and charter fish during the summer months. Other black sea bass fishermen may alternate between fisheries or among several fisheries. The effort placed in the black sea bass pot fishery is often dependent on how well the income generated by black sea bass fishing compares to the income generated by the fisherman's other endeavors. Furthermore, many snapper grouper permit holders maintain pot endorsements though they are not actively involved in the pot fishery. Thus, the number of fishermen permitted to fish with pots is higher than the actual number fishing. In South Carolina, logbook data suggests that as many as 50 to 60 fishermen are permitted for pots as either their primary or secondary gear but that only a quarter of them are actively involved in pot fishing during the season.

Fishermen are required to purchase a tag for each pot they possess. As of April 23, 2003, the following number of black sea bass pot tags have been ordered for vessels with active snapper grouper permits, listed by homeport states: Florida (includes both east and west coast) - 150 tags; Georgia – 45; South Carolina – 93; and North Carolina – 1,979. Since most fishermen tend to fish only a portion of their pots while keeping the remaining pots available to replace any losses during the season, the number of tags purchased is often not an accurate count of how many pots are being actively fished.

Powerheads

Fishing commercially by diving and killing the fish by spear or powerheads is most commonly practiced off the coast of Florida. The use of powerheads to kill snapper grouper species is illegal off the coast of South Carolina and in Special Management Zones.

Powerheads, or bangsticks, are underwater firearms that usually use 12-gauge or .357 Magnum rounds. Sharp contact from a thrust against a solid object activates a heavy, spring loaded, stainless steel firing pin, which detonates the round from a short barrel. Much of the damage inflicted on the target comes from the rapidly expanding gases forced into the body by the barrel end pressed at that moment against it (Bannerot and Bannerot 2000).

There are three common methods for using powerheads to kill fish. There is a traditional powerhead (also known as a bangstick) in which the initial injury to the fish would come from a spear tip and then a powerhead would be used to ensure the fish is killed or to kill them in a quicker manner. I n clear water some fishermen shoot just the spear, as it has the capability of being more accurate at longer distances (40-50 feet) than a powerhead. The spear would not stay connected to the shaft by a string so the fisherman would have to then physically capture the dead or dying fish. Finally, a powerhead can be on the shaft as a part of the spear shaft and once the trigger is pulled and the powerhead hits the fish the round detonates in the fish (R. Cardin, personal communication).

Bottom time is a function of depth. It is also important to separate total dive time from actual working time on the dive. The following estimates are actual working time on the bottom based on input from divers. Estimate 1 – about ¾ of bottom time is actual spearing/working time. At 100 to 120 feet a diver has about 15 minutes of actual spearing/working time on the bottom. An 80 cubic foot tank lasts about 20 minutes at 100 feet. A diver can use up to 4 tanks per day, which allows for between 1 hour and 1.5 hours total working time or bottom time per day. Estimate 2 – maximum allowable bottom time is about 16 minutes per tank. A limit of 4 tanks per diver per day allows for 48 minutes working time or bottom time in the winter and about 64 minutes working bottom time in the summer (SAFMC 2001).

3.4.1.2 Recreational Fishery

Charter and private recreational

According to MRFSS estimates (NMFS 2005a), an average of 4.5 million recreational anglers participated in saltwater fishing in the Southeastern U.S. in recent years. It is not possible to determine the number of anglers that target snapper grouper species but testimony at public hearings, Council meetings, and overall public interest indicates that the recreational snapper grouper fishery is growing in popularity. Recreational fishermen for the large part use hook and line gear although in some areas spearfishing for reef fish can be popular.

Methods that recreational fishermen use to fish for snapper grouper are very diverse. The distance people can go offshore in search of reef fish depends in part on the size of their boat, engine power, comfort level, and fuel prices. Experience levels vary among recreational fishermen and therefore fishing methods and efficiency differ. Bottom fishing for snapper and shallow water grouper can be accessible to many recreational fishermen as they do not have to travel as far offshore and there is somewhat less skill involved than deep drop fishing that targets mostly big grouper. As with the commercial fleet, many recreational anglers rely on technology such as fish finders and color machines to find fish. There is little or no technology gap between the professional (for-hire and commercial) fishermen and those who fish for fun on the weekends.

Recreational anglers will use both electric and manual reels for bottom fishing. Twelve volt electric reels, commonly called elec-tra-mates, attach to fishing rods and reels to assist fishermen in reeling in catches from deep water. People who use electric reels tend to be more serious about fishing or fish deeper water.

Fishermen will choose to use lighter or heavier tackle based on which species they are targeting, the level of skill of the fishermen, and a multitude of other factors including limiting gear loss. Generally when fishing for grouper they will use heavier line (80 to 120 lb test) and larger hooks (6/0 and larger) which mostly calls for larger weights. Fishing for snappers, porgies, and grunts generally means lighter tackle (1/0 to 4/0 hooks and 20 and 40 lb test line).

Like tackle, the use of bait also varies very widely among the region and among fishermen and according to target species. Cut bait, live baits, and even artificial plugs are all used to fish for various snapper and grouper species. Popular cut baits include menhaden, herring, bluefish, sardines, and cigar minnows.

Headboat

Headboats (also called party boats) are popular in the southeast. These vessels are larger than the commercial hook and line vessels and private and charter boats. Many are longer than 100 feet. They provide easy and economical access to successful fishing for the beginning angler and tourist. These boats take as many as 100 people offshore to fish for snapper grouper species and a host of other fish.

Fishing trips on headboats can either be an all day (11 hours) or half day (4 hours) experience. Generally when fishing off the Carolinas on half day trips they are fishing the black fish banks targeting sea bass, porgies, sharks, flounder, and other bottom species. On all day headboat trips, they will fish 40 to 50 miles offshore (North Carolina through northeast Florida) to target snapper, grouper, large sea bass, and trigger fish; in southeast Florida trips are less than 20 miles offshore. Occasionally larger fish such as king mackerel, cobia, amberjack, and dolphin may be landed. In general, headboats are fishing the same grounds as the commercial fleet and they can often be seen fishing side by side. Headboats will make special trips to fish during the night.

Generally, customers are provided with gear and bait. The fishing methods on headboats for snapper grouper species are similar to those of the commercial fishery and the private charter fishery. Customers will be set up with a 4/0 or 6/0 reel rigged with 80 lb test monofilament, a rig with a 16 ounce weight, and the same variety of hook sizes as used by the commercial fleet. Most reels will be set up with two hook rigs. Cut squid is generally the preferred bait among headboat crews because it is easy to prepare and stays on the hook longer than other baits.

3.4.2 Economic Description of the Fishery

The economic description of the snapper grouper fishery is separated into two main segments: a description of the commercial fishery that focuses mainly on the commercial harvesting sector and a description of the recreational fishery with separate descriptions of the for-hire and private sectors. There is some overlap between the for-hire and the commercial harvesting sectors in the South Atlantic snapper grouper fishery as some vessels participate in both sectors.

A description of the databases used in this section can be found in **Appendix E**.

3.4.2.1 The Commercial Fishery

The commercial snapper grouper fishery in the South Atlantic is comprised of vessels, which utilize a number of different gear types and target a variety of species. The following sections describe trends for the overall fishery, followed by discussions about the individual species addressed in this amendment.

3.4.2.1.1 Commercial Landings, Ex-vessel Value, Price, and Effort

The snapper grouper complex is important to the commercial harvesting sector in the U.S. Southern Atlantic states (South Atlantic). In 2003, landings of snapper grouper species managed by the South Atlantic Council amounted to 6.44 million lbs with an ex-vessel value of $11.91 million (Table 3-5a). In comparison, landings of the five species in this amendment (red porgy, vermilion snapper, black sea bass, golden tilefish and snowy grouper) amounted to 2.05 million lbs with an ex-vessel value of $3.99 million in 2003 (Table 3-5b). The value of all snapper grouper landings represented 7% of the value of commercial landings and 21% of the value all finfish landings in South Atlantic states in 2003 (Table 3-5a).

During 1999 to 2003, landings, ex-vessel (dockside) revenue, number of vessels in the fishery, number of permitted vessels, number of trips and days fished have been declining (Tables 3-5a and b). The decline in these parameters appears to be more prominent from 2002 to 2003. Many fishermen reported that unusually cold water temperatures in the summer and fall of 2003 were associated with lower harvests. Inflation adjusted revenue for all snapper species declined by $3.55 million from 1999 to 2003 and the inflation adjusted average price for all species declined by 8% (Tables 3-5a). For the Amendment 13C species inflation adjusted revenue declined by $2.09 million dollars and the inflation adjusted average price declined by 10% (Tables 3-5b).

The number of vessels with reported snapper grouper landings dropped from 1,101 in 1999 to 906 in 2003, with the decline in the number of vessels evident in all harvest categories (Table 3-5a). Prior to 2003, the decline in the active snapper grouper fleet is concentrated in the number of vessels that land less than 10,000 lbs of snapper grouper species annually. Only 20 vessels landed more than 50,000 lbs in 2003 and 172 vessels reported landings that exceeded 10,000 lbs (Table 3-5a). Based on the low level of landings, it would appear that a relatively large number of vessels (734 out of 906) operated on a part-time basis in the snapper grouper fishery during (Table 3-5a).

The number of vessels with any reported landings of Amendment 13C species dropped from 520 in 1999 to 396 in 2004 (Table 3-5a). Except for the "greater than 50,000 lb" harvest category, the decline in the number of vessels is evident in all harvest categories. If 2003 and 2004 are discounted, because of the extreme cold water temperatures observed in 2003 and the unusually active hurricane season in 2004, the decline in the active fleet is concentrated in the number of vessels that land less than 10,000 lbs of Amendment 13C species annually. Only eight vessels landed more than 50,000 lbs in 2004 and 74 vessels reported landings that exceeded 10,000 lbs (Table 3-5b).

Table 3-5a. The snapper grouper fishery in the South Atlantic: annual landings, ex-vessel revenue, and effort.
Source: Southeast logbook (SEFSC, Beaufort Lab, NMFS) and Southeast permits database (SERO, NMFS).

Item	1999	2000	2001	2002	2003	2004
Snapper grouper landings	7,704,007	7,679,823	7,562,215	7,324,660	6,442,148	
Ex-vessel revenue from the snapper grouper fishery	$13,996,781	$14,619,050	$13,902,225	$13,521,614	$11,914,249	
Real ex-vessel revenue in $2003*	$15,466,056	$15,618,643	$14,436,371	$13,825,781	$11,914,249	
Ex-vessel revenue from all landings in the South Atlantic **	$202,772,265	$218,251,010	$175,665,169	$168,359,567	$163,863,862	
Ex-vessel revenue from finfish landings in the South Atlantic **	$59,337,165	$69,941,863	$65,211,694	$62,615,403	$56,818,354	
Number of trips	17,200	16,241	16,922	16,820	16,176	
Days fished	29,285	28,913	29,567	29,243	27,227	
Average days per trip	1.70	1.78	1.75	1.74	1.68	
Price/lb	$1.82	$1.90	$1.84	$1.85	$1.85	
Real price/lb $2003*	$2.01	$2.03	$1.91	$1.89	$1.85	
Number of permitted vessels	1,441	1,341	1,264	1,174	1,123	1,066
Number of vessels with unlimited permits	1,085	1,001	959	907	879	841
Number of vessels landing snapper grouper species	1,101	1,045	981	955	906	
Number of vessels with more than 100 lb of landings	972	920	850	813	773	
Number of vessels with more than 1,000 lb of landings	657	606	585	583	542	
Number of vessels with more than 5,000 lb of landings	311	304	288	281	276	
Number of vessels with more than 10,000 lb of landings	199	195	196	200	172	
Number of vessels with more than 50,000 lb of landings	27	26	26	26	20	
Number of dealer permits	239	245	252	246	271	269
Number of processors (snapper grouper species)+	6	11	9	5	10	
Number of processors (snapper grouper and unclassified finfish species)+	15	20	17	20	15	

Landings information came from the Southeast logbook. Data from the Gulf of Mexico and other (unknown) states are not included in this table. However, Monroe County data is included. Also, wreckfish landings are not included.
* The CPI was used to adjust these values for inflation.
** Data obtained form the NMFS web site.
+Summarized from the NMFS Annual Processor Survey.

Table 3-5b. Species addressed in this amendment[1]: annual landings, ex-vessel revenue, and effort in the South Atlantic.
Source: Southeast logbook (SEFSC, Beaufort Lab, NMFS).

Item	1999	2000	2001	2002	2003	2004
Landings (5 species)	2,796,552	3,144,204	3,149,283	2,627,477	2,047,711	2,323,581
Ex-vessel revenue	$5,504,700	$6,477,358	$6,188,370	$5,204,760	$3,992,534	$4,699,342
Real ex-vessel revenue in $2003*	$6,082,541	$6,920,254	$6,426,137	$5,321,841	$3,992,534	$4,629,894
Number of trips	5,867	5,680	5,837	5,614	4,648	4,326
Days fished (days away)	14,460	14,320	15,450	14,956	12,582	11,548
Average days per trip	2.46	2.52	2.65	2.66	2.71	2.67
Price/lb	$1.97	$2.06	$1.97	$1.98	$1.95	$2.02
Real price/lb $2003*	$2.18	$2.20	$2.04	$2.03	$1.95	$1.99
Number of vessels landing these 5 species	520	474	459	414	396	396
Number of vessels with more than 100 lb of landings	383	370	363	330	307	304
Number of vessels with more than 1,000 lb of landings	240	232	220	211	186	184
Number of vessels with more than 5,000 lb of landings	137	145	140	124	107	111
Number of vessels with more than 10,000 lb of landings	93	93	99	89	64	74
Number of vessels with more than 50,000 lb of landings	7	9	7	7	5	8

[1] This includes red porgy, vermilion snapper, black sea bass, golden tilefish, and snowy grouper.

The limited access program in the South Atlantic snapper grouper fishery was implemented in 1998/1999 and since that time through 2004 there has been a decline of 375 permitted vessels (244 vessels with unlimited permits). Some of the vessels, which exited the snapper grouper fishery were replaced through the two for one permitting program while other vessels were not replaced, and 1,725 different vessels reported landings in this fishery from 1999 to 2003 (Table 3-6). In comparison, over this period, 970 different vessels recorded harvests of the five species addressed in this amendment (Table 3-6). There appears to be a core group of vessels that frequently operate in the South Atlantic snapper grouper fishery. For example, 678 (205+473) vessels fished during at least 4 out of the past five years, and 473 vessels fished every year since the limited access program went into effect (Table 3-6).

In contrast to the trend observed with vessel participation, the number of snapper grouper dealer permits increased during the period 1999 to 2004 (Table 3-5a). One explanation for this trend could be fishermen are acting as their own dealers and selling directly to consumers or other retailers and wholesalers in an attempt to increase profit margins or to adapt to the decline in the number of "fish houses" operating in the South Atlantic. Fish houses provide support to the fishing industry including any or all of the following: dockage, fuel, ice, repair parts, gear and supplies, fish packing and processing, and a place for transactions with permitted snapper grouper dealers. In some cases fish house owners extend credit to vessel owners with negative cash flow problems. About 10 fish houses that provided docking facilities in the South Atlantic closed for business during the past five years. More recently, one of the main fishing docks in the snapper grouper fishery located in Murrells Inlet, South Carolina closed for business. The owner sold this waterfront property to a condominium developer. In general, closure of fish houses and loss of dock space results in relocation costs, increased costs of fishing, and disruption of normal business relationships. A more detailed description of the adaptations in the secondary sector to the closure of several fishing docks can be found in the cumulative impacts section of this document (Section 4.13).

Table 3-6. Distribution of vessels by the number of years they operated in the snapper grouper fishery during 1999-2003.
Source: Southeast permits database, Permits Office, SER, NMFS.

Number of years fished	Number of vessels in the snapper grouper fishery	Number of vessels harvesting species in this amendment
1	507	434
2	324	162
3	216	104
4	205	82
5	473	188
Total number of vessels operating in the fishery during 1999-2003	**1,725**	**970**

Long-term Trends

The snapper grouper fishery has been heavily regulated since the fishery management plan was implemented in 1983 (Figures 3-5a; b and Section 1.3). Apart from the response to fishery management regulations, fluctuations in landings can be partly attributed to changes in stock abundance and availability, water quality, environmental conditions, market conditions (e.g., price), and fleet dynamics. Ex-vessel prices for the various species in the fishery depend on the quantity of landings, product quality, market conditions such as the availability of imports and the relative prices of substitutes, and consumer income levels.

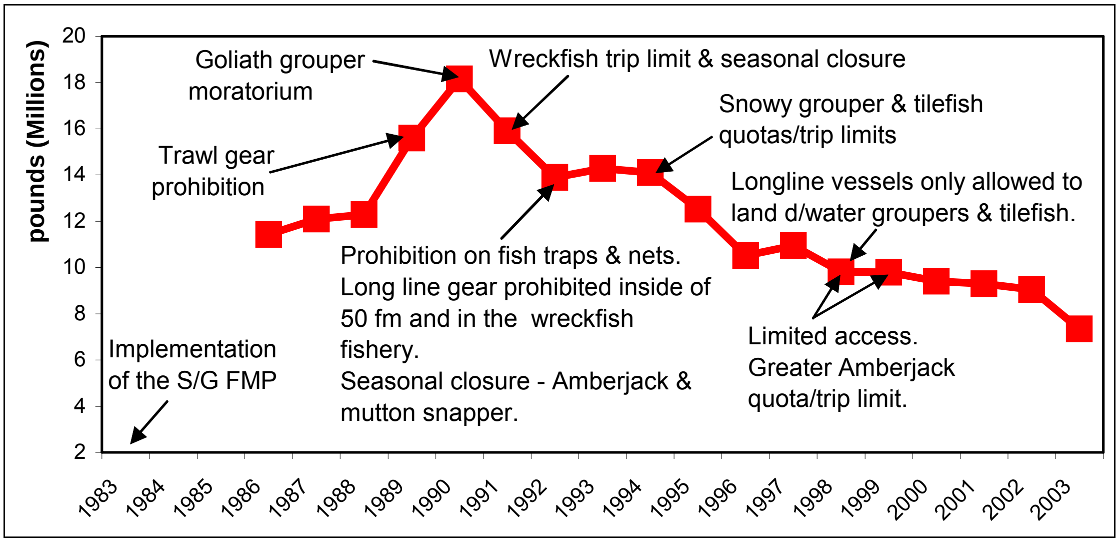


Figure 3-5a. Major events in the regulatory history of the snapper grouper fishery superimposed on total snapper grouper landings during 1983-2003.
Source: Accumulated landings system, Southeast Fisheries Science Center, Beaufort Lab.

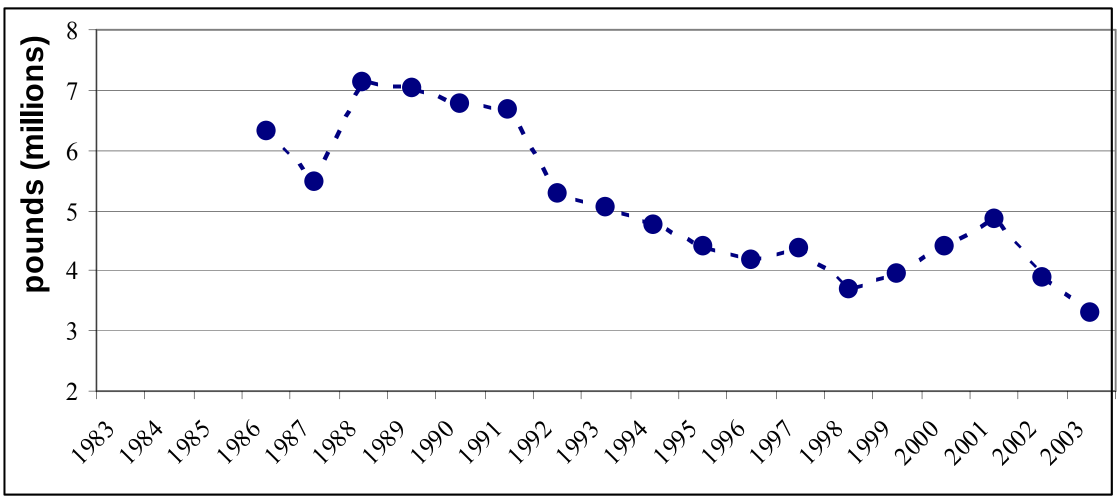


Figure 3-5b. Trends in total harvest of species in Amendment 13C during 1983-2003.
Source: Accumulated landings system, Southeast Fisheries Science Center, Beaufort Lab.

Snapper grouper ex-vessel landings and value increased from 1986 to 1990. During this period, real ex-vessel revenue increased from approximately $26 million to $35 million (Figure 3-6). Even though the overall average unit price of the fish, adjusted for inflation, was on a decreasing trend during this period (Figure 3-7), the 59% increase in landings resulted in the growth in overall ex-vessel revenue from 1986 through 1990. Data from the Accumulated Landings System (ALS) were used to examine long-term trends in prices, landings and revenue (**Appendix E**). These data will not correspond exactly to the statistics in Table 3-5a since this table contains statistics derived from the Southeast logbook database.

Since the peak in snapper grouper landings and revenue in 1990, there has been a steady decline in landings, ex-vessel revenue, and real ex-vessel revenue (Figure 3-5a and Figure 3-6). The cause of this decline can be partly attributed to restrictive regulations taken to improve/maintain the health of species in the snapper grouper complex and protect essential fish habitat. This fishery was first regulated in 1983 with a number of size limit measures and gear restrictions. In 1992, Amendment 4 prohibited fish traps, entanglements nets, longlines for wreckfish, and the use of longline gear inside of 50 fathoms for snapper grouper species in the South Atlantic EEZ. Also, additional minimum size regulations and bag limits went into effect during 1992 (Figure 3-5a).

The implementation of a limited access program in 1998/1999 partly contributed to the decline in the number of commercial vessels in the snapper grouper fishery (SAFMC 1997). Since 1999, the annual number of permitted vessels has declined by 375; the number of vessels with unlimited permits has declined by 244 (Table 3-5a). Commercial and recreational fishermen in the snapper grouper fishery have faced additional restrictive measures implemented in Amendment 9 (SAFMC 1998c) and Amendment 12 (SAFMC 2000). A detailed account of these regulations is contained in the history of management section of this document (Section 1.3). If current permit requirements remain in effect, it is likely fishing effort will continue to decline since each new entrant will have to purchase two existing snapper grouper permits. Also, the number of non-transferable permits will decline over time as their owners retire.

The trend in aggregate harvest of all species in this amendment follows a similar pattern to landings in the snapper grouper fishery (Figure 3-5b). There was a continual decline in harvest from 1991 until 1998. However, unlike the trend in total snapper grouper landings, the total harvest of these five species increased between 1998 and 2001, before declining again during the following three years (Figure 3-5b).

The average unit price for all snapper grouper species was fairly stable from 1986 to 1992 (Figure 3-7). Under normal conditions one would expect nominal prices to increase over time to account for inflation. However, landings increased during this period, which could partly account for the decreasing trend in inflation-adjusted prices up until 1991. Real prices remained relatively stable between 1992 and 2001 and declined afterwards. Other factors that influence snapper grouper prices include landings and market conditions in the Gulf of Mexico and the quantity of imports. The overall average price for snapper grouper species is calculated from data for a large number of individual species with different price trends. Also, prices for individual species will vary by size and for some species like black sea bass there is a large difference in price per lb among the various size categories.

In 2004, the volume of snappers and groupers imported into the U.S. was 43 million lbs valued at $75.6 million dollars. In comparison, domestic harvest of snappers and groupers landed at ports in the Gulf of Mexico and South Atlantic states amounted to 23.4 million lbs in 2003 (NOAA Fisheries 2004). Imports of snappers and groupers are classified into two product forms: fresh and frozen. Fresh fish comprised over 70% of total snapper grouper imports in 2004 (Table 3-7), which increased almost threefold from 16 million lbs in 1991 to 44.4 million lbs in 2003. Imports of other product forms cannot be identified by species group.

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

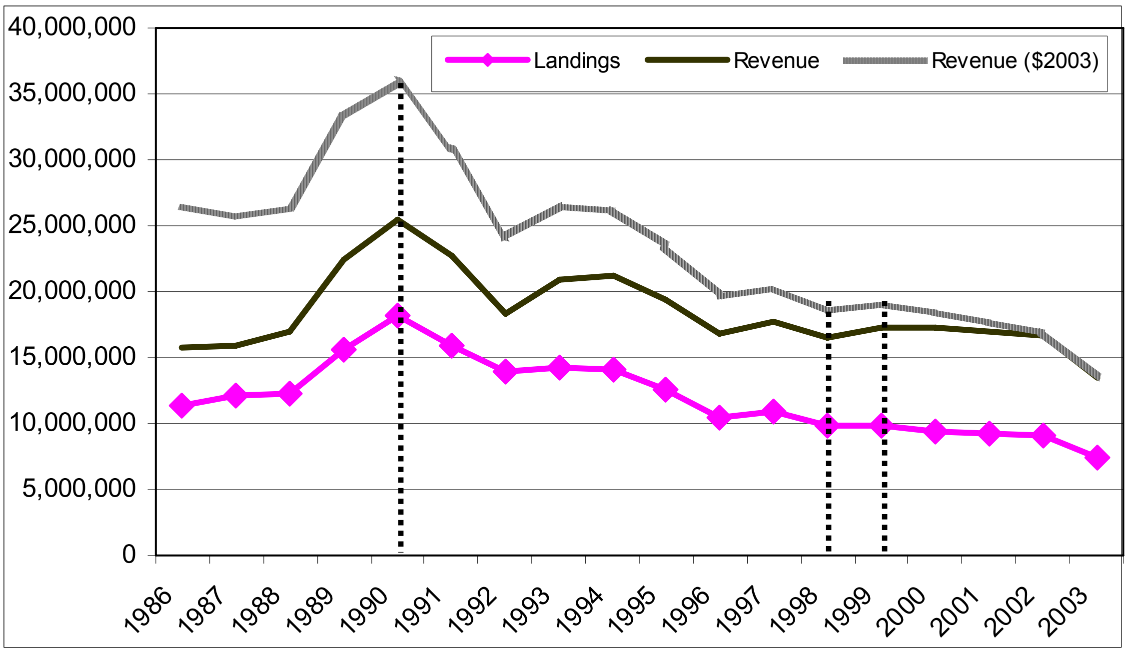


Figure 3-6. Trends in dockside landings and nominal and real ex-vessel revenue for all snapper grouper species in the South Atlantic region during 1986-2003. Florida landings include all of Monroe County.
Source: Accumulated landings system, Southeast Fisheries Science Center, Beaufort Lab.
*landings data are presented in whole weight equivalents
**Real value was calculated using the Consumer Price Index (CPI) and represents the purchasing power of earnings of a respective year in 2003 dollars.

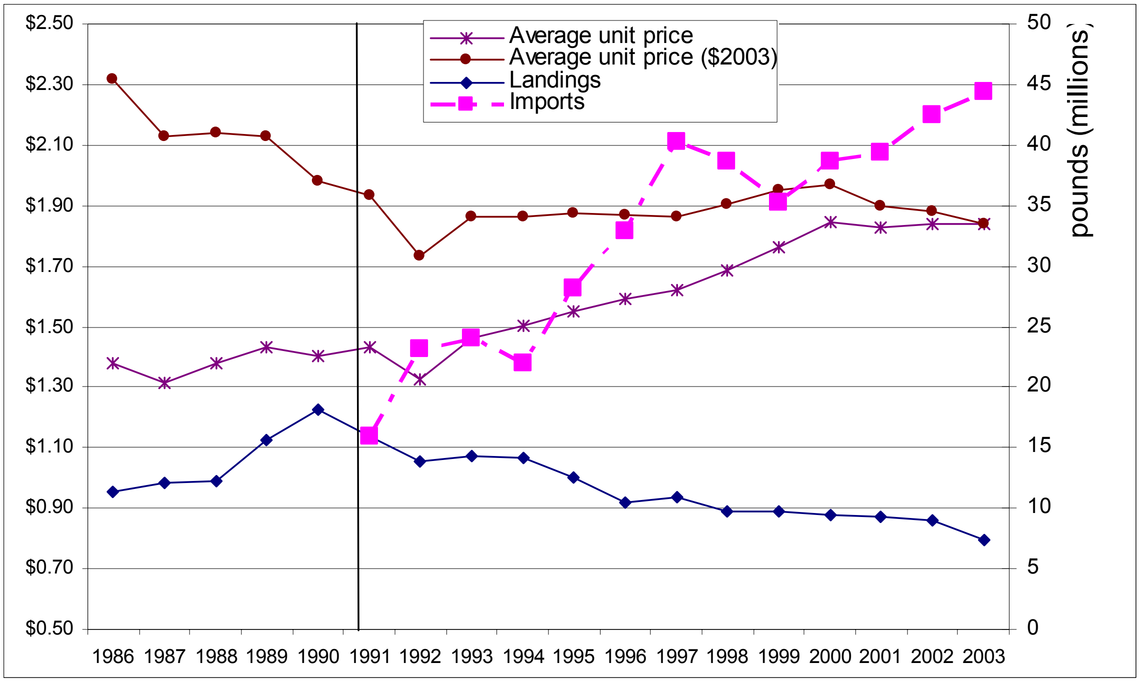


Figure 3-7. Trends in unit price, imports, and landings of snapper grouper species. Average unit prices are expressed in nominal value and real value (2003 dollars).
Source: Accumulated landings system, Southeast Fisheries Science Center, Beaufort Lab.

Table 3-7. U.S. imports of snappers and groupers from 1991 to 2004.
Source: NMFS, Foreign Trade Database.

YEAR	Pounds of imports by product form Millions of pounds**			Value of imports by product form Millions of dollars		
	FRESH	FROZEN	TOTAL	FRESH	FROZEN	TOTAL
1991	12.6	3.4	16.0	$16.3	$4.0	$20.2
1992	19.4	3.9	23.2	$28.0	$4.6	$32.6
1993	20.8	3.2	24.0	$28.9	$3.9	$32.9
1994	20.0	2.0	22.0	$28.4	$2.5	$30.9
1995	26.1	2.1	28.2	$35.9	$2.6	$38.5
1996	30.7	2.2	32.9	$44.8	$2.7	$47.5
1997	36.8	3.5	40.2	$53.8	$4.2	$58.0
1998	35.1	3.6	38.7	$53.3	$5.2	$58.5
1999	32.0	3.3	35.3	$49.4	$4.6	$53.9
2000	32.5	6.1	38.6	$53.5	$9.5	$63.0
2001	31.1	8.4	39.4	$51.7	$10.6	$62.3
2002	33.3	9.2	42.5	$57.1	$12.3	$69.5
2003	34.2	10.2	44.4	$58.9	$14.4	$73.3
2004	33.2	9.8	43.0	$61.7	$13.9	$75.6

**Weights are not converted to equivalent whole weights.

3.4.2.1.2 Overall Description of the Snapper Grouper Fishery for Individual South Atlantic States

Due to confidentiality considerations, statistics on the economic importance and characteristics of the snapper grouper fishery for individual states in the South Atlantic are presented as averages for 1999 to 2003.

The South Atlantic state with the highest ex-vessel revenue from snapper grouper landings was Florida ($5.8 million) followed by North Carolina ($3.7 million), South Carolina ($3.3 million), and Georgia ($0.8 million) (Table 3-8a). A similar ranking is observed for the number of days fished, number of trips, landings, number of permitted vessels, and number of vessels in the fishery by state (Table 3-8b). Snapper grouper landings appear to be relatively more important to the commercial fishing industry in Florida and South Carolina compared to the other two states. However, another picture emerges when considering the relative contribution of snapper grouper species to the overall ex-vessel value of finfish landings. Approximately 95% of the total revenue from finfish landings in Georgia is comprised of snapper grouper species (Table 3-8a). Thus, while total snapper grouper landings in Georgia may be relatively low compared to other states, the fishery has great significance to the commercial finfish harvesters in the state.

Similar to the pattern observed for the South Atlantic, the dockside value of landings, number of trips and the number of vessels in the snapper grouper fishery declined during the period 1999-2003. However, the relative decrease in South Carolina was not as severe as observed for the other states during this period. For example, the decrease in ex-vessel value was 12% for South Carolina compared to 31% for North Carolina, 32% for Georgia, and 22% for Florida. A possible explanation for this difference is that even though the number of vessels declined in South Carolina the number of days fished increased (in contrast to the other states). Also, the proportional decline in vessels with a high level of landings was lower in South Carolina than observed for the other states. Except for South Carolina the number of home-ported vessels with snapper grouper permits decreased in all states (Tables 3-8a).

Another difference to note is snapper grouper trips in Georgia and South Carolina were of greater duration than trips in the other two states. The average trip length for South Carolina and Georgia was 4.64 days and 6.35 days, respectively compared to 1.75 days for North Carolina and 1.4 days for Florida (Table 3-8a). One explanation for this difference is the fleet in Florida and North Carolina is comprised of a larger proportion of smaller vessels (Tables 3-8a and 3-9). In Florida, snapper grouper species are available closer to shore whereas the travel distance to the fishing grounds is greater for vessels fishing in the other states. The shorter average trip length in North Carolina could be due to a fishery comprised of small vessels, which primarily operate in the inshore areas and only venture further out occasionally to catch snapper grouper species.

Average landings per vessel and average landings per trip were much higher for South Carolina and Georgia vessels compared to vessels from the other two states (Table 3-8b). In North Carolina, the average landings per trip was 645 lbs compared to 2,354 lbs for Georgia. The average landings per day was at about the same level for all states except Florida where the average landings per day was about 50% less than the average daily catch in Georgia (Table 3-8b).

Table 3-8a. Economic characteristics of the snapper grouper fishery by state in the South Atlantic from 1999-2003.
Source: Database derived from the Southeast logbook provided by the Southeast Fisheries Science Center, NMFS, Beaufort Lab.

	Average per year - 1999-2003				**Change from 1999-2003 (1999 to 2004 for the permit data**)**			
Item	North Carolina	South Carolina	Georgia	Florida	North Carolina	South Carolina	Georgia	Florida
Snapper grouper Landings (lb)	2,016,539	1,637,005	428,472	3,251,899	-24%	-3%	-20%	-17%
Ex-vessel revenue	$3,673,443	$3,273,266	$823,729	$5,806,406	-31%	-12%	-32%	-22%
Ex-vessel revenue from all landings*	$93,529,784	$27,396,198	$17,490,320	$42,408,722	-13%	-9%	-43%	-33%
Ex-vessel revenue from all finfish landings*	$34,308,323	$5,502,254	$862,760	$16,243,040	-6%	5%	-22%	-18%
% of total ex-vessel revenue	4%	12%	5%	14%				
% of total revenue from finfish landings	11%	59%	95%	36%				
Number of trips	3,125	1,016	182	12,346	-20%	-5%	-7%	-2%
Number of days	5,475	4,712	1,150	17,490	-18%	15%	-11%	-8%
Average trip length	1.75	4.64	6.35	1.4	2%	21%	-5%	-6%
Number of permitted vessels**	191	89	15	945	-33%	5%	-20%	-27%
Number of vessels with unlimited permits**	163	80	13	686	-28%	17%	-23%	-25%

* Data downloaded from the NMFS web site.
** Statistics on snapper grouper permits are calculated using data from 1999-2004.

Table 3-8b. Economic characteristics of the snapper grouper fishery by state in the South Atlantic from 1999-2003.
Source: Database derived from the Southeast logbook provided by the Southeast Fisheries Science Center, NMFS, Beaufort Lab.

	Average per year -1999-2003				**Change from 1999-2003**			
Item	North Carolina	South Carolina	Georgia	Florida	North Carolina	South Carolina	Georgia	Florida
Number of vessels (any landings)	181	75	14	738	-14%	-27%	-14%	-18%
Average landings per vessel (lb.)	11,153	21,827	29,755	4,406				
Average landings per trip (lb.)	645	1,612	2,354	263				
Average landings per day (lb.)	368	347	372	186				
Number of vessels with more than 100 lb of landings	157	73	13	631	-19%	-29%	0	-20%
Number of vessels with more than 1,000 lb of landings	124	64	12	402	-15%	-24%	-9%	-17%
Number of vessels with more than 10,000 lb of landings	64	39	8	84	-27%	-12%	0	-1%
Number of vessels with more than 50,000 lb of landings	confidential data	10	confidential data	7				
Number of dealer permits	38	22	4	129	93%	-8%		1%

The previous two paragraphs described the entire fishery for snapper grouper species by state. Statistics on only the species in this amendment, summarized by state for the period 1999 to 2003, are contained in Table 3-8c. North Carolina had the highest level of recorded landings (1.07 million lbs), followed by South Carolina (0.80 million lbs), Florida (0.66 million lbs) and Georgia (0.21 million lbs). A similar ranking is observed for the number of days fished and sales revenue (Table 3-8c). The species addressed in this amendment are relatively more important to the snapper grouper fishery in North Carolina, South Carolina, and Georgia, where these five species comprised at least 50% of the revenue from snapper grouper landings, compared to Florida where they comprised 22% of the total snapper grouper revenue. A slightly different picture emerges when considering the importance of these species to all finfish harvested in the respective state. In Georgia, these species comprised at least 53% of the total finfish landings compared to less than 10% for North Carolina and Florida (Table 3-8c).

Commercial fishermen made more trips for the species addressed by this amendment and more vessels were engaged in the harvest of these species in Florida and North Carolina compared to the other two states. However, the average trip length, the harvest per trip, and the annual harvest per vessel is considerably higher for South Carolina and Georgia compared to the other two states (Table 3-8c). These statistics are fairly comparable to the observations made in the earlier discussion on the entire snapper grouper fishery.

As observed for the entire snapper grouper fishery, changes in landings, ex-vessel revenue, the number of trips, and the number of vessels engaged in harvesting these five species were lower in 2003 compared to 1999. A greater proportional decline in ex-vessel revenue and landings was observed for North Carolina and Florida compared to the other two states (Table 3-8c).

Table 3-8c. Economic characteristics of the fishery for species in this amendment by state from 1999-2003.
Source: Database derived from the Southeast logbook provided by the Southeast Fisheries Science Center, NMFS, Beaufort Lab.

	Average per year - 1999-2003				**Change from 1999-2003**			
Item	North Carolina	South Carolina	Georgia	Florida	North Carolina	South Carolina	Georgia	Florida
Landings (lb)	1,070,275	802,498	212,522	660,445	-32%	-7%	-2%	-40%
Ex-vessel revenue	$2,119,258	$1,599,875	$453,683	$1,288,570	-36%	-9%	-3%	-34%
% of total snapper grouper revenue	58%	49%	55%	22%				
% of total revenue from finfish landings	6%	29%	53%	8%				
% of total revenue from commercial landings	2%	6%	3%	3%				
Number of trips	2,682	991	175	1,678	-26%	-5%	-13%	-22%
Number of days	4,917	4,624	1,138	3,655	-21%	16%	-12%	-30%
Average trip length	1.84	4.67	6.55	2.17				
Number of vessels	156	74	13	219	-23%	-28%	-15%	-23%
Average landings per vessel (lb.)	6,852	10,874	16,348	3,021				
Average landings per trip (lb.)	399	810	1,214	394				
Average landings per day (lb.)	218	174	187	181				

Table 3-9. Length distribution of permitted vessels by state in 2004.
Source: Southeast permits database, Permits Office, SER, NMFS.

Size Category (feet)	Florida	North Carolina	Georgia	South Carolina
Less than 20	6%	2%	0%	1%
20-29	51%	35%	17%	22%
30-39	31%	46%	42%	44%
40-49	10%	16%	42%	30%
50-59	2%	1%	0%	2%
60-69	1%	1%	0%	1%
70-79	<1%	<1%	<1%	<1%
larger than 80 feet	<1%	<1%	<1%	<1%
	100%	100%	100%	100%

3.4.2.1.3 Species Composition in the Commercial Fishery

Numerous species make up the Snapper Grouper Fishery Management Unit (FMU). In Amendment 13B to the Snapper Grouper FMP, the Council is considering dividing the FMU into nine separate multi-species sub-units to conserve and manage snapper grouper species that are generally targeted and/or captured together. Much of the remaining social and economic analyses in Section 3.4 describe the economic and social environment in the context of these proposed sub-units. In terms of ex-vessel revenue the most important groups include the shallow water groupers, shallow water snappers, and mid-shelf snappers (Figure 3-8a). Of secondary importance are golden tilefish, deep water groupers, jacks, and sea basses. No one group comprised more than 30% of the snapper grouper complex revenue during the period 1999 to 2003 (Figures 3-8a and b).

Ex-vessel revenue from the species in this amendment accounts for 41% of the total snapper grouper revenue. Revenue from South Atlantic vermilion snapper harvest comprises 20% of the total snapper grouper revenue (Figure 3-8b). Among other factors the species composition of the snapper grouper catch depends on fishing location, time of year, and distance from shore.

Trends in the harvest of individual species in this amendment are presented in Figure 3-9. Subsequent to the peak observed in 1988 black sea bass landings declined continuously over the period 1991 to 2002. These statistics contain harvest north of Cape Hatteras, which includes harvest from the black sea bass populations managed by the Mid-Atlantic Fishery Management Council. Vermilion snapper harvests were at their lowest levels during 1992 through 1998. Since 1999, harvest of vermilion snapper increased and peaked in 2001. Harvest in 2003 was at the level observed during 1992 to 1998 (Figure 3-9). As mentioned previously, harvest of other snapper grouper species were at unusually low levels in 2003 and this was linked to extremely low water temperatures during 2003. Snowy grouper and golden tilefish landings were at their highest levels during the period 1989 to 1993. The observed drop off in 1994 is possibly correlated to the trip limit and quota regulations implemented in 1994 for these two species (Figure 3-5a). Further harvest declines of these species occurred from 1999 through 2003 (Figure 3-9). Red porgy harvests have been declining throughout this entire period. The drop in red porgy landings during the period 1999 through 2003 resulted from the substantial harvest reduction measures implemented in 1999 (Figure 3-9). A detailed account of the regulatory history of the snapper grouper fishery is contained in Section 1.3 of this amendment.

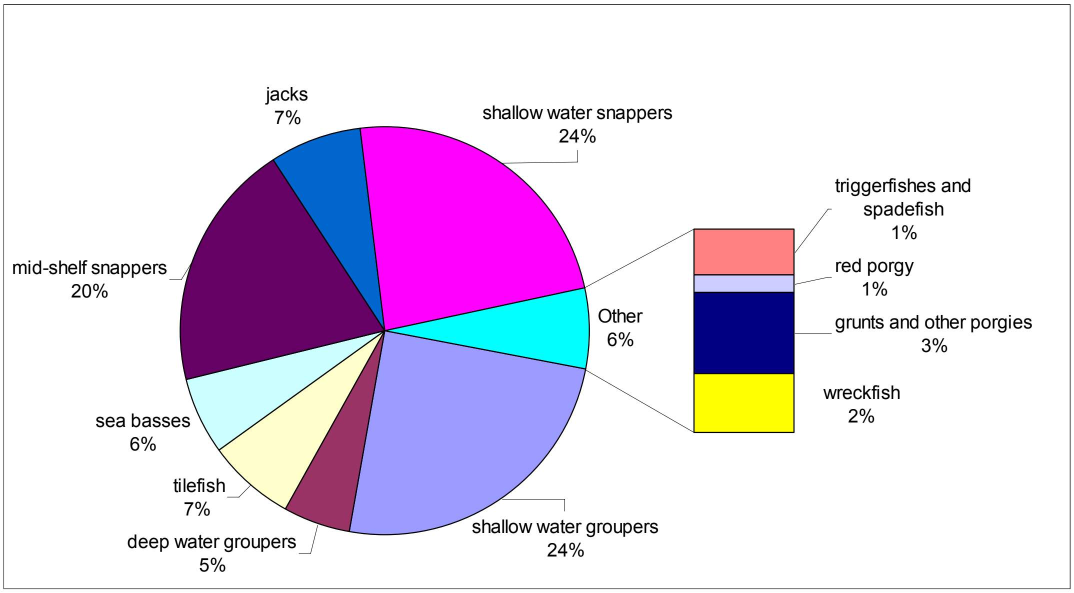


Figure 3-8a. Proportion of ex-vessel revenue derived from the various groups in the snapper grouper complex.

Average ex-vessel revenue for 1999-2003 was used to calculate the percent composition. All unclassified groupers were placed in the shallow water grouper unit (1A) and all unclassified snappers were placed in the shallow water snapper category. Source: Accumulated landings system, Southeast Fisheries Science Center, Beaufort Lab.

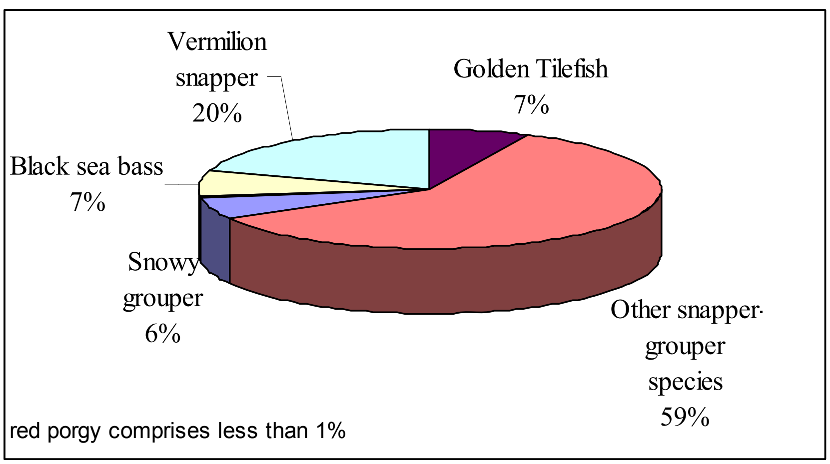


Figure 3-8b. Proportion of ex-vessel revenue derived from the various species addressed in this amendment.

Average ex-vessel revenue for 1999-2003 was used to calculate the percent composition. Source: Accumulated landings system, Southeast Fisheries Science Center, Beaufort Lab.

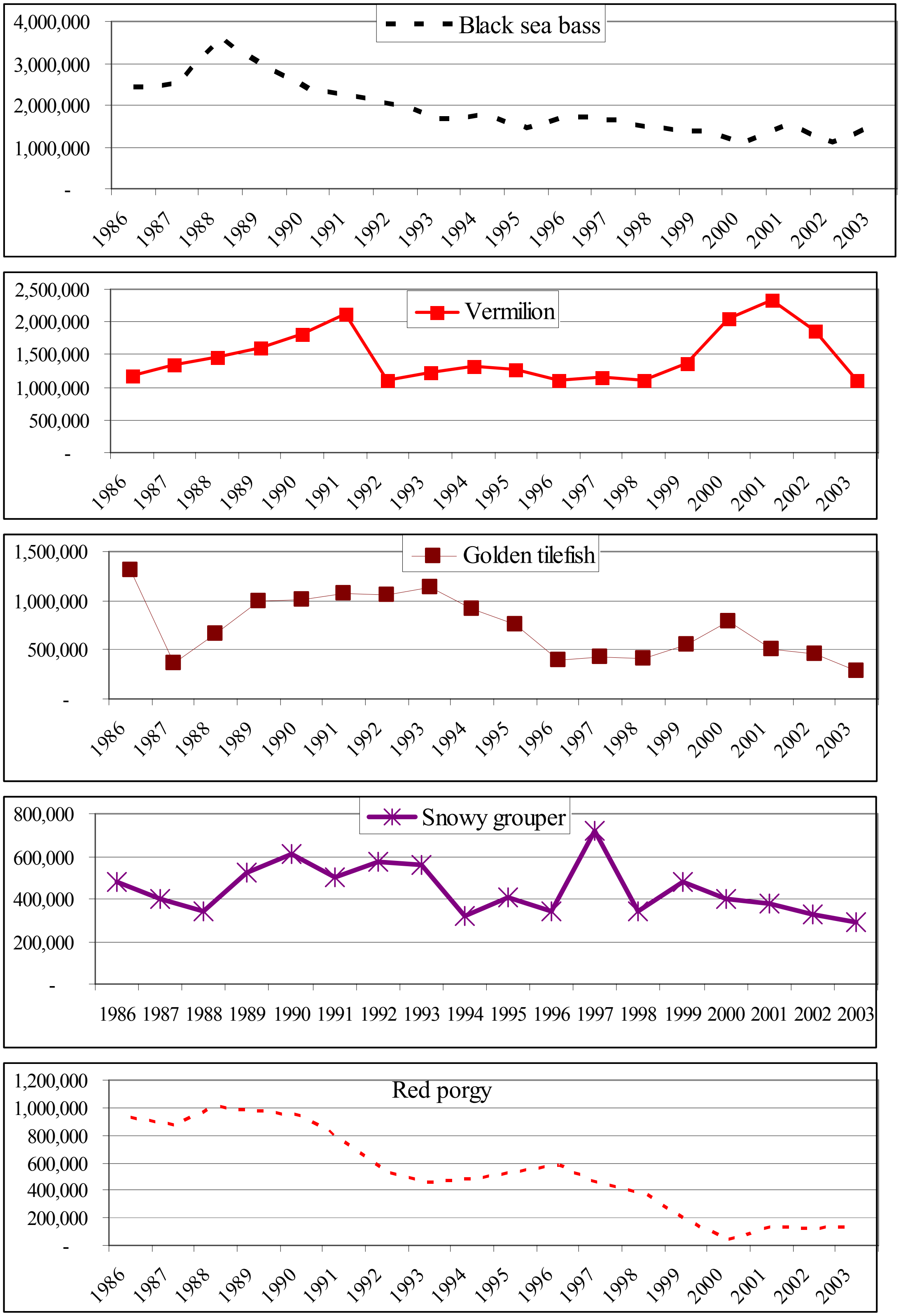


Figure 3-9. Harvest trends in landings for the five species in this amendment during 1986-2003. Source: Accumulative landings system, Southeast Fisheries Science Center, Beaufort Lab.

A substantial difference in price exists among the various species or species groupings in the snapper grouper complex. In general, the species groupings can be placed into three categories based on the observed average annual price per lb (Figure 3-10):

- Low price category - nominal price did not exceed $1.00 per lb during the entire time series. Species groups include the jacks, grunts and other porgies, and triggerfishes and spadefish.

- Medium price category – generally prices ranged between $1.00 and $1.50 per lb. Species groups include red porgy, black sea bass, and the tilefishes. The tilefish group can be split into two categories based on average prices where blueline tilefish would fall into the low price category. Average ex-vessel prices for golden tilefish varied between $1.30 and $2.00 per lb.

- High price category - the price per lb is usually close to or exceeds $2.00 per lb. The following groups fall in this category: deep water groupers (including snowy grouper), wreckfish, shallow water groupers, shallow water snappers, and mid-shelf snappers (including vermilion snapper).

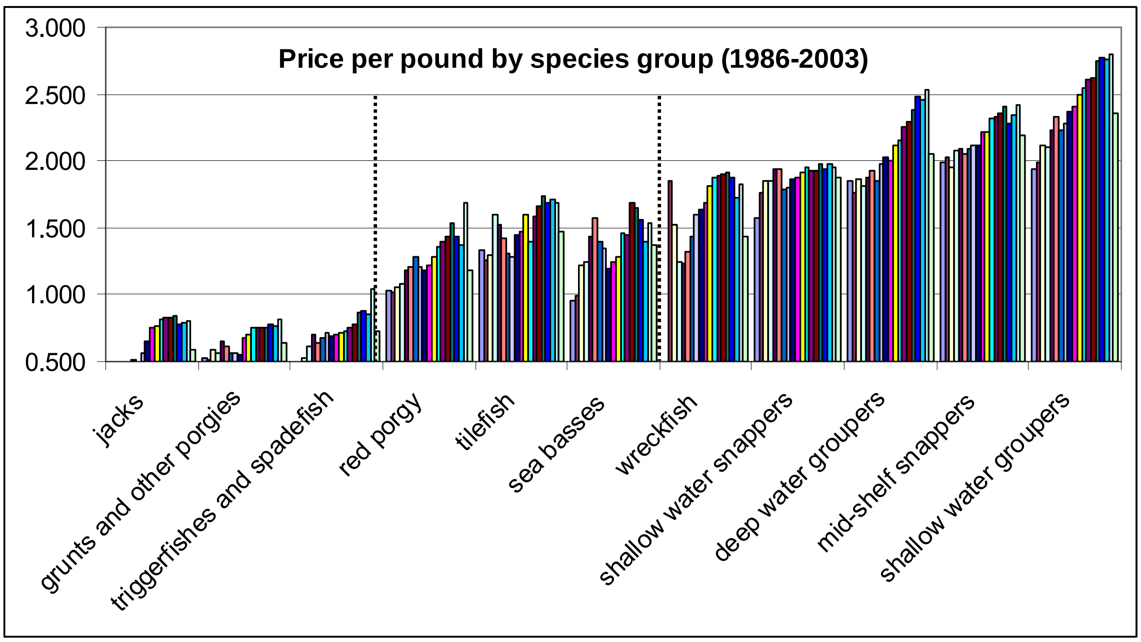


Figure 3-10. Price per lb by species group during 1986-2003.
Source: Accumulative landings system, Southeast Fisheries Science Center, Beaufort Lab.

Trips where shallow water snappers, shallow water groupers, and jacks are caught dominate the snapper grouper fishery (Table 3-10a). Also, a large proportion of the snapper grouper fleet reported landings for species in these groupings (Table 3-10b). As far as trips and vessels where a specific unit was the top revenue earner, shallow water snappers and shallow water groupers emerge as the most important groups in the snapper grouper fishery (Tables 3-10a and 3-10b). However, there is substantial variability among the groups in terms of the proportion of trips where a unit is the top revenue earner as a percent of total trips when species in that unit were caught. The shallow water snapper group was the top revenue earner on 69% of all trips where species in the unit were caught. For the mid-shelf snappers, tilefishes, sea basses, shallow water groupers, and deep water groupers, this figure is around the 40% level. The other units (jacks, triggerfishes/spadefish, and grunts/porgies) are not usually the top revenue earner on trips where they are caught. These are lower priced species groups and are probably not targeted as regularly as the other units in the snapper grouper complex. Also, these species are probably caught in association with many other species and hence are not a main contributor to overall revenue (Table 3-10a). In terms of primary and secondary sources of revenue most vessels depend on the shallow water groupers, followed by shallow water snappers and mid-shelf snappers (Table 3-10b).

Table 3-10a. Average number of trips during 1999-2003 with landings from each proposed unit in Snapper Grouper Amendment 13B.
Source: Data table provided by the Southeast Fisheries Science Center, NMFS, Beaufort Lab.

Unit	**Trips with at least 1 pound in unit (Y)**	**Percent of all trips that landed at least 1 pound of unit**	**Trips with unit at top source of revenue (X)**	**Percent of trips with unit at top source of revenue**	**(X/Y) ***
Shallow Water Groupers	6,045	36%	2,745	16%	45%
Deep Water Groupers	1,816	11%	684	4%	38%
Tilefish	1,250	8%	472	3%	38%
Shallow Water Snappers	9,279	56%	6,412	38%	69%
Mid-Shelf Snappers	3,488	21%	1,487	9%	43%
Triggerfishes	2,478	15%	42	0%	2%
Jacks	5,742	34%	1,063	6%	19%
Red Porgy	1,446	9%	16	0%	1%
Grunts and Porgies 7B	4,127	25%	133	1%	3%
Sea Basses	2,673	16%	1,018	6%	38%

16,672 = The average number of trips for the period 1999-2003 where at least 1 lb of snapper grouper species was landed.

*Top revenue trips for each unit as a percent of all trips with at least 1 lb of the unit.

Table 3-10b. Average number of boats during 1999-2003 with landings from each proposed unit in Snapper Grouper Amendment 13B.
Source: Data table provided by the Southeast Fisheries Science Center, NMFS, Beaufort Lab.

	Total boats with at least 1 pound of species in group	**Percent of all boats that landed at least 1 pound of unit**	**Boats with Top-revenue trips only (X)**	**Both top-rev and secondary rev trips (Y)**	**X+Y**
Shallow Water Groupers	677	68%	95	353	448
Deep Water Groupers	269	27%	36	102	139
Tilefish	170	17%	20	56	76
Shallow Water Snappers	708	71%	200	282	482
Mid-Shelf Snappers	388	39%	47	178	225
Triggerfishes	307	31%	6	21	27
Jacks	625	63%	29	158	187
Red Porgy	187	19%	0	7	8
Grunts and Porgies	461	46%	6	45	51
Sea Basses	255	26%	30	73	103

998 = average number of vessels that landed at least 1 lb of snapper grouper species during the period 1999-2003
X = Number of boats that only recorded trips for the unit as top-revenue unit
Y = Number of boats that recorded trips for unit, with some trips as top-revenue and other trips as secondary source of revenue

Golden tilefish dominate most trips on which this species is caught. Since the species was the top revenue earner on 59-75% of all trips where it was caught during the period 1999 to 2004 (Table 3-11). In comparison, black sea bass was the top revenue earner on 34% to 41% of all trips where black sea bass were harvested during the same period (Table 3-11).

Data on the composition of the catch were examined for all trips where a particular species was caught (Figures 3-11a-f). This information provides insight into potential target shifts if regulations restrict the harvest of a particular species. Vermilion snapper is a top revenue earner on a large proportion of trips on which this species is caught, and gag, red grouper and scamp also frequently dominate the catch on these trips (Figure 3-11a). Vermilion snapper is targeted on a large number of trips on which snowy grouper and red porgy are harvested (Figures 3-11b and c).

For golden tilefish and black sea bass, the composition of the catch was examined by gear type. In the case of black sea bass, catch on trips employing trap gear is dominated by black sea bass. Black sea bass was the top revenue earner on 99% of all trap trips. However, catches taken by hook and line gear are dominated by vermilion snapper and gag (Figure 3-11d). It is reasonable to surmise black sea bass are not usually the main target on these hook and line trips. Golden tilefish tend to dominate the revenue earned on longline trips (77%). This is evident also on trips where golden tilefish are caught using hook and line gear (Figures 3-11e and f). For both gear types, snowy grouper dominates the catches on a fairly large proportion of trips (20% in the hook and line fishery and 13% in the long line fishery) (Figure 3-11e and f).

Table 3-11. Landings, ex-vessel revenue, number of vessels, and effort associated with harvest of the five species in this amendment during 1999-2004.
Source: Southeast logbook, SEFSC, NMFS, Beaufort Lab.

Year	Landings (pounds)	Ex-vessel Revenue	No. vessels[1] (A)	No. vessels top species[2] (B)	All trips[3] (C)	Trips - top species[4] (D)	% top vessels of total (B/A)	% top trips of total (D/C)
				Vermilion snapper				
1999	906,279	$2,111,719	332	181	2,856	1,136	55%	40%
2000	1,381,791	$3,203,512	293	176	2,849	1,487	60%	52%
2001	1,651,209	$3,539,515	294	181	3,029	1,690	62%	56%
2002	1,309,396	$2,912,203	273	166	2,907	1,495	61%	51%
2003	769,895	$1,733,558	248	149	2,173	926	60%	43%
2004	1,065,613	$2,466,331	250	156	2,111	1,034	62%	49%
				Snowy grouper				
1999	463,054	$934,613	247	147	1,767	711	60%	40%
2000	412,784	$862,871	228	140	1,723	693	61%	40%
2001	352,331	$765,232	226	130	1,719	603	58%	35%
2002	310,458	$669,035	205	112	1,550	600	55%	39%
2003	286,936	$638,558	189	109	1,347	541	58%	40%
2004	236,774	$543,741	166	92	1,048	430	55%	41%
				Red porgy				
1999	91,412	$133,889	237	25	1,586	29	11%	2%
2000	15,207	$23,560	144		623		0%	0%
2001	52,412	$76,753	199	8	1,790	11	4%	1%
2002	56,706	$81,327	180	7	1,694	41	4%	2%
2003	44,768	$61,612	175	8	1,541	12	5%	1%
2004	43,327	$54,492	170	7	1,289	8	4%	1%
				Black sea bass				
1999	790,645	$1,365,122	307	140	3,069	1,257	46%	41%
2000	550,757	$931,397	256	112	2,485	956	44%	38%
2001	604,438	$938,950	249	97	2,959	1,186	39%	40%
2002	506,673	$745,418	237	91	2,616	881	38%	34%
2003	597,840	$924,386	225	88	2,241	863	39%	39%
2004	705,889	$1,121,589	240	103	2,342	903	43%	39%
				Golden tilefish				
1999	545,923	$959,897	82	53	545	389	65%	71%
2000	783,774	$1,456,076	94	62	710	532	66%	75%
2001	489,253	$868,160	87	53	471	294	61%	62%
2002	444,285	$796,842	86	55	569	363	64%	64%
2003	348,281	$634,436	64	42	394	233	66%	59%
2004	272,392	$513,294	66	44	335	233	67%	70%

[1]number of vessels with at least one lb of recorded landings of the respective species.
[2]number of vessels on which the species was a top revenue earner for at least one trip during the year.
[3]number of trips with at least one lb of the species.
[4]number of trips on which the species was the top revenue earner.

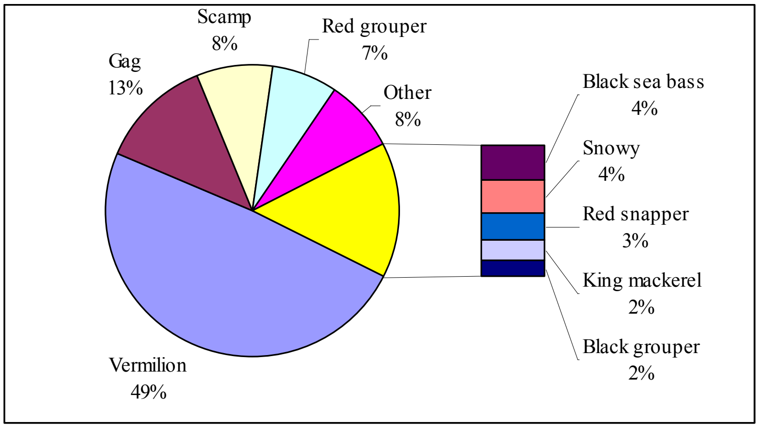


Figure 3-11a. Proportion of trips where the respective species was the top revenue earner on all trips where **vermilion snapper** were harvested.
Source: Southeast logbook database, NMFS, Beaufort Lab.

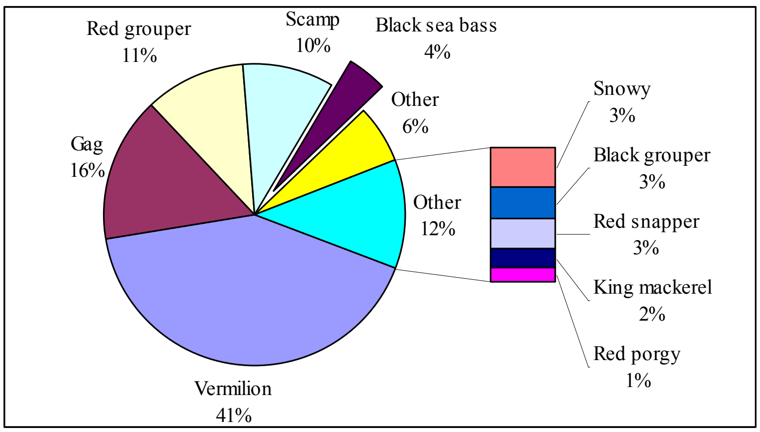


Figure 3-11b. Proportion of trips where the respective species was the top revenue earner on all trips where **red porgy** were harvested.
Source: Southeast logbook database, NMFS, Beaufort Lab.

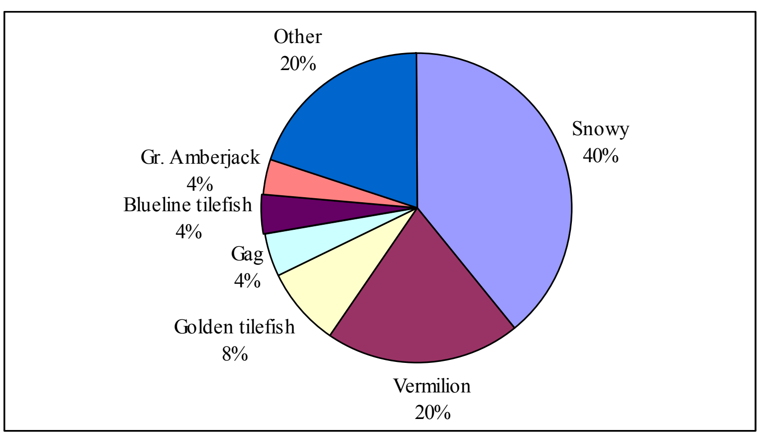


Figure 3-11c. Proportion of trips where the respective species was the top revenue earner on all trips where **snowy grouper** were harvested.
Source: Southeast logbook database, NMFS, Beaufort Lab.

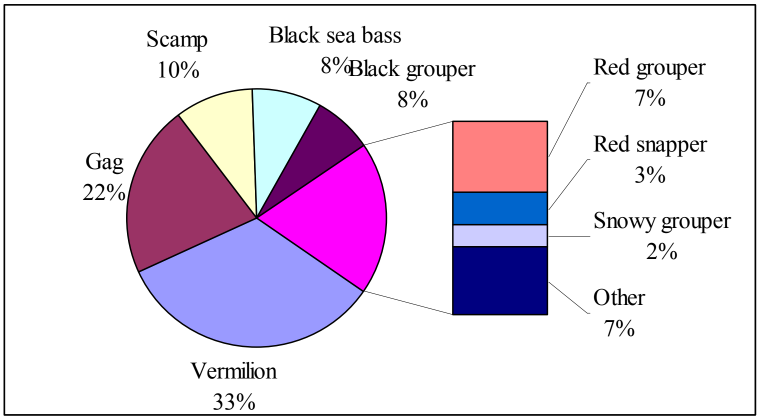


Figure 3-11d. Proportion of trips where the respective species was the top revenue earner on all trips where **black sea bass** were harvested by **hook and line gear**.
Source: Southeast logbook database, NMFS, Beaufort Lab.
Black sea bass was the top revenue earner on 99% of trips on which **black sea bass** were caught using **trap gear**.

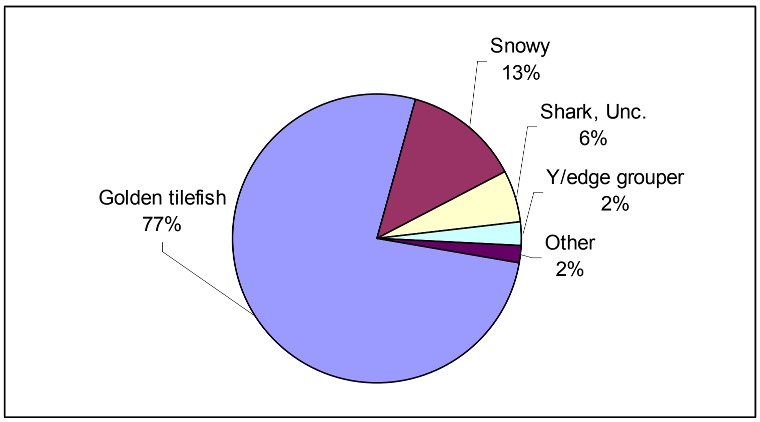


Figure 3-11e. Proportion of trips where the respective species was the top revenue earner on all trips where **golden tilefish** were harvested by **longline gear**.
Source: Southeast logbook database, NMFS, Beaufort Lab.

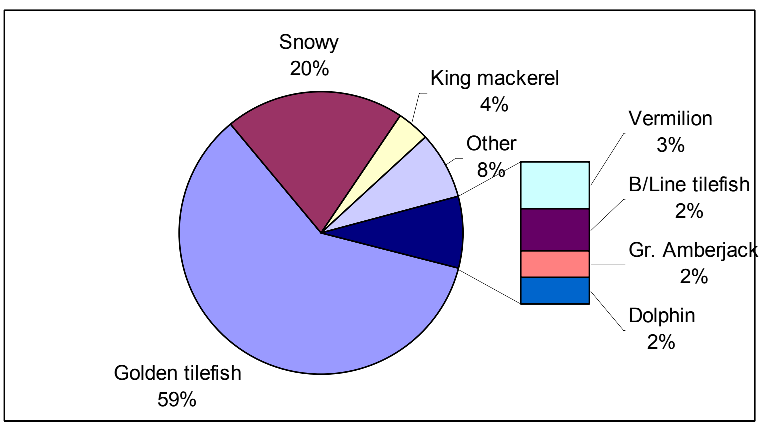


Figure 3-11f. Proportion of trips where the respective species was the top revenue earner on all trips where **golden tilefish** were harvested by **hook and line gear**.
Source: Southeast logbook database, NMFS, Beaufort Lab.

There is some variability among the states with respect to the species and/or species groups dominating overall revenue from snapper grouper landings. In terms of ex-vessel revenue the top state for black sea bass is North Carolina. Revenue from golden tilefish landings is concentrated in Florida and to a lesser extent South Carolina (Table 3-12a and b). Most of the shallow water snappers and jacks are landed in Florida, with minimal landings in other states (Table 3-12a). In terms of overall contribution to the state's revenue from snapper grouper landings, North Carolina snapper grouper harvests are dominated by the mid-shelf snapper, shallow water grouper, and sea bass units. Mid-shelf snappers and shallow water groupers also dominate the snapper grouper fishery in South Carolina (Table 3-12a and c). In Georgia, the mid-shelf unit comprises 59% of the total revenue in the snapper grouper complex followed by the shallow water grouper unit. Of the five species in this amendment, vermilion snapper dominates the total harvest in Georgia (Table 3-12b). In Florida, the most important group is the shallow water snapper unit, which makes up 43% of the snapper grouper revenue (Table 3-12c).

Table 3-12a. Average ex-vessel value of the snapper grouper units (proposed in Snapper Grouper Amendment 13B) by state during 1999-2003.
Source: Southeast logbook database, NMFS, Beaufort Lab.

Group	North Carolina	Georgia	South Carolina	Florida	Other
Shallow water groupers	$1,077,252	$217,731	$1,228,433	$962,362	
Deep water groupers	$275,553	$14,044	$228,680	$367,193	$3,505
Tilefishes	$105,115	$5,476	$266,709	$689,805	$13,318
Shallow water snappers	$24,362	$10,111	$41,884	$2,483,091	
Mid-shelf snappers	$1,083,541	$481,999	$1,025,725	$581,215	
Triggerfish / Spadefish	$119,604	$29,671	$72,314	$30,884	
Jacks	$103,690	$51,803	$144,306	$640,809	
Red Porgy	$34,969	$3,854	$24,191	$12,338	
Grunts and other porgies	$77,769	$5,269	$44,746	$32,770	
Sea basses	$771,669	$3,770	$196,278	$6,361	

Table 3-12b. Average ex-vessel value of species in this amendment by state for 1999-2004.
Source: Southeast logbook database, NMFS, Beaufort Lab.

Species	Florida	Georgia	North Carolina	South Carolina	Other
Vermilion snapper	$338,130	$418,213	$979,303	$925,389	<$300
Snowy grouper	$263,791	<$15,000	$253,189	$203,832	<$2,000
Red porgy	$11,593	<$5,000	$34,110	$22,562	
Black sea bass	<$10,000	<$5,000	$771,802	$221,026	<$500
Golden tilefish	$597,194	<$5,000	$38,733	$222,970	<$10,000

Table 3-12c. Proportional contribution of each unit (proposed in Snapper Grouper Amendment 13B) to the total ex-vessel revenue from all snapper grouper species by state, averaged over 1999-2003.
Source: SEFSC logbook database, NMFS, Beaufort Lab.

Group	North Carolina	Georgia	South Carolina	Florida
Shallow water groupers	29%	26%	38%	17%
Deep water groupers	8%	2%	7%	6%
Tilefishes	3%	1%	8%	12%
Shallow water snappers	1%	1%	1%	43%
Mid-shelf snappers	29%	59%	31%	10%
Triggerfish / Spadefish	3%	4%	2%	1%
Jacks	3%	6%	4%	11%
Red Porgy	1%	0%	1%	0%
Grunts and other porgies	2%	1%	1%	1%
Sea basses	21%	0%	6%	0%
	100%	100%	100%	100%

3.4.2.1.4 Landings Distribution by Gear Type

Except for golden tilefish and black sea bass, most of the harvest of the remaining species addressed by this amendment is taken by hook and line gear. For black sea bass, 85% of the catch is taken by traps and 13% is harvested by hook and line gear. The longline fishery is primarily responsible for harvesting golden tilefish. Also, 28% of the snowy grouper catch is harvested by vessels employing longline gear. The longline vessels, which report to the southeast logbook program, also operate in other fisheries such as the shark fishery (Table 3-13). A more in-depth description of the trap and longline components within the snapper grouper fishery can be found in the subsequent sections.

Table 3-13. The relative importance of different gear types used to harvest species addressed in this amendment. Percentage of species caught by gear type during 1999-2004.
Source: SEFSC Logbook, NMFS.

Species	Hook and line	Longline	Traps	Other
Vermilion snapper	99%	0%	0%	1%
Snowy grouper	70%	28%	0%	2%
Red porgy	97%	0%	2%	1%
Black sea bass	13%	0%	85%	1%
Golden tilefish	6%	93%	0%	1%

The black sea bass fishery

The majority of the black sea bass catch is harvested by trap gear in the South Atlantic, with a smaller portion is taken by hook and line gear (Table 3-13). During 1999-2003, a total of 112 different vessels employed trap gear to catch black sea bass in the South Atlantic and a total of 394 different vessels employed hook and line gear (Tables 3-14a and 3-14b). Most of these vessels land their catch in North Carolina and South Carolina. For both sectors in the black sea bass fishery there was a decline in the number of vessels, trips, and revenue during 1999 through 2003 (Tables 3-14a and 3-14b).

There are fewer trap vessels than hook and line vessels in this fishery. However, vessels in the trap fishery are more dependent on black sea bass compared to the hook and line sector. Approximately 10% of the hook and line fleet harvest more than 1,000 lbs of black sea bass per vessel annually. In comparison, at least 76% of the trap fleet harvests more than 1,000 lbs per vessel per year. Also, revenue from black sea bass comprises almost all revenue for trips where trap was that top gear utilized. In contrast, only 5% (106,037/2,049,127) of the total revenue earned by vessels that caught black sea bass in the hook and line sector came from black sea bass landings (Tables 3-14b). These hook and line vessels are primarily dependent on revenue from the mid-shelf complex and shallow water groupers (Figure 3-12).

Table 3-14a. Characteristics of the trap fishery for black sea bass.
Source: SEFSC Logbook database, NMFS, Beaufort Lab.

Item	1999	2000	2001	2002	2003	Total*
Number of vessels	71	64	59	50	50	112
North Carolina	42	41	40	35	35	72
South Carolina	29	23	18	14	14	39
Number of trips for black sea bass	1,021	806	1,074	788	747	
Trip length (trap was top gear)	1.2	1.1	1.2	1.3	1.3	
Number of vessels with more than 10,000 lbs (% of total vessels)	22 (31%)	14 (22%)	16 (27%)	15 (30%)	13 (26%)	
Number of vessels with more than 1,000 lbs (% of total)	58 (82%)	49 (77%)	49 (83%)	40 (80%)	38 (76%)	
Trips where sea bass was top revenue earner for the traps	1,009	792	1,065	771	743	
Total number of trips for all traps	1,035	825	1,082	798	752	
Revenue from black sea bass	$1,102,636	$793,564	$811,200	$629,539	$796,238	
Revenue from all trips where trap was the top gear	$1,262,066	$913,913	$887,241	$730,878	$835,526	

*The total number of different vessels that participated in this fishery from 1999 through 2003.

Table 3-14b. Characteristics of the hook and line fishery for black sea bass.
Source: SEFSC Logbook database, NMFS, Beaufort Lab.

Item	1999	2000	2001	2002	2003	Total*
Number of vessels with reported landings	247	207	204	199	181	394
North Carolina	142	113	107	116	105	219
South Carolina	63	58	62	50	49	98
Number of trips for black sea bass	1,902	1,551	1,785	1,728	1,398	
Trip length (hook and line was top gear)	1.7	1.8	1.8	1.8	1.7	
Number of vessels with more than 100 lbs of black sea bass (%)	147 (60%)	115 (59%)	128 (63%)	130 (65%)	111 (61%)	
Number of vessels with more than 1,000 lbs (%)	31 (13%)	19 (9%)	20 (10%)	22 (11%)	18 (10%)	
Number of hook and line trips - black sea bass top revenue earner	219	148	110	98	105	
Trips where hook and line was top gear and vessel caught black sea bass	3,395	2,979	3,214	3,302	2,587	
Revenue from black sea bass	$216,425	$129,961	$121,610	$110,957	$106,037	
Revenue from all trips where hook and line was the top gear and the vessel caught black sea bass	$2,863,818	$2,634,123	$2,360,183	$2,724,406	$2,049,127	

*The total number of different vessels that participated in this fishery from 1999 through 2003.
**this item represents all trips for the hook and line vessels that caught black sea bass in a given year

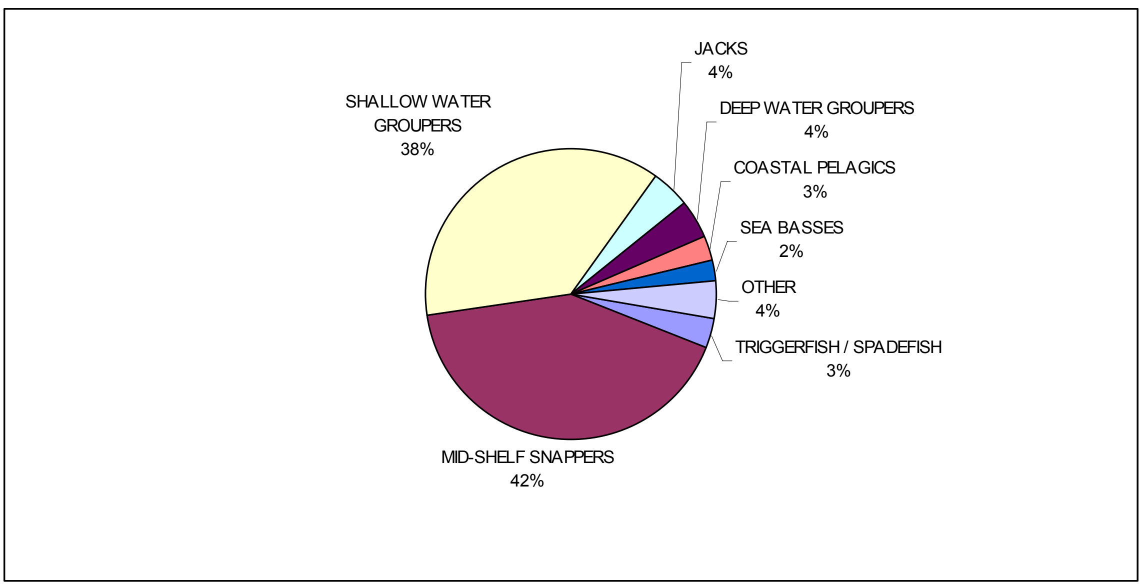


Figure 3-12. Distribution of revenue in the hook and line sector that harvested black sea bass during 1999-2003.
Source: SEFSC Logbook database, NMFS, Beaufort Lab.

The tilefish and deepwater grouper fisheries

Longline vessels, which harvest both tilefish and snowy grouper, primarily land their harvest of these species in Florida and South Carolina (Table 3-15a). Golden tilefish dominates the tilefish group and are primarily landed in South Carolina and Florida. On trips where snapper grouper species are caught, the longline vessels in the South Atlantic are more dependent on revenue from tilefish and snowy grouper. For example, in 2003 the total dockside value of snowy grouper and tilefish was $799,869 ($197,765+$602,104) while the total revenue from all species on longline trips targeting snapper grouper species was $1.21 million (Table 3-15a). The average catch per trip for tilefish (1,558 lb/trip) is substantially higher than the catch per trip for snowy grouper (501 lbs/trip).

Vessels utilizing hook and line gear harvest the majority of the total snowy grouper landings. However, these vessels take more trips and the harvest per trip is lower than for the longline fleet (Table 3-15b). There are a few vessels which harvest a large portion (more than 1,000 lbs annually) of snowy grouper. In contrast, hook and line vessels harvest a relatively smaller proportion of the overall tilefish catch. In conclusion, hook and line vessels, which land tilefish, appear to be less dependent on the revenue from this species because only a few vessels land more than 1,000 lbs of tilefish annually (Table 3-15b).

Table 3-15a. Characteristics of the longline fishery for snowy grouper and golden tilefish. Source: SEFSC logbook, NMFS, Beaufort Lab.

Item	1999	2000	2001	2002	2003
Number of longline vessels in the snapper grouper fishery	42	40	40	43	29
Florida	31	30	29	29	21
South Carolina	8	6	5	6	5
North Carolina	4	4	4	9	3
Number of vessels – snowy grouper	24	28	29	32	21
Number of vessels – golden tilefish	22	25	28	24	17
Total trips (days) with long line gear (snapper grouper fishery)	339	437	362	409	334
Number of trips for snowy grouper	174	237	216	172	171
Number of trips for golden tilefish	264	341	284	249	212
Revenue from snowy grouper	$201,981	$224,305	$255,066	$229,592	$197,765
Revenue from golden tilefish	$900,247	$1,369,913	$822,335	$702,250	$602,104
Revenue from all species on trips where snapper grouper are caught	$1,433,724	$2,138,777	$1,482,869	$1,518,522	$1,207,274
Trip length - longline is top gear	4.6	4.6	4.6	4.1	4.3
Lbs/trip – snowy grouper	558	454	530	577	501
Lbs/trip – golden tilefish	1,940	2,167	1,628	1,568	1,558
Number of vessels with more than 1,000 lbs snowy grouper	13	19	15	11	12
Number of vessels with more than 10,000 lbs of snowy grouper	Confidential				
Number of vessel with more than 1,000 lbs of golden tilefish	18	23	24	17	16
Number of vessels with more than 10,000 lbs of golden tilefish	14	15	14	11	12

Table 3-15b. Characteristics of the hook and line fishery for snowy grouper and golden tilefish. Source: Southeast logbook, NMFS, Beaufort Lab.

Item	1999	2000	2001	2002	2003
Number of vessels with reported landings – snowy grouper	212	195	195	184	176
Florida	113	103	110	96	96
North Carolina	64	58	44	47	44
South Carolina	32	27	35	35	31
Number of trips for snowy grouper	1,503	1,374	1,441	1,335	1,145
Trip length (days) - hook and line was top gear	2.82	2.50	2.87	2.86	2.97
Number of vessels with more than 100 lbs of snowy grouper	148	140	137	122	118
Number of vessels with more than 1,000 lbs of snowy grouper	71	64	55	57	47
Number of vessels with more than 10,000 lbs of snowy grouper	Confidential data	Confidential data	Confidential data	Confidential data	Confidential data
Lbs/trip of snowy grouper harvested	103	92	79	68	78
Revenue from snowy grouper	$719,507	$608,047	$500,253	$432,658	$436,523
Number of vessels with reported tilefish landings	56	63	57	64	49
Florida	44	52	47	54	37
North Carolina	10	9	8	9	8
Number of trips for tilefish	256	346	180	310	179
Trip length (days) - hook and line was top gear	1.5	1.3	1.7	1.4	1.5
Lbs/trip of tilefish harvested	111	119	145	152	99
Number of vessels with more than 100 lbs of tilefish	26	34	24	38	26
Number of vessels with more than 1,000 lbs	9	10	Confidential data	9	Confidential data
Revenue from golden tilefish	$50,267	$77,724	$43,961	$82,138	$31,788

3.4.2.1.5 Seasonal Variability

In terms of seasonal variability in landings and revenue, the only unit proposed in Snapper Grouper Amendment 13B that really stands out is the sea bass unit where most of the harvest is taken in the winter months from November to February in North Carolina and South Carolina (Tables 3-16, 3-17a and b).

The peak harvest months for the shallow water grouper fishery are May, June and July in the entire South Atlantic (Tables 3-16). There is a prohibition on the harvest of gag and black grouper during March and April and in Georgia the fishery shifts over to the mid-shelf complex during the closed season (Table 3-17c). Also, the peak month for the shallow water grouper fishery in Georgia occurs in May, which falls immediately after the closure for gag and black grouper.

For the deep water groupers, the peak harvest months are May and June for the entire fishery (Table 3-16). In North Carolina, most of the harvest of the deep water groupers is taken in May and June and the shallow water groupers are primarily harvested from May through August (Table 3-17a). In South Carolina, the shallow water grouper season is from May through July and the deep water grouper season extends from March through July (Table 3-17b).

Although there is a prohibition on harvest of greater amberjack during April, the peak months for harvest of the jack unit occurs in March and May in the South Atlantic (Table 3-16) and Florida (Table 3-17d).

Table 3-16. Percent revenue from important species units by month for the South Atlantic averaged over 1999-2003.
Source: Southeast logbook database, NMFS, Beaufort Lab.

Month	Shallow water grouper	Deep water grouper	Tilefish	Shallow water snapper	Mid-shelf snapper	Triggerfish/ spadefish	Jack	Red porgy	Grunt/ porgy	Sea bass
Jan	8.4%	6.06%	4.3%	6.6%	5.3%	6.1%	8.1%	11.2%	6.6%	**21.0%**
Feb	8.6%	9.23%	5.1%	7.3%	5.0%	5.5%	9.1%	4.6%	7.1%	**15.6%**
Mar	3.0%	10.91%	**8.7%**	**10.9%**	7.5%	7.9%	**13.5%**	0.1%	7.1%	8.5%
Apr	4.0%	10.73%	**11.1%**	**11.1%**	9.3%	8.9%	2.9%	0.6%	6.4%	5.4%
May	**12.8%**	**11.95%**	**10.5%**	**10.1%**	8.8%	7.1%	**17.0%**	12.9%	7.9%	5.2%
Jun	**11.5%**	**12.32%**	**9.1%**	**9.8%**	9.2%	7.9%	8.1%	13.9%	8.7%	3.0%
Jul	**10.8%**	9.54%	5.8%	**10.6%**	7.5%	5.7%	7.2%	12.5%	9.8%	3.8%
Aug	9.0%	8.31%	11.3%	7.1%	9.9%	8.2%	6.6%	14.1%	10.2%	4.1%
Sep	6.2%	7.18%	8.7%	5.8%	9.9%	**12.1%**	7.3%	8.1%	9.1%	2.2%
Oct	9.1%	5.39%	9.6%	7.0%	11.4%	**13.2%**	7.3%	7.2%	9.6%	3.9%
Nov	8.8%	4.14%	8.1%	6.4%	9.6%	9.3%	6.4%	8.4%	8.5%	9.3%
Dec	7.9%	4.23%	7.6%	7.4%	6.8%	8.2%	6.7%	6.4%	9.0%	**17.8%**

Table 3-17a. Percent revenue from important species units by month for North Carolina averaged over 1999-2003.
Source: Southeast logbook database, NMFS, Beaufort Lab.

Month	Shallow water grouper	Deep water grouper	Tilefish	Mid-shelf snappers	Triggerfish/ spadefish	Jack	Grunt/ porgy	Sea bass
Jan	5.3%	5.97%	1.18%	4.5%	5.6%	6.3%	5.6%	**19.4%**
Feb	5.0%	11.39%	5.34%	4.1%	5.2%	5.6%	5.6%	**14.7%**
Mar	2.7%	8.37%	7.13%	4.8%	6.3%	5.0%	3.9%	8.0%
Apr	4.6%	10.92%	8.34%	6.3%	6.2%	4.3%	4.1%	5.0%
May	**13.1%**	**18.37%**	**11.48%**	10.9%	7.3%	**10.0%**	8.3%	5.3%
Jun	**13.9%**	**14.54%**	**13.67%**	9.7%	10.4%	**16.2%**	**10.6%**	3.1%
Jul	**11.3%**	9.45%	**14.18%**	7.5%	7.4%	**11.4%**	**11.3%**	4.3%
Aug	**11.6%**	7.74%	**18.99%**	13.1%	10.6%	**10.2%**	**13.5%**	4.8%
Sep	6.5%	5.31%	**11.92%**	10.8%	11.8%	6.6%	9.6%	2.5%
Oct	10.3%	3.34%	4.69%	12.5%	13.7%	9.4%	10.8%	4.5%
Nov	9.1%	2.46%	2.19%	10.0%	9.1%	8.3%	8.6%	**10.8%**
Dec	6.5%	2.14%	0.90%	5.8%	6.5%	6.6%	8.2%	**17.5%**

*Note: Information on jacks and shallow water snappers are not included.

Table 3-17b. Percent revenue from important species units by month for South Carolina averaged over 1999-2003.
Source: Southeast logbook database, NMFS, Beaufort Lab.

Month	Shallow water grouper	Deep water grouper	Tilefish	Mid-shelf snappers	Triggerfish/ spadefish	Grunt/ porgy	Sea bass
Jan	6.6%	3.88%	5.21%	4.8%	6.3%	5.9%	**27.5%**
Feb	7.6%	7.64%	6.31%	4.3%	5.6%	6.8%	**19.3%**
Mar	2.8%	15.92%	10.47%	8.8%	10.0%	7.2%	**10.3%**
Apr	3.7%	10.32%	10.37%	12.6%	12.3%	7.3%	6.9%
May	**12.1%**	9.19%	8.45%	7.5%	5.9%	7.7%	4.7%
Jun	**11.6%**	10.96%	8.64%	8.3%	5.3%	8.0%	2.0%
Jul	**12.5%**	11.24%	5.38%	6.7%	3.6%	10.6%	1.8%
Aug	8.8%	7.85%	11.72%	8.1%	5.4%	9.3%	1.5%
Sep	7.2%	7.94%	7.11%	10.2%	13.0%	9.3%	1.0%
Oct	9.2%	7.02%	10.37%	11.5%	12.8%	8.7%	1.4%
Nov	10.0%	5.17%	10.42%	10.4%	9.2%	9.1%	3.9%
Dec	7.9%	2.87%	5.55%	6.8%	10.5%	10.0%	**19.7%**

Table 3-17c. Percent revenue from important species units by month for Georgia averaged over 1999-2003.
Source: Southeast logbook database, NMFS, Beaufort Lab.

Month	Shallow water grouper	Mid-shelf snapper
Jan	8.6%	5.9%
Feb	10.3%	5.9%
Mar	3.0%	10.1%
Apr	4.5%	9.3%
May	15.4%	7.4%
Jun	8.4%	9.4%
Jul	8.0%	8.0%
Aug	5.5%	8.3%
Sep	5.7%	9.5%
Oct	11.6%	10.0%
Nov	10.5%	7.6%
Dec	8.6%	8.5%

Table 3-17d. Percent revenue from important species units by month for Florida averaged over 1999-2003.
Source: Southeast logbook database, NMFS, Beaufort Lab.

Month	Shallow water grouper	Deep water grouper	Tilefish	Shallow water snapper	Mid-shelf snapper	Jack
Jan	**14.1%**	7.72%	4.52%	6.6%	7.0%	8.5%
Feb	**13.3%**	8.93%	4.74%	7.3%	7.2%	9.4%
Mar	3.5%	9.35%	8.50%	**11.0%**	8.1%	**17.1%**
Apr	3.5%	9.89%	11.89%	**11.3%**	8.8%	2.2%
May	**12.8%**	8.70%	11.18%	**10.2%**	8.4%	**20.8%**
Jun	**9.4%**	11.77%	8.65%	**9.8%**	9.6%	6.6%
Jul	8.6%	8.30%	4.64%	**10.6%**	8.5%	5.5%
Aug	7.1%	9.18%	9.89%	7.1%	8.1%	4.8%
Sep	4.7%	8.35%	9.03%	5.7%	8.3%	7.5%
Oct	7.0%	6.14%	10.20%	6.9%	10.0%	6.3%
Nov	6.5%	4.87%	8.17%	6.2%	9.1%	5.6%
Dec	9.4%	6.79%	8.58%	7.3%	6.8%	5.8%

3.4.2.1.6 Description of the Trip Cost Data

This section presents results from the first two years of an economic survey appended to the Federal Logbook Trip Report Form used by fishermen to report fishing activity in the South Atlantic snapper grouper, dolphin-wahoo, mackerel, and shark fisheries. The population for the economic survey consisted of all federally permitted South Atlantic snapper grouper, mackerel, and shark vessels in 2001. Approximately, one-fifth of the population was randomly selected for the survey based on state and gear stratifications. Details of the sample selection methodology and nonresponse rates are available in the **Appendix E**.

The results of the survey for 2002-03 as well as trip-level effort variables are summarized in Table 3-18. Trips are categorized by primary gear employed to account for heterogeneity throughout the fleet (**Appendix E**). Means, standard deviations, and ranges are used to summarize effort variables and fuel prices. Considerable variability remains for revenue and cost measurements within each gear classification, so median values are used to measure central tendency (i.e., an average trip) for these variables (Larkin *et al.* 2000).

On average, sampled vessels primarily using traps and longlines were significantly larger and employed more crew than other trips, and longliners fished more days than all other trips. The typical hook and line or troll trip lasted from 1-2 days with 1-2 crew members, while dive trips were of similar duration and on average employed two crew members. The vast majority (over 90%) of non-longline trips included the permit-holder/vessel-owner aboard suggesting a significant subgroup of the South Atlantic snapper grouper fleet were owner-operators explicitly covered under the Regulatory Flexibility Act.

The trip-level economic performance of the fleet can be characterized across the different primary gear types. Minimum and maximum figures for revenues and expenses again illustrate the diversity of the South Atlantic snapper grouper fleet even when stratified by primary gear types. Looking across gear types, longline and trap trips clearly incurred higher expenses but typically generated higher trip revenues as well as higher per day net operating revenues. Median values suggest that fuel expenditures were the biggest expenditure for all types of trips; however, longline and trap trips also spent a significant amount on bait, ice, and miscellaneous expenses. For hook and line, troll, and diving trips median statistics suggest that bait, ice, and other expenses were relatively minor for at least half of these trips (in many cases these trips incurred zero expenses for these inputs); however, these cost figures are a bit misleading. The figures for bait and ice expense can be viewed as conservative estimates due to implicit costs. For instance, some South Atlantic snapper grouper fishermen receive free ice prior to departure; however, this perceived benefit is usually counterbalanced with depressed ex-vessel price paid by the fish house. Also, South Atlantic snapper grouper fishermen sometimes catch their own bait yet are not explicitly compensated for their effort (i.e., “time is money”).

Median statistics can also give managers an idea about how regulations may affect marginal members of the fleet. For instance, at least half of all sampled vertical line, troll, and dive trips made less than $142, $134, and $181 in net operating revenues per day fished, respectively. Crew shares and amortized fixed expenses (e.g., insurance, loan, and engine repair payments) must still be subtracted from net operating revenues. These modest operating profits suggest economic shocks (e.g., rising fuel prices, increased import pressures) or regulatory effects, which curtail revenue generation (e.g., size limits, quotas) or increase operating costs (e.g., closures), could drive operating margins below zero for a significant portion of these types of trips causing a short-run (and possibly permanent) exit from the industry.

Table 3-18. Summary of trip-level economic data and effort variables by primary gear for the South Atlantic snapper grouper fishery (2002-03).
Source: Southeast logbook trip cost database and catch effort database, NMFS, SEFSC, Miami.

GEAR	**Hook and Line[1] (n=2,715)**			**Traps (n=110)**			**Longline (n=123)**		
	Mean	Std. Dev.	Range[3]	Mean	Std. Dev.	Range	Mean	Std. Dev.	Range
Variable									
Days away	1.7	1.9	13	1.1	0.3	1	4.6	3.1	12
Crew	1.9	0.9	5	2.4	0.5	1	2.4	0.5	2
Vess. Length[4]	28.0	6.0	32	42.6	3.6	23	37.7	8.6	23
Fuel Price/ gal.[5]	$1.43	$0.31	$2.28	$1.21	$0.18	$0.93	$1.09	$0.18	$0.64
	Median	Min	Max	Median	Min	Max	Median	Min	Max
Revenue	$218	$3	$12,414	$1,485	$100	$5,450	$1,658	$37	$15,386
Fuel exp.[6]	$28	$2	$650	$172	$63	$480	$295	$18	$950
Bait exp.	$15	$0	$700	$104	$10	$360	$293	$0	$1,845
Ice exp.	$0	$0	$256	$0	$0	$80	$85	$0	$300
Misc. Exp.[7]	$0	$0	$3,373	$20	$0	$700	$200	$0	$2,052
Net Oper. Rev.[8] per Day Fished	$142	-$554	$2,961	$979	-$115	$5,154	$330	-$2,038	$1,755

GEAR	**Trolling (n=987)**			**Divers[2] (n=161)**		
	Mean	Std. Dev.	Range	Mean	Std. Dev.	Range
Variable						
Days away	1	0.2	2	1.1	0.6	4
Crew	1.3	0.6	4	2.1	0.6	4
Vess. Len.[4]	28.1	5.5	38	26.5	7.3	30
Fuel Price/gal.[5]	$1.37	$0.22	$1.05	$1.55	$0.26	$1.05
	Median	Min	Max	Median	Min	Max
Revenue	$183	$2	$3,931	$252	$8	$7,137
Fuel exp.[6]	$32	$4	$422	$41	$6	$246
Bait exp.	$5	$0	$225	$0	$0	$260
Ice exp.	$0	$0	$50	$0	$0	$110
Misc. Exp.[7]	$0	$0	$325	$10	$0	$210
Net Oper. Rev.[8] per Day Fished	$134	-$310	$2,323	$181	-$87	$1,298

[1] This category includes the following gear: rods and reels; handlines; and electric and bandit reels.
[2] 25% of these trips utilized an explosive device.
[3] The range is the difference between the maximum and minimum observations for each variable.
[4] Mean vessel length is weighted by each vessel's number of trips.
[5] Fuel prices are not adjusted for inflation.
[6] This figure does not include oil expense.
[7] This includes other trip-related expenditures, such as groceries, oil and other lubricants, gas for dive tanks, packing fees, and other costs that are typically incurred during a trip.
[8] Net operating revenues are defined as gross trip revenues minus variable trip expenses excluding labor (i.e., fuel, bait, ice, and miscellaneous expenses).

3.4.2.2 The Recreational Fishery

The South Atlantic recreational fishery is comprised of a private recreational sector and a for-hire recreational sector. The former includes anglers fishing from shore (including dock), piers and from private/rental boats. In the subsequent description of the recreational fishery, the for-hire recreational sector is divided into the charterboat and headboat segments. Where possible catch, effort, and economic data pertaining to snapper grouper fishing and the individual species addressed in this amendment are presented for each sector of this fishery. Relevant databases for 2004 were not available for these analyses. A snapshot of the fishery is contained in Table 3.19a.

Table 3-19a. The recreational fishery for snapper grouper species in the South Atlantic. Average values calculated over the period 1999-2003.

Item	Headboat Mode	Charter Mode	Private Mode	Total
Snapper grouper harvest (lb.)	1,524,487	1,548,191	6,564,245	9,636,923
Number of fish harvested*	1,200,896	1,219,569	5,170,905	7,591,370
Value of fish caught (consumer surplus)	$2,978,223	$3,024,531	$12,823,845	$18,826,599
Number of trips on which snapper grouper species were caught	235,130	112,600	2,771,074	3,118,804
Expenses by anglers on trips where snapper grouper species are caught ($2003)**	$42,609,193	$20,450,664	$211,344,466	$274,404,323

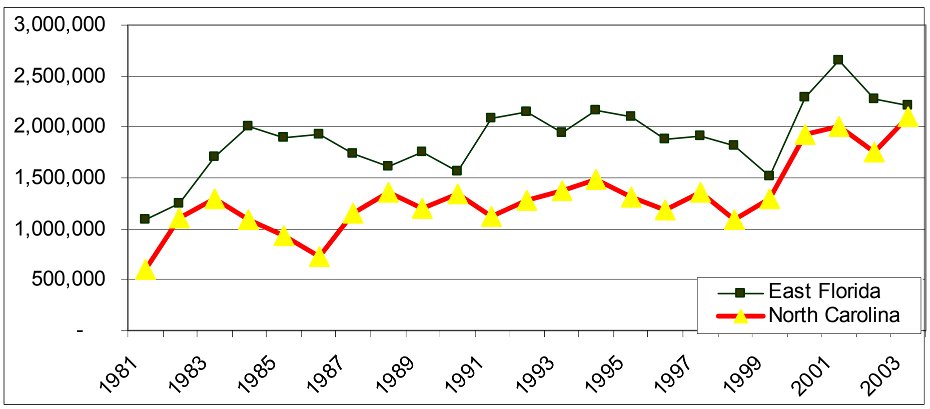
* Number of fish for other sectors estimated using average weight per fish from the headboat sector.
**For the headboat sector - multiplied expenditure estimate for the charter mode by angler days to estimate total expenditures and adjusted for inflation to $2003.
*** The figures in this table were summarized from data presented in subsequent tables as follows: total snapper grouper harvest was summarized from data in Table 3-25; value of fish caught was calculated using a per fish value of $2.48 as explained in Appendix E; number of trips was summarized from the data in Table 3-20 and Table 3-23; angler expenditures on snapper grouper trips were summarized from estimates contained in Table 3-34b.

This amendment proposes management measures for vermilion snapper, black sea bass, golden tilefish, snowy grouper, and red porgy. Nevertheless, in addition to statistics on these species, effort and harvest data on other snapper grouper species are presented since anglers fishing for some or all of these five species also target, catch, and harvest other species in the snapper grouper complex.

3.4.2.2.1 Recreational Fishing Participation

Charts depicting the number of saltwater anglers in the South Atlantic include participants engaged in all fisheries and those anglers who either fished from private/rental boats, from charter boats or by shore/beach bank mode (Figure 3-13). Most South Atlantic saltwater anglers fish on the east coast of Florida and North Carolina. In Florida, there was an increasing trend in the number of saltwater anglers from 1981 to 2001 and a slight decline in 2002 and 2003. The number of participants engaged in saltwater fishing increased from 1981 through 2003 in North Carolina and by 2003 this figure was at almost the same level as observed in Florida during 2003 (Figure 3-13). The number of anglers fishing off South Carolina appears to have peaked in 1988, declined in 1989 and fluctuated with no apparent trend thereafter. In Georgia, the number of anglers increased in the 1990s up until 1995, declined until 1999 and began increasing from 2000 (Figure 3-13).

Anglers targeted a variety of species including species in the South Atlantic snapper grouper complex (Figure 3-13). It is not possible to extract the estimated number of participants who targeted or caught snapper grouper species from this dataset. A more specific estimate of recreational activity in the snapper grouper fishery can be obtained from the effort data reported in Section 3.4.2.2.2.



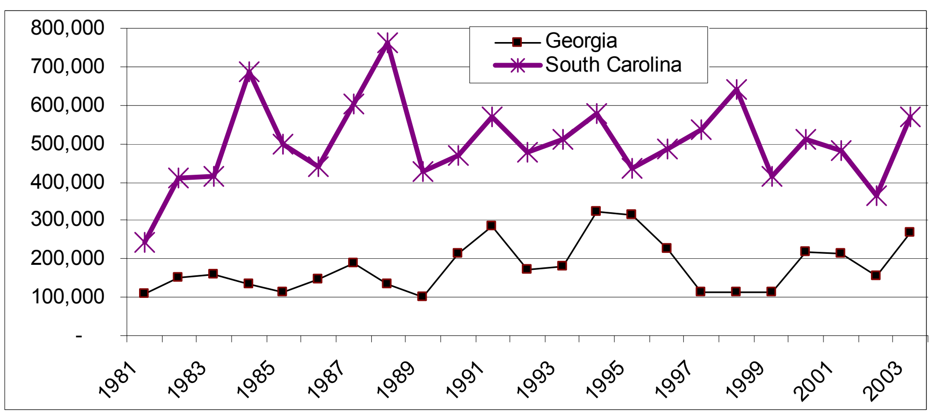


Figure 3-13. Number of anglers participating in all saltwater fisheries by state.
Source: MRFSS, NMFS (http://www.st.nmfs.gov/st1/recreational/data.html). Note: Data for the east coast of Florida does not include Monroe County. Also, these numbers are not additive across states since an angler can fish in multiple states.

3.4.2.2.2 Recreational Fishing Effort

The analysis on angler effort in the snapper grouper fishery has been separated into a discussion of the data from the MRFSS, which covers the charter segment of the for-hire sector and the private recreational fishing sector (all modes), and the data collected from a separate survey of headboats operating in the South Atlantic.

The estimates of saltwater angling effort derived from the MRFSS can be characterized as follows:

- 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.
- 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.
- 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).
- Total recreational trips - The total estimated number of recreational trips in the South Atlantic, regardless of target intent or catch success.

In the charter and private recreational fishing sectors, snapper grouper species were caught on 15.3% of all saltwater fishing trips during the period 1999-2003 (Table 3-19b). This proportion declines to 6.9% when considering only those trips where snapper grouper species were actually harvested. Furthermore, snapper grouper species were harvested on about 45% of trips on which they were caught (1,305,882/2,883,874). Apart from individual preferences for particular species and catch and release ethics, this difference could be explained by regulatory constraints such as bag limits and size limits. Only a relatively small percentage of total trips indicated a target preference for snapper grouper species (Table 3-16).

Table 3-19b. South Atlantic recreational effort for species in the snapper grouper fishery management unit[1].
Source: MRFSS, Fisheries Economics Office, SERO, NMFS.

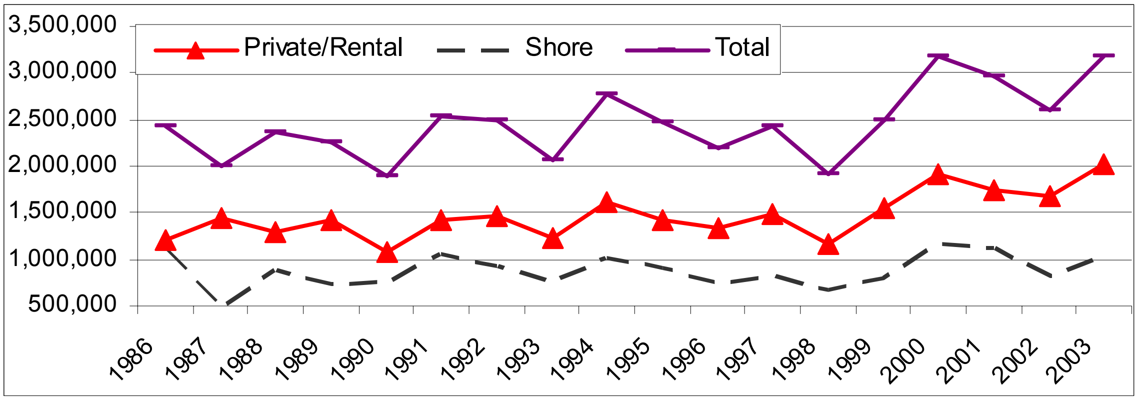
	Target Effort		Catch Effort		Harvest Effort	
Year	Trips	% Total	Trips	% Total	Trips	% Total
Average 1986-2003	761,592	4.29%	2,456,758	13.85%	1,240,388	6.99%
Average 1999-2003	680,552	3.55%	2,883,874	15.29%	1,305,882	6.93%

[1]This includes all species in the snapper grouper fishery management unit.

The total number of trips where snapper grouper species were caught from 1986 to 2003 is shown in Figure 3-14. These snapper grouper catch trips fluctuated between 1.9 million and 3.2 million trips annually and there appears to be an increasing trend from 1998 to 2003. During this period, there was considerable fluctuation in the charter sector with no discernable trend. Most snapper grouper trips are taken by either private/rental or shore modes, and for the private/rental mode there appears to be an increasing trend in effort during the period 1998 to 2003 (Figure 3-14).

In terms of catch trips, snapper grouper species are relatively more important for the charter and private/rental modes compared to the shore mode. For the charter sector and private/rental boat sector, snapper grouper species were caught on 18% of all recreational trips while snapper grouper species were caught on 9% of all recreational shore mode trips in 2003 (Table 3-20). Among other factors an angler's choice of mode can depend on the species targeted, location of the trip, and the cost of fishing.

In the South Atlantic, during the period 2000 to 2003 an average of 85% of all snapper grouper catch trips (private recreational and charter sector) were either inland or inshore of three miles (SAFMC 2003). Some of the factors that determine the location of a recreational fishing trip are the species targeted, the cost of the trip, the angler's available time, and the mode of fishing.



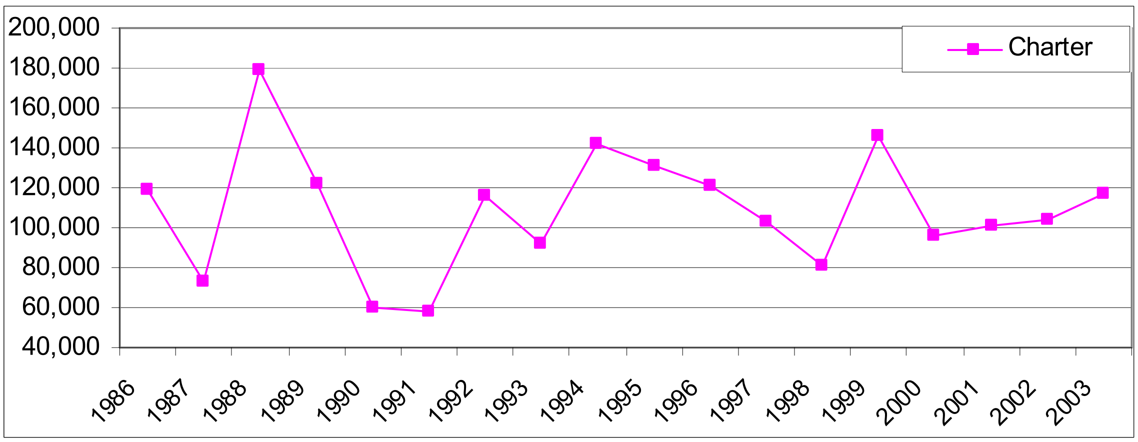


Figure 3-14. Recreational fishing trips (private and charter) where snapper grouper species were caught (catch effort) in the South Atlantic by mode.
Source: MRFSS, NMFS, SERO.

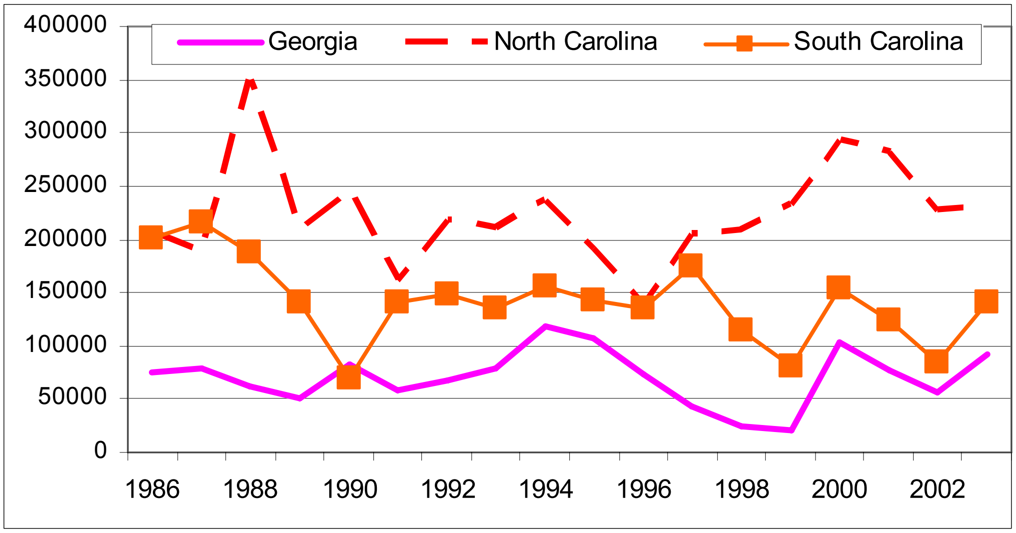
Table 3-20. Recreational fishing trips where snapper grouper species were caught (catch effort) in the South Atlantic by mode 1999-2003.
Source: MRFSS, NMFS, Washington DC.

Number of snapper grouper catch trips					Percent of total recreational trips			
Year	**Charter**	**Private/Rental**	**Shore**	**Total**	**Charter**	**Private/ Rental**	**Shore**	**Total**
1999	145,524	1,546,316	796,956	2,488,796	21.9	22.3	11.7	17.2
2000	95,864	1,914,054	1,162,330	3,172,248	18.4	21.0	11.1	15.8
2001	100,743	1,743,299	1,127,365	2,971,408	20.3	18.2	9.8	13.8
2002	103,777	1,673,346	830,325	2,607,448	23.6	20.2	9.2	14.7
2003	117,090	2,025,667	1,035,712	3,178,470	28.4	20.3	9.5	15.0

A breakdown of saltwater angling effort for snapper grouper in the South Atlantic by state is shown in Table 3-21. Consistent with total participation, the majority of trips where snapper grouper species were caught occurred in Florida. For example, in 2003 snapper grouper species were caught on 2.72 million trips in Florida compared to 0.46 million trips for the other three states combined (Table 3-21). Also, snapper grouper species appear to be relatively more important to the recreational fishery in Florida compared to the other three states. In 2003, snapper grouper species were caught on 23.7% of all recreational trips in Florida compared to less than 10% for the other South Atlantic states (Table 3-21).

Table 3-21. Recreational fishing trips where snapper grouper species were caught in the South Atlantic by state.
Source: MRFSS, FEO, NMFS, SERO.

Year	Number of snapper grouper catch trips				Percent of all recreational trips			
	East Florida	**Georgia**	**North Carolina**	**South Carolina**	**East Florida**	**Georgia**	**North Carolina**	**South Carolina**
1999	2,153,349	20,857	233,677	80,912	26.3	4.4	5.1	6.7
2000	2,620,737	103,385	293,875	154,252	22.8	13.0	4.6	11.5
2001	2,489,972	76,705	281,553	123,178	20.0	9.5	4.2	7.4
2002	2,240,008	56,760	226,532	84,148	21.7	9.2	4.1	6.7
2003	2,716,431	92,124	228,998	140,917	23.7	9.5	3.4	6.7



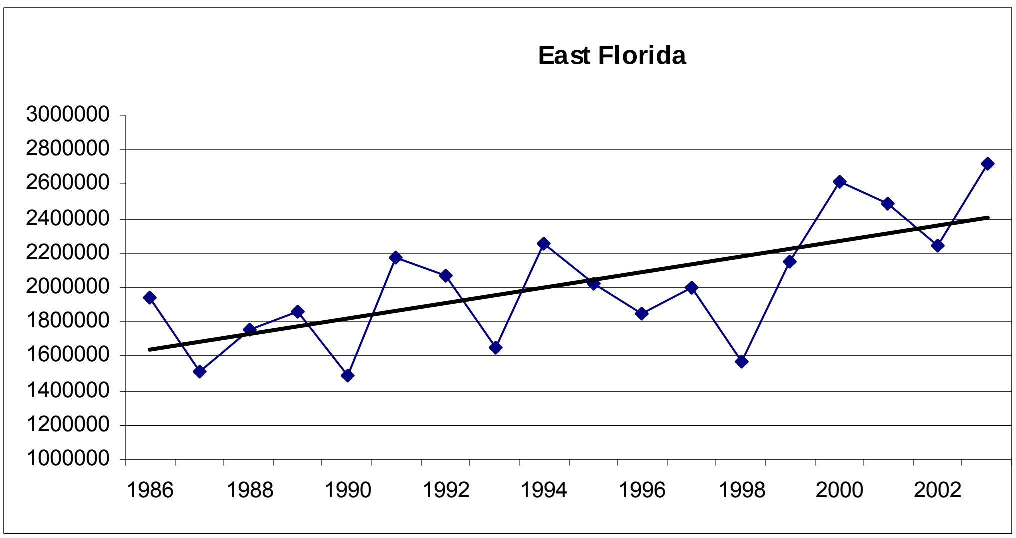


Figure 3-15. Recreational fishing trips (private and charter) where snapper grouper species were caught (catch effort) in the South Atlantic by state.
Source: MRFSS, NMFS, SERO.

Two sets of averages for target, catch, and harvest effort for each species group in the South Atlantic snapper grouper complex, calculated during 1986-2003 and 1999-2003, are shown in Tables 3-22 a-h. These statistics provide another measure to gauge the relative importance of the various species groups. The relative magnitudes of the catch effort and harvest effort shares suggests species in the shallow water snapper unit (Table 3-22b), the grunt and porgy unit (Table 3-22e), the jack unit (Table 3-22d), and the sea bass unit (Table 3-22f) are most important to snapper grouper anglers in the South Atlantic. Furthermore, these statistics also indicate black sea bass, white grunt, Atlantic spadefish, blue runner, yellowtail snapper, and vermilion snapper are among the most popular species in this complex to South Atlantic anglers. In contrast, species in the deep water grouper and tilefish units are of little importance in the charter and private sectors of the recreational fishery.

Table 3-22a. South Atlantic recreational effort for the shallow water grouper (SWG) unit [1]. Source: MRFSS database, NMFS, SERO.

	Target Effort							
	SWG Unit 1		Gag		Black Grouper		Red Grouper	
Year	Trips	% Total	Trips	% Unit	Trips	% Unit	Trips	% Unit
Avg 1986-2003	72,750	0.41%	64,842	89.13%	4,797	6.59%	3,323	4.57%
Avg 1999-2003	71,045	0.37%	62,811	87.64%	6,230	9.89%	2,357	3.35%
	Catch Effort							
	SWG Unit 1		Gag		Black Grouper		Red Grouper	
Year	Trips	% Total	Trips	% Unit	Trips	% Unit	Trips	% Unit
Avg 1986-2003	132,670	0.75%	60,397	45.52%	12,466	9.40%	42,695	32.18%
Avg 1999-2003	179,062	0.95%	81,454	45.61%	16,309	9.27%	59,805	32.91%
	Harvest Effort							
	SWG Unit 1		Gag		Black Grouper		Red Grouper	
Year	Trips	% Total	Trips	% Unit	Trips	% Unit	Trips	% Unit
Avg 1986-2003	54,795	0.31%	28,617	52.23%	5,162	9.42%	12,803	23.37%
Avg 1999-2003	60,503	0.32%	29,005	47.75%	4,581	7.59%	14,940	24.80%

[1]The shallow water grouper unit 1includes gag, red grouper, red hind, rock hind, yellowmouth grouper, tiger grouper, black grouper yellowfin grouper, graysby, coney, and scamp.

Table 3-22b. South Atlantic recreational effort for the shallow water snapper (SWS) unit [1]. Source: MRFSS database, NMFS, SERO.

	Target Effort							
	SWS Unit 1		Yellowtail Snapper		Mutton Snapper		Gray Snapper	
Year	Trips	% Total	Trips	% Unit	Trips	% Unit	Trips	% Unit
Avg 1986-2003	252,943	1.43%	39,122	15.47%	64,883	25.65%	145,253	57.43%
Avg 1999-2003	169,800	0.89%	15,289	8.87%	32,252	18.32%	113,376	67.02%
	Catch Effort							
	SWS Unit 1		Yellowtail Snapper		Mutton Snapper		Gray Snapper	
Year	Trips	% Total	Trips	% Unit	Trips	% Unit	Trips	% Unit
Avg 1986-2003	596,378	3.36%	100,797	16.90%	68,250	11.44%	398,190	66.77%
Avg 1999-2003	828,512	4.42%	89,899	10.80%	83,233	10.06%	611,814	73.78%
	Harvest Effort							
	SWS Unit 1		Yellowtail Snapper		Mutton Snapper		Gray Snapper	
Year	Trips	% Total	Trips	% Unit	Trips	% Unit	Trips	% Unit
Avg 1986-2003	276,220	1.56%	50,492	18.28%	45,951	16.64%	155,173	56.18%
Avg 1999-2003	349,863	1.87%	43,013	12.16%	53,011	15.10%	220,980	63.06%

[1]The shallow water snapper unit 1 includes yellowtail snapper, mutton snapper, gray snapper, lane snapper, mahogany snapper, dog snapper, schoolmaster, cubera snapper, sand tilefish, puddingwife, and hogfish.

Table 3-22c. South Atlantic recreational effort for the triggerfish unit[1]. Source: MRFSS database, NMFS, SERO.

	Target Effort					
	All Triggerfish		Gray Triggerfish		Atlantic Spadefish	
Year	Trips	% Total	Trips	% Unit	Trips	% Unit
Avg 1986-2003	17,403	0.10%	2,374	13.64%	14,924	85.76%
Avg 1999-03	21,551	0.11%	1,565	9.46%	20,053	91.72%
	Catch Effort					
	All Triggerfish		Gray Triggerfish		Atlantic Spadefish	
Year	Trips	% Total	Trips	% Unit	Trips	% Unit
Avg 1986-2003	212,509	1.20%	86,124	40.53%	116,016	54.59%
Avg 1999-03	228,769	1.21%	78,535	35.43%	141,750	60.86%
	Harvest Effort					
	All Triggerfish		Gray Triggerfish		Atlantic Spadefish	
Year	Trips	% Total	Trips	% Unit	Trips	% Unit
Avg 1986-2003	127,325	0.72%	39,377	30.93%	78,894	61.96%
Avg 1999-03	129,164	0.69%	39,771	31.95%	84,489	64.16%

[1]The triggerfish unit includes gray triggerfish, ocean triggerfish, queen triggerfish, and Atlantic spadefish.

Table 3-22d. South Atlantic recreational effort for the jacks unit[1].
Source: MRFSS database, NMFS, SERO.

	Target Effort					
	All Jacks		Greater Amberjack		Blue Runner	
Year	Trips	% Total	Trips	% Unit	Trips	% Unit
Avg 1986-2003	77,873	0.44%	7,329	9.41%	25,784	33.11%
Avg 1999-03	74,622	0.40%	4,784	6.83%	22,576	28.47%
	Catch Effort					
	All Jacks		Greater Amberjack		Blue Runner	
Year	Trips	% Total	Trips	% Unit	Trips	% Unit
Avg 1986-2003	965,294	5.44%	57,265	5.93%	354,428	36.72%
Avg 1999-03	1,127,689	5.99%	54,558	4.88%	425,743	37.46%
	Harvest Effort					
	All Jacks		Greater Amberjack		Blue Runner	
Year	Trips	% Total	Trips	% Unit	Trips	% Unit
Avg 1986-2003	351,171	1.98%	37,250	10.61%	177,294	50.49%
Avg 1999-03	394,677	2.10%	35,992	9.27%	222,337	55.50%

[1]The jacks unit includes greater amberjack, lesser amberjack, almaco jack, banded rudderfish, yellow jack, blue runner, bar jack, and crevalle jack.

Table 3-22e. South Atlantic recreational effort for the grunts and porgies (GP) unit [1].
Source: MRFSS database, NMFS, SERO.

	Target Effort							
	GP Unit 2		White Grunt		Black Margate		Sheepshead	
Year	Trips	% Total	Trips	% Unit	Trips	% Unit	Trips	% Unit
Avg 1986-2003	312,165	1.76%	1,271	0.41%	667	0.21%	294,122	94.22%
Avg 1999-03	308,470	1.60%	944	0.31%	932	0.31%	304,738	98.74%
	Catch Effort							
	GP Unit 2		White Grunt		Black Margate		Sheepshead	
Year	Trips	% Total	Trips	% Unit	Trips	% Unit	Trips	% Unit
Avg 1986-2003	617,545	3.48%	115,798	18.75%	22,776	3.69%	371,751	60.20%
Avg 1999-03	681,382	3.63%	96,849	14.41%	31,524	4.60%	415,289	60.79%
	Harvest Effort							
	GP Unit 2		White Grunt		Black Margate		Sheepshead	
Year	Trips	% Total	Trips	% Unit	Trips	% Unit	Trips	% Unit
Avg 1986-2003	430,029	2.42%	73,747	17.15%	17,759	4.13%	274,541	63.84%
Avg 1999-03	421,822	2.24%	67,084	16.24%	25,560	6.03%	268,044	63.15%

[1]The grunts and porgies unit 2 includes white grunt, porkfish, margate, black margate, tomtate, bluestriped grunt, french grunt, Spanish grunt, smallmouth grunt, cottonwick, sailors choice, grass porgy, jolthead porgy, saucereye porgy, whitebone porgy, knobbed porgy, longspine porgy, sheepshead, and scup.

Table 3-22f. South Atlantic recreational effort for the sea bass unit[1].
Source: MRFSS database, NMFS, 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%

[1]The sea bass unit includes black sea bass, rock sea bass, and bank sea bass.

Table 3-22g. South Atlantic recreational effort for the deepwater grouper and tilefish units 2A and 2B, and red porgy.
Source: MRFSS database, NMFS, SERO.

Deep water groupers (includes snowy grouper, yellowedge grouper, Warsaw grouper, speckled hind, misty grouper, and queen snapper						
	Target Effort		Catch Effort		Harvest Effort	
Year	Trips	% Total	Trips	% Total	Trips	% Total
Avg 1986-2003	688	0.00%	14,419	0.08%	11,294	0.06%
Avg 1999-03	444	0.00%	19,388	0.10%	14,669	0.08%
Deep water tilefish (includes golden tilefish and blueline tilefish)						
	Target Effort		Catch Effort		Harvest Effort	
Year	Trips	% Total	Trips	% Total	Trips	% Total
Avg 1986-2003	465	0.00%	10,266	0.06%	2,818	0.02%
Avg 1999-03	981	0.00%	18,773	0.10%	4,592	0.02%
	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%

Table 3-22h. South Atlantic recreational effort for the mid-shelf snapper (MSS) unit[1]. Source: MRFSS database, NMFS, SERO.

	Target Effort					
	MSS Unit [1]		Vermilion Snapper		Red Snapper	
Year	Trips	% Total	Trips	% Unit	Trips	% Unit
Avg 1986-2003	59,004	0.33%	1,934	3.28%	57,006	96.61%
Avg 1999-03	64,239	0.33%	2,204	3.44%	61,884	96.45%
	Catch Effort					
	MSS Unit [1]		Vermilion Snapper		Red Snapper	
Year	Trips	% Total	Trips	% Unit	Trips	% Unit
Avg 1986-2003	91,219	0.51%	48,454	53.12%	50,985	55.89%
Avg 1999-03	129,171	0.69%	75,194	58.34%	74,696	57.92%
	Harvest Effort					
	MSS Unit [1]		Vermilion Snapper		Red Snapper	
Year	Trips	% Total	Trips	% Unit	Trips	% Unit
Avg 1986-2003	65,163	0.37%	37,001	56.78%	31,439	48.25%
Avg 1999-03	82,992	0.44%	55,836	67.50%	35,288	42.43%

[1]The mid-shelf snapper unit includes vermilion snapper, silk snapper, red snapper, black snapper, and blackfin snapper.

The total number of angler days for the headboat sector in the U.S. South Atlantic represents all headboat effort and not only those trips where snapper grouper species were caught. Since the database does not associate catch with a specific angler on the trip due to the bottom-fishing nature of the industry. However, a large portion of these trips probably target snapper grouper species. Since 1987, there has been a declining trend in headboat angler days in the South Atlantic (Table 3-23). The number of angler days peaked at 443,448 in 1987 and steadily declined to 204,565 in 2003 (Table 3-23). This represents an overall decrease of 54%. This decline in the number of angler days from 1987 to 2003 was observed in all South Atlantic states. Headboat effort on the east coast of Florida comprises a large proportion (70%) of the headboat trips in the South Atlantic. This is followed by South Carolina (18%), North Carolina (11%) and Georgia (1%) (Table 3-23).

Table 3-23. Estimated headboat angler days for the U.S. South Atlantic.
Source: The Headboat Survey, NMFS, 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	242,296	485	36,691	63,231	342,703
1995	206,852	3,214	40,295	61,739	312,100
1996	197,173	2,684	35,142	54,929	289,928
1997	170,367	2,906	37,189	60,150	270,612
1998	153,339	2,002	37,399	61,342	254,082
1999	162,195	1,857	31,596	55,499	251,147
2000	180,097	2,152	31,351	40,291	253,891
2001	161,052	2,337	31,779	49,265	244,433
2002	149,274	2,272	27,601	42,467	221,614
2003	143,585	1,426	22,998	36,556	204,565

Headboat operators usually offer their passengers options for choosing trip packages of different durations (Table 3-24). The majority of headboat trips are of half-day duration in Florida (78%) and South Carolina (59%). In North Carolina and Georgia, the majority of trips are full-day trips (Table 3-21).

Table 3-24. Average number of headboat trips (1999-2003) by trip length and percent of total trips by trip length.
Source: The Headboat Survey, NMFS, SEFSC, Beaufort Lab.

Average Number of trips 1999-2003					Percent of total trips		
State	Full day	¾ day	½ day		Full day	¾ day	½ day
NC	561	17	374		56%	2%	38%
SC	642	110	1,144		33%	6%	59%
GA	152	1	10		93%		6%
FLA	1,972	546	9,038		17%	5%	78%
Total	1,014	123	2,079		23%	5%	72%

3.4.2.2.3 Harvest in the Recreational Fishery

The harvest of recreational snapper grouper species peaked in 1988 at 12.4 million lbs. Thereafter, landings decreased to 6.5 million lbs in 1998, and subsequently increased to between 8.0 million lbs and 11.06 million lbs (Table 3-25). A similar trend was observed in the private recreational sector (private/rental boat mode and shore mode), which accounted for 62% to 78% of total snapper grouper landings. Harvest by the headboat sector has been on a steadily declining trend since 1988. Snapper grouper harvest by the charterboat sector fluctuated considerably during this period with no distinct trend (Table 3-25).

Table 3-25. Harvest of snapper grouper species by mode in the South Atlantic.
Source: The Headboat Survey, NMFS, SEFSC, Beaufort Lab and MRFSS database, NMFS, 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.

The previous discussion focused on harvest trends of all snapper grouper species in the South Atlantic. Graphics depicting harvest trends for black sea bass, vermilion snapper and red porgy are presented in Figures 3-16a through c. Black sea bass harvests were at higher levels prior to 1993 for all three sectors. After 1993, harvest in the private recreational sector fluctuated between 250,000-500,000 lbs and harvest in the headboat sector varied between 100,000 and 200,000 lbs annually. For the charterboat sector, there was an unusually high level of black sea bass harvest in 1988. However, more recently, during the period 1998-2003 charterboat harvest of black sea bass was at or below 100,000 lbs per year (Figure 3-16a).

Vermilion snapper is one of the most frequently harvested species in the headboat sector (Figure 3-17b) and harvest was at the highest levels prior to 1992. Since 1992, headboat harvest of vermilion snapper was at or below 300,000 lbs annually until 1999, after which harvest increased to levels between 300,000 and 400,000 lbs annually. The decrease in headboat harvest after 1991 could be partly attributed to the declining trend in headboat effort and the 10 fish bag limit and 10 inch minimum size limit measures implemented in 1992. Landings of vermilion snapper in the charterboat and private recreational sectors have fluctuated widely from year to year and remained below 200,000 lbs throughout the period 1986 to 2003. Harvests attributed to these two sectors of the recreational fishery were at the lowest levels during the period 1992 through 1997. Subsequent to 1997, landings increased and appear to have stabilized around the 100,000 lbs level annually during the period 2001 to 2003 (Figure 3-16b).

In the headboat sector, there has been a continuous decline in the harvest of red porgy over the entire period 1986 through 2003 (Figure 3-16c). The decline in headboat effort could be a contributing factor in the reduction in headboat harvest of this species. Also, restrictive regulations that were implemented in 1999 and 2000 accounted for the very low harvest levels observed in the recreational fishery during 1999 and 2000.

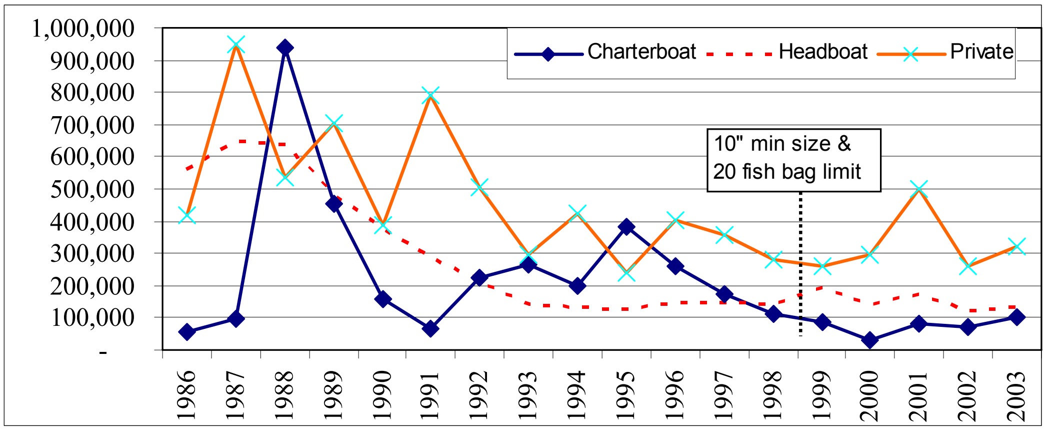


Figure 3-16a. Black sea bass harvest (lbs) in the recreational fishery by sector from 1986 to 2003.
Source: The Headboat Survey, NMFS, SEFSC, Beaufort Lab and MRFSS database, NMFS, SERO.

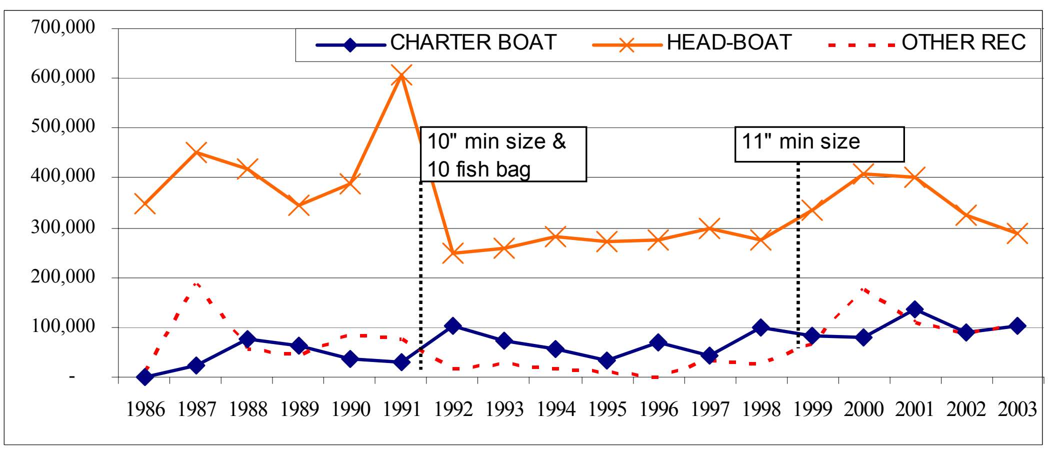


Figure 3-16b. Vermilion snapper harvest (lbs) in the recreational fishery by sector from 1986 to 2003.
Source: The Headboat Survey, NMFS, SEFSC, Beaufort Lab and MRFSS database, NMFS, SERO.

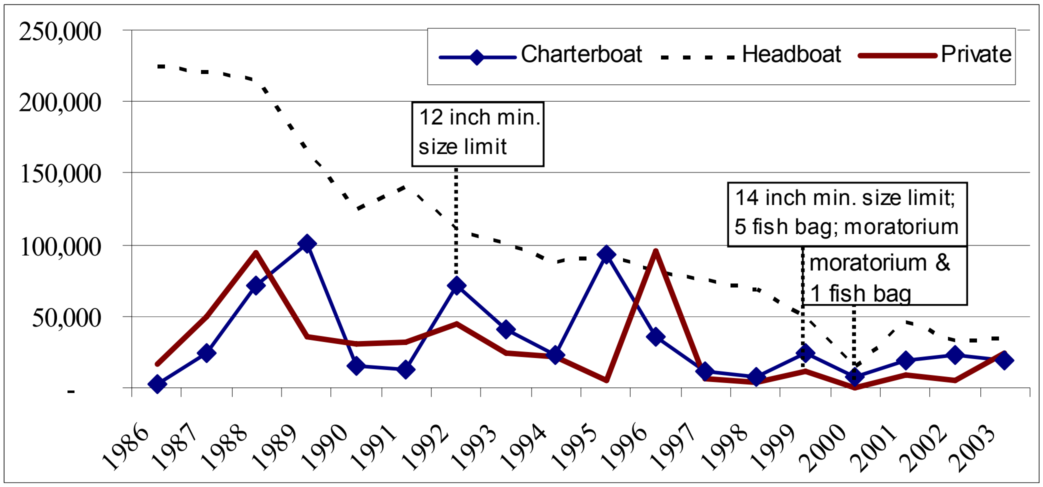


Figure 3-16c. Red porgy harvest (lbs) in the recreational fishery by sector from 1986 to 2003. Source: The Headboat Survey, NMFS, SEFSC, Beaufort Lab and MRFSS database, NMFS, SERO.

Of the species addressed in this amendment, black sea bass and vermilion snapper are more frequently harvested in the South Atlantic recreational snapper grouper fishery (Table 3-26). The largest share of the black sea bass recreational harvest is taken by sport anglers in the private recreational sector while the largest share of the vermilion snapper recreational harvest is taken by passengers on headboats in the South Atlantic.

Table 3-26. Average harvest (lbs) during 1999-2003 for species in this amendment by sector. Source: The Headboat Survey, NMFS, SEFSC, Beaufort Lab and MRFSS database, NMFS, SERO.

Sector	Black Sea Bass	Vermilion snapper	Red porgy*	Snowy grouper*	Golden tilefish*
Charterboat	74,114	98,779	18,734	13,233	12,958
Headboat	153,911	351,804	35,417	605	2
Private	327,094	108,478	10,150	2,190	5,271

*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 and golden tilefish were reported on few trips. During this period golden tilefish were reported on two headboat trips in 1999.

The harvest of snowy grouper and golden tilefish is relatively minor in the recreational sector (Table 3-26). Also, the estimates of harvest from the MRFSS survey for both golden tilefish and snowy grouper during the time period 1999 to 2003 are associated with very high proportional standard errors (PSE) (Tables 3-27 and 3-28). These high PSEs indicate high variability around these estimates and the estimates may not be a reliable indicator of the harvest.

Table 3-27. Estimates of golden tilefish harvest (A+B1 fish) and proportional standard error (PSE) in the South Atlantic recreational fishery from 1999-2003.
Combined estimates for the charterboat and private recreational sector. Source: MRFSS.

Year	Number of fish	PSE (%)*	Weight (lbs)	PSE (%)*
1999	1,950	62	4,409	78.3
2000	3,171	76.9	1,803	46.2
2001	3,150	44.9	26,799	59.2
2002	2,036	45.4	9,246	52.7
2003	7,833	40.8	28,029	41.7

*Proportional standard error (PSE) is the standard error of the estimate expressed as a percentage of that estimate.

Table 3-28. Estimates of snowy grouper harvest (A+B1 fish) and proportional standard error (PSE) in the South Atlantic recreational fishery from 1999-2003.
Combined estimates for the charterboat and private recreational sector. Source: MRFSS.

Year	Number of fish	PSE (%)	Weight (lbs)	PSE (%)
1999	7,856	43.7	14,978	52.8
2000	1,341	54.9	963	
2001	9,603	47.1	39,248	47.2
2002	1,643	55.2	8,512	66.4
2003	3,090	62.3	13,417	76.2

*Proportional standard error (PSE) is the standard error of the estimate expressed as a percentage of that estimate.

There are regional differences in the composition of the catch in the South Atlantic recreational fishery. The relative abundance of the various units in the overall snapper grouper harvest across the different sectors in the recreational fishery can differ considerably by state. Also, there are variations in the relative importance of the five species in this amendment and units proposed in Snapper Grouper Amendment 13B by fishing mode.

The mid-shelf snapper unit makes up the largest component of the headboat harvest in the South Atlantic (Figure 3-18a). Thus, it is not surprising vermilion snapper comprises 24% of the headboat harvest in the South Atlantic and 30% of the total headboat harvest when the harvest south of North Florida are excluded (Figures 3-17a and b). Black sea bass is the second most abundant species in the headboat harvest in North Carolina, South Carolina, Georgia and North Florida (Figure 3-17b). A number of other units such as the shallow water snappers, grunts and porgies, jacks, and shallow water groupers also comprise a substantial amount of the total headboat harvest in the South Atlantic. Even though most headboat angler trips occur off Florida, a larger proportion of the headboat harvest is taken from North and South Carolina (Figure 3-18c).

Species in the jack unit dominate snapper grouper harvests in the charterboat sector (Figure 3-20a). The jack unit comprised an average of 48% of the entire snapper grouper harvest in the charter sector during the period 1999 to 2003 (Figure 3-20a). Black sea bass and vermilion snapper only comprised 5% and 6% of the total South Atlantic charterboat harvest respectively (Figure 3-19a). A vastly different composition emerges when the harvest from east Florida is excluded. The jack unit comprises only 14% of the total charterboat harvest and the mid-shelf snapper, sea bass, and shallow water grouper units make up a substantially larger proportion of the total charterboat harvest (Figure 3-20b). This is not surprising since 73% of the total charterboat harvest is taken on trips in east Florida where species in the jack unit and the shallow water snapper unit are relatively more abundant (Figure 3-20c). Also, when the harvest from East Florida is excluded from the total catch, black sea bass and vermilion snapper comprise 16% and 13% of the total charterboat harvest respectively (Figure 3-19b).

Species in this amendment are relatively less important to the private recreational sector in the South Atlantic compared to other snapper grouper species (Figures 3-21a and b). For example, black sea bass and vermilion snapper comprised about 7% of the total snapper grouper harvest in this sector (Figures 3-21a). Harvest in the private recreational sector in the South Atlantic is dominated by the jacks, grunts, and porgies (Figure 3-22a). These two units comprised almost 60% of the total snapper grouper harvest during the period 1999 to 2003 (Figure 3-22a). Similar to the charterboat sector, a substantial proportion (80%) of the harvest is taken in Florida (Figure 3-22c). When East Florida harvest is removed it is clear that black sea bass is important to the private recreational sector that harvests snapper grouper species, as black sea bass now comprises 16% of the total harvest (Figure 3-21b).

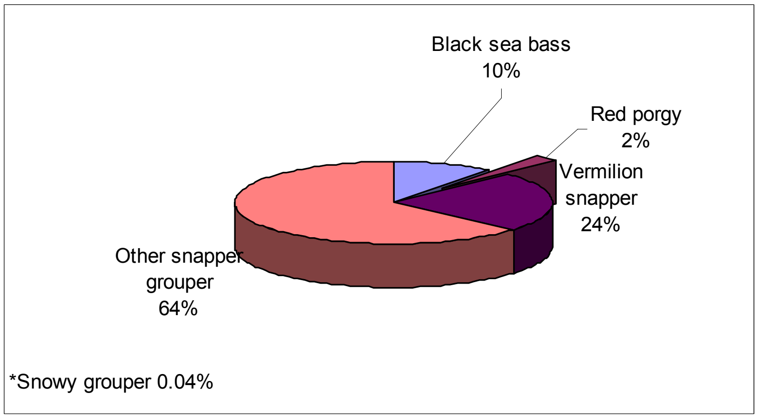


Figure 3-17a. Composition of the headboat harvest by species addressed in this amendment averaged over the period 1999-2003.
Source: The Headboat Survey, NMFS, SEFSC, Beaufort Lab.

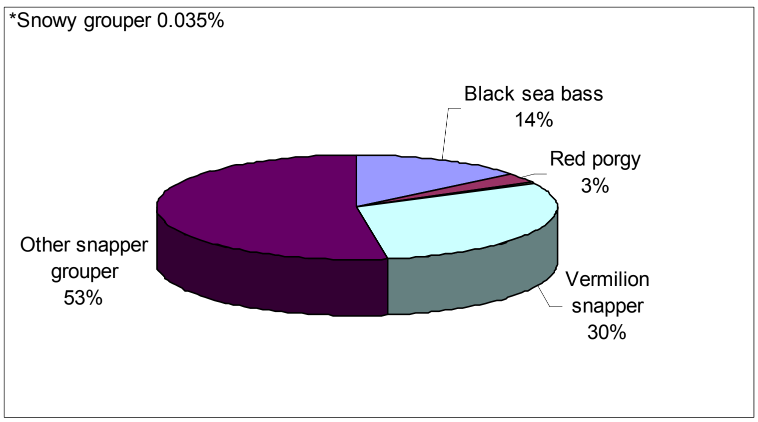


Figure 3-17b. Composition of the headboat harvest in North Carolina, South Carolina, Georgia, and North Florida by species in this amendment averaged over the period 1999-2003.
Source: The Headboat Survey, NMFS, SEFSC, Beaufort Lab.

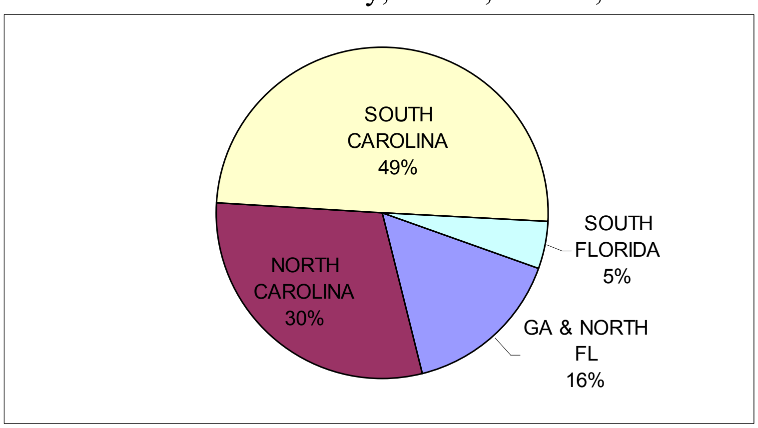


Figure 3-17c. Distribution of headboat harvest of species addressed in this amendment by state averaged over the period 1999-2003.
Source: The Headboat Survey, NMFS, SEFSC, Beaufort Lab.

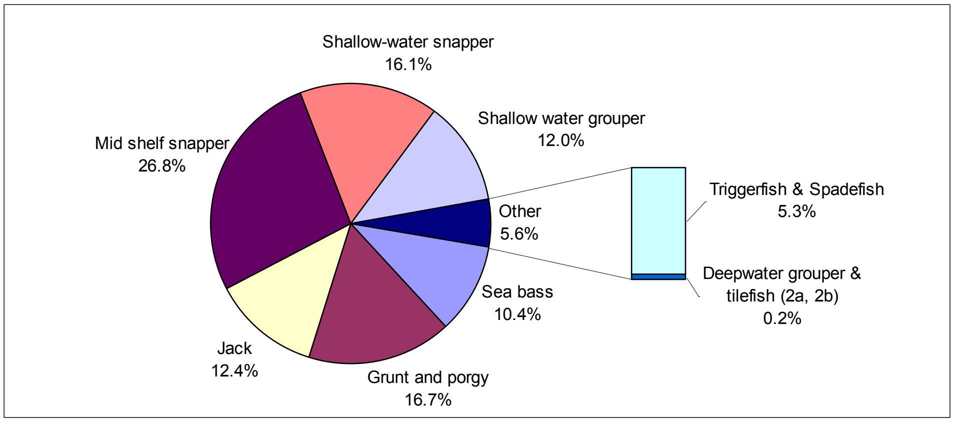


Figure 3-18a. Composition of the headboat harvest by proposed fishery management unit averaged over the period the period 1999-2003.
Source: The Headboat Survey, NMFS, SEFSC, Beaufort Lab.

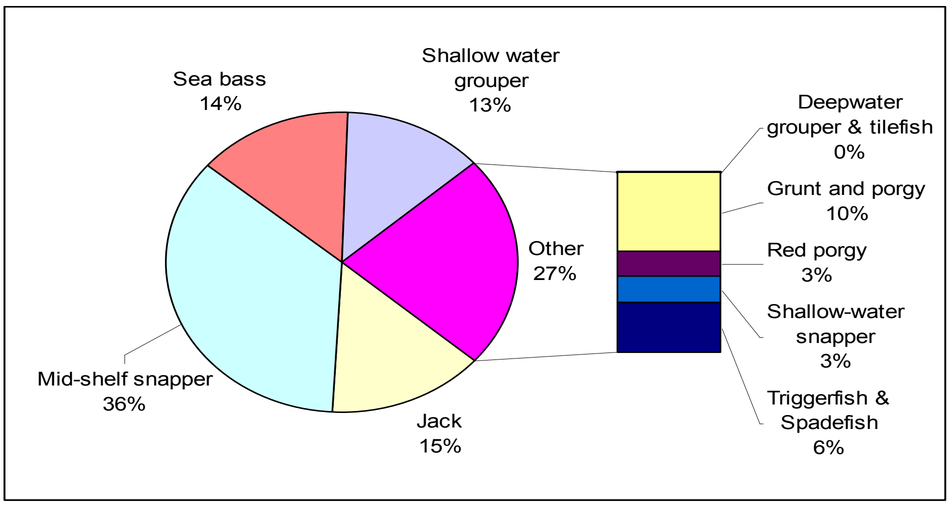


Figure 3-18b. Composition of the headboat harvest in North Carolina, South Carolina, Georgia, and North Florida by proposed fishery management unit averaged over the period 1999-2003.
Source: The Headboat Survey, NMFS, SEFSC, Beaufort Lab.

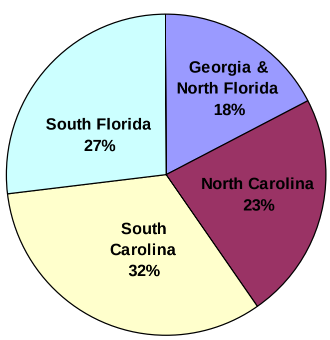


Figure 3-18c. Distribution of headboat harvest by state/region averaged over the period 1999-2003.
Source: The Headboat Survey, NMFS, SEFSC, Beaufort Lab.

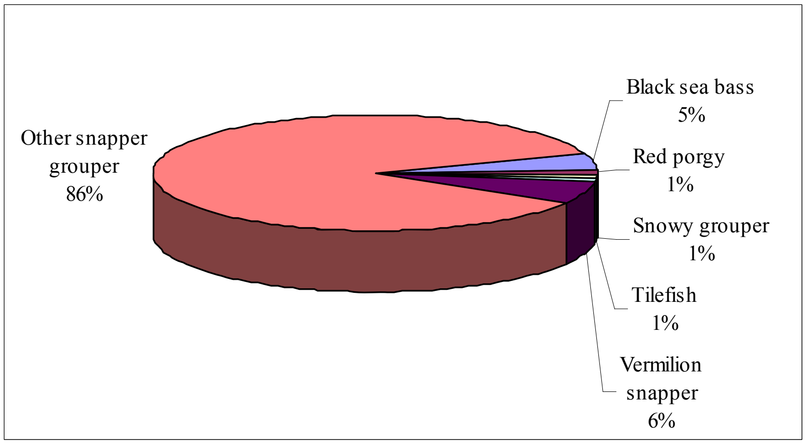


Figure 3-19a. Composition of the charterboat harvest by species in this amendment averaged over the period the period 1999-2003.
Source: MRFSS database, NMFS, NMFS, SERO.

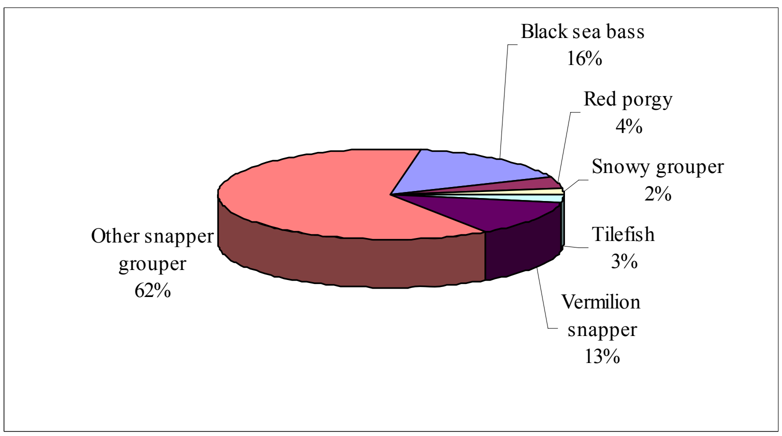


Figure 3-19b. Composition of the charterboat harvest in North Carolina, South Carolina, and Georgia by species in this amendment averaged over the period 1999-2003.
Source: MRFSS database, NMFS, NMFS, SERO.

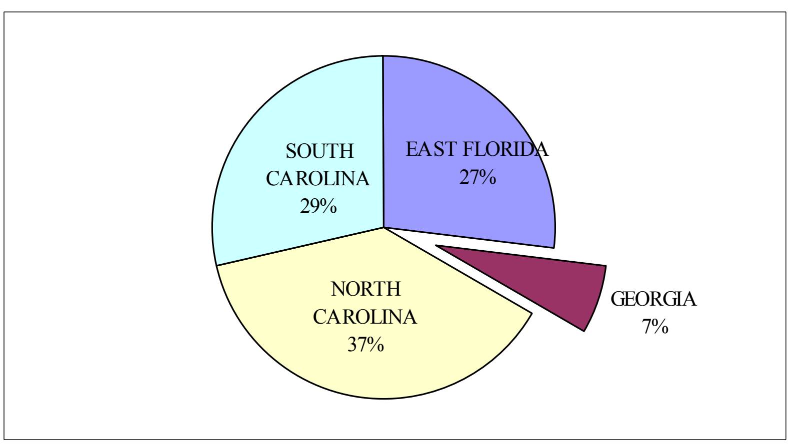


Figure 3-19c. Distribution of charterboat harvest of species in this amendment by state averaged over the period 1999-2003.

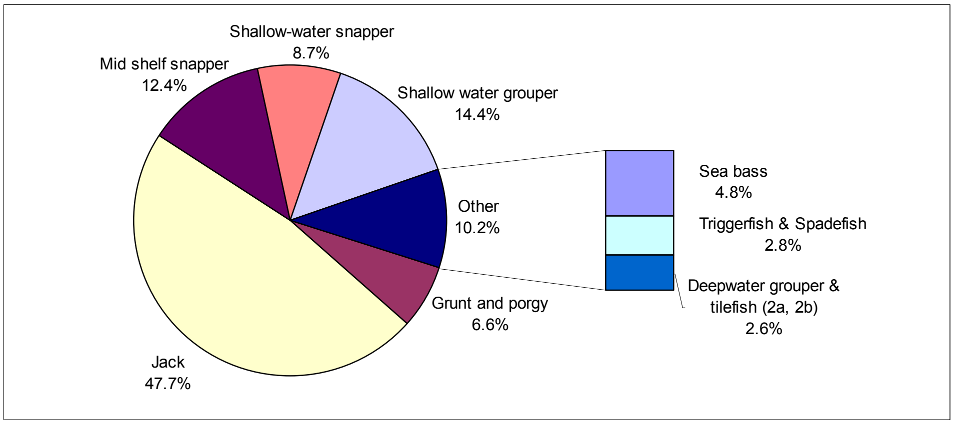


Figure 3-20a. Composition of the charterboat harvest by proposed fishery management unit averaged over the period 1999-2003.
Source: MRFSS database, NMFS, NMFS, SERO.

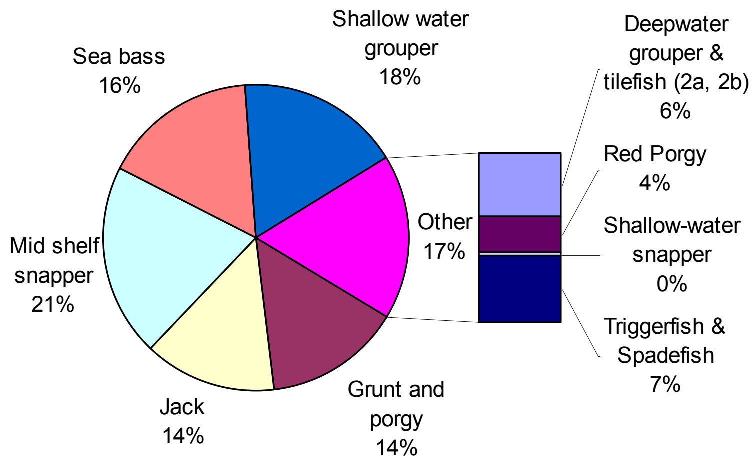


Figure 3-20b. Composition of the charterboat harvest in North Carolina, South Carolina, and Georgia by fishery management unit averaged over the period 1999-2003.
Source: MRFSS database, NMFS, NMFS, SERO.

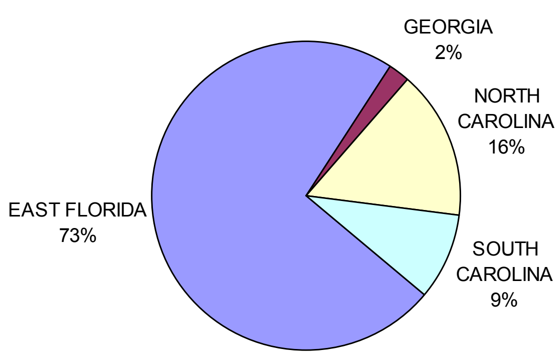


Figure 3-20c. Distribution of charterboat harvest by state averaged over the period 1999-2003.
Source: MRFSS database, NMFS, NMFS, SERO.

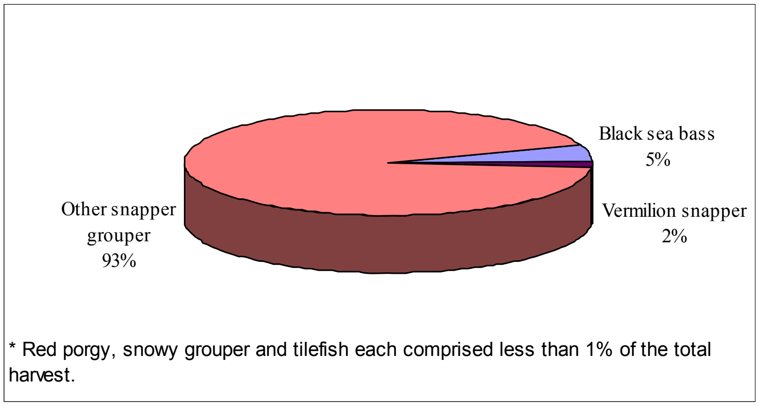


Figure 3-21a. Composition of the private recreational sector's harvest by species in this amendment averaged over the period 1999-2003.
Source: MRFSS database, NMFS, NMFS, SERO.

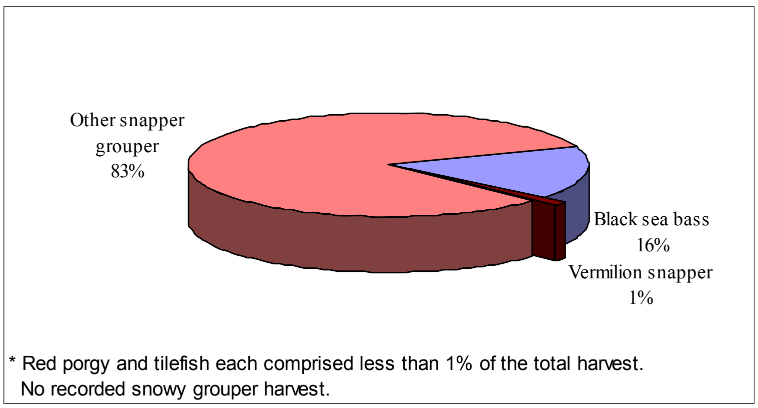


Figure 3-21b. Composition of the private recreational sector's harvest in North Carolina, South Carolina, and Georgia by species in this amendment averaged over the period 1999-2003.
Source: MRFSS database, NMFS, NMFS, SERO.

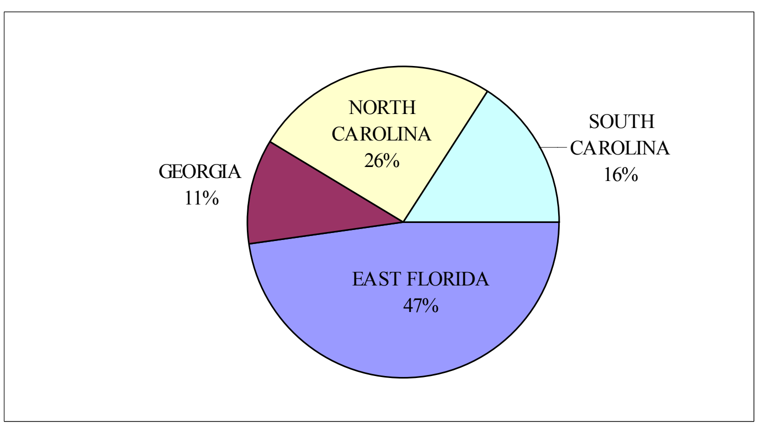


Figure 3-21c. Distribution of the private recreational sector's harvest of species addressed in this amendment by state averaged over the period 1999-2003.
Source: MRFSS database, NMFS, NMFS, SERO.

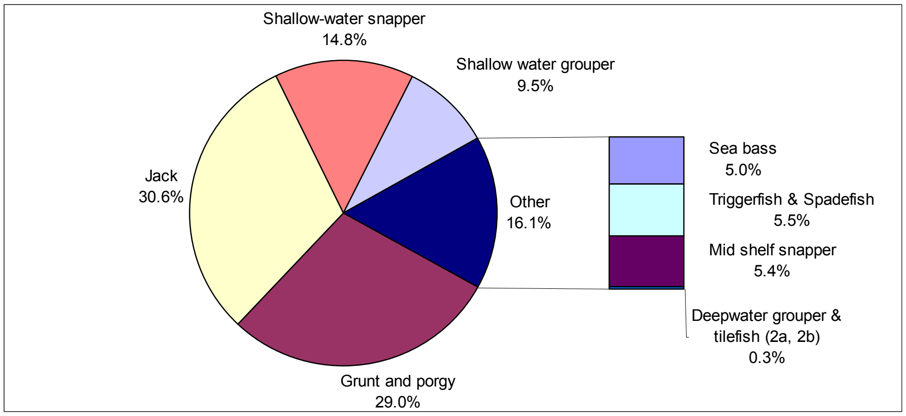


Figure 3-22a. Composition of the private recreational sector's harvest by proposed fishery management unit averaged over the period 1999-2003.
Source: MRFSS database, NMFS, NMFS, SERO.

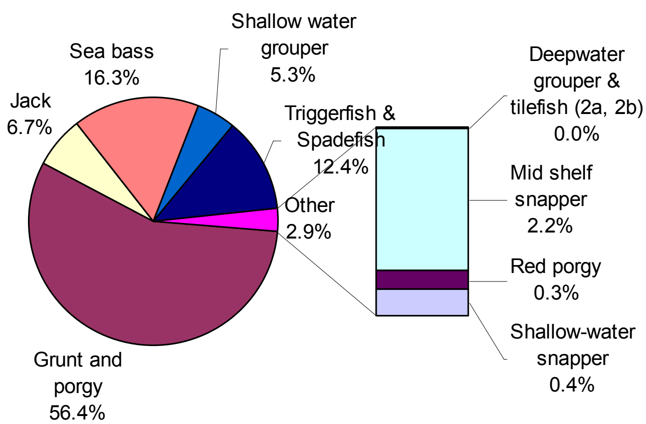


Figure 3-22b. Composition of the private recreational sector's harvest in North Carolina, South Carolina, and Georgia by proposed fishery management unit averaged over the period 1999-2003.
Source: MRFSS database, NMFS, NMFS, SERO.

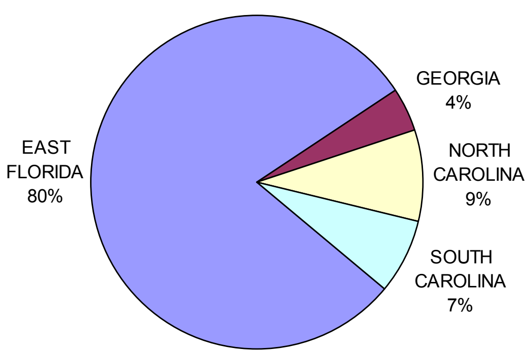


Figure 3-22c. Distribution of the private recreational sector's harvest by state averaged over the period 1999-2003.
Source: MRFSS database, NMFS, NMFS, SERO.

Headboats in the South Atlantic are dependent on other fisheries apart from the snapper grouper complex. During 1999-2003, an average of 643,113 lbs of non-snapper grouper species were harvested annually by headboats in the South Atlantic (Table 3-29). The average headboat landings of snapper grouper species during the period 1999-2003 amounted to 1.52 million lbs (Table 3-25). Thus, these non-snapper grouper species comprised 30% (643,111*100/(643,113+1,524,487)) of the total headboat harvest in the South Atlantic, and the most frequently harvested species in this group are king mackerel and little tunny. Of lesser importance are sharks, wahoo, dolphin, cobia, and bluefish (Table 3-29).

Table 3-29. Percent composition of the headboat harvest of species not included in the snapper grouper complex.
Source: Annual survey of headboats in the South Atlantic, NMFS, SERO.

Species/Group	Percent of non-snapper grouper species
King Mackerel	29.3%
Little Tunny	26.1%
Sharks	8.8%
Wahoo	7.7%
Dolphin	6.1%
Cobia	5.0%
Bluefish	4.0%
Average harvest of 1999-2003 (lbs)	643,113

3.4.2.2.4 Characteristics of the Charter and Headboat Sectors

There is no specific economic information on the for-hire sector that currently operates in the South Atlantic snapper grouper fishery. The information presented below comes from two sources. Holland *et al.* (1999) conducted a study of the charterboat sector in 1998 and provided information on charterboats and headboats engaged in all fisheries. The Southeast permits database contains information on each vessel issued a snapper grouper commercial permit and/or a snapper grouper for-hire recreational permit. In the South Atlantic, charterboats and headboats are required to have a snapper grouper for-hire permit to fish for or possess snapper grouper species in the South Atlantic EEZ. The for-hire fishery operates as an open access fishery and not all of the permitted snapper grouper for-hire vessels are necessarily active in this fishery. Some vessel owners have been known to purchase open access permits as insurance for uncertainties in the fisheries in which they currently operate.

Since 1998, there has been an increasing trend in the numbers of permits issued to for-hire operations in the South Atlantic (Table 3-30). In 2004, there were 1,594 for-hire permits issued compared to 611 in 1999. The increase in South Atlantic permits might be attributed, in part, to anticipation of the charter permit moratorium in the Gulf of Mexico region that was announced in 1999, but not implemented until 2005.

Table 3-30. Snapper grouper for-hire permit holders by home port state.
Source: Southeast Permits Database, NMFS, 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**

Some vessels with commercial snapper grouper permits also hold for-hire recreational snapper grouper permits in the South Atlantic. The number of commercial snapper grouper vessel owners purchasing these for-hire permits was greater in 2004 compared to 1999. In 2004, a total of 235 commercial snapper grouper vessel owners purchased a snapper grouper for-hire permit compared to 206 vessel owners in 1999 (Table 3-30). This increase in vessel permit issuance is somewhat at odds with the declining trend in headboat effort and the fact that there has been no observed increase in catch trips in the party/charter sector for snapper grouper species.

There is a lot of mobility in the for-hire fishery. A vessel can be moved from area to area within a state and between states in a given year. The number of permits by state represents the vessel's location (address provided to the NMFS SER Permits Office) at the latest date within a particular year. The majority, 1,084, vessels, are home-ported in Florida (Table 3-30).

In addition to the permits data, Table 3-31 contains estimates of the active for-hire sector in the South Atlantic during 1997 (Holland *et al.* 1999). A total of 1,080 charter vessels and 96 headboats supplied for-hire services in all fisheries during 1997. Most of the active for-hire vessels were located in Florida during 1997 (Table 3-31).

Table 3-31. Charterboats and headboats operating in the South Atlantic during 1998. Source: Holland *et al.* (1999).

State	Number of Headboats	Number of Charter Boats
North Carolina	18	207
South Carolina	18	174
Georgia	2	56
Florida-Atlantic Coast	42	413
Florida –Keys	16	230
Total	96	1,080

Holland *et al.* (1999) surmised charterboats in Florida tend to be less specific in terms of species targeting behavior when compared to charterboats in the other South Atlantic states. In their study, 47.7% of all captains in Atlantic Florida said they don't have specific targets but spend their time trolling or bottomfishing for any species. The most popular species for the Florida Atlantic vessels that had specific targets were king mackerel, dolphin, billfish, wahoo, and amberjack.

Information on the size of for-hire vessels can be obtained from the Southeast Permits Database. In 2003, the majority, 86%, of these permitted vessels were between 21 and 49 feet in length (Table 3-32).

Table 3-32. Proportion of permitted charter/headboat vessels in each length category. Source: Southeast Permits Database, NMFS, Southeast Region.

Category	2000	2001	2002	2003
Less than 20 feet	2%	3%	3%	2%
21-29 feet	32%	31%	34%	31%
30-39 feet	33%	33%	31%	32%
40-49 feet	22%	21%	19%	23%
50-59 feet	7%	8%	8%	9%
60-69 feet	2%	2%	3%	2%
70-79 feet	1%	1%	2%	1%
80-89 feet	0%	0%	0%	0%
90-117 feet	1%	0%	0%	0%

3.4.2.2.5 Economic Value and Economic Impact of the Recreational Fishery

The statistics presented in the preceding section document marine recreational fishing participation, recreational effort, and harvest of snapper grouper species. 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 consumers surplus, which is a non-market value since it cannot be observed in the marketplace. The magnitude of this non-market benefit derived from the recreational experience is dependent on several quality determinants, which include fish size, catch success rate, the number of fish kept, and aesthetics. These quality variables are important not only in their determination of the value of a recreational fishing trip but also in their influence on total demand for recreational fishing trips. For example, as the population of fish increases, it is expected angler success rate would increase and the marginal value of the fishing trip to the angler would increase, provided all other conditions remain the same.

Recent estimates of the economic value of a day of saltwater recreational fishing are available for the South Atlantic from different sources. Some of these estimates are not specific to snapper grouper fishing trips but shed some light on the magnitude of an angler's willingness to pay for this recreational experience. The mean value of access per marine recreational fishing trip was estimated at $109.31 for the South Atlantic (Haab *et al.* 2001). Such values can be considered good estimates of the opportunity cost of time for saltwater recreational fishing.

Other types of willingness to pay estimates represent the marginal value to the angler from a change in the bag limit or the value per fish caught per trip. Willingness to pay for an incremental increase in catch and keep rates per trip amounted to $3.01 for bottom fish species (Haab *et al.* 2001). Contingent valuation results from the same survey group yielded marginal valuation estimates of $1.06 to $2.20 to avoid a one fish red snapper bag limit decrease (Whitehead and Haab 2001). The latter are averages across all recreational anglers and not only those anglers who targeted or caught red snapper. Results from a valuation study conducted in 1997 provided an estimate of $2.49 per fish when calculated across recreational anglers in the boat mode category targeting snapper grouper species in the South Atlantic (Haab *et. al.* 2001). This represents the value of an additional fish taken in all four states. Additional estimates used in calculation of the impacts of the proposed management actions in this amendment are discussed in **Appendix E**.

The valuation estimates previously discussed should not be confused with angler expenditures or economic activity generated as a result of these expenditures. Angler expenditures benefit a number of sectors that provide goods and services for salt-water sport fishing. A recent study conducted by NMFS (Gentner *et al.* 2001) provides estimates of saltwater recreational fishing trip expenditures (Table 3-34). The average expenditure per trip varies depending on the state, type of trip, duration, travel distance, and other factors (Table 3-33). As expected, trip expenditures for non-residents are higher than for in-state residents. Compared to in-state residents, non-residents generally travel longer distances and incur greater expenses for food and lodging. Some in-state residents will incur higher trips expenses if they reside far from the coast. These estimates do not include expenditures on recreational fishing in Monroe County or expenditures made on headboat angler trips.

Table 3-33. Summary of expenditures on saltwater trips estimated from a 1999 MRFSS add-on survey.
Source: 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

Estimated expenses per trip presented in Table 3-33 were used to calculate expenditures in the snapper grouper recreational fishery by mode and state. However, weighted average expenditure estimates per trip by mode and state regardless of the resident status of the angler were required, since data on snapper grouper catch and harvest trips were not available separately for residents and non-residents. First, total expenditures by resident status, mode and state were calculated for the 1999/2000 fishing year (the period during which the NMFS angler expenditure study was conducted) as the product of the number of marine recreational fishing trips by state, mode, and resident status for 1999/2000 (Gentner *et al.* 2001) and the corresponding expenditure per trip data contained in Table 3-33. Then the total expenditures by state and mode were calculated by summing across total expenses in each resident category. Finally, weighted expenditure estimates per trip by state and mode were calculated by dividing the total expenditures by state and mode by the number of saltwater trips in the corresponding state and mode. These average weighted expenditure per trip estimates are presented in Table 3-34a and Table 3-34b along with corresponding data on number of snapper grouper catch trips used to calculate total angler expenditures associated with snapper grouper trips.

On average, during the period 1999-2003, it is estimated recreational fishermen incurred a total of $209 million in trip expenses to fish for snapper grouper species in the South Atlantic (Table 3-34a). A relatively large portion (84%) of these expenses impacted the economy in east Florida. The trip expenditures for fishing off Florida were estimated at $174.8 million (Table 3-34b). The economic impact of this fishery is larger than the figures presented in Tables 3-34a and 3-34b. Angler expenses for fishing tackle, gear, and vessel purchase and maintenance are not included in these estimates. Also, expenditures incurred for trips in the Florida Keys (Monroe County) are not included in these calculations.

Table 3-34a. Estimated trip expenditures on snapper grouper trips in the South Atlantic by state.

State	Average number of catch trips 1999-2003	Average weighted expenditures per trip[1]	Revenue associated with catch trips	Revenue adjusted for inflation to $2003
Florida	2,444,099	$71.53	$174,826,401	$193,178,344
Georgia	69,966	$111.97	$7,834,093	$8,656,456
North Carolina	252,927	$76.11	$19,250,274	$21,271,021
South Carolina	116,681	$63.45	$7,403,409	$8,180,562
South Atlantic			$209,314,178	$231,286,385

[1] Expenses per trip for saltwater fishing were calculated across all modes from data collected from a 1999 expenditure survey (NMFS 2001). Used total expenditures calculated for the state divided by the total number of trips (resident and non-resident) presented in Gentner *et al.* (2001).

Table 3-34b. Estimated trip expenditures on snapper grouper trips in the South Atlantic by mode.

Mode	Average number of catch trips 1999-2003	Average weighted expenditures per trip[1]	Revenue	Revenue adjusted for inflation to $2003
Charter	112,600	$164	$18,507,851	$20,450,664
Private/Rental	1,780,536	$72	$127,342,992	$140,710,488
Shore	990,538	$65	$63,923,750	$70,633,978

1 Expenses per trip for saltwater fishing were calculated across all states from data collected from a 1999 expenditure survey (NMFS 2001).

3.4.2.2.6 Financial Operations of the Charter and Headboat Sectors

Holland *et al.* (1999) defined charterboats as boats for-hire carrying 6 or less passengers, which charge a fee to rent the entire boat. Data from their study conducted in 1998 indicated this trip fee reportedly ranged from $292 to $2,000. The actual cost to the passenger depended on state, trip length, and the variety of services offered by the charter operation. In the South Atlantic, 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 in average fee was $1,000 to $2,000. Most (>90%) Florida charter operators offered half day and full day trips and about 15% of the fleet offered overnight trips. In comparison, in the other South Atlantic states about 3% of the total charter trips were overnight trips.

Headboats tend to be larger, diesel powered and generally can carry a maximum of around 60 passengers. The average vessel length of the headboats whose owners responded to the survey was around 62 feet. In Florida, the average headboat fee 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).

The demand for charter and headboat trips will depend on the fee charged and the quality of the fishing experience. As noted previously, variables such as catch success rates, bag (keep) limits, and aesthetics are determinants of the quality of the experience to the angler. Profits within the for-hire sector will depend on trip demand, the fee charged and cost of the fishing operation. The cost of fishing will bear some inverse relationship to the population size of the targeted species as it is expected costs of searching for fish will decrease as the population size increases.

On the east cost of Florida, the average charter vessel length and horsepower was 39 feet and 617 hp respectively. The average vessel length in North Carolina was comparable to Florida. Also, for the other states it appears charter vessels tended to be smaller than vessels in Florida and North Carolina. Electronics such as global positioning systems (GPS) and fish finders are common on most charter vessels in the South Atlantic. 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 (Holland *et al.* 1999). 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 around $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 of average gross revenue per vessel 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 also 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% higher for charterboats and 113% higher for headboats), the authors surmised that this was due to sensitivity associated with reporting gross receipts, and subsequent under reporting. 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.

While the reported gross revenue figures may be underestimates of true vessel income, these 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.

3.4.3 Social and Cultural Environment

While general identification of fishing communities has taken place in the past few years, there has been less social or cultural investigation into the nature of the snapper grouper fishery itself. 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 represent some of the important changes that have occurred in the fishery such as the implementation of a limited entry permit system. Some survey work has been done by Dr. Brian Cheuvront of the North Carolina Division of Marine Fisheries, but it did not include ethnographic examination of communities dependent upon fishing. No recent study has examined the changing nature of the fishery in the South Atlantic, nor have the cumulative impacts of many earlier regulations been quantified. Some of these changes will be discussed in a qualitative manner below.

To help fill some of the gaps, members of the South Atlantic Council's Snapper Grouper Advisory Panel were asked to help designate which communities they believed would be most impacted by the proposed management measures. The results are displayed in Table 3-35. Because of the great many communities in the South Atlantic, which have a presence of snapper grouper fishing – be it commercial, private recreational or charter and/or headboat fishermen – we have had to limit further descriptions to what we are calling "indicator communities". The status of indicator communities represents the condition of the overall fishing communities.

Table 3-35. Potentially impacted snapper grouper communities in the South Atlantic.
An empty cell reflects a lack of data about a community not a determination on whether a community is important to a certain fishery sector. Recreational information by specific community is more difficult to obtain as it is not available from MRFSS data. Information presented below for the recreational sector was obtained from Council members, Advisory Panel members, and from the recreational angling public.

CH = CHARTER/HEADBOAT/FOR HIRE — **1= NOT IMPORTANT**
C = COMMERCIAL — **2= SOMEWHAT IMPORTANT**
R = PRIVATE RECREATIONAL — **3= VERY IMPORTANT**

Potentially Affected Community	**SNOWY GROUPER**	**GOLDEN TILEFISH**	**VERMILION SNAPPER**	**RED PORGY (Pinkies)**	**BLACK SEA BASS**
NORTH CAROLINA					
Hatteras	C3, R1, CH 2	-		-	C3
Manteo	C1, CH1, R1	C1, CH1, R1	C1, CH1, R2	C1, CH1, R2	R3, CH2, C1(for traps)
Wanchese	C2, R1, CH 2	C1, R1, CH1	C1, R?, CH?	-	C3, R3, CH3
Beaufort	C2, CH?, R1	C1	C3	C2	C3
Morehead City	C3, CH3, R1	R1, C1, CH1	R3, C3, CH3	R3, C3, CH3	R3, C3, CH3
Atlantic Beach	C1, CH3, R1	CH3	CH3		
Swansboro	N/A -- Most of the effort in Swansboro is recreational with a few charter boats and smaller private vessels – no specific data.				
Sneads Ferry	C1	C1	R3, C3, CH3	R3, C3,CH3	R3, C3, CH3
Carolina Beach	C2, CH2, R2	C1. CH1, R1	C3, CH3, R3		C3
Hampstead	Mostly recreational effort around Hampstead located in other areas such Wrightsville Beach and Wilmington.				C3,
Wrightsville Beach	C2, CH1, R1	C1. CH1, R1	C3, CH3, R3	R3, C3, CH3	R3, C3, CH3

Wilmington	C1, CH1, R1	C1. CH1, R1	C3, CH3, R3	R3, C3,CH3	R3, C3, CH3
Supply		C3			
Southport	C1, CH1, R1	C2	C3		

Potentially Affected Community	**SNOWY GROUPER**	**GOLDEN TILEFISH**	**VERMILION SNAPPER**	**RED PORGY (Pinkies)**	**BLACK SEA BASS**
SOUTH CAROLINA Due lack of in-depth databases for SC, determinations are approximations.					
Little River			C3, R3, CH3	C3, R3, CH3	C3, R3, CH3
Murrells Inlet	C3, R3	C3, R3	R3	C3,CH3,R3	R3, CH3
Georgetown	C3, CH3	C3, CH3	R3	C3, CH3	R3
Charleston Area		C2	CH3	CH3	CH3
Hilton Head	CH1, R1	CH1, R1	CH2, R2	?	?

Potentially Affected Community	**SNOWY GROUPER**	**GOLDEN TILEFISH**	**VERMILION SNAPPER**	**RED PORGY (Pinkies)**	**BLACK SEA BASS**
GEORGIA					
Tybee Island	CH1	CH1	CH3	CH2	CH3
Savannah	CH1	CH1	CH3	CH2	CH3
Townsend	C1	C1	C3,R3,CH3	C3,	C3
Brunswick	No commercial effort for Snapper Grouper; Recreational effort on St. Simons and Jekyll Islands is less than but mirrors that of Tybee Island and Savannah.				

Potentially Affected Community	**SNOWY GROUPER**	**GOLDEN TILEFISH**	**VERMILION SNAPPER**	**RED PORGY (Pinkies)**	**BLACK SEA BASS**
FLORIDA					
Mayport	C2, R1,CH2	C1, R1, CH1	C3	C3 Prior to Am12	C1
Jacksonville	C1	C1	R3, CH3, C3	C3 Prior to Am12	C1
St. Augustine	C3	C2	C3	C3 Prior to Am12	C3
Port Orange	C2	C3			
Cape Canaveral	C2, R1, CH1		C2. R2, CH2	C2, R2, CH2	
Merritt Island	C2, R1, CH1		C2. R2, CH2	C2, R2, CH2	
Titusville	C2, R1, CH1		C2. R2, CH2	C2, R2, CH2	
Cocoa Beach	C2, R1, CH1		C2. R2, CH2	C2, R2, CH2	
Melbourne	C2, R1, CH1		C2. R2, CH2	C2, R2, CH2	
Sebastian					
Vero					
Fort Pierce	C2	C2	C1		
Port St. Lucie	C1	C1	C1		
Jupiter	C1	C1			
Palm Beach, West Palm	?	?	?	?	?
Deerfield Beach	C1	C1	C1	C1	C1
Ft. Lauderdale	C1	C1	C1	C1	C1
Miami	C2	C2	C2	C1	C1
Key Largo	CH1, R1, C2	**N/A**	CH1, R1, C2	CH1,R1, C1	N/A
Islamorada	CH1, R1, C2	**N/A**	CH1, R1, C2	CH1,R1, C1	C1
Marathon	CH1, R1, C2	**N/A**	CH1, R1, C2	CH1,R1, C1	C1
Key West	CH1, R1, C2	**N/A**	CH1, R1, C2	CH1,R1, C1	C1
Stock Island	CH1, R1, C2	**N/A**	CH1, R1, C2	CH1,R1, C1	C1

It is our intention to let Table 3-35 be the most efficient manner for quickly identifying which communities potentially face the most severe impacts. The different types of fishing have been simplistically broken down into three sectors in accordance with standard practice at NMFS: Commercial, For-hire (CH), and Recreational. While we realize that subsistence fishing may be important in the South Atlantic, we have assumed it would fall under one of these other categories.

The communities identified in Table 3-35 have varying degrees of dependency on and level of engagement with the five species dealt with in this amendment. Some of these species make up an important proportion of commercial and/or recreational catches. These fisheries are not homogenous and attempting to describe the fisheries throughout the entire South Atlantic is difficult. However, there are some similarities among commercial and recreational sectors. There seems to be a broad similarity, however, between the snapper grouper effort north of the Georgia-Florida state line, and then a different type of effort south of the same state line. Florida, then, stands out as different from the other states, for a number of reasons: greater amount of coastal development, one of the top three states in the U.S. for population; one of the top states for number of recreational fishermen; a more severe history of restrictions on commercial fisheries (the Net Ban of 1996, the closed area of the *Oculina* Bank; the Florida Keys Marine Sanctuary); and having two coasts, which can be easily crossed to fish, but have different data accounting systems (Gulf of Mexico vs. South Atlantic). All of these factors must be taken into account when determining future impacts of management measures.

Furthermore, 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. These exogenous threats increase the severity of the immediate, short-term adverse impacts of the actions proposed in this amendment. In general, privatization of public resources refers to waterfront property and beach access being developed into private condominiums, gate communities, etc., most of which had been held as common property resources until the past few decades. This means that it is not solely or even primarily fishery regulations that are impacting the fishing community; rather changes from outside fishing are having larger impacts.

Changes in harvesting strategies were noticed across gear types for the fleet during 1998-2002. Vertical line effort, especially bandit gear, increased and was focused more towards vermilion snapper and shallow water groupers. The reclassification of bandit gear on logbook forms, which became significant in 2002, highlighted that king mackerel were being landed in large quantities by traditional rods and reels and handlines while bandit gear was being used to target higher valued snapper and grouper species. This distinction was not clear from the data for 1998-2001. Vertical lines also landed or incidentally caught snowy grouper, scamp and red grouper, red snapper, amberjacks, black sea bass, porgies, and triggerfish. Trolling and trap effort stayed consistently focused on king mackerel and black sea bass, respectively. Gillnet effort increased pressure on South Atlantic shark species and Spanish mackerel, and longliners reacted to increased regulations on deepwater species by shifting effort away from tilefish and snowy grouper toward sharks in 2002 (Logbook Data, SEFSC 1998-2002).

Throughout the South Atlantic, snapper grouper fishermen employ similar gear. However, it is important to delineate potential impacts of certain gear and the manners in which they are fished as compared to other fishermen when discussing levels of efficiency or appropriate management strategies. For example, in the Black Sea Bass (BSB) fishery in central and southern North Carolina, pots/traps are the primary technique for targeting BSB. One must consider the kinds of traps that are used, the seasons they are fished, and the manner in which they are fished can vary based upon factors such as climate and geographic location. If managers determine a reduction in traps is the most effective manner to reduce effort for the BSB commercial fishery throughout the South Atlantic, the differential impact it would have on fishermen based on where and how they fish should be understood.

Furthermore, while it may be easier to administer the region as a whole, the fisheries in North Carolina are prosecuted quite dissimilarly from those in, for example, the Florida Keys. Certain species are targeted at different times of the year in both areas due to climate differences, which affect such things as tourism flows and hence, effort shifts, primarily in recreational fisheries.

There are also differences in the species targeted by fishermen living in different areas, and this will affect how the regulations impact them. State regulations will also interact with how the snapper grouper fishery is prosecuted; for example, some North Carolina fishermen might move more inshore to estuaries to fish, while south Florida fishermen may just shift to a different species in the snapper grouper complex. Regulations affecting king and Spanish mackerel, along with new regulations in the Highly Migratory Species division of NMFS (tuna, sharks, swordfish) will also have differential impacts on fishermen in the South Atlantic region.

Throughout the South Atlantic the private and for hire recreational fisheries are to varying degrees dependent on many of the species identified in this amendment. The cause of the variance in terms of the level of dependency on certain species is to a large extent related to abundance of the species and geographic area. For example, yellowtail snapper are much more abundant and desired in central and south Florida as compared to North Carolina simply because yellowtail snapper are found in South Florida in greater numbers than anywhere else in the continental U.S. However, in North Carolina, fishermen are more apt to target species such as black sea bass than their central and south Florida counterparts. Some of the most commonly sought after and desired species are the shallow water groupers, especially gag and black grouper, and certain snappers and wrasses, such as mangrove (grey) snapper, vermilion snapper, red snapper and hogfish. Grunts and triggerfish are also commonly caught throughout the region.

Recreational fishermen are most likely to either troll for pelagic species or go bottom-fishing for species from the snapper grouper complexes. Consistent throughout all kinds of recreational fisheries, the primary gear used to target snapper grouper species is some form of hook and line, be it electric reel, regular rod and reel fishing, or handlines. One interesting growth in the recreational industry, which can be seen throughout North Carolina and Florida, is the increasing numbers of spear fishermen who desire and target many of these species. There has also been an observed and reported increase in the number of anglers practicing “deep-dropping” for snapper and grouper species off of central and south Florida. Some websites (e.g., www.kristalusa.com) indicate a number of recreational fishermen are now practicing a modified form of longlining in Florida.

It is also known from discussions with dealers and fishermen that there is some sale of recreationally caught snapper and grouper, along with other species. This sale may well take place in accordance with state regulations and is therefore not illegal sale of the bag limits. There is no good way to document this, other than public hearing testimony and anecdotal data. How this behavior is changing fishing behavior is not known at this time, nor is it known how this affects prices and dependency of dealers on recreationally caught fish.

Overview of the Age of Snapper Grouper Permit Holders

Overall 12% of permit holders are 70 or older, 27% are 55-69 old, 32% are 40-54 years old, 15% are 25-39 years old, and 15% are younger than 25 years old.

Table 3-35a. Breakdown of ages of snapper grouper permit holders by age range and type of permit.
Source: NMFS Permit Files, 2004.

	70 Years Old or Older	55 – 69 Years	40 – 54 Years	25 – 39 Years	Younger than 25	TOTAL
Unlimited Permits	84 (10%)	219 (26%)	285 (33.8%)	123 (14.6%)	126 (15%)	837*
Limited Permits	46 (20.6%)	63 (28%)	52 (23%)	31 (13.9%)	31 (13.9%)	223**
TOTAL	130 (12%)	282 (27%)	337 (32%)	154 (15%)	157 (15%)	1060

* Four permit files are missing Owner's Date of Birth information.

** Two permit files are missing Owner's Date of Birth information.

Community Profiles of Key Indicator Communities in The South Atlantic

This section highlights and describes certain communities determined to be potentially impacted by the proposals in this amendment. They have been chosen based on whether they are particularly important to one sector of the snapper grouper fishery (e.g. recreational fishing) or to all sectors (commercial, for hire and recreational).

3.4.3.1 North Carolina

Figure 3-23. North Carolina fishing communities.

Overview of North Carolina's Fishery

Of all the four states in the South Atlantic region, North Carolina (Figure 3-23) 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 same might be said for the recreational sector of North Carolina. The state offers a wide variety of fishing opportunities, from sound fishing, to trolling for tuna, to bottom fishing or shrimping. Perhaps because of the wide variety of fishing, fishermen have been better able to weather regulations and coastal development pressures, adjusting their annual fishing routine as times have changed.

In Table 3-36, one notes the steady decline of federal unlimited Snapper Grouper permits in North Carolina since 1998 when Amendment 8 was implemented. The 1999 value is a more accurate accounting of the number of permits than 1998, when regulations (federal and state) that were in effect may have undercounted permit holders. All permit data fluctuate as permits are renewed based on the permit holder's birth date, and thus the numbers of permit holders is not stable. There is also no good method at this time for determining which of the permits actually have landings of snapper grouper species associated with them.

Table 3-36. Number federal snapper grouper permits by type for North Carolina. Source: NMFS 2004.

Type of Permit	1998	1999	2000	2001	2002	2003	2004
Charter/Headboat for Snapper Grouper	33	37	38	39	35	204	42
Snapper Grouper Unlimited	147	194	167	162	146	142	139
Snapper Grouper Limited	30	36	33	25	22	18	16

At the state level, in 2002, there were over 9,500 state licenses sold with the capability of sale and over 5,500 reported sales in 2002 (Table 3-37). Although the overall number of licenses sold has been increasing since 1994, the number of licenses reporting sales has been decreasing.

Table 3-37. Number of licenses sold by the North Carolina Division each license year. The number of licenses with selling privileges that potentially can report catch on trip tickets by license year, and the number of licenses actually used to report catches. Individuals may hold more than one license with selling privileges. Source: NCDMF 2002.

License Year	Number of licenses sold*	Number of licenses reporting sales	Number of licenses sold, but did not report sales
1994	6,781	Not available	Not available
1994/1995	7,535	6,710	825
1995/1996	7,898	7,285	613
1996/1997	8,173	6,700	1,473
1997/1998	8,595	7,000	1,595
1998/1999**	8,426*	6,515	1,911
1999/2000+***	9,711	6,015	3,696
2000/2001*	9,677	6,057	3,620
2001/2002*	9,712	5,509	4,203

*Licenses from 1994 to June 1999 are Endorsement to Sell licenses. Licenses from 1999 to the present include number of SCFL, RSCFL, Shellfish, Menhaden License for Non-Residents without SCFL, Recreational Fishing Tournament License to Sell Fish, and Land or Sell licenses. License year is July to June. Source: 1994-1997/98 license year sales were derived from historical reports. 1998/99-2001/2002 from FIN license sales reports.
**1998/99 was a transition year and not all dBase licenses were migrated to FIN. The numbers provided were from FIN.
***1999/00 to 2001/02 include licenses sold that were subsequently surrendered without a refund.
+1999/2000 license counts were stated as much higher in other documents. This was due to the grace period when switching from ETS to SCFL. The number above is correct.

A good overview of North Carolina commercial snapper grouper fishermen can be found in Cheuvront and Neal's 2003 survey of North Carolina federal snapper grouper permit holders (Cheuvront and Neal 2004). The complete results of this study can be found in the NOAA Fisheries 2005 SAFE Report (NMFS 2005a). The report is instructive for most of the commercial snapper grouper fishermen that fish from ports in North Carolina, South Carolina, and Georgia. Florida, as noted above, poses different problems in the analysis due to the greater importance of recreational fishing, a changed coastline, and different climate, offshore conditions and species of fish, cannot be assumed to be represented by the results in the Cheuvront and Neal (2004) study. Because it is illustrative of how fishing activities among North Carolina snapper grouper fishermen are carried out, the section from the Cheuvront and Neal (2004) report describing targeted species is reproduced in whole below along with the related tables (Cheuvront and Neal 2004; Tables 3-38; 3-39).

Table 3-38. Sociodemographics of snapper grouper fishermen (N=124) in North Carolina, 2004. Source: Cheuvront and Neal 2004.

	Frequency	Percent
Gender		
Male	122	98.4%
Female	2	1.6%
Age		
Average	46.6	
Minimum	18	
Maximum	73	
Racial/Ethnic Background		
White	121	97.6%
Asian/Pacific Islander	2	1.6%
Native American	1	0.8%
Education		
Less than High School	13	10.5%
High School Graduate	40	32.3%
Some College	32	25.8%
College Graduate	39	31.5%
Marital Status		
Married	98	79.0%
Divorced	12	9.7%
Separated	0	0.0%
Widowed	2	1.6%
Never Married	11	8.9%
# of People in Household		
One	10	8.1%
Two	51	41.1%
Three	30	24.2%
Four	24	19.4%
Five	5	4.0%
Six	2	1.6%

	Frequency	Percent
Annual Household Income		
Less than $15,000	4	3.2%
$15,001 - $30,000	26	21.0%
$30,001 - $50,000	36	29.0%
$50,001 - $75,000	22	17.7%
$75,001 - $100,000	14	11.3%
More than $100,000	9	7.3%
Refused to Answer	13	10.5%
County of Residence		
Brunswick	16	12.9%
Carteret	20	16.1%
Craven	1	0.8%
Currituck	1	0.8%
Dare	8	6.5%
Hyde	2	1.6%
New Hanover	27	21.8%
Onslow	24	19.4%
Pamlico	2	1.6%
Pender	11	8.9%
Other NC County	9	7.3%
Out of State	3	2.4%
Years Fishing		
Average	18.1	
Minimum	1	
Maximum	60	
Years in Community		
Average	26.6	
Minimum	2	
Maximum	65	

Eighty-one (65.3%) of the fishermen indicated year around fishing. Table 4 shows the main species landed by these fishermen in each month. The percentage listed for each month indicates the overall percentage of the respondents who reported fishing activity in that month in 2002. The species listed are the ones reported as being landed by at least 5% of the fishermen who fished in that month. Non-snapper/grouper complex species were included to show the fishermen's progression through fisheries during the year. NC DMF trip ticket species codes were used to record the species fishermen said they targeted. Gag is the fish most frequently targeted by these fishermen. The season for gag is effectively closed for the months of March and April because of the SAFMC restricted bag limit. Also, during those months it cannot be sold commercially. Beeliner and black sea bass are the next most frequently landed species. There is a significant number of fishermen who land king mackerel each month of the year. Over 20% of fishermen target king mackerel between October and May. During the gag closed season, king mackerel are targeted by about 35% of the fishermen. Other snapper/grouper complex species landed by at least 5% of the fishermen in any given month were red grouper, scamp, snowy grouper, grunts, and triggerfish. Non-snapper/grouper complex species landed by at least 5% of the fishermen in any given month included Atlantic croaker (Micropogonias undulates), yellowfin tuna (Thunnus albacares), bluefin tuna (Thunnus thynnus), dolphin (Coryphaena hippurus), and shrimp (Penaeid spp.).

Table 3-39. Fisheries participation and major species landed by month. (All figures are in percents).
Source: Cheuvront and Neal (2004).

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Overall Effort	**85%**	**83%**	**82%**	**86%**	**91%**	**93%**	**95%**	**94%**	**92%**	**95%**	**93%**	**90%**
Gag	41	40	6	5	46	54	58	57	54	56	52	46
Red Grouper	12	14	21	25	28	31	31	30	28	27	25	20
BSB	34	32	26	25	19	18	17	14	18	23	29	32
Vermilion Snapper	21	23	23	26	34	39	39	39	36	33	29	23
Snowy Grouper	--	--	--	7	8	9	7	7	--	--	--	--
Scamp	--	8	9	14	20	21	18	19	18	18	14	13
Triggerfish	--	--	--	--	--	--	--	8	7	5	--	--
Grunts	--	--	--	--	--	--	10	11	10	10	8	6
King Mackerel	23	25	35	--	21	16	17	17	18	22	23	21
Yellowfin Tuna	--	--	--	11	13	11	9	8	7	--	--	10 (Blue fin)
Dolphin	--	--	--	--	--	11	5	5	6	5	--	
Shrimp	--	--	--	--	--	7	7	7	7	5	--	--
Croaker	--	8	7	--	--	--	--	--	--	--	--	--

At some point in the year gag are targeted by 61.3% of fishermen. Red grouper were landed by 39.5%. Scamp were reported as being landed by 27.4%. All three species are primarily landed using vertical lines or diving spears. Black sea bass are targeted by 46% of the fishermen with 40% using fish pots and 60% using vertical line gear.

Beeliners were landed by 36.3% of fishermen. Likewise, 14.5% reported landing grunts, and 13.7% reported triggerfish. Less frequently mentioned species included golden tilefish (5.6%), amberjack, American red snapper (4.8%), pink snapper (1.6%), and jolthead and knobbed porgies (1.6%). Each of these species was primarily landed using vertical line gear.

Hogfish, targeted by 1.6% of the respondents were caught primarily using diving spears. Snowy grouper were targeted by 9.7% of the fishermen at some point in the year using primarily vertical lines or longline gears.

As can be seen from this selection above, all the species targeted for action under in this amendment are the same species that are heavily targeted by North Carolina's snapper grouper fishermen. As fishing practices are similar in South Carolina and Georgia, it may be safe to assume the impacts will also be the same for these fishermen and their communities. As will be discussed in Section Four, Management Measures, the impacts of this proposed amendment will disproportionately affect the fishermen (commercial and recreational) of southern North Carolina, South Carolina and Georgia.

Recreational fishing is well-developed in North Carolina, and due to natural geography, is not limited to areas along the coast, as is demonstrated in the two maps of public boat ramps shown below. While most of these boat ramps are located on the sounds and rivers, the two maps below serve as one type of indicator of recreational fishing activity. The North Carolina Department of Transportation and the North Carolina 2003 Coastal Boating Guide list 109 marinas and boatworks for the state (Figures 3-24; 3-25). North Carolina is now almost on par with Florida for total recreational fishing effort (see Section 3.Economic Environment).

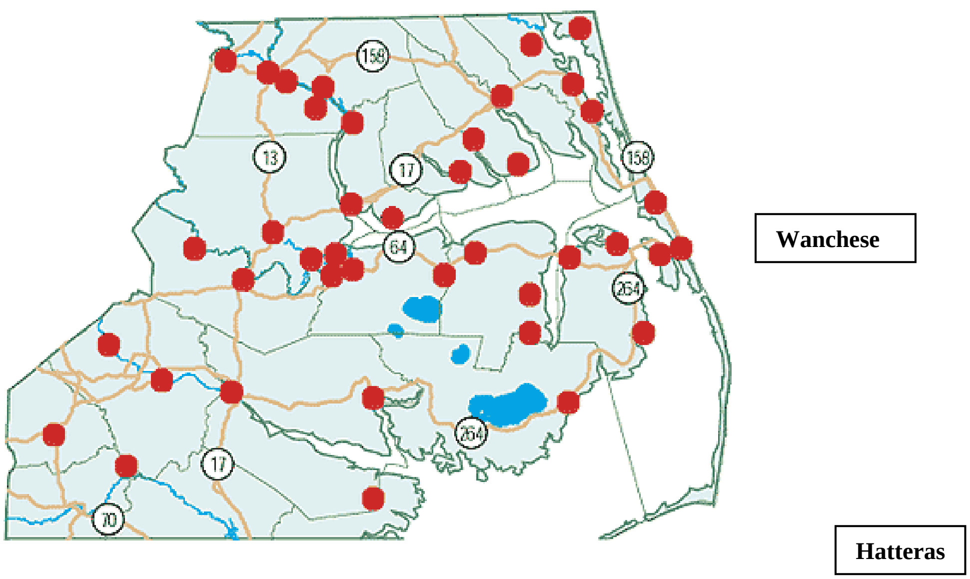


Figure 3-24. Public boat ramps for North Carolina, Currituck through Carteret Counties. Source: http://www.rbff-education.org/cgi-bin/search/rbff.cgi?ID=981848282.

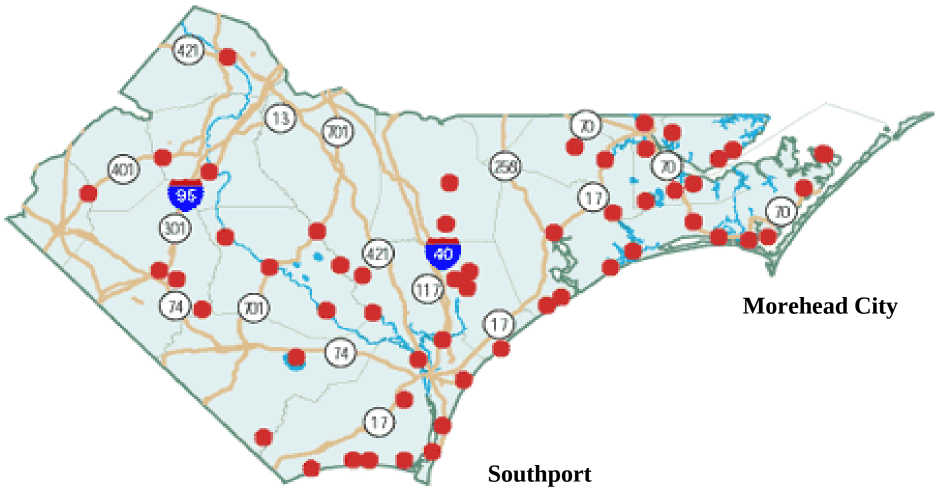


Figure 3-25. Public boat ramps, Onslow through Brunswick Counties.
Source: http://www.rbff-education.org/cgi-bin/search/rbff.cgi?ID=981848282.

Other than the large national organizations (often with regional or state chapters) such as the Recreational Fishing Alliance (RFA) and the Coastal Conservation Association, there are other clubs for recreational anglers that are locally based and give members a sense of community based on a favorite pastime. While there are other fishing clubs that focus on inland, lake fishing such as the Jon Boat Fishing Club, the following clubs are dedicated mostly to saltwater fishing.

Charlotte Offshore Sportfishing Club
Raleigh Saltwater Sportfishing Club
Sandhills Saltwater Fishing Club, Inc.
Tarboro Association Saltwater Sportsman
Cape Fear Blue Water Fishing Club
Carteret County Light Tackle Club
Piedmont Offshore Fishing Club
Hatteras Marlin Club
Nags Head Surf Fishing Club
Cape Hatteras Anglers Club
Topsail Island Fishing Club

These clubs offer a sense of camaraderie and community, and members are usually involved in fishing and fishing-related events all year long. Often clubs will offer discounted group rates so that members can travel abroad to experience different types of recreational fishing. Local community volunteer work is also an event that different clubs participate in, and often proceeds from fishing tournaments go to benefit local community causes.

There are also numerous websites catering to recreational marine fishing, ranging from lone charterboats with their own site for booking charters to larger mega-sites that serve as types of fishing information clearinghouses, for example NC Watermen (http://www.ncwaterman.com) or North Carolina Sportsman (http://www.northcarolinasportsman.com).

Most fishing tournaments in North Carolina focus on catching pelagic species such as king mackerel, dolphin, wahoo, and tuna. Far fewer tournaments have categories for bottom fish such as snappers and groupers. A comprehensive list of North Carolina tournaments is offered at http://www.ncfisheries.net/download/2005tourn.pdf.

In 2005, the North Carolina State Legislature approved the creation of a state recreational saltwater fishing license to be implemented in January 2007. While still subject to revision by the legislature, the license has created controversy for both recreational and commercial fishermen, each believing it will hurt or help their access to marine resources.

Community Profiles

Because of the large commercial landings of blueline tilefish, snowy grouper, and black sea bass, and because Wanchese still is considered a predominantly commercial fishing village, it will be profiled below. Hatteras Village offers itself as a combination of commercial fishing and recreational fishing; however, it appears that the commercial landings for blueline tilefish and snowy grouper are more significant than the recreational targeting of snapper grouper species.

Hatteras Village

History

The history of Hatteras Village is a long one: the Italian explorer Amerigo Vespucci landed in the area in the 16th Century. It was not until the mid-1880s when a storm opened up both Oregon and Hatteras Inlets, did a fishing village really take root here. The first post office was established in Hatteras in 1858 (http://www.hatteras-nc.com/history/hattehis.htm). By the turn of the century, a US weather station was established on the island. In the mid-1930s, the Army Corps of Engineers dredged a deeper channel, which allowed for better access from the Pamlico Sound to Hatteras Inlet. Soon after this development, a sizable fishing fleet was established at Hatteras. During World War II, this area was known as "Torpedo Junction" due to more than 100 ships that were lost due to German submarines (www.hatteras-nc.com/history/hattehis.html). After WWII, a private ferry service was established and began operating across the inlet to connect Hatteras and Ocracoke Island. The state took over the ferry service in 1957. In 1953, a 72-mile stretch of the Outer Banks from Nags Head to Ocracoke Island was set aside as the nation's first National Seashore. This is still a matter of contention for the inhabitants of the island, as they feel much of their island was taken away by the US government. Today most of Hatteras Island remains protected. In 1999, the Cape Hatteras Lighthouse was moved away from the sea in an effort to save it from the erosion of the shoreline (www.hatteras-nc.com).

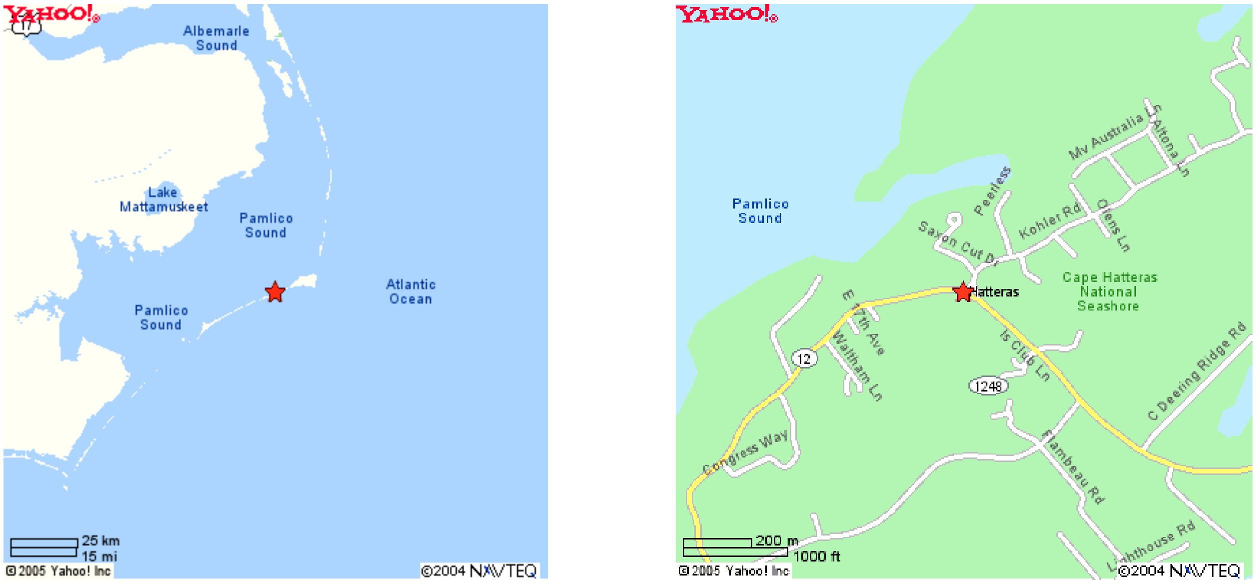


Figure 3-26. Hatteras Island and Village, Outer Banks, North Carolina.
Source: Yahoo Maps, http://www.yahoo.com.

Current Situation

As seen in Table 3-40, there has not been a significant increase in population since 1990. However, this table hides the number of seasonal visitors and tourists to the island in the late spring through early fall each year. Furthermore, the demographics of the island have been shifting, as is evidenced in the 1) decreasing percentage of the population of that is actively in the workforce, reflecting a larger number of retirees in the community and 2) the increasing proportion of residents with higher education, also reflecting a retired, professional segment of the population. However, there has been 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, etcetera.

While Hatteras Village is located on an island and its growth is constrained by this geographical feature and by the federal National Seashore Park as seen in Figure 3-26, the area of the Outer Banks in general has grown considerably in the past two decades. Beginning in Nags Head and stretching north and south along the banks, the growth of vacation homes, condominiums, hotels, restaurants, and amusement and shopping centers has overwhelmed the area in the past 15 years. The Outer Banks, including Hatteras Island, give the visitor and social scientist a first impression of being communities geared to nothing much more than summer tourism and its associated activities.

Table 3-40. Community demographics for Hatteras Township, North Carolina.
*Source: US Bureau of the Census.

	1990	2000
Total population	2584	2642
Gender (Percent of total population)		
Male	50.5	50.1
Female	49.5	49.9
Age (Percent of total population)		
Under 18 years of age	22.3	20.1
18 to 64 years of age	64.6	65.4
65 years and over	13.1	14.5
Ethnicity or Race (Number)		
White	2567	2605
Black or African American	5	4
American Indian and Alaskan Native	8	2
Asian*	N/A	1
Native Hawaiian and other Pacific Islander*	N/A	2
Some other race	2	13
Two or more races*	N/A	15
Hispanic or Latino (any race)	17	27
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	7.1	5.0
Percent high school graduate or higher	74.4	83.7
Percent with a Bachelor's degree or higher	20.6	22.5
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	2.0	5.0
And Percent who speak English less than very well	0.8	2.8
Median household income	$24,667	$39,881
Poverty Status (% of population with income below poverty line)	6.4	2.3
Percent female headed household	6.8	7.9
Home Ownership (Number)		
Owner occupied	798	902
Renter occupied	279	269
Value Owner-occupied Housing (Median $)	$109,000	$149,400
Monthly Rent (Median $)	$478	$610
Employment Status (Population 16 yrs and over)		
Percent in the labor force	70.1	66.4
Percent of civilian labor force unemployed	4.2	8.5
Occupation		
Management, professional, and related occupations*	N/A	23.2
Service occupations*	N/A	16/2
Sales and office occupations	14.9	23.3
Farming, fishing, and forestry occupations	5.6	10.8
Construction, extraction, and maintenance occupations*	N/A	17.7
Production, transportation, and material moving occupations*	N/A	8.8
Industry		
Agriculture, forestry, fishing, hunting and mining	6.4	10.4
Manufacturing	3.4	2.4
Percent government workers	21.0	10.8
Commuting to Work (Workers 16 yrs and over)		
Percent in carpools	17.5	13.6
Percent using public transportation	0.9	0.0
Mean travel time to work (those who did not work at home)*	N/A	17.3
Percent worked outside of county of residence*	N/A	N/A

* Some values could not be determined accurately due to changes in the way the Census Bureau tabulates responses, or to changes in the categories themselves.

Commercial

Hatteras is host to several prestigious fishing tournaments and is homeport for the island's famous charter fishing fleet. In addition, there are numerous restaurants that offer fresh caught seafood.

According to conversations with residents in 2002 (Jepson *et al.* 2005), there were once as many as 10 or 12 fish houses. The largest fish house was lost to condominium development; there were four fish houses left by 2002. All the fishermen are "getting put out of the fishing business" according to one individual. Tourism is taking over, and the businesses are catering to tourists. He further commented that the quality of the water has changed and there used to be shellfish on the shoreline; now it is all gone due to development. He suggested that the bridges could have changed the currents of the inlet.

Again, as in other communities in the South Atlantic, the numbers of commercial snapper grouper permits has declined since the limited access program was instituted in 1998 (Table 3-41). The number of state permits by type is illustrated in Table 3-42. Employment in fishing related industry was dominated by individuals working at marinas (Table 3-43).

Table 3-41. Number of federal snapper grouper permits by type for Hatteras, North Carolina. Source: NMFS 2002.

Type of Permit	1998	1999	2000	2002	2003	2004
Charter/Headboat for Snapper Grouper	1	1	1	0	20	28
Snapper Grouper Unlimited	7	9	8	6	5	5
Snapper Grouper Limited	3	3	1	3	3	3

Table 3-42. Number of state permits by type for Hatteras, North Carolina. Source: North Carolina Division of Marine Fisheries 2002.

Type	Permits
Commercial Fishing Vessel Registration	81
Dealer License	10
Flounder License	0
Land or Sell License	0
Non-resident Menhaden License	0
Ocean Fishing Pier License	0
Spotter Plane License	0
Retired Standard Commercial Fishing License	5
Standard Commercial Fishing License	73
Shellfish License	21
Recreational Fishing Tournament to Sell License	1
Total	190

Table 3-43. Employment in fishing related industry for Hatteras, North Carolina. Zip code Business Patterns, U.S. Census Bureau 1998).
Source: Jepson *et al.* (2005).

Category	NAIC Code	Number Employed
Total Other Employment		
Fishing	114100	0
Seafood Canning	311711	0
Seafood Processing	311712	0
Boat Building	336612	0
Fish and Seafoods	422460	0
Fish and Seafood Markets	445220	4
Marinas	713930	16
Total Fishing Employment		20

While there are many festivals and events in the Outer Banks that are geared to tourists, there is a general mix of locals and tourists at such activities. However, Hatteras Village, after persistent efforts from some of its residents, have had their town named a Preserve America Community, which now entitles it to certain benefits (http://www.preserveamerica.gov/communities.html). There is has also been a rebirth of the Blessing of the Fleet Festival, and in 2005 there will be added another festival, the Day at the Docks - A Celebration of Hatteras Island Watermen. Both of these festivals and special community designations resulted from the efforts of mostly fishermen's wives who believe their way of life is threatened by both regulations and development. As one woman wrote recently, "our fishing families are dissolving under the pain [of change]."

There is one commercial fishing organization in the area, the Hatteras/Ocracoke Chapter of the Auxiliaries of the North Carolina Fisheries Association.

Recreational Fishing

The following is a listing of marinas available at Hatteras Village: Frisco Cove Marina, Hatteras Harbor Marina, Hatteras Landing Marina, Oden's Dock, Teach's Lair Marina, and Village Marina.

There are numerous bait and tackle stores in the immediate area; a partial listing is below: Hatteras Jack Bait and Tackle, The Fishin' Hole, Frank and Fran's, Dillon's Corner, Red Drum Tackle Shop, Frisco Rod and Gun, Frisco Tackle, and The Roost.

There are also two to three public boat ramps and two fishing piers on Hatteras Island that cater to recreational fishermen. While there is a large charter boat fleet that is based on the Outer Banks, most of these for-hire vessels do not target snapper or grouper species.

Wanchese

History

The history of Wanchese is deeply entwined in its neighboring town of Manteo and is further embedded in the long history of Roanoke Island, on which Wanchese is located (See Figure 3-27). The two towns were named for two Native Americans – Wanchese and Manteo – who traveled back to England with some of the first colonists to arrive on North Carolina's shores. Roanoke is the island of Sir Walter Raleigh's Lost Colony, and much of today's tourists to the area are drawn by the colonial history of the area.

Figure 3-27. Map of Roanoke Island, North Carolina showing both Wanchese and Manteo. Source: Kathi Kitner.

From Wilson, McCay *et al.* (1998:88), more of the recent history of Wanchese is recounted:

Throughout the nineteenth century, the commercial fishing industry expanded, due in part to the involvement of the first postmaster (CNCSS 1993). This postmaster owned or financed most of the commercial fishing boats in Wanchese; he also established a system of credit for the fishermen at his store, which was paid off when they brought in their catches. During that time, almost all of the residents of Wanchese were commercial fishermen. Today the village still revolves around fishing, but has expanded to included processing plants…Wanchese' first fish house was begun in 1936 by the grandfather of the current generation that still runs two fish houses in the community, one of which related this history. His son fished the first trawler in Wanchese in the 1950s. He took a little 65' wooden boat and converted it into a fishing trawler. The grandfather stayed and helped packing boats but he was a gillnetter at heart and would rather be catching fish. In those days they were fishing more in Pamlico and Albemarle Sounds.

While Manteo has developed into a upscale tourist-based economy replete with small boutiques, tiny restaurants, and restored colonial and turn-of-the-century buildings and museums (including a Maritime Museum that documents the community's sea-going and fishing past), Wanchese has remained a small, close-knit community focused on making its living from the sea.

The Current Situation

Wanchese, while feeling some pressure of development from the town of Manteo and other Outer Banks communities with high rates of growth, is still foremost a commercial fishing community. This may not be the case for many more years, as development interests and real estate agents have been making inquiries about land available for sale. There have also been some rumors of turning some of the commercial docks into docks more geared towards the recreational sector. However, the town has recently approved a version of a zoning document that would prevent unplanned growth and would help preserve working waterfronts and residential areas (Kozak 2005).

The following partial community profile has been reproduced from the *Community Profiles of the Mid-Atlantic, McCay et al. 2003:*
One two-lane road, US 64/264, has always carried all the local traffic plus vacationer traffic right down the spine of Roanoke Island, creating backups and bottlenecks that make being in a hurry an unfortunate but likely condition to be in. This started changing in the summer of 2002 with a new 5-mile bridge bypassing Roanoke Island. This bridge, the longest in the state, will steer vacationer traffic and much of the local traffic away from the island. One end of the bridge is in Manns Harbor and the other is at the Manteo-Wanchese junction, which leads right to the beaches. Air travel has people arriving at the Dare County Regional Airport located on the north end of Roanoke Island. Private pilots fly into this airport on a daily basis, and charter services are also available.

Once you leave Rt 64/264 and are on Rt 345 it is about three and a half miles of traveling through marsh until entering the community of Wanchese. The first major structure reached on the way into Wanchcese on Highway 345 is the Manns Red and White Store (a grocery and hardware store). Next to the store there is a small diner that seems to be a popular local place where some come to eat as well as visit one another. Adjacent to the Red and White is a gas station, the only in the community. Traveling south into the more heavily populated area, street signs with the names Tillet, Jovers, and Smith become increasingly apparent. The fact that the streets are named after prominent families, specifically fishing families, is very telling about the nature of this "tight knit" community (to be discussed much more fully later in this document). It does not take long to orient oneself in Wanchese and getting lost is almost an impossibility. Many of the houses have boats or gear stored in the yard or in an adjacent lot. Becoming even more prevalent is the sight of crab shedders constructed in people's yards. Driving along the road it is not uncommon to see someone out hanging nets to be mended much in the same way their previous generations had done.

Figure 3-28. View of Wanchese harbor and Industrial Park, 2002.
Source: Kitner 2002.

The largest industrial area in Wanchese is centered round the Wanchese Seafood Industrial Park. The Park was built to enhance business opportunities in the seafood and marine trades. It encourages outside as well as local development in an effort to create a "new day for seafood and marine commerce" (www.nccommerce.com). Nestled on the south end of historic Roanoke Island, which, by the way, is centrally located on the East Coast of the United States, its tenants are able to ship their products overnight to major markets nationally and internationally through the international airport in Norfolk, Virginia. Not only is this a Park utilized by fishermen and seafood dealers, but the marine trade tenants are "smack" in the center of this region's boatbuilding and boat maintenance markets. Yachts and sportfishing vessels are built in Wanchese and shipped to ports all over the world. It is not uncommon to see million dollar boats being built next to thousand dollar boats being repaired. The park is full of activity and it is common to find large numbers of people, especially local Hispanics, working in the marine trade industries (Figure 3-28).

The population of Wanchese is aging (Table 3-44). It is still a very homogenous community, having little ethnic diversity, at least in the immediate vicinity. There has been a slight increase in the Hispanic population, which mirrors almost every other community and the rest of North Carolina. Educational levels have increased also, and the poverty rate appears to have decreased. Wanchese also manifests a higher percentage of people working in fishery related work than almost any other community – close to 10 percent – although even that number has been halved from 1990.

Table 3-44. Community demographics for Wanchese, North Carolina.
*Source: US Census Bureau.

	1990	2000
Total population	1380	1527
Gender (Percent of total population)		
Male	50.4	50.7
Female	49.6	49.3
Age (Percent of total population)		
Under 18 years of age	30.0	23.4
18 to 64 years of age	58.8	64.5
65 years and over	11.2	12.0
Ethnicity or Race (Number)		
White	1366	1498
Black or African American	1	5
American Indian and Alaskan Native	4	9
Asian*	N/A	2
Native Hawaiian and other Pacific Islander*	N/A	0
Some other race	4	7
Two or more races*	N/A	6
Hispanic or Latino (any race)	15	28
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	10.8	4.5
Percent high school graduate or higher	67.3	76.5
Percent with a Bachelor's degree or higher	7.8	16.2
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	2.1	1.2
And Percent who speak English less than very well	0.0	0.0
Median household income	$25,977	$39,250
Poverty Status (Percent of population with income below poverty line)	9.3	5.1
Percent female headed household	9.3	9.8
Home Ownership (Number)		
Owner occupied	384	465
Renter occupied	129	149
Value Owner-occupied Housing (Median $)	$75,200	$104,900
Monthly Rent (Median $)	$412	$617
Employment Status (Population 16 yrs and over)		
Percent in the labor force	78.6	66.6
Percent of civilian labor force unemployed	10.0	2.8
Occupation		
Management, professional, and related occupations*	N/A	24.3
Service occupations*	N/A	18.3
Sales and office occupations	11.8	21.9
Farming, fishing, and forestry occupations	18.8	9.5
Construction, extraction, and maintenance occupations*	N/A	15.8
Production, transportation, and material moving occupations*	N/A	10.2
Industry		
Agriculture, forestry, fishing, hunting and mining	19.7	8.2
Manufacturing	9.5	13.1
Percent government workers	16.5	23.9
Commuting to Work (Workers 16 yrs and over)		
Percent in carpools	21.3	12.6
Percent using public transportation	0.0	0.0
Mean travel time to work (those who did not work at home)*	N/A	14.8
Percent worked outside of county of residence*	N/A	N/A

* Some values could not be determined accurately due to changes in the way the Census Bureau tabulates responses, or to changes in the categories themselves.

Commercial Fishing

The port designated area of Wanchese/Stumpy Point in 2001 landed 31.9 million lbs, valued at 26.1 million dollars. In 2002, 28.7 million lbs was landed at a value of 23.2 million dollars. In 2001, Wanchese/Stumpy Point was listed as the 28th most prominent U.S. port based on the value of the product landed. In 2002, Wanchese/ Stumpy Point's revenue dropped almost 3 million dollars placing them in 30th position in relation to the other US ports.

However, by 2003 (the last year that comparative NMFS landings data are available), while Wanchese stayed at #31 in the US for landings overall, the total landings increased to 33 million lbs, but only with a value of 21 million dollars, a decrease of over 5 million dollars (Table 3-45). In 2004, overall landings again fell to a little over 31 million lbs, and revenue decreased almost another half million dollars. Table 3-46 illustrates the change in the number of fishing permits by year.

Table 3-45. Commercial fishery landings for Wanchese-Stumpy Point, North Carolina. Source: http://www.st.nmfs.gov/pls/webpls.

Wanchese-Stumpy Point, NC: Landings by Year		
Year	**Millions of Pounds**	**Millions of Dollars**
2004	31.4	20.6
2003	33.0	21.0
2002	28.7	23.2
2001	31.9	26.1
2000	33.3	24.0
1999	33.6	22.7
1998	36.7	24.7

Table 3-46. Number of federal snapper grouper permits by type for Wanchese, North Carolina. Source: NMFS 2004

Type of Permit	1998	1999	2000	2001	2002	2003	2004
Charter/Headboat for Snapper Grouper	1	2	2	2	4	7	9
Snapper Grouper Unlimited	4	7	7	8	9	9	8
Snapper Grouper Limited	4	3	3	2	1	0	3

Employment in fishing related activities reported in Table 3-47 indicates 120 people employed in several fishing-related categories, with 56 in fish and seafood, 40 in boatbuilding, 16 in fishing and 8 in seafood processing. However, data from the US Census Bureau must be used with some caution as sometimes the numbers are not correct due to age and the rapidly shifting demographics of the coast. For example, in the case of Wanchese, there are at least two full service marinas, which obviously employ people, yet they are newer operations (opened since 2002) so the Census has not recorded them yet. Furthermore, the Census constantly updates categories making it difficult to compare exact numbers over the years. Overall, recreational fishing effort has been increasing greatly in North Carolina and is now almost equal to recreational effort Florida.

Table 3-47. Employment in fishing related industry for Wanchese, North Carolina (Zip code Business Patterns, U.S. Census Bureau 1998).
Source: Jepson *et al.* (2005).

Category	NAIC Code	Number Employed
Total Other Employment		
Fishing	114100	16
Seafood Canning	311711	0
Seafood Processing	311712	8
Boat Building	336612	40
Fish and Seafoods	422460	56
Fish and Seafood Markets	445220	0
Marinas	713930	0
Total Fishing Employment		120

There were 228 commercial vessels registered and over 200 standard commercial fishing licenses in the community according to Table 3-48. There were also 12 dealer licenses and 18 flounder licenses for Wanchese. It is also important to remember that Wanchese serves as a unloading port for many vessels transiting from both the Mid-Atlantic and South Atlantic, which adds to the town's importance as a port.

Table 3-48. Number of state permits by type for Wanchese, North Carolina.
Source: NCDMF 2002, Jepson *et al.* (2005).

Type	Permits
Commercial Fishing Vessel Registration	228
Dealer License	12
Flounder License	18
Land or Sell License	0
Non-resident Menhaden License	0
Ocean Fishing Pier License	0
Spotter Plane License	0
Retired Standard Commercial Fishing License	13
Standard Commercial Fishing License	201
Shellfish License	2
Recreational Fishing Tournament to Sell License	0
Total	474

Recreational Fishing

In 2005, nine boatbuilding businesses are located in Wanchese, building either pleasure yachts, recreational fishing vessels, or less often, commercial fishing vessels. There are two bait and tackle businesses, Anglers Fish-N-Mate and Etheridge Fishing Supply Company. Furthermore, two marinas are in town, the Wanchese Marina and Broad Creek Marine Fishing Center.

Both Manteo and Wanchese have active recreational fisheries, both private and for hire. At this time it is unknown the level to which recreational fishermen are potentially impacted by the management alternatives proposed in these measures. However, if the Manteo/Wanchese recreational fisheries are dependent on these species in the same manner as Morehead City's for hire fleet, then there is potential for some of these alternatives to have a negative economic impact on the fishermen, fisheries and local community.

Much more of the recreational sector for this area is concentrated in Manteo and Nags Head. For example, the mega-marina, Pirates' Cove, is located in Manteo and it has a great many charter and a few headboat vessels.

Morehead City
In Carteret County, Morehead City, Beaufort, and Atlantic Beach form a triad of different but complementary fishing effort that is in close geographic proximity (Figure 3-29).

Figure 3-29. Area of Carteret County showing Morehead City, Atlantic Beach (at the red star) and Beaufort, North Carolina.
Source: Yahoo Maps, http://www.yahoo.com.

Morehead City - History
Morehead City was founded in the 1840s and 1850s, and included a railroad line that connected its deep-water harbor with inland markets. Following several severe hurricanes during the 1880s and 1890s, fishermen who had lived on Shackleford Banks moved their houses by boat onto the mainland in the areas between 10th and 15th Streets. They called this area the Promise Land and it became the nucleus of the fishing industry that continues to be an important part of the economy of Morehead City. Today, fish caught by local commercial fishermen are shipped around the country and the world.

In recent years, a large charter-fishing fleet has developed, and Morehead City has become widely known as a center for sport and tournament fishing, drawing fishermen from all over the eastern United States. It is the location of one of the major, annual international Blue Marlin tournaments, as well as other fishing tournaments (www.morehead.com/history).

Currently, Morehead City's economy is based on tourism, fishing (commercial and recreational) light industry, and government positions, and other service and professional industries. The town has regained its commercial viability as a modern port terminal as well as being the "sound-side" of the Atlantic Beach resort trade. Diving has become an important activity, and periodicals such as Rodale's Scuba Diving magazine named North Carolina as the best wreck diving destination in North America, and Morehead City as the best overall dive destination. Recreational fishing effort overall is growing quickly, as new marinas, boat storage areas (see Figure 3-30), boat builders and marine supply stores open in the city.

The population of Morehead City increased from 1990 to 2000, showing a more ethnically diverse population as well (Table 3-49). Another indication of this diversity is the percentage of people who speak a language other than English at home. Those completing high school increased by 10 percent and by seven percent for those receiving a bachelor's degree or higher. The poverty level decreased; however, the unemployment rate increased over the last decade. The occupations of farming, fishing, and forestry still comprise more than one percent of the population of Morehead City.

Figure 3-30. Recreational boats at a marina, Morehead City, NC.
Note one commercial shrimp skimmer vessel in the background. Source: Jepson *et al.* (2005).

Table 3-49. Community demographics for Morehead City, North Carolina.
*Source: US Census Bureau. * Some values could not be determined accurately due to changes in the way the Census Bureau tabulates responses, or to changes in the categories themselves.

	1990	2000
Total population	6046	7691
Gender (Percent of total population)		
Male	45.3	45.6
Female	54.7	54.4
Age (Percent of total population)		
Under 18 years of age	22.3	20.2
18 to 64 years of age	56.9	59.0
65 years and over	20.8	20.8
Ethnicity or Race (Number)		
White	4877	6284
Black or African American	1066	1075
American Indian and Alaskan Native	35	51
Asian*	N/A	59
Native Hawaiian and other Pacific Islander*	N/A	3
Some other race	16	87
Two or more races*	N/A	132
Hispanic or Latino (any race)	56	180
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	11.9	8.1
Percent high school graduate or higher	70.6	80.1
Percent with a Bachelor's degree or higher	13.2	20.8
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	3.9	4.7
And Percent who speak English less than very well	1.4	1.4
Median household income	$20,041	$28,737
Poverty Status (Percent of population with income below poverty line)	19.1	14.6
Percent female headed household	15.7	13.7
Home Ownership (Number)		
Owner occupied	1479	1997
Renter occupied	1196	1600
Value Owner-occupied Housing (Median $)	$56,600	$106,400
Monthly Rent (Median $)	$376	$507
Employment Status (Population 16 yrs and over)		
Percent in the labor force	59.4	60.2
Percent of civilian labor force unemployed	6.4	7.8
Occupation		
Management, professional, and related occupations*	N/A	33.1
Service occupations*	N/A	19.7
Sales and office occupations	15.9	21.0
Farming, fishing, and forestry occupations	3.4	1.1
Construction, extraction, and maintenance occupations*	N/A	14.4
Production, transportation, and material moving occupations*	N/A	10.7
Industry		
Agriculture, forestry, fishing, hunting and mining	3.3	1.1
Manufacturing	8.9	7.4
Percent government workers	15.7	18.1
Commuting to Work (Workers 16 yrs and over)		
Percent in carpools	19.8	13.3
Percent using public transportation	0.3	0.2
Mean travel time to work (those who did not work at home)*	N/A	17.3
Percent worked outside of county of residence*	N/A	N/A

The following section has been drawn from the *Community Profiles of the Mid-Atlantic, McCay et al.* (*2000)* to give more depth to this particular profile*:*

We visited the docks of this business [fish house in Morehead City]. *Our informant was a fisherman who captains a "bandit boat." There are 10 bandit boats at the Morehead City waterfront, and our informant pointed out their distinguishing features: a set of 3 to 4 motorized hook and line rigs positioned at the corners of the deck. Each rig is handled by one crew member or by the captain. Most of the boats are 30' to 36', though the biggest is 44'. According to our informant, all of the bandit boats in the area are docked in Morehead City, except for one, which is docked in Beaufort. He said that 3 of the Morehead City boats are docked at private slips rather than at the main waterfront area. On this particular day about half of the bandit boats were at the dock because of high winds.*

After stating that "the damn government is trying to put us out of business" with regulations, our informant pointed out that, like rod and reel fishing, bandit fishing "is not indiscriminate" and has almost no by-catch; "99.5% of the catch is sellable." This is because the boats target schools of specific species of fish, mostly groupers and snappers, and use only bait (squid, Boston mackerel, cigar minnows) and techniques appropriate to those species.

He says the boats go 30 to 60 miles offshore, to at least 200 feet of water and sometimes to as much as 750 feet. The boats are usually out for 5 or 6 days at a time. Smaller boats, however, only go out for 3 or 4 days and the one larger boat is out for up to a week. In North Carolina waters they are able to catch 4 different types of grouper that range in weight from 5 to 50 pounds, but they are only able to catch 1 kind of snapper (vermilion), which comes in at 1 to 5 pounds. He and a lot of the other bandit boat fishermen head as far south as Key West in the winter, where they are able to catch American red snapper which weighs anywhere from 6 to 50 pounds. He himself stays in the area for 8 months and sells primarily to the same dealer. In the other months, however, he sells to three other fish houses farther south. This is basically a matter of following the fish because, according to our informant, the overall fishing in North Carolina is better than in Florida due to over-fishing in Florida waters. He said that the prices for grouper and snapper do not vary much, but do slightly depending on size, maybe from $2.40 to 2.90/lb. to the boat. The grouper and snapper apparently do not migrate farther north than the Oregon Inlet. He also reels in some porgies, triggers and wahoos, but said that they are not a mainstay. He does not fish for the sushi market, though he claims his fish is sushi-grade.

Our informant is in his early 40s and only began fishing 12 years ago. He had been a furniture maker in Maryland and engaged in recreational fishing on the side. He said that he got bored with the furniture making and that and had enjoyed fishing much more. He then moved to Morehead City and began working on a head boat for $5/hour. He then worked as a commercial fishing boat crew member before being hired as a captain. He remained a captain until he was able to buy his own boat 4 years ago. "There was a lot to learn to be good at it." The boat that he now owns, a T-Beam, is a 22-year-old boat that he bought from someone who was "more or less" retiring. (Note: reflecting a larger pattern of in-migration to North Carolina from other states, a sizeable percentage of North Carolina's fishers are not native to the state, like this person. According to Johnson and Orbach [1996:8], 21% of the 388 fishers sampled were born in other states).

On an average day, the boat will catch $1,000 worth of fish, or $5,000 to $6,000 on one trip. Last year was not his best year, but two years ago in Florida his boat, with only 3 hands, hauled in $10,000 in three days; this was his best trip ever. Pulling in this amount, however, was unusual. He said that he grosses $100,000/year and nets about $50,000, but his crew members do not make that much. He also said that captains generally get the same share as crewmembers and that there is a share for the owner as well. Therefore owner/operators get two shares.

Although Morehead City is where he is based for the majority of the year, he lives in a motel and his legal address is in Florida where his parents live. He said that Morehead City is a very inexpensive place to live; a two-bedroom apartment would probably rent for $320, which would be less than half of what it would be rented for in Maryland. Still, he said that very few young people are going into fishing in the area "with the restrictions and everything." He said that most of the bandit boat captains and crews are about his age, though a couple of the captains and 6or 7of the crewmembers are under 30. He also said that it is very difficult to recruit and retain crewmembers. He himself has had 7 different crewmembers in the last 3.5 years, but he also said that some boats have had as many as 50 in that time. He said it all depends on how the captain treats the crew.

In the past, there have been some women who have worked as crew members in Morehead City. However there are not any now. He also said that there are no blacks working on the commercial boats, but that there is one black licensed head boat captain who works as an auxiliary captain on a 100' head boat.

Our informant said that there is a "large history" of commercial fishing in the area and that the long-time residents are supportive of their work. He did say, however, that the newcomers do not realize the extent of what commercial fishermen do and how many people, besides fishermen, are connected to the industry. "If they were to get rid of commercial fishing here, it would affect half the town. Even more in Harker's Island [see below]." He said that while the bandit boats work closely together when they are out on the ocean (e.g., helping each other find fish and assisting when there are breakdowns), the fishermen mostly go their separate ways on land. According to our informant this is because they are not family men, though on Harker's Island "it's a different story."

Although there is a well-known bar hangout, at one of the fish houses mentioned above, one informant said that most people "go their separate ways" after fishing. However, Morehead City has a Blessing of the Fleet the first weekend in October. And the North Carolina Fisheries Association erected a memorial in Morehead City to fishermen who lost their lives at sea.

Beaufort is built on a former Native American village, called Warelock, which means "fish town" or "fishing village". Beaufort lies on the coast near Cape Lookout, and borders the southern portion of the Outer Banks. Its deep-water harbor is home to vessels of all sizes and its marinas are a favorite stop over for transient boaters. Originally a fishing village and port of safety, it was known as Fishtowne until incorporated in 1722 (www.clis.com/beaufortnc). A whaling community, Diamond City, was located on Shackleford Banks, six miles to the southeast by boat, during the eighteenth and nineteenth centuries. Lumber, barrel staves, rum, and molasses comprised some of Beaufort's main exports. However, when the port declined as a trade center, commercial fishing gained greater importance and became the primary economic activity of the town. Beaufort served as home-port for a large menhaden fishing fleet and was a preeminent area known for processing plants for the menhaden products (See Figure 3-31 and http://www.beaufort-nc.com/history/bn-his02.htm). Today, tourism, service industries, retail businesses and construction are important mainstays of the area, with many shops and restaurants catering to people from outside the area.

Figure 3-31. Picture of the Beaufort, North Carolina Menhaden Fleet, circa 19??. Courtesy of http://www.beaufort-nc.com/history/postcard/bft0016f.jpg).

There was a slight decrease in the population of Beaufort from 1990 to 2000 (Table 3-50). This could be explained by the demographics, which indicate an 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 indication of an aging population. However, the percentage of those unemployed also decreased. The number of people working in farming, fishing, and forestry increased from 1990 to 2000, possibly reflecting an increase in recreational fishing.

Beaufort is tourist oriented and has a growing number of expensive waterfront homes. It is home to the NOAA Marine Services Center and Duke Marine Sciences Center. Directly across the bridge from Morehead City is Radio Island, which is part of Beaufort. While there are some private boats along the waterfront in downtown Beaufort, Radio Island seems to be the commercial and recreational fishing hub for Beaufort. The waterfront has two tour/party boats in addition to the private boats, some of which may be smaller charter boats. There are several marinas in the community and many businesses that provide necessary support for the recreational and commercial fishing industries.

Table 3-50. Community demographics for Beaufort, North Carolina.
*Source: US Census Bureau. * Some values could not be determined accurately due to changes in the way the Census Bureau tabulates responses, or to changes in the categories themselves.

	1990	2000
Total population	3808	3771
Gender (Percent of total population)		
Male	44.7	46.5
Female	55.3	53.5
Age (Percent of total population)		
Under 18 years of age	21.4	18.3
18 to 64 years of age	59.5	61.9
65 years and over	19.1	19.8
Ethnicity or Race (Number)		
White	2852	2861
Black or African American	908	754
American Indian and Alaskan Native	18	4
Asian*	N/A	14
Native Hawaiian and other Pacific Islander*	N/A	2
Some other race	16	90
Two or more races*	N/A	46
Hispanic or Latino (any race)	25	142
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	8.6	6.2
Percent high school graduate or higher	75.1	78.9
Percent with a Bachelor's degree or higher	15.0	21.7
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	0.5	7.0
And Percent who speak English less than very well	0.0	2.7
Median household income	$21,532	$28,763
Poverty Status (% of population with income below poverty line)	17.4	16.6
Percent female headed household	17.0	15.3
Home Ownership (Number)		
Owner occupied	959	998
Renter occupied	762	782
Value Owner-occupied Housing (Median $)	$65,400	$119,200
Monthly Rent (Median $)	$373	$502
Employment Status (Population 16 yrs and over)		
Percent in the labor force	60.0	56.3
Percent of civilian labor force unemployed	8.1	4.7
Occupation		
Management, professional, and related occupations*	N/A	26.9
Service occupations*	N/A	18.6
Sales and office occupations	15.8	28.7
Farming, fishing, and forestry occupations	0.9	1.2
Construction, extraction, and maintenance occupations*	N/A	14.9
Production, transportation, and material moving occupations*	N/A	9.7
Industry		
Agriculture, forestry, fishing, hunting and mining	3.0	2.4
Manufacturing	13.7	7.6
Percent government workers	25.3	13.5
Commuting to Work (Workers 16 yrs and over)		
Percent in carpools	12.8	16.6
Percent using public transportation	0.0	1.1
Mean travel time to work (those who did not work at home)*	N/A	18.5
Percent worked outside of county of residence*	N/A	N/A

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

Atlantic Beach is a recreational fishing town, predominantly. The photographs below are from the website for Captain Stacy's Fishing Center in Atlantic Beach (Figures 3-32A; B; C). This business was founded in approximately 1960 and today runs one headboat, one charter boat, and a marina, which is the homeport for many other charter vessels. All types of fishing are available (winter bluefin, king mackerel, and snapper grouper, for example). By looking at the amount and kind of fish shown in the photographs below, one can see that the proposed amendment could have a large impact on this and other similar recreational fishing businesses, in North Carolina and other areas.

Figure 3-32. Recreational catches from Atlantic Beach, North Carolina. Photographs courtesy of Captain Stacy Fishing Center, http://www.captstacy.com/pics.php.

Table 3-51. Community demographics for Atlantic Beach town, North Carolina.
* Source: US Census Bureau. * Some values could not be determined accurately due to changes in the way the Census Bureau tabulates responses, or to changes in the categories themselves.

Year (Table 3-51)	**1990**	**2000**
Total population	1938	1781
Gender (Percent of total population)		
Male	52.8	52.8
Female	47.2	47.2
Age (Percent of total population)		
Under 18 years of age	13.7	9.8
18 to 64 years of age	73.8	72.0
65 years and over	12.5	18.2
Ethnicity or Race (Number)		
White	1878	1746
Black or African American	25	11
American Indian and Alaskan Native	10	11
Asian*	N/A	13
Native Hawaiian and other Pacific Islander*	N/A	0
Some other race	4	0
Two or more races*	N/A	7
Hispanic or Latino (any race)	17	12
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	3.0	2.8
Percent high school graduate or higher	85.1	90.0
Percent with a Bachelor's degree or higher	24.1	30.7
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	2.6	3.9
And Percent who speak English less than very well	1.1	1.0
Median household income	$27,465	$38,313
Poverty Status (Percent of population with income below poverty line)	10.2	5.3
Percent female headed household	6.7	5.0
Home Ownership (Number)		
Owner occupied	574	628
Renter occupied	361	343
Value Owner-occupied Housing (Median $)	$125,400	$207,800
Monthly Rent (Median $)	$414	$582
Employment Status (Population 16 yrs and over)		
Percent in the labor force	69.8	63.3
Percent of civilian labor force unemployed	3.1	5.4
Occupation		
Management, professional, and related occupations*	N/A	36.6
Service occupations*	N/A	8.8
Sales and office occupations	23.7	35.4
Farming, fishing, and forestry occupations	2.6	0.5
Construction, extraction, and maintenance occupations*	N/A	14.8
Production, transportation, and material moving occupations*	N/A	3.8
Industry		
Agriculture, forestry, fishing, hunting and mining	2.9	0.7
Manufacturing	7.6	2.2
Percent government workers	17.6	17.6
Commuting to Work (Workers 16 yrs and over)		
Percent in carpools	14.2	8.5
Percent using public transportation	0.7	0.2
Mean travel time to work (those who did not work at home)*	N/A	21.2
Percent worked outside of county of residence*	N/A	N/A

Atlantic Beach has seen a slight population decline since 1990, as well as decreases in the percent of the population involved in farming, fishing and forestry (Table 3-51). There has been an increase in the age of the population, perhaps a reflection of the growing number of retirees moving to this area of the coast. Again, as in many beach communities, the population figures reported here do not reflect the transient tourist population.

Commercial Fishing

The total amount of all commercial products landed in Morehead City and Beaufort places it 11th in the nation in terms of number of lbs and 37th in the nation in terms of value (www.st.nmfs.gov/pls/webpls; Table 3-52). Much of this variability may be attributable to the high-volume menhaden fishery.

Table 3-52. Overall commercial fishery landings for Beaufort-Morehead City, North Carolina. Source: http://www.st.nmfs.gov/pls/weblps.

Beaufort-Morehead City, NC: Landings by Year		
Year	**Millions of Pounds**	**Millions of Dollars**
2004	63.5	16.9
2003	59.0	15.0
2002	82.0	19.1
2001	67.5	17.9
2000	68.4	16.9
1999	57.0	16.7

Radio Island and the Beaufort/Morehead causeway include the hub of Beaufort's commercial fishery. The waterfront has two tour/party boats in addition to private boats, some of which may be smaller charter boats. There are several marinas in the community and many businesses that provide necessary support for both the recreational and commercial fishing industries.

Again, as in other communities in the South Atlantic, the numbers of commercial snapper grouper permits has declined since the limited access program was instituted in 1998 (Table 3-53).

Table 3-53. Number of federal snapper grouper permits by type for Beaufort, North Carolina. (Source: NMFS 2004)

Type of Permit	1998	1999	2000	2001	2002	2003	2004
Charter/Headboat for Snapper Grouper	0	0	0	0	0	1	1
Snapper Grouper Unlimited	2	5	3	2	3	3	4
Snapper Grouper Limited	1	1	1	1	1	0	0

Most of the fishing related employment, according to census business pattern data, occurs in the boat building industry, with 184 persons employed in that business (Table 3-55). Others are employed in fish processing and fish and seafood. There are over 400 commercial vessels registered with the state from Beaufort, with almost 300 standard commercial fishing licenses. There are 172 shellfish licenses and 32 dealer licenses (Table 3-54).

Table 3-54. Number of state permits by type for Beaufort, North Carolina.
Source: North Carolina Division of Marine Fisheries 2002, Jepson *et al.* (2005).

Type	Permits
Commercial Fishing Vessel Registration	430
Dealer License	32
Flounder License	21
Land or Sell License	0
Non-resident Menhaden License	0
Ocean Fishing Pier License	0
Spotter Plane License	1
Retired Standard Commercial Fishing License	37
Standard Commercial Fishing License	294
Shellfish License	178
Recreational Fishing Tournament to Sell License	1
Total	994

Table 3-55. Employment in fishing related industry for Beaufort, North Carolina. Zip code Business Patterns, U.S. Census Bureau 1998, from Jepson *et al.* (2005).

Category	NAIC Code	Number Employed
Fishing	114100	8
Seafood Canning	311711	0
Seafood Processing	311712	36
Boat Building	336612	184
Fish and Seafoods	422460	20
Fish and Seafood Markets	445220	4
Marinas	713930	48
Total Fishing Employment		300

In 2004, Morehead City had approximately 16 federally permitted snapper grouper vessels, which maintained unlimited permits (Table 3-56). There are about 100 people employed in fishing related business according to census business figures, with about half of those employed in marinas and 36 employed in fish and seafood business (Table 3-58). Over 200 state commercial vessel licenses, 150 standard commercial fishing permits, 53 shellfish licenses and 14 dealer licenses issued by the state for Morehead City (Table 3-57).

Table 3-56. Number of federal snapper grouper permits by type for Morehead City, North Carolina.
Source: NMFS 2004.

Type of Permit	1998	1999	2000	2001	2002	2003	2004
Charter/Headboat for Snapper Grouper	6	7	5	7	7	13	13
Snapper Grouper Unlimited	12	15	14	16	15	15	16
Snapper Grouper Limited	2	3	2	1	1	1	0

Table 3-57. Number of state permits by type for Morehead City, North Carolina.
Source: North Carolina Division of Marine Fisheries 2002, Jepson *et al.* (2005).

Type	Permits
Commercial Fishing Vessel Registration	211
Dealer License	14
Flounder License	0
Land or Sell License	0
Non-resident Menhaden License	0
Ocean Fishing Pier License	0
Spotter Plane License	0
Retired Standard Commercial Fishing License	19
Standard Commercial Fishing License	150
Shellfish License	53
Recreational Fishing Tournament to Sell License	2
Total	448

Table 3-58. Employment in fishing related industry for Morehead City, North Carolina. Zip code Business Patterns, U.S. Census Bureau 1998. Source Jepson *et al.* (2005).

Category	NAIC Code	Number Employed
Fishing	114100	4
Seafood Canning	311711	0
Seafood Processing	311712	0
Boat Building	336612	16
Fish and Seafood	422460	36
Fish and Seafood Markets	445220	4
Marinas	713930	40
Total Fishing Employment		**100**

The number of federally permitted vessels for Atlantic Beach is 11 for 2001 (Table 3-59), with 4 of them for the Charter/Headboat for Snapper Grouper. The total fishing employment for this community in 1998 was 60 persons (Table 3-60), with the majority in the marina sector. There were 56 state permits for commercial fishing vessels in 2002 and 10 dealer licenses (Table 3-61).

The numbers of individuals employed in fishing related industries (Table 3-60) can vary greatly from the numbers reported from the NMFS Permit Database (Table 3-59) as the data are counted differently and are drawn from different data (census data versus permit data).

Table 3-59. Number of federal snapper grouper permits by type for Atlantic Beach, North Carolina.
Source: NMFS 2004.

Type of Permit	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Charter/Headboat for Snapper Grouper	9	6	5	4	1	15	19
Snapper Grouper Unlimited	8	8	5	4	3	3	4
Snapper Grouper Limited	3	4	3	1	1	1	0

Table 3-60. Employment in fishing related industry for Atlantic Beach, North Carolina (Zip code Business Patterns, U.S. Census Bureau 1998.
Source: Jepson *et al.* (2005).

Category	**NAIC Code**	**Number Employed**
Fishing	114100	0
Seafood Canning	311711	0
Seafood Processing	311712	0
Boat Building	336612	0
Fish and Seafoods	422460	0
Fish and Seafood Markets	445220	4
Marinas	713930	56
Total Fishing Employment		60

Table 3-61. Number of state permits by type for Atlantic Beach, North Carolina.
Source: North Carolina Division of Marine Fisheries 2002; Jepson *et al.* (2005).

Type	Permits
Commercial Fishing Vessel Registration	56
Dealer License	10
Flounder License	0
Land or Sell License	0
Non-resident Menhaden License	0
Ocean Fishing Pier License	5
Spotter Plane License	0
Retired Standard Commercial Fishing License	5
Standard Commercial Fishing License	42
Shellfish License	6
Recreational Fishing Tournament to Sell License	2
Total	126

Sneads Ferry

History

Sneads Ferry is known as a historical fishing village located on the New River near the northern tip of Topsail Island. The river joins the Intracoastal Waterway at Sneads Ferry, and access to the Atlantic Ocean is easy. A very active commercial fishing community, Sneads Ferry takes in more fish than any other Onslow County port (http://www.cbcoastline.com/areainfo.htm). According to the website www.cbcoastline.com, the town was named after tavern owner and ferry operator Robert Snead around 1760. The ferry operated until 1939 when a wooden bridge spanned the river. Today, the bridge is a new high-rise span that leads into Camp Lejeune, a US Marine base.

In 1971, the Snead's Ferry Community Council was organized and the annual Sneads Ferry Shrimp Festival was first celebrated. 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).

Current Situation

The total population of Sneads Ferry is increasing, but slowly (Table 3-62). This may not be a true reflection of the seasonal population. The percent involved with farming, fishing and forestry occupations has decreased significantly from 18.2 percent to 9.0 percent since 1990.

New housing developments appear to be occurring further south of Sneads Ferry proper where the fishing docks are located, (see Figures 3-33 and 3-34) and more along Chadwick Bay and between Sneads Ferry and North Topsail Beach. A quick search for real estate at www.realtor.com reveals at least 40 undeveloped pieces of land for sale, ranging from .25 acres to one acre in size, and from $10,000 to $55,000 or more, respectively.

It is unclear who may be buying these home sites, but the town's current demographics may point to an increase in retirees in Sneads Ferry; they are better educated, have higher incomes, and are older. Also of note is the decline by approximately 50% of persons employed in extractive natural resource occupations. This may be due to increasing job opportunities outside of the community, the changing impacts of regulations, status of the resources, or something unknown.

Figure 3-33. General area of Sneads Ferry, North Carolina.
Source: Yahoo Maps, http://www.yahoo.com.

Figure 3-34. Sneads Ferry area showing new housing developments south of the fishing docks.
Source: Yahoo Maps, http://www.yahoo.com.

Table 3-62. Community demographics for Sneads Ferry, North Carolina.
Source: US Census Bureau and Jepson *et al.* (2005).

Year (Table 3-62) **Total population**	**1990** 2031	**2000** 2248
Gender (Percent of total population)		
Male	50.7	51.2
Female	49.3	48.8
Age (Percent of total population)		
Under 18 years of age	23.2	20.7
18 to 64 years of age	65.9	64.5
65 years and over	10.9	14.8
Ethnicity or Race (Number)		
White	1826	2045
Black or African American	159	115
American Indian and Alaskan Native	9	12
Asian*	N/A	21
Native Hawaiian and other Pacific Islander*	N/A	2
Some other race	23	16
Two or more races*	N/A	37
Hispanic or Latino (any race)	38	38
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	13.3	7.4
Percent high school graduate or higher	70.1	81.5
Percent with a Bachelor's degree or higher	6.0	12.8
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	1.7	4.1
And Percent who speak English less than very well	0.5	1.2
Median household income	$20,108	$34,509
Poverty Status (Percent of population with income below poverty line)	20.9	13.5
Percent female headed household	7.0	8.2
Home Ownership (Number)		
Owner occupied	572	691
Renter occupied	252	269
Value Owner-occupied Housing (Median $)	$65,300	$110,000
Monthly Rent (Median $)	$403	$425
Employment Status (Population 16 yrs and over)		
Percent in the labor force	58.6	59.0
Percent of civilian labor force unemployed	8.3	2.2
Occupation		
Management, professional, and related occupations*	N/A	23.9
Service occupations*	N/A	13.0
Sales and office occupations	10.1	27.8
Farming, fishing, and forestry occupations	18.2	9.0
Construction, extraction, and maintenance occupations*	N/A	16.9
Production, transportation, and material moving occupations*	N/A	9.5
Industry		
Agriculture, forestry, fishing, hunting and mining	16.7	8.4
Manufacturing	2.2	7.2

Year (Table 3-62)	1990	2000
Percent government workers	19.8	18.3
Commuting to Work (Workers 16 yrs and over)		
Percent in carpools	10.5	12.9
Percent using public transportation	0.0	0.0
Mean travel time to work (those who did not work at home)*	N/A	28.0
Percent worked outside of county of residence*	N/A	N/A

*Some values could not be determined accurately due to changes in the way the Census Bureau tabulates responses, or to changes in the categories themselves.

Commercial Fishing

Sneads Ferry is a small town with little of the large-scale development (although see above for a brief description of the residential development occurring) seen elsewhere on the North Carolina coast. Many houses in the community have fishing vessels in front of the house or on the lawn. One respondent commented that at least half of the people in the community have something to do with the commercial fishing industry. 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." Such an icon named after the community suggests 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 that is resident in the town (see Figure 3-35). The species with the highest consistent landings in the town are black sea bass, button clams, blue crab, flounders, mullet, shrimp, spot and whiting.

Snead's Ferry had 25 vessels with federal permits in 2001 and most vessels held snapper grouper unlimited and coastal pelagic permits (Table 3-63). Comparable numbers for 2004 are not available but the numbers of unlimited snapper grouper permits has seen a decline of 3 permits. There were over 340 North Carolina state commercial fishing vessel registrations for Snead's Ferry and among those there were 228 standard commercial fishing licenses (Table 3-64). The community also had 2 recreational sell licenses. There was some seafood employment in other areas with 16 persons employed in fish and seafood and 2 in marinas (Table 3-65).

Table 3-63. Number of federal snapper grouper permits by type for Sneads Ferry, North Carolina.
Source: NMFS 2004.

Type of Permit/Year	1998	1999	2000	2001	2002	2003	2004
Charter/Headboat for Snapper Grouper	5	6	8	5	5	13	13
Snapper Grouper Unlimited	18	22	21	21	19	18	17
Snapper Grouper Limited	0	1	2	1	1	2	1

Table 3-64. Number of state permits by type for Sneads Ferry, North Carolina. Source: North Carolina Division of Marine Fisheries 2002, Jepson *et al.* (2005).

Type	Permits
Commercial Fishing Vessel Registration	347
Dealer License	18
Flounder License	3
Land or Sell License	0
Non-resident Menhaden License	0
Ocean Fishing Pier License	0
Spotter Plane License	0
Retired Standard Commercial Fishing License	28
Standard Commercial Fishing License	228
Shellfish License	169
Recreational Fishing Tournament to Sell License	2
Total	**794**

Table 3-65. Employment in fishing related industry for Sneads Ferry, North Carolina. Zip code Business Patterns, U.S. Census Bureau 1998. Jepson *et al.* (2005).

Category	NAIC Code	Number Employed
Fishing	114100	0
Seafood Canning	311711	0
Seafood Processing	311712	0
Boat Building	336612	0
Fish and Seafoods	422460	12
Fish and Seafood Markets	445220	0
Marinas	713930	4
Total Fishing Employment		**16**

Figure 3-35. Sneads Ferry, North Carolina pot fisherman.
Source: Kitner 2003.

Potentially Affected Species

In Onslow County, black sea bass is the predominant commercial finfish species landed (49.9% of all species landed in 2002). Overall, for Sneads Ferry, shrimp is the most commonly landed species, followed by whiting, spot, blue crab, flounder, oysters, and black sea bass. Due to the decline in numbers of snapper grouper dealers in both Sneads Ferry and restrictions to protect confidential data, the exact landings and value cannot be reported.

Recreational Fishing

Recreational fishing in Sneads Ferry is not as prominent as in Morehead City; however, there are a large number of charter permits for snapper grouper homeported there. Currently there is little known about recreational fishing out of Sneads Ferry, except it is advertised as an important tourist attraction in many of the websites that discuss Sneads Ferry. There are at least five marinas, which to cater to recreational fishermen. At Camp LeJeune Marine Base, just across the Neuse River, are two other marinas. It is not known at this time the extent of recreational fishing from the base. There are some smaller river and sound fishing charters operating out of the area and one headboat runs from Sneads Ferry. Other than black sea bass, other snapper grouper species are not frequently caught recreationally from Sneads Ferry. As coastal development increases, there could be more recreational fishing effort evident in this area.

3.4.3.2 South Carolina

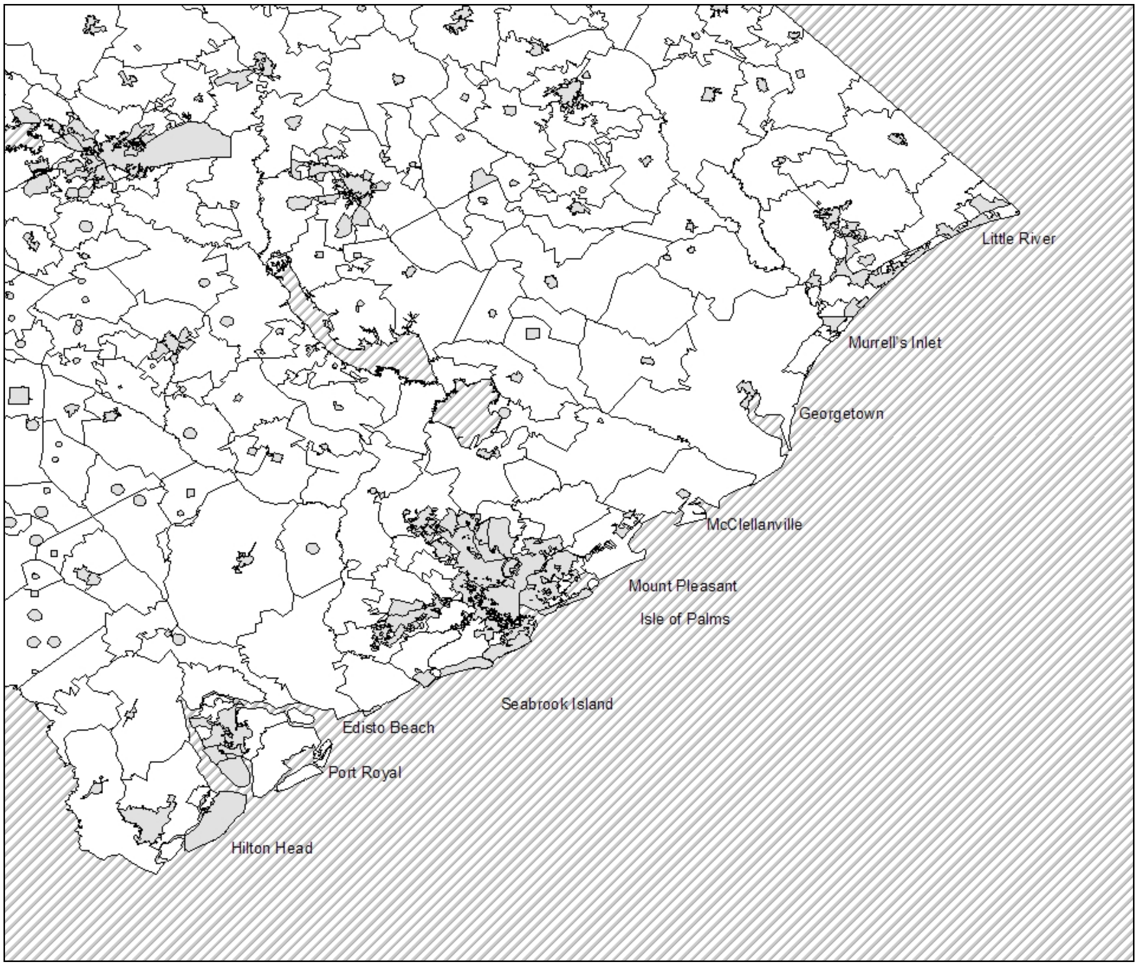


Figure 3-36. Fishing communities of South Carolina.

South Carolina (Figure 3-36)
Commercial Fishing
South Carolina shows less development of commercial fishing communities in general than North Carolina, and in fact, has had over the past 20 to 30 years, seen much more tourist-oriented development along its coast 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 (see Figure 3-37 of the map of Little River). The fishing communities most impacted by this development are Little River, Murrells Inlet, Pawleys Island and Georgetown, although the latter three are located in Georgetown County. 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 resort development of Hilton Head Island has been the impetus for changing coastal landscapes in the small towns of Port Royal, Beaufort, St. Helena Island and Bluffton. While pockets of

commercial fishing activities remain in these places, most are being swallowed up by development and associated changes in demographics. Recreational fishing; however, has grown, and many areas, which used to be dedicated to commercial fishing endeavors are now geared towards the private recreational angler and the for hire sector. This trend can be found up and down both coasts of the U.S.

In the 1990s, the port of Georgetown was an important landing center for snapper grouper species. However, the fish house there closed, and the owner went into the real estate business. Georgetown-based snapper grouper vessels moved to Murrells Inlet, where they fished until 2003. At the end of 2003, the waterfront fish house, H and C Fisheries, sold out to a developer and the boats dispersed again. Some of the vessels have relocated back to Georgetown, sharing docks with shrimp boats. Some of the other boats in the snapper grouper fleet were absorbed by business interests in Little River, SC. For the purposes of this document, only Little River will be profiled as a community, which exhibits a high concentration of both commercial and recreational fishing, along with other types of coastal oriented leisure pursuits.

The number of snapper grouper commercial permits for South Carolina has declined, but not as drastically as in North Carolina (Table 3-66).

Table 3-66. Number of federal snapper grouper permits by type for South Carolina.
Source: NMFS 2004.

Type of Permit	1998	1999	2000	2001	2002	2003	2004
Charter/Headboat for Snapper Grouper	41	41	36	44?	34	123	111
Snapper Grouper Unlimited	66	74	83	83	81	84	87
Snapper Grouper Limited	11	12	10	9	6	6	4

Recreational Fishing

South Carolina has a well-developed recreational fishing sector, which participates in many different forms of fishing as in the other South Atlantic States. There are anglers dedicated to lake fishing, particularly bass fishing, river and inland fishing, and near shore and offshore saltwater fishing. 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 head boats that run out of Little River, Murrells Inlet and Charleston.

There are some fishing clubs dedicated to saltwater sportfishing. These clubs are located in both the coastal areas and in the "upstate" and are as follows:

Florence Blue Water Sportfishing Club
Greenville Saltwater Sportfishing Club
Beaufort Sportfishing and Diving Club
Lowcountry Lady Anglers
Coastal Conservations Association (more a political action group than a fishing club)
Stono River Fishing Club
CharlestonFishing.Com (an online community of anglers in the Charleston area)

According to the South Carolina Department of Natural Resources, there are 35 coastal marinas in the state, distributed as follows:

Beaufort County	=	14 (8 of the marinas are in Hilton Head, SC)
Charleston County	=	15
Colleton County	=	1
Georgetown County	=	9
Horry County	=	6

There are 34 sportfishing tournaments running from April to November each year in South Carolina (http://www.scdnr.sc.gov). Not all of these tournaments are for saltwater fishing and many are for coastal pelagics and not snapper grouper species. The peak months for the tournaments are May and June.

Community Profile
Little River

Figure 3-37. Little River, South Carolina and surrounding area.
Source: Yahoo Maps, http://www.yahoo.com.

History

Quoting directly from Burrel (2000):

Little River was the first permanent settlement in Horry County and dates back to the late 1600s. It is situated on the North Carolina – South Carolina border and has always had a strong maritime tradition. First as a source of seafood for Indian tribes of the region and then for subsequent settlers. Next it was an important terminus for sailing ships bringing in supplies for the surrounding area, chiefly from Wilmington, N.C. in the 1800s and early 1900s. Lumber and naval stores were the major exports during this era, with some cotton and oysters being shipped

around the turn of the century. A fish factory also operated out of Little River in the early 1900s, processing the catch of the purse seiner Prince….
People from surrounding communities came to Little River to fish and enjoy other water activities such as swimming and sightseeing. Some camped on the bluff along the water front. This became a very popular site and in 1925 Lucian Bryan built a hotel. This has turned out to be the only water front hotel ever located at Little River and has always been referred to as The Hotel. As Little River became a vacation spot, other industry was dying out. In 1918 the boiler at the Hammer lumber mill which was the largest in the area blew-up killing five people (Berry 1977). It eventually closed putting many out of work. In the early 20's the oyster factory closed probably due to poor markets and short supply of cheap oysters and labor. The cotton gin closed about this time as did the fish factory (Horry Herald 1922). The naval store industry suffered as demand for their products fell off also, limiting job opportunities further. About this time some of the local men began to carry people fishing, first in row boats and then in power boats, probably due to some extent to the drop off in industry, but also as a result of increased presence of vacationers. This was the first organized offshore recreational fishing in South Carolina where a group of boats carried people fishing for a fee (Gragg 1994) (Lewis 1988). When the men and boys at Little River began to take people fishing can not be dated exactly, but probably it began in the early 1920s. River parties were the first to be carried out. Some were taken in boats rowed by the guide. The former crew boat for the Hammer Lumber Company was used by Lawrence and Jerome Long to carry river parties in the 1920s.

Both the recreational fishery and the commercial fishery grew alongside each other in Little River, with many of the same men fishing commercially in the winter and then running party or charter vessels in the summers. This is practiced less so today.

Current Situation
Little River's population has more than doubled in the last decade (Table 3-67). The percent of owner occupied housing has risen from 61 percent in 1990 to over 80 percent in 2000. The percent of the population in the labor force has not significantly changed while unemployment has dropped. The number of persons living below the poverty level has decreased. The number of person working in the agriculture, fishing and mining sector has grown to 87 over the past ten years, while those in the occupation of farm, fishing and forestry has dropped. There are 16 vessels with federal snapper grouper permits homeported in Little River (Table 3-68). Fishing related employment reported in Table 3-69 is mostly in the marinas sector with 31 persons and 7 more are in fish and seafood. Of the 24 state permits listed in Table 3-70, ten were for saltwater licenses.

In general, the population of Little River has grown as the area around it has developed rapidly. What was once, even four years ago, a little community more or less isolated from the hustle and bustle of North Myrtle Beach and Myrtle Beach, has now become a part of Myrtle Beach's sprawl. Allen *et al.* (1999) developed a spatial multivariate logistic regression model to predict the possibilities of land-use change for Murrells Inlet. Figures 3-38a-c show how the area south of Little River – Murrells Inlet – has been developed, particularly for residential development in the past 20 or so years. Much the same predictive results could be said to be occurring for the area surrounding Little River. Furthermore, the results of the model created by Allen *et al.* (1999) predicted the way coastal growth would proceed. They write in their conclusions:

The results also indicate that Murrells Inlet has experienced tremendous land-use change over the last three decades. The recent period from 1982 to 1996 has brought about rapid residential growth, but little commercial development. The continuing growth appears to be transforming the area into a residential community for metropolitan Myrtle Beach. There is a significant difference in spatial preference between commercial and residential land uses with commercial parcels linearly distributed along the primary roads. As beachfront and waterfront areas are encroached mainly by seasonal homes, residential development moves inland though somewhat restricted by existing parklands and wetlands. Overall spatial patterns show that the area is lacking an integrated plan for development. Limited public access to waterfront and beachfront and the lack of a focal point in the business district are major problems from the tourism planning perspective.

Table 3-67. Community demographics for Little River, South Carolina.
*Source: US Census Bureau.

Years (Table 3-67)	1990	2000
Total population	3470	7027
Gender (Percent of total population)		
Male	48.1	48.1
Female	51.9	51.9
Age (Percent of total population)		
Under 18 years of age	16.5	15.7
18 to 64 years of age	64.2	60.9
65 years and over	19.3	23.4
Ethnicity or Race (Number)		
White	3120	6423
Black or African American	329	478
American Indian and Alaskan Native	10	30
Asian*	N/A	20
Native Hawaiian and other Pacific Islander*	N/A	3
Some other race	6	24
Two or more races*	N/A	49
Hispanic or Latino (any race)	17	72
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	3.4	3.7
Percent high school graduate or higher	84.5	89.2
Percent with a Bachelor's degree or higher	20.5	21.4
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	3.6	3.7
And Percent who speak English less than very well	1.2	1.0
Median household income	$28,705	$40,427
Poverty Status (Percent of population with income below poverty line)	13.5	4.7
Percent female headed household	12.6	8.4
Home Ownership (Number)		
Owner occupied	1064	2690
Renter occupied	508	597
Value Owner-occupied Housing (Median $)	$89,500	$127,200
Monthly Rent (Median $)	$487	$652
Employment Status (Population 16 yrs and over)		
Percent in the labor force	56.6	58.0
Percent of civilian labor force unemployed	6.6	3.4
Occupation		
Management, professional, and related occupations*	N/A	31.9
Service occupations*	N/A	19.2
Sales and office occupations	16.0	33.7
Farming, fishing, and forestry occupations	3.6	0.9
Construction, extraction, and maintenance occupations*	N/A	7.5
Production, transportation, and material moving occupations*	N/A	6.8
Industry		
Agriculture, forestry, fishing, hunting and mining	4.2	2.6
Manufacturing	3.3	4.7
Percent government workers	11.2	6.3
Commuting to Work (Workers 16 yrs and over)		
Percent in carpools	11.2	7.2
Percent using public transportation	0.6	0.0
Mean travel time to work (those who did not work at home)*	N/A	21.0
Percent worked outside of county of residence*	N/A	N/A

*Some values could not be determined accurately due to changes in the way the Census Bureau tabulates responses, or to changes in the categories themselves.

Commercial Fishing

Little River has recently had a small surge in the commercial fishing sector due to the closure of H and C Fisheries in Murrells Inlet in December, 2003. Some of the snapper grouper boats, which were homeported there, have relocated to Little River. The commercial docks are located on the water, but are obscured by two casino ships.

Table 3-68. Number of federal snapper grouper permits by type for Little River, South Carolina. Source: NMFS 2002.

Type of Permit	1998	1999	2000	2001	2002	2003	2004
Charter/Headboat for Snapper Grouper	9	9	8	10	13	12	16
Snapper Grouper Unlimited	13	15	10	13	13	16	16
Snapper Grouper Limited	1	1	1	2	1	1	1

Table 3-69. Employment in fishing related industry for Little River, South Carolina. Zip code Business Patterns, U.S. Census Bureau 1998).

Category	NAIC Code	Number Employed
Fishing	114100	0
Seafood Canning	311711	0
Seafood Processing	311712	0
Boat Building	336612	0
Fish and Seafoods	422460	7
Fish and Seafood Markets	445220	0
Marinas	713930	31
Total Fishing Employment		38

Table 3-70. Number of state permits by type for Little River, South Carolina. Source South Carolina Division of Marine Fisheries, 2003.

Type	Permits
Crab Pots	2
Gill Net	2
Hand Held Equipment	2
Miscellaneous Pots/Traps	1
Saltwater License	8
Shellfish License	1
Trawler License	5
Wholesale Dealer	3
Total	24

Recreational Fishing
There were three headboats that 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. Many fishermen in the 1940s through the 1970s commercial fished in the winter and led charters during the summer. A detailed account of how recreational fishing developed in Little River is provided by Burrell (2000). Most of the private recreational fishing effort in this area is accounted for by marinas in North Myrtle Beach, Myrtle Beach, and Murrells Inlet.

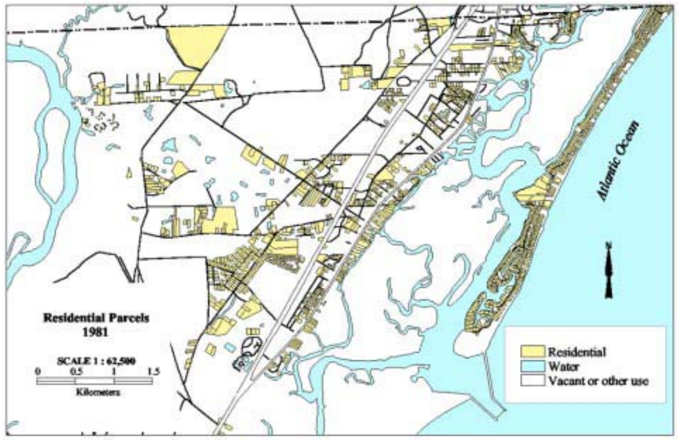


Figure 3-38a. Residential parcels, Murrells Inlet 1981.
Source: Allen *et al.* 1999.

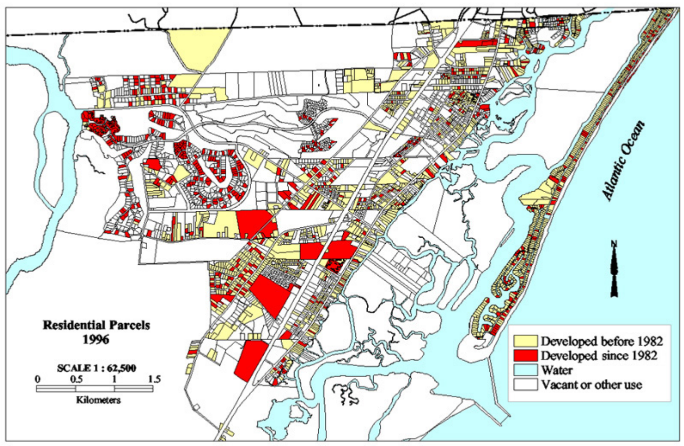


Figure 3-38b. Residential parcels, Murrells Inlet, 1996.
Source: Allen *et al.* 1999.

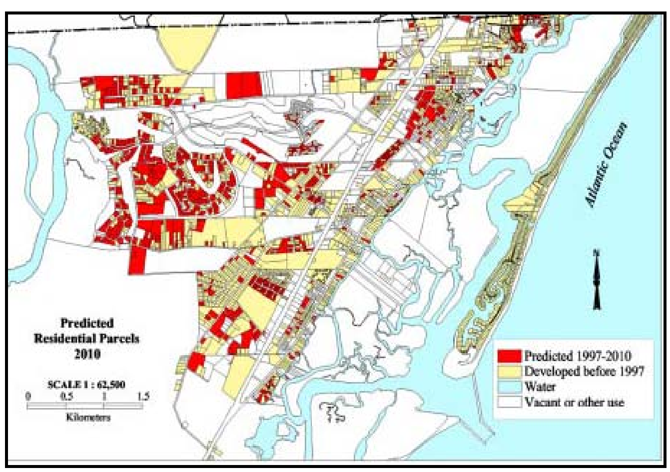


Figure 3-38c. Predicted residential parcels, Murrells Inlet, 2010.
Source: Allen *et al.* 1999.

3.4.3.3 Georgia

Overview of the Georgia Fishery

There is only one community in Georgia that lands a substantial amount of the snapper and grouper species to be regulated 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. Recreationally there are vessels located at Tybee Island close to Savannah, and on the barrier islands off Brunswick. There are some other locations in between Savannah and Brunswick where charter boats and private vessels are located.

Commercial Sector

The number of federally permitted snapper grouper vessels for Georgia has decreased from 14 vessels to 12 vessels in 2004 (Table 3-71). However, there is not comparable "across-the-board" data for any types of permits for 2004 other than snapper grouper, and therefore we cannot be sure of any decline in other fisheries.

Table 3-71. Number of federal permits by type for Georgia.
(Source: NMFS 2002, Jepson *et al.* 2005.

Type of Permit	1998	1999	2000	2001	2002	2003	2004
Charter/Headboat for Snapper Grouper	6	5	5	43		N/A	27
Snapper Grouper Unlimited	9	8	7	6	6	N/A	8
Snapper Grouper Limited	1	1	21	1	1	N/A	1

At the state level, the number of permits for Georgia in 2002 was 947 for commercial fishing vessel registration. There were a total of 612 state permits by full-time commercial fishers and 147 state permits for part-time commercial fishers (Table 3-72).

Table 3-72. Number of state permits by type for Georgia.
Source: GADNR 2002, Jepson *et al.* (2005).

Type	Number
Commercial Fishing Vessel Registration	947
Vessels with shrimp gear	482
Full-time commercial fishermen	612
Part-time commercial fishermen	147

In general, except for shrimp and blue crab, there are only two commercial fishing communities in Georgia who land and pack species in the snapper grouper complex. Each of these communities – Townsend and St. Simon's Island outside of Brunswick – has one snapper grouper licensed dealer, which also owns a fish house. The one fish house in Townsend accounts for the great majority snapper grouper species landed in the state of Georgia; other landings appear to be incidental.

Community Profile
Towsend, GA

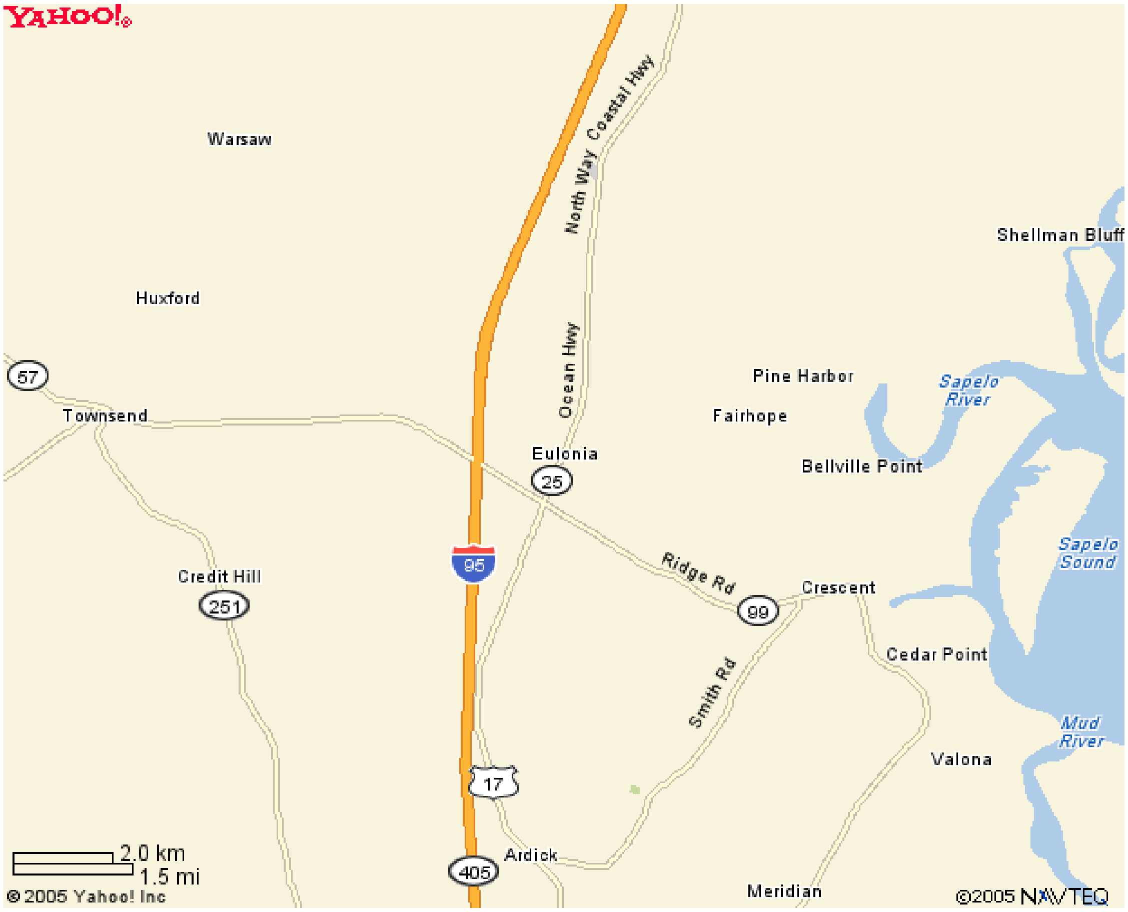


Figure 3-38d. Area map showing Townsend, Eulonia, and Crescent, Georgia, including Sapelo Sound.

Towsend/Eulonia/Crescent, GA
History

Before the Civil War this area of MacIntosh County experienced growing prosperity as local plantations produced cotton, rice, and indigo for world markets, shipping products on the Altamaha River, including timbers such as pine, oak, and cypress. The growing importance of Darien to the economic life of McIntosh County lead to the transfer there of the county seat from Eulonia in 1819. In 1863, Union troops attacked the area from St. Simons and burned much of Darien and other closely located concerns.

Despite the devastation the area recovered when lumbering peaked after the Civil War. The town of Darien became a thriving international port in the 1890's but by 1900 the depletion of the forests brought the boom to an end. The building of Georgia Coast and Piedmont Railroad (G.C. and P.) through Darien and up the coast failed to stem the decline. The G. C. and P. was affectionately known as the “Get Out Crackers and Push” and it failed as US 17 pushed south in the 1920’s. Until the 1990s this part of Georgia remained rural and undeveloped.

Current Situation

Townsend, Georgia is a small rural community; the closest larger town is Darien (located about 25 miles to the south of Townsend), which now only has shrimp and blue crab industries. As this document is being written, the fish house in Townsend mentioned above is in the process of relocating from the shores of the riverbank where it has been historically located. The land is being sold to developers who will divide it for private or rental residences. The fish house owner is currently looking for an inland location in which to relocate.

The community of Townsend has seen their population increase approximately 47% since 1990 (Table 3-73); however, the percent of the population in the labor force has decreased by about five percent. The percent below the poverty status has also decreased, but still remains quite high at slightly over 14 percent. The percent in agriculture, forestry, fishing, hunting and mining has slightly increased since 1990, although the cause for this is unknown.

Table 3-73. Community demographics for Townsend, Georgia.
Source: US Census Bureau.
* Some values could not be determined accurately due to changes in the way the Census Bureau tabulates responses, or to changes in the categories themselves.

Years (Table 3-73)	**1990**	**2000**
Total population	2413	3538
Gender (Percent of total population)		
Male	49.5	49.8
Female	50.5	50.2
Age (Percent of total population)		
Under 18 years of age	24.5	23.5
18 to 64 years of age	68.4	62.8
65 years and over	7.1	13.7
Ethnicity or Race (Number)		
White	1465	2437
Black or African American	947	1048
American Indian and Alaskan Native	1	7
Asian*	N/A	8
Native Hawaiian and other Pacific Islander*	N/A	0
Some other race	0	13
Two or more races*	N/A	25
Hispanic or Latino (any race)	2	27
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	26.9	11.0
Percent high school graduate or higher	55.4	69.7
Percent with a Bachelor's degree or higher	8.4	8.9
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	0.4	4.0
And Percent who speak English less than very well	0	1.7
Median household income	$23,314	$35,531
Poverty Status (Percent of population with income below poverty line)	18.7	14.6
Percent female headed household	14.7	10.8
Home Ownership (Number)		
Owner occupied	842	1317
Renter occupied	90	126
Value Owner-occupied Housing (Median $)	$33,000	$98,100
Monthly Rent (Median $)	$213	$431
Employment Status (Population 16 yrs and over)		
Percent in the labor force	61.3	56.4
Percent of civilian labor force unemployed	3.4	6.5
Occupation		
Management, professional, and related occupations*	N/A	25.2
Service occupations*	N/A	14.2
Sales and office occupations	7.7	21.7
Farming, fishing, and forestry occupations	3.5	3.2
Construction, extraction, and maintenance occupations*	N/A	14.4
Production, transportation, and material moving occupations*	N/A	21.3
Industry		
Agriculture, forestry, fishing, hunting and mining	1.8	3.4
Manufacturing	29.0	16.2
Percent government workers	19.3	17.0
Commuting to Work (Workers 16 yrs and over)		
Percent in carpools	33.9	13.4
Percent using public transportation	1.4	0
Mean travel time to work (those who did not work at home)*	N/A	37.0
Percent worked outside of county of residence*	N/A	N/A

Commercial Fishing

The following is copied directly from an informal survey of the cumulative impacts on fish houses in the South Atlantic region (SAFMC 2005):

Currently there is only one fish house in Georgia that handles snapper grouper species and other offshore fish (see detailed discussion below) and this has been the case for almost a decade. Historically, however, some docks and fish housed that specialize in shrimp and other inshore species tried their hand in dealing snapper grouper species. In the 1990's, there was a fish house in Darien called Marco's, which tried to get into handling offshore catches (snapper-grouper and some large catches of dolphin) (Henry Ansley, Georgia DNR, personal communication). As with other fish houses in the area that had dabbled in snapper grouper they lacked the connections necessary to economically distribute the fish and eventually stopped handling those species (Charlie Phillips, personal communication). Further north there was a fish house/dock in Sunbury that was called Morgan's - it handled a few landings of offshore fish at one time. Other seafood companies in Glynn County that had landing occasional landings of snapper grouper were Knight's Seafood in Brunswick and Zachary's at the old wharf on Jekyll Island (Henry Ansley, Georgia DNR, personal communication).

In Camden County in the southern part of the state, it is possible that Lang's dock in St. Marys landed some offshore catches over the years, as they were active in the rock and royal red shrimp fisheries. A dock on Point Peter in Camden landed sharks for a few years and it would be likely that they landed other offshore species such as snapper grouper; however, all of the activity there has evidently ended, having shifted to Mayport, Florida (Henry Ansley, Georgia DNR, personal communication).

Overall, it appears that only a few docks in Georgia over the years appeared to really cater to and actively court offshore fish landings. Most docks focused on shrimp, but appeared willing to land any seafood if they had a market for it. It is an interesting point that a some Georgia docks were a bit more active in the early eighties as regards snapper grouper landings. This was related to the University of Georgia/ Gulf & South Atlantic Fisheries Development Foundation gear diversification efforts off the BULLDOG (roller rigs, longlines, etc). The BULLDOG landed and sold a good bit snapper grouper, including good catches of golden tilefish. One dock that apparently received a good portion of these landings was the Bryan County Co-op, which also was home port for some of the shrimp boats participating in the diversification activities.

Phillips Seafood, a fish house in Townsend, Georgia has been operating since 1975. Presently it is the hub of the snapper grouper fleet in Georgia. It is a family owned and operated business. The current owner is the son of the original owner. The owner's father, "Captain" Philllips started the business and his son Charlie bough it in 1999 after spending years on a shrimp boat.

Phillips Seafood is home to six snapper grouper (bandit) boats: The Canyon Runner; the Sea Dog; the Denise Marie; the Kimberly L; the Sea Otter; and the Vong Phong. These boats range in size from 30 to 46 feet in length. It is not uncommon to find boats from the Carolinas or

Florida unloading at Phillips Seafood. These transient boats will unload their fish there when they get "blown in" by the weather or are just fishing their way up or down the coast. There are also three shrimp boats that call Phillips Seafood home.

The fish house is a full service dock supplying commercial fishing boats with ice, bait, diesel fuel, propane and packing and buying fish. The business has 4 full time employees including the owner, a bookkeeper and people to help grade fish, pack fish and blow ice. At times the owner will take on additional seasonal help. In additional to serving commercial fishing boats, the owner is also involved in clam farming, raising soft shell crabs, and the buying and selling of fish such as shad and catfish.

In general when a snapper grouper boat unloads they have already called ahead to the fish house and given some idea of how much product they have (numbers of boxes (roughly a 100 lbs. per box) and species composition). At Phillips Seafood the dock buys the fish outright from the boat at market value. The fish is then marked up to account for "packing expenses" and operations costs. The owner then sells the fish to larger wholesalers and to retail markets and arranges for trucking. According to the owner approximately one third of the snapper grouper unloaded at this dock goes to Canada, one third goes to New York and Philadelphia and one third stays local (in the southeast region).

The unloading process at this dock is similar to other snapper grouper docks in the region. As a boat unloads fish are graded according to size and species and packed in wax cartons of ice. If there is a truck there at that time the wax cartons are loaded on the truck right then. If a boat unloads on a day there are no trucks running the wax cartons are stored in a large walk-in freezer until the truck comes through again.

After unloading, when the fish is tallied, the fish house owner will cut a check to the vessel minus expenses accrued for bait, fuel, ice and any other expenses. As is common among most fish houses in the South Atlantic, Phillips seafood also works as a bank, cutting checks to the crew, floating money for groceries, wiring money to accounts for out of state boats.

Like fish houses throughout the region, Phillips Seafood is facing many challenges. As regulations get stricter snapper grouper fisherman are landing less product making it harder for the fish houses to find markets for the product, to offer good prices, and to justify full time help around the docks. Regulations have also meant less boats tied to the dock. At one time as many as ten boats docked there, supplying fish, and buying ice, bait and fuel. Many of the boats left to try to open up a better market for their product by moving to locations in Jacksonville, Florida and Murrells Inlet, South Carolina that are closer to retail markets and restaurants. The number of shrimp boats operating out of this dock has also declined from seven to three. Other factors contributing to the decline in profits include rising fuel prices (this affects the fish house on both ends by affecting the boats and trucking) and the rising cost of maintenance while fish prices remain steady. The owner cites an example of having to pass on the cost of a new ice compressor to the fishermen because it had cost 30% more to replace than it had cost a year ago.

Arranging trucking is increasingly affected by lower production. As availability of product has declined, trucking companies have gone out of business and truck routes have disappeared. In order to get a truck to stop many times the owner of the dock will have to drive to the nearest Interstate exit (about seven miles) with the fish and meet a truck.

Coastal development is also taking its toll on the future of this business. The owner is currently leasing the land and knows that he may not be able to re-new the lease the next time because he will be competing with offers from developers to buy the land for condominiums. Also as property taxes increase so will the price of the lease.

While the long-term looks uncertain for Phillips Seafood they are finding ways to makes ends meet by diversifying their products (clams, soft-shell crabs, shad etc.) and by cutting costs (selling boats that no longer produce adequate income and hiring less help). In the end it seems fair to say that the future of the snapper grouper industry in Georgia will be determined by the success of this fish house staying viable.

Brunswick, Georgia, the other community with 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 are blue crab and different species of penaeid shrimp. According to the ACCSP website, there have been no snapper grouper species landed in Brunswick since 2001.

Recreational Sector

Recreationally, anglers that fish offshore do not often target or harvest snapper grouper species (MRFFS 2003 - http://crd.dnr.state.ga.us/assets/documents/2003_MRFSS_Summary.pdf). Of the snapper grouper species harvested, the most commonly caught and kept fishes are sheepshead (7%), black sea bass (5%), and vermilion snapper (2%).

As for recreational snapper grouper fishing (private, charter, and headboat information) two areas should be considered. The first is the Savannah, and more specifically, Tybee Island. This area had 16 charter or headboat permits for snapper grouper in 2004. Many of these vessels are docked on Tybee Island in an area called Lazaretto Creek. Closer to Savannah and to the south is Richmond Hill is a growing community and is becoming a large center for recreational fishing effort.

The second region, which may be impacted by the proposed management measures, is the area around the city of Brunswick. Along with Brunswick, which has four charter boats that fish for snapper grouper species, Jekyll Island and Sea Island have 2 more charter boats. Interestingly, the number of for hire vessels has seen a great decline, as in the commercial fishing sector (Table 3-74). From 2003 to 2004, the number of snapper grouper permitted for hire vessels declined by just over 60 percent. It is not known at this time if fishermen shifted effort to different fisheries or dropped out of the business entirely, nor is it known why this shift occurred.

Table 3-74. Number and location of for-hire permits by homeport in Georgia, 2003 and 2004. Source: NMFS 2004.

Charter Permits	2003	2004
Brunswick	3	4
Crescent	2	0
Darien	1	0
Harlem	1	1
Jekyll Island	1	1
Richmond Hill	3	3
Sapelo Sound	2	0
Savannah	13	11
Sea Island	1	0
Shellman Bluff	2	2
St. Simons Island	2	0
Townsend	5	0
Tybee Island	7	5
Grand Total	**43**	**27**

3.4.3.4 Florida

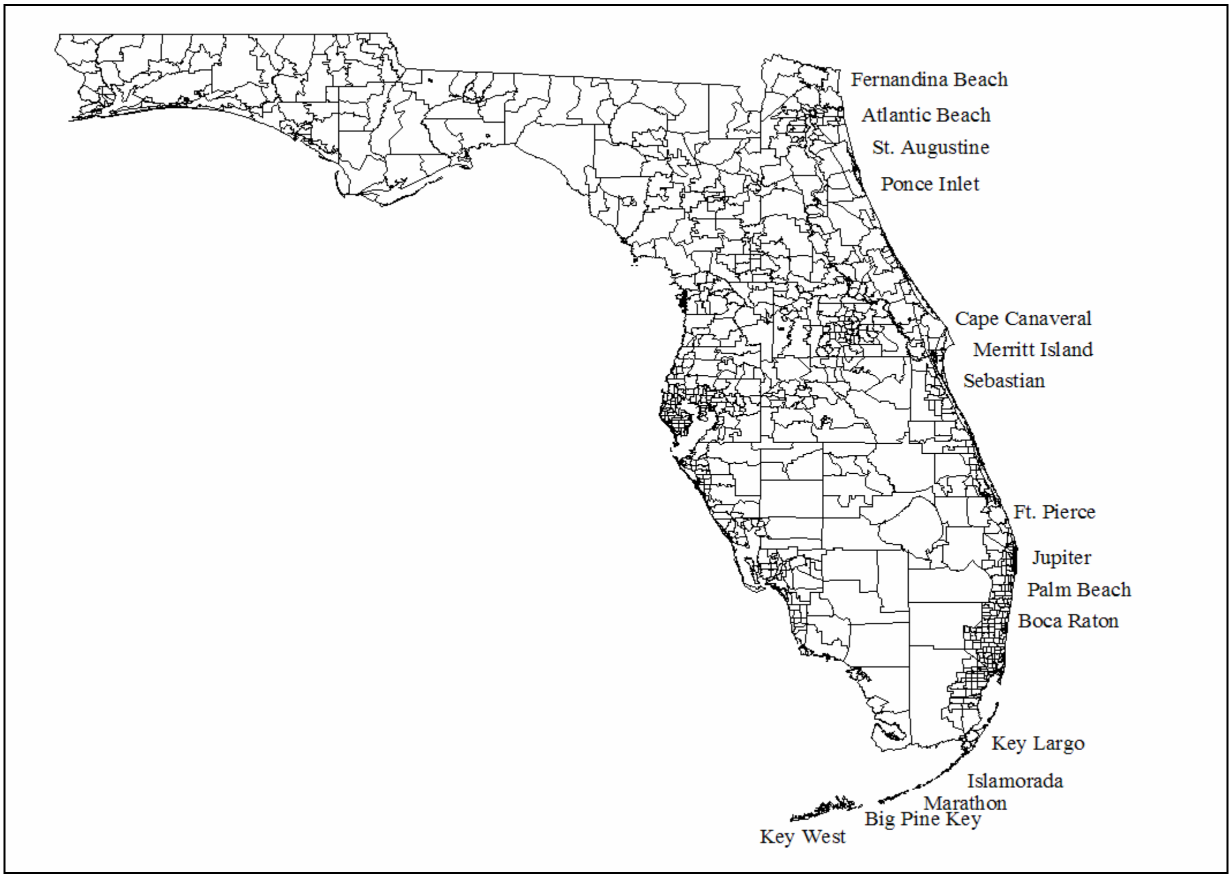


Figure 3-39. Florida communities with substantial fishing activity as identified by South Atlantic advisory panels.
Source: Jepson *et al.* (2005).

Overview of Florida's Fishery

As noted above, the state of Florida (Figure 3-39), in terms of the snapper grouper fishery (and other fisheries), stands apart from the other states in the South Atlantic region in fishing behaviors, history, and demographics. Florida has one of the fastest growing populations in the U.S., estimated to increase each day by 750 to 1,000 new immigrants. Twenty-five percent of all vacation homes in the U.S. are located in Florida's coastal counties (Coastal Ocean Resource Economics 2005).

The coastal waters are 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 sort of struggle was the conflict between commercial fishermen using gillnets in state waters and those who believed this practice was harmful. The conflict culminated in a state-wide ban on the use of gillnets, and this was 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 regulations and closing of both the *Oculina* Bank off of Florida's central coast, and in the Keys with the creation of both the Florida Keys National Marine Sanctuary and the Tortugas Sanctuary.

Outside of political and social conflicts, the natural geography of Florida makes it different than other states, particularly from central Florida through the Keys. The weather is amenable to fishing almost year round, and yet 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 starting around West Palm Beach in 2003, and it moved up the east coast causing a great decline in snapper grouper fishing that year. The continental shelf is much narrower in Florida than elsewhere in the region, allowing fishermen to get out to deep water quickly and come home the same day. Lastly, the species of snapper grouper available to fishermen are different than further north on the coast, with yellowtail snapper, gag and black grouper, and other alternative species such as stone crab and spiny lobster, or dolphin, kingfish and billfish allowing for a great variety of commercial and recreational fishing opportunities.

Commercial Sector

Considering the high population growth rates and the emphasis on a tourism economy in Florida, the commercial fishing sector in Florida is still robust in some areas, despite regulations imposed in the past decade. This point is illustrated by Table 3-75 showing all species landed on the Florida East coast between 1998 and 2003. While total landings and dollar values have decreased, there is still a considerable presence of commercial fishing along the East coast of Florida.

Table 3-75. Commercial landings of all species for Florida's East Coast only, 1998 – 2003. Source: Personal communication from the National Marine Fisheries Service, Fisheries Statistics Division, Silver Spring, MD.

Year	Metric Tons	Pounds	$ Dollar Value
1998	13,577.60	29,933,212	44,447,487
1999	13,877.20	30,593,684	49,537,126
2000	14,243.20	31,400,550	52,247,529
2001	12,403.00	27,343,703	42,866,092
2002	9,830.70	21,672,653	34,374,173
2003	10,643.50	23,464,562	33,026,773
GRAND TOTALS:	74,575.10	164,408,364	256,499,180

As in other areas, the commercial fisherman is sometimes not truly distinguishable from the recreational fisherman. There is overlap from each sector to the other, illustrating again the opportunistic nature of fishermen, particularly in the face of increasing regulations (Table 3-76).

Recreational Sector

According to the state of Florida's Fish and Wildlife Research Institute, Florida's recreational sector is one of the largest in the U.S. The following text is directly from their website (http://research.myfwc.com/features/view_article.asp?id=19870):

Close to half the estimated recreational fishing trips in Florida are made by visitors to the state. The MRFSS estimates more than 6.5 million recreational anglers took more than 27.4 million saltwater fishing trips statewide in Florida during 2004. Estimates of angler participation and numbers of recreational fishing trips provided by the MRFSS give scientists a measure of the amount of fishing pressure that is exerted on fish populations.

Whereas the commercial fishing industry is in decline, the charter boat and private recreational sectors appear to be growing and, in some instances, are thriving. As more people move to Florida and to the coastal regions, more of them are taking to the water, both inshore and offshore. The following italicized text illustrating this degree of growth is excerpted from the Executive Summary of a recent study by the National Fish and Wildlife Service (USFWS 2003):

Human use of the waters of the southeastern U.S. has increased dramatically as a function of residential growth and increased visitation. This phenomenon is particularly evident in the State of Florida. The population of Florida has grown by 124 percent since 1970 (6.8 million to 15.2 million, U.S. Census Bureau) and is expected to exceed 18 million by 2010, and 20 million by the year 2020.

According to a report by the Florida Office of Economic and Demographic Research (2000), it is expected that, by the year 2010, 13.7 million people will reside in the 35 coastal counties of Florida. In a parallel fashion to residential growth, visitation to Florida has increased dramatically. It is expected that Florida will have 83 million visitors annually by the year 2020, up from 48.7 million visitors in 1998. In concert with this increase of human population growth and visitation is the increase in the number of watercraft that travel Florida waters. In 2001, 943,611 vessels were registered in the State of Florida. This represents an increase of 42 percent since 1993. The Florida Department of Community Affairs estimates that, in addition to boats belonging to Florida residents, between 300,000 and 400,000 boats registered in other States use Florida waters each year.

The FWC Division of Law Enforcement reported that in 1999, more than one million vessels used Florida's waterways, including over 829,000 State-registered vessels and about 300,000 out-of-State vessels. Boating continues to increase in Florida as evidenced by just over 943,600 State-registered vessels (FWC 2002a) and more than 400,000 out-of-State vessels for 2001.

Table 3-76. Number of Florida vessels by homeport that hold both a South Atlantic snapper grouper charter license and an unlimited snapper grouper commercial permit, 2004 (NMFS 2004).

Homeport City	No. of Permits	Homeport City	No. of Permits
Boca Raton	1	Sarasota	1
Boynton Beach	1	Sebastian	5
Cape Canaveral	1	St Augustine	1
Conch Key	2	St Petersburg	1
Cudjoe Key	1	St. Augustine	1
Delray Beach	1	Stuart	2
Englewood	1	Sugar Loaf Key	1
Gieger Key	1	Sugarloaf Key	2
Hudson	1	Summerland Key	3
Islamorada	2	Tampa	1
Jacksonville	3	Tarpon Springs	1
Jupiter	1	Tavernier	5
Key Colony Beach	2	Vero Beach	1
Key Largo	4		
Key West	35		
Little Torch Key	2		
Madeira Beach	1		
Marathon	7		
Miami	15		
Naples	1		
Okeechobee	1		
Ponce Inlet	5		
Port Canaveral	6		
Port Everglades	1		
Port Salerno	1		
Saint Augustine	2		
Sarasota	1		
Grand Total			**124**

Community Profile
Cape Canaveral

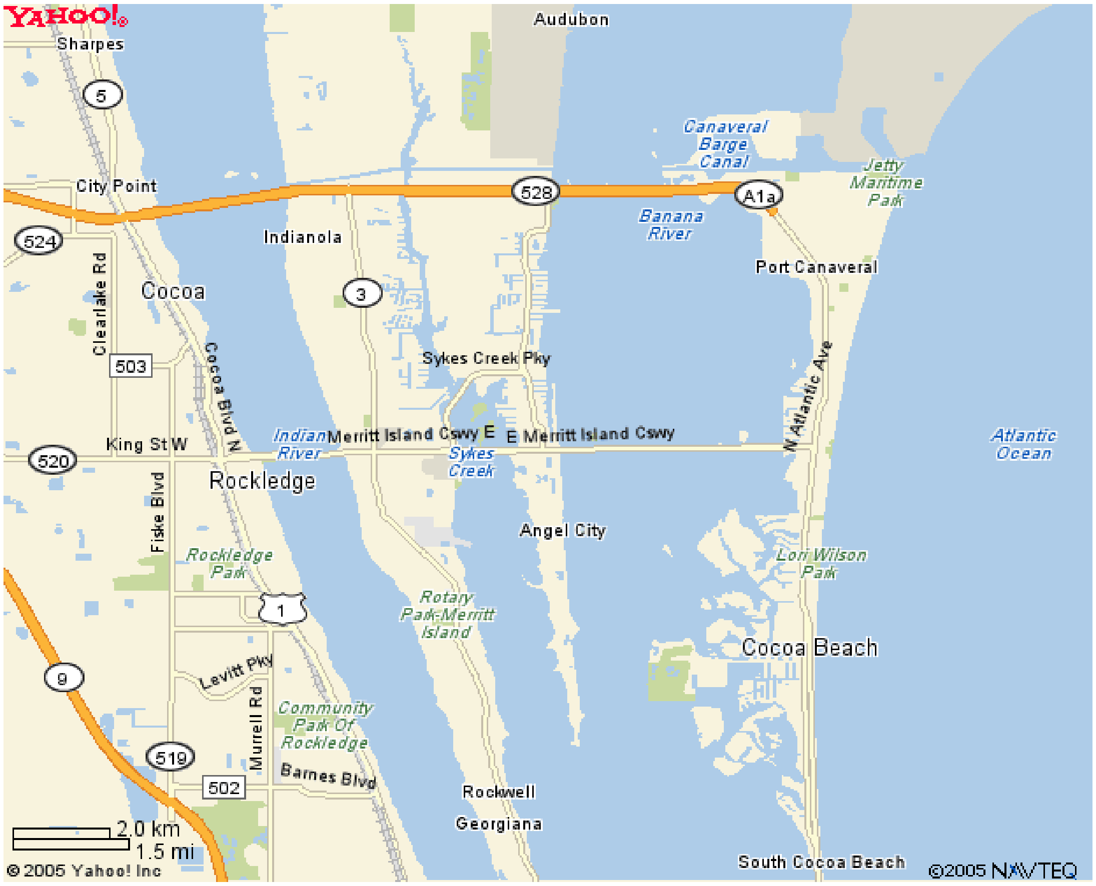


Figure 3-38e. Area map of Cape Canaveral, Florida.

History
The first inhabitants of the Cape Canaveral area date back to approximately 10,000 years ago according to more recent archaeological finds (http://www.spaceline.org/capehistory.html). When the Spanish arrived the Native American tribes inhabiting the area were Timucuans and Ais, both known throughout early colonial Florida.

Cape Canaveral was held under both Spanish and French flags, and was not settled under the U.S. until the early 1800s when the area that now has the Kennedy Space Center was planted in oranges that were then exported north on the Indian River. The actual geographic area of the Cape was not settled until the 1840s by small groups of migrants from South Carolina and Georgia who were of Scottish and English descent. The first lighthouse was erected in 1847 but still the surrounding towns about the Cape were small and the Cape itself was sparsely populated. The Homestead Act of 1862 increased the population more, but it was not until the 1920s when much of what we think of as the Cape area was created and incorporated. During WWII the Banana River Naval Air Station was created, which opened the way for later developments as first a missile test range, and later to become Patrick Air Force Base officially in 1952. This was the beginning of the population growth expansion in the area. Interviews with the local Brevard County Historical Society point to this time and later, in 1959, when NASA came to the Cape, as the defining moment of the communities (Kitner field notes 2003). Currently much of the population of the area has been leaving the Cape and moving to the Orlando, Florida area where there are more varied economic opportunities.

Current Situation

Fisheries in this section of central Florida generally occur in two different environments. First there is the inshore, river/inlet fishing, which is predominately characterized by recreational fishing. This area encompasses the Indian River, St. Johns River, Banana River and the associated lagoons. The decline of commercial exploitation of the river and lagoon can be traced to the Florida Net Ban of 1994, which prohibited the use of gillnets in state waters. This prohibition has had a profound impact on the commercial fishing industry in general in Florida (Smith *et al.* 1999). The impact of this legislation, along with the growing dominance of tourism as an industry in the state, and the decline of agriculture (which formed a reciprocal economic relation with fishing and while healthy, kept commercial and residential development at bay, helping to protect the fishermen's access to the waters) has changed forever the face of commercial fishing in the region.

Additionally, 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.

Each of the following sections includes tables on each community's demographics. These have been included so that the reader might attain a better understanding of the range in values of some more critical variables such as poverty status, ethnicity, and occupation. By employing information from some of the Federal and state databases, such as permit files, landings reports, and U.S. Census data, we can build general community profiles that help us to describe the potentially affected communities.

Commercial Fishing

Cape Canaveral draws on fishermen from the communities of Cocoa/Cocoa Beach, Merritt Island, Melbourne and Titusville. Fishermen from these areas target greater amberjack, bluefish, bonnethead, catfish, cobia, blue crab, dolphin, gag, snowy grouper, yellowedge grouper, crevalle jack, spiny lobster, king mackerel, Spanish mackerel, great barracuda, menhaden, mojarra, striped mullet, white mullet, Eastern oyster, Northern and Southern quahog, blue runner, Atlantic calico scallops, shark (sharpnose, blacknose, blacktip, bull, fine-tooth, hammerhead, sandbar), sheepshead, shrimp (brown, pink, white, rock), swordfish, tilefish, little tunny, and whiting (Table 3-77). Snowy grouper and tilefish (particularly golden or sand tilefish) are landed in quantities exceeding 10,000 lbs per year.

Table 3-77. Cape Canaveral total commercial landings per year, 1998-2004.
Source: Personal Communication from NMFS, Fisheries Statistics Division, Silver Spring MD.

Year	Millions of Pounds	Millions of Dollars
2004	6	9.3
2003	5.2	6.8
2002	4.4	6.2
2001	8.2	11.3
2000	10.9	15.3
1999	8.9	11.9
1998	8.9	10.6

The number of federally permitted vessels has shown little change for Cape Canaveral (Tables 3-78). Any trend in numbers of permits is hard to determine, as there are other factors affecting how many vessels are homeported in certain communities, such as mobility of boats, the location of fish stocks from year to year, or resettlement of fishermen due to urban and tourist developments on the coast. As noted in previous sections, the actual location of vessels shifts throughout the year or from one year to the next. Regardless of these shifts, these geographical representations help in to determine where impacts may be felt.

Table 3-78. Number of federal snapper grouper permits by type for Cape Canaveral, Florida. Source: NMFS 2002.

Type of Permit	1998	1999	2000	2001	2002	2003	2004
Charter/Headboat for Snapper Grouper	2	0	0	3		N/A	7
Snapper Grouper Unlimited	9	9	9	11	15	N/A	16
Snapper Grouper Limited	3	4	5	5	4	N/A	1

While reasons for change in the number of federal permits may not be wholly clear, considerable fluctuation in trends is seen in the county's commercial fishing permits in Table 3-79. Some of these declines are due to new permitting programs being instituted (new accounting methods or limited access permits being introduced). However, in general there is a steady decline in the number of fishermen in Brevard County, and this trend is evident from other qualitative and quantitative data throughout the state.

Table 3-79. Number of Florida commercial fishing permits in Brevard County, FL, 1998 – 2005. Source: Florida Fish and Wildlife Research Institute 2005.

Permit Type	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	% Change
Blue Crab	353	353	224	168	137	122	115	-67
Brevard County Clam	29	29	82	9	1	29	42	+31
Crawfish/Lobster	78	78	67	64	52	54	44	-44
Marine Life	7	7	3	3	3	3	3	-57
Purse Seine	4	4	5	8	8	4	6	+33
Restricted Species	592	592	440	403	375	369	371	-37
Retail Dealer	118	118	107	101	104	129	156	+24
Saltwater Products	872	872	657	546	518	496	492	-43
Special Recreational Crawfish	10	10	9	8	8	9	9	-10
Stone Crab	174	174	121	22	21	21	22	-88
Wholesale Dealer	47	47	44	44	38	45	52	+10

Community demographics for Cape Canaveral (Table 3-80) provide an overview of this community. Cape Canaveral shows 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. More persons speak a language other than English at home (an increase of 2.5 percent), but fewer people have incomes below the poverty line. Unemployment has decreased, but there are fewer in the labor force today than in 1990, again indicating an aging population. The percentage of persons in a service occupation has grown from 14.1 percent to 20.4 percent, while there is a decline in the percentage of those in the primary industries of forestry, mining, and fishing.

Table 3-80. Community demographics for Cape Canaveral, Florida.
* Source: US Census Bureau.

Years (Table 3-80)	1990	2000
Total population	8,014	8829
Gender Ratio M/F	107/100	109.1/100
Age (Percent of total population)		
Under 18 years of age	14.0	11.3
18 to 64 years of age	70.0	65.6
65 years and over	16.1	23.1
Ethnicity or Race (Number)		
White	7545	8359
Black or African American	277	126
American Indian and Alaskan Native	102	28
Asian	62	150
Native Hawaiian and other Pacific Islander	0	5
Some other race	28	37
Two or more races*	N/A	124
Hispanic or Latino (any race)	374	307
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	2.7	2.3
Percent high school graduate or higher	83.2	87
Percent with a Bachelor's degree or higher	21.4	25.2
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	7.0	9.5
And Percent who speak English less than very well	0.9	2.2
Median household income	25,499	30,858
Poverty Status (Percent of population with income below poverty line)	16	11.6
Percent female headed household	4.92	7.4
Home Ownership (Number)		
Owner occupied	1802	2526
Renter occupied	2502	2540
Value Owner-occupied Housing (Median $)	80300	91,600
Monthly Rent (Median $)	370	564
Employment Status (Population 16 yrs and over)		
Percent in the labor force	70	59.6
Percent of civilian labor force unemployed	6.7	5.3
Occupation		
Management, professional, and related occupations*	N/A	31.9
Service occupations	14.1	20.4
Sales and office occupations*	N/A	24.7
Farming, fishing, and forestry occupations	2.7	0.4
Construction, extraction, and maintenance occupations*	N/A	12.8
Production, transportation, and material moving occupations*	N/A	9.8
Industry		
Agriculture, forestry, fishing and hunting	1.5	0.4
Manufacturing	19.8	10.1
Percent government workers	12.63	13.3
Commuting to Work (Workers 16 yrs and over)		
Percent in carpools	10.91	13.1
Percent using public transportation	1.63	1
Mean travel time to work (those who did not work at home)*	N/A	25
Percent worked outside of county of residence*	N/A	8.6

* Some values could not be determined accurately due to changes in the way the Census Bureau tabulates responses, or to changes in the categories themselves.

Recreational Fishing

As in other coastal areas of Florida, there is a fairly heavy presence of charter boat businesses, private marinas, and other associated businesses catering to the recreational fishing sector in Brevard County. 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 charter vessels with South Atlantic Snapper Grouper permits homeported in Cape Canaveral or Port Canaveral (this figure include an approximate four party boats). That is likely a low estimate, as it does not account for the smaller number of for-hire boats present in the nearby Merritt Island and in the Cocoa/Cocoa Beach area.

According to the Brevard County Marine Advisory Council (http://www.brevardparks.com/bcmac, November 2002), there are 70 marinas in Brevard County, ranging from small fish camps with no boat slips to large private clubs that have over 200 wet slips. There are approximately 3,263 wet slips at these 70 marinas. While one cannot determine how many of these wet slips are used by recreational (or commercial) fishermen, it is a very rough indicator of potential recreational fishing effort.

There are approximately 36 bait and tackle stores in Brevard county cities, distributed as follows: 5 in Cape Canaveral, 5 in Cocoa/Cocoa Beach, 1 in Fellsmere, 15 in Melbourne/Melbourne Beach, 4 in Merritt Island, and 6 in Titusville.

The number and location of fishing tournaments may vary from year to year, but the following tournaments seem to have staying power:

* Seventh Annual Cal Dixon Celebrity Offshore Fishing Classic, May, Sunrise Marina, Port Canaveral
* Canaveral Kingfish Classic, July, Port Canaveral
* Coconut's on the Beach Wahoo and Dolphin Shootout, May, Port Canaveral
* FSFA's Offshore Slam, June, Port Canaveral
* Rusty's Canaveral Kingfish Challenge, June, Port Canaveral

Additionally, Port Canaveral participates in the newer H.O.T. (Hardcore Offshore Tournaments) Fishing Circuit, a series of 9 offshore, recreational fishing tournaments that occur off Port Canaveral, Sebastian, Ponce, and Ft. Pierce.

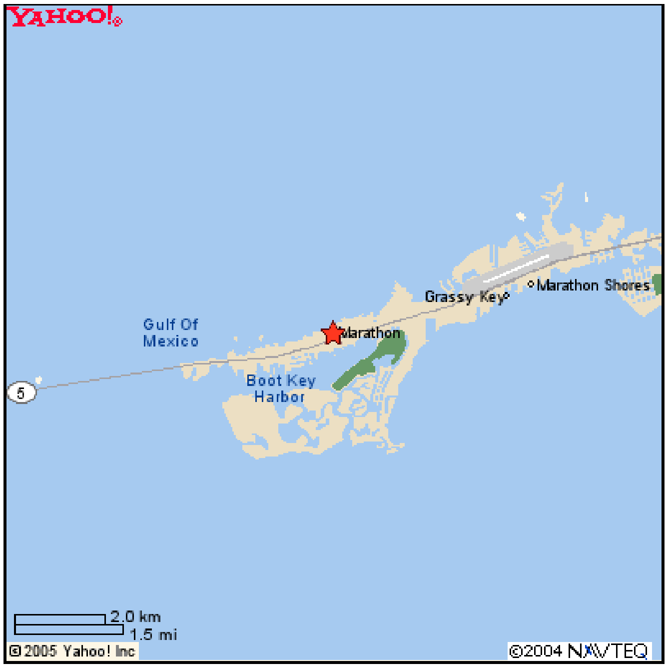


Figure 3-40. Map of Monroe County, Florida.
Source: Yahoo Maps, http://www.yahoo.com.

Community Profile
History

Like the development of many of the Keys, Marathon's history is closely tied to fishing and the water. Marathon is a short drive down the island chain from Miami and mainland Florida. Marathon is also accessible by air as over the last decade attempts to modernize the local airport have created increased private and commercial traffic. Marathon, or Key Vaca, as it was initially named by the Spanish, was originally settled in the early 1800s by a group of Bahamians and numerous families from Mystic, Connecticut. The people were probably tied to fishing and earliest settlement activities were centered around fishing and farming. One of the other main activities occurring in the Keys at this time was the salvaging of cargo from the Spanish Galleons. People would salvage a variety of items from the shipwrecks and lay claim to these items in order to sell (http://floridakeys.com/marathon/history.htm).

Marathon was named during the building of Henry Flagler's railroad. While building the tracks on this island in the middle of the Florida Keys, a worker made the comment that the job was a marathon (www.floridakeys.com). Apparently the name stuck and even outlasted the existence of the railroad. Henry Flagler's Overseas Railroad was completed in the early 1900s and allowed for the fishing industry to flourish by opening up transportation pathways for a variety of products to be sold outside of the Keys. Some of the earliest commercial endeavors out of Marathon began with the Miami Ice and Fish Company coming to Marathon to buy catches from local fishermen, then packing the fish on ice and putting them on the train to be disbursed throughout the Country. However, in 1935 much of this commercial transportation was halted by the Great Hurricane, which destroyed the train tracks and all future train travel throughout the area. Shortly after the hurricane, the construction of a highway began and replaced the need of train travel. This opened up the Keys to increased numbers of tourists and subsequent tourism related businesses. The service industry began and shortly thereafter Marathon became known as a resort and sport fishing destination (http://floridakeys.com/marathon/history.htm). "Throughout the Keys, visitors started to become the most important product and charter fishing would become an industry unto itself, as an element of increased tourism" (http://www.keyshistory.org/keylargopage2.html).

Current Situation

An analysis of socio-demographic data from the U.S. Census Bureau provides insight into some the changes and trends between 1990 and 2000. One of the more interesting differences between 1990 and 2000 relates to increases in total population and ethnicity (Table 3-81). There was an increase in overall population over this time frame (1,398 people), but what is most interesting about the population figures is the fact that the Hispanic population more than doubled in the last 10 years (from 1,040 to 2,095). This increase accounts for more than two thirds of the total population increase for the area.

Table 3-81. Community demographics for Marathon, Florida.
*Source: US Census Bureau.

Years (Table 3-81)	**1990**	**2000**
Total population	8857	10255
Gender (Percent of total population)		
Male	51.6	52.5
Female	48.4	47.5
Age (Percent of total population)		
Under 18 years of age	18.0	17.3
18 to 64 years of age	64.1	66.7
65 years and over	17.9	16.0
Ethnicity or Race (Number)		
White	8053	9341
Black or African American	580	477
American Indian and Alaskan Native	31	37
Asian*	N/A	49
Native Hawaiian and other Pacific Islander*	N/A	4
Some other race	138	205
Two or more races*	N/A	142
Hispanic or Latino (any race)	1040	2095
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	9.5	4.9
Percent high school graduate or higher	72.0	80.5
Percent with a Bachelor's degree or higher	16.1	21.0
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	16.6	23.6
And Percent who speak English less than very well	8.2	13.1
Median household income	$25,483	$36,010
Poverty Status (Percent of population with income below poverty line)	15.1	14.2
Percent female headed household	7.7	7.5
Home Ownership (Number)		
Owner occupied	2589	2904
Renter occupied	1363	1693
Value Owner-occupied Housing (Median $)	$141,600	$222,500
Monthly Rent (Median $)	$477	$472
Employment Status (Population 16 yrs and over)		
Percent in the labor force	59.0	63.7
Percent of civilian labor force unemployed	3.9	3.5
Occupation		
Management, professional, and related occupations*	N/A	22.4
Service occupations*	N/A	25.3
Sales and office occupations	14.7	22.1
Farming, fishing, and forestry occupations	8.7	4.1
Construction, extraction, and maintenance occupations*	N/A	15.0
Production, transportation, and material moving occupations*	N/A	11.1
Industry		
Agriculture, forestry, fishing and hunting and mining	9.0	4.1
Manufacturing	4.4	2.1
Percent government workers	11.9	9.3
Commuting to Work (Workers 16 yrs and over)		
Percent in carpools	17.8	9.6
Percent using public transportation	8.7	2.2
Mean travel time to work (those who did not work at home)*	N/A	15.2
Percent worked outside of county of residence*	N/A	N/A

* Some values could not be determined accurately due to changes in the way the Census Bureau tabulates responses, or to changes in the categories themselves.

Marathon has one of the highest percentages of total population involved in farming, fishing, and forestry (because there is little commercial farming and forestry occurring in the area, it is easy to make the assumption that the majority of percentage is directly attributable to fishing activities – especially commercial and for hire fishing). The total population involved in this category was 4.1%; however, there is a significant decline from the 8.1% in 1990. There are probably numerous forces, which have caused people to leave this industry, perhaps death, retirement, regulatory change, economic viability, or the perception of younger generations that fishing is not for them. The percentage of people who live below the poverty line has decreased between 1990 and 2000; however, the numbers are still high (14.2%).

Commercial Fishing

For almost 150 years t people have been fishing the waters around Marathon. The catch was not only sold to local markets but as transportation improved and demand increased, the marine resources harvested in the area were sold within Florida and to other national and international markets (http://floridakeys.com/marathon/history.htm). Commercial fishing is still an important aspect of the lives of many people in Marathon. Driving through Marathon reveals numerous homes where yards are full of boats and fishing equipment is being stored or repaired (especially visible are the lobster and crab traps). During a field visit in 2003, it seemed commercial fishing was still a common denominator for many of Marathon's residents. Staying at a local Holiday Inn, the night clerk was asked for directions to one of the fish houses supposedly nearby. She responded by asking who the researcher was looking for, and then provided a list of fishermen in the area. When the researcher mentioned someone else by name, she hesitated, and claimed the fisherman in question was from "the other group." She explained there were different groups, or factions, of fishermen and they all were not on the friendliest terms. Similar reactions and stories came from waitresses, bartenders, and convenience store clerks – those who are not often with direct ties to the fishing industry. These small events gave the researcher the impression there is still a core community of local residents who see fishing as integral to community life, no matter how much there is an overlay of newly settled residents who see tourism and other development as essential activities for Marathon.

However, for some in the commercial industry there is a growing apprehension about the future of fishing. The fear stems from increased pressure from the recreational sectors and environmental groups (having been made wary already by the creation of the Florida Keys Marine Sanctuary) and the increased regulatory restrictions coupled with flat values of local catch and increasing costs (especially fuel), thus limiting the economic viability of fishing. Currently, many of Marathon's commercial boats are beginning to share space in recreational marinas such as at Key's Fisheries, where the owner has made one part of the slips for recreational boats, and the other area for commercial dockage. While this seems to work well because the owner is sympathetic to and buys fish and shellfish from the commercial boats, such an arrangement is harder to come by in other area. And, as efforts to develop tourism continue, it is feared the increased value for coastal areas where fish houses are located, eventually will change the fisheries to one that is completely recreational.

1999 was the highpoint for snapper grouper vessels in Marathon, reaching a peak over the last 6 years of 108 vessels (Table 3-82). The majority of those with permits have commercial king and Spanish mackerel permits. Other types of fisheries that occur in Marathon are spiny lobster and stone crab. According to Table 3-83 there are 92 persons employed in the fish and seafood sector of fishing related employment. There are 39 in the fishing sector and 47 in marinas. These numbers may not reflect certain kinds of labor (such as day labor, undocumented crew, or family members that help with the book keeping responsibilities).

Table 3-82. Number of federal permits by type for Marathon, Florida.
Source: NMFS 2002, Jepson *et al.* (2005).

Type of Permit	1998	1999	2000	2001	2002	2003	2004
Charter/Headboat for Snapper Grouper	36	16	22	57?		N/A	30
Snapper Grouper Unlimited	52	65	58	56	53	N/A	44
Snapper Grouper Limited	38	43	46	44	39	N/A	31

Table 3-83. Employment in fishing related industry for Marathon, Florida.
Source: Zip code Business Patterns, U.S. Census Bureau 1998, Jepson *et al.* (2005).

Category	NAIC Code	Number Employed
Fishing	114100	39
Seafood Canning	311711	0
Seafood Processing	311712	0
Boat Building	336612	0
Fish and Seafoods	422460	92
Fish and Seafood Markets	445220	6
Marinas	713930	47
Total Fishing Employment		184

Recreational Fishing

Marathon is situated at the mid-point of the Florida Keys island chain, which is why locals have declared their home “The Heart of the Keys.” The city boasts resorts, luxury condo and home rentals, numerous restaurants, shopping and all the conveniences of a modern community, including a 58-bed hospital. Even though there have been efforts to modernize the community it is said that Marathoners have modernized their community without losing their roots as a 19th-century fishing village (www.fla-keys.com/marathon).

While most of the waters around Marathon are open to fishing, some areas have been set aside purely 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 (www.fla-keys.com/marathon).

Marathon is well situated for recreational fishing. It offers mainland Floridians as well as tourists that fly into Miami or Marathon, the opportunity to come and participate in a variety of fishing activities, such as flats fishing, inshore fishing, offshore fishing and diving for lobster and fish. The area has developed with fishing as a main theme/attraction. Many of the local resorts have their own docking facilities or are located conveniently near public docking facilities. There are also numerous guides and charters available for those who are on vacation and do not have their own boats and gear. Marathon also offers land-based fishing, meaning that people are able to engage in fishing from shore as well as from bridges. It is not uncommon to find people on the Keys' bridges fishing next to elaborate tent setups. Marathon offers one of the best bridge fishing experiences in the Keys, as the old seven mile bridge is a popular fishing location for locals and tourists alike.

Offshore fishing is a said to be "excellent" for trolling for pelagic species such as sailfish, dolphin fish, and wahoo. Marathon provides anglers with an added advantage over some other places throughout the Keys, the Marathon West Hump. This Hump ranges in depth from 1,100 feet to a peak of 480 feet. It creates an "underwater platform" and is said to be a veritable dinner table in the Gulf stream for gamefish, and a prime for targeting blue and white marlin, Mako shark, blackfin tuna, amberjack and a number of other pelagic and bottom species (www.fla-keys.com/marathon).

Reef fishing in Marathon provides anglers with great fishing for yellowtail, mangrove, and mutton snapper, along with grouper, mackerel, and the ever-present barracuda. With its beautiful coral reefs, Marathon also has numerous ocean-side artificial reefs. Depths of these artificial reefs range from 25-200 feet, providing a wide variety of angling opportunities for both surface, mid-depth, and bottom dwelling species (www.fla-keys.com/marathon).

There are more than 25 charter boat businesses in the area, some having more than one boat and suitable for most types of fishing. The charters cater to all types of fishing, from inshore bottom fishing to offshore big game fishing. As well there are flats boats that cater to the bone and tarpon fishing.

There are two party boats that cater to larger groups of people (either as a group or group of individuals). The party boats are much more likely to target reef species such as groupers and snappers, however there are some trips designed for target pelagic species as well.

There are 27 marinas located in the Marathon area. This is a good measurement of how dependent the local area is on recreational boating and fishing. Many of these facilities provide full or partial service for fishermen, such as fuel, ice, and other supplies. Some of the marinas are associated with dive centers and this caters not only to the recreational diver, but to spearfishermen who fish the local waters.

According to the Web, there are 8 tackle and bait shops in the Marathon area. These local businesses are dependent on local and non-local fishermen to be successful. As well they are dependent on the resource being available to attract tourists to the area to fish.

There are seven fishing tournaments in Marathon. The majority of the tournaments are centered around 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 receive the economic benefit 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.

3.5 Administrative Environment

3.5.1 The Fishery Management Process and Applicable Laws

3.5.1.1 Federal Fishery Management

Federal fishery management is conducted under the authority of the Magnuson-Stevens Fishery Conservation and Management Act (M-SFCMA) (16 U.S.C. 1801 et seq.), originally enacted in 1976 as the Fishery Conservation and Management Act. The M-SFCMA 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, which 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-SFCMA and with other applicable laws summarized in Section 7.0. In most cases, the Secretary has delegated this authority to NMFS.

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 NMFS; 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.

3.5.1.2 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.

NMFS' 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.

3.5.2 Enforcement

There is a perception by some fishery stakeholders that a lack of enforcement is a major impediment to successful fishery management in the South Atlantic region (The Heinz Center 2000). As discussed below, multiple agencies provide enforcement assets to Federal fisheries concerns in the South Atlantic region.

Both the National Oceanic and Atmospheric Administration (NOAA) Fisheries Office for Enforcement (NOAA/OLE) and the U.S. 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 $130,000 per violation.

3.5.3 Science Underlying the Management of Snapper Grouper Species

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 (SEDAR) process. The SEDAR process consists of a series of workshops aimed at ensuring each assessment is based on the best available scientific information.

First, representatives from NMFS, 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 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 NMFS, 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 (Vermilion Snapper and 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.

3.5.3.1 Snowy Grouper

The data workshop convened in Charleston, South Carolina during the week of November 3, 2003 to examine data from eight deep-water species for assessment purposes. The group determined data were adequate to conduct assessments on snowy grouper and golden 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 the snowy grouper assessment. Commercial and recreation 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 snowy grouper population (SEDAR 4 2004). The population was determined to be overfished and experiencing overfishing. In the absence of fishing it was determined that it would take 13 years to rebuild the stock to the biomass at maximum sustainable yield (B_{MSY}). The maximum rebuilding time is 34 years based on the formula: T_{MIN} (13 years) + one generation time (21 years).

3.5.3.2 Golden Tilefish

There were two indices of abundance available for the tilefish stock assessment (SEDAR 4 2004). A fishery-independent index was developed from MARMAP horizontal longlines and a fishery-dependent index was developed from commercial logbook data during the data workshop. Commercial and recreation 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 (SEDAR 4 2004). It was determined that the golden tilefish population was not overfished but overfishing was occurring.

3.5.3.3 Vermilion Snapper

The vermilion snapper 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 by the data workshop. One CPUE index was developed from the NMFS headboat survey, 1973-2001. Three indices were derived from CPUE observed by the South Carolina MARMAP fishery-independent monitoring program ("Florida" trap index, 1983-1987; hook and line index, 1983-1987; and chevron trap index, 1990-2001) (SEDAR2 2003 a). A forward-projecting model of catch at length was formulated for this stock.

Two other models (forward-projecting catch at age and age-aggregated production model) were applied but neither could provide estimates. The assessment was based on the catch-at-length model, which was applied in a base run and eight sensitivity runs. The assessment indicated that the stock was undergoing overfishing but that there was a high level of uncertainty in the biomass level given that the stock recruitment relationship was poorly defined. Therefore, no determinations could be made concerning whether the stock was overfished.

3.5.3.4 Black Sea Bass

Black Sea Bass was assessed at the second SEDAR (SEDAR 2 2003b). 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 by 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) (SEDAR 2 2003b).

Age-structured and age-aggregated production models were applied to available data at the assessment workshop. The age-structured model was considered the primary model, as recommended by participants in the data workshop. The stock assessment indicated black sea bass was overfished and overfishing was occurring.

At the request of the South Atlantic Council, the SEDAR panel convened to update the 2003 black sea bass stock assessment, using data through 2003, and to conduct stock projections based on possible management scenarios (SEDAR Update #1 2005). The update indicated the stock was still overfished and overfishing was still occurring but results showed the stock was much more productive that previously indicated. The stock could be rebuilt to the biomass level capable of producing the maximum sustainable yield in 5 years if all fishing mortality were eliminated; previously this was estimated to take 11 years (SEDAR 2 2003b).

3.5.3.5 Red Porgy

Red porgy was the subject of the first SEDAR assessment that expanded on previous assessments conducted by Vaughan *et al.* (1992), Huntsman *et al.* (1993), 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) (SEDAR 1 2002).

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, given the different assumptions used by each type of model and the lack of age structure in the production models, this degree of agreement with the models increased confidence in the assessment results. It was concluded the stock was overfished, but overfishing was not occurring due to the management regulations developed by the South Atlantic Council. Recent work done in association with SEDAR 1 (2002) indicates the stock is rebuilding and harvest can be increased.

3.5.4 Method of Calculating Percentage Reductions in Catch

Several methods were examined to determine the required reduction in catch. The simplest approximation would be to compare the ratio of instantaneous fishing mortality rates (Table 3-84).

Table 3-84. Reduction based on instantaneous Fcurrent (Fc) and F_{MSY}.

Species	Fc	F_{MSY}	Fc/F_{MSY}	reduction
Vermilion snapper*	0.6	0.375	1.600	37.50%
Black Sea Bass	2.64	0.43	6.140	83.71%
Golden Tilefish	0.066	0.043	1.535	34.85%
Snowy Grouper	0.154	0.05	3.080	67.53%

* Fproj used as a proxy for Fc and F_{MAX} used as a proxy for F_{MSY}

In a document dated June 18, 2003, the NMFS Beaufort Population Dynamics Team states a more accurate approximation for computing the required reduction in catch is to use the Baranov catch equation. The Baranov equation relates catch (*Ct*) in time period *t* to the number (*Nt*) at the start of period, the fishing mortality rate (*Ft*) during the period, and the natural mortality rate (*M*). Incorporating the notation that $Zt = Ft + M$, the Baranov equation is written as:

$$Ct = Ft/Zt * Nt\,[1\text{-}\exp(-Zt)]$$

Population size cancels out leaving:

$$\text{Reduction} = 1- \frac{(Fmsy/Zmsy)[1-\exp(-Zmsy)]}{(Fcurr/Zcurr)[1-\exp(-Zcurr)]}$$

Reduction in catch based on the Baranov equation are shown in table 3-85.

Table 3-85. Reduction based on Baranov equation that accounts for natural mortality (M).

Species	Ec	E_{MSY}	M	Ec/E_{MSY}	Reduction
Vermilion snapper*	0.404	0.279	0.25	1.45	31.01%
Black Sea Bass	0.850	0.305	0.3	2.79	64.12%
Golden Tilefish	0.061	0.040	0.08	1.52	34.11%
Snowy Grouper	0.135	0.046	0.12	2.93	65.87%

Reductions in catch were also determined by examining the relationship of Fcurrent to F_{MSY} after it is converted from an instantaneous rate to an annual rate. To convert an instantaneous rate to an annual rate one uses the equation $1\text{-}e^{-F}$ where e = 2.71828 (Table 3-86). Reductions in catch provided by converting instantaneous rates to annual rates were very similar to those provided by the Baranov equation.

Table 3-86. Reduction based on annual Fcurrent (Fc) and F_{MSY}. Instantaneous F converted to annual F (Exploitation Rate E) using equation $1 – e^{-F}$ where e = 2.71828.

Species	Ec	E_{MSY}	Ec/E_{MSY}	Reduction
Vermilion snapper	0.451	0.313	1.443	30.69%
Black Sea Bass	0.929	0.349	2.657	62.37%
Golden Tilefish	0.064	0.042	1.517	34.10%
Snowy Grouper	0.143	0.049	2.927	65.83%

Reductions for snowy grouper and golden tilefish based on exploitation rates provided by the assessment are shown in Table 3-87. The assessments for snowy grouper and golden tilefish provided separate median values for fishing mortality rates (F, F_{MSY}) as well as exploitation rates (E, E_{MSY}).

Table 3-87. Reduction based on annual Fcurrent (Fc) and F_{MSY}. Instantaneous F converted to annual F (Exploitation Rate E) using equation $1 – e^{-F}$ where e = 2.71828.

Species	Ec	E_{MSY}	Ec/E_{MSY}	reduction
Golden Tilefish	0.054	0.035	1.543	35.19%
Snowy Grouper	0.115	0.037	3.108	67.83%

Reductions based on instantaneous and annual rates for snowy grouper and golden tilefish are very similar because the Fs are so small. When Fs are larger (as in vermilion snapper and black sea bass), there is a greater difference between an instantaneous rate and an annual rate.

3.5.5 Quota Monitoring

Commercial quotas proposed for snowy grouper, golden tilefish, black sea bass, vermilion snapper, and red porgy would be monitored by the NMFS Southeast Fisheries Science Center (SEFSC). It is anticipated that the methods for monitoring quotas would be similar to what is currently used in the Gulf of Mexico to monitor grouper landings. Landings information would be obtained from dealers. Dealer selections will be made for a calendar year based on the production for the previous year. Selected dealers would be notified that they must report landings by the 5th of a following month, even if no purchases were made. The SEFSC would provide periodic reports to NMFS Southeast Regional Office (SERO) and the Council (at least prior to each Council meeting). In addition, timing of possible closures would be estimated.

Periodically, quota monitoring data would be compared to general canvas landings data for the same dealers. The purpose is to determine if selected dealers provide an acceptable percentage of total reported landings. The review of the general canvass landings data are also used to identify new dealers handling quota species. If new dealers are identified or if the percentage of landings accounted for by selected dealers drops below a specified percentage, additional dealers would be required to report landings. In the Gulf of Mexico dealers are required to report the total landings (purchases) for either a two-week period or the entire calendar month. The timing for dealer reporting of snowy grouper, golden tilefish, vermilion snapper, black sea bass, and red porgy needs to be determined.

Dealers would have the option of two methods to submit data: (1) a paper form faxed to SEFSC or (2) online reporting.

To enter and use the online system, the dealer would use a valid user login ID and password. This system is secure and only users with valid user ID's and passwords can access it. Furthermore, the user ID and password would be unique for each dealer and will only allow access to the data entered by an individual using that password. All entries would be logged on a tracking database and each time a user enters the system and makes a change to the data, that entry, and the changes are recorded, along with the date and time the changes were made. Instructions would be provided to the dealers on how to use the online system.

4.0 BIOLOGICAL/ECONOMIC/SOCIAL/ADMINISTRATIVE EFFECTS

Note #1: Proposed Quotas and Total Allowable Catch are rounded to the nearest 1,000 lbs for gutted weight and whole weight. Proposed trip limits are rounded to the nearest 5 lbs for gutted weight and whole weight.

Note #2: Quotas considered for all species, except black sea bass, are based on the calendar year. If harvest were to exceed a quota adopted or adjusted in this amendment before the regulations were implemented, then all purchase and sale is prohibited and harvest and/or possession is limited to the bag limit of that species upon the effective date of the final rule.

Note #3: The alternative quotas for black sea bass are based on a new fishing year of June 1 through May 31. Should a quota be implemented, landings beginning on June 1, 2006 would be used to track quotas. It is expected that the amendment will be implemented sometime during the summer.

Note #4: In this amendment new fishing mortality (F) values from recent SEDAR assessments are compared with the Council's existing maximum fishing mortality thresholds (MFMT) that the Council has specified as the fishing mortality rate that produces maximum sustainable yield (F_{MSY}). Management measures are being considered to end overfishing. Other measures (e.g., stock status determination criteria, species groupings, rebuilding programs, etc.) for the species in this amendment are being addressed in Snapper Grouper Amendment 15 that the Council intends to complete in 2006.

Note #5: During the September 2005 meeting the Council reviewed Draft Regulatory Amendment 9. However, because the black sea bass fishing year cannot be changed through the framework provisions of the Snapper Grouper FMP, the regulatory amendment became Plan Amendment 13C.

4.1 Snowy Grouper

4.1.1 Background

Snowy grouper are experiencing overfishing, since current fishing mortality exceeds the fishing mortality, which would achieve the maximum sustainable yield (SEDAR 4 2004). Overfishing is defined as a fishing mortality rate (F) exceeding the maximum fishing mortality threshold (MFMT), which the Council has specified as F_{MSY}. Current F is 0.154, while F_{MSY} is 0.05. A 66% reduction in catch is needed to end overfishing immediately. Current Spawning Potential Ratio is 11%.

SEDAR 4 (2004) Assessment
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. The group determined 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 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. 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 snowy grouper was overfished and overfishing was occurring in 2002. In the absence of fishing it was determined 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 Council is currently considering alternative rebuilding schedules and strategies for snowy grouper in Amendment 15 to the Snapper Grouper FMP.

The estimated stock status for snowy grouper in 2002 is quite low, median of 18% for SSB(2002)/SSBmsy. 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, which covers the whole time period of the model. The headboat CPUEand 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, which 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.

Research recommendations from the assessment identified a number of items, which would strengthen the results of future snowy grouper assessments. These include:

1. Resolve ageing discrepancies between laboratories, continue efforts to standardize techniques and resolve the systematic discrepancies in age determinations. Additional research should be undertaken to verify and validate age determinations.
2. Quantify discard rates and identify management strategies that could reduce discard mortality. Discarding may become an increasingly important concern as the stock recovers.
3. Fishery-independent data collected by the MARMAP program are important to understanding the dynamics of this population, and the National Research Council has recommended that fishery independent data play a more important role in stock assessment. However, it has been noted that the MARMAP sampling programs do not have ideal extent, both in area coverage and in sampling intensity, for many important species in the South Atlantic snapper–grouper complex. It would be highly desirable for the MARMAP program to receive sufficient funding to expand its coverage and thus provide improved measures of stock abundance.
4. Representative age, length, and sex composition data are needed for all fisheries, seasons, and areas.
5. Additional life history and biological research is needed, especially data covering the full geographic range of the species. Among other items, fecundity and reproductive research is needed (batch fecundity and frequency at age and/or size).
6. Further research is needed into the implications of sex change for fishery management.

Review of Previous Stock Assessments

The first stock assessment for snowy grouper was conducted in 1990 (PDT 1990) using data from 1972 through 1988/89. Spawning Stock Ratio (SSR) (considered to be the same as Spawning Potential Ratio (SPR)) was calculated separately for recreational and commercial fisheries:

Table 4-1. Spawning Stock Ratio (SSR) values for snowy grouper from PDT (1990).

SPECIES	RECREATIONAL	COMMERCIAL
Snowy Grouper	Carolinas = 10%	Carolinas = 15%
		Florida = 36 - 40%

A series of stock assessments conducted by NMFS (1991), Huntsman *et al.* (1992); and Potts and Brennan (2001) provided estimates of SSR/SPR based on catch curves (Table 4-2).

Table 4-2. Spawning Stock Ratio (SSR) values for snowy grouper from NMFS (1991); Huntsman *et al.* (1992); and Spawning Potential Ratio from Potts and Brennan (2001).

Species	Assessment Year	Catch Data From	Overall SSR
Snowy Grouper	1991	1988	15%
	1992	1990	15%
	2001	2000	10 - 19%

Landings information

During 1999-2003, 73% of the commercial catch was with hook and line gear and 27% was with longline gear. Most snowy grouper were landed off North Carolina followed by East Florida and Monroe County, Florida (Table 4-3).

Table 4-3. The percentage of snowy grouper landed by state during 1999-2003.
Source: NMFS Accumulative Landings System.

Area	Percent
Monroe County	18.2
Eastern Florida	14.3
Georgia	1.5
South Carolina	23.2
North Carolina	42.7

Landing peaked in 1997 at 718,000 lbs whole weight but decreased to 298,000 lbs whole weight in 2003 (Figure 4-1). Regulations, which may have affected the catch of snowy grouper, are shown in Table 4-4 and Figure 4-1.

Table 4-4. Snowy grouper regulations.

Regulation	Effective Date	Plan or Amendment
Prohibit trawls	1/12/89	Amendment 1 (SAFMC 1988)
Prohibit fish traps, entanglement nets & longlines within 50 fathoms; 5 grouper bag limit; rebuilding timeframe	1/1/92	Amendment 4 (SAFMC 1991)
Commercial quota phased-in: 540,314 lbs gutted weight in 1994 442,448 lbs gutted weight in 1995 344,508 lbs gutted weight in 1996 onwards; Commercial trip limits = 2,500 lb (gutted); Commercial bycatch limit = 300 lbs (gutted); Snowy grouper added to grouper aggregate bag limit; Established *Oculina* Experimental Closed Area	6/27/94	Amendment 6 (SAFMC 1993)
Limited entry program: transferable permits and 225-lb non-transferable permits	12/98	Amendment 8 (SAFMC 1997)
Vessels with longlines may only possess deepwater species	2/24/99	Amendment 9 (SAFMC 1998c)

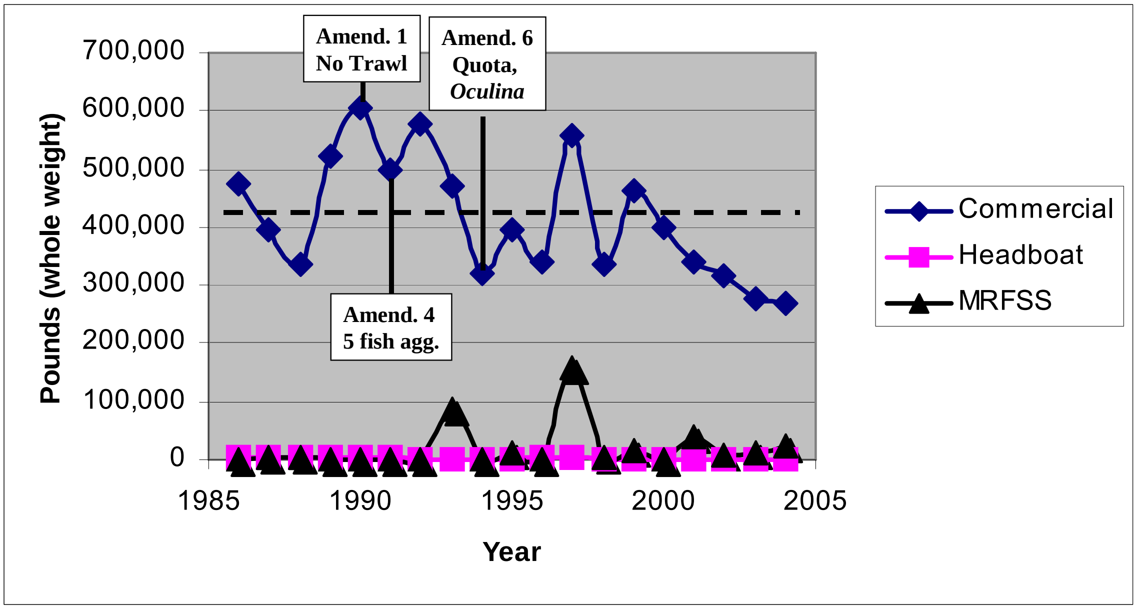


Figure 4-1. Annual landings (lbs whole weight) of snowy grouper 1986-2004. Commercial landings are from the NMFS Accumulative Landings System (ALS), Headboat data are from NMFS-Beaufort, and MRFSS data are from the MRFSS web site. Dotted line represents quota of 344,508 lbs gutted weight (406,519 lbs whole weight) implemented in 1994.

Snowy grouper are primarily taken by commercial fishermen (Figure 4-2). Recreational catch is minor because this is a deep water species. Based on data from ALS, MRFSS, and the Headboat Survey, recreational landings made up about 4% of the landings during 1999-2003. The mean length of snowy grouper taken with all commercial gear decreased from an average of 25.3" total length in 1984 to 21.1" total length in 2003 (Figure 4-3). The mean length of snowy grouper taken by headboat and recreational fishermen also exhibited declining trends during 1984-2003; however, there was considerable fluctuation due to the small sample sizes.

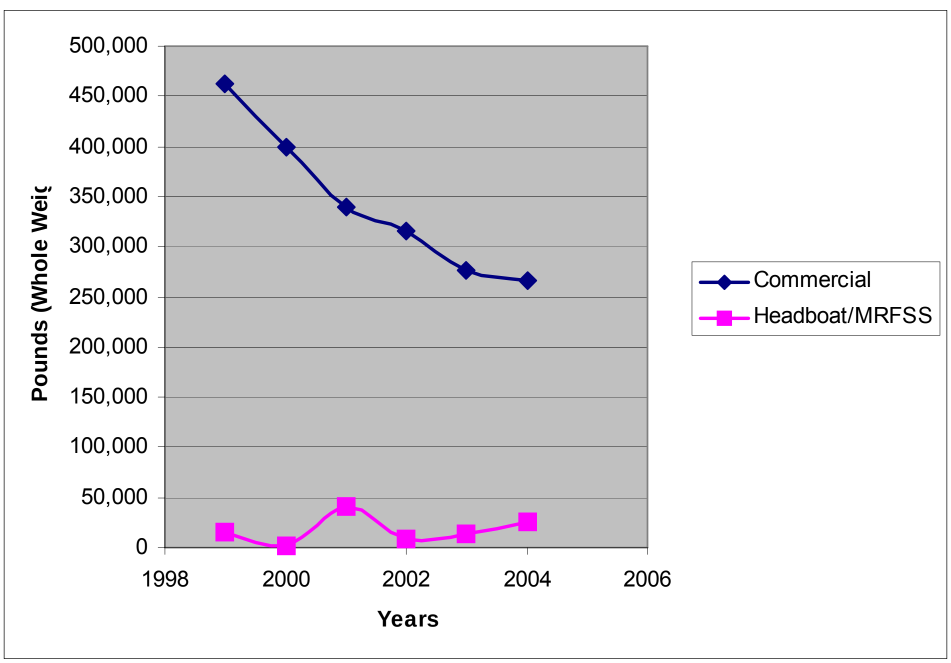


Figure 4-2. Annual landings (lbs whole weight) of snowy grouper (1999-2004). Commercial landings are from the NMFS Accumulative Landings System (ALS), Headboat data are from NMFS-Beaufort, and MRFSS data are from the MRFSS web site.

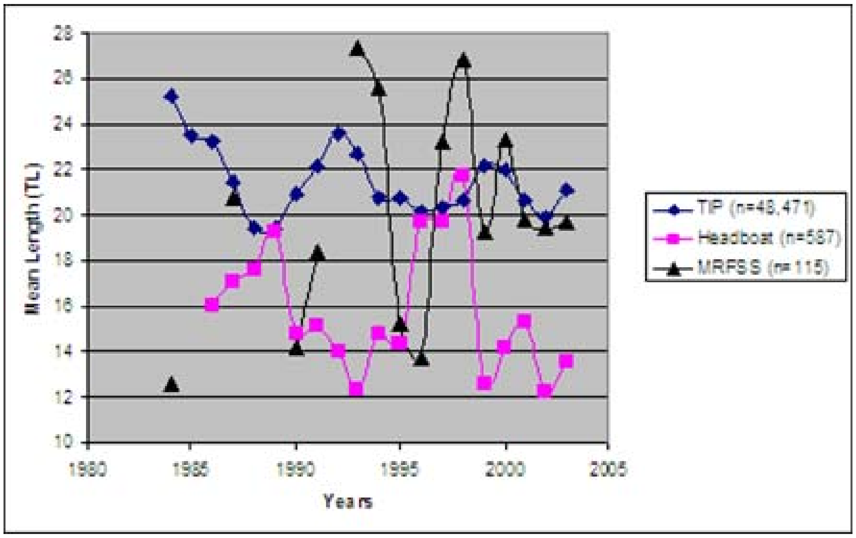


Figure 4-3. Mean lengths (inches, total length) of snowy grouper taken by commercial, headboat, and recreational (MRFSS) fishermen during 1984-2003.

Compliance

The quota is tracked in gutted weight. Current quotas (in lbs gutted weight) are provided in Table 4-5.

Table 4-5. Current commercial quota (lbs gutted weight) for snowy grouper.

Fishery	TAC (Pounds)	Bycatch Set-Aside (Pounds)	Directed Quota (Pounds)
Snowy Grouper	440,508	96,000	344,508

The snowy grouper trip limit is 2,500 lbs until the directed quota is met, then the trip limit decreases to 300 lbs to account for incidental catch (bycatch) while fishing for other species.

The directed quota was exceeded in August 1997; however, the trip limit was not reduced to 300 lbs until December 20 through December 31, 1997. This resulted in catches exceeding the TAC by 31,470 lbs or 7%. The directed quota was also exceeded in November 1999; however, the trip limit was not reduced prior to the end of the year. This did not result in the TAC being exceeded (388,210 lbs harvested; 52,298 lbs or 12% below the TAC). The last time catches exceeded the directed quota was in October 2000 and the snowy grouper trip limit was reduced to 300 lbs effective 12:01 a.m., local time, October 1, 2000 through December 31, 2000 [65 Federal Register 56801]. However, the TAC was not exceeded; catches were 90,842 lbs (21%) below the TAC.

The directed quota was not exceeded in 1998 (35% or 154,201 lbs below quota), 2001 (34% or 149,804 lbs below quota), 2002, 2003, or 2004. The trend of landings thus far in 2005 indicates the directed quota will not be exceeded although weather may be an important factor. The numbers of hurricanes by year is presented in Table 4-6.

Table 4-6. Number of hurricanes by year affecting the South Atlantic Fishery Management Council area.

Year	Number Hurricanes in SAFMC Area
1997	-
1998	1 off NC
1999	3 off East Coast
2000	-
2001	4 off NC
2002	-
2003	1 off NC
2004	2 off East Coast

4.1.2 Management Measures

4.1.2.1 Commercial

Alternative 1. **No action.** The annual commercial snowy grouper quota is 344,508 lbs gutted weight (406,519 lbs whole weight). A commercial trip limit of 2,500 lbs gutted weight (2,950 lbs whole weight) applies until the quota is taken. An incidental catch allowance of 300 lbs gutted weight (355 lbs whole weight) per trip applies after the quota has been taken. Note: The regulations specify gutted weight only.

Alternative 2. Reduce the annual commercial snowy grouper quota from 344,508 lbs gutted weight (406,519 lbs whole weight) to 84,000 lbs gutted weight (99,000 lbs whole weight). After the commercial quota is met, all purchase and sale is prohibited and harvest and/or possession is limited to the bag limit.

Alternative 2A. Specify a commercial trip limit of 100 lbs gutted weight (115 lbs whole weight) until the quota is met.

Alternative 2B. Specify a commercial trip limit of ten snowy grouper until the quota is met.

Alternative 3. **Preferred.** Reduce the annual commercial snowy grouper quota from 344,508 lbs gutted weight (406,519 lbs whole weight) to 151,000 lbs gutted weight (178,000 lbs whole weight) in year 1; to 118,000 lbs gutted weight (139,000 lbs whole weight) in year 2; and to 84,000 lbs gutted weight (99,000 lbs whole weight) in year 3 onwards until modified. Specify a commercial trip limit of 275 lbs gutted weight (325 lbs whole weight) during year 1; 175 lbs gutted weight (210 lbs whole weight) during year 2; and 100 lbs gutted weight (115 lbs whole weight) during year 3 onwards until modified. These trip limits apply until the quota is met. After the commercial quota is met, all purchase and sale is prohibited and harvest and/or possession is limited to the bag limit.

Discussion

A commercial quota of 84,000 lbs gutted weight (99,000 lbs whole weight) as specified in **Alternative 2** represents a 69% reduction in harvest from average landings during 1999-2003, and would end overfishing during 2006-2010. The step-down quotas specified in **Preferred Alternative 3** would end overfishing during 2009. The trip limit components of these alternatives are intended to extend the duration of the fishing season as long as practicable.

4.1.2.2 Recreational

Alternative 1. **No action.** Snowy grouper are included in the 5-grouper per person per day aggregate recreational bag limit.

Alternative 2. Limit the possession of snowy grouper to two per person per day within the 5-grouper per person per day aggregate recreational bag limit.

Alternative 3. **Preferred.** Limit the possession of snowy grouper to one per person per day within the 5-grouper per person per day aggregate recreational bag limit.

<u>Discussion</u>

Currently up to five snowy grouper could be retained per person per day under the 5-grouper per person per day aggregate bag limit. A bag limit of two snowy grouper as specified in **Alternative 2** would reduce total recreational mortality by 3.6% if the release mortality rate were assumed to be 90%, and 0.4% if the release mortality rate were assumed to be 99%. A bag limit of one snowy grouper as specified in **Preferred Alternative 3** would reduce total recreational mortality by 5.0% or 0.5%, assuming a 90% or 99% release mortality rate, respectively.

The Council's Scientific and Statistical Committee recommended using a 100% release mortality rate; therefore, reducing the bag limit would not reduce recreational fishing mortality if fishermen continued to target snowy grouper because all released fish would die. However, the Council believes reducing the bag limit might provide an incentive to avoid snowy grouper.

4.1.3 Biological Effects of Management Measure Alternatives

Fishery management measures directly affect target and bycatch species by influencing the rate of fishing mortality, as well as the amount and distribution of fishing effort, applied to a fishery. This analysis examines the type(s) and extent of potential effects resulting from adjusting established management measures for snowy grouper.

4.1.3.1 Commercial

Alternative 1 would retain the current regulations used to manage catches of snowy grouper. In general, commercial regulations include an annual quota and trip limit for snowy grouper and a limited access system. In addition, the *Oculina* Bank HAPC is closed to bottom fishing off of the coast of Florida (an area where the species is known to occur).

Total allowable catch quotas (TACs) and trip limits are designed to reduce the number of targeted fishing trips or time spent pursuing a species. Area closures are intended to provide fish populations and/or valuable bottom habitat a refuge from fishing pressure. When properly designed, these types of measures are generally expected to benefit the environment in the short-term and long-term by limiting the extent to which a stock is targeted. However, the extent to which such benefits are realized depends on if and to what extent fishing effort changes or shifts in response to the select management measure. For example, discard mortality can limit the amount by which fishing mortality is reduced by quotas, trip limits, and area closures if fishermen continue to target co-occurring species after the catch quota or limit has been achieved, or within the closed area.

To determine the actual environmental effects of the no action management alternative on snowy grouper, one must first examine current trends in harvest levels, stock biomass levels, and life history characteristics, then predict the direction of future trends under status quo management. The recent SEDAR assessment determined that the snowy grouper stock in the South Atlantic is overfished and currently undergoing overfishing (SEDAR 4 2004). MARMAP catch per unit effort (CPUE), as measured through short longline, has decreased from an average of 4 fish caught per 100 hooks per hour in 2001 to 2 fish caught per 100 hooks per hour in 2004 (Harris and Machowski 2004). CPUE from the headboat industry has decreased for snowy grouper. There are not sufficient data to calculate CPUE from MRFSS data (SEDAR 4 2004).

Wyanski *et al*. (2000) indicate snowy grouper off the Southeastern U.S. is exhibiting many of the symptoms of an exploited population due to a combination of heavy fishing pressure and life history attributes (e.g., slow growth, long life span) that increase the stock's vulnerability to fishing pressure. Significant adverse trends in the size at age, size/age at maturity, size/age at transition, and percentage of males are expected to continue for snowy grouper if status quo commercial management regulations are maintained.

Wyanski *et al*. (2000) report a decrease in the mean length of fish landed in the longline fishery from 65-80 cm in the early 1980s to 50-60 cm in the mid-1990s, consistent with size selective mortality. MARMAP recorded a decrease in mean total fish length of snowy grouper taken with vertical longline gear during 1996 to 2004 (Harris and Machowski 2004). The average length and weight of snowy caught by headboats has decreased 54% and 88%, respectively, since 1972 (SEDAR 4 2004). Furthermore, although Wyanski *et al.* (2000) report snowy grouper up to 29 years old were found, over 80% of specimens caught with longline gear during the 1990s were age 6 or younger. This is consistent with high fishing pressure, where older, larger fish are selectively removed by the fishery. According to SEDAR 4 (2004), snowy grouper may live for as long as 50 years.

Snowy grouper are protogynous, functioning first as females and then transforming to males at older ages and larger sizes (Wyanski *et al*. 2000). However, Wyanski *et al*. (2000) report the percentage of males decreased from 7%-23% to 1% in the 10 years between sampling. If protogynous fish are removed from the population at small sizes and young ages, the sex ratio can become abnormally skewed because fish are unable to transform into males. Shapiro (1987) suggests sex change is socially mediated in many protogynous species where the cues for sexual transition may be provided by the loss of larger males in a group of fish.

Some species, including snowy grouper, gag, and scamp, aggregate annually in the same locations to spawn, making them available for fishermen to target and to remove them in large numbers (Coleman *et al*. 2000). Furthermore, snowy grouper are often associated with structure such as live bottom and rocky outcrops that are easily recognized with a fathometer and can be repeatedly located with the use of GPS. For example, Epperly and Dodrill (1995) observed a newly found, previously unfished, snowy grouper population on a deep reef off the North Carolina coast. The site was fished intensively by nine vessels for less than three months, with about 3% of the population removed daily. After less than two months, over 60% of the exploitable biomass had been caught (19 tons), and within a year, 80% had been removed. In this case, rapid declines in abundance were observed within one year of escalated fishing pressure.

The largest members of an aggregation are often the most aggressive and may be the first to be removed by fishing gear (Thompson and Monroe 1974; Gilmore and Jones 1992). Epperly and Dodrill (1995) found behavior and the presence of more aggressive animals was as important as absolute size or age in determining vulnerability of an individual fish to capture. Because many grouper species (e.g. snowy grouper, gag, scamp) are aggregated for only a portion of the year, the sociodemographic factors responsible for sex change are only in place for a short period. Therefore, in the presence of heavy fishing pressure, it may not be possible for protogynous species, which form temporary spawning aggregations, to maintain a natural sex ratio since larger males are removed from the population when aggregations are not intact.

A decline in the number of males in a population may affect the reproductive fitness of grouper species. For example, large, aggressive males tend to have the favorable genetic characteristics which allow them to live for long periods of time, achieve large sizes, successfully reproduce, etc. Removal of specimens with the best genetic makeup may result in males having less desirable genetic characteristics to engage in successful mating encounters. In an unfished population where large, dominant males are not removed, sex reversal of large females may be naturally inhibited by the presence of these large males. This may allow the population to maintain greater numbers of older females, which have the highest fecundity (Gilmore and Jones 1992). Fishing such a population may indirectly result in more females transforming into males to take advantage of the absence of the dominant males and in an overall reduction in the period of successful mating for any particular fish, therefore reducing fecundity of the population (Gilmore and Jones 1992).

It is possible that the egg production potential of a protogynous stock subjected to selective removal of only males might not be affected as severely as a gonochoristic species where males and females are removed at the same rate. In protogynous species where the sex ratio is skewed toward females, egg production is very high. Therefore, fishing would not necessarily reduce fecundity if it removed only males. This assumes there would be enough males present in aggregations to fertilize eggs of all the females. However, most groupers are subject to fisheries targeting large fish. Therefore, not only are males being selected but also large females with the greatest reproductive potential.

Fishing can indirectly affect fish reproduction by disrupting courtship and mating behaviors in spawning aggregations. These courtship displays can involve elaborate swimming behavior, color changes, and territorial behavior. Disruption of these displays and behaviors could negatively affect reproductive success (Shapiro 1987). Spawning aggregations are made up of fish, which normally reside elsewhere but travel to the spawning location each year. If the location of these sites is learned from previous generations, then depletion of larger individuals could result in decreased site fidelity from later generations because the younger fish cannot find the spawning site (Coleman *et al*. 2000).

Many species of snappers and groupers are extremely vulnerable to overexploitation. Species such as snowy grouper, gag, and speckled hind are slow growing, long lived, and mature at large sizes, which can result in the capture of large numbers of immature fishes (SEDAR 4 2004). For example, the average size of snowy grouper currently caught by commercial fishermen (21” total length) is also the size at which 50% of the fish are mature.

Overfishing snowy grouper also can indirectly affect populations of co-occurring species who share the same habitat. For example, the average size at age, size/age at maturity, size/age at transition, and sex ratio of co-occurring species can change as a result of a reduced need to compete for resources, and selective removal of individuals by the fishing gear. Snowy grouper are generally taken with gag, scamp, red grouper, red porgy, speckled hind, warsaw grouper, golden tilefish, blueline tilefish, blackbelly rosefish, and others. When fishing reduces the abundance of conspecifics or other species that share available resources, the remaining fishes have access to more food and habitat, resulting in higher growth rates and larger size at age (Pitcher and Hart 1982, Rothschild 1986).

However, there is variability in size and growth within fish populations. As fishing pressure intensifies, individuals with a genetic makeup for achieving large sizes may be selectively removed from the population because of gear selectivity or economic value, leaving behind fishes with a genetic disposition for smaller size and slower growth. The overall effect of this heavy, sustained fishing pressure on a fish population can be a reduction in the growth rate, a reduction in size at age, a decrease in the size and age at transition from female to male (for protogynous species) or a decrease in the percentage of males, a decline in the size and age at maturity and first reproduction, a decrease in the size and age structure of the population, a decrease in fecundity, and a decline in the number of spawning events. Snapper grouper species with a shorter lifespan, such as populations of black sea bass and red porgy, would be expected to respond to fishing pressure sooner than species such as snowy grouper and golden tilefish, which have longer lifespans. Continued overfishing may ultimately disrupt the natural community structure of the reef ecosystems that support snowy grouper and co-occurring species.

Russ (1991) defines ecosystem overfishing of a multi-species stock as occurring when "fishing is of such intensity that it results in changes in the relative abundance of species or the species composition of the community". Often, the biomass of some stocks decreases (such as those targeted by fishing gear), while the biomass of some other stocks increases in response (such as an increase in abundance of a competitor of the fished species, or of a species preyed upon by the fished species). Fishing pressure targeting larger fish often results in a shift toward persistence of small individuals of the targeted species. These smaller individuals may occupy a different trophic level than they would if they grew to their normal adult size (Jennings *et al*. 2002). However, Russ (1991) found that "there is usually an overall reduction in CPUE since species that increase in biomass do not "compensate" for declines in others".

Competitor, predator, and prey relationships in marine ecosystems are complex and poorly understood. As a result, the exact nature and magnitude of the ecological effects of management measures are difficult to accurately predict or distinguish. There is evidence that during the mid-1990s, reef communities in the South Atlantic may have been altered by selective fishing pressure that targeted commercially valuable species. McGovern *et al*. (1999) used fishery-independent data collected during 1983-1996 in the South Atlantic to determine temporal trends in CPUE and mean length of many snapper grouper species. Increases in the abundance of gray triggerfish, tomtate, and bank sea bass may have been, in part, due to changes in reef fish community structure, which resulted from heavy fishing pressure on other reef species (i.e., red porgy, vermilion snapper, black sea bass, and various grouper species) (McGovern *et al*. 1999). Removal of some heavily fished species may have resulted in greater availability of food and habitat for the remaining reef species, while a decrease in abundance of apex predators such as large groupers may have reduced mortality on prey species.

Koenig *et al*. (2000) report that directed harvest and habitat destruction related to fishing activities have changed population demographics in an area off the South Atlantic coast identified as the Experimental *Oculina* Research Reserve (Koenig *et al*. 2000). Commercially important species, including black sea bass, scamp, gag, and greater amberjack, accounted for 76% of the observed reef fish videotaped during submersible dives in the area in 1980. However, those species comprised 5% of the reef fish observed in submersible dives at the same location in 1995 (Koenig *et al*. 2000). The *Oculina* HAPC closed area currently provides a biological benefit to snapper grouper species that cannot be quantified at this time. This area allows species like snowy grouper to achieve their natural age and size structure in the absence of fishing. Recent evidence indicates that there has been an increase in abundance of many species including snowy grouper since the area was closed (Koenig 2001).

All the alternatives to status quo management evaluated for snowy grouper are intended to end overfishing over different timeframes. As a result, they are expected to directly and significantly benefit the biological environment by assisting in restoring stock status and population demographics to more natural conditions.

The commercial quota reduction proposed in **Alternative 2** is designed to reduce commercial catches by 69% from average landings recorded from 1999 to 2003 and to end overfishing during 2006-2010. A reduction in fishing mortality and subsequent increase in biomass would be expected to restore the natural population structure of the stock and reverse the trends of decreasing males and mean length as documented in recent studies. A reduction in fishing mortality would benefit the ecosystem in which snowy grouper occurs, as described above. The 100 lbs gutted weight trip limit proposed in **Alternative 2A** is intended to extend the fishery through December and would reduce or eliminate the likelihood that the quota would result in derby conditions and associated adverse effects. However, trip limits also have the potential to increase discards if fishermen continue to pursue co-occurring species after achieving the trip limit or practice "highgrading," which means discarding landed fish in favor of more marketable fish captured later during the trip. **Alternative 2B** would implement a 10 fish trip limit instead of the 100 lbs gutted weight trip limit.

Snowy grouper attain sizes as great as 48" total length and 66 lbs. However, the average snowy grouper currently being taken by commercial fishermen is about 21" total length and 5 lbs. Furthermore, 21" total length also represents the size at 50% maturity for snowy grouper so it is likely that many snowy grouper now taken by commercial fishermen are immature. A trip limit of 10 fish is intended to encourage fishermen to move offshore and target larger snowy grouper, which have had the opportunity to spawn, rather than land 100 lbs per trip of small immature individuals. As in the 100 lbs gutted weight trip limit, a 10 fish trip limit would reduce the probability that the quota would result in derby conditions. Initially, it is unlikely that a limit of 10 fish would exceed 100 lbs. However, as the stock rebuilds, fish larger than 10 lbs would be more commonly caught, which would increase the chance of exceeding 100 lbs and meeting the quota before December.

There is a concern that if a quota is met for snowy grouper before the end of the year, discards of snowy grouper would occur when fishermen target golden tilefish or blueline tilefish in deep water and while targeting mid-shelf species. Snowy grouper are also taken on trips that target gag, scamp, and vermilion snapper. Due to incidental catch of snowy grouper on trips that target other species it is possible that the quota might only provide a 42% reduction if fishermen do not change behavior to avoid locations where snowy grouper occur. This assumes that 100% of released snowy grouper die and the 10 fish trip limit will average 50 lbs. However, it is likely that there will be some decrease in effort and that fishermen will be able to fish for other species in areas where snowy grouper do not occur. For longline trips, which caught at least 100 lbs of golden tilefish, snowy grouper made up about 10% of the catch. Therefore, incidental catch of snowy grouper could occur when fishermen were targeting golden tilefish. However, fishermen might be able avoid taking snowy grouper by setting longline gear over mud away from hard bottom areas, which hold snowy grouper.

If fishermen target blueline tilefish, incidental catch of snowy grouper could be high since both species occur over rough bottom. For longline trips that landed at least 100 lbs of blueline tilefish during 1999-2003, golden tilefish and snowy grouper constituted 32.0%, and 18.7% of the landings, respectively. However, it is likely catches of blueline tilefish would remain incidental to the targeted catch of snowy grouper or golden tilefish. Blueline tilefish do not appear to be as abundant or as desirable to fishermen as snowy grouper and golden tilefish. An economic analysis in Section 3 indicated blueline tilefish are less valuable than golden tilefish and many other snapper grouper species.

Although the discard mortality rate of snowy grouper is nearly 100%, the net effects of the quota reduction proposed in **Alternative 2** are expected to benefit snowy grouper by reducing total fishing mortality and allowing stock biomass to increase, which could help to reverse the above-mentioned size and sex ratio trends and promote a more natural population structure.

It is possible effort may decrease because the small trip limit of 10 fish may reduce the incentive to target snowy grouper. In addition, this alternative would offer better protection against derby-type conditions, which may benefit protected species by reducing the risk of increased fishing effort prior to reaching the TAC. Finally, the Council is considering in Amendment 13B to the Snapper Grouper FMP a multi-species approach to management that would further minimize bycatch in the snapper grouper fishery.

The Council's **Preferred Alternative 3** is identical to **Alternative 2**, except it steps down the quota over a 3-year period from current average landings during 1999-2003 to the quota proposed in **Alternative 2**, which would end overfishing during 2009. The stepped trip limit described in that alternative is designed to coordinate with the corresponding quota to extend the duration of the fishery in each of the three years. As in **Alternative 2**, the trip limit proposed in **Alternative 3** would reduce or eliminate the likelihood the reduced catch quota would result in derby conditions and associated adverse effects. However, it could increase bycatch if fishermen continued to pursue co-occurring species after achieving the trip limit or practice "highgrading."

The biological benefits resulting from **Alternative 3** would be the same as those associated with **Alternative 2** after two years. However, by allowing overfishing to continue over a longer period, **Alternative 3** could make the stock more vulnerable to adverse environmental conditions. **Alternative 3** would result in less discards during the initial two years because the quota would be set higher, and would provide the Council additional time to address discards through Snapper Grouper 13B. However, the overall fishing mortality would be less under **Alternative 2**, which provides for smaller directed catches.

4.1.3.2 Recreational

Alternative 1 would retain the current recreational regulations used to manage catches of snowy grouper. In general, this includes a 5-grouper per person aggregate bag limit and a 92 nm^2 area (*Oculina* HAPC) closed to bottom fishing off of the coast of Florida (an area where snowy grouper are known to occur).

Bag limits are designed to reduce fishing mortality by reducing the number of fish landed and the amount of time spent pursuing a species. Area closures are intended to provide fish and/or valuable bottom habitat a refuge from fishing pressure. When properly designed, these types of measures are generally expected to benefit the environment in the short-term and long-term by limiting the extent to which a stock is targeted. However, the extent to which such benefits are realized depends on if and to what extent fishing effort changes or shifts in response to the selected management measure. For example, discard mortality can limit the amount by which fishing mortality is reduced by bag limits and area closures if fishermen continue to target co-occurring species after the catch quota or limit has been achieved, or within the closed area.

Failing to reduce the 5-grouper aggregate bag limit in the recreational fishery could contribute to the declining status of snowy grouper. However, the effect of the recreational fishery on snowy grouper is considered minor compared to that of the commercial fishery because the recreational harvest comprises only 4% of the total harvest.

The *Oculina* HAPC closed area currently provides a biological benefit, which cannot be quantified at this time. This area allows species, like snowy grouper, to achieve their natural age and size structure in the absence of fishing. Recent evidence indicates there has been an increase in abundance of many species, including snowy grouper, since the area was closed (Koenig 2001).

Alternative 2 would reduce the snowy grouper bag limit to two per person per day within the 5-grouper per person per day aggregate bag limit. The short-term benefits of this measure are not substantial because the majority of recreational fishermen are not currently filling the bag limit. For example, nearly 95% of MRFSS (charter and private recreational angler) trips and 97% of headboat trips landed less than one fish per angler per trip during 1999-2002. However, the snowy grouper stocks could benefit from this action in the long-term if recreational fishing effort increases in the South Atlantic. Additionally, since release mortality is considered to range from 90-100% for snowy grouper, a smaller bag limit would provide little reduction in fishing mortality if fishermen continued to target snowy grouper because the vast majority of released fish would likely die from the trauma of capture. However, a smaller bag limit could provide fishermen an incentive to avoid snowy grouper.

The Council's **Preferred Alternative 3** would reduce the snowy grouper bag limit to one per person per day within the 5-grouper per person per day aggregate bag limit. The biological effects of this alternative would be similar to those described for **Alternative 2**. However, a bag limit of 1 fish per person per day may provide fishermen an incentive to avoid snowy grouper altogether.

4.1.4 Protected Species Effects of Management Measure Alternatives

4.1.4.1 Commercial

Alternative 1 would maintain the status quo and thus keep the existing level of risk for protected species interactions as summarized in the Affected Environment.

Alternatives 2 and 3 may potentially benefit protected species if the reduction in allowable harvest results in the reduction of effort (i.e., reduction of hook-and-line/longline gear in the water). If a reduction in effort occurs, **Alternative 2** may benefit protected species more rapidly because it specifies a shorter time period for ending overfishing. However, benefits may be reduced or negated if fishing effort was to shift into other fisheries that pose a risk to protected species (e.g., other vertical hook-and-line, gillnet, pot/trap fisheries) after the quota was reached or, if as a result, effort were to increase in shallow waters where there may be an increased risk of sea turtle or smalltooth sawfish encounters.

4.1.4.2 Recreational

Alternative 1 would maintain the status quo and thus keep the existing level of risk for protected species interactions as summarized in the Affected Environment.

Alternatives 2 and **3** would not likely measurably change the current impact of the snapper grouper fishery on protected species (as summarized in the Affected Environment) because they would allow fishermen to continue to pursue other species in the 5-grouper per person per day aggregate recreational bag limit.

4.1.5 Economic Effects of Management Measure Alternatives

This section describes the short-term quantitative effects on the commercial fishery, the quantitative short-term effects on the recreational fishery, and then provides a qualitative discussion of the long-term effects on these harvesting sectors and non-use benefits to society. Estimates of the short-term economic impacts are expressed in nominal values (i.e., not adjusted for inflation).

As described below, the analysis of the commercial impacts encompasses consideration of all harvest on trips that harvest any of the species addressed by this action. The recreational analysis; however, reflects only the impacts on activity associated with each individual species. As such, while the estimated impacts on the recreational sector are accurate with regards to activity for that species, they are not reflective of impacts on total activity by anglers who fish for these species or total snapper grouper activity. For instance, as discussed below, while the maximum expected reduction of fish harvested is expected to occur in the black sea bass sector, approximately 306,000 fish, or 55% of current recreational sea bass harvests in the second year of implementation, this amounts of only 3.2% of total snapper grouper average annual harvests of approximately 7.6 million fish (Table 3.19a). If the projected reductions in fish harvested for all species addressed by this amendment occur, total harvest reductions in the snapper grouper fishery would amount to approximately 6 percent.

4.1.5.1 Commercial

An important characteristic of the commercial snapper grouper fishery is that fishermen usually catch several species on the same trip. Therefore, the method adopted in this analysis is to simulate the effects of the different alternatives that were proposed for a particular species while holding the alternatives proposed for all other species at their base levels rather than their status quo levels. As such, the base model is defined as **Alternative 3** for snowy grouper, **Alternative 2C-E** for golden tilefish, **Alternative 10** for vermilion snapper, **Alternative 2** for red porgy, and **Alternative 10** for black sea bass (**Appendix E**).

The general method of analysis in this study was to hypothetically impose proposed regulations on individual fishing trips as reported to the logbook database. A four-year average (2001-2004) was used to estimate the expected effects of proposed regulations so that anomalies that may have affected fishing success in any one year would be averaged out. Data from trips that landed at least 1 lb of snowy grouper, golden tilefish, vermilion snapper, or black sea bass were included in the analysis and the analysis includes revenues from all species landed on these trips. A more detailed account of this analysis is contained in **Appendix E**. The variable of analysis was net revenue defined as gross ex-vessel revenues minus trip costs and opportunity costs of labor. This analysis does not necessarily encompass all fishing activity and revenues by these entities since some vessels likely participate in other fisheries and incur trips on which none of the five species addressed by this action are harvested. This analysis also does not incorporate potential behavioral changes by fishermen in response to the proposed regulations. The absence of both these components results in an overestimate of the potential impacts of the proposed measures. The magnitude of this overestimation; however, cannot be determined.

Under the status quo for snowy grouper and base model alternatives for the other species, the expected total net revenue earned by all boat owners, captains, and crews is $4.92 million per year (Table 4-7a). This represents a short-term loss of $1.07 million, or 17.9%, compared to the status quo for all species (Table 4-7a). Since, by definition, the no-action alternative for snowy grouper would not impose additional restrictions on commercial fishermen, the predicted short-term loss is attributed to the base model alternatives for the other species (Table 4-7a).

The marginal effects of the proposed alternatives for snowy grouper were evaluated by holding the alternatives for other species constant at their base levels. If the proposed regulations were implemented for snowy grouper, then losses in net revenue would increase by $0.43 million with **Alternative 2A**, $0.49 million with **Alternative 2B**, $0.28 million with **Preferred Alternative 3** (year 1), $0.35 million in year 2 for **Alternative 3**, and $0.43 in year 3 for **Alternative 3** (Table 4-7b). These losses range from 4.7% to 8.1% of the net income predicted for the status quo for all species (Table 4-7b).

All the proposed alternatives combine the use of quotas and trip limits. **Alternative 2A** and **Alternative 2B** specify the smallest quotas and trip limits, and hence would generate the largest losses for commercial fishermen. The Council's **Preferred Alternative 3** specifies the largest quota and trip limit in the first year, and hence, would generate the smallest losses. **Alternative 3** then phases-in reductions in both quota and trip limits until equal to **Alternative 2A** by year 3.

Short-term losses will vary in magnitude depending on fishing conditions that prevail. If fishing conditions most closely resemble those of 2001, then the additional losses that would be incurred by fishermen due to proposed alternatives for snowy grouper would range from \$0.35-\$0.56 million; with 2002 conditions, additional losses would range from \$0.27-\$0.49 million; with 2003 conditions, additional losses would range from \$0.27-\$0.48 million, and with 2004 conditions, additional losses would range from \$0.23-\$0.42 million (Table 4-7b).

Table 4-7a. Estimated change in revenues minus trip costs and opportunity costs of labor for proposed snowy grouper alternatives, by year, given base model alternatives for golden tilefish (2CE), vermilion snapper (10), red porgy (2), and black sea bass (8).

Snowy Grouper Alternative	Revenues minus Trip Costs and Opp Costs of Labor (Millions of Dollars)					Cumulative Change compared to Status Quo ($Million)	Cumulative Percentage Change compared to Status Quo	Extra Change due to Snowy Grouper Alternatives ($Million)	Extra Percentage Change compared to Status Quo
	2001	2002	2003	2004	Average	Average	Average	Average	Average
Status Quo	$6.84	$5.94	$5.19	$5.99	$5.99	$0.00	0.0%	n.a.	n.a.
No Action	$4.90	$4.71	$4.92	$5.15	$4.92	-$1.07	-17.8%	$0.00	0.0%
2A	$4.40	$4.29	$4.50	$4.79	$4.50	-$1.49	-24.9%	-$0.43	-7.1%
2B[1]	$4.34	$4.23	$4.44	$4.74	$4.44	-$1.55	-25.9%	-$0.49	-8.1%
3 (year 1)	$4.55	$4.44	$4.65	$4.92	$4.64	-$1.35	-22.5%	-$0.28	-4.7%
3 (year 2)	$4.48	$4.37	$4.58	$4.86	$4.57	-$1.42	-23.7%	-$0.35	-5.9%
3 (year 3)	$4.40	$4.29	$4.50	$4.79	$4.50	-$1.49	-24.9%	-$0.43	-7.1%

[1]Snowy grouper Alternative 2B specifies a 10-fish trip limit. However, the simulation model examines trip limits in terms of pounds per trip rather than fish per trip. Therefore, Alternative 2B simulated fishing conditions with a 54 lb trip limit because the average weight per fish is approximately 5.4 lbs per fish (personal communication from Jack McGovern, NMFS Southeast Regional Office).

Table 4-7b. The portion of total change in revenues minus trip costs and opportunity costs of labor attributable to proposed alternatives for snowy grouper, by year, given base model alternatives for golden tilefish (2CE), vermilion snapper (10), red porgy (2), and black sea bass (8).

Snowy Grouper alternatives, given: Tile(2CE), VS(10), RPorgy(2), BSB(8)	**Extra Change in Revenues minus Trip Costs and Opportunity Costs of Labor due to Proposed Alternatives for Snowy Grouper, and Excluding the Simultaneous Effects of Proposed Alternatives for Other Species**				
	Change from No-Action Alternative, Millions of Dollars				
	2001	**2002**	**2003**	**2004**	**Avg**
No Action	$0.00	$0.00	$0.00	$0.00	$0.00
2A	-$0.50	-$0.42	-$0.42	-$0.36	-$0.43
2B	-$0.56	-$0.49	-$0.48	-$0.42	-$0.49
3(1)	-$0.35	-$0.27	-$0.27	-$0.23	-$0.28
3(2)	-$0.42	-$0.34	-$0.34	-$0.30	-$0.35
3(3)	-$0.50	-$0.42	-$0.42	-$0.36	-$0.43
Status Quo	$6.84	$5.94	$5.19	$5.99	$5.99
	Extra Change as Percent of Status Quo				
	2001	2002	2003	2004	Avg
No Action	0.0%	0.0%	0.0%	0.0%	0.0%
2A	-7.3%	-7.1%	-8.1%	-6.1%	-7.1%
2B	-8.2%	-8.2%	-9.3%	-7.0%	-8.1%
3(1)	-5.1%	-4.6%	-5.3%	-3.9%	-4.7%
3(2)	-6.2%	-5.7%	-6.6%	-5.0%	-5.9%
3(3)	-7.3%	-7.1%	-8.1%	-6.1%	-7.1%

In relative terms, the effects of the proposed alternatives for snowy grouper would primarily be incurred primarily by boats with bottom longlines (Table 4-7c). The losses be incurred by these fishermen are expected to range from $0.13 million with **Preferred Alternative 3** (first year) to $0.17 million with **Alternative 2B**, or is 19%-24% of their status quo earnings (Table 4-7c). In aggregate, boats with vertical lines would incur greater losses due to proposed snowy grouper regulations, but these losses would constitute a smaller percentage of their status quo earnings. Across all sectors by state, losses would be greatest in South Carolina (Table 4-7d). However, as a percentage of status quo earnings, losses would be greatest in central and south Florida (Table 4-7d).

Table 4-7c. The portion of total change in revenues minus trip costs and opportunity costs of labor attributable to proposed alternatives for snowy grouper, by primary gear, given base model alternatives for golden tilefish (2CE), vermilion snapper (10), red porgy (2), and black sea bass (8).

Snowy Grouper alternatives, given: Tile(2CE), VS(10), RPorgy(2), BSB(8)	**Extra Change in Revenues minus Trip Costs and Opportunity Costs of Labor due to Proposed Alternatives for Snowy Grouper, by Primary Gear, and Excluding the Simultaneous Effects of Proposed Alternatives for Other Species**						
	Change from No-Action Alternative, Millions of Dollars						
2001-2004 Average	**Vert Lines**	**Long Lines**	**Pots**	**Trolling**	**Diving**	**Other**	**Total**
No Action	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
2A	-$0.27	-$0.16	$0.00	$0.00	$0.00	$0.00	-$0.43
2B	-$0.32	-$0.17	$0.00	$0.00	$0.00	$0.00	-$0.49
3(1)	-$0.15	-$0.13	$0.00	$0.00	$0.00	$0.00	-$0.28
3(2)	-$0.21	-$0.14	$0.00	$0.00	$0.00	$0.00	-$0.35
3(3)	-$0.27	-$0.16	$0.00	$0.00	$0.00	$0.00	-$0.43
Status Quo	$4.55	$0.69	$0.52	$0.06	$0.14	$0.03	$5.99
	Extra Change as Percent of Status Quo						
2001-2004 Average	Vert Lines	Long Lines	Pots	Trolling	Diving	Other	Total
No Action	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2A	-5.8%	-22.7%	0.0%	-2.3%	0.0%	-6.2%	-7.1%
2B	-6.9%	-23.9%	0.0%	-3.8%	0.0%	-7.5%	-8.1%
3(1)	-3.4%	-18.5%	0.0%	0.4%	0.0%	-3.1%	-4.7%
3(2)	-4.5%	-20.8%	0.0%	-0.7%	0.0%	-4.6%	-5.9%
3(3)	-5.8%	-22.7%	0.0%	-2.3%	0.0%	-6.2%	-7.1%

Table 4-7d. The portion of total change in revenues minus trip costs and opportunity costs of labor attributable to proposed alternatives for snowy grouper, by area landed, given base model alternatives for golden tilefish (2CE), vermilion snapper (10), red porgy (2), and black sea bass (8).

Snowy Grouper alternatives, given: Tile(2CE), VS(10), RPorgy(2), BSB(8)	**Extra Change in Revenues minus Trip Costs and Opportunity Costs of Labor due to Proposed Alternatives for Snowy Grouper, by Area Landed, and Excluding the Simultaneous Effects of Proposed Alternatives for Other Species**				
	Change from No-Action Alternative, Millions of Dollars				
2001-2004 Average	**North Carolina**	**South Carolina**	**Georgia & NE FL**	**Central & South FL**	**Total**
No Action	$0.00	$0.00	$0.00	$0.00	$0.00
2A	-$0.13	-$0.17	-$0.01	-$0.12	-$0.43
2B[1]	-$0.15	-$0.18	-$0.01	-$0.15	-$0.49
3(1)	-$0.07	-$0.13	-$0.01	-$0.07	-$0.28
3(2)	-$0.10	-$0.15	-$0.01	-$0.09	-$0.35
3(3)	-$0.13	-$0.17	-$0.01	-$0.12	-$0.43
Status Quo	$2.20	$2.11	$0.97	$0.70	$5.99
	Extra Change as Percent of Status Quo				
2001-2004 Average	North Carolina	South Carolina	Georgia & NE FL	Central & South FL	Total
No Action	0.0%	0.0%	0.0%	0.0%	0.0%
2A	-5.8%	-7.9%	-1.0%	-17.1%	-7.1%
2B	-6.8%	-8.4%	-1.2%	-20.6%	-8.1%
3(1)	-3.3%	-6.4%	-0.6%	-9.7%	-4.7%
3(2)	-4.5%	-7.2%	-0.8%	-13.1%	-5.9%
3(3)	-5.8%	-7.9%	-1.0%	-17.1%	-7.1%

[1] Snowy grouper Alternative 2B specifies a 10-fish trip limit. However, the simulation model examines trip limits in terms of lbs per trip rather than fish per trip. Therefore, Alternative 2B simulated fishing conditions with a 54 lb trip limit because the average weight per fish is approximately 5.4 lbs per fish (personal communication from Jack McGovern, NMFS Southeast Regional Office).

Total cumulative losses from the snowy grouper alternatives plus base model alternatives for the other species range from $1.07 million with the no-action alternative to $1.55 million with Alternative 2B, which corresponds to average annual losses of 17.8% to 25.9% (Table 4-7a). During the first year of implementation, the Preferred Alternative (3) would result in a $1.35 million cumulative annual loss (Table 4-7a).

Estimates of number of vessels affected by the proposed snowy grouper alternatives are provided (Table 4-7e). Consistent with the results of net revenue, the number of vessels likely to experience reduced revenues will be highest if **Alternative 2B** is implemented (324) and lowest if **Preferred Alternative 3** (year 1) is implemented (296) (Table 4-7e). Similarly, the expected number of trips canceled in comparison to the no action alternative is greatest for **Alternative 2B** (35 trips) and lowest for **Preferred Alternative 3** (18 trips) (Table 4-7e).

The simulation model predicted the quota associated with **Alternative 2B**, with its low trip limit, would not be filled under any of the 2001-2004 fishing conditions. The fishery would be closed with each of the other alternatives if fishing conditions most closely resemble conditions in 2001 and 2002, but quotas would not be filled with fishing conditions of 2003 and 2004. The predicted dates on which quotas would be filled vary slightly by alternative and year. Under 2001 fishing conditions, the approximate dates of closure would be November with Preferred **Alternative 3** (year 1), November 2 with **Alternative 3** (year 2), and November 15 with **Alternatives 2A and 3** (year 3). Under 2002 fishing conditions, the approximate dates of closure would be December 17 with **Preferred Alternative 3** (year 1), December 16 with **Alternative 3** (year 2), and December 18 with **Alternatives 2A and 3** (year 3).

As previously discussed, predicted closure dates, net revenue losses, number of affected vessels, and canceled trips are conditional on the assumption that fishermen will not alter targeting behavior except to cancel trips if they are not expected to be profitable. However, fishermen could change targeting behavior in other ways, which cannot be incorporated into this model because of lack of information. Regulatory changes are proposed for several species that are harvested along with snowy grouper on the same trip (Figure 3-11c). Some species like vermilion snapper are frequently harvested on the same trips on which snowy grouper are harvested (Figure 3-11c). Fishermen's strategic responses to other measures in this amendment could result in earlier/later closures for snowy grouper if harvesting strategies become more/less aggressive in the snowy grouper fishery.

Table 4-7e. Frequency distribution of annual loss in net revenue per vessel across the snapper grouper fleet that harvested black sea bass, vermilion snapper, snowy grouper, and golden tilefish averaged over the period 2001-2004. Net losses (revenues minus trip costs and opportunity costs of labor) attributable to proposed alternatives for snowy grouper, given base model alternatives for golden tilefish (2CE), vermilion snapper (10), red porgy (2), and black sea bass (8).

Net revenue loss category	1 (no action)	2A (base model)	2B	3(1)	3(2)	3(3)
NO LOSSES*	139	95	83	112	103	95
$1- $100	93	84	89	86	87	84
$101- $500	46	56	56	53	54	56
$501- $1,000	19	29	29	23	25	29
$1,001- v2,500	27	36	39	34	35	36
$2,501- $5,000	19	27	26	25	27	27
$5,001-$10,000	25	33	36	30	31	33
$10,001-$20,000	23	27	29	24	25	27
$20,001-$30,000	12	16	15	14	15	16
$30,001-$75,000	5	7	8	7	7	7
Losses	269	313	324	296	305	313
Incremental number of canceled trips above the no action alternative scenario.		29	35	18	25	29

*Number of vessels out of the total number of vessels that harvest species addressed in this amendment not affected by the suite of regulations in a proposed scenario.

Since 1999, there has been a continual decline in the number of vessels in the snapper grouper fishery as a result of the 2 for 1 permit transfer requirement and retirement of the non-transferable snapper grouper permits (Section 3.4.2.1.1). Other non-regulatory events such as the displacement of fishing docks and "fish houses", which is expected to continue in the future, could contribute to a further reduction in effort in the snapper grouper fishery. The permit requirements and the closure of fishing docks probably contributed to the decline in snowy grouper harvests, the number of trips on which snowy grouper was harvested, and the number of vessels engaged in the harvest of snowy grouper observed during the period 1999-2004 (Table 3-11). It is expected that even under status quo regulations, snowy grouper harvests would decrease in the near future. These events will also play a role in the timing of quota closures and future economic benefits associated with the snowy grouper alternatives. These expectations; however, have not been included in the modeling of status quo conditions due to the inability to predict the magnitude of their occurrence

Another criterion to weigh in evaluating the relative benefits of the various alternatives is the tradeoff in keeping markets open year round versus lower trip limits. The more advantageous strategy would depend on the characteristics of the fishery such as trip duration, trip costs, the seasonality of other fisheries in which the vessel may be engaged, and the dynamics of the wholesale sector. Generally, keeping markets open year round would result in relatively higher prices for a product. In addition, trip limits would impede the development of a derby fishery if quotas are extremely limiting. However, trip limits could result in fewer trips and lost revenue not only from the regulated species but other species expected to be caught on canceled trips if the trips are overly severe. This would lead to additional disruptions in the fishing operation and associated distribution channel, support industries, and consumptive sector.

The potential quota closures of the commercial fishery for snowy grouper, discussed previously, are based on the assumption that all measures in this amendment will take effect at the start of the fishing year. During the first year of implementation of this amendment trip limits will not take effect on January 1st. However, harvest of snowy grouper taken in South Atlantic waters from January 1st would count toward the new quota established by the amendment. As a result, there is a high likelihood that snowy grouper closures would occur earlier than model predictions during the first year of implementation of this amendment. For example, if **Preferred Alternative 3** is implemented it is expected that the 151,000 lbs gutted weight (178,000 lbs whole weight) snowy grouper quota would be exceeded in June (Table 4-7f). If the amendment goes into effect after June of the implementation year it is expected that the fishery for snowy grouper would be closed for the remainder of the year, since the expected cumulative harvest of 212,454 lbs whole weight would exceed the quotas proposed by all alternatives.

Table 4-7f. Cumulative monthly harvest of snowy grouper by state averaged over the period 2001-2004, and cumulative monthly harvest (whole weight) as a percent of the total average annual harvest for each state.
Source: Southeast logbook database, NMFS, SEFSC, Beaufort Lab.

	Cumulative monthly harvest (pounds)					**Cumulative monthly harvest as a percent of total harvest**				
Month	**Florida**	**Georgia**	**North Carolina**	**South Carolina**	**Total**	**Florida**	**Georgia**	**North Carolina**	**South Carolina**	**Total**
January	C	C	C	C	C	C	C	C	C	C
February	C	C	C	C	C	**C**	**C**	**C**	C	C
March	C	C	C	C	87,188	**C**	**C**	**C**	C	25%
April	43,883	3,300	45,618	35,492	128,293	36%		37%		37%
May	55,342	3,932	69,360	43,958	172,593	45%		56%		50%
June	67,832	4,130	86,684	53,807	212,454	55%		70%		62%
July	78,318	5,243	98,850	63,415	245,826	64%		79%		72%
August	89,625	5,576	109,075	69,596	273,872	73%		88%		80%
September	99,121	5,704	115,070	75,788	295,683	81%		92%		86%
October	107,962	5,753	119,077	81,810	314,602	88%		96%		92%
November	114,993	5,912	121,956	87,002	329,863	94%		98%		96%
December	122,655	6,015	124,420	89,846	342,936	100%		100%		100%

C indicates the data in a cell are confidential or the data item is not displayed to maintain the confidentiality of another data point.

4.1.5.2 Recreational

Data from the MRFSS and the Southeast headboat survey indicate snowy grouper are not commonly caught in the South Atlantic recreational fishery (Section 3.4.2.2.3). Furthermore, most of the recreational harvest of snowy grouper appears to be taken by vessels in the charter sector (Table 3-26), and snowy grouper comprises a larger portion of the snapper grouper harvest in the charter sector (Figure 3-19) compared to the headboat sector (Figure 3-17). However, harvest estimates for the charterboat and private recreational sectors are subject to a high degree of uncertainty due to the low sample sizes in the MRFSS and the high variability in the intercept estimates (Table 3-28). For some years these estimates may be unreliable indicators of the true magnitude of harvest. Nevertheless, it is clear snowy grouper are not as frequently targeted or caught as other snapper grouper species such as vermilion snapper and black sea bass (Table 3-22).

As noted in Section 4.1.5, the impacts discussed below refer only to activity for this individual species and do not reflect impacts relative to all species harvested by anglers that fish for this species or all recreational snapper grouper activity.

The estimated annual effects of the proposed alternatives for snowy grouper were calculated assuming status quo regulations for the other species in this amendment. The estimated change in harvest (numbers of kept fish), the associated net economic loss (compensating variation or the amount of money necessary to make someone as well off to compensate for the loss of a good or service; in these analyses, the compensation is for the loss/reduction of kept fish), and the number of constrained trips are calculated for each alternative using data from 1999 to 2003. A detailed description of the methodology used in these analyses is contained in **Appendix E**.

Assuming fishing conditions in the near future are similar to conditions during the period 1999-2003, it is expected that the Council's **Preferred Alternative 3** would reduce non-market benefits by $5,401 and reduce the number of kept snowy grouper by 45% compared to the no action Alternative (Table 4-8a). Lower immediate impacts are associated with **Alternative 2** (Table 4-8a). In terms of the number of constrained trips (trips where harvest exceeds the proposed bag limit), **Preferred Alternative 3** would affect 65% (((776/472)-1)*100) more trips than **Alternative 2** (Table 4-8a). Unlike the analysis on impacts in the commercial sector, the number of cancelled trips cannot be estimated as behavioral models to conduct these types of calculations have not been developed.

The analyses for the charterboat and private recreational sectors are combined since the sample sizes were not sufficient to produce separate estimates (Table 4-8b). However, as stated previously, there is a high degree of uncertainty associated with these harvest estimates. From the data on total harvest by sector, it would appear that the charterboat sector is responsible for the majority of the snowy grouper harvest in the recreational fishery (Table 3-26). Thus, **Alternatives 2 and 3** are likely to have relatively larger negative impacts on the charter sector compared to the private recreational sector.

In comparing the charterboat/private and headboat sector, both **Alternative 2** and the Council's **Preferred Alternative 3** will have a relatively higher negative impact on the charter/private sector compared to the headboat sector. **Alternative 2** will reduce the number of kept fish by

30% in the charterboat/private sector compared to 8% in the headboat sector (Table 4-8b and Table 4-8c). **Alternative 3** will reduce harvest by 47% in the charter/private sector compared to 14% in the headboat sector (Table 4-8b and Table 4-c).

Table 4-8a. Summary of the short-term recreational impacts resulting from the snowy grouper alternatives.

	Description of Alternatives	**Expected catch (number of kept fish)**	**Reduction in numbers of kept fish**	**Percent change**	**Value of reduction**	**Number of Affected Trips**
Alternative 1 (no action)	5 grouper limit	4,797				3,829
Alternative 2	2 snowy per person per day	3,387	1,410	-29%	$3,497	472
Alternative 3	1 snowy per person per day.	2,619	2,178	-45%	$5,401	776

Table 4-8b. Summary of the short-term recreational impacts resulting from the snowy grouper alternatives in the private and charters sectors.

	Description of Alternatives	**Expected catch (number of kept fish)**	**Reduction in numbers of kept fish**	**Percent change**	**Value of reduction**	**Number of Affected Trips**
Alternative 1 (no action)	5 grouper limit	4,598				2,447
Alternative 2	2 snowy per person per day	3,204	1,394	-30%	$3,457	465
Alternative 3	1 snowy per person per day.	2,447	2,151	-47%	$5,334	757

Table 4-8c. Summary of the short-term recreational impacts resulting from the snowy grouper alternatives in the headboat sector.

	Description of Alternatives	Expected catch (number of kept fish)	Reduction in numbers of kept fish	Percent change	Value of reduction	Number of Affected Trips
Alternative 1 (no action)	5 grouper limit	199				1,382
Alternative 2	2 snowy per person per day	183	16	-8%	$40	6
Alternative 3	1 snowy per person per day.	172	27	-14%	$68	20

The expected reductions in net economic benefits, numbers of kept fish, and numbers of constrained trips are calculated assuming recreational fishermen and for-hire vessel operators will not change targeting preferences or increase effort targeted at snowy grouper. This may be a reasonable assumption in the short-term since snowy grouper are caught further offshore compared to the more popular species such as shallow water groupers and grunts and porgies (Table 3-18). In addition, the cost of fuel is an important consideration in determination of distance traveled to the fishing grounds and increasing fuel prices will reduce the probability of the vessel taking an offshore trip.

Long-term Economic Effects of Proposed Alternatives

Hahn and Sunstein (2005) cautions that it may not always be in the best interest of society to make decisions solely based on the need to be precautionary, and decisionmakers should weigh the short and long-term costs and benefits of the various policy alternatives under consideration. In this amendment the factors that should be considered in weighing the benefits of ending overfishing early (the precautionary approach) versus ending overfishing over a longer time period are: the scientific uncertainty in estimating these stock status determination criteria; the indirect costs and benefits of restrictive management regulations including effort shifts to other fisheries; and the distribution of costs and benefits across different groups of fishermen over the time horizon for rebuilding and relaxation of restrictive harvest regulations. Unfortunately, the data and analytical tools to quantify these effects are not available. However, these criteria should be qualitatively evaluated in making the final policy decision.

Commercial **Alternative 2B** will end overfishing during 2006-2010 and is more precautionary than the other alternatives but will impose the greatest reduction in net revenue to the commercial sector in the short-term. On the other hand, **Preferred Alternative 3** will impose the lowest negative impact during the first year of implementation. The difference between ending overfishing during 2006-2010 (**Alternative 2B**) compared to the three-year stepped down approach (**Preferred Alternative 3**) equates to $150,000 in net dockside revenue.

The long-term effects on the commercial sector of choosing the no action alternative versus one of the other alternatives to end overfishing and rebuild the stock depends on the potential harvest (and associated benefits) over time if overfishing continued (no action) compared to the stream of benefits and costs from choosing one of the other alternatives. Snowy groupers are a long lived, slow growing species that is susceptible to collapse if status quo regulations are maintained (refer to the biological impacts section for more details on the effects of continued overfishing). Under the conditions that infrastructure exists (fish houses and docking facilities), fuel costs are not prohibitive, there is consumer demand for this product, and wild caught snowy grouper are not permanently displaced by cultured fish species, the long-term economic benefits of ending overfishing are expected to exceed the rebuilding costs in the commercial harvesting sector.

Currently, snowy grouper is relatively unimportant to the recreational harvesting sector. However, ending overfishing and rebuilding the snowy grouper fishery could provide future opportunities for the for-hire and private/rental boat sectors of the recreational fishery if harvest regulations become more liberal as the stock rebuilds, there are improvements in catch success rates, and the population is comprised of a greater proportion of larger fish. These benefits will be realized if there is an increase in future demand for snowy grouper which will depend on the quality of substitute (near shore) fishing experiences and the cost of fuel.

For both sectors, because stock biomass and catches are expected to increase only slowly in response to a reduction in fishing mortality, it is possible those who bear the short term losses of the proposed management measures will either not economically survive long enough to realize the benefits of a recovered stock, or may voluntarily elect to pursue other species or activities, as in the case of recreational fishermen. However, this would similarly be the case under delayed action and, in fact, the likelihood of such would increase since delay would require more severe restrictions than those currently proposed.

There is a non-use value for this species. Once measures to end overfishing are implemented and abundance increases, the theory of diminishing marginal utility dictates that non-use benefits to society will increase at a decreasing rate until satiation is reached, provided all other conditions remain constant (*ceteris paribus*). After this state of the resource is achieved, any further improvement will not yield an increase in net economic benefits. Determining the non-use value of many environmental resources is a complex endeavor since these assets are not traded in the marketplace. In these cases, economists utilize a number of sophisticated, non-market valuation techniques to express these values in monetary terms. Such techniques have yet to be applied to determine the non-consumptive and non-use benefits from snapper grouper species in the South Atlantic.

4.1.6 Social Effects of Management Measure Alternatives

Impacts from this suite of proposed alternatives will vary depending on sector/fishery, the specific alternative, and whether one looks at the short or long-term impacts.

In general, ending overfishing is expected to provide long-term benefits to all participants in the fishery, and the general public. **Alternatives 2 and 3** differ in when overfishing would end and, as a result, in the degree of negative short and long-term impacts they would impose on each fishing and non-fishing sector. The following sections provide a more detailed analysis of the negative and positive short-term impacts of the proposed alternatives. Long-term benefits are discussed throughout the analysis but as there are sparse data to analyze long-term effects of management measures, future conditions cannot be predicted with confidence.

4.1.6.1 Commercial

Alternative 1, No Action, would be the least problematic in terms of social impacts for the commercial sector in the short-term. However, this alternative does not meet the legal requirements to end overfishing. Furthermore, failure to end overfishing would compromise the long-term sustainability of the snowy grouper fishery, negatively impacting the commercial fishing communities.

From a social perspective, **Alternative 2** has the most significant short-term adverse impacts of all the proposed alternatives on the commercial fishery and its associated communities as it requires the greatest immediate reduction in commercial landings. This alternative would end overfishing during 2006-2010 but at a considerable social cost. In general, social impacts may be mitigated by gradually reducing harvest. In some cases, it might be preferable to take big cuts up front and improve the fishery status quickly if the human component of the fishery is healthy. But if the fishing community in general is under stress from numerous other outside forces, then it is less damaging to phase-out overfishing over a longer timeframe. In the case of the snapper grouper commercial fishery, one could argue that sustained participation in fishing is in jeopardy and any additional stress would be enough to put a number of commercial fishermen and fish houses out of business.

The **sub-alternatives for Alternative 2** mitigate some of the impacts of a low TAC equaling 84,000 lbs. **Alternative 2A** eliminates the potential of a derby fishery by having a 100 lbs trip limit; this action would essentially make snowy grouper an incidental catch fishery. **Alternative 2B** would allow 10 fish of any size, which may be more appealing to commercial fishermen as it may allow a higher weight in fish than 100 lbs. This sub-alternative may unintentionally encourage the practice of high-grading; however, which would result in additional snowy grouper mortality.

Should the Council choose **Alternative 2** (regardless of which sub-alternative is chosen), it is very likely that by the time this amendment is implemented the snowy grouper quota will have been filled and the fishery will immediately close when the regulations are implemented.

The Council's **Preferred Alternative 3** is a stepped down approach to decreasing commercial harvest. This has the benefits of allowing fishermen to adjust their fishing practices and business over approximately three years, or to make plans to leave commercial fishing altogether. This preferred alternative would end overfishing after three years, and be somewhat less harsh for the fishermen. The trip limits would also be adjusted downward each year, again allowing the fishermen to adapt in the way they see best for their livelihood.

While the Council's **Preferred Alternative 3** mitigates the immediate long-term negative impacts on fishing communities, public hearing testimony from northern North Carolina fishermen and fishermen in the Florida Keys pointed out that the severity of the impacts may be much the same regardless of the time frame of implementation of the measures. Most of the commenters pointed out low trip limits would not make trips economically feasible, since commercial (and some charter boats) fishing in both areas must travel far offshore to fish for snowy grouper. Both groups of fishermen expressed their concern that their communities and work were in a precarious state, and these regulations were coming at a critical time.

Given the precarious situation of the commercial fishing efforts in the South Atlantic, the argument could be made that dramatic reductions of landings in key snapper grouper species (and the associated species in the complex) in a very short time will critically impact the commercial fishermen and their communities. The combined impacts from this suite of management measures may be severe enough to never allow for any resurgence of a commercial snapper grouper fishery even once the stocks are rebuilt fully because the community infrastructure is gone.

Considering the predicament (major changes in demographics, economies, and environment) of the fishing communities in the South Atlantic in 2005/06, it is difficult to predict at this time what short- or medium-term benefits communities would derive from improving snapper grouper stocks. While it is generally thought if fish stocks are healthy, then the communities, which fish for those stocks will also be healthy, the community structures along the South Atlantic coast are in such flux now that future predictions would necessarily be incomplete. With a rebuilt snapper grouper fishery, it is likely fishermen will return to fishing for snowy grouper, but in fewer numbers than before due to the trends discussed in Section 3 previously. Landing areas will be limited by coastal development, so traveling long distances to unload catches may be become necessary. After not having locally-caught fish on the market for a while, the market may not have as large a niche for domestic snowy grouper, and fishermen may not return to pursue a fish that has lost market demand. Because snowy groupers are such a long-lived species, it does not appear fishermen could return to fishing them with any concentrated effort without jeopardizing the stock again and snowy grouper fishing will likely by necessity have to be part of a multi-species fishing operation.
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The communities who could be impacted the most from these reductions are, in North Carolina: Wanchese, Hatteras, Beaufort, Morehead City, and potentially Southport; in South Carolina: Little River, Georgetown, and the greater Charleston area. In Georgia, only Townsend has substantial commercial landings of snowy grouper. In Florida, only the Florida Keys communities of Islamorada and Key West showed substantial landings of snowy grouper in the most recent years, although other communities show smaller amounts being landed. Snowy grouper is a high dollar fish and so could, even in smaller amounts, be a significant part of some people's income. When one talks of smaller landings of snowy grouper in the area of south Florida, it is hard to make the case that there will be a significant community impact on a place like Ft. Lauderdale or Miami. Still, erasing one node of a market network may have significant impacts throughout that domestic market chain, causing local hardships and changing the cultural geography once again.

Alternative 2 and the Council's Preferred Alternative 3 would not have a disproportionately negative affect on fishermen from North Carolina and Florida (where 75% of the landings occur). The 100 lb gutted weight or 10 fish trip limit is intended to extend the fishery through December. However, it is likely this amendment will be implemented in the middle of 2006 or later. Without these trip limits, the quota proposed in the **Council's Preferred Alternatives 3** would be filled in June 2006. According to ACCSP landings data, including the east coast communities in the Florida Keys/Monroe County, North Carolina and Florida landed similar amounts of snowy grouper between 1999 and 2004. Figure 4-4 shows that communities in the Florida Keys land a large percentage of their annual catch in the first three months of the year; whereas, communities north of Cape Fear land snowy grouper beginning in April and May. However, based on 1999-2003 data, North Carolina fishermen would have landed 62% of their catch by June and Florida fishermen have landed 57% of their catch in June. Furthermore, the trip limit proposed in the **Council's Preferred Alternative 3** would allow the snowy grouper fishery to remain open all year during 2007 and onwards further minimizing any inequitable access to the resource.

Nevertheless, North Carolina fishermen might have to forgo fishing for other deepwater species caught with snowy grouper when a trip limit or quota is met. For example, in Hatteras, some fishermen fish for blueline tilefish from April to late summer and early fall. Fishermen could still fish for blueline tilefish after a trip limit or quota is met for snowy grouper, but would have to discard all snowy grouper they landed outside the recreational bag limit. As has been learned from the red porgy, fishermen would rather avoid locations where a target species occurs in large numbers rather than have to release dead fish, as this is seen as a wasteful practice.

North Carolina and Florida communities can be expected to have short-term, immediate negative impacts from measures proposed in **Alternative 2**. According to one North Carolina fisherman, due to the increase in regulations in the shark fishery, and having to compete with the Mid-Atlantic states for market share in the black sea bass fishery, the blueline tilefish and snowy grouper fishery was about all he had left for that season. In this case, all of the Outer Banks communities will be negatively impacted by this measure as it is now proposed. It is possible that along with other events occurring in these communities that commercial snapper grouper fishing could be severely diminished. The higher quota proposed in Year I of the **Council's Preferred Alternative 3** would mitigate the immediate negative short term impacts of **Alternative 2** by gradually decreasing the quota over three years.

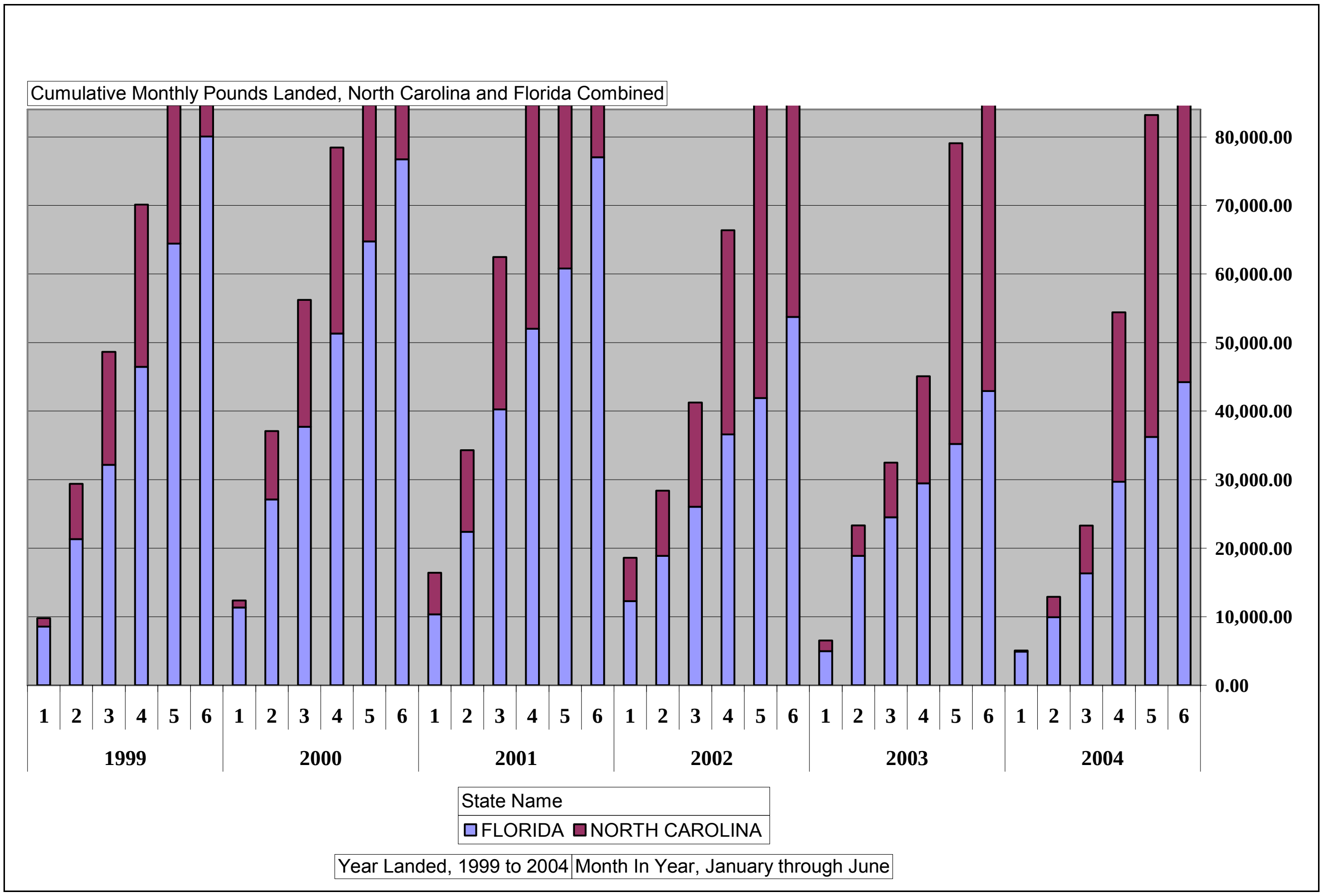

Figure 4.4. Cumulative landed lbs by month and year of snowy grouper for Florida and North Carolina, 1999 through 2004. TOP LINE is proposed quota amount (84,000 lbs) in year 3 of the preferred alternative. Source: ACCSP 2005.

Florida fishermen may have an advantage over other South Atlantic fishermen: they may be able to fish in the Gulf of Mexico reef fish fisheries if they hold the necessary permits. While this may be easier for a fisherman from, for example Ft. Pierce or Key West as the distances to travel to fishing grounds are less, data show a few fishermen homeported in the South Atlantic regularly land product in Florida's west-coast ports. Further analysis of the Snapper Grouper Permits database reveals 167 snapper grouper permit holders also held Gulf of Mexico Reef Fish permits. Of those 167 permit holders, 147 were homeported in South Atlantic communities, with the remainder being located in Gulf of Mexico communities (Table 4-9).

Table 4-9. South Atlantic unlimited snapper grouper permit holders by homeport who also hold a Gulf of Mexico Reef Fish Permit.
Source: NMFS 2004 Permits Database.

Big Pine Key	7
Cedar Key*	1
Clearwater*	1
Conch Key	1
Cortez*	1
Cudjoe Key	3
Destin*	1
Englewood*	1
Fort Myers Bch*	1
Fort Walton Bch*	1
Gulfport*	1
Hernando Beach*	1
Homestead	1
Islamorada	2
Jupiter	1
Key Largo	1
Key West	75
Little Torch Key	1
Madeira Bch*	5
Malabar	1
Marathon	19
Miami	14
Naples*	2
New Smyrna Beach	1
Niceville*	1
Plantation	1
Ponce Inlet	1
Port Canaveral	2
Port Orange	1
Ramrod Key	1
Sarasota*	1
Sebastian	1
St Marks*	2
St. Augustine	1
Summerland Key	4
Suwannee*	1
Tampa*	1
Tarpon Springs*	3
Tavernier	3
Grand Total	**167**

* denotes a Gulf of Mexico community.

Related to the differential impacts of the amendment's management measures in different states, there are problems for law enforcement. An article from the USA Today newspaper, *Coast Guard plagued by breakdowns*, (Mimi Hall, USA TODAY July 06, 2005) points out how difficult it is for the Coast Guard to perform their maritime security duties due to decreasing budgets and a change in political climate. The lack of support for routine law enforcement activities could have an effect in the lower Keys where it would be difficult to determine where fishes are caught – particularly when the reef fish regulations do not mirror each other. Some fishermen could continue catching snowy grouper on the South Atlantic side, and simply claim it was caught on the Gulf side of the Keys.

If fishermen comply with regulations, there could then be an effort shift to the Gulf of Mexico to fish for snapper grouper species. Conversations with fishermen have suggested this movement already occurs in response to increasingly restrictive regulations in the South Atlantic. However, access to Gulf of Mexico fisheries is limited and most major species are managed with total allowable catch quotas.

4.1.6.2 Recreational

Throughout the region, snowy grouper are not targeted by a large number of recreational fishers. However, for Florida anglers, targeting snowy grouper may be a viable option during certain times of the year when fishing is slow for other species. The majority of those who target snowy grouper are from the Florida for-hire sector, and the manner by which they target snowy grouper is called deep dropping because snowy grouper are most commonly found in waters ranging from depths of 300 to 800 feet. Targeting deep water fishes most often requires the use of electric reels, and the majority of private recreational vessels are not outfitted with this type of electronic rig. Some headboats and charter boats have electric rigs, which is why they are more likely to be impacted by snowy grouper restrictions. However, the degree to which these anglers would be impacted is not currently known. Local businesses associated with the recreational fishery are not likely to be impacted by the proposed recreational measures due to the relatively minor importance of the fishery.

Under Alternative 1, the "No Action" alternative, and the major social impacts relate to the accuracy of our understanding of stock status. If the current stock assessment, which concludes a reduction in fishing effort is needed, is not acted upon and the conclusions are correct, then more stringent regulations will be required in the future. If so, the potential short and long-term social impact of more restrictive regulations may have a greater impact on the future of the fishery and fishers corrective actions at this time.

Alternative 2 is not likely to have a negative impact on the private boat fisher and may only have minimal impact on the for-hire business, specifically in Florida where charter and headboat captains are more likely to target these species than other fishers throughout the region. Florida fishers report they are more likely to target snowy grouper than fishermen in other areas because of the decreased distance to certain fishing locales, and reduced amount of fuel needed for a trip. This is confirmed by interviews with Florida and North Carolina for-hire captains who say distance traveled impacts cost and cost can often dictate whether certain kinds of clients are likely to come and fish off their boats.

The impacts of the Council's **Preferred Alternative 3**, are similar to those in **Alternative 2**, except the magnitude of impacts would be more severe due to more restrictive measures.

Although nearly 95% of MRFSS (charter and private recreational angler) trips and 97% of headboat trips landed less than one snowy grouper per angler per trip during 1999-2002, fishermen in Florida and North Carolina report that they occasionally reach their bag limit for snowy grouper. These are often caught as a part of an attempt to target mid shelf and deep water species. What must be recognized is that many of these species are found in the same location, so while fishing for one species you might catch another. Fishermen would argue if more snowy grouper are being caught it is probably a reflection of an increasingly healthy stock, though greater effort may also be a factor.

Contrary to the potential shift of commercial effort from the South Atlantic to the Gulf of Mexico, in the recreational sector there is now a pending recreational red grouper closure for November and December and a lowering of the grouper aggregate and red grouper bag limit in the Gulf of Mexico. This action may act to drive some for-hire and private recreational fishermen from the Gulf of Mexico to fish in the South Atlantic, putting further stress on South Atlantic snapper grouper stocks.

General Non-Fishing Public

For the general non-fishing public of the U.S., the proposed alternatives to end overfishing offer long-term benefits as the proposed management measures work to improve stock status. These actions have benefits for those in the United States who derive satisfaction from knowing the marine environment is managed sustainably and is thriving. The consumer of fish in the U.S. may benefit from potential increased consumption of locally caught fish as the stock recovers.

There is the potential of long-term negative impacts to the general non-fishing public who enjoy coming to the coast to experience a "fishing community," eat locally caught seafood, and enjoy the heritage tourism benefits of many coastal communities. If the infrastructure for commercial fishing in the South Atlantic continues to wane, and the proposed management measures hasten that decline, communities will lose this attraction for their tourist trade, and visitors may have a diminished coastal tourism experience. However, these communities can only be expected to exist and prosper if healthy resources and fisheries also exist. So, ending overfishing of the snowy grouper resource, as a component of the marine ecosystem, is essential to the existence and sustenance of these communities.

4.1.7 Administrative Effects of Management Measure Alternatives

4.1.7.1 Commercial

Monitoring catch quotas, and enforcing fishery closures when a quota is met directly burdens the administrative environment. **Alternative 1**, the No Action Alternative, would retain the 344,508 lb gutted weight quota and a trip limit of 2,500 lbs gutted weight. Programs are in place to monitor the quota. Since there would be no regulation changes, the No Action Alternative would offer no additional administrative burden.

Alternative 2 would not represent a substantial increase in the administrative burden since a quota monitoring program is already in place for snowy grouper. Some burden would be experienced by requiring NMFS to provide notice to the public about changes in regulations. The decreased quota and trip limits could pose a problem for enforcement since fishermen are more likely to meet or exceed the trip limits specified in **Alternative 2**. However, the smaller trip limit of 100 lbs gutted weight or 10 fish would require less time by law enforcement to determine compliance with the trip limit.

The administrative burden would be greatest for **Alternative 3**, the preferred commercial alternative, since the quota is stepped down over a three-year period. The public complains when laws change frequently, although in this instance the change would mitigate the adverse social and economic impacts of ending overfishing.

4.1.7.2 Recreational

Alternative 1-3 would continue to manage the recreational fishery with bag limit requirements. There is no measurable difference in the effects of these three alternatives on the administrative environment, as each would maintain the 5-fish grouper aggregate bag limit.

4.1.8 Conclusions

A snowy grouper commercial quota of 344,508 lbs gutted weight in year 1, 151,000 lbs gutted weight in year 2, and 84,000 lbs gutted weight in year 3 onwards until modified with a trip limit of 275 lbs gutted weight in year 1, 175 lbs gutted weight in year 2, and 100 lbs gutted weight in year 3 onwards until modified and a recreational limit of one snowy grouper per person per day within the 5-grouper per person per day aggregate recreational bag limit is the **Council's preferred alternative**. The Council obtained public input during the public hearing and informal review process on the preferred alternative 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 changed their preferred alternative based on comments received.

SEDAR 4 (2004) indicates that snowy grouper is overfished and experiencing overfishing. **Alternative 1** (No Action) would continue to allow overfishing and was rejected by the Council. The **Preferred Commercial Alternative 3** implements measures to end overfishing with a stepped down quota that represents a 69% reduction of the average landings during 1999-2003 in year 3 as well as a trip limit that is intended to extend the fishery throughout the year. **Alternative 2** would have implemented an immediate 69% reduction and would result in greater biological benefits over a shorter period of time as compared to **Alternative 3**. Both **Alternatives 2 and 3** would be expected to benefit the stock in terms of restoring the natural size/age structure, sex ratio, and community balance. They both would also be expected to have immediate, short-term, negative social and economic impacts on commercial fishermen, fishing communities, and associated industries. However, the short-term negative impacts of **Alternative 3** would be less than **Alternative 2**. Ending overfishing of snowy grouper is expected to increase stock biomass allowing for increased harvest with time. Therefore, **Alternatives 2 and 3** are expected to have net positive social and economic impacts over the long-term.

The Council's **Preferred Recreational Alternative 3** reduces the bag limit to one snowy grouper per person per day within the 5-grouper aggregate bag limit. While the recreational catch of snowy grouper is small (4%), the Council concluded a reduction in the bag limit would provide an incentive to avoid snowy grouper and thereby contribute to rebuilding. **Alternative 1 (No Action)** would retain the allowance of 5 snowy grouper per person per day in the aggregate bag limit and **Alternative 2** would reduce the bag limit to 2 snowy grouper per person per day. Both of these alternatives would allow a greater harvest than the preferred alternative.

The Council received many public comments addressing snowy grouper. A number of comments questioned the data going into the assessment and the accuracy of the assessment results. Particular comments noted a lack of sampling from northern North Carolina and Florida where larger snowy grouper are caught and the purported over-reliance on data from South Carolina where smaller fish are harvested. Questions were raised about how representative the headboat catches are when the sample sizes are very low. The issue of bycatch and discard mortality was raised noting that snowy grouper are caught with vermilion snapper, amberjack, and queen triggerfish (in south Florida). Members of the public were also concerned that high-grading could occur with a snowy grouper trip limit and a low recreational bag limit. Suggestions for alternatives were offered including size limits, alternative trip limits, bag limit of 2 snowy grouper, prohibition of hydraulic or electric reels for those without a commercial permit, prohibition of longline gear, phase-in the quota reductions, higher bag limit so fishermen will pay for a charter to go offshore, and separate management regulations by area (e.g., south Florida separate from Carolinas). A number of comments supported the Council's action indicating it was better to protect the stocks now so that there will be better catches in the future. There was also support for the Council's attempt to accelerate the process of ending overfishing.

The Snapper Grouper Advisory Panel questioned the accuracy of the data and assessment conclusions including: lack of adequate size and age data; data not representative of the full geographic range of the species and the fishery; reliance on the headboat as an index when the catch of snowy grouper is very low; accuracy of the recreational catch data; purported reliance on samples from South Carolina where small fish are caught; difficulty separating Monroe County recreational and commercial landings into South Atlantic and Gulf Council areas; and data through only 2002, leaving two years of data not included in the assessment. The Advisory Panel felt it was unfair to the commercial sector to have low commercial quotas but allow the sale of recreationally caught fish, since it could speed up the commercial closure. The Advisory Panel's consensus recommendation for snowy grouper is to take no action (**Alternative 1**) until better data are collected and the science is more sound.

The Law Enforcement Advisory Panel was concerned about adequate public notice for low quotas and expected rapid closures. During discussion it was pointed out that the NMFS process for providing public notice of pending closures would provide sufficient time for fishermen to be informed about a pending quota closure.

The Scientific and Statistical Committee (SSC) reviewed the SEDAR Assessment and approved the assessment as being based on the best available science. The SSC concluded the proposed alternatives that end overfishing in one to five years are sufficient to end overfishing if there is no bycatch or post-quota mortality. Discard and post-quota mortality, from bycatch and discard mortality, was not incorporated into the proposed actions and the actions might not end overfishing as soon as projected. The methodology to estimate the discard and post-quota mortality is still being developed and was not available for use in finalizing Amendment 13C. The SSC concluded the social and economic analyses were accurate and complete given the available data; however, they noted shortcoming in the biological analyses due to the lack of estimates for the bycatch and post-quota mortality.

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 were also concerned about the discard mortality and post-quota mortality. To balance the need to end overfishing with the resulting socio-economic impact on fishing communities (particularly in northern North Carolina), the Committee changed the preferred alternative to **Alternative 3** which phases-in the quota reductions. This will give the Council time to evaluate alternatives to address the discard and post-quota mortality through Amendment 13B prior to the more restrictive quotas being implemented, which could result in the most discards. In addition, the Council will be working with the NMFS, the States, and fishermen to improve data collection and have some of the identified data gaps filled prior to the next SEDAR Assessment (approximately 5 years from 2004). **Alternative 3** will also phase-in trip limits. During 2006, the quota will be retroactive to January 1 when the trip limit is 2,500 pounds.

Committee members felt **Alternative 3** would not compromise their efforts to end overfishing and achieve their conservation objective; rather the additional two years as compared to **Alternative 2** would allow sufficient time for scientists to develop their estimate of bycatch and post-quota mortality and for the Council to consider management alternatives to reduce his source of mortality. The difference between **Alternative 2** and **Alternative 3** during 2006, is that the 151,000 lb gutted weight quota is expected to be met in July at about the same time the final rule is published in the Federal Register. In contrast, the quota specified in **Alternative 2** could be exceeded by ~70,000 lbs gutted weight when the final rule is published. In the second year, there is a difference of 34,000 lbs between the quotas and in the third year there is no difference. While **Alternative 3** may end overfishing a little bit later, given all the inherent uncertainties, the Committee concluded it would be difficult to tell much difference between the **Alternatives 2 and 3** in terms of biological impacts. **Alternative 3** provides some relief to address the negative, short-term social and economic impacts expected on fishing communities.

Alternative 2 would end overfishing sometime between 2006 and 2010 (probably 2007) while **Alternative 3** would end overfishing during 2009, a two year difference. The Snapper Grouper Committee felt that **Alternative 3** could potentially mitigate bycatch mortality, particularly in the first and second years.

For the recreational fishery, the Committee considered increasing the proposed bag limit from 1 fish (**Alternative 3**) to 2 fish (**Alternative 2**) to address the discard issue as fishermen try to fill their 5-aggregate grouper bag limit (which includes tilefish). There was concern about the serious reductions for the commercial sector. However, the bag limit analysis indicates that few recreational fishermen catch more than one snowy grouper per trip. Therefore, the Council could be perceived as not being equitable between sectors with a higher bag limit. There was a great deal of recreational input supporting the preferred alternative of a 1 fish per person per day bag limit.

There was public concern that the low hard TACs could cause effort shifting in some of these fisheries. Furthermore, as the snowy grouper stock recovers, it was felt that recreational effort could increase. Without a reduction in the bag limit now, the Committee was concerned that in a few years it would be harder to reduce the bag limit in the face of an expanding fishery.

The <u>Council</u> concluded the commercial alternative recommended by the Committee best meets the conservation objective of ending overfishing while addressing concerns about bycatch and post-quota mortality. The preferred alternative phases-in the quota reductions which will give the Council time to address bycatch and post-quota mortality through Amendments 13B and 16. The phase-in also provides some time for the affected fishermen and communities to adjust to the negative short-term social and economic impacts.

The Council considered increasing the recreational bag limit from 1-fish as recommended by the Committee to 2-fish given the limited number of recreational fishermen targeting this species and their low catches. There was some discussion that this may reduce the amount of discards as fishermen try to fill the 5-fish aggregate grouper bag limit (including tilefish). The Council did not adopt the 2-fish bag limit because it would not represent an actual reduction in the current recreational catches. The Council concluded it would be better to lower the bag limit to 1-fish now and as the stock rebuilds, evaluate whether the bag limit could be increased in the future. The Council's preferred recreational alternative is **Alternative 3**, which limits the possession of snowy grouper to one per person per day within the 5-grouper per person per day aggregate recreational bag limit.

The Council concluded that the preferred commercial and recreational alternatives best meet the purpose and need to end overfishing of snowy grouper as soon as practicable and to allow as close to a year-round fishery as possible while maintaining (where possible), historic participation rates and patterns (including allocation rations), minimizing costs, meeting the objectives of the Snapper Grouper Fishery Management Plan, and complying with the requirements of the Magnuson-Stevens Act and other applicable law. **Alternative 1** (No Action) would continue to allow overfishing and was rejected by the Council.

4.2 Golden Tilefish

4.2.1 Background

Golden tilefish are experiencing overfishing, since the current fishing mortality (F) exceeds the fishing mortality, which would achieve the maximum sustainable yield (SEDAR 4 2004). Overfishing is defined as an F exceeding the maximum fishing mortality threshold (MFMT), which the Council has defined as F_{MSY}. Current F is 0.066, while F_{MSY} is 0.043. A 34% reduction in catch is needed to end overfishing immediately. Current Spawning Potential Ratio = 30%.

SEDAR 4 (2004) Assessment

There were two indices of abundance available for the golden tilefish stock assessment. A fishery-independent index was developed from MARMAP horizontal longlines. 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 F_{MSY}, 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 10th to 90th 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.

The following research recommendations were made to strengthen future assessments.

1. Ageing discrepancies between laboratories should be resolved. State and Federal investigators should continue efforts to standardize techniques and resolve the systematic discrepancies in age determinations.
2. Sampling programs are required to quantify discard rates.
3. Research should also be initiated to identify management strategies that could reduce discard mortality.
4. Fishery-independent data collected by the MARMAP program are important to understanding the dynamics of this population, and the National Research Council has recommended that fishery-independent data play a more important role in stock assessment. However, it has been noted that the MARMAP sampling programs do not have ideal extent, both in area coverage and in sampling intensity, for many important species in the South Atlantic snapper–grouper complex. It would be highly desirable for the MARMAP program to receive sufficient funding to expand its coverage and thus provide improved measures of stock abundance.
5. Representative age, length, and sex composition data are needed for all fisheries, seasons, and areas.
6. Additional life history and biological research is needed, especially that which covers the full geographic range of the species. Among other items, fecundity and reproductive research is needed (batch fecundity and frequency at age and/or size).

Review of Previous Stock Assessments

The first stock assessment for golden tilefish was conducted in 1990 (PDT 1990) using data from 1972 through 1988/89. Spawning Stock Ratio (SSR) (considered to be the same as Spawning Potential Ratio (SPR)) was only calculated for the commercial fishery (Table 4-10).

Table 4-10. Spawning Stock Ratio (SSR) values for golden tilefish.
Source: PDT 1990.

SPECIES	RECREATIONAL	COMMERCIAL
Golden Tilefish		Carolinas = 35%
		North Florida = 28%
		South Florida = 42%

A series of stock assessments conducted by NMFS (1991), Huntsman *et al.* (1992); and Potts and Brennan (2001) provided estimates of SSR/SPR based on catch curves (Table 4-11).

Table 4-11. Spawning Stock Ratio (SSR) values for snowy grouper.
Source: NMFS (1991); Huntsman *et al.* (1992); and Spawning Potential Ratio from Potts and Brennan (2001).

Species	Assessment Year	Catch Data From	Overall SSR
Golden Tilefish	1991	1988	31%
	1992	1990	21%
	2001	2000	20 - 34%

Landings Information

During 1999-2003, most golden tilefish were landed off East Florida followed by South Carolina (Table 4-12). About 94% of the commercial catches were taken with longline gear.

Table 4-12. The percentage of landings by state during 1999-2003.
Source: Accumulative Landings System.

Area	Percent
Monroe County	4.5
East Florida	68.4
Georgia	0.1
South Carolina	24.9
North Carolina	2.0

Landings of golden tilefish were greater than 1,000,000 lbs whole weight during 1990-1993 but have generally been less than 600,000 lbs gutted weight since 1996 (Figure 4-5).

Regulations, which may have affected the catch of golden tilefish, are shown in Table 4-13 and Figure 4-5.

Table 4-13. Golden tilefish regulations.

Regulation	Effective Date	Plan or Amendment
Prohibit trawls	1/12/89	Amendment 1 (SAFMC 1988)
Prohibit fish traps, entanglement nets & longlines within 50 fathoms; 5 grouper bag limit; rebuilding timeframe	1/1/92	Amendment 4 (SAFMC 1991)
Commercial quota phased-in: 1,475,795 lbs gutted weight in 1994 1,238,818 lbs gutted weight in 1995 1,001,663 lbs gutted weight in 1996 onwards; Commercial trip limit = 5,000 lbs (gutted); Commercial bycatch limit = 300 lbs (gutted); Golden tilefish added to grouper aggregate bag limit; Established *Oculina* Experimental Closed Area.	6/27/94	Amendment 6 (SAFMC 1993)
Limited entry program: transferable permits and 225-lb non-transferable permits	12/98	Amendment 8 (SAFMC 1997)
Vessels with longlines may only possess deepwater species	2/24/99	Amendment 9 (SAFMC 1998c)

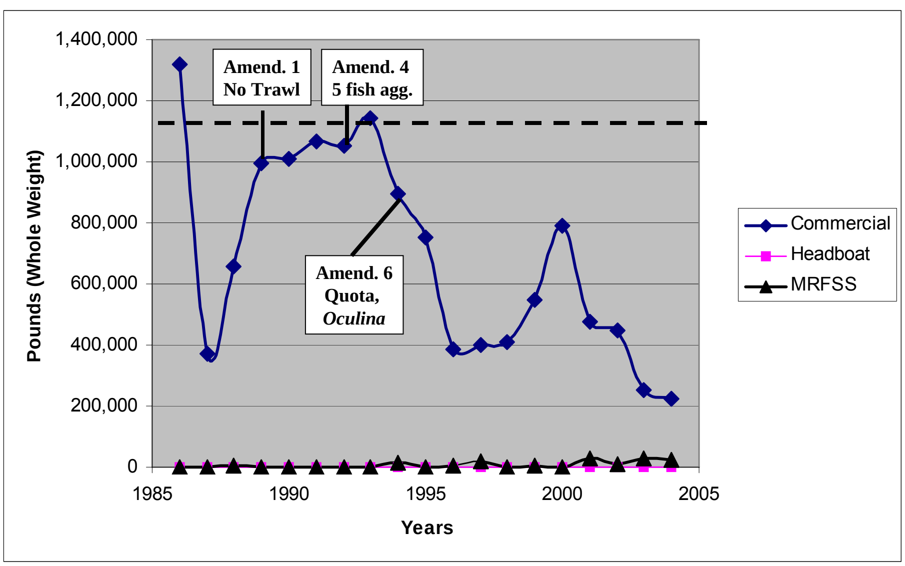

Figure 4-5. Annual landings (lbs whole weight) of golden tilefish 1986-2004. Commercial landings are from the NMFS Accumulative Landings System (ALS), Headboat data are from NMFS-Beaufort, and MRFSS data are from the MRFSS web site. Dotted line represents quota of 1,001,663 lbs gutted weight (1,121,863 lbs whole weight) from 1996 onwards.

During 1999-2003, about 97% of the golden tilefish were caught by commercial fishermen (Figure 4-6). The mean length of golden tilefish taken by commercial fishermen decreased from 27.9" total length in 1984 to 23.9" total length in 1988 (Figure 4-7). Since 1988, the mean size of golden tilefish has been between 24" and 24.5" total length.

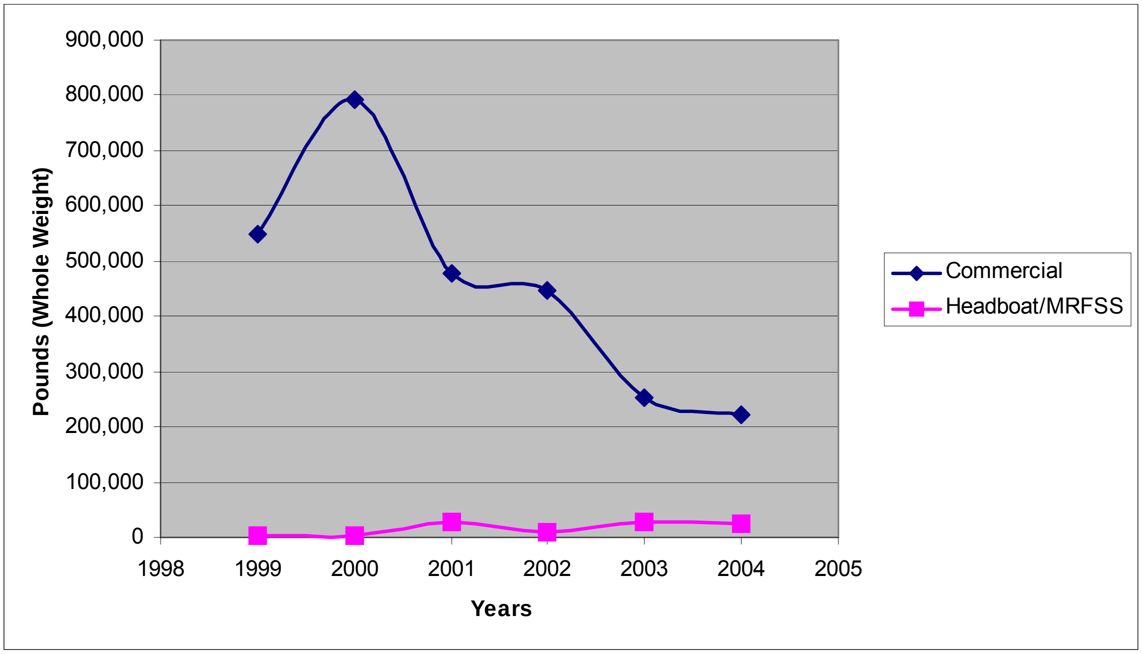

Figure 4-6. Annual landings (lbs whole weight) of golden tilefish (1999-2004). Commercial landings are from the NMFS Accumulative Landings System (ALS). Headboat data are from NMFS-Beaufort, and MRFSS data are from the MRFSS web site.

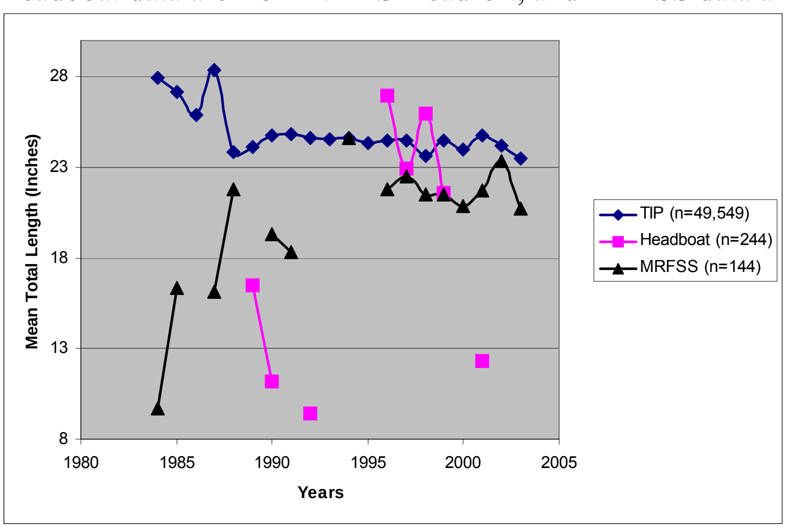

Figure 4-7. Mean lengths (inches, total length) of golden tilefish taken by commercial, headboat, and recreational (MRFSS) fishermen during 1984-2003.

Compliance
The golden tilefish quota has never been met.

4.2.2 Management Measures

4.2.2.1 Commercial

Alternative 1. **No action.** The annual commercial golden tilefish quota is 1,001,663 lbs gutted weight (1,121,863 lbs whole weight). A trip limit of 5,000 lbs gutted weight (5,600 lbs whole weight) applies until the quota is taken. An incidental catch allowance of 300 lbs gutted weight (336 lbs whole weight) per trip applies after the quota has been taken. Note: The regulations specify gutted weight only.

Alternative 2. **Preferred.** Reduce the annual commercial golden tilefish quota from 1,001,663 lbs gutted weight (1,121,863 lbs whole weight) to 295,000 lbs gutted weight (331,000 lbs whole weight). After the commercial quota is met, all purchase and sale is prohibited and harvest and/or possession is limited to the bag limit.

The Council is considering the following commercial trip limit alternatives:

Alternative 2A. Specify a commercial trip limit of 3,000 lbs gutted weight (3,360 lbs whole weight) until 75% of the quota is taken when the trip limit is reduced to 300 lbs gutted weight (335 lbs whole weight).

Alternative 2B. Specify a commercial trip limit of 3,000 lbs gutted weight (3,360 lbs whole weight) until 85% of the quota is taken when the trip limit is reduced to 300 lbs gutted weight (335 lbs whole weight).

Alternative 2C. **Preferred.** Specify a commercial trip limit of 4,000 lbs gutted weight (4,480 lbs whole weight) until 75% of the quota is taken when the trip limit is reduced to 300 lbs gutted weight (335 lbs whole weight).

Alternative 2D. Specify a commercial trip limit of 4,000 lbs gutted weight (4,480 lbs whole weight) until 85% of the quota is taken when the trip limit is reduced to 300 lbs gutted weight (335 lbs whole weight).

Alternative 2E. **Preferred.** Do not adjust trip limit downwards in Alternatives 2A, 2B, 2C (Preferred), and 2D unless percent specified is captured on or before September 1.

The Council's **preferred trip limit is 2C and 2E combined**.

Alternative 3. Specify the annual commercial golden tilefish quota and trip limit as follows: retain the current quota of 1,001,663 lbs gutted weight (1,121,863 lbs whole weight) in year 1; reduce the quota to 450,000 lbs gutted weight (503,000 lbs whole weight) (average commercial landings 1999-2003) in year 2; and reduce the quota to 295,000 lbs gutted weight (331,000 lbs whole weight) in year 3 onwards until modified. During years 1 and 2 the current trip limit of 5,000 lbs gutted weight (5,600 lbs whole weight) would continue to apply until the quota is taken. During year 1 an incidental catch allowance of 300 lbs gutted weight (335 lbs whole weight) per trip would continue to apply after the quota is taken. In years 2 and 3, the fishery would be closed when the quota is met. After the commercial quota is met, all purchase and sale is prohibited and harvest and/or possession is limited to the bag limit.

The Council is considering the following commercial trip limit alternatives for year 3 onwards:

Alternative 3A. Specify a commercial trip limit of 3,000 lbs gutted weight (3,360 lbs whole weight) until 75% of the quota is taken when the trip limit is reduced to 300 lbs gutted weight (335 lbs whole weight).

Alternative 3B. Specify a commercial trip limit of 3,000 lbs gutted weight (3,360 lbs whole weight) until 85% of the quota is taken when the trip limit is reduced to 300 lbs gutted weight (335 lbs whole weight).

Alternative 3C. Specify a commercial trip limit of 4,000 lbs gutted weight (4,480 lbs whole weight) until 75% of the quota is taken when the trip limit is reduced to 300 lbs gutted weight (335 lbs whole weight).

Alternative 3D. Specify a commercial trip limit of 4,000 lbs gutted weight (4,480 lbs whole weight) until 85% of the quota is taken when the trip limit is reduced to 300 lbs gutted weight (335 lbs whole weight).

Alternative 3E. Do not adjust trip limit downwards in Alternatives 3A-2D unless percent specified is captured on or before September 1.

Discussion

The Council's **Preferred Alternative 2** would end overfishing immediately. **Alternative 3** would phase-out overfishing over a 3-year period. The trip limit components of these alternatives are intended to extend the duration of the fishing season as long as practicable. With a 3,000 lb gutted weight (3,360 lbs whole weight) trip limit as specified in **Alternatives 2A and 2B**, 71% of the quota would have been taken by August 1 and 86% of the quota would have been taken by September 1 based on historical catch data under the current quota of slightly over one million lbs. Reducing the quota to 295,000 lbs gutted weight is likely to change the seasonal fishing pattern of fishermen. The commercial longline fishermen begin fishing for sharks in July so they should be expected to target golden tilefish beginning in January. Under such a scenario, the lower quota of 295,000 lbs would likely be filled by the end of June. With a 4,000 lb gutted weight trip limit (4,480 lbs whole weight) as specified in **Alternatives 2C and 2D**, 76% of the quota would have been taken by August 1 and 92% of the quota would have been taken by September 1 based on historical catch data under the current quota of slightly over one million lbs. The date trigger proposed in **Alternative 2E** would ensure the trip limit strategy does not unintentionally prevent the fishery from harvesting the full quota in years where harvest is lower than expected through August. The Council's preferred trip limit combination of **Alternatives 2C and 2E** would be expected to reduce the trip limit to 300 lbs gutted weight around August 1.

With a 3,000 lb gutted weight (3,360 lbs whole weight) commercial trip limit as specified in **Alternatives 3A and 3B**, 71% of the quota would have been taken by August 1 and 86% of the quota would have been taken by September 1 based on historical catch data under the current quota of slightly over one million lbs. Reducing the quota to 295,000 lbs is likely to change the seasonal fishing pattern of fishermen. The commercial longline fishermen begin fishing for sharks in July so they would be expected to target golden tilefish beginning in January. Under such a scenario, the lower quota of 295,000 lbs would likely be filled by the end of June. With a 4,000 lb gutted weight (4,480 lbs whole weight) trip limit as specified in **Alternatives 3C and 3D**, 76% of the quota would have been taken by August 1 and 92% of the quota would have been taken by September 1 based on historical catch data under the current quota of slightly over one million lbs. The date trigger proposed in **Alternative 3E** would ensure the trip limit strategy does not unintentionally prevent the fishery from harvesting the full quota in years where the harvest is lower than expected through August.

4.2.2.2 Recreational

Alternative 1. **No action.** Golden tilefish are included in the 5-grouper per person per day aggregate recreational bag limit.

Alternative 2. Limit the possession of golden tilefish to two per person per day within the 5-grouper per person per day aggregate recreational bag limit.

Alternative 3. **Preferred.** Limit the possession of golden tilefish to one per person per day within the 5-grouper per person per day aggregate recreational bag limit.

Alternative 4. Limit the possession of golden tilefish to one per vessel within the 5-grouper per person per day aggregate recreational bag limit.

<u>Discussion</u>
Currently five golden tilefish could be retained per person per day under the 5-grouper per person per day aggregate recreational bag limit. The two fish bag limit proposed in **Alternative 2** would reduce the total recreational mortality by 2.3% if a 90% release mortality rate was assumed and 0.5% if a 99% release mortality rate was assumed. A bag limit of one golden tilefish would reduce the total recreational mortality by 4.2% or 0.4% if the release mortality rate was assumed to be 90% or 99%, respectively.

The Council's Scientific and Statistical Committee recommended using a 100% release mortality rate, which would mean there is no reduction with a lower bag limit because all the fish would die when released. A lower bag limit, while not achieving a great reduction, might serve as an incentive to avoid golden tilefish.

4.2.3 Biological Effects of Management Measure Alternatives

Fishery management measures directly affect target and bycatch species and, sometimes, fish habitat by influencing the rate of fishing mortality, as well as the amount and distribution of fishing effort, applied to a fishery. This analysis examines the type(s) and extent of potential effects resulting from establishing or adjusting established management measures for golden tilefish.

4.2.3.1 Commercial

Management Measure Alternative 1 would retain the current regulations used to manage catches of golden tilefish. In general, commercial regulations include an annual catch quota and trip limit for golden tilefish, and a limited access system. In addition, the *Oculina* bank HAPC is closed to all bottom fishing off the coast of Florida (an area where golden tilefish are known to occur).

Total allowable catch quotas (TACs) and trip limits are designed to reduce fishing effort in the form of the number of targeted fishing trips or time spent pursuing a species. Area closures are intended to provide fish populations and/or valuable bottom habitat a refuge from fishing pressure. When properly designed, these types of measures are generally expected to benefit the environment in the short term and long term by limiting the extent to which a stock is targeted. However, the extent to which such benefits are realized depends on if and to what extent fishing effort changes or shifts in response to the select management measure. For example, discard mortality can limit the amount by which fishing mortality is reduced by quotas, trip limits, and, if fishermen continue to target co-occurring species after the catch quota or limit has been achieved. Additionally, the environmental benefits of a closed area management strategy can be reduced or negated if not integrated with some form of control on fishing mortality and effort outside the closed area. Current management regulations control fishing mortality with a quota, and allow fishery participants to retain 300 lbs gutted weight of golden tilefish per trip after the quota has been achieved to better account for and limit the extent of regulatory discards.

To determine the actual environmental effects of the no action management alternative on golden tilefish, one must first examine current trends in harvest levels, stock biomass levels, and life history characteristics, then predict the direction of future trends under status quo management. Despite a steady decline in biomass since the 1980s, the recent SEDAR assessment determined the South Atlantic golden tilefish stock is not overfished, but undergoing overfishing (SEDAR 4 2004). MARMAP estimates of longline catch per unit effort (CPUE) for golden tilefish decreased from approximately 3.5 fish per 100 hooks in 1997 to approximately 0.3 fish per 100 hooks in 2003 (Harris and Machowski, 2004), suggesting the stock is stressed. Headboat and MRFSS data are insufficient to use in determining CPUE trends.

Harris *et al*. (2001) report the golden tilefish stock is exhibiting many of the symptoms of an overexploited population. Golden tilefish are a slow growing species, which may live for as long as 50 years (SEDAR 4 2004), making them vulnerable to fishing pressure. Harris *et al*. (2001) indicate there was a significant decrease in the mean length at age for most age classes between 1980-1986 and 1996-1998, which may have been a function of heavy fishing pressure. There was also a decrease in the size and age at maturity during the two time periods. Harris *et al*. (2001) state that males are significantly larger than females. With a shift to smaller fish in recent years, Harris *et al*. (2001) identify differences in the sex ratios between the 1980s and 1990s. During 1980-1986, the sex ratio was not significantly different from 1:1; however, during 1996-1998, females dominated samples. The discussion under snowy grouper (Section 4.1.3) provides more detailed information on the adverse effects of decreasing size and age trends on stock biomass and reproduction, population structure, and the marine ecosystem. Such trends are expected to continue if status quo commercial management regulations are maintained, and could have a significant adverse effect on the stock if allowed to continue indefinitely.

All the alternatives to status quo management evaluated are intended to end or phase out overfishing of golden tilefish. As a result, they are expected to directly and significantly benefit the biological environment by assisting in restoring stock status and population demographics to more natural conditions. The indirect effects of these alternatives on the ecological environment are less certain. Improving the status of stocks would likely promote more natural ecological functions. However, competitor, predator, and prey relationships in marine ecosystems are complex and poorly understood. As a result, the exact nature and magnitude of the ecological effects of alternative management measures are difficult to accurately predict or distinguish.

The current *Oculina* closed area provides biological benefits, which cannot be quantified at this time. This area allows species like golden tilefish to achieve their natural age and size structure in the absence of fishing. Recent evidence indicates that there has been an increase in abundance of many species since the area was closed (Koenig 2001). Koenig *et al.* (in press) documented the presence of golden tilefish in the *Oculina* closed area.

The commercial quota reduction proposed in **Alternative 2** is designed to reduce commercial catches by 35% from average landings recorded during 1999 to 2003, thereby ending overfishing. Reducing fishing mortality on golden tilefish is expected to increase stock biomass and promote a more natural population structure by helping to reverse the trends of decreasing males and mean length documented by Harris *et al*. (2001). These effects would benefit golden tilefish and associated species by protecting the stock against recruitment overfishing and reducing its vulnerability to adverse environmental conditions.

Golden tilefish are primarily targeted with longline gear in depths of 180-200 m (Low 2003) and are mainly taken over smooth mud bottom where they occupy burrows. However, off of the Carolinas, longline gear also is deployed across rough, rocky areas of high relief and mud, resulting in a catch that generally includes snowy grouper, blueline tilefish, blackbelly rosefish, as well as golden tilefish. If golden tilefish continue to be captured and discarded by longline fishermen pursuing other species, such as blueline tilefish or snowy grouper, after the commercial golden tilefish quota has been taken, the quota proposed in the Council's **Preferred Alternative 2** might only provide a reduction in fishing mortality ranging from 27% to 34%.

This estimate is based on a golden tilefish release mortality rate of 100%. Logbook data indicate that blueline tilefish constituted a minor (8%) portion of the landings on longline trips that caught at least 100 lbs of snowy grouper during 1999-2003; whereas, golden tilefish and snowy grouper made up 40% and 21% of the total, respectively. However, the Snapper Grouper Advisory Panel stated they felt fishermen could avoid locations where snowy grouper and golden tilefish co-occur after the golden tilefish fishery is closed by limiting fishing gear to mud bottom.

Alternatives 2A through 2D specify alternative trip limits that would extend the duration of the fishery for various time periods. **Alternative 2A** would specify a commercial trip limit of 3,000 lbs gutted weight that would be decreased to 300 lbs gutted weight when 75% of the quota is taken. This alternative might not allow fishermen to take the whole quota. Based on data from 1999-2003, 75% of the quota would be met in early August, when the trip limit would be reduced to 300 lbs gutted weight. However, only 85% of the annual quota would be met by December 31 after the quota was reduced to 300 lbs gutted weight. Since it is unlikely the quota would be met by December, this alternative would provide the greatest assurance the fishery would remain open throughout the year and, therefore the greatest biological benefit.

Alternative 2B would specify a commercial trip limit of 3,000 lbs gutted weight that would be decreased to 300 lbs gutted weight when 85% of the quota is taken. When compared to **Alternative 2A**, there is a greater likelihood of meeting the quota in **Alternative 2B**. Based on data from 1999-2003, 85% of the quota would be met by September 1 and 97% of the quota would be met by December 31 after the quota was reduced to 300 lbs gutted weight.

The Council's **Preferred Alternative 2C** would specify a commercial trip limit of 4,000 lbs gutted weight that would be decreased to 300 lbs gutted weight when 75% of the quota is taken. Based on data from 1999-2003, 75% of the quota would be met by August 1 and 90% of the quota would be met by December 31 after the quota was reduced to 300 lbs gutted weight. This alternative would allow for a larger catch of golden tilefish than **Alternative 2A** and would be more likely than **Alternative 2B** to allow the fishery to remain open throughout the year.

Alternative 2D would specify a commercial trip limit of 4,000 lbs gutted weight, which would be decreased to 300 lbs gutted weight when 85% of the quota is taken. Based on data from 1999-2003, 85% of the quota would be met during mid-August and 100% of the quota would be met by November after the quota was reduced to 300 lbs gutted weight. Since the quota would be achieved in November, the golden tilefish fishery would be closed for the rest of the year. As a result, **Alternative 2D** could encourage derby-type conditions, where fishermen compete with each other to catch as many fish as possible before the TAC is taken and the fishery is closed. Derby fisheries can unnecessarily increase bycatch by providing participants less flexibility in deciding when, where, and how to fish. In a derby-type fishery, a full-scale race for fish can occur resulting in shorter seasons, market gluts, and depressed market prices. Furthermore, the safety of fishermen can be compromised should fishermen attempt catch fish in bad weather or with poorly maintained vessels before the quota is met.

Commercial longline fishermen begin fishing for sharks in July. Given the lower quota proposed in **Alternatives 2A through 2D**, fishermen may increase effort prior to July and take 75% or 85% of the quota earlier than they have historically (August or September). As a result, it is possible the quota would be met and the fishery would be shut down before December 31. As noted above, fishermen would be forced to discard golden tilefish when pursuing other species, such as the snowy grouper and blueline tilefish, after the fishery was closed.

Alternatively, the trip limit could be reduced to lower limits late in the year if high gas prices, cold water events, or other unforeseen circumstances, served to reduce catches below historic levels. Switching to a lower trip limit late in the year (i.e. December) could unnecessarily prevent fishermen from harvesting the annual quota and could present administrative problems if the lower trip limit were in place for only a short period of time. The Council's **Preferred Alternative 2E** would allow fishermen to keep fishing at the higher trip limit until the quota is filled if 75% or 85% of the quota was not met by September 1.

Alternative 3 would phase in the reduced quota proposed in the Council's Preferred Alternative 2 over a 3-year period. The 3,000 and 4,000 lb gutted weight trip limits, which would be reduced to 300 lbs gutted weight when 75% or 85% of the quota is met (**Alternatives 3A-3E**), would not apply until year 3. Since there would be a delay in the amount of time it takes to end overfishing, **Alternative 3** would take longer to restore the natural age, size, and community structure of golden tilefish than **Alternative 2**, and could make the stock more vulnerable to adverse environmental conditions in the interim.

The biological benefits resulting from **Alternative 3** would be the same as **Alternative 2** after the initial 3 year period. **Alternative 3** would result in less discards during the initial 3 year period and would give the Council time to address discards through Snapper Grouper 13B.

4.2.3.2 Recreational

Alternative 1 would retain the current recreational regulations used to manage catches of golden tilefish. This includes a 5-grouper per person aggregate bag limit (including golden tilefish) and the *Oculina* HAPC is closed to bottom fishing off of the coast of Florida (an area where golden tilefish are known to occur).

Bag limits are designed to reduce fishing mortality by reducing the number of fish landed and the amount of time spent pursuing a species. Area closures are intended to provide fish and/or valuable bottom habitat a refuge from fishing pressure. When properly designed, these types of measures are generally expected to benefit the environment in the short-term and long-term by limiting the extent to which a stock is targeted. However, the extent to which such benefits are realized depends on if and to what extent fishing effort changes or shifts in response to the select management measure. For example, discard mortality can limit the amount by which fishing mortality is reduced by bag limits and area closures if fishermen continue to target co-occurring species after the catch quota or limit has been achieved, or within the closed area.

Failing to reduce the 5-grouper aggregate bag limit in the recreational fishery could contribute to the declining status of golden tilefish. However, the effect of the recreational fishery on golden tilefish is considered minor compared to the commercial fishery because the recreational harvest is a small (2%) component of the total harvest. The short-term benefits of this measure are not substantial because the majority of recreational fishermen are not currently filling the bag limit.

The average catch per angler (for MRFSS trips that caught golden tilefish) was 1.1 fish per angler.

The current *Oculina* closed area provides biological benefits, which cannot be quantified at this time. However, it is expected to provide species, like golden tilefish, a greater opportunity to achieve their natural age and size structure in the absence of fishing. Koenig (2001) indicates there has been an increase in abundance of many species within the closed area since it was closed (Koenig 2001).

Alternative 2 would reduce the golden tilefish bag limit to two per person per day within the 5-grouper per person per day aggregate bag limit. The short-term benefits of this measure are not substantial because the majority of recreational fishermen are not currently filling the bag limit. The average catch per angler (for MRFSS trips that caught golden tilefish) was 1.1 fish per angler during 1999-2003. However, the golden tilefish stock could benefit from this action in the long-term if recreational fishing effort were to increase in the South Atlantic. In addition, since release mortality is considered to be nearly 100% for golden tilefish, a smaller bag limit would provide little reduction in overall fishing mortality they would likely die from the trauma of capture. However, a smaller bag limit could provide fishermen an incentive to avoid golden tilefish.

Alternative 3 is similar to **Alternative 2** except it would reduce the golden tilefish bag limit to one per person per day within the 5-grouper per person per day aggregate bag limit. A bag limit of 1 fish per person per day rather than 2 fish per person per day would provide little reduction since the fish are likely to die from the trauma of capture. However, a bag limit of 1 fish per person per day may provide a greater incentive than **Alternative 2** to avoid golden tilefish.

Alternative 4 would limit the possession of golden tilefish to one per vessel within the 5-grouper per person per day aggregate. The biological effects of this alternative would be similar to those described for **Alternatives 2 and 3**. However, **Alternative 4** might provide fishermen an incentive to avoid golden tilefish.

4.2.4 Protected Species Effects of Management Measure Alternatives

4.2.4.1 Commercial

Alternative 1 would maintain the status quo and thus keep the existing level of risk for protected species interactions as summarized in the Affected Environment.

Alternatives 2 and **3** may potentially benefit protected species if the reduction in allowable harvest results in the reduction of effort (i.e., reduction of hook-and-line/longline gear in the water). If a reduction in effort occurs, the Council's **Preferred Alternative 2**, which specifies a shorter time period for ending overfishing, may result in increased benefits to protected species more rapidly. Trip limit **Alternatives 2A and 2C**, which increase the likelihood the reduced trip limit would be implemented earlier in the season (i.e., August versus September), may provide more benefit to protected species if the reduction in trip limit reduces fishing effort. However, such benefits may be reduced or negated if fishing effort were to shift into other fisheries that pose a risk to protected species (e.g., other vertical hook-and-line, gillnet, pot/trap fisheries) after the quota was reached or, if as a result, effort were to increase in shallow waters where there may be an increased risk of sea turtle or smalltooth sawfish encounters.

4.2.4.2 Recreational

Alternative 1 would maintain the status quo and thus keep the existing level of risk for protected species interactions as summarized in the Affected Environment.

Alternatives 2, **3** and **4** would not likely measurably change the current impact of the snapper grouper fishery on protected species (as summarized in the Affected Environment) because they would allow fishermen to continue pursuing other species included in the 5-grouper per person per day aggregate recreational bag limit.

4.2.5 Economic Effects of Management Measure Alternatives

This section describes the short-term quantitative effects on the commercial fishery, then the quantitative short-term effects on the recreational fishery, and provides a qualitative discussion of the long-term effects on these harvesting sectors and non-use benefits to society. Estimates of the short-term economic impacts are expressed in nominal values (i.e., not adjusted for inflation).

4.2.5.1 Commercial

The methodology employed for the analysis for the commercial sector is described in Section 4.1.5 and is incorporated herein by reference.

Under the golden tilefish and base model alternatives for the other species, the expected total net revenue earned by all boat owners, captains, and crews is $4.64 million per year (Table 4-14a). This represents a short-term loss of $1.35 million, or 22.6% compared to the status quo for all species (Table 4-14a). Since, the no-action alternative for golden tilefish would not impose additional restrictions on commercial fishermen, the predicted short-term loss is attributed to the base model alternatives for the other species (Table 4-14a). .

The marginal effects of the proposed alternatives for golden tilefish were evaluated by holding the alternatives for other species constant at their base levels. If proposed regulations were implemented for golden tilefish, then increased losses in net revenue would range between $0 with **Alternative 3** (year 1, the no-action alternative) and $0.16 million (2.7% of status quo net revenues) with **Alternatives 2A and 3(3)A** (year 3) (Table 4-14b).

Short-term losses are expected to vary annually, and will be greater when golden tilefish are more abundant and proposed quotas and trip limits are more likely to be restrictive. Commercial landings of golden tilefish have declined steadily from 2001 through 2004, with landings in 2003 barely exceeding proposed quotas and landings in 2004 falling short of proposed quotas. If fishing conditions most closely resemble those in 2001, then the additional losses that would be incurred by fishermen due to proposed alternatives for golden tilefish would range up to $0.25 million (Table 4-14b). However, short-term losses would range up to only $0.04 million with 2004 conditions (Table 4-14b).

The Council's **Preferred Alternative 2CE** will result in an incremental loss of $0.12 million annually which represents 2.1% of the status quo revenue (Tables 4-14a and 4-14b).

Table 4-14a. Estimated change in revenues minus trip costs and opportunity costs of labor for proposed golden tilefish alternatives, by year, given base model alternatives for snowy grouper (3), vermilion snapper (10), black sea bass (8,) and red porgy (2).

Golden tilefish Alternative	Revenues minus Trip Costs and Opp Costs of Labor (Millions of Dollars)					Cumulative Change compared to Status Quo ($Million)	Cumulative Percentage Change compared to Status Quo	Extra Change due to Golden tilefish Alternatives ($Million)	Extra Percentage Change compared to Status Quo
	2001	2002	2003	2004	Average	Average	Average	Average	Average
Status Quo	$6.84	$5.94	$5.19	$5.99	$5.99	$0.00	0.0%	n.a.	n.a.
No Action	$4.65	$4.52	$4.55	$4.83	$4.64	-$1.35	-22.6%	$0.00	0.0%
2A	$4.40	$4.29	$4.42	$4.79	$4.48	-$1.51	-25.2%	-$0.16	-2.7%
2AE	$4.40	$4.29	$4.50	$4.79	$4.50	-$1.49	-24.9%	-$0.14	-2.3%
2B	$4.44	$4.32	$4.46	$4.79	$4.50	-$1.48	-24.8%	-$0.13	-2.2%
2BE	$4.44	$4.38	$4.50	$4.79	$4.53	-$1.46	-24.3%	-$0.11	-1.8%
2C	$4.40	$4.30	$4.44	$4.80	$4.48	-$1.50	-25.1%	-$0.15	-2.6%
2CE	$4.40	$4.30	$4.53	$4.82	$4.51	-$1.48	-24.6%	-$0.12	-2.1%
2D	$4.45	$4.33	$4.47	$4.82	$4.52	-$1.47	-24.6%	-$0.12	-2.0%
2DE	$4.45	$4.39	$4.53	$4.82	$4.55	-$1.44	-24.1%	-$0.09	-1.5%
3(1)	$4.65	$4.52	$4.55	$4.83	$4.64	-$1.35	-22.6%	$0.00	0.0%
3(2)	$4.64	$4.52	$4.55	$4.83	$4.63	-$1.35	-22.6%	$0.00	0.0%
3(3)A	$4.40	$4.29	$4.42	$4.79	$4.48	-$1.51	-25.2%	-$0.16	-2.7%
3(3)AE	$4.40	$4.29	$4.50	$4.79	$4.50	-$1.49	-24.9%	-$0.14	-2.3%
3(3)B	$4.44	$4.32	$4.46	$4.79	$4.50	-$1.48	-24.8%	-$0.13	-2.2%
3(3)BE	$4.44	$4.38	$4.50	$4.79	$4.53	-$1.46	-24.3%	-$0.11	-1.8%
3(3)C	$4.40	$4.30	$4.44	$4.80	$4.48	-$1.50	-25.1%	-$0.15	-2.6%
3(3)CE	$4.40	$4.30	$4.53	$4.82	$4.51	-$1.48	-24.6%	-$0.12	-2.1%
3(3)D	$4.45	$4.33	$4.47	$4.82	$4.52	-$1.47	-24.6%	-$0.12	-2.0%
3(3)DE	$4.45	$4.39	$4.53	$4.82	$4.55	-$1.44	-24.1%	-$0.09	-1.5%

Table 4-14b. The portion of total change in revenues minus trip costs and opportunity costs of labor attributable to proposed alternatives for golden tilefish, by year, given base model alternatives for snowy grouper (3), vermilion snapper (10), black sea bass (8), and red porgy (2).

Golden tilefish alternatives, given: Snowy(3), VS(10), RPorgy(2), BSB(8)	**Extra Change in Revenues minus Trip Costs and Opportunity Costs of Labor due to Proposed Alternatives for Golden tilefish, and Excluding the Simultaneous Effects of Proposed Alternatives for Other Species**			
	Change from No-Action Alternative, Millions of Dollars			
	2001	**2002**	**2003**	**2004**	**Avg**
No Action	$0.00	$0.00	$0.00	$0.00	$0.00
2A	-$0.25	-$0.23	-$0.13	-$0.04	-$0.16
2AE	-$0.25	-$0.23	-$0.05	-$0.04	-$0.14
2B	-$0.20	-$0.20	-$0.09	-$0.04	-$0.13
2BE	-$0.20	-$0.14	-$0.05	-$0.04	-$0.11
2C	-$0.24	-$0.22	-$0.11	-$0.03	-$0.15
2CE	-$0.24	-$0.22	-$0.02	-$0.01	-$0.12
2D	-$0.20	-$0.19	-$0.08	-$0.01	-$0.12
2DE	-$0.20	-$0.14	-$0.02	-$0.01	-$0.09
3(1)	$0.00	$0.00	$0.00	$0.00	$0.00
3(2)	-$0.01	$0.00	$0.00	$0.00	$0.00
3(3)A	-$0.25	-$0.23	-$0.13	-$0.04	-$0.16
3(3)AE	-$0.25	-$0.23	-$0.05	-$0.04	-$0.14
3(3)B	-$0.20	-$0.20	-$0.09	-$0.04	-$0.13
3(3)BE	-$0.20	-$0.14	-$0.05	-$0.04	-$0.11
3(3)C	-$0.24	-$0.22	-$0.11	-$0.03	-$0.15
3(3)CE	-$0.24	-$0.22	-$0.02	-$0.01	-$0.12
3(3)D	-$0.20	-$0.19	-$0.08	-$0.01	-$0.12
3(3)DE	-$0.20	-$0.14	-$0.02	-$0.01	-$0.09
Status Quo	$6.84	$5.94	$5.19	$5.99	$5.99

Table 4-14b continued.

	Extra Change as Percent of Status Quo				
	2001	2002	2003	2004	Avg
No Action	0.0%	0.0%	0.0%	0.0%	0.0%
2A	-3.6%	-3.9%	-2.4%	-0.7%	-2.7%
2AE	-3.6%	-3.9%	-0.9%	-0.7%	-2.3%
2B	-3.0%	-3.4%	-1.7%	-0.7%	-2.2%
2BE	-3.0%	-2.3%	-0.9%	-0.7%	-1.8%
2C	-3.6%	-3.8%	-2.2%	-0.5%	-2.6%
2CE	-3.6%	-3.8%	-0.4%	-0.2%	-2.1%
2D	-2.9%	-3.3%	-1.6%	-0.2%	-2.0%
2DE	-2.9%	-2.3%	-0.4%	-0.2%	-1.5%
3(1)	0.0%	0.0%	0.0%	0.0%	0.0%
3(2)	-0.1%	0.0%	0.0%	0.0%	0.0%
3(3)A	-3.6%	-3.9%	-2.4%	-0.7%	-2.7%
3(3)AE	-3.6%	-3.9%	-0.9%	-0.7%	-2.3%
3(3)B	-3.0%	-3.4%	-1.7%	-0.7%	-2.2%
3(3)BE	-3.0%	-2.3%	-0.9%	-0.7%	-1.8%
3(3)C	-3.6%	-3.8%	-2.2%	-0.5%	-2.6%
3(3)CE	-3.6%	-3.8%	-0.4%	-0.2%	-2.1%
3(3)D	-2.9%	-3.3%	-1.6%	-0.2%	-2.0%
3(3)DE	-2.9%	-2.3%	-0.4%	-0.2%	-1.5%

Alternatives 2A, 2AE, 2B, 2BE, 3A, 3AE, 3B, and 3BE differ according to the criteria by which proposed trip limits decrease from 3,000 lbs to 300 lbs. **Alternatives 2C, 2CE, 2D, 2DE, 3C, 3CE, 3D, and 3DE** differ according to the criteria by which trip limits decrease from 4,000 lbs to 300 lbs. The simulation model found only small (and probably insignificant) differences among the criteria for adjusting trip limits because of the small magnitudes of short-terms losses associated with golden tilefish alternatives. However, three generalizations were suggested by the simulation model, although they may be less important than other factors, which were not accounted for in the model, such as potential changes in fishing behavior due to regulation.

First, short-term losses would be slightly lower for alternatives that specified 4,000 lb trip limits rather than 3,000 lb trip limits. Progress toward quotas would be faster with 4,000 lb trip limits, and hence, trip limits would change sooner. However, the simulation model predicted that quotas usually would not be filled if fishing conditions in the near-future are similar to recent (2003-2004) fishing conditions.

Second, the simulation model predicted that short-term losses would be slightly lower for trip limit **Sub-Alternatives B and D**, which specified that trip limits change when 85% of the quota is filled, rather than alternatives with **Sub-Alternatives A and C**, which specified that trip limits change when 75% of the quota is filled. Progress toward quotas would be faster when adjustment of the trip limit does not occur until 85% of the quota is filled. However, the simulation model predicted that quotas usually would not be filled if fishing conditions in the near-future are similar to recent (2003-2004) fishing conditions.

Third, the simulation model predicted losses would be slightly lower for trip limit **Sub-Alternative E**, which specified that trip limits change only when 85% or 75% of the quota is filled prior to September 1. Trip limit **Sub-Alternative E** intends to maintain the full 3,000 lb or 4,000 lb trip limit throughout the fishing year when progress toward filling the quota is slower than expected. By not reducing the trip limit, the likelihood increases that quotas will be filled and the fishery will close, but the level of overall harvest could be greater than if a lower trip limit prevented fishermen from achieving the biologically allowable catch. Interestingly, the simulation model found that the golden tilefish quota would be filled and the fishery closed only with trip limit **Sub-Alternatives BE, CE, and DE** when trip limits did not change because 85% or 75% of the quota was not filled prior to September 1. The simulation model predicted that proposed quotas would have been filled in mid-October with trip limit **Sub-Alternatives BE and DE** and 2002 fishing conditions, and in late December with trip limit **Sub-Alternatives CE and DE** and 2003 fishing conditions.

Although proposed regulation of the golden tilefish fishery would generate relatively small short-term losses for the snapper-grouper fishery as a whole, the losses would be relatively large for fishermen that target golden tilefish. In both absolute and relative terms, the effects of proposed alternatives for golden tilefish would be incurred primarily by boats that use bottom longlines (Table 4-14c). On average, the extra losses that would be incurred by fishermen with longlines to range up to $0.15 million with **Alternatives 2A, 2C**, and year 3 for **Alternatives 3A and 3C**, which represents up to 22.3% of their status quo earnings (Table 4-14c). On average, most of the short-term losses would be incurred by fishermen in South Carolina and central Florida (Table 4-14d).

Table 4-14c. The portion of total change in revenues minus trip costs and opportunity costs of labor attributable to proposed alternatives for golden tilefish, by primary gear, given base model alternatives for snowy grouper (3), vermilion snapper (10), black sea bass (8), and red porgy (2).

Golden tilefish alternatives, given: Snowy(3), VS(10), RPorgy(2), BSB(8)	**Extra Change in Revenues minus Trip Costs and Opportunity Costs of Labor due to Proposed Alternatives for Golden tilefish, by Primary Gear, and Excluding the Simultaneous Effects of Proposed Alternatives for Other Species Change from No-Action Alternative, Millions of Dollars**						
2001-2004 Average	**Vert Lines**	**Long Lines**	**Pots**	**Trolling**	**Diving**	**Other**	**Total**
No Action	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
2A	-$0.01	-$0.15	$0.00	$0.00	$0.00	$0.00	-$0.16
2AE	-$0.01	-$0.13	$0.00	$0.00	$0.00	$0.00	-$0.14
2B	-$0.01	-$0.13	$0.00	$0.00	$0.00	$0.00	-$0.13
2BE	$0.00	-$0.10	$0.00	$0.00	$0.00	$0.00	-$0.11
2C	-$0.01	-$0.15	$0.00	$0.00	$0.00	$0.00	-$0.15
2CE	-$0.01	-$0.12	$0.00	$0.00	$0.00	$0.00	-$0.12
2D	-$0.01	-$0.11	$0.00	$0.00	$0.00	$0.00	-$0.12
2DE	$0.00	-$0.09	$0.00	$0.00	$0.00	$0.00	-$0.09
3(1)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
3(2)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
3(3)A	-$0.01	-$0.15	$0.00	$0.00	$0.00	$0.00	-$0.16
3(3)AE	-$0.01	-$0.13	$0.00	$0.00	$0.00	$0.00	-$0.14
3(3)B	-$0.01	-$0.13	$0.00	$0.00	$0.00	$0.00	-$0.13
3(3)BE	$0.00	-$0.10	$0.00	$0.00	$0.00	$0.00	-$0.11
3(3)C	-$0.01	-$0.15	$0.00	$0.00	$0.00	$0.00	-$0.15
3(3)CE	-$0.01	-$0.12	$0.00	$0.00	$0.00	$0.00	-$0.12
3(3)D	-$0.01	-$0.11	$0.00	$0.00	$0.00	$0.00	-$0.12
3(3)DE	$0.00	-$0.09	$0.00	$0.00	$0.00	$0.00	-$0.09
Status Quo	$4.55	$0.69	$0.52	$0.06	$0.14	$0.03	$5.99

Table 4-14c continued.

2001-2004 Average	Vert Lines	Long Lines	Pots	Trolling	Diving	Other	Total
	Extra Change as Percent of Status Quo						
No Action	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2A	-0.2%	-22.3%	0.0%	0.0%	0.0%	0.4%	-2.7%
2AE	-0.2%	-19.3%	0.0%	0.0%	0.0%	0.4%	-2.3%
2B	-0.1%	-18.4%	0.0%	0.0%	0.0%	0.6%	-2.2%
2BE	-0.1%	-15.0%	0.0%	-0.1%	0.0%	0.0%	-1.8%
2C	-0.2%	-21.1%	0.0%	-1.2%	0.0%	0.4%	-2.6%
2CE	-0.2%	-16.9%	0.0%	-1.2%	0.0%	0.4%	-2.1%
2D	-0.2%	-16.5%	0.0%	0.0%	0.0%	0.4%	-2.0%
2DE	-0.1%	-12.5%	0.0%	-0.1%	0.0%	0.0%	-1.5%
3(1)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3(2)	0.0%	-0.4%	0.0%	0.0%	0.0%	0.0%	0.0%
3(3)A	-0.2%	-22.3%	0.0%	0.0%	0.0%	0.4%	-2.7%
3(3)AE	-0.2%	-19.3%	0.0%	0.0%	0.0%	0.4%	-2.3%
3(3)B	-0.1%	-18.4%	0.0%	0.0%	0.0%	0.6%	-2.2%
3(3)BE	-0.1%	-15.0%	0.0%	-0.1%	0.0%	0.0%	-1.8%
3(3)C	-0.2%	-21.1%	0.0%	-1.2%	0.0%	0.4%	-2.6%
3(3)CE	-0.2%	-16.9%	0.0%	-1.2%	0.0%	0.4%	-2.1%
3(3)D	-0.2%	-16.5%	0.0%	0.0%	0.0%	0.4%	-2.0%
3(3)DE	-0.1%	-12.5%	0.0%	-0.1%	0.0%	0.0%	-1.5%

Table 4-14d. The portion of total change in revenues minus trip costs and opportunity costs of labor attributable to proposed alternatives for golden tilefish, by area landed, given base model alternatives for snowy grouper (3), vermilion snapper (10), black sea bass (8), and red porgy (2).

Golden tilefish alternatives, given: Snowy(3), VS(10), RPorgy(2), BSB(8)	Extra Change in Revenues minus Trip Costs and Opportunity Costs of Labor due to Proposed Alternatives for Golden tilefish, by Area Landed, and Excluding the Simultaneous Effects of Proposed Alternatives for Other Species Change from No-Action Alternative, Millions of Dollars				
2001-2004 Average	North Carolina	South Carolina	Georgia & NE FL	Central & South FL	Total
No Action	$0.00	$0.00	$0.00	$0.00	$0.00
2A	-$0.01	-$0.06	$0.00	-$0.09	-$0.16
2AE	-$0.01	-$0.05	$0.00	-$0.08	-$0.14
2B	-$0.01	-$0.05	$0.00	-$0.07	-$0.13
2BE	-$0.01	-$0.05	$0.00	-$0.05	-$0.11
2C	-$0.01	-$0.05	$0.00	-$0.09	-$0.15
2CE	$0.00	-$0.05	$0.00	-$0.07	-$0.12
2D	-$0.01	-$0.04	$0.00	-$0.07	-$0.12
2DE	$0.00	-$0.04	$0.00	-$0.05	-$0.09
3(1)	$0.00	$0.00	$0.00	$0.00	$0.00
3(2)	$0.00	$0.00	$0.00	$0.00	$0.00
3(3)A	-$0.01	-$0.06	$0.00	-$0.09	-$0.16
3(3)AE	-$0.01	-$0.05	$0.00	-$0.08	-$0.14
3(3)B	-$0.01	-$0.05	$0.00	-$0.07	-$0.13
3(3)BE	-$0.01	-$0.05	$0.00	-$0.05	-$0.11
3(3)C	-$0.01	-$0.05	$0.00	-$0.09	-$0.15
3(3)CE	$0.00	-$0.05	$0.00	-$0.07	-$0.12
3(3)D	-$0.01	-$0.04	$0.00	-$0.07	-$0.12
3(3)DE	$0.00	-$0.04	$0.00	-$0.05	-$0.09
Status Quo	$2.20	$2.11	$0.97	$0.70	$5.99

Table 4-14d continued.

2001-2004 Average	North Carolina	South Carolina	Georgia & NE FL	Central & South FL	Total
	Extra Change as Percent of Status Quo				
No Action	0.0%	0.0%	0.0%	0.0%	0.0%
2A	-0.5%	-2.8%	-0.1%	-12.7%	-2.7%
2AE	-0.3%	-2.6%	-0.1%	-11.0%	-2.3%
2B	-0.4%	-2.4%	-0.1%	-10.2%	-2.2%
2BE	-0.3%	-2.3%	-0.1%	-7.1%	-1.8%
2C	-0.5%	-2.4%	0.0%	-12.9%	-2.6%
2CE	-0.2%	-2.2%	0.0%	-10.5%	-2.1%
2D	-0.3%	-2.0%	0.0%	-10.2%	-2.0%
2DE	-0.2%	-1.7%	0.0%	-7.0%	-1.5%
3(1)	0.0%	0.0%	0.0%	0.0%	0.0%
3(2)	-0.1%	0.0%	0.0%	0.0%	0.0%
3(3)A	-0.5%	-2.8%	-0.1%	-12.7%	-2.7%
3(3)AE	-0.3%	-2.6%	-0.1%	-11.0%	-2.3%
3(3)B	-0.4%	-2.4%	-0.1%	-10.2%	-2.2%
3(3)BE	-0.3%	-2.3%	-0.1%	-7.1%	-1.8%
3(3)C	-0.5%	-2.4%	0.0%	-12.9%	-2.6%
3(3)CE	-0.2%	-2.2%	0.0%	-10.5%	-2.1%
3(3)D	-0.3%	-2.0%	0.0%	-10.2%	-2.0%
3(3)DE	-0.2%	-1.7%	0.0%	-7.0%	-1.5%

Total cumulative losses from the golden tilefish alternatives plus base model alternatives for the other species range from $1.35 million with the no-action alternative to $1.51 million with **Alternatives 2A, 2C** and year 3 for **Alternatives 3A and 3C**, which corresponds to average annual losses of 22.6% to 25.2% of status quo net revenue earnings (Table 4-14a).

Estimates of the number of vessels affected by the golden tilefish alternatives are provided (Table 4-14e.) The number of vessels expected to incur losses in net revenue ranged from 311 (no action) to 315 (**Alternative 2BE**). This lack of variability is probably due to the fact that vessels engaged in the golden tilefish fishery also operate in the other fisheries addressed in this amendment (Table 4-14e). The additional number of trips canceled in comparison to the no action alternative is greatest for golden tilefish **Alternatives 2DE and 3(3)DE** (29 trips) and lowest for **Alternatives 3(1) and 3(2)** (0 trips) (Table 4-14e).

Table 4-14e. Frequency distribution of annual loss in net revenue per vessel across the snapper grouper fleet that harvested black sea bass, vermilion snapper, snowy grouper, and golden tilefish averaged over the period 2001-2004.
Net losses (revenues minus trip costs and opportunity costs of labor) attributable to proposed alternatives for golden tilefish, given base model alternatives for snowy grouper (3), vermilion snapper (10), red porgy (2), and black sea bass (8).

Net revenue loss category	**1**	**2A**	**2A E**	**2B**	**2B E**	**2C**	**2CE & 33C E**	**2D & 33D**	**2DE & 33D E**	**3(1) & 3(2)**	**33 A**	**33 AE**	**33 B**	**33 BE**	**33 C**
NO LOSSES*	97	95	94	95	93	95	94	94	94	94	94	94	94	94	94
$1- $100	85	84	84	84	84	84	84	84	84	84	84	84	84	84	84
$101- $500	56	55	56	55	57	56	56	56	56	56	56	56	56	56	56
$501- $1,000	30	29	29	29	29	29	29	29	29	29	29	29	29	29	29
$1,001- $2,500	36	36	35	35	36	35	35	35	35	35	35	35	35	35	35
$2,501- $5,000	27	27	27	28	27	27	27	27	27	27	27	27	27	27	27
$5,001-$10,000	33	33	33	33	34	33	33	33	33	33	33	33	33	33	33
$10,001- $20,000	25	27	27	28	26	26	27	27	26	27	27	27	27	27	27
$20,001- $30,000	15	16	15	16	15	15	15	15	15	15	15	15	15	15	15
$30,001- $100,000	6	7	7	7	7	7	7	6	6	6	7	7	7	7	7
Losses	311	314	314	313	315	313	314	314	314	314	314	314	314	314	314
Incremental number of canceled trips above the no action alternative scenario.		23	18	19	28	25	19	20	29	0	23	18	19	28	25

The potential quota closures of the commercial fishery for golden tilefish, discussed previously, are based on the assumption that all measures in this amendment will take effect at the start of the fishing year. During the first year of implementation of this amendment trip limits will not take effect on January 1st. However, harvest of golden tilefish taken in South Atlantic waters from January 1st would count toward the new quota established by this amendment. Depending on which alternative is implemented the golden tilefish fishery could be closed earlier than model predictions during the first year of implementation of this amendment.

If the Council's **Preferred Alternative 2** is implemented, the golden tilefish quota of 331,000 lbs (whole weight) would be exceeded in June (Table 4-14f).

Table 4-14f. Cumulative monthly harvest of golden tilefish by state averaged over the period 2001-2004, and cumulative monthly harvest as a percent of the total average annual harvest for each state.
Source: Southeast logbook database, NMFS, SEFSC, Beaufort Lab.

	Cumulative monthly harvest (pounds)					**Cumulative monthly harvest as a percent of total harvest**				
Month	**Florida**	**Georgia**	**North Carolina**	**South Carolina**	**Total**	**Florida**	**Georgia**	**North Carolina**	**South Carolina**	**Total**
January	C	C	C	C	C	C	C	C	C	C
February	C	C	C	C	C	C	C	C	C	C
March	C	C	C	47,290	85,100	C	C	C	45%	31%
April	51,993	C	C	53,338	110,079	41%	C	C	51%	40%
May	60,349	C	C	61,425	126,734	47%	C	C	59%	47%
June	71,577	C	C	70,746	147,392	56%	C	C	68%	54%
July	74,974	C	C	79,634	166,439	59%	C	C	76%	61%
August	75,519	C	C	84,242	178,187	59%	C	C	81%	65%
September	75,570	C	C	85,810	183,813	59%	C	C	82%	67%
October	96,281	C	C	96,692	227,156	75%	C	C	92%	83%
November	116,992	C	C	103,440	260,673	92%	C	C	99%	96%
December	127,591	C	C	104,560	272,392	100%	C	C	100%	100%

C indicates that the data in a particular cell is confidential or not displayed to maintain confidentiality of another cell.

The discussion of the potential impacts of fishermen behavioral changes and year-round markets provided in Section 4.1.5 are also relevant to this fishery and are incorporated by reference.

4.2.5.2 Recreational

Data from the MRFSS and the Southeast headboat survey indicate golden tilefish are not commonly caught in the South Atlantic recreational fishery (Section 3.4.2.2.3). Furthermore, most of the recreational harvest of golden tilefish appears to be taken by vessels in the charter sector (Table 3-26). Since 1999, there have been no reports of golden tilefish in the headboat survey. In 1999, golden tilefish were reported on only two trips. As a result, the economic impacts associated with the golden tilefish alternatives were not evaluated for the headboat sector. Furthermore, it is unlikely there would be any harvest of golden tilefish in the near future unless headboats alter their targeting practices and attempt to catch fish further offshore in response to the proposed restrictive measures on vermilion and black sea bass.

Harvest estimates for the charterboat and private recreational sectors are subject to a high degree of uncertainty due to the low sample sizes in the MRFSS and the high variability in the intercept estimates (Table 3-27). For some years these estimates may be unreliable indicators of the true magnitude of harvest. Nevertheless, it is clear that golden tilefish are not as frequently targeted or caught as other snapper grouper species, such as vermilion snapper and black sea bass (Table 3-22). As noted in Section 4.1.5, the impacts discussed below refer only to activity for this individual species and do not reflect impacts relative to all species harvested by anglers that fish for this species or all recreational snapper grouper activity.

The analytical assessment procedures for the recreational sector are described in Section 4.1.5.2 and are incorporated herein by reference.

Assuming fishing conditions in the near future are similar to conditions during the period 1999-2003, it is expected that **Preferred Alternative 3** would reduce non-market benefits by $3,615 and reduce the number of kept golden tilefish by 41% compared to the no action Alternative 1 (Table 4-15). Lower immediate impacts are associated with **Alternative 2**, (Table 4-15). In terms of the number of constrained trips (trips where harvest exceed the proposed bag limit) **Alternative 3** would impact more than double the number of trips compared to **Alternative 2** (Table 4-15). Unlike the analysis on impacts in the commercial sector, the number of cancelled trips cannot be estimated as behavioral models to conduct these types of calculations have not been developed.

It was not possible to estimate the impacts of a boat limit (Alternative 4) on the charter and private sectors since the vessel-level data are not collected by the MRFSS. It is reasonable to expect that the reduction in the numbers of kept fish and reduction in economic benefits associated with Alternative 4 would be greater than similar effects associated with Preferred Alternative 3 (Table 4-15).

The expected reductions in net economic benefits, numbers of kept fish, and numbers of constrained trips are calculated assuming that recreational fishermen and for-hire vessel operators would not change targeting preferences or increase effort targeted at golden tilefish. This may be a reasonable assumption in the short-term since golden tilefish are caught further offshore compared to the more popular species such as jacks (Figure 3-19a). In addition, the cost of fuel is an important consideration in determination of distance traveled to the fishing grounds and increasing fuel prices will reduce the probability of the vessel taking an offshore trip to target golden tilefish.

Table 4-15. Summary of the short-term recreational impacts resulting from the golden tilefish alternatives.

	Description of Alternatives	**Expected catch (number of kept fish)**	**Reduction in numbers of kept fish**	**Percent change**	**Value of reduction (CV estimates)**	**Number of Affected Trips**
Alternative 1 (no action)	5 grouper limit	3,552				2,094
Alternative 2	2 golden tilefish per person per day	2,968	584	-16%	$1,449	350
Alternative 3	1 golden tilefish per person per day	2,094	1,458	-41%	$3,615	873
Alternative 4	Possession limited to 1 per person per boat	<=2,094	>= 1,458	>=-41%	>=$3,615	>=873

Long-term Economic Effects of Proposed Alternatives

The purpose for action in the golden tilefish fishery is to end overfishing. Since the stock is not overfished there is no proposed strategy to increase future harvest. Hence, the restrictive regulations proposed for the commercial and recreational sectors will continue in the future. However, it is expected that by ending overfishing of golden tilefish, CPUE will increase in the future due to an increase in the mean size and age of the stock. For the commercial sector it is clear the Council's **Preferred Alternative 2** would end overfishing sooner than **Alternative 3**. **Alternative 3** would adopt a stepped down approach to achieve the same quota reduction over a three-year period and hence small business entities directly and indirectly affected by these measures would have a longer time horizon to adjust to economic losses.

The long-term effects on the commercial sector of choosing the no action alternative versus one of the other alternatives to end overfishing depends on the potential harvest (and associated net benefits) over time if overfishing continued (no action) compared to the stream of net benefits from choosing one of the other alternatives. Incremental annual economic losses could vary from $90,000 to $160,000 if action was taken to end overfishing. These losses represent 12.5% to 22.3% reduction in net revenue to vessels in the longline fishery that harvests snapper grouper species. Unfortunately, the data and analytical tools to quantify the long-term effects of the "no action" alternative are not available. However, the account of the potential costs of **Alternative 1** described in the biological impacts section indicates the other alternatives are superior to the "no action" alternative. Golden tilefish are a long lived, slow growing species susceptible to collapse from overfishing. It is expected the alternatives to end overfishing could result in higher net economic benefits to the commercial harvesting sector compared to the no action alternative.

Currently, golden tilefish is relatively unimportant to the recreational harvesting sector. Reductions in fishing mortality could provide future benefits for the for-hire and private/rental boat sectors of the recreational fishery if there are improvements in catch success rates and the population is comprised of a greater proportion of larger fish. These benefits would be realized if there is an increase in future demand for golden tilefish, which would depend on the quality of substitute (near shore) fishing experiences and the cost of fuel and other cost components.

The discussion on non-use values contained in Section 4.1.5 is relevant to golden tilefish as well and is incorporated herein by reference.

4.2.6 Social Effects of Management Measure Alternatives

Impacts from this suite of proposed alternatives will vary depending on sector/fishery, the specific alternative, and whether one looks at the short or long-term impacts.

In general, by ending overfishing long-term benefits are expected to accrue to all participants in the fishery, commercial, recreational, and the general public. Alternatives differ in how they would allow the stock to arrive at a long-term sustainable status. As a result, each of these alternatives differs in the degree and type of short and long-term impacts imposed on each fishing and non-fishing sector. Below is a more detailed analysis of the negative and positive short-term impacts of the proposed alternatives. Long-term benefits are discussed throughout the analysis but as there are sparse data to analyze long-term effects of management measures on communities, future conditions of communities cannot be predicted with confidence.

4.2.6.1 Commercial

The main impacts of the proposed commercial alternatives come from a reduction in the current quota by approximately two-thirds and a lowered trip limit. Some note has been made of the fact that for the past two years the total catch for the region was far under the allowable 1,001,663 million pound quota. Dealers and fishermen believe stock status has been improving (including a large increase in the large size fish), and a decrease in effort rather than overfishing is responsible for the decrease in landings. Therefore, there is a "disconnect" between what the fishermen are seeing "on the water" and what scientists conclude from the stock assessments.

While fishermen do not mind lowering the quota from its current level (**Alternatives 2 and 3**), they feel that lowering the trip limit to 3,000 lbs gutted weight would seriously impact their ability to make a profitable trip, considering costs have increased so much in the past few years, particularly for fuel. Even one of the largest dealers of golden tilefish in Florida said "If you take anything more from me I will go into more of survival mode…to continue being a 100% commercial fishing dock, I am just hanging on by the skin of my teeth." There would be differential impacts on the two gear sectors, hook and line and bottom longline, with the longline fishermen being impacted more than others due to their higher landings, their increased reliance on golden tilefish, and other factors impinging on the longline fleet in the southeast (closed areas, gear restrictions, serious pressure applied politically to cease fishing altogether, and competition from foreign fishermen/imports).

There is also concern by smaller operators, particularly from the Ft. Pierce area and south through Miami, that allowing large trip limits with a reduced TAC will unfairly cut them out of the fishery before they have a chance to harvest their historical share. Should the quota be caught by June or July, there will be nothing left for small boat operators who will also be impacted by restrictions on other species addressed in this amendment. One of the social impacts already becoming evident are divisions are springing up among fishermen, which in the past would not be at conflict over who catches what and when. Therefore, social disintegration is occurring even before the proposed regulations are implemented.

Decreasing the trip limit in particular and the TAC generally will result in fish houses being negatively impacted by having less product flow across their docks. When this happens, the operating costs of the fish house must still be paid, and costs will be passed along to other fishermen (such as in the shrimp fishery or wreckfish fishery). These higher costs would negatively impact other fishermen whose fisheries are also struggling (the shrimp fishery in particular). None of the fisheries in the southeast (and elsewhere) operate totally independently from each other, and hardship in one fishery eventually radiates to the other fisheries, impacting everyone.

Alternative 1, No Action, may not be viable legally but is the one preferred by the commercial sector as posing the least economic and social hardship and allowing the commercial industry to continue fishing in the face of many pressures. The commercial fishermen prefer this alternative primarily because they continue to have doubts about the accuracy of the stock assessment. However, continued overfishing would be expected to adversely impact fishing participants in the future by reducing CPUE and the mean size of fish captured and requiring more severe corrective action in the future.

The Council's **Preferred Alternative 2** would immediately reduce the current quota by more than two-thirds, posing a potentially large shock to the commercial longline sector, a group of fishermen that are already extremely challenged to stay in business. However, the current quota has never been reached. Furthermore, landings of golden tilefish have been decreasing. A simulation model (Section 4.2.5.1) indicates the quota in **Alternative 2** would not be filled if future conditions are similar to those in 2003-2004. Under the **Preferred Alternative 2**, the trip limit could be either 3,000 lb or 4,000 lbs gutted weight, and once a certain percentage of the quota has been landed, the trip limit would decrease to 300 lbs gutted weight. The larger trip limit is preferred by commercial longline fishermen and dealers, as they see 3,000 lbs gutted weight as too restrictive. The Council is proposing a 4,000 lb gutted weight trip limit until 75% of the quota is taken; then the trip limit would be reduced to 300 lbs gutted weight if 75% is taken on or before September 1. This should moderate the impacts of the lower quota by allowing a higher trip limit for most of the year and then lowering the trip limit to extend the fishery for as long as practicable while maintaining, where possible, historic participation rates and patterns, minimizing costs, etc.

Alternative 3 would allow for a stepped down approach to lowering the quota, doing so over three years. This would somewhat mitigate impacts on fishermen by allowing them to realign their businesses and fishing practices if possible, or make a "dignified exit" altogether from the fishery. Since golden tilefish - like vermilion snapper - are undergoing overfishing but are not overfished, it would seem that a more lenient pace of halting overfishing would greatly mitigate both the social and psychological impacts of more severe restrictions in light of the precarious situation that the majority of commercial fishermen and their communities.

4.2.6.2 Recreational

Golden tilefish are not targeted by a large number of recreational fishers in the region. The majority of those who target golden tilefish are from the Florida for-hire sector (similar to the discussion of the snowy grouper fishery). However, the level of impact is unknown at this time due to the absence of appropriate data. Local businesses associated with the fishery are not likely to be impacted to any substantial degree by the proposed recreational restrictions due to the low target importance of these species.

Golden tilefish are deep water animals and are difficult to locate. Though prized for their excellent table qualities, few rod and reel anglers catch this species. Golden tilefish are found in water from 240 feet to 400 feet in depth, which in most cases requires the use of electric reels. The best tilefishing is reported to be between Jupiter Inlet and Fort Pierce Inlet (http://web.tcpalm.com/sports/areafish/tilfish.htm). Thus, any adverse social impacts might be surmised to be concentrated in this area.

Under **Alternative 1**, the "No Action" alternative, the only social impact associated with this alternative would occur if a reduction in fishing mortality is needed and nothing is done. If that is the case, in the future more restrictive measures may be required, and the short- and long-term economic impact would likely be more severe than if corrective action is taken now.

Alternatives 2 and 3 are not likely to measurably impact private recreational fishermen, including the for-hire industry because the majority of recreational fishermen in the region do not target these species.

Alternative 4 would not impact the private-boat recreational fishery because they rarely target golden tilefish. However, this alternative could potentially adversely impact fishers who fish off deep water charter and headboats in Florida. If there are a few trips where golden tilefish are targeted, their discard rate might increase because it is possible for more than one person to land a golden tilefish on a trip and because of the depth from which the golden tilefish are caught, mortality is nearly 100%.

Regulations that force fishermen to discard dead or dying fish have negative social impacts because most people do not want to see fish killed and go to waste. With regards to the for-hire sector, people pay to catch and keep fish, meaning they are buying a chance to catch fish. Regulations resulting in increased discards of dead fish frustrate fishermen who do not like to see fish being wasted.

General Non-Fishing Public

For the general non-fishing public of the U.S., all the alternatives to status quo offer long-term benefits related to ending overfishing and improving stock status. These alternatives benefit those in the U.S. who derive satisfaction from knowing the marine environment is managed sustainably and is thriving. The U.S. consumer may benefit from potential increased consumption of locally caught fish as the stock recovers.

There is the potential of long-term negative impacts to the general non-fishing public who enjoy coming to the coast to experience a "fishing community," eat locally caught seafood, and enjoy the heritage tourism benefits of many coastal communities. If the infrastructure for commercial fishing in the South Atlantic continues to wane, and the proposed management measures hasten that decline, communities will lose this attraction for their tourist trade, and visitors may have a diminished coastal tourism experience. However, these communities can only be expected to exist and prosper if healthy resources and fisheries also exist. So, ending overfishing of the golden tilefish resource, as a component of the marine ecosystem, is essential to the existence and sustenance of these communities.

4.2.7 Administrative Effect of Management Measure Alternatives

4.2.7.1 Commercial

Monitoring catch quotas, and enforcing fishery closures when a quota is met, directly burdens the administrative environment. **Alternatives 1-3** specify alternative golden tilefish quotas. Because quota monitoring programs are already in place, these alternatives would present no additional administrative burden.

The trip limit sub-alternatives specified in **Alternatives 2** and **3** would reduce the trip limit from 3,000 or 4,000 lbs gutted weight to 300 lbs gutted weight when 75% or 85% of the quota is met. Such a stepped trip limit strategy would be more difficult to administer than the status quo year round trip limit because it would require NMFS to monitor landings, predict when the percent specified would be met, and then notify the public of a trip limit reduction.

The administrative burden of **Alternative 3** would be greater than that of **Alternative 2**, since Alternative 3 would step down the annual quota and trip over a 3-year period in addition to decreasing the trip limit during year 3 when 75% or 85% of the quota was met. The public would have to be notified of the annual quota changes, as well a decrease in the trip limit in year 3 when 75% or 85% of the quota was met.

4.2.7.2 Recreational

Alternatives 1-4 would continue to manage the recreational fishery with bag (Alternatives 1-3) or vessel (Alternative 4) limit requirements. There is no measurable difference in the effects of these alternatives on the administrative environment, as each would maintain the 5-fish grouper aggregate bag limit.

4.2.8 Conclusions

A golden tilefish commercial quota of 295,000 pounds gutted weight with a trip limit of 4,000 pounds gutted weight, decreasing to 300 pounds gutted weight if 75% of the quota is caught on or before September 1st, and a recreational limit of one golden tilefish per person per day within the 5-grouper per person per day aggregate recreational bag limit is the Council's preferred alternative. The Council received public input during the public hearing and informal review process on the preferred alternative 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 alternative based on comments received.

SEDAR 4 (2004) indicates golden tilefish is experiencing overfishing and is not overfished. The Council's **Preferred Commercial Alternative 2** would require the greatest reduction in harvest and ends overfishing immediately upon implementation of the regulations. This represents a 35% reduction in the average landings during 1999-2003, and includes a trip limit that is intended to extend the fishery throughout the year. This alternative would be expected to have the greatest benefit to the stock in terms of restoring the natural size/age structure, sex ratio, and community balance than the other alternatives. However, it would also be expected to have the greatest immediate, short-term, negative social and economic impacts on commercial fishermen, fishing communities, and associated industries. Ending overfishing of golden tilefish is expected to increase stock biomass allowing for an increased harvest with time. Therefore, this alternative is expected to have net beneficial social and economic impacts in the future.

The Council received many <u>public comments</u> addressing golden tilefish. The traditional commercial hook and line fishery begins in September and with the quota and trip limits proposed, the total quota could be met by then and there would be no opportunity for these traditional fishermen to participate. Some fishermen stated in public comments that the longline prohibition south of St. Lucie inlet has worked, which is reflected in the presence of larger size classes in their catches, and an increase in the landings per trip. Some fishermen support a fishing year beginning September 1 to allow the traditional commercial hook and line fishery to take place. Amendment 15 will consider a change in the fishing year for golden tilefish. There was also support by some fishermen for a lower trip limit to ensure a year round fishery (300 pounds). Trip limits increase production costs, reduce catches, and force docks to increase packing fees. There was also support among the charter boat operators in the Florida Keys for the 1 fish bag limit.

The Snapper Grouper Advisory Panel believed the shift in the industry to other species (e.g., sharks and tunas), the discontinuation of fishing activities by some fishermen, and the cold water temperatures in recent years have all contributed to the overall reduction in longline vessels targeting golden tilefish. Catch per unit effort of active fishermen is believed to be fairly constant. The Advisory Panel's consensus recommendation for the commercial alternatives is to take no action (**Alternative 1**) until better data are collected and the science is more sound.

For golden tilefish recreational alternatives, the Advisory Panel recommended two golden tilefish per person, **Alternative 2**, because it is a growing fishery, there are many people targeting golden tilefish, there are fewer snappers and groupers, (especially off Miami), and it is easier to target golden tilefish off south Florida because the continental shelf is very narrow. The Advisory Panel recommended that the bag limit not exceed two golden tilefish per person because they wanted ensure that the fishery would be protected.

The Law Enforcement Advisory Panel concluded the level of quota would not impact law enforcement. The Advisory Panel had no specific comments for golden tilefish.

The Scientific and Statistical Committee (SSC) reviewed the SEDAR Assessment and approved the assessment as being based on the best available science. The SSC concluded the proposed alternatives that end overfishing in one to five years are sufficient to end overfishing if there is no bycatch or post-quota mortality. Discard and post-quota mortality, from bycatch and discard mortality, was not incorporated into the proposed actions and the actions might not end overfishing as soon as projected. The methodology to estimate the discard and post-quota mortality is still being developed and was not available for use in finalizing Amendment 13C. The SSC concluded the social and economic analyses were accurate and complete given the available data; however, they noted shortcoming in the biological analyses due to the lack of estimates for the bycatch and post-quota mortality.

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 golden tilefish is a long-lived, slow growing species and emphasized the need to be conservative in the face of uncertainty. Committee members were also concerned about the discard mortality and post-quota mortality. The Committee considered changing the fishing year but this was not included in the alternatives that went to public hearing and was not in the DEIS. Therefore for the Committee and Council to consider this alternative, additional public comment and a supplement to the DEIS would be required. Rather than delay implementation of Amendment 13C, the Committee indicated they would evaluate a change in the fishing year in Amendment

15. Therefore, the Committee did not change their preferred Commercial **Alternative 2** other than to clarify the language on possession after the quota is met.

The Committee discussed the Advisory Panel's recommendation for a 2-fish limit but did not change from their current 1-fish bag limit (**Alternative 3**) for the same reasons described previously for snowy grouper (increased recreational participation and catch as the stock recovers).

The Council concluded the commercial alternative recommended by the Committee best meets the conservation objective of ending overfishing while addressing concerns about bycatch and post-quota mortality. The preferred alternative reduces the quota to 295,000 pounds gutted weight, which ends overfishing immediately. The Council will address bycatch and post-quota mortality through Amendments 13B and 16.

The Council considered increasing the recreational bag limit from 1-fish as recommended by the Committee to 2-fish given the limited number of recreational fishermen targeting this species and their low catches. There was some discussion that this may reduce the amount of discards as fishermen try to fill the 5-fish aggregate grouper bag limit (including tilefish). The Council did not adopt the 2-fish bag limit because it would not represent an actual reduction in the current recreational catches, it would be perceived as reallocating given the commercial sector is under a hard TAC, and as the stock rebuilds the recreational catch would increase under the 2-fish limit. The Council would be faced with reducing the bag limit in the face of a rebuilding stock in the future. The Council concluded it would be better to lower the bag limit to 1-fish and as the stock rebuilds, evaluate whether the bag limit could be increased in the future. The Council's preferred recreational alternative is **Alternative 3**, which limits the possession of golden tilefish to 1 per person per day within the 5-grouper per person per day aggregate recreational bag limit.

The Council concluded the preferred commercial and recreational alternatives best meet the purpose and need to end overfishing of golden tilefish as soon as possible in 2006 and to allow as close to a year-round fishery as possible while maintaining (where possible) historic participation rates and patterns (including allocation rations), minimizing costs, meeting the objectives of the Snapper Grouper Fishery Management Plan, and complying with the requirements of the Magnuson-Stevens Act and other applicable law. **Alternative 1** (No Action) would continue to allow overfishing and was rejected by the Council.

4.3 Vermilion Snapper

4.3.1 Background

Vermilion snapper are experiencing overfishing, since the current fishing mortality (F) exceeds the fishing mortality, which would achieve the maximum sustainable yield (SEDAR 2 2003a). A consensus statement on stock status produced by the SEDAR assessment review panel workshop during February 2003 states the best estimate of current F is F averaged over 1999-2001 ($F_{PROJ} =$ 0.60). The consensus statement also states that $F_{MAX} = 0.375$ should be used as a proxy for F_{MSY}. A 31% reduction in catch is needed to end overfishing immediately. SEDAR 2 (2003a) did not provide an estimate of SPR.

<u>SEDAR 2 (2003) Assessment</u>
The vermilion snapper 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 at the data workshop. One CPUE index was developed from the NMFS headboat survey, 1973-2001. Three indices were derived from CPUE data collected by the South Carolina MARMAP fishery-independent monitoring program ("Florida" trap index, 1983-1987; hook and line index, 1983-1987; and chevron trap index, 1990-2001).

A forward-projecting model of catch at length was formulated for this stock. Two other models (forward-projecting catch at age and age-aggregated production model) were applied but neither could provide estimates. The assessment was based on the catch-at-length model, which was applied in a base run and eight sensitivity runs.

The customary SFA benchmarks and status indicators are based on MSY theory, which means in an age-structured context they depend on the stock–recruitment relationship. The stock and recruitment estimates for this stock did not define that relationship very well. Adding to this uncertainty, the estimated steepness parameter (h) of the recruitment curve reached the upper bound of allowed values in the corrected base run, an indication the data are uninformative about expected recruitment at lower levels of spawning stock size. That result further weakens the credibility of MSY-based estimates from that run and strengthens the argument for using proxy-based benchmarks and status indicators instead.

Nonetheless, estimates of benchmarks and status indicators in F were similar between the original and corrected base runs. In particular, F_{MSY} differed only slightly (an increase from

0.32/yr to 0.36/yr), and the ratio of F in 2001 to F_{MSY} also increased (from 1.6 to 1.8). Because of the uncertainty in the stock–recruitment curve, the review panel recommended using F_{MAX} as a proxy for F_{MSY}. Thus, the original run and the run on corrected data both indicate the stock is currently undergoing overfishing, regardless of whether F_{MSY} or a proxy based on F_{MAX} is used.

The situation is less clear when benchmarks and status indicators in spawning-stock biomass are considered. Although using F_{MAX} as a proxy for F_{MSY} avoids the uncertainty associated with the stock–recruitment relationship, the expected spawning-stock biomass (or egg production) associated with F_{MAX} still depends on an estimate of average future recruitment. As that is not well estimated from the available data, all estimates of biomass-related benchmarks and status are highly uncertain. Subject to that uncertainty, the original base run estimated that egg production in 2002 was 1.23 of the egg production associated with MSY, while the corresponding estimate from the corrected run was 0.66, which would correspond to the overfished condition. Both the Assessment Workshop report and the review panel (in its Advisory Report on Stock Status) were reluctant to accept estimates of biomass status at face value.

Estimates of status indicators from all sensitivity runs are credible only to the degree the data define a meaningful stock–recruitment relationship. In both panels, sensitivity runs C, F, and J resulted from assuming a rather low value of steepness (h=0.5), which was specified as a sensitivity value but not necessarily thought realistic by Data Workshop and Assessment Workshop participants. Taken at their face value, most estimates imply that the stock is in an overfished condition. The sensitivity runs; however, should be considered with no less skepticism than the base runs where MSY-based benchmarks are concerned. As in the base runs, estimates of F_{MAX} are not influenced by uncertainty of the recruitment curve. Estimates of F_{MAX} (the proxy for F_{MSY} recommended by the review panel) from the corrected runs are similar to those from the original runs.

The following recommendations were made to strengthen future vermilion snapper assessments.

1. Further research should be made to investigate methods of weighting data sources (e.g., based on their apparent significance, relevance, or reliability).
2. Fishery-independent data collected by the MARMAP do not have ideal extent, either in area coverage or in sampling intensity, for vermilion snapper. The group recommends that the MARMAP program expand its coverage, particularly into deeper water, as needed.
3. Under many forms of management, considerable discarding of vermilion snapper could be expected to occur. Sampling programs should be strengthened to quantify discard rates, especially in the commercial fishery, where the discard mortality rate is believed higher, and to estimate discard mortality rates better.
4. The group recommends that research be instituted on management strategies that could reduce discard mortality.
5. Examine the feasibility of and best methodology for using commercial logbooks to develop an abundance index for the commercial fishery for vermilion snapper.
6. An important data element for stock assessment, including vermilion snapper, is routinely collected age-composition data for major fisheries. Regular statistical sampling and analysis of vermilion snapper for aging is needed in both the commercial hook-and-line and headboat fisheries.
7. Abundance indices for vermilion snapper indicate only minor fluctuations in population abundance during the model time period. This low population contrast is partly responsible for the large uncertainty in estimates derived from the model. Alternative age-structured models should be investigated for vermilion snapper and other low contrast populations to determine whether more robust population estimates might be achieved.
8. Recreational landings estimates for vermilion snapper (and other species) in the MRFSS database are often highly variable, resulting in large year-to-year swings in the estimates. Those swings apparently reflect sampling error, rather than true fluctuations in fishery landings. Such large year-to-year changes can influence assessment models in undesirable ways. Smoothing techniques should be investigated to potentially reduce some of those large year-to year changes.
9. Fecundity estimates at age should be developed for future use in age-structured models.

Review of Previous Stock Assessments
The first stock assessment for vermilion snapper was conducted in 1990 (PDT 1990) using data from 1972 through 1988/89. Spawning Stock Ratio (SSR) (considered to be the same as Spawning Potential Ratio (SPR)) was calculated separately for recreational and commercial fisheries (Table 4-16).

Table 4-16. Spawning Stock Ratio (SSR) values for vermilion snapper.
Source: PDT 1990.

RECREATIONAL	COMMERCIAL
Carolinas = 19%	Carolinas = 20 - 28%
Florida = 26 - 19%	Florida = 17 - 27%
SSR with 10 inch Recreational Minimum Size Limit:	SSR with 12 inch Commercial Minimum Size Limit:
30%	25%

A series of stock assessments provided estimates of SSR based on catch curves (NMFS 1991; Huntsman *et al.* 1992; Huntsman *et al.* 1993) (Table 4-17). Virtual Population Analyses conducted by Zhao and McGovern (1995) and Manooch *et al.* (1998) provided SPR values (Manooch *et al.* 1998) (Table 4-17).

Table 4-17. Spawning Stock Ratio (SSR) values provided by NMFS 1991; Huntsman *et al.* 1992; Huntsman *et al.* 1993; Zhao and McGovern 1995.

Assessment Year	Catch Data From	Overall SSR	SSR with Minimum Sizes
1991	1988	23%	28%
1992	1990	20%	27%
1993	1991	16%	27%
1995	1993	25%	?
1998	1997	21-27%	>30%

Regulations, which may have affected the catch of vermilion snapper are shown in Table 4-18 and Figure 4-8.

Table 4-18. Regulations for vermilion snapper.

Regulation	Effective Date	Plan or Amendment
4" trawl mesh size to achieve a 12" TL minimum size	8/31/83	Original FMP (SAFMC 1983)
Prohibit trawls	1/12/89	Amendment 1 (SAFMC 1988)
Prohibit fish traps, entanglement nets & longlines within 50 fathoms; bag limit of 10 vermilion per person per day; 10" TL recreational minimum size limit & 12" TL commercial minimum size limit	1/1/92	Amendment 4 (SAFMC 1991)
Oculina Experimental Closed Area	6/27/94	Amendment 6 (SAFMC 1993)
Limited entry program: transferable permits and 225-lb non-transferable permits	12/98	Amendment 8 (SAFMC 1997)
Recreational size limit increased to 11" TL; Vessels with longlines may only possess deepwater species	2/24/99	Amendment 9 (SAFMC 1998c)

Commercial harvest was less than 1,000,000 lbs whole weight during 1992-1999 then spiked to over 1,600,000 lbs whole weight in 2001; commercial landings then decreased to about 760,000 lbs whole weight in 2003 (Figure 4-8). In 2004, landings were about 1.1 million lbs whole weight. Based on data from ALS, the headboat survey and MRFSS, 68% of the harvest during 1999-2003 was by commercial fishermen and 32% by recreational fishermen (Figure 4-9).

The mean length of vermilion snapper caught by commercial, recreational, and headboat fishermen has generally increased since 1984 (Figure 4-10). The mean size of vermilion snapper is largest for commercially caught fish and smallest for vermilion snapper taken by headboat fishermen. Noticeable increases in the mean size occurred when minimum sizes of 10” total length recreational and 12” total length commercial were implemented in 1992 (Figure 4-10).

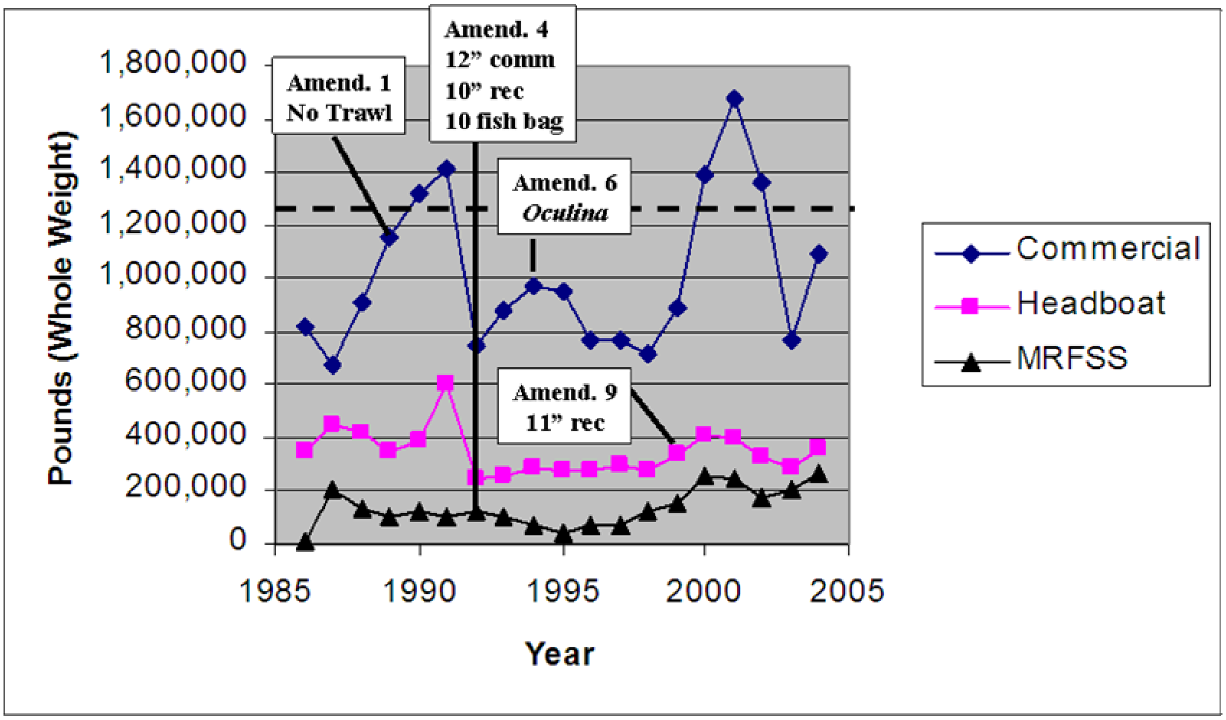

Figure 4-8. Annual landings (lbs whole weight) of vermilion snapper.
Commercial landings are from the NMFS Accumulative Landings System (ALS), Headboat data are from NMFS-Beaufort, and MRFSS data are from the MRFSS web site. Dotted line represents proposed quota of 1,100,000 lbs gutted weight (1,221,000 lbs whole weight).

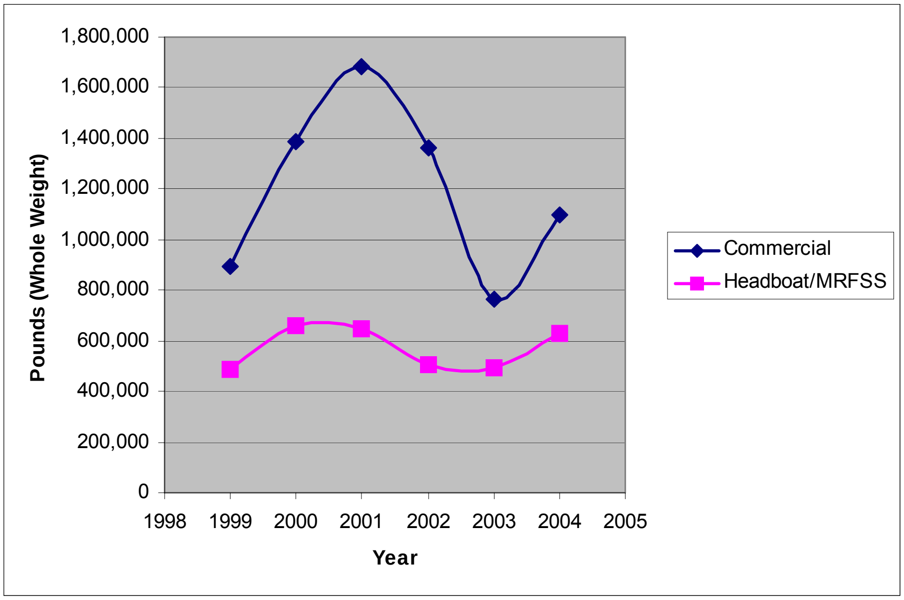

Figure 4-9. Annual landings (lbs whole weight) of vermilion snapper (1999-2004). Commercial landings are from the NMFS Accumulative Landings System (ALS), Headboat data are from NMFS-Beaufort, and MRFSS data are from the MRFSS web site.

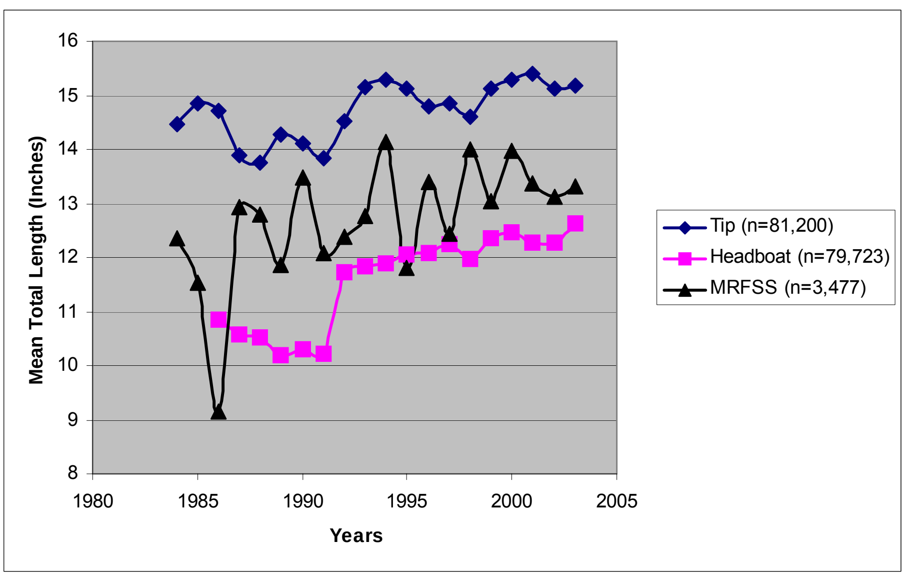

Figure 4-10. Mean lengths (inches, total length) of vermilion snapper taken by commercial, headboat, and recreational (MRFSS) fishermen during 1984-2003.

Compliance

Compliance with the vermilion snapper minimum size limit is summarized by sector in Table 4-19. See Burton (2002) for the breakout by region and for numbers of fish measured. Criteria for a finding of significant non-compliance are: number of fish measured must be greater than or equal to 15, and percent of fish below the size limit must be greater than or equal to 15 (Burton 2002).

Table 4-19. Compliance with vermilion snapper size limits; note changes to minimum size limits as shown in Table 4-18.
Source: Burton (2002).

	Percent Landed Below Legal Size Limit		
Year	Commercial	Headboat	Private & Charter
1992	0.9	14.4	46.7
1993	5.3	3.1	4.0
1994	6.3	8.9	34.2
1995	11.0	13.5	36.5
1996	9.7	6.1	0.0
1997	15.3	6.3	1.5
1998	6.9	7.4	4.0
1999	9.1	18.4	11.8
2000	4.8	20.7	4.9
2001	4.7	19.4	6.3

In February 1999, the minimum size limit for recreationally-caught vermilion snapper was increased to 11” total length. Non-compliance was not significant by the criterion for the overall commercial or MRFSS intercept data. Headboat data indicated non-compliance from the two Florida areas, although this is likely attributable to the State’s 10-inch size limit. When the data are re-analyzed using this size limit, non-compliance in south Florida drops to 6.3%. The significant non-compliance in the Georgia-North Florida headboat fishery is undoubtedly real, as vermilion are not caught within three miles of shore in this area. Note: only 19 vermilion snapper were measured in the private/charter sector in 1996.

4.3.2 Management Measures

4.3.1.1 Commercial

Alternative 1. **No action.** The commercial vermilion snapper minimum size limit is 12” total length.

Alternative 2. Specify a commercial vermilion snapper quota of 821,000 lbs gutted weight (912,000 lbs whole weight). After the commercial quota is met, all purchase and sale is prohibited and harvest and/or possession is limited to the bag limit.

Alternative 3. Specify a commercial vermilion snapper quota of 821,000 lbs gutted weight (912,000 lbs whole weight). Specify a commercial trip limit of 720 lbs gutted weight (800 lbs whole weight). After the commercial quota is met, all purchase and sale is prohibited and harvest and/or possession is limited to the bag limit.

Alternative 4. Specify a commercial vermilion snapper quota of 821,000 lbs gutted weight (912,000 lbs whole weight). Increase the commercial minimum size limit from 12” total length to 13” total length and specify a commercial trip limit of 1,080 lbs gutted weight (1,200 lbs whole weight). After the commercial quota is met, all purchase and sale is prohibited and harvest and/or possession is limited to the bag limit.

Alternative 5. Specify a commercial vermilion snapper quota of 757,000 lbs gutted weight (840,000 lbs whole weight). After the commercial quota is met, all purchase and sale is prohibited and harvest and/or possession is limited to the bag limit.

Alternative 6. Specify a commercial vermilion snapper quota of 757,000 lbs gutted weight (840,000 lbs whole weight). Specify a commercial trip limit of 720 lbs gutted weight (800 lbs whole weight). After the commercial quota is met, all purchase and sale is prohibited and harvest and/or possession is limited to the bag limit.

Alternative 7. Specify a commercial vermilion snapper quota of 757,000 lbs gutted weight (840,000 lbs whole weight). Increase the commercial minimum size limit from 12” total length to 13” total length and specify a commercial trip limit of 1,080 lbs gutted weight (1,200 lbs whole weight). After the commercial quota is met, all purchase and sale is prohibited and harvest and/or possession is limited to the bag limit.

Alternative 8. Specify a commercial vermilion snapper quota of 821,000 lbs gutted weight (912,000 lbs whole weight). After the commercial quota is met, all purchase and sale is prohibited and harvest and/or possession is limited to the bag limit.

The Council is considering the following commercial trip limit alternatives:

Alternative 8A. Specify a commercial trip limit of 300 lbs gutted weight (335 lbs whole weight) when 75% of the quota is taken.

Alternative 8B. Specify a commercial trip limit of 200 lbs gutted weight (220 lbs whole weight) when 85% of the quota is taken.

Alternative 8C. Do not implement trip limit in Alternatives 8A and 8B unless percent specified is captured on or before September 1.

Alternative 9. Specify a commercial vermilion snapper quota of 757,000 lbs gutted weight (840,000 lbs whole weight). After the commercial quota is met, all purchase and sale is prohibited and harvest and/or possession is limited to the bag limit.

The Council is considering the following commercial trip limit alternatives:

Alternative 9A. Specify a commercial trip limit of 300 lbs gutted weight (335 lbs whole weight) when 75% of the quota is taken.

Alternative 9B. Specify a commercial trip limit of 200 lbs gutted weight (220 lbs whole weight) when 85% of the quota is taken.

Alternative 9C. Do not implement trip limit in Alternatives 9A and 9B unless percent specified is captured on or before September 1.

Alternative 10. **Preferred.** Specify a commercial vermilion snapper quota of 1,100,000 lbs gutted weight (1,221,000 lbs whole weight). After the commercial quota is met, all purchase and sale is prohibited and harvest and/or possession is limited to the bag limit.

Discussion

A commercial vermilion snapper quota of 821,000 lbs gutted weight (912,000 lbs whole weight) as specified in **Alternatives 2-4** and **Alternative 8** represents a 31% reduction from the average 1999-2001 commercial landings (ALS).

A commercial vermilion snapper quota of 757,000 lbs gutted weight (840,000 lbs whole weight) as specified in **Alternatives 5-7** and **Alternative 9** represents a 31% reduction from the average 1999-2003 commercial landings (Note: includes 2003 ALS landings available in January 2005). A commercial vermilion snapper quota of 1,100,000 lbs gutted weight (1,232,000 lbs whole weight) in **Preferred Alternative 10** is equivalent to the average landings during 1999-2003. It represents an 8% reduction in the average landings during 1999-2001. The trip limit components of **Alternatives 3-4** and **Alternatives 6-9** are intended to extend the duration of the fishing season under a reduced quota for as long as practicable.

4.3.1.2 Recreational

Alternative 1. **No action.** The recreational vermilion snapper minimum size limit is 11" total length and the recreational bag limit is 10 vermilion snapper per person per trip in addition to the aggregate snapper bag limit of 10.

Alternative 2. **Preferred.** Increase the recreational vermilion snapper minimum size limit from 11" total length to 12" total length. (Snapper Grouper Advisory Panel Recommendation)

Alternative 3. Increase the recreational vermilion snapper minimum size limit from 11" total length to 12" total length and reduce the recreational bag limit from 10 to 6 vermilion snapper per person per trip.

Alternative 4. Prohibit any recreational harvest and/or possession of vermilion snapper from October through December.

Alternative 5. Prohibit any recreational harvest and/or possession of vermilion snapper from October through December and reduce the recreational bag limit from 10 to 6 vermilion snapper per person per trip.

Alternative 6. Prohibit any recreational harvest and/or possession of vermilion snapper from January through February.

Alternative 7. Prohibit any recreational harvest and/or possession of vermilion snapper from January through February and reduce the recreational bag limit from 10 to 5 vermilion snapper per person per trip.

Alternative 8. Make separate adjustments to the recreational minimum size and recreational bag limits for the for-hire (those with permits) and private sectors to address all alternative TACs:

Alternative 8A. Based on average recreational catches from 1999-2003, a recreational minimum size limit of 12" total length and a recreational bag limit of 6 vermilion snapper per person per trip provides a 33.3% reduction for the for-hire sector (those with permits). A minimum size limit of 12" total length and a recreational bag limit of 4 vermilion snapper per person per trip provides a 30.6% reduction for the private sector.

Alternative 8B. Based on average recreational catches from 1999-2001, a recreational minimum size limit of 12” total length and a recreational bag limit of 6 vermilion snapper per person per trip provides a 33.5% reduction for the for-hire sector (those with permits). A recreational minimum size limit of 12” total length and a recreational bag limit of 5 vermilion snapper per person per trip provides a 30.7% reduction for the private sector.

Alternative 9. Increase the recreational vermilion snapper minimum size limit from 11” total length to 12” total length. Prohibit any recreational harvest and/or possession of vermilion snapper from January through February.

Discussion

The Council’s **Preferred Alternative 2** would reduce the recreational harvest of vermilion snapper by 20.5% based on 1999-2003 data and by 19.6% based on 1999-2001 data. **Alternative 3** would reduce the recreational harvest of vermilion snapper by 31.8% based on 1999-2003 and by 31.1% based on 1999-2001 data. **Alternative 4** would reduce the recreational harvest of vermilion snapper by 16.2% based on 1999-2003 data. **Alternative 5** would reduce the recreational harvest of vermilion snapper by 16.2% from the closure and by 14.2% from the bag limit based on 1999-2003 data. **Alternative 6** would reduce the recreational harvest of vermilion snapper by 13% based on 1999-2003 data. **Alternative 7** would reduce the recreational harvest of vermilion snapper by 13% from the closure and by 19.4% from the bag limit based on 1999-2003 data. Based on average recreational catches from 1999-2003, **Alternative 8A** would reduce the recreational harvest of vermilion snapper by 33.3% from the 12”minimum size limit/6 vermilion bag limit and by 30.6% from the 12” minimum size limit/4 vermilion bag limit. Based on average recreational catches from 1999-2001, **Alternative 8B** would reduce the recreational harvest of vermilion snapper by 33.5% from the 12”minimum size limit/6 vermilion bag limit and by 30.7% from the 12” minimum size limit/5 vermilion bag limit. **Alternative 9** would reduce harvest by 32.6% based on data from 1999-2003. **Alternative 10** would reduce harvest by 8% based on data from 1999-2001.

4.3.3 Biological Effects of Management Measure Alternatives

Fishery management measures directly affect target and bycatch species and, sometimes, fish habitat by influencing the rate of fishing mortality, as well as the amount and distribution of fishing effort, applied to a fishery. This analysis examines the type(s) and extent of potential effects resulting from establishing or adjusting established management measures for vermilion snapper.

4.3.3.1 Commercial

Alternative 1 would retain the current regulations used to manage catches of vermilion snapper. In general, commercial regulations include limited access system, trip limits, and a 12” total length size limit. In addition, the *Oculina* HAPC is closed to all bottom fishing off the coast of Florida (an area where vermilion snapper are known to occur).

Limited access systems are designed to limit the type and amount of effort applied to a fishery. Minimum size limits are generally used to maximize the yield of each fish recruited to the fishery and to protect a portion of a stock from fishing mortality. The idea behind maximizing yield is to identify the size that best balances the benefits of harvesting fish at larger, more commercially valuable sizes against losses due to natural mortality. Protecting immature and newly mature fish from fishing mortality provides them increased opportunities to reproduce and replace themselves before they are captured. If the size limit chosen is larger than the size at first reproduction for the species in question, then a sufficient pool of spawners could be retained even if fishing pressure is heavy. Area closures are intended to provide fish populations and/or valuable bottom habitat a refuge from fishing pressure.

These types of measures are generally expected to benefit the environment in the short term and long term by limiting the extent to which a stock is targeted. However, the extent to which such benefits are realized depends on the appropriateness of a measure when applied to a specific stock, as well as if and to what extent fishing effort changes or shifts in response to the select management measure. Minimum size limits can have detrimental effects on fish stocks because they do not protect the older year classes. Recruitment problems can occur in a fishery that has fewer age classes than an unfished population. For example, a population might live for ten years, but minimum sizes might allow for the harvesting of all fish less than four years of age. Recruitment failure could occur if there were several consecutive years of poor recruitment due to environmental conditions. The older age classes might not be present to guard against recruitment failure as they would under natural conditions. This truncation of average size is often undesirable from an economic perspective, because larger fish are sought after by recreational fishermen and because commercial markets often favor fish of a certain size.

Additionally, minimum sizes encourage the harvest of older, larger fish that have the greatest reproductive potential. For example, fecundity has an exponential relationship with size. One 60.5 cm female red snapper can produce the same number of eggs as 212 females at 42 cm (PDT 1990). Therefore, the size of the spawner, not just the overall number of spawners, is important when considering the reproductive potential of a population, and removal of all the large spawners can be catastrophic even if some smaller spawners remain. If the size limit is set below the minimum size for reproduction, heavy fishing pressure may lead to reproductive failure, as the size limit does not protect fish of spawning size.

Discard mortality also can limit the amount by which fishing effort and mortality is reduced by, limited access systems, trip limits, and minimum size limits, if fishermen catch and discard vermilion snapper when targeting co-occurring species. Additionally, the environmental benefits of a closed area management strategy can be reduced or negated if not integrated with some form of control on fishing mortality and effort outside the closed area.

Alternative 1, which retains the status quo management strategy is expected to adversely impact the vermilion snapper stock. To determine the actual environmental effects of the no action management alternative on vermilion snapper, one must first examine current trends in harvest levels, stock biomass levels, and life history characteristics, then predict the direction of future trends under status quo management. The recent SEDAR assessment determined the vermilion snapper stock in the South Atlantic is currently undergoing overfishing (SEDAR 2 2003a). The

Council's Scientific and Statistical Committee (SSC), in June 2003, recommended the Council not adopt the biomass and yield benchmarks used to determine whether the stock is overfished, as they were deemed unreliable for management purposes.

Commercial landings of vermilion snapper rose from 743,000 to 954,000 lbs whole weight during 1992 to 1995. Landings declined to 718,000 lbs whole weight followed by a large increase to 1,682,000 lbs whole weight in 2001. A sharp decline in landings to 760,000 lbs whole weight occurred in 2003 followed by a modest increase to 1,095,000 lbs whole weight in 2004. The CPUE of vermilion snapper taken with MARMAP trapping gear showed similar trends to commercial landings with an increase during 1994-1996 from 5.8 to 6.2 fish caught per hour followed by a decrease to 2.2 fish caught per hour in 1999. CPUE increased to 4.7 fish caught per hour in 2001 with a sharp decrease in 2003 to 0.35 fish per trap hour, the lowest value recorded since 1988. Low CPUE in 2003, as well as low commercial catches, was probably due to a prolonged cold water upwelling event. A slight increase in CPUE occurred in 2004. Headboat CPUE increased during 1992-2001 (SEDAR 2 2003a).

Zhao *et al*. (1997) and Zhao and McGovern (1997) report during the middle 1990s, the vermilion snapper stock was exhibiting many of the symptoms of an overexploited population, including a decrease in size at age, possibly caused by fishing pressure. Since these studies were conducted, the Council established a program to limit initial eligibility for the snapper grouper fishery and raised the vermilion snapper recreational size limit to 11" total length (see Section 4.3.3.2). Additionally, the Council recently extended indefinitely the *Oculina* closed area. Although the biological benefits of this area cannot be quantified at this time, evidence indicates there has been an increase in abundance of many species within the area since it was closed (Koenig 2001). Koenig *et al.* (in press) documented the presence of vermilion snapper in the *Oculina* closed area.

These management measures may have reduced fishing mortality (F) during the late 1990s as the SEDAR stock assessment noted a substantial decline in fishing mortality during 1997 and 1998 from a F=1.6 to a F=0.5 (SEDAR 2 2003a). However, F increased during 1999-2001 to an average of F=0.60 (F_{PROJ}). Despite the reductions in F that occurred during the late 1990s, overfishing is still occurring since F_{PROJ}=0.60 is greater than F_{MAX}=0.375 (a proxy for F_{MSY}). Such trends are expected to continue if status quo commercial management regulations are maintained, and could have a significant adverse effect on the stocks if allowed to continue indefinitely. The adverse effects of decreasing size and age trends on stock biomass and reproduction, population structure, and the marine ecosystem are described in Section 4.1.3.1.

All the alternatives to status quo management evaluated for vermilion snapper are intended to reduce fishing mortality. As a result, they are expected to directly and significantly benefit the biological environment by assisting in restoring stock status and population demographics to more natural conditions. The indirect effects of these alternatives on the ecological environment are less certain. Improving the status of the vermilion snapper stock would likely promote more natural ecological functions. However, competitor, predator, and prey relationships in marine ecosystems are complex and poorly understood.

The snapper grouper ecosystem includes many species, which occupy the same habitat at the same time. For example, vermilion snapper co-occur with tomtate, scup, red porgy, white grunt, black sea bass, red grouper, scamp, gag, and others. Therefore, snapper grouper species are likely to be caught when regulated since they will be incidentally caught when fishermen target other co-occurring species. Continued overexploitation of any snapper grouper species may disrupt the natural community structure of the reef ecosystems that support these species. Predators exploited species could be expected to decrease in abundance in response to a decline of an exploited species. Alternatively, predators would target other species as prey items. Conversely, the abundance of those prey and competitor species of the overexploited species that are not targeted in fisheries (e.g., scup and tomtate) could increase in response to a decline in the abundance of sea bass.

Alternative 2 would implement a commercial quota of 821,000 lbs gutted weight, which represents a 31% reduction of the average catch from 1999-2001. The reduction needed to end overfishing is based on a comparison between the average fishing mortality during 1999-2001 with the fishing mortality (F_{MAX}) that would produce MSY. Ending overfishing of vermilion snapper is expected to increase stock biomass and promote a more natural population structure by helping to reverse the trends of decreasing mean length and size/age at sexual maturity. These effects would benefit the vermilion snapper stock and associated species by protecting the stock against recruitment overfishing and reducing its vulnerability to adverse environmental conditions.

Based on data from 1999-2003, this quota would be achieved in September, at which time the fishery for vermilion snapper would be closed. As a result, the quota could encourage derby conditions, where fishermen compete with each other to catch as many fish as possible before the quota is taken and the fishery is closed for the remainder of the fishing year. Derby fisheries can unnecessarily increase discards by providing participants less flexibility in deciding when, where, and how to fish. Vermilion snapper are also taken on trips that target gag, scamp, red grouper, snowy grouper, greater amberjack, and almaco jack. Due to incidental catch of vermilion snapper during October through December, the quota might only provide a 23% to 34% (depending on release mortality rate and years considered) reduction if fishermen continue to target co-occurring species after the vermilion snapper fishery is closed, and do not change behavior to avoid locations where vermilion snapper are found. However, it is likely that fishermen can avoid “hot spots” where vermilion snapper occur after the quota is met.

Alternative 3 also would specify a commercial quota of 821,000 lbs gutted weight based on a 31% reduction of the average landings during 1999-2001, but would manage the quota with a trip limit of 720 lbs gutted weight to eliminate the likelihood that the reduced catch quota would result in derby conditions and associated adverse effects. The 720-lb gutted weight trip limit is designed to extend the fishing season through December. However, trip limits also have the potential to increase discards if fishermen continue to pursue co-occurring species after achieving the trip limit.

Alternative 4 would increase the vermilion snapper minimum size limit to 13” total length, specify an 821,000 lb gutted weight commercial quota, and institute a trip limit of 1,075 lbs gutted weight. A 13” total length commercial size limit would be expected to reduce fishing mortality 11.7% based on data from 1999-2003 and 11.5% based on data from 1999-2001. A trip limit of 1,080 lbs gutted weight would provide an 18.6% reduction based on data from 1999-2001 and a 19.9% reduction based on data from 1999-2001.

The commercial quota represents a 31% reduction of the average landings from average landings during 1999-2001. The intended effect of the combined trip limit and increased minimum size limit is to eliminate the likelihood that the reduced catch quota would result in derby conditions and associated adverse effects. However, trip limits and minimum size limits also have the potential to increase regulatory discards if fishermen continue to pursue co-occurring species after achieving the trip limit.

Because it would increase the minimum size limit, **Alternative 4** would be expected to result in a greater number of regulatory discards than **Alternative 3**. The size limit analyses assume a release mortality rate of 40% vermilion snapper stock, as recommended by SEDAR 2 (2003a). However, release mortality rates might be higher than 40%. Release mortality rates from SEDAR 2 (2003a) are based on cage studies conducted by Collins (1996) and Collins *et al.* (1999). Burns *et al*. (2002) suggest release mortality rates of vermilion snapper may be higher than estimated from cage studies because cages protect vermilion snapper from predators. A higher release mortality rate is supported by low recapture rates of vermilion snapper in tagging studies. Burns *et al*. (2002) estimate a 0.7% recapture rate for 825 tagged fish; whereas, recapture rates for red grouper, gag, and red snapper range from 3.8% to 6.0% (Burns *et al.* 2002). McGovern and Meister (1999) estimate a 1.6% recapture rate for 3,827 tagged vermilion snapper. Higher recapture rates are estimated for black sea bass (10.2%), gray triggerfish (4.9%), gag (11%), and greater amberjack (15.1%) (McGovern and Meister 1999; McGovern *et al*. 2005). Burns *et al*. (2002) suggest released vermilion snapper do not survive as well as other species due to predation. Vermilion snapper that do not have air removed from swim bladders are subjected to predation at the surface of the water. Individuals with a ruptured swim bladder or that have air removed from the swim bladder are subject to bottom predators since fish would not be able to join schools of other vermilion snapper hovering above the bottom (Burns *et al.* 2002).

As release mortality rates for vermilion snapper could be higher than 40%, it is possible that **Alternative 4** might not achieve the desired effect of ending overfishing. However, an increased minimum size limit might serve as an incentive for fishermen to avoid areas where small vermilion snapper occur. The Council’s Scientific and Statistical Committee has recommended the Council not use minimum size limits except for species like black sea bass that have a high survival rate.

Alternative 5 would specify a commercial quota of 757,000 lbs gutted weight, which represents a 31% reduction in average landings during 1999-2003. This alternative differs from **Alternatives 2-4** in that it considers 2002 and 2003 landings in determining the quota adjustment needed to end overfishing. Because the quota proposed in **Alternative 5** is based in part on 2003 landings, which were lower than any other year since 1986, it is more conservative and expected to result in greater biological benefits than **Alternatives 2-4**. However, based on data from 1999-2003, this quota would be achieved in August, when the fishery for vermilion snapper would be closed. As a result, the derby impacts of this alternative, where fishermen compete with each other to catch as many fish as possible before the quota is taken, could be greater than those associated with **Alternative 2**. Derby fisheries can unnecessarily increase discards by providing participants less flexibility in deciding when, where, and how to fish. Additionally, fishermen might shift effort to other species, such as red porgy, gag, scamp, snowy grouper, black sea bass, etc., after the vermilion snapper fishery was closed.

Alternative 6 would specify a commercial quota of 757,000 lbs gutted weight based on a 31% reduction of the average landings of 1999-2003 and would establish a trip limit of 720 lbs gutted weight. The intended effect of the trip limit is to extend the fishing season through December. The trip limit would reduce or eliminate the likelihood that the reduced catch quota would result in derby conditions and associated adverse effects. However, trip limits also have the potential to increase discards if fishermen continue to pursue co-occurring species after achieving the trip limit.

Alternative 7 would increase the minimum size limit to 13 inches total length, specify a 757,000 lb gutted weight commercial quota, and institute a trip limit of 1,080 lbs gutted weight. A 13" total length commercial size limit would be expected to reduce fishing mortality 11.7% based on data from 1999-2003 and 11.5% based on data from 1999-2001. A trip limit of 1,080 lbs would provide an 18.6% reduction based on data from 1999-2003 and a 19.9% reduction based on data from 1999-2001.

The intended effect of the combined trip limit and 13" total length minimum size is to extend the fishing season through December. The combined trip limit and size limit would reduce or eliminate the likelihood that the reduced catch quota would result in derby conditions and associated adverse effects. However, trip limits and minimum size limits also increase regulatory discards.

Because **Alternative 7** would increase the minimum size limit, it would be expected to have a greater number of regulatory discards than **Alternative 6**. Furthermore, survival of released vermilion snapper is assumed to be 40% in the analyses (SEDAR 2 2003a) but based on the results of low rate of tag recapture, mortality of released vermilion snapper could be much greater (McGovern and Meister 1999; Burns *et al.* 2002). Therefore, it is possible that **Alternative 4** might not achieve the desired effect of ending overfishing. However, the larger size limit might serve as an incentive for fishermen to avoid areas where small vermilion snapper occur.

In addition to the quota of 821,000 lbs gutted weight, **Alternative 8** would consider a trip limit of 300 lbs gutted weight when 75% of the quota was met (**Alternative 8A**) or a trip limit of 200 lbs gutted weight when 85% of the quota was met (**Alternative 8B**). **Alternative 8C** would specify that, if 75% or 85% of the quota was not met by the trigger date of September 1, then fishing would continue without a trip limit until the quota was filled.

In the absence of any other management measures and based on data from 1999-2003, the quota of 821,000 lbs would be achieved in September, at which time the fishery for vermilion snapper would be closed. As a result, this quota could encourage derby-type conditions, where fishermen compete with each other to catch as many fish as possible before the quota is taken and the fishery is closed for the remainder of the fishing year. In addition, fishermen might shift effort to other species, such as red porgy, gag, scamp, snowy grouper, black sea bass, etc. after the vermilion snapper fishery is closed. The establishment of a trip limit (**Alternatives 8A and 8B**) when 75% or 85% of the quota was met would help ensure the fishery was extended through December and derby conditions did not take place. However, catches could be reduced by factors such as cold water temperatures (as in 2003), bad weather, or high fuel prices. In this situation, 75% or 85% of the catch might not be taken until late in the year. The establishment of a trip limit of 300 lbs gutted weight in October through December could result in a failure of fishermen to meet the quota. A trigger date of September 1 would ensure the trip limit strategy does not unintentionally prevent fishermen from harvesting the full quota in years where harvest is lower than expected through August due to cold water or other exogenous factors. Alternatively, failure to meet the quota due to factors such as bad weather could reduce fishing pressure and have beneficial effects on the biological environment.

In addition to the alternative 757,000 lbs gutted weight commercial quota, **Alternative 9** would consider a trip limit of 300 lbs gutted weight when 75% of the quota was met (**Alternative 9A**) or a trip limit of 200 lbs gutted weight when 85% of the quota was met (**Alternative 9B**). **Alternative 9C** would specify that, if 75% or 85% of the quota was not met by the trigger date of September 1, then fishing would continue until the quota was filled. The effects of this alternative would be similar to those of **Alternative 8**, with the exception that the quota in **Alternative 9** is lower and, thus, more protective of the vermilion snapper stock.

The Council's **Preferred Alternative 10** would implement a commercial quota of 1,100,000 lbs gutted weight, which is equivalent to the average catch during 1999-2003 and the commercial portion of the optimum yield (OY). Furthermore, a 2003 NMFS population dynamics team memo indicated 1,100,000 lbs gutted weight represents a proxy long-term reference point for the commercial portion (55% of the 1999-2001 landings) of the maximum yield (Ymax) obtained by fishing at 75% of Fmax.

The recent stock assessment (SEDAR 2 2003) indicated overfishing was occurring during 1999-2001 when the commercial landings peaked at 1,600,000 lbs gutted weight. Commercial landings have generally been below 1,100,000 lbs gutted weight with occasional spikes in landings (Figure 4-8). Based on the ratio between the average fishing mortality during 1999-2001 (F_{PROJ}) and the fishing mortality, which would produce MSY (estimated as F_{MAX}), a 31% reduction in catch would be needed to end overfishing immediately. During 2003 and 2004, a 30% reduction in landings from the 1999-2001 average occurred.

Although SEDAR 2 (2003) indicated overfishing was occurring during 1999-2001 and estimated biomass values below B_{MSY}, the SSC and Stock Assessment Review Panel stated the stock recruitment relationship was poorly defined, and it was uncertain whether or not the stock was overfished. Despite uncertain biomass values, OY is estimated to be 1,628,692 lbs gutted weight. As 68% of the total catch during 1999-2003 was taken by the commercial fishery, the commercial portion of OY would be 1,114,310 lbs gutted weight which is roughly equivalent to the average landings during 1999-2003. It is also equivalent to commercial portion of the maximum yield obtained with a fishing mortality at 75% of Fmax.

Due to uncertainty associated with the assessment, the Council felt it was best to cap landings at 1,100,000 lbs gutted weight until a new stock assessment update was completed in 2007. A 30% reduction in landings during 2003-2004 would have ended overfishing and allowed for rebuilding of the stock to occur. If the estimate of OY approximates the true value for vermilion snapper, a quota of 1,100,000 lbs gutted weight would prevent overfishing from occurring in the future and eliminate the occasional spikes in landings. Preventing peaks in fishing pressure and eliminating overfishing would stabilize stock biomass at current levels or allow increases in biomass if the stock is overfished. The quota would also ensure there are no declines in the mean length and size/age at sexual maturity, and protect the stock against recruitment overfishing.

Vermilion snapper are also taken on trips, which target gag, scamp, red grouper, snowy grouper, greater amberjack, and almaco jack. Based on average landings from 1999-2003, setting the quota at 1,100,000 lbs gutted weight would allow the fishery to be open all year and an increase in the incidental catch of vermilion snapper would not be expected. Furthermore, derby conditions would not be expected.

4.3.3.2 Recreational

Alternative 1 would retain the current regulations used to manage catches of vermilion snapper. In general, recreational regulations include an 11" total length size limit and a 10 fish bag limit. In addition, a 92-nautical mile^2 area (*Oculina* HAPC) is closed to all bottom fishing off the coast of Florida (an area where vermilion snapper are known to occur).

Minimum size limits are designed to protect a portion of a stock from fishing mortality. Bag limits are designed to reduce overall fishing mortality by reducing the number of fish landed and the amount of time spent pursuing a species. Area closures are intended to provide fish and/or valuable bottom habitat a refuge from fishing pressure. When properly designed, these types of measures are generally expected to benefit the environment in the short-term and long-term by limiting the extent to which a stock is targeted. However, the extent to which such benefits are realized depends on the appropriateness of a measure to a specific stock, as well as if and to what extent fishing effort changes or shifts in response to the select management measure. For example, discard mortality can limit the amount by which fishing mortality is reduced by bag limits, minimum size limits, and area closures, as discussed in Section 4.1.3.1.

Zhao *et al*. (1997) and Zhao and McGovern (1997) indicate the vermilion snapper stock experienced a decrease in size at age and maturity during the mid 1990s. Although SEDAR 2 (2003a) state there was a substantial decline in fishing mortality during the late 1990s, overfishing was still occurring. There are adverse effects resulting from decreasing size and age trends on stock biomass, population structure, and the marine ecosystem. Such trends are expected to continue if status quo recreational management regulations are maintained.

The Council's **Preferred Alternative 2** would maintain the 10-fish bag limit, and increase the minimum size limit to 12" total length. Assuming a 25% recreational (SEDAR 2 2003a) release mortality rate, increasing the minimum size to 12" total length would provide a 20.5% reduction based on data from 1999-2003 and a 19.6% reduction based on data from 1999-2001. Based on results from SEDAR 2 (SEDAR 2 2003a), neither reduction would be sufficient to immediately end overfishing of vermilion snapper. However, estimates of biomass from the assessment were highly uncertain and it could not be determined if the population was overfished. If the stock is not overfished and biomass is near B_{MSY}, then the measures proposed in the Council's **Preferred Alternative 2** would be adequate to end overfishing. Due to uncertainty associated with the assessment (SEDAR 2 2003a), the Council concluded it was best to increase the minimum size to 12" total length and make it equivalent with the minimum size limit in the commercial fishery until a new stock assessment update was completed in 2007.

Preferred Alternative 2 would be expected to increase the number of regulatory discards. Since recreational fishermen fish in shallower water and bring fish to the surface at a slower rate than commercial fishermen, it is expected that the survival of vermilion snapper released by recreational fishermen would be higher than those caught by commercial fishermen (25% versus 40%). However, given the very low recapture rates of vermilion snapper reported by McGovern and Meister (1999) and Burns *et al*. (2002), it is possible the release mortality rate of 25% might be an underestimate, further diminishing the effectiveness of **Alternative 2** in reducing fishing mortality. Therefore, **Alternative 2** could continue trends observed in the mid 1990s, including a smaller size at age, smaller size at maturity, a change in the genetic integrity of the stock, and possible shifts in community structure. However, some reduction in fishing mortality and biological benefits are expected from an increase in the minimum size.

Alternative 3 would increase the minimum size limit to 12" total length and reduce the bag limit to 6 fish. Assuming a 25% release mortality rate, **Alternative 3** would provide a 31.8% reduction based on 1999-2003 data and a 31.1% reduction based on 1999-2001 data. This alternative would end overfishing for the recreational sector if estimates of release mortality rates are correct. However, if release mortality rates are higher than 25%, as suggested by the very low tag recapture rates (McGovern and Meister 1999; Burns *et al*. 2002), then the desired effects of **Alternative 3** might not be achieved. The number of regulatory discards could be higher than **Alternative 2** since the bag limit would be decreased in addition to the increased size limit. Therefore, **Alternative 3** could continue trends observed in the mid 1990s, including a smaller size at age, smaller size at maturity, a change in the genetic integrity of the stock, and possible shifts in community structure.

Bag limits have some desirable characteristics as management tools. They are commonly used management measures, which are readily understood by fishermen. Violations of bag limits are readily apparent by simply counting the number of fish that are retained, which aids in enforcement of fishery regulations. The rationale for bag limits is that they reduce the amount of harvest and are often used in conjunction with size limits to achieve a desired reduction.

There are a number of shortcomings with bag limits. Once bag limits are reached, some fishermen may continue to fish, keeping larger fish and throwing smaller dead fish back. The snapper grouper fishery represents many species occupying the same location at the same time. Fishermen could continue to target other co-occurring species and throw back fish that have bag limits, many of which will die. It would be expected that fishermen would still tend to target the largest most desirable species. Therefore, there still could be a problem with removing the larger faster growing fish, reducing genetic variability, and reducing the variability in the age structure of the population that ensures against recruitment failure.

Alternative 4 would maintain the 10-fish bag limit and the 11” total length minimum size limit, and prohibit recreational harvest and/or possession of vermilion snapper from October through December. While **Alternative 4** would not end overfishing, it is estimated it would reduce recreational harvest of vermilion snapper by 16.2%. An October to December closure would not protect vermilion snapper in spawning condition since they are summer spawners.

The length of the closed season may influence its effectiveness in reducing fishing mortality on vermilion snapper due to shifting of effort to weeks before and after the closure. For example, a February 15-March 15 closure on red grouper, gag, and black grouper was implemented in the Gulf of Mexico in 2001. Although a reduction in catch of 8% for red grouper and 10% for gag/black grouper was predicted based on landings in previous years, relative catch was only 2% less during the first year the closure was effective (GMFMC 2004). A longer closed season may be more effective in reducing harvest, as it would be more difficult for fishermen to shift all their effort. However, some displacement of effort is still likely to occur, making estimates of percent impacts of spawning season closures overestimates (GMFMC 2004).

Furthermore, it is unlikely fishing mortality could be completely eliminated on vermilion snapper during a closure since vermilion snapper would be caught when fishermen target co-occurring species.

Since **Alternative 4** would not end overfishing, it would be expected to continue negative trends observed during the 1990s, including a smaller size at age, smaller size at maturity, a change in the genetic integrity of the stock, and possible shifts in community structure.

Alternative 5 is similar to **Alternative 4**, except it would reduce the 10-fish bag limit to 6 fish per person per trip in addition to establishing an October through December closure. It is estimated that **Alternative 5** would provide a 30.4% reduction in harvest.

An increase in regulatory discards could be expected with a decreased bag limit. However, the number of regulatory discards would probably be less than in **Alternatives 2 and 3**. In addition, effort could increase those weeks before and after the closure, which could decrease the effectiveness of **Alternative 5**. Furthermore, it is unlikely that fishing mortality would be completely eliminated on vermilion snapper during a closure since vermilion snapper could be caught when fishermen target co-occurring species. The incidental take vermilion snapper would probably increase if abundance increased in response to management measures.

Alternative 6 is similar to **Alternative 4** except it would prohibit recreational harvest and/or possession during January and February. While **Alternative 6** would not end overfishing, it is estimated it would reduce harvest by 13%. A January to February closure would not protect vermilion snapper in spawning condition since they are summer spawners.

Since the closed season in **Alternative 6** is shorter than in **Alternative 4**, **Alternative 6** might not be as effective as **Alternative 4** in reducing fishing mortality on vermilion snapper.

Furthermore, there could be a shift in effort to those weeks before and after the closure. A longer closed season may be more effective in reducing harvest, as it would be more difficult for fishermen to shift all their effort. However, some displacement of effort is still likely to occur, which could result in overestimates of reductions provided by spawning season closures (GMFMC 2004).

It is unlikely that fishing mortality could be completely eliminated on vermilion snapper during a closure since vermilion snapper will be caught when fishermen target co-occurring species. In addition, the incidental take of vermilion snapper would probably increase if abundance increased in response to a closure.

Since **Alternative 6** would not end overfishing, negative trends observed during the 1990s could continue including a smaller size at age, smaller size at maturity, a change in the genetic integrity of the stock, and possible shifts in community structure.

Alternative 7 is similar to **Alternative 6**, except it would reduce the 10-fish bag limit to 5 fish per person per trip in addition to establishing a January and February closure. It is estimated that **Alternative 7** would provide a 32.4% reduction in harvest.

An increase in regulatory discards could be expected with a decreased bag limit. However, the number of regulatory discards would probably be less than in **Alternatives 2 and 3**. In addition, effort could also increase those weeks before and after the closure, which could also decrease the effectiveness of **Alternative 7**. Furthermore, it is unlikely that fishing mortality could be completely eliminated on vermilion snapper during a closure since vermilion snapper would be caught when fishermen target co-occurring species. The incidental take of vermilion snapper would probably increase if abundance increased in response to management measures.

Alternative 8 would increase the minimum size limit to 12" total length, and would reduce the bag limit to 6 fish per person per trip for the for-hire sector and to 4 fish per person per trip for the private sector. Assuming a 25% recreational release mortality rate, **Alternative 8** would provide a 33.3% (for-hire) and 30.6% (private) reduction based on 1999-2003 data and a 33.5% (for-hire) and 30.7% (private) reduction based on 1999-2001 data. This alternative would end overfishing for the recreational sector if estimates of release mortality rates are correct. However, if release mortality rates are higher than 25%, as suggested by the very low tag recapture rates (McGovern and Meister 1999; Burns *et al*. 2002), then the desired effects of **Alternative 8** might not be achieved. The number of regulatory discards could be higher than **Alternative 2** but similar to **Alternative 3** since the bag limit would be decreased in addition to the increased size limit. Therefore, **Alternative 8** might not achieve the desired effects and could continue trends observed in the mid 1990s including a smaller size at age, smaller size at maturity, a change in the genetic integrity of the stock, and possible shifts in community structure.

Alternative 9 would retain the 10-fish bag limit, establish a January-February closure, and increase the minimum size limit from 11" total length to 12" total length. This alternative could be expected to end overfishing assuming a release mortality rate of 25%. Assuming a 25% release mortality and that no vermilion snapper would be caught during the January through

February closure, **Alternative 9** would provide a 33% reduction. However, it is expected that vermilion snapper would continue to be caught during the seasonal closure when fishermen target co-occurring species. The expected reduction from the January-February closure and the increased minimum size limit (12" total length) would range from 52% (0% release mortality, 100% compliance with the size limit, 100% effectiveness of closure) to 14.5% (maximum non-compliance; 40% release mortality, 38% effectiveness of closure). Assuming a 25% release mortality rate, the expected reduction would range from 20.3% (maximum non-compliance, 38% effectiveness of closure) to 42.0% (100% compliance, 100% effectiveness of closure). Increasing the minimum size limit would be expected to increase regulatory discards, as described for **Alternative 2**.

4.3.4 Protected Species Effects of Management Measure Alternatives

4.3.4.1 Commercial

Alternative 1 would maintain the status quo and thus keep the existing level of risk for protected species interactions as summarized in the Affected Environment.

Alternatives 2, 5, and **10** could potentially benefit protected species if the reduction in allowable harvest results in the reduction of effort (i.e., reduction of hook-and-line gear in the water). However, benefits may be reduced or negated if fishing effort was to shift into other fisheries that pose a risk to protected species (e.g., other vertical hook-and-line, gillnet fisheries) after the quota is reached. There also may be an increased risk of incidental capture of protected species by the implementation of **Alternative 2 or 5** if it results in derby-type conditions due to the catch quota (i.e., increased competition among fishermen to catch as many fish as possible before the quota is met thus increasing effort for a period of time). Impacts to protected species from **Alternatives 3**, **4**, **6** and **7** are similar to those described for **Alternatives 2 and 5**; however, these Alternatives would offer some protection against derby-type conditions due to the implementation of trip limits which may benefit protected species by eliminating the risk of increased fishing effort prior to reaching the quota. Impacts to protected species from **Alternatives 8** and **9** are similar to those described for **Alternatives 2 through 7** with a risk of derby-type conditions arising prior to a trip limit being triggered.

4.3.4.2 Recreational

Alternative 1 would maintain the status quo and thus keep the existing level of risk for protected species interactions as summarized in the Affected Environment.

Preferred Alternative 2 which only modifies the size limit as a management measure to reduce landings would not likely provide a benefit because it would probably not reduce overall effort (i.e., reducing vertical hook-and-line gear in the water). **Alternatives 3** and **8** incorporate measures to reduce the recreational bag limit in addition to modifying size limits which may have potential benefit to protected species if the reduction in allowable harvest results in the reduction of effort (i.e., reduction of hook-and-line gear in the water). However, benefits may be reduced or negated if fishermen continue to pursue co-occurring species after achieving the bag limit. The October through December closure proposed in **Alternatives 4** and **5** may benefit sea turtles, primarily off North Carolina and the east coast of Florida since sea turtles occur year-round off both states, if the closure results in the reduction of effort (i.e., reduction of hook-and-line gear in the water). However, benefits may be negated if fishing effort was to shift to target other fish species during the closure. **Alternative 5** may provide additional benefits due to the inclusion of a measure to reduce the existing bag limit. The impacts to protected species from **Alternatives 6, 7, and 9** are similar to those described for **Alternatives 4 and 5** with **Alternative 7** perhaps providing additional benefits due to the inclusion of a measure to reduce the existing bag limit.

4.3.5 Economic Effects of Management Measure Alternatives

This section describes the short-term quantitative effects on the commercial fishery, then the quantitative short-term effects on the recreational fishery, and provides a qualitative discussion of the long-term effects on these harvesting sectors and non-use benefits to society. Estimates of the short-term economic impacts are expressed in nominal values (i.e., not adjusted for inflation).

4.3.5.1 Commercial

The methodology employed for the analysis for the commercial sector is described in Section 4.1.5 and is incorporated herein by reference.

Under the status quo for vermilion snapper and base model alternatives for other species, the expected total net revenue earned by all boat owners, captains and crews is $5.14 million per year (Table 4-20a). This represents a short-term loss of $0.85 million, or 14.1% compared to the status quo regulation for all species (Table 4-20a). Since, the no-action alternative for vermilion snapper would not impose additional restrictions on commercial fishermen in the short-term, the predicted short-term loss is attributed to the base model alternatives for snowy grouper, tilefish and black sea bass. (Table 4-20a)

The marginal effects of the proposed alternatives for vermilion snapper were evaluated by holding the alternatives for other species constant at their base levels. If the proposed regulations were implemented for vermilion snapper, the increased loss in net revenue would range from $0.25 million with the Council's **Preferred Alternative 10** and $1.02 million (17%) with **Alternative 7** (Table 4-20a).

Comparisons of **Alternative 3 with 4** and **Alternative 6 with 7** suggest that the short-term losses in net revenue for proposed quotas with a higher trip limit and a larger minimum size limit are approximately equal to losses for quotas with a lower trip limit without a change in the size limit (Table 4-20a). Also, comparisons of **Sub-Alternatives 8** with **Alternatives 3 and 4** and **Sub-Alternatives 9** with **Alternatives 6 and 7** suggest that, on average, management with quotas and relatively small late-season trip limits would yield smaller short-term losses than management with quotas and year-long trip limits.

Table 4-20a. Estimated change in revenues minus trip costs and opportunity costs of labor for proposed vermilion snapper alternatives, by year, given base model alternatives for snowy grouper (3), golden tilefish (2CE), black sea bass (8), and red porgy (2).

Vermilion Snapper Alternative	Revenues minus Trip Costs and Opp Costs of Labor (Millions of Dollars)					Cumulative Change compared to Status Quo ($Million)	Cumulative Percentage Change compared to Status Quo	Extra Change due to Vermilion Snapper Alternatives ($Million)	Extra Percentage Change compared to Status Quo
	2001	2002	2003	2004	Average	Average	Average	Average	Average
Status Quo	6.84	5.94	5.19	5.99	5.99	0.00	0.0%	n.a.	n.a.
No Action	5.84	5.09	4.50	5.14	5.14	-0.85	-14.1%	0.00	0.0%
2	4.40	4.29	4.50	4.79	4.50	-1.49	-24.9%	-0.64	-10.8%
3	4.33	4.22	4.08	4.29	4.23	-1.76	-29.4%	-0.91	-15.2%
4	4.33	4.19	4.00	4.31	4.21	-1.78	-29.8%	-0.93	-15.6%
5	4.22	4.12	4.50	4.58	4.36	-1.63	-27.3%	-0.79	-13.1%
6	4.15	4.04	4.08	4.29	4.14	-1.85	-30.9%	-1.00	-16.7%
7	4.16	4.03	4.00	4.31	4.12	-1.86	-31.1%	-1.02	-17.0%
8A	4.37	4.23	4.40	4.53	4.38	-1.60	-26.8%	-0.76	-12.7%
8AC	4.37	4.23	4.50	4.79	4.47	-1.51	-25.3%	-0.67	-11.2%
8B	4.37	4.24	4.50	4.62	4.43	-1.56	-26.0%	-0.71	-11.8%
8BC	4.37	4.24	4.50	4.79	4.47	-1.51	-25.3%	-0.67	-11.1%
9A	4.20	4.05	4.29	4.42	4.24	-1.75	-29.2%	-0.90	-15.0%
9AC	4.20	4.05	4.50	4.58	4.33	-1.66	-27.6%	-0.81	-13.5%
9B	4.21	4.05	4.40	4.49	4.28	-1.70	-28.5%	-0.86	-14.3%
9BC	4.21	4.05	4.50	4.58	4.33	-1.65	-27.6%	-0.81	-13.5%
10	5.02	4.92	4.50	5.14	4.90	-1.09	-18.2%	-0.25	-4.1%

The various options for **Alternatives 8 and 9** differ according to the criteria by which late-season trip limits would be implemented. The simulation model found options B with a smaller 200 lb trip limit that would be implemented when 85% of the quota was filled would generate slightly smaller losses than options A with a 300 lb trip limit that would be implemented when 75% of the quota was filled. However, the short-term losses associated with alternative late-season trip limits were approximately equal with options C, which linked implementation of the 300 lb or 200 lb trip limits to progress toward filling the quota as of September 1. Short-term losses with options C were slightly lower than with corresponding options A or B.

Short-term net revenue losses are expected to vary annually, and will be greater when vermilion snapper are more abundant and proposed quotas and trip limits are more likely to be restrictive. Commercial landings of vermilion snapper have fluctuated between 2001 and 2004 (Figure 4-8), with landings in 2003 falling short of all proposed quotas, and landings in 2001 and 2002 exceeding the larger proposed quota of 1.1 million pounds (gutted weight). If fishing conditions in the near future most closely resemble the fishing conditions that existed in 2001, then the additional losses that would be incurred by fishermen due to the proposed alternatives for vermilion snapper would range from $0.82 million (11.9% of status quo earnings) with Council's **Preferred Alternative 10** to $1.68 million (24.6% of status quo earnings) with **Alternatives 6 and 7** (Table 4-20b). On the other hand, with 2003 fishing conditions, short-term losses would range up to only $0.50 million (9.7% of status quo earnings) with **Alternatives 4 and 7** (Table 4-20b).

The Council's **Preferred Alternative 10** results in an average annual incremental loss of $0.25 million (Table 4-20b) and a reduction of 4.1% of status quo earnings (Table 4-20c). Vermilion snapper is an important species for commercial snapper-grouper fishermen. Hence, the losses incurred by fishermen due to regulation of the vermilion snapper fishery are greater in absolute magnitude than the losses associated with regulation of the snowy grouper or tilefish or black sea bass fisheries. However, in relative terms, short-term losses due to management of the vermilion snapper fishery would not be as great as the losses incurred by boats with fish pots due to management of the black sea bass fishery. Short-term losses associated with proposed vermilion snapper alternatives would be incurred primarily by fishermen with vertical lines (Table 4-20c). In relative terms, the losses that would be incurred due to management of vermilion snapper would be about equal to the percentage losses incurred by fishermen with bottom longlines due to management of snowy grouper and tilefish fisheries. The largest losses attributed solely to the vermilion snapper preferred alternative will occur in South Carolina (Table 4-20d). Compared to the status quo, Georgia and northeast Florida would incur the highest proportional reduction in revenue (Table 4-20d).

The total cumulative losses from the vermilion snapper alternatives plus base model alternatives for the other species range from $0.85 million with the no-action alternative to $1.86 million with **Alternative 7**, which corresponds to average annual losses of 14.1% to 31.1% of status quo earnings (Table 4-20a).

Table 4-20b. The portion of total change in revenues minus trip costs and opportunity costs of labor attributable to proposed alternatives for vermilion snapper, by year, given base model alternatives for snowy grouper (3), golden tilefish (2CE), black sea bass (8), and red porgy (2).

Vermilion Snapper alternatives, given: Snowy(3), Tile(2CE), RPorgy(2), BSB(8)	Extra Change in Revenues minus Trip Costs and Opportunity Costs of Labor due to Proposed Alternatives for Vermilion Snapper, and Excluding the Simultaneous Effects of Proposed Alternatives for Other Species				
	Change from No-Action Alternative, Millions of Dollars				
	2001	2002	2003	2004	Avg
No Action	0.00	0.00	0.00	0.00	0.00
2	-1.44	-0.80	0.00	-0.35	-0.64
3	-1.50	-0.87	-0.43	-0.84	-0.91
4	-1.51	-0.90	-0.50	-0.82	-0.93
5	-1.61	-0.97	0.00	-0.56	-0.79
6	-1.68	-1.05	-0.43	-0.84	-1.00
7	-1.68	-1.06	-0.50	-0.82	-1.02
8A	-1.47	-0.85	-0.10	-0.60	-0.76
8AC	-1.47	-0.85	0.00	-0.35	-0.67
8B	-1.47	-0.85	0.00	-0.51	-0.71
8BC	-1.47	-0.85	0.00	-0.35	-0.67
9A	-1.64	-1.04	-0.21	-0.72	-0.90
9AC	-1.64	-1.04	0.00	-0.56	-0.81
9B	-1.63	-1.04	-0.11	-0.65	-0.86
9BC	-1.63	-1.04	0.00	-0.56	-0.81
10	-0.82	-0.17	0.00	0.00	-0.25
Status Quo	6.84	5.94	5.19	5.99	5.99
	Extra Change as Percent of Status Quo				
	2001	2002	2003	2004	Avg
No Action	0.0%	0.0%	0.0%	0.0%	0.0%
2	-21.0%	-13.4%	0.0%	-5.8%	-10.8%
3	-22.0%	-14.7%	-8.2%	-14.1%	-15.2%
4	-22.1%	-15.2%	-9.7%	-13.8%	-15.6%
5	-23.6%	-16.4%	0.0%	-9.3%	-13.1%
6	-24.6%	-17.7%	-8.2%	-14.1%	-16.7%
7	-24.6%	-17.8%	-9.7%	-13.8%	-17.0%
8A	-21.5%	-14.4%	-2.0%	-10.0%	-12.7%
8AC	-21.5%	-14.4%	0.0%	-5.8%	-11.2%
8B	-21.5%	-14.3%	0.0%	-8.6%	-11.8%
8BC	-21.5%	-14.3%	0.0%	-5.8%	-11.1%
9A	-23.9%	-17.5%	-4.1%	-12.0%	-15.0%
9AC	-23.9%	-17.5%	0.0%	-9.3%	-13.5%
9B	-23.8%	-17.6%	-2.0%	-10.9%	-14.3%
9BC	-23.8%	-17.6%	0.0%	-9.3%	-13.5%
10	-11.9%	-2.8%	0.0%	0.0%	-4.1%

Table 4-20c. The portion of total change in revenues minus trip costs and opportunity costs of labor attributable to proposed alternatives for vermilion snapper, by primary gear, given base model alternatives for snowy grouper (3), golden tilefish (2CE), black sea bass (8), and red porgy (2).

Vermilion Snapper alternatives, given: Snowy(3), Tile(2CE), RPorgy(2), BSB(8)	Extra Change in Revenues minus Trip Costs and Opportunity Costs of Labor due to Proposed Alternatives for Vermilion Snapper, by Primary Gear, and Excluding the Simultaneous Effects of Proposed Alternatives for Other Species						
	Change from No-Action Alternative, Millions of Dollars						
2001-2004 Average	Vert Lines	Long Lines	Pots	Trolling	Diving	Other	Total
No Action	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	-0.64	0.00	0.00	0.00	0.00	0.00	-0.64
3	-0.91	0.00	0.00	0.00	0.00	0.00	-0.91
4	-0.93	0.00	0.00	0.00	0.00	0.00	-0.93
5	-0.78	0.00	0.00	0.00	0.00	0.00	-0.79
6	-1.00	0.00	0.00	0.00	0.00	0.00	-1.00
7	-1.01	0.00	0.00	0.00	0.00	0.00	-1.02
8A	-0.75	0.00	0.00	0.00	0.00	0.00	-0.76
8AC	-0.66	0.00	0.00	0.00	0.00	0.00	-0.67
8B	-0.70	0.00	0.00	0.00	0.00	0.00	-0.71
8BC	-0.66	0.00	0.00	0.00	0.00	0.00	-0.67
9A	-0.90	0.00	0.00	0.00	0.00	0.00	-0.90
9AC	-0.80	0.00	0.00	0.00	0.00	0.00	-0.81
9B	-0.85	0.00	0.00	0.00	0.00	0.00	-0.86
9BC	-0.80	0.00	0.00	0.00	0.00	0.00	-0.81
10	-0.24	0.00	0.00	0.00	0.00	0.00	-0.25
Status Quo	4.55	0.69	0.52	0.06	0.14	0.03	5.99
	Extra Change as Percent of Status Quo						
2001-2004 Average	Vert Lines	Long Lines	Pots	Trolling	Diving	Other	Total
No Action	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2	-14.0%	-0.2%	-0.1%	-2.1%	-2.3%	-2.5%	-10.8%
3	-19.9%	-0.1%	0.0%	-1.8%	-0.7%	0.0%	-15.2%
4	-20.4%	-0.1%	-0.1%	-2.2%	-1.7%	-1.3%	-15.6%
5	-17.1%	-0.2%	-0.1%	-2.3%	-2.5%	-2.5%	-13.1%
6	-21.9%	-0.1%	0.0%	-1.9%	-1.0%	-0.4%	-16.7%
7	-22.2%	-0.1%	-0.1%	-2.2%	-2.1%	-1.6%	-17.0%
8A	-16.6%	-0.2%	-0.1%	-1.5%	-1.3%	-0.9%	-12.7%
8AC	-14.6%	-0.2%	-0.1%	-1.6%	-1.1%	-0.9%	-11.2%
8B	-15.5%	-0.2%	-0.1%	-1.6%	-1.3%	-1.1%	-11.8%
8BC	-14.5%	-0.2%	-0.1%	-1.7%	-1.3%	-1.2%	-11.1%
9A	-19.7%	-0.2%	-0.1%	-1.6%	-1.6%	-0.9%	-15.0%
9AC	-17.6%	-0.2%	-0.1%	-1.9%	-1.5%	-0.9%	-13.5%
9B	-18.7%	-0.2%	-0.1%	-1.6%	-2.0%	-1.3%	-14.3%
9BC	-17.6%	-0.2%	-0.1%	-1.9%	-1.8%	-1.3%	-13.5%
10	-5.3%	-0.2%	0.0%	-0.5%	-1.2%	-0.4%	-4.1%

Table 4-20d. The portion of total change in revenues minus trip costs and opportunity costs of labor attributable to proposed alternatives for vermilion snapper, by area landed, given base model alternatives for snowy grouper (3), tilefish (2CE), black sea bass (8), and red porgy (2).

Vermilion Snapper alternatives, given: Snowy(3), Tile(2CE), RPorgy(2), BSB(8)	Extra Change in Revenues minus Trip Costs and Opportunity Costs of Labor due to Proposed Alternatives for Vermilion Snapper, by Area Landed, and Excluding the Simultaneous Effects of Proposed Alternatives for Other Species				
	Change from No-Action Alternative, Millions of Dollars				
2001-2004 Average	North Carolina	South Carolina	Georgia & NE FL	Central & South FL	Total
No Action	0	0	0	0	0
2	-0.23	-0.23	-0.17	-0.01	-0.64
3	-0.17	-0.39	-0.34	0.00	-0.91
4	-0.24	-0.37	-0.31	-0.01	-0.93
5	-0.29	-0.28	-0.20	-0.01	-0.79
6	-0.21	-0.43	-0.36	-0.01	-1.00
7	-0.28	-0.40	-0.33	-0.01	-1.02
8A	-0.24	-0.29	-0.22	0.00	-0.76
8AC	-0.22	-0.25	-0.19	-0.01	-0.67
8B	-0.25	-0.26	-0.19	-0.01	-0.71
8BC	-0.23	-0.25	-0.18	-0.01	-0.67
9A	-0.29	-0.34	-0.26	-0.01	-0.90
9AC	-0.28	-0.30	-0.23	-0.01	-0.81
9B	-0.30	-0.31	-0.24	-0.01	-0.86
9BC	-0.29	-0.29	-0.22	-0.01	-0.81
10	-0.08	-0.11	-0.06	0.00	-0.25
Status Quo	2.20	2.11	0.97	0.70	5.99
	Extra Change as Percent of Status Quo				
2001-2004 Average	North Carolina	South Carolina	Georgia & NE FL	Central & South FL	Total
No Action	0.0%	0.0%	0.0%	0.0%	0.0%
2	-10.6%	-10.8%	-17.6%	-1.8%	-10.8%
3	-7.7%	-18.7%	-35.4%	-0.6%	-15.2%
4	-11.1%	-17.6%	-31.8%	-1.7%	-15.6%
5	-13.3%	-13.4%	-20.4%	-2.0%	-13.1%
6	-9.4%	-20.3%	-37.3%	-0.9%	-16.7%
7	-12.5%	-19.1%	-33.6%	-1.9%	-17.0%
8A	-11.0%	-13.6%	-23.0%	-0.6%	-12.6%
8AC	-10.2%	-11.8%	-19.6%	-0.7%	-11.1%
8B	-11.2%	-12.5%	-19.9%	-0.7%	-11.8%
8BC	-10.6%	-11.8%	-18.4%	-0.9%	-11.1%
9A	-13.2%	-16.0%	-27.3%	-1.1%	-15.0%
9AC	-12.6%	-14.0%	-23.5%	-1.3%	-13.5%
9B	-13.5%	-14.9%	-24.6%	-1.1%	-14.3%
9BC	-13.2%	-13.9%	-22.3%	-1.2%	-13.5%
10	-3.4%	-5.1%	-6.1%	-0.6%	-4.1%

The number of vessels likely to experience reduced net revenues as a result of the proposed vermilion snapper regulations will be highest if either **Alternative 4 or 7** is implemented (362) and lowest if **Alternative 3** is implemented (299) (Table 4-20e). The additional number of trips canceled in comparison to the no action alternative is greatest for **Alternative 5** (82 trips) compared to **Alternative 3** (11 trips) (Table 4-20e).

As previously discussed, the predicted closure dates, net revenue losses, number of affected vessels, and canceled trips are conditional on the assumption that fishermen will not alter targeting behavior except to cancel trips if they are not expected to be profitable. However, fishermen could change targeting behavior in other ways that cannot be incorporated into this model because of lack of information. Regulatory changes are proposed for several species harvested with vermilion on the same trip (Figure 3-11a). Fishermen's strategic responses to other measures in this amendment could result in earlier/later closures for vermilion snapper if harvesting strategies become more/less aggressive in the vermilion snapper fishery. Non-regulatory events such as the displacement of fishing docks or "fish houses", which is expected to continue into the future, could contribute to a reduction in effort targeted at vermilion snapper. Closure of fishing docks that are engaged in the snapper grouper fishery could be accelerated by actions in this amendment since the volume of product and associated revenue from the harvest of species in this amendment would affect the profit margins of these facilities. Decreased profitability provides an additional incentive for owners to sell these properties for alternative development projects (e.g., oceanfront condominiums). This scenario would cause the reduction in effort if displaced vessels cannot find alternative docking sites.

Another criterion to weigh in evaluating the relative benefits of the various alternatives is the tradeoff in keeping markets open year round versus lower trip limits. The more advantageous strategy would depend on the characteristics of the fishery such as trip duration, trip costs, the seasonality of other fisheries in which the vessel may be engaged, and the dynamics of the wholesale sector. Generally, keeping markets open year round would result in relatively higher prices for a product. In addition, trip limits would impede the development of a derby fishery if quotas are extremely limiting.

Table 4-20e. Frequency distribution of annual loss in net revenue per vessel across the snapper grouper fleet that harvested black sea bass, vermilion snapper, snowy grouper, and golden tilefish averaged over the period 2001-2004.
Net losses (revenues minus trip costs and opportunity costs of labor) attributable to proposed alternatives for vermilion snapper, given base model alternatives for tilefish (2CE), vermilion snapper (10), red porgy (2), and black sea bass (8).

Net Revenue Loss Category	1	2	3	4	5	6	7	8A	8AC	8B	8BC	9A	9AC	9B	9BC	10
NO LOSSES*	117	95	109	46	93	103	46	106	103	106	103	102	99	101	98	105
1- 100	106	84	86	103	83	86	101	87	88	89	88	86	87	86	87	96
101- 500	55	56	44	67	56	45	68	47	51	48	51	47	52	49	52	50
501- 1,000	31	29	25	30	29	28	29	28	29	28	29	27	29	27	29	30
1,001- 2,500	33	36	34	37	35	32	40	32	33	31	33	32	32	33	32	37
2,501- 5,000	23	27	27	31	26	27	28	25	25	24	25	26	26	27	27	28
5,001- 10,000	22	33	34	37	29	32	35	27	30	28	30	28	28	27	27	28
10,001- 20,000	13	27	26	31	32	29	35	33	28	31	28	32	30	32	30	22
20,001- 30,000	6	16	11	13	16	12	15	13	12	13	13	17	16	16	17	7
30,001- 40,000	2	4	5	5	6	5	5	6	5	6	6	4	5	6	6	2
40,001- >$100,000	3	4	9	7	4	9	7	5	4	4	4	7	6	6	5	4
Losses	291	313	299	362	315	305	362	302	305	302	305	306	309	307	310	303
Incremental number of canceled trips above the no action alternative scenario.		68	11	17	82	22	29	18	22	21	25	35	41	39	45	24

However, trip limits could result in fewer trips and lost revenue not only from the regulated species but other species expected to be caught on canceled trips if the limits are overly severe. This would lead to additional disruptions in the fishing operations and associated distribution channel, support industries and consumptive sector.

The potential closures of the commercial fishery for vermilion snapper, discussed previously, are based on the assumption that all measures in this amendment will take effect at the start of the fishing year. During the first year of implementation of this amendment trip limit measures may not take effect on January 1st. However, harvest of vermilion snapper taken in South Atlantic waters from January 1st would count toward the new quota established by the amendment. As a result, it is likely vermilion snapper closures would occur earlier than model predictions during the first year of implementation of this amendment. For example, if **Alternative 5, 6, or 7** is implemented it is expected that the 821,000 lb (gutted weight) vermilion snapper quota would be exceeded in September (Table 4-20f). The quota associated with the **Preferred Alternative 10** (1.1 million lb gutted weight) could be attained sometime in December (Table 4-20f).

Table 4-20f. Cumulative monthly harvest of vermilion snapper by state averaged over the period 2001-2004, and cumulative monthly harvest as a percent of the total average annual harvest for each state.
Source: Southeast logbook database, NMFS, SEFSC, Beaufort Lab. C = Confidential Data.

Month	Florida	Georgia	North Carolina	South Carolina	Total	Florida	Georgia	North Carolina	South Carolina	Total
January	C	C	C	C	C	C	C	C	C	C
February	C	C	C	C	C	C	C	C	C	C
March	C	C	C	79,745	202,118	C	C	C	19%	17%
April	47,837	52,246	76,470	125,426	301,979	30%	27%	19%	29%	26%
May	59,710	64,267	119,219	154,625	397,820	37%	33%	30%	36%	34%
June	74,537	81,757	154,864	185,202	496,360	46%	43%	39%	43%	42%
July	89,732	97,639	185,356	215,245	587,971	56%	51%	46%	50%	50%
August	106,312	117,277	237,261	251,855	712,704	66%	61%	59%	59%	60%
September	118,791	136,173	278,202	294,991	828,156	74%	71%	69%	69%	70%
October	137,517	159,228	331,144	348,384	976,273	86%	83%	83%	81%	83%
November	151,333	176,092	374,217	394,348	1,095,990	94%	92%	93%	92%	93%
December	160,395	192,007	400,704	427,541	1,180,648	100%	100%	100%	100%	100%

4.3.5.2 Recreational

Vermilion snapper is one of the more frequently harvested species in the recreational snapper grouper fishery (Section 3.4.2.2.3). This species is very important to the headboat sector in the South Atlantic. In fact, the headboat harvest exceeds the harvest in both the private recreational and charter sectors combined (Table 3-26). In relative terms, vermilion snapper comprises a much greater proportion of the headboat harvest (24%) in the South Atlantic (Figure 3-17a) compared to the charter (6%) and private recreational (2%) sectors (Figures 3-19a and Figure 3-21a).

The analytical assessment procedures for the recreational sector are described in Section 4.1.5.2 and are incorporated herein by reference. As noted in Section 4.1.5, the impacts discussed below refer only to activity for this individual species and do not reflect impacts relative to all species harvested by anglers that fish for this species or all recreational snapper grouper activity.

Assuming fishing conditions in the near future are similar to conditions during the period 1999-2003, it is expected that **Alternative 8A** would result in the greatest reduction in the expected numbers of fish harvested (191,026 to 200,698) and the greatest annual loss in net non-market benefits ($473,744 to $497,732) (Table 4-21a). This alternative proposes a 12 inch minimum size limit and a 6 fish bag limit in the for-hire sector and a 4-fish bag limit in the private recreational sector. The losses are mainly attributed to the minimum size regulation. The bag limit was not a constraint on many trips after the 12 inch minimum size limit was applied to the data set. The lowest immediate impacts are associated with Alternative 6 which proposes a two-month seasonal closure in January and February (Table 4-21a). Implementation of Alternative 6 would result in a 6% reduction in the numbers of fish retained by anglers compared to a reduction between 38 and 40% associated with **Alternative 8** (Table 4-21a). The Council's **Preferred Alternative 2** will result in a reduction of 140,673 (28%) fish kept by anglers, which corresponds to an annual loss in net non-market benefits of $348,870 (Table 4-21a).

The analyses for the charterboat and private recreational sectors are combined since harvest distributions were not available separately for these sectors (Table 4-21b and c). It appears that harvest levels are about the same for the private and charter sectors. Thus, these alternatives are likely to have similar negative impacts on both sectors.

Similar to the results for the overall recreational fishery, discussed previously, it appears that **Alternative 8A** would cause the greatest losses in terms of numbers of kept fish and net economic benefits in the private, headboat and charter sectors (Tables 4-21b, c, and d). In fact, the impact of these Alternatives on the private and charter sectors and the headboat sector are ranked in the same order as observed in the table of results of impacts to the entire recreational fishery (Tables 4-21a, b, c, and d).

Table 4-21a. Summary of estimated effects associated with vermilion snapper alternatives in the South Atlantic recreational fishery.

	Description of Alternatives	**Expected catch (num. of kept fish)**	**Reduction (Num.)**	**% reduction**	**Value of reduction**
Alternative 1 (no action)	10 vermillion per person not in snapper aggregate. 11" min size limit	504,487			
Alternative 2	12" min size limit	363,814	140,673	-28%	$348,870
Alternative 3	6 vermillion per person 12" min size limit	313,462	191,026	-38%	$473,744
Alternative 4	Seasonal closure October through December	427,232	77,256	-15%	$191,594
Alternative 5	Seasonal closure October through December 6 vermillion per person	321,474	183,013	-36%	$453,873
Alternative 6	Seasonal closure January and February	476,265	28,223	-6%	$69,992
Alternative 7	Seasonal closure January and February 5 vermillion per person	322,667	181,820	-36%	$450,914
Alternative 8A	12" - 6 fish per trip in the for-hire sector	313,462	191,026	-38%	$473,744
	12" - 4 fish per trip in the for-hire sector	303,789	200,698	-40%	$497,732
Alternative 8B	12" - 6 fish per trip in the for-hire sector	313,462	191,026	-38%	$473,744
	12" - 5 fish per trip in the for-hire sector	309,241	195,246	-39%	$484,210
Alternative 9	12” min. size limit. Jan. & Feb. closure	343,758	160,729	-32%	$398,608

Table 4-21b. Summary of estimated effects associated with vermilion snapper alternatives in the charter and private sectors of the South Atlantic recreational fishery.

	Description of Alternatives	**Expected catch (num. of kept fish)**	**Reduction (Num. of kept fish)**	**% reduction**	**Value of reduction**	**Num. of Affected Trips**	
Alternative 1 (no action)	10 vermillion per person not in snapper aggregate. 11" min size limit	141,210					
Alternative 2	12" min size limit	111,048	30,163	-21%	$74,803	6,345	trips with zero harvest
Alternative 3	6 vermillion per person	101,528	39,571	-28%	$98,136	6,345	trips with zero harvest
Alternative 4	Seasonal closure October through December	117,508	23,703	-17%	$58,782	10,857	trips with zero harvest
Alternative 5	Seasonal closure October through December	101,100	40,110	-28%	$99,473	10,857	trips with zero harvest
	6 vermillion per person					3,978	trips constrained by the bag limit
Alternative 6	Seasonal closure January and February	119,861	21,349	-15%	$52,945	8,361	trips with zero harvest
Alternative 7	Seasonal closure January and February	102,015	39,196	-28%	$97,205	8,361	trips with zero harvest
	5 vermillion per person					5,110	trips constrained by the bag limit
Alternative 8A**	12" - 6 fish per trip	101,528	39,683	-28%	$98,413	6,345	trips with zero harvest
	12" - 4 fish per trip)	91,855	49,355	-35%	$122,401	6,345	trips with zero harvest
Alternative 8B**	12" - 6 fish per trip	101,528	39,683	-28%	$98,413	6,345	trips with zero harvest
	12" - 5 fish per trip	97,307	43,903	-31%	$108,879	6,345	trips with zero harvest
Alternative 9	12” min. size limit. Jan. & Feb. closure	94,690	46,520	-33%	$115,369		

**Data were not available to estimate the separate effects on the charter and private recreational sectors. Thus, the impacts of each subalterantive was calculated for both sectors and the actual effects will lie somewhere in this range of impacts.

Table 4-21c. Summary of estimated effects associated with vermilion snapper alternatives in the charter and private recreational sectors by state.

	Item	Florida	Georgia	South Carolina	North Carolina
Alt1	Number of fish harvested	98,016	4,513	27,829	8,668
	Number of vermilion harvest trips	41,468	1,359	9,184	3,867
Alt2	Reduction (nos of fish)	22,191	1,288	679	1,581
	Value of reduction	$55,033	$3,195	$1,684	$3,921
	Percent reduction	-23%	-29%	-2%	-18%
Alt3	Reduction (nos of fish)	26,700	1,688	5,093	2,405
	Value of reduction	$66,215	$4,185	$12,630	$5,964
	Percent reduction	-27%	-37%	-18%	-28%
Alt4	Reduction (nos of fish)	16,073	470	5,372	1,787
	Value of reduction	$39,861	$1,167	$13,322	$4,432
	Percent reduction	-16%	-10%	-19%	-21%
Alt6	Reduction (nos of fish)	21,349			
	Value of reduction	$52,945	$0	$0	$0
	Percent reduction	-22%	0%	0%	0%
Alt8A (12" 4 fish)	Reduction (nos of fish)	32,457	2,044	8,020	3,028
	Value of reduction	$80,492	$5,069	$19,890	$7,509
	Percent reduction	-33%	-45%	-29%	-35%
Alt8B (12" 5 fish)	Reduction (nos of fish)	29,146	1,845	6,369	2,677
	Value of reduction	$72,283	$4,575	$15,795	$6,638
	Percent reduction	-30%	-41%	-23%	-31%

Data on harvest distribution by wave by state were not available for this analysis as a result of low sample sizes and hence Alternatives 5 and 7 could not be evaluated.

Table 4-21d. Summary of estimated effects associated with vermilion snapper alternatives in the headboat sector of the South Atlantic recreational fishery.

	Description of Alternatives	Expected catch (num. of kept fish)	Reduction (Num.)	% reduction	Value of reduction	Num. of Affected Trips	
Alternative 1 (no action)	10 vermillion per person not in snapper aggregate. 11" min size limit	363,277					
Alternative 2	12" min size limit	252,766	110,511	-30%	$274,067	28,126	trips with zero harvest
Alternative 3	6 vermillion per person 12" min size limit	211,934	151,343	-42%	$375,331	28,126	trips with zero harvest
Alternative 4	Seasonal closure October through December	309,724	53,553	-15%	$132,811	9,942	trips with zero harvest
Alternative 5	Seasonal closure October through December	220,374	142,903	-39%	$354,400	9,942	trips with zero harvest
	6 vermillion per person					754	trips constrained by bag limit
Alternative 6	Seasonal closure January and February	356,403	6,874	-2%	$17,047	3,938	trips with zero harvest
Alternative 7	Seasonal closure January and February	220,653	142,625	-39%	$353,709	3,938	trips with zero harvest
	5 vermillion per person					999	trips constrained by bag limit
Alternative 8A &B*	12" – 6 fish per trip in the for hire sector	211,934	151,343	-42%	$375,331	28,126	trips with zero harvest
Alternative 9	Jan. and Feb. closure. 12" min size limit.	249,068	114,209	-31%	$283,239	30,639	trips with zero harvest

*The same management alternatives would apply in the headboat sector if either Alternative 8A or 8B is implemented.

Application of the proposed size limits to the recreational data indicates that a certain proportion of recreational trips would result in zero harvest assuming that anglers do not change behavior to target larger fish. Also, seasonal closures will result in zero harvest trips. **Alternatives 4 and 5** are associated with the greatest number of zero harvest trips (10,857) in the charter/private sectors (Table 4-21-b). In contrast, **Alternative 8A** results in the greatest number of zero harvest trips (28,126) in the headboat sector (Table 4-21d). For the charter and private sectors **Alternatives 2, 3, 8A, and 8B** are associated with the fewest zero harvest trips (6,345) (Table 4-21b). In the headboat sector **Alternative 6** is associated with the fewest zero-harvest trips (Tables 4-21d). Unlike the analysis on impacts in the commercial sector, the number of cancelled trips cannot be estimated as behavioral models to conduct these types of calculations have not been developed. However, it is reasonable to assume that some of the trips where the harvest of vermilion snapper is expected to be zero would be cancelled. If trips for vermilion snapper are cancelled, anglers could choose to target other species on these fishing trips or choose not to go recreational fishing.

These alternatives have lower impacts on the private/charter recreational sector compared to the headboat sector (Tables 4-21b and d). However, **Alternatives 4 and 6** would have a relatively larger impact on the private and charter sectors compared to the headboat sector (Tables 4-21b and d). For example, **Alternative 4** would reduce the numbers of kept fish by 15% in the headboat sector compared to 17% in the charter and private sectors (Tables 4-21b and d). In contrast, **Alternative 5** would have a relatively larger impact on the headboat sector compared to the charter/private sector (Table 4-21b and Table 4-21c).

Vermilion snapper are commonly harvested off North Carolina, the east coast of Florida and South Carolina by anglers in the charter and private recreational sectors (Table 4-21c). The effects of **Alternative 6**, which would impose a seasonal closure in January and February, would largely be limited to Florida, since the recreational fisheries in the other states are relatively inactive during these months due to adverse weather conditions (Table 4-21c).

In the headboat sector most vermilion snapper are harvested off South Carolina (Table 4-21e). Thus, it is not surprising that the magnitude of losses associated with alternatives for vermilion snapper will be larger for South Carolina compared to the other South Atlantic states (Table 4-21e). However, the relative magnitude of these losses is higher for Florida and Georgia compared to the other two states (Table 4-21e).

The proposed reductions in net economic benefits, numbers of kept fish, and number of constrained trips are calculated assuming that recreational fishermen and for-hire vessel operators will not change targeting preferences or decrease effort targeted at vermilion snapper. This may not be a reasonable assumption in the short-term since vermilion snapper is one of the most important species to the headboat sector.

Table 4-21e. Summary of estimated effects associated with vermilion snapper alternatives in the headboat sector by state.

	Item	North Carolina	South Carolina	Georgia & NE Florida	Florida (South, Central, Keys)
Alt1	Number of fish harvested	74,991	198,597	78,627	11,063
	Number of vermilion harvest trips	15,753	23,977	17,396	22,562
Alt2	Nos kept fish	54,556	152,502	40,571	5,138
	Reduction (no. of fish)	20,435	46,094	38,056	5,926
	Percent reduction	-27%	-23%	-48%	-54%
Alt3	Nos kept fish	49,304	118,959	38,542	5,128
	Reduction (no. of fish)	25,686	79,637	40,085	5,935
	Percent reduction	-34%	-40%	-51%	-54%
Alt4	Nos kept fish	57,711	174,893	67,627	9,492
	Reduction (no. of fish)	17,279	23,703	11,000	1,571
	Percent reduction	-23%	-12%	-14%	-14%
Alt5	Nos kept fish	43,911	111,397	55,866	9,200
	Reduction (no. of fish)	31,080	87,200	22,760	1,863
	Percent reduction	-41%	-44%	-29%	-17%
Alt6	Nos kept fish	74,039	197,829	75,375	9,160
	Reduction (no. of fish)	951	768	3,252	1,903
	Percent reduction	-1%	0%	-4%	-17%
Alt7	Nos kept fish	49,493	106,507	55,884	8,768
	Reduction (no. of fish)	25,498	92,089	22,742	2,295
	Percent reduction	-34%	-46%	-29%	-21%
Alt8A and B	Nos kept fish	49,304	118,959	38,542	5,128
	Reduction (no. of fish)	25,686	79,637	40,085	5,935
	Percent reduction	-34%	-40%	-51%	-54%
Alt9	Nos kept fish	53,864	151,913	39,037	4,254
	Reduction (no. of fish)	21,127	46,684	39,589	6,809
	Percent reduction	-28%	-24%	-50%	-62%

Long-term Economic Effects of Proposed Alternatives

The purpose for action in the vermilion snapper fishery is to end overfishing. Since it is not known if the stock is overfished, there is no proposed strategy to increase future harvest. Hence, the restrictive regulations proposed for the commercial and recreational sectors will continue in the future. However, it is expected that by ending overfishing of vermilion snapper, CPUE will increase in the future due to an increase in the mean size and age of fish in the population, and biomass of the stock.

The long-term effects on the commercial sector of choosing the no action alternative versus one of the other alternatives to end overfishing depends on the potential harvest (and associated net benefits) over time if overfishing continued (no action) compared to the stream of net benefits from choosing one of the other alternatives. Incremental annual economic losses could vary from $250,000 to $1.02 million if action is taken to end overfishing (Table 4-20a). These losses represent from 4.1% to 17.0% reduction in net revenue to vessels, which harvest the snapper grouper species addressed in this amendment (Table 4-20b). Unfortunately, the data and analytical tools to quantify the long-term effects of the "no action" alternative are not available. There is a fair degree of uncertainty associated with the stock assessment for vermilion snapper. It was not possible to estimate the current biomass of this species. Other biological diagnostics on the health of the vermilion snapper stock (e.g., recent changes in fishing mortality, MARMAP CPUE indices, and headboat CPUE indices) are more favorable than similar data presented in the biological impacts section for golden tilefish and snowy grouper. Also, the life history characteristics of this species makes it less vulnerable to stock collapse compared to the other two long-lived, slow growing species. Nevertheless, continued overfishing would adversely affect stock status and, ultimately, lead to larger future harvest reductions. This would reduce net economic benefits to the commercial fishery in the future.

For the commercial sector it is clear the Council's **Preferred Alternative 10** will have the least short-term economic impact compared to the other alternatives. **Alternative 7** would result in increased annual net losses of $770,000 compared to **Preferred Alternative 10** (Table 4-20a). However, given the uncertainty in the stock assessment and the biological characteristics of this stock, it is possible the level of additional precaution associated with **Alternative 7** may not benefit the commercial industry in the long run.

The headboat sector in the South Atlantic is very dependent on the harvest of vermilion snapper. Vermilion snapper is also frequently targeted by anglers in the private and charter sectors of the recreational fishery. Reductions in benefits associated with alternatives to restrict harvests are fairly significant for the headboat sector. However, as described for the commercial fishery, a reduction in current fishing mortality could avoid future decreases in economic benefits if biomass decreases below levels that can sustain current harvests and current catch success rates.

The discussion on non-use value provided in Section 4.1.5 is relevant for this species also and is incorporated herein by reference.

4.3.6 Social Effects of Management Measure Alternatives

Impacts from this suite of proposed alternatives will vary depending on sector/fishery, the specific alternative, and whether one looks at the short or long-term impacts.

In general, by ending overfishing and keeping vermilion snapper at a sustainable status, long-term benefits are expected to accrue to all participants in the fishery, commercial, recreational, and the general public. Alternatives differ in how they would allow the stock to arrive at a long-term sustainable status. As a result, each of these alternatives differs in the degree and type of negative short- and long-term impacts imposed on each fishing and non-fishing sector. Below is a more detailed analysis of the negative and positive short-term impacts of the proposed alternatives. Long-term benefits are discussed throughout the analysis but as there are sparse data to analyze long-term effects of management measures on communities, future conditions of communities cannot be predicted with confidence.

4.3.6.1 Commercial Fishery

While the **No Action Alternative 1** would pose the least short-term negative impacts, the stock assessment indicates the stock cannot sustain the current rate of fishing mortality over time and still provide maximum sustainable yield. If stock status worsened in the future and more restrictive management measures were needed, adverse impacts to the commercial fishing sector and associated communities would be substantial.

Alternative 2 is also of concern as it only sets a commercial quota and is not tempered by a trip limit to slow development of a derby fishery, which not only poses a safety hazard (less boat maintenance, continuing to fish in bad weather, more stress and less sleep lead to more accidents) for fishermen, but deteriorates any sense of community between fishermen as they must compete tirelessly against each other to get their historical catch.
Alternatives 3 and 4 would ultimately have the effect of shutting down the vermilion snapper fishery at least off of North Carolina, Georgia and South Carolina, as few fishermen would travel 60 miles offshore to catch 7 to 10 boxes of vermilion snapper, particularly if retention of snowy grouper was prohibited. Fishermen might be able to make a "trip of it" if they could catch gag or other species; however, co-occurring species might not be able to withstand the increased fishing mortality.

The same problems exist with the complementary **Alternatives 5, 6, and 7**, except the impacts would be heightened due to the lower proposed quota. Adding a size limit increase in **Alternative 7** adds the possibility of increasing discards, which increase frustration for fishermen and further erodes their faith in management.

Alternative 8 offers the next best approach to mitigating of the immediate short-term impacts on fishing communities, with **Alternative 8C** allowing the fishermen the most flexibility in their fishing practices and harvest patterns. This alternative contains a trigger date that would ensure the proposed trip limits do not unintentionally prevent fishermen from harvesting their full quota in any given year.

Alternative 9 and the various sub-alternatives is less injurious than **Alternatives 2 through 7** but could be unnecessarily precautionary in that it bases the quota on average catches from 1999 to 2003, and 2003 was a problematic year for catches of many species due to the unusual cold water event that occurred throughout much of the South Atlantic coastal waters.

Preferred Alternative 10 was developed at the December, 2005 SAFMC meeting and represents a compromise between the managers and the commercial fishermen. It was acknowledged that there was a need to reduce fishing effort for vermilion snapper, but it was also agreed that some of the data used for estimating biomass was incomplete and previous proposed alternatives may have been overly precautionary. **Preferred Alternative 10** serves to cap effort at a sustainable level and balance impacts on the commercial fishing communities with the beneficial impacts on the fish stock.

4.3.6.2 Recreational Fishery

Alternative 1 is the "No Action" alternative, and negative impacts could occur if a reduction in effort is needed and nothing is done. This might mean that the fishery could be fished to a level, which might not allow it to recover or would require more restrictive management measures in the future. The length of recovery might drive some people out of the fishery (or it might be a driving force in eliminating certain for-hire trips), but might even have greater implications for the commercial sector.

The Council's **Preferred Alternative 2** is the preferred alternative of the Snapper Grouper Advisory Panel, and discussions with fishermen in North Carolina indicate this to be their preferred alternative as well. In fact, one headboat captain in North Carolina already uses a 12-inch minimum size on his boat. He states there is nothing wrong with a 12-inch minimum size limit and that it should not impact the fishery except to help protect it. Those who agree with his statement; however, are quick to state others in the South Atlantic who target this species might disagree.

Alternative 3 may have a significant, adverse impact on longer headboat trips, especially in North Carolina. Because longer trips are often frequented by return clients, as well as "hardcore" fishers. For these people the trip may be more expensive and taxing on the body, but the reward is often a bigger stringer of prized fish for the table. In North Carolina, many of the trips associated with vermilion snapper catches are longer in nature and require longer steam time to offshore locations. If the bag limit is reduced to 6, then it is possible that these trips may be in jeopardy of being lost due to fishers' perceptions that it is no longer worth their time or money to go fishing for this species.

Alternative 4 is potentially detrimental for recreational fishermen, especially in the North Carolina for-hire fishery, because October and November are prime months for targeting vermilion snapper. Many of the trips taken in these months are said to be for repeat clientele consisting of hardcore fishers who come to the area to fish for vermilion as well as other snapper and grouper species targeted on the longer trips. These fishers are deemed hardcore because these trips are longer and more strenuous in nature because of the taxing physical activity over 18 hours, and also because the weather can be rough during these months. It is unknown at this time what the impact of **Alternative 4** would be on the private boat fisher.

Alternative 5 would have an even greater negative impact than **Alternative 4** because it would not only close two important months of fishing, but it would reduce the bag limit to 6, potentially making people decide whether or not it is economically worthwhile to come and fish these trips. During these months if the trips are canceled, there would be tremendous loss of revenue for the owner, captain and crew.

Alternative 6 is supported by many North Carolina headboat captains, who state that a closure in January and February would be acceptable, since the fishery is largely shut down during these months, and they doubt many private fishers would be affected by closing these months. These captains are quick to mention; however, that while these may be months when they are not targeting these species, boats from states farther south could potentially be targeting them at this time.

Alternative 7 has two components: the first is a closure which fishermen support; the second is a reduction in bag limit, which fishermen do not support. Throughout the discussion of various management alternatives and their impacts, bag reductions are not preferred in the for-hire industry because the for-hire boats are selling the opportunity to catch fish. If they cannot sell this opportunity then there is no reason for a fisher to come and spend money on a trip. A reduction in bag limit from 10 fish to 5 fish would likely impact the number of trips designated for targeting vermilion snapper and would mean a potential loss of revenue for owner, captain, and crew.

Alternative 8A. The larger bag limit for recreational fishers on for-hire trips is a positive aspect of the management strategy because it would take into account the for-hire industry's need to sell the opportunity to catch fish. However, the overall impact of a 4-fish bag limit would be serious for the for-hire sector because of the nature of vermilion snapper fishing, especially in North Carolina where specific trips to offshore locales are built into the annual round for headboats. In addition, vermilion snapper fishermen tend to be repeat clientele who may decide that it is no longer worthwhile to continue fishing on headboats. The increase in minimum size is not likely to have an impact on any of the recreational fishers, private or for-hire.

Alternatives 8A and 8B are identical except that **Alternative 8B** would implement a 5-fish bag limit rather than a 4-fish bag limit. Therefore, the types of impacts on recreational fishermen are similar to those in **Alternative 8A**, except that the magnitude of impacts would be less severe. **Alternative 9** combines **Alternatives 2 and 6** and the combined social impacts will be similar. **Alternative 9** is favored by a number of fishermen.

General Non-Fishing Public
For the general non-fishing public of the U.S., all the alternatives to status quo offer long-term benefits related to ending overfishing and improving stock status. These alternatives benefit those in the U.S. who derive satisfaction from knowing the marine environment is managed sustainably and is thriving. The U.S. consumer may benefit from potential increased consumption of locally caught fish as the stock recovers.

There is the potential of long-term negative impacts to the general non-fishing public who enjoy coming to the coast to experience a "fishing community," eat locally caught seafood, and enjoy the heritage tourism benefits of many coastal communities. If the infrastructure for commercial fishing in the South Atlantic continues to wane, and the proposed management measures hasten that decline, communities will lose this attraction for their tourist trade, and visitors may have a diminished coastal tourism experience. However, these communities can only be expected to exist and prosper if healthy resources and fisheries also exist. So, ending overfishing of the snowy grouper resource, as a component of the marine ecosystem, is essential to the existence and sustenance of these communities.

4.3.7 Administrative Effects of Management Measure Alternatives

4.3.7.1 Commercial

Retaining the 12" total length minimum size (**Alternative 1**) would not represent an increased administrative burden.

Alternative 2 would specify a commercial quota of 821,000 lbs gutted weight. It would represent an increased burden over **Alternative 1** since there is currently no quota monitoring program in place for vermilion snapper. Furthermore, it is likely that the quota would be met before the end of the year, which would require that the fishery would be shut down. NMFS would also have to issue a notice the fishery was closed. This could place an additional burden on Law Enforcement to ensure that commercial fishermen would not sell any vermilion snapper, harvest, and/or retain any vermilion snapper over the bag limit once the quota was met.

The administrative burden of **Alternative 3** would be similar to **Alternative 2**. However, since this alternative also includes a trip limit of 720 lbs gutted weight, there would be an additional burden to Law Enforcement to ensure that fishermen were in compliance.

Alternative 4 includes a trip limit of 1,080 lbs gutted weight as well as an increased minimum size limit (13" TL). The burden of **Alternative 4** on Law Enforcement would be greater than in **Alternative 3** since more fish would have to be counted and measured to ensure compliance. However, the burden would be less than in **Alternative 1**.

The administrative burden of **Alternatives 5, 6, and 7** would be very similar to **Alternatives 2, 3, and 4**.

The administrative burden of **Alternatives 8 and 9** would be greater than other alternatives because NMFS would have to monitor landings to determine when 75% or 85% of the quota was met and then notice the public of a trip limit. NMFS could also have to issue a second notice in a year if the quota was met and the fishery was closed.

The Council's **Preferred Alternative 10** would specify a commercial quota of 1,100,000 lbs gutted weight. It would represent an increased burden over **Alternative 1** since there is currently no quota monitoring program in place for vermilion snapper.

4.3.7.2 Recreational

Alternative 1 would maintain the current regulations of an 11" total length size limit and 10 fish bag limit. This alternative would not increase the burden on the administrative environment and would not change how landings are monitored.

The Council's **Preferred Alternative 2** would increase the size limit to 12" total length. NMFS would be required to notice the public of changes in regulations; however, other administrative burdens would be similar to **Alternative 1**.

Alternative 3 would decrease the bag limit to 6 fish per person per day in addition to increasing the minimum size to 12" total length. The administrative burden would be similar to **Alternative 2**; however, a smaller bag limit would decrease the number of fish that Law Enforcement has to count and measure.

The administrative burden of **Alternative 4** could be less than **Alternatives 2 and 3** since no fish would be taken during an October through December closure. Although a closed season would represent an additional regulation to enforce, a closure may reduce the overall burden on enforcement by making it simpler to determine whether or not anglers are complying with regulations. The burden for Law Enforcement would be even less in **Alternative 5** since the bag limit would be reduced to 6 fish during the open season. The administrative burden of **Alternatives 6 and 7** would be similar to **Alternatives 4 and 5**.

Alternative 8 would specify separate size limits and bag limits for private boats and for-hire vessels. This could present a burden on Law Enforcement in situations where it is difficult to discern private from for-hire vessels.

Alternative 9 would increase the size limit to 12" total length and close the fishery during January through February. There could be an increased burden on Law Enforcement to ensure compliance with the larger size limit.

4.3.8 Conclusions

A vermilion snapper commercial quota of 1,100,000 lbs gutted weight and an increase in the recreational minimum size limit to 12" total length is the Council's preferred alternative. The Council requested public input during the public hearing and informal review process on the preferred alternative 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 changed their preferred alternative based on comments received.

SEDAR 2 (2003) indicates vermilion snapper are experiencing overfishing but it is unknown if they are overfished. The **Preferred Commercial Alternative 10** represents an 8% reduction of the average landings during 1999-2001. This alternative may benefit the stock by stabilizing stock biomass at current levels, ensuring there are no further declines in the mean length and size/age at sexual maturity, and protecting the stock against recruitment overfishing. However, this alternative could have short-term, negative social and economic impacts on commercial fishermen, fishing communities, and associated industries during years of exceptionally high landings. A reduction in fishing pressure is expected to increase stock biomass, which would increase CPUE and mean fish size over time and better protect the stock from adverse environmental conditions. Therefore, this alternative is expected to have beneficial social and economic impacts in the future.

The Council received many public comments addressing vermilion snapper. Comments included support for increasing the size limit (no other regulations); determine the quota bycatch history and boat size to ensure a year round fishery; allow fishermen to keep the first 10 fish they catch due to high release mortality; change the fishing year so that the fishery will not close in September (perhaps start in March when gag/black grouper are closed); support for a commercial quota between 821,000 and 1.l6 million pounds; no change in the recreational size limit off Georgia due to smaller size of fish; defer action until better data are available; high-grading will occur under size and bag limits; bycatch and discard mortality not addressed sufficiently; and the fishing year could result in disproportionate impacts to fishermen in North Carolina versus Florida.

The Snapper Grouper Advisory Panel during their deliberations offered the following comments: they noted that after the Council prohibited trawl gear and changed the size limit, landings decreased and then slowly built back up. The Panel feels that the size limits have worked and have allowed landings to increase to 1.6 million pounds.

On the recreational side, there was support for maintaining the ten vermilion snapper bag limit, even with the increase in size limit. There was support for the ten fish and the 12" total length minimum size limit and the two-month closure (January/February). There was concern that the two-month closure would impact the recreational fishery in Florida, especially the headboat fishery.

The Advisory Panel consensus recommendation for the commercial fishery is no action and for the recreational fishery is to retain the 10 fish bag limit and increase the size limit to 12" total length.

The Law Enforcement Advisory Panel was concerned about potentially different closure times for recreational and commercial sectors. The preferred alternative for public hearings had a proposed closure for January and February. The projected closure for vermilion snapper with the 821,000 pound gutted weight quota would come sometime in September, and they would prefer that closures are at the same time. The Law Enforcement Advisory Panel recommended that once the quota is met purchase and/or sale should be prohibited for all sectors, but allow retention of the bag limit for personal consumption.

The Scientific and Statistical Committee (SSC) reviewed the SEDAR Assessment and approved the assessment as being based on the best available science. The SSC concluded the proposed alternatives that end overfishing in one to five years are sufficient to end overfishing if there is no bycatch or post-quota mortality. Discard and post-quota mortality, from bycatch and discard mortality, was not incorporated into the proposed actions and the actions might not end overfishing as soon as projected. The methodology to estimate the discard and post-quota mortality is still being developed and was not available for use in finalizing Amendment 13C. The SSC concluded the social and economic analyses were accurate and complete given the available data; however, they noted shortcoming in the biological analyses due to the lack of estimates for the bycatch and post-quota mortality.

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 vermilion snapper is a moderately long-lived, slow growing species and emphasized the need to be conservative in the face of uncertainty. Committee members were also concerned about the discard mortality and post-quota mortality.

The Committee discussed the public recommendations to change the fishing year but did not do so for the same reasons described previously for the commercial golden tilefish fishery.

The Committee reviewed the SSC's original recommendation for vermilion snapper, which was to make no change in the commercial regulations but to increase the recreational size limit to 12 inches to address overfishing. The corrections to the original assessment were reviewed by the SSC and some of the revised runs indicated less concern about overfishing. Therefore, the Committee changed the preferred alternative to **Alternative 1** (No Action) on the commercial side and **Alternative 2** (12" total length) on the recreational side. Committee members felt this was equitable because the commercial fishery currently has a 12" total length size limit and there was no objection in the recreational input to increasing to the 12" total length size limit. Some concern was expressed about the discard mortality and that the losses from mortality may offset any positive gains. In addition, some concern was expressed about only achieving a reduction on the recreational side.

The Council concluded the commercial alternative recommended by the Committee was not sufficient to end overfishing. The Council approved a commercial quota of 1.1 million pounds gutted weight (**Alternative 10**). After the commercial quota is met, all purchase and sale is prohibited and harvest and/or possession is limited to the bag limit. This figure is based on using the 1999 to 2003 landings to estimate the commercial landings when at Optimum Yield. The current 12" total length commercial size limit remains unchanged.

The Council noted that F during 1999 to 2001 was greater than F_{MAX} and indicated overfishing was occurring. Landings were highest in 2001 and above 1.2 million pounds in 2000, 2001, and 2002. However, during the years prior to 2000 and in 2003-2004, the landings were much lower. The Council concluded that overfishing has subsided from 2000-2002 levels and the quota of 1.1 million pounds gutted weight would prevent very high landings and overfishing of vermilion snapper in the future. Furthermore, 1.1 million pounds gutted weight is equivalent to the average commercial landings during 1999 to 2003.

The Council approved increasing the recreational size limit from 11 to 12" total length as recommended by the Committee (**Alternative 2**) but expressed concern about the discard mortality. Examining recreational catches after the 11" total length size limit was implemented showed an increase in the number of fish released. Mortality rate of released vermilion snapper is estimated to be 25% for the recreational sector but it could be higher. Public input indicated fishermen are currently releasing fish 12" total length and larger and the fish appear to survive, particularly when the fishermen are fishing in waters shallower than 100 feet (31 meters). The Council concluded the 12" total length size limit was appropriate at this time and will examine the issue of discard mortality in the 2007 assessment update. If additional regulations are necessary at that time to address overfishing, the Council will consider alternative management measures.

The Council concluded the preferred alternatives for the commercial and recreational sectors best meet the purpose and need to end overfishing of vermilion snapper as soon as possible in 2006 and to allow as close to a year-round fishery as possible while maintaining (where possible), historic participation rates and patterns (including allocation rations), minimizing costs, meeting the objectives of the Snapper Grouper Fishery Management Plan, complying with the requirements of the Magnuson-Stevens Act and other applicable law. **Alternative 1** (No Action) would continue to allow overfishing and was rejected by the Council.

4.4 Black Sea Bass

4.4.1 Background

Black sea bass are experiencing overfishing, since the current fishing mortality (F) exceeds the fishing mortality, which would achieve the maximum sustainable yield (SEDAR 2 2003b). Overfishing for black sea bass is defined as a fishing mortality (F) that exceeds the maximum fishing mortality threshold (MFMT) that the Council has specified as F_{MSY}. Current F is 2.64, while F_{MSY} is 0.43. A 62% reduction in catch is needed to end overfishing immediately. Current SPR = 25.8%.

<u>SEDAR 2 (2003) Assessment; SEDAR Assessment #1 (2005)</u>

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 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).

A report from the chair of the review panel noted the MARMAP study was undertaken at times and locations, which might not have recorded the abundance seen by the commercial fishers. Commercial fishers were concerned that their logbook and other data were not included as time series in the assessment. Moreover, the commercial fisher on the Review Panel considered that, based on his and other fishers' observations, the abundance had not declined to the extent shown by the headboat index. The Panel considered these issues and acknowledged that the use of GLM to adjust the data for factors such as time and space was appropriate and should remove the impact of any change in the spatial or temporal distribution of fishing by the headboat sector of the fishery. However, further review of these data would be useful to determine whether more subtle factors, such as targeting of different species, were influencing the trend shown by this index. The Panel noted that the effects of increasing fishing efficiency, arising from introduction of technology such as GPS or improved sounders, had not been included in the assessment. It would assist greatly if a longer-term time series could be recovered from the fishery-independent data. The magnitude and composition of the discards from the different fishing sectors, and the release mortality associated with capture and discard, were areas in which the data could be improved.

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 5 years when F = 0. The Council is currently considering alternative rebuilding schedules and strategies for black sea bass in Amendment 15 to the Snapper Grouper FMP.

Research recommendations that were made to strengthen future assessments included:

1. Representative age sampling is needed (proportional);
2. Increase spatial extent of fishery-independent sampling;
3. Development of an appropriate logbook index;
4. Fecundity information;
5. Further consideration of sex change;
6. Further development of analytical methods that will allow incorporation of historical catch information going back to the 1950s;
7. Better methods to estimate discards;
8. Use information from tagging and genetic studies;
9. Develop a recruitment index;
10. MARMAP gear standardization study;
11. Next benchmark study in five years;
12. Have headboat survey collect more information on depth and location.

Review of Previous Stock Assessments

The first stock assessment for black sea bass was conducted in 1990 (PDT 1990) using data from 1972 through 1988/89. Spawning Stock Ratio (SSR) (considered to be the same as Spawning Potential Ratio (SPR)) was calculated separately for recreational and commercial fisheries (Table 4-22)

Table 4-22. Spawning Stock Ratio (SSR) values for black sea bass.
Source: PDT 1990.

RECREATIONAL	COMMERCIAL
Carolinas = 15%	Carolinas Hook & Line & Longline = 39%
FL = 17 - 26%	Carolinas Traps = 40%
SSR with 8 inch Minimum Size Limit:	SSR with 8 inch Minimum Size Limit:
30%	47%

A series of stock assessments provided estimates of SSR based on catch curves (NMFS 1991; Huntsman *et al.* 1992). Updates of SPR are provided by Vaughan (1996) and Potts *et al.* (1998); (Table 4-23).

Table 4-23. Spawning Stock Ratio (SSR) values for black sea bass.
Source: NMFS 1991; Huntsman *et al.* 1992; Vaughan 1996; Potts *et al.* 1998.

Assessment Year	Catch Data From	Overall SSR	SSR with Minimum Sizes
1991	1988	34%	48%
1992	1990	29%	38%
1996	VPA 1979-95	26%	
1997	1996	26%	

The first biomass-based parameters were developed by Dr. Doug Vaughan in 1998 based on output from the assessment conducted in 1996 with data through 1995 (Vaughan 1996). The following parameters were presented in the Council's Comprehensive SFA Amendment (SAFMC 1998b): MSST = 3.72 million lbs and MFMT = 0.72. Table 4-24 is taken directly from the SFA Amendment:

Table 4-24. Black sea bass biomass proxy calculations.
Source: Dr. Doug Vaughan, NMFS Beaufort Lab.

BLACK SEA BASS — DATA MODERATE CALCULATIONS.					
	1979-85	**1986-90**	**1991-95**	**AVERAGE**	
F	1.06	0.89	0.95	0.97	
F30	0.73	0.73	0.69	0.72	
F35	0.54	0.53	0.51	0.53	
R1	7.72	6.47	2.60	7.67*	
SSB/R (30)	0.69	0.69	0.69	0.69	
SSB (30)	5.34	4.48	1.80	5.31	
SSB/R (35)	0.81	0.81	0.81	0.81	
SSB (35)	6.24	5.23	2.10	6.19	
NOTE: *BASED ON 1979-87 DATA.					
SSB/R=SPAWNING STOCK BIOMASS PER RECRUIT; PRESENTED IN POUNDS.					
SSB=SPAWNING STOCK BIOMASS; PRESENTED IN MILLIONS OF POUNDS OF MATURE FISH					
R1=RECRUITMENT; MEASURED IN MILLIONS OF FISH.					
SOURCE: DR. DOUG VAUGHAN, NMFS BEAUFORT LAB					
MFMT & MSST CALCULATED USING 30% STATIC VALUES AS PER COUNCIL					
MFMT = AVERAGE F30% STATIC SPR FOR YEARS 1979-95					
MFMT =	0.72				
MSST = max (0.5, 1-M) * B-msy					
M =	0.3	(M=NATURAL MORTALITY			
MSST (0.5) =	2.66	MILLIONS OF POUNDS			
MSST (0.7) =	3.72	MILLIONS OF POUNDS			
MSST (MAX)=	3.72	MILLIONS OF POUNDS			

The Council's determinations in the SFA Amendment were:

"1. ***Black sea bass*** *remain overfished. Black sea bass are above the "threshold level" with a static SPR of 26%. Black sea bass are overfished given that the MSST is 3.72 million pounds and the 1995 biomass was estimated to be 1.33 million pounds. Black sea bass are also experiencing overfishing given that the MFMT is 0.72 and the average fishing mortality rate (F) for 1991-1995 was 0.95. The measures proposed in Snapper Grouper Amendment 9 will reduce commercial catch by 26%, recreational catch by 36%, and total catch by 30%.* ***The Council concluded these reductions are sufficient to rebuild black sea bass above the overfished level.****"*

Regulations, which may have affected the catch of black sea bass, are provided in Table 4-25 and Figure 4-12.

Table 4-25. Regulations for black sea bass.

Regulation	Effective Date	Plan or Amendment
8" TL minimum size limit and 4" trawl mesh size	8/31/83	Original FMP SAFMC (1983)
Prohibit trawls	1/12/89	Amendment 1 SAFMC (1988)
Prohibit fish traps, entanglement nets, & longline gear within 50 fathoms; black sea bass pot gear and identification requirements	1/1/92	Amendment 4 (SAFMC 1991)
Limited entry program: transferable permits and 225-lb non-transferable permits	12/98	Amendment 8 (SAFMC 1997)
10" TL minimum size limit and 20 black sea bass bag limit; escape panel	2/24/99	Amendment 9 (SAFMC 1998c)

Landings information

Total landings of black sea bass have decreased from about 2,868,000 lbs whole weight in 1988 to around 1,000,000 lbs in recent years (Figure 4-11).

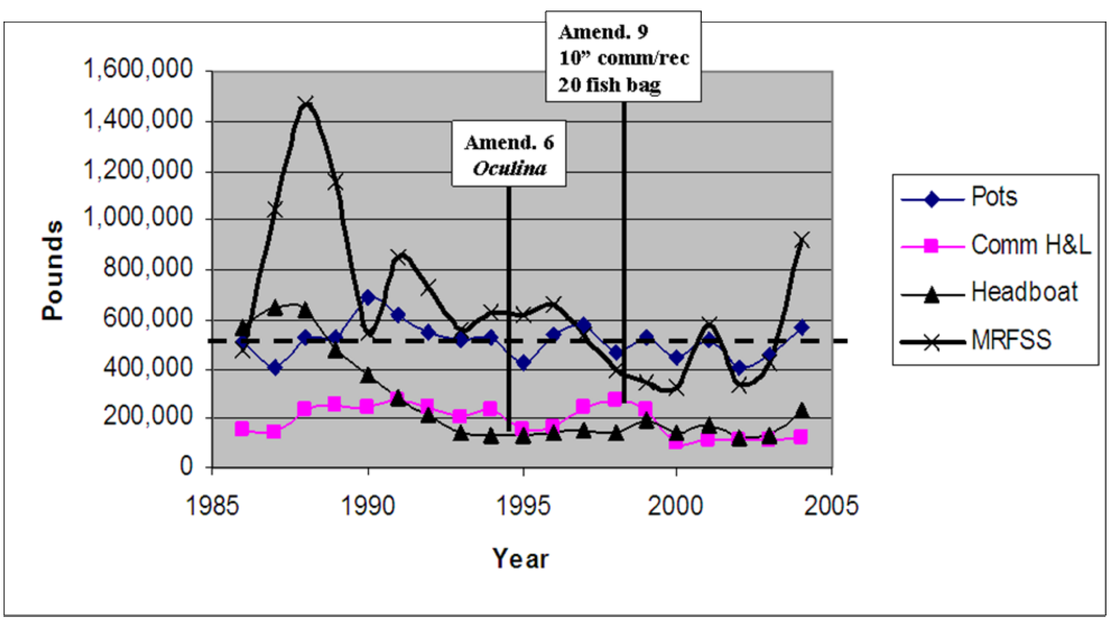

Figure 4-11. Annual landings (lbs whole weight) of black sea bass.
Commercial landings are from the NMFS Accumulative Landings System (ALS), Headboat data are from NMFS-Beaufort, and MRFSS data are from the MRFSS web site. Dotted line represents commercial quota of 477,000 lbs gutted weight (563,000 lbs whole weight) proposed for year 1.

Data from ALS, MRFSS, and the Headboat Survey indicate that catch from commercial pots and hook and line gear represented about 50% of the harvest during 1999-2003 (Figure 4-12).

The mean length of black sea bass caught by commercial, headboat, and recreational fishermen has increased steadily with some fluctuation since 1984 (Figure 4-13). The increase in minimum size to 10" total length in 1999 seems to have increased the average size landed. The average size of black sea bass is largest for fish taken by commercial fishermen and smallest for black sea bass caught in the headboat fishery.

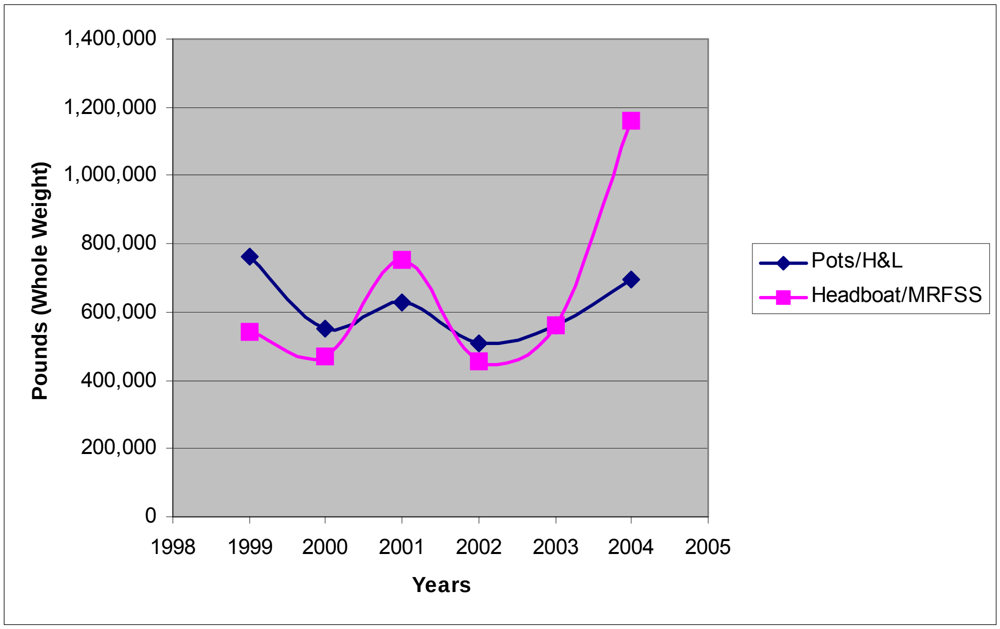

Figure 4-12. Annual landings (lbs whole weight) of black sea bass (1999-2004). Commercial landings are from the NMFS Accumulative Landings System (ALS), Headboat data are from NMFS-Beaufort, and MRFSS data are from the MRFSS web site.

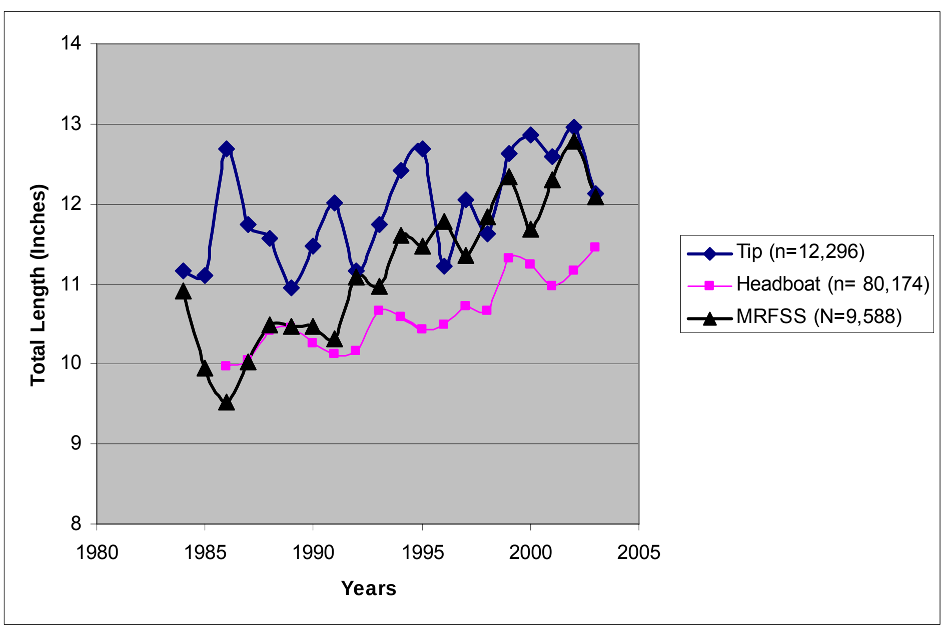

Figure 4-13. Mean lengths (inches, total length) of black sea bass taken by commercial, headboat, and recreational (MRFSS) fishermen during 1984-2003.

Compliance

Compliance is summarized by sector in Table 4-26. See Burton (2002) for the breakout by region and for numbers of fish measured. Criteria for a finding of significant non-compliance are: number of fish measured must be greater than or equal to 15, and percent of fish below the size limit must be greater than or equal to 15 (Burton 2002).

Table 4-26. Compliance with black sea bass size limits; note changes to minimum size limits as shown in Table 4-25.
Source: Burton (2002).

	Percent	Landed Below	Legal Size Limit
Year	Commercial	Headboat	Private & Charter
1992	0.5	4.7	6.1
1993	0.0	2.2	13.1
1994	0.4	3.0	19.0
1995	0.1	4.1	10.2
1996	1.4	2.0	3.5
1997	0.2	1.2	4.1
1998	0.0	1.5	5.4
1999	13.8	13.7	3.1
2000	3.4	9.3	18.0
2001	5.8	14.1	7.45

The only significant non-compliance with the size limit in 2001 was for the headboat fishery in the Carolinas and south Florida regions. Percentage of undersized fish in the Carolinas did meet the 15% criterion, and in south Florida, total fish measured was small as black sea bass are less commonly landed in this area.

4.4.2 Management Measures

4.4.2.1 Commercial

Alternative 1. **No action.** The commercial black sea bass minimum size limit is 10" total length. Pot gear is only allowed North of Cape Canaveral, Florida and must be equipped with an escape panel or door (hinges or fasteners must be made of specific degradable material) and must have an unobstructed escape vent opening on at least two opposite sides (excluding top and bottom) meeting the following requirements: opening must measures at least 1 1/8" x 5 ¾" for rectangular vents, 1.75" x 1.75" inside measure for square vents, or 2" diameter for circular vents. Pots must be made of mesh sized as follows: hexagonal mesh (chicken wire) – at least 1.5" between wrapped sides; square mesh – at least 1.5" between sides; or rectangular mesh - at least 1" between the longer sides and 2" between the shorter sides. Additional pot marking requirements apply.

Alternative 2. Implement the following commercial measures for black sea bass:

A. Specify a commercial quota of 347,000 lbs gutted weight (409,000 lbs whole weight) based on an initial Total Allowable Catch (TAC) of 806,000 lbs gutted weight (951,000 lbs whole weight) for both the recreational and commercial fisheries. Prohibit purchase and sale and, prohibit harvest and/or possession of black sea bass over the bag limit after the quota is taken.
B. Increase the commercial black sea bass minimum size limit from 10" total length to 11" total length.
C. Require use of 2" mesh for the entire back panel of black sea bass pots.
D. Change the fishing year from the calendar year to June 1 through May 31.

Alternative 3. Implement the following commercial measures for black sea bass:

A. Specify a commercial quota of 309,000 lbs gutted weight (364,000 lbs whole weight) based on an initial Total Allowable Catch (TAC) of 718,000 lbs gutted weight (847,000 lbs whole weight) for both the recreational and commercial fisheries. Prohibit purchase and sale and, prohibit harvest and/or possession of black sea bass over the bag limit after the quota is taken.
B. Increase the commercial black sea bass minimum size limit from 10" total length to 11" total length.
C. Require use of 2" mesh for the entire back panel of black sea bass pots.
D. Change the fishing year from the calendar year to June 1 through May 31.
E. Specify a commercial hook and line trip limit of 235 lbs gutted weight (275 lbs whole weight) and a commercial pot limit of 910 lbs gutted weight (1,075 lbs whole weight).

Alternative 4. Implement the following commercial measures for black sea bass:

A. Specify a commercial quota of 423,000 lbs gutted weight (499,000 lbs whole weight) based on an initial Total Allowable Catch (TAC) of 983,000 lbs gutted weight (1,160,000 lbs whole weight) for both the recreational and commercial fisheries. Prohibit purchase and sale and, prohibit harvest and/or possession of black sea bass over the bag limit after the quota is taken.
B. Increase the commercial black sea bass minimum size limit from 10” total length to 11” total length.
C. Require use of 2” mesh for the entire back panel of black sea bass pots.
D. Change the fishing year from the calendar year to June 1 through May 31.

Alternative 5. Implement the following commercial measures for black sea bass:

A. Specify a commercial quota of 477,000 lbs gutted weight (563,000 lbs whole weight) in year 1; 423,000 lbs gutted weight (499,000 lbs whole weight) in year 2; and 309,000 lbs gutted weight (364,000 lbs whole weight) in year 3 onwards until modified. This is based on a Total Allowable Catch (TAC) of 1,110,000 lbs gutted weight (1,310,000 lbs whole weight) in year 1; 983,000 lbs gutted weight (1,160,000 lbs whole weight) in year 2; and 718,000 lbs gutted weight (847,000 lbs whole weight) in year 3 onwards until modified. Prohibit purchase and sale and, prohibit harvest and/or possession of black sea bass over the bag limit after the quota is taken.
B. Increase the commercial black sea bass minimum size limit from 10” total length to 11” total length.
C. Require use of 2” mesh for the entire back panel of black sea bass pots.
D. Change the fishing year from the calendar year to June 1 through May 31.
E. Specify a commercial hook and line trip limit of 595 lbs gutted weight (700 lbs whole weight) and a commercial pot limit of 1,675 lbs gutted weight and (1,975 lbs whole weight) in year 2. Specify a commercial hook and line trip limit of 235 lbs gutted weight (275 lbs whole weight) and a commercial pot limit of 910 lbs gutted weight (1,075 lbs whole weight) in year 3 onwards until modified.

Alternative 6. Implement the following commercial measures for black sea bass (Snapper Grouper Advisory Panel Recommendation):

A. Do not specify a commercial quota.
B. Retain the 10” total length commercial minimum size limit.
C. Require use of 2” mesh for the entire back panel of black sea bass pots.
D. Prohibit harvest and/or retention of black sea bass over the bag limit, annually, from March through June.

Alternative 7. Increase the black sea bass commercial minimum size limit from 10” total length to 11” total length, and require use of 2” mesh for the entire back panel of black sea bass pots.

Alternative 8. **Preferred.** Implement the following commercial measures for black sea bass:

A. Specify a commercial quota of 477,000 lbs gutted weight (563,000 lbs whole weight) in year 1; 423,000 lbs gutted weight (499,000 lbs whole weight) in year 2; and 309,000 lbs gutted weight (364,000 lbs whole weight) in year 3 onwards until modified. This is based on a Total Allowable Catch (TAC) of 1,110,000 lbs gutted weight (1,310,000 lbs whole weight) in year 1; 983,000 lbs gutted weight (1,160,000 lbs whole weight) in year 2; and 718,000 lbs gutted weight (847,000 lbs whole weight) in year 3 onwards until modified. After the commercial quota is met, all purchase and sale is prohibited and harvest and/or possession is limited to the bag limit.

B. Require use of at least 2” mesh for the entire back panel of black sea bass pots. This measure will be effective 6 months after publication of the final rule in the Federal Register.

C. Change the fishing year from the calendar year to June 1 through May 31.

D. Require that black sea bass pots be removed from the water when the quota is met. The Regional Administrator has authority to grant a 10-day grace period for removal of traps.

<u>Discussion</u>

Alternative 2 would end overfishing during 2007-2009 by establishing an annual commercial quota of 346,000 lbs gutted weight. The quota represents a 25% reduction from 2000-2003 landings and a 27% reduction from 2001-2003 landings. An 11” commercial size limit would provide an 18.7% reduction in the trap and hook-and-line fishery without 2” mesh in pots. A minimum size limit of 11” total length (pots and hook and line) with 2” mesh in pots would provide a 22% reduction.

Alternative 3 would end overfishing during 2007-2009 by establishing a commercial annual quota of 309,000 lbs gutted weight (364,000 lbs whole weight). This quota would reduce catch by 35% during 2007-2009 from current levels. A hook and line trip limit of 235 lbs gutted weight (275 lbs whole weight) and a commercial pot limit of 910 lbs gutted weight (1,075 lbs whole weight) would provide an 11% reduction. A minimum size limit of 11” total length (pots and hook and line) with 2” mesh in pots would provide a 22% reduction.

Alternative 4 would end overfishing during 2007-2011 by establishing a commercial annual quota of 423,000 lbs gutted weight (490,000 lbs whole weight). This quota would reduce catch by 11% during 2007-2009. A minimum size limit of 11” total length (pots and hook and line) with 2” mesh in pots would provide a 22% reduction.

Alternative 5 is similar to Alternative 3 except that it would step down the quota and trip limit from the current level of catches to those specified in Alternative 3. This alternative would end overfishing during 2009 to 2011.

Alternative 6 would retain the 10" total length commercial minimum size limit with a 2" mesh in the entire back panel and would reduce catch by 13.8% assuming that 25% of fishermen currently use 2" mesh and 15% release mortality. A March through June commercial closure would reduce catch by 14.2%.

Alternative 7 would increase the minimum size limit to 11" total length and require the use of 2" mesh in the entire back panel of the pot. A minimum size of 11" total length (pots and hook and line) with 2" mesh in pots would provide a 22% reduction.

The Council's **Preferred Alternative 8** would step down the quota and trip limit from the current level of catches to those specified in Alternative 3 and would not increase the size limit. This alternative would end overfishing during 2009.

4.4.2.2 Recreational

Alternative 1. **No action.** The recreational black sea bass minimum size limit is 10" total length. The recreational black sea bass bag limit is 20 black sea bass per person per trip. (Snapper Grouper Advisory Panel Recommendation)

Alternative 2. Specify a recreational allocation of 459,000 lbs gutted weight (542,000 lbs whole weight) based on an initial Total Allowable Catch (TAC) of 806,000 lbs gutted weight (951,000 lbs whole weight) for both the recreational and commercial fisheries. Limit recreational landings to approximate this harvest level by increasing the recreational minimum size limit from 10" total length to 12" total length and reducing the recreational bag limit from 20 to 15 black sea bass per person per trip. Change the fishing year from the calendar year to June 1 through May 31.

Alternative 3. Specify a recreational allocation of 409,000 lbs gutted weight (483,000 lbs whole weight) based on an initial Total Allowable Catch (TAC) of 718,000 lbs gutted weight (847,000 lbs whole weight) for both the recreational and commercial fisheries. Limit recreational landings to approximate this harvest level by increasing the recreational minimum size limit from 10" total length to 11" total length and reducing the recreational bag limit from 20 to 4 black sea bass per person per trip. Change the fishing year from the calendar year to June 1 through May 31.

Alternative 4. Specify a recreational allocation of 560,000 lbs gutted weight (661,000 lbs whole weight) based on an initial Total Allowable Catch (TAC) of 983,000 lbs gutted weight (1,160,000 lbs whole weight) for both the recreational and commercial fisheries. Limit recreational landings to approximate this harvest level by increasing the recreational minimum size limit from 10" total length to 11" total length and maintaining the current recreational bag limit of 20 black sea bass per person per trip. Change the fishing year from the calendar year to June 1 through May 31.

Alternative 5. Specify a recreational allocation of 633,000 lbs gutted weight (746,000 lbs whole weight) in year 1; 560,000 lbs gutted weight (661,000 lbs whole weight) in year 2; and 409,000 lbs gutted weight (483,000 lbs whole weight) in year 3 onwards until modified. This is based on a Total Allowable Catch (TAC) of 1,110,000 lbs gutted weight (1,310,000 lbs whole weight) in year 1; 983,000 lbs gutted weight (1,160,000 lbs whole weight) in year 2; and 718,000 lbs gutted weight (847,000 lbs whole weight) in year 3 onwards until modified. Increase the recreational minimum size limit from 10" total length to 11" total length in years 2 and 3 onwards until modified. Maintain the recreational bag limit of 20 black sea bass per person per trip in years 1 and 2, and reduce the recreational bag limit to 4 black sea bass per person per trip in year 3 onwards until modified. Change the fishing year from the calendar year to June 1 though May 31.

Alternative 6. Retain the recreational minimum size limit of 10" total length, and reduce the recreational bag limit from 20 to 10 black sea bass per person per trip.

Alternative 7. Retain the recreational bag limit of 20 black sea bass per person per trip and increase the recreational minimum size limit from 10" total length to 11" total length.

Alternative 8. **Preferred.** Implement the following recreational measures for black sea bass:

A. Specify a recreational allocation of 633,000 lbs gutted weight (746,000 lbs whole weight) in year 1; 560,000 lbs gutted weight (661,000 lbs whole weight) in year 2; and 409,000 lbs gutted weight (483,000 lbs whole weight) in year 3 onwards until modified. This is based on a Total Allowable Catch (TAC) of 1,110,000 lbs gutted weight (1,310,000 lbs whole weight) in year 1; 983,000 lbs gutted weight (1,160,000 lbs whole weight) in year 2; and 718,000 lbs gutted weight (847,000 lbs whole weight) in year 3 onwards until modified.

B. Limit recreational landings to approximate these harvest levels by increasing the recreational minimum size limit from 10" total length to 11" total length in year 1 and to 12" total length in year 2 onwards until modified, and reducing the recreational bag limit from 20 to 15 black sea bass per person per day.

C. Change the fishing year from the calendar year to June 1 through May 31.

Discussion

The recreational 12" minimum size limit and bag limit of 15 black sea bass would reduce the total recreational catch by 45.6%. There is a recreational reduction of 46.8% with a 12" minimum size limit and bag limit of 10. The reduction is 26.3% with an 11" size limit and bag limit of 10. An increase in the recreational minimum size to 11" total length would provide a 22% reduction. **Alternatives 2 and 3** would end overfishing during 2007 to 2009. **Alternative 4** could allow overfishing to occur until 2011. **Alternatives 5 and 8** would end overfishing during 2009. **Alternatives 6 and 7** might not end overfishing.

4.4.3 Biological Effects of Management Measure Alternatives

Fishery management measures directly affect target and bycatch species and, sometimes, fish habitat by influencing the rate of fishing mortality, as well as the amount and distribution of fishing effort, applied to a fishery. This analysis examines the type(s) and extent of potential effects resulting from establishing or adjusting established management measures for black sea bass.

4.4.3.1 Commercial

Alternative 1 would retain the current regulations used to manage catches of black sea bass. In general, commercial regulations include a 10" total length size limit, a commercial limited access system, and gear restrictions. In addition, the *Oculina* Bank HAPC is closed to all bottom fishing off the coast of Florida (an area where black sea bass are known to occur).

Gear restrictions and limited access systems are designed to limit the type and amount of effort applied to a fishery. Minimum size limits are generally used to maximize the yield of each fish recruited to the fishery and to protect a portion of a stock from fishing mortality. The idea behind maximizing yield is to identify the size, which best balances the benefits of harvesting fish at larger, more commercially valuable sizes against losses due to natural mortality. Protecting immature and newly mature fish from fishing mortality provides them increased opportunities to reproduce and replace themselves before they are captured. If the size limit chosen is larger than the size at first reproduction for the species in question, then a sufficient pool of spawners could be retained even if fishing pressure is heavy. Area closures are intended to provide fish populations and/or valuable bottom habitat a refuge from fishing pressure.

These types of measures are generally expected to benefit the environment in the short term and long term by limiting the extent to which a stock is targeted. However, the extent to which such benefits are realized depends on the appropriateness of a measure when applied to a specific stock, as well as if and to what extent fishing effort changes or shifts in response to the select management measure.

Minimum size limits can have detrimental effects on fish stocks because they do not protect the older year classes. Recruitment problems can occur in a fishery that has fewer age classes than an unfished population. For example, a population might live for ten years, but minimum sizes might allow for the harvesting of all fish less than four years of age. Recruitment failure could occur if there were several consecutive years of poor recruitment due to environmental conditions. The older age classes might not be present to guard against recruitment failure as they would under natural conditions. This truncation of average size is often undesirable from an economic perspective, because larger fish are sought after by recreational fishermen and because commercial markets often favor fish of a certain size.

Additionally, minimum size limits encourage the harvest of older, larger fish, which have the greatest reproductive potential. For example, fecundity has an exponential relationship with size. Wenner *et al.* (1986) estimate that one 7-year old black sea bass produces the same number of eggs as six 2-year old black sea bass. However, the difference may actually be greater since Wenner *et al.* (1986) used outdated methods, which underestimated fecundity. Therefore, the size of the spawner, not just the overall number of spawners, is important when considering the reproductive potential of a population, and removal of all the large spawners can be catastrophic even if some smaller spawners remain. If the size limit is set below the minimum size for reproduction, heavy fishing pressure may lead to reproductive failure, as the size limit does not protect fish of spawning size.

The update of the black sea bass SEDAR assessment (SEDAR Assessment Update #1 2005) shows that the 10" total length minimum size limit instituted in 1999 ensures biomass persists even in a heavily fished environment because it is large enough to protect several year classes of spawning fish resulting in a SPR = 25.8%. The age and size at 50% maturity for female black sea bass is 7" total length and 1 year, respectively. Black sea bass are 3 years old when they reach a size of 10" total length.

Discard mortality also can limit the effectiveness of specific management measures if fishermen catch and discard black sea bass when targeting co-occurring species. Additionally, the environmental benefits of a closed area management strategy can be reduced or negated if not integrated with some form of control on fishing mortality and effort outside the closed area. Release mortality of black sea bass is considered to be low (15%), indicating minimum size limits and other management measures that create regulatory discards can be an effective management tool for black sea bass. SEDAR 2 (2003b) recommend a release mortality rate of 15% for black sea bass based on cage studies conducted by Collins (1996) and Collins *et al*. (1999). 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. The Council's Scientific and Statistical Committee (SSC) supports use of minimum size limits for black sea bass.

Alternative 1, which retains the status quo management strategy is expected to adversely impact the black sea bass stock. To determine the actual environmental effects of the no action management alternative on black sea bass, one must first examine current trends in harvest levels, stock biomass levels, and life history characteristics, then predict the direction of future trends under status quo management. The recent SEDAR assessment determined the South Atlantic black sea bass stock is overfished and undergoing overfishing (SEDAR 2 2003b; SEDAR AssessmentUpdate1 2005). From 1993 to 1999, CPUE of black sea bass taken with MARMAP trapping gear increased from 9.9 to 19.7 fish caught per hour. Since 1999, CPUE declined steadily to an all time low of 5.87 fish caught per hour in 2003, followed by an increase to 13.25 fish per hour in 2004. Low CPUE in 2003 was probably due to a prolonged summer upwelling event, which occurred off the southeast U.S. The CPUE of the headboat fleet also decreased for black sea bass during 1970s through 1995, followed by a slight increase during 1996-2001.

Continued overfishing of the black sea bass stock may result in changes in the size/age at maturity and size/age at transition, and growth overfishing, which could make the stock more susceptible to recruitment failure. Black sea bass are protogynous, functioning first as females, then later as males. 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 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 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 a level of spawner biomass persisted even in a heavily fished population. Projections of the current fishing mortality rate indicate a further increase in biomass but not to the biomass at maximum sustainable yield.

SEDAR Assessment Update #1 (2005) also indicates the size structure of the black sea bass stock has been truncated. The number of young that are produced each year (recruitment) is highly variable due to annual changes in environmental factors that affect the survival of eggs and larvae (McGovern and Olney 1996). A population maintained at a sustainable biomass level can withstand several years of poor recruitment, which may occur due to natural factors. Heavy fishing pressure, which truncates the size structure and reduces the number of age classes in the population, can make it more difficult for the population to recover from several years of poor recruitment. However, the shorter lifespan and early maturity of black sea bass enables the stock to quickly respond to reduced fishing mortality rates, compared to species such as snowy grouper and golden tilefish, which have longer lifespans.

Fishing pressure can abnormally skew the sex ratio of protogynous populations if large fish are selectively removed. However, McGovern *et al*. (2002) demonstrate black sea bass compensate for the loss of larger males by undergoing sexual transition at smaller sizes and younger ages. Furthermore, McGovern *et al*. (2002) indicate that, despite a decrease in the mean size of black sea bass from the early 1980s to the late 1990s, there was not a significant change in the sex ratio of the population. Koenig *et al*. (1996) suggest species, like black sea bass, which are permanently schooled may undergo transition throughout the year, thereby maintaining a constant male:female ratio.

Reducing the density of a population (Bohnsack 1999) and the proportion of males in a population (Coleman *et al*. 1996) can affect the genetic diversity of a population, making it less resilient to environmental change (Bohnsack 1999). Fisheries tend to remove the largest, fastest growing, oldest, and most genetically fit members of a stock. Consequently, continued heavy fishing pressure over many generations can result in a species, which possesses less desirable traits, such as small size or small size at maturity, and that lacks genetic diversity (PDT 1990).

Overexploiting the black sea bass stock could affect the community structure of reef ecosystems off the southeast U.S. Reef ecosystems support communities of species, which compete with each other for resources, such as habitat and food. Black sea bass co-occur with a variety of species, including tomtate, scup, red porgy, white grunt, vermilion snapper, red grouper, and gag. Continued overexploitation of black sea bass may disrupt the natural community structure of the reef ecosystems, which support these species. Predators of black sea bass, including red grouper, scamp, greater amberjack, gag, white grunt, red porgy, vermilion snapper, and red snapper, might decrease in abundance in response to a decline in the abundance of black sea bass or switch to alternative prey items. Conversely, the abundance of black sea bass prey and competitor species, which are not targeted in fisheries (e.g., scup and tomtate) could increase in response to a decline in the abundance of sea bass.

There is evidence that reef communities in the South Atlantic have been altered by selective fishing pressure, which targets large, commercially valuable species (McGovern *et al*. 1999). Koenig *et al*. (2000) report directed harvest and habitat destruction related to fishing activities have changed population demographics in an area off the South Atlantic coast identified as the Experimental *Oculina* Research Reserve (Koenig *et al*. 2000). Commercially important species, including black sea bass, scamp, gag, and greater amberjack, accounted for 76% of the observed reef fish videotaped during submersible dives in the area in 1980. However, those species comprised 5% of the reef fish observed in submersible dives at the same location in 1995 (Koenig *et al*. 2000). Additionally, scup increased in abundance in waters of the South Atlantic during the mid 1990s, while black sea bass has declined in abundance in the same area (McGovern *et al*. 1999). Scup competes with the black sea bass for food and other resources.

Community structure can also be affected by the introduction of non-indigenous species. For example, adult lionfish, *Pterois volitans*, have been collected off the coasts of North Carolina, Georgia and Florida, and juveniles have been collected along the shore of Long Island, New York. They have also been found around Bermuda (Whitfield *et al.* 2002). Since Whitefield *et al.* published their 2002 study, there have been numerous observations of lionfish by divers, fishermen, and scientists indicating that the species has become firmly established off the east coast of the U.S. Lionfish are indigenous to tropical waters of the western Pacific and their occurrence along the east coast of the U.S. represents a human-induced introduction. Lionfish are surviving and reproducing in the western Atlantic.

Lionfish feed on a wide variety of smaller fishes, shrimps and crabs (Whitfield *et al.* 2002). All these prey items can be found in reef areas along the east coast of the U.S. and there have been reports indicating juvenile black sea bass have been found in the gut contents of lionfish. Change has already been documented in the community structure of reef fishes, which may be the result of heavy fishing pressure (Huntsman *et al.* 1999; McGovern *et al.* 1999). Furthermore, reef fish fauna of the North Carolina coast is becoming more tropical suggesting that conditions are favorable for the dispersal of lionfish. The effect of the increasing abundance of lionfish could have on the reef fish ecosystem along the east coast of the U.S. is unknown (Whitfield *et al.* 2002).

The current *Oculina* closed area provides biological and ecological benefits that cannot be quantified at this time. Gilmore and Jones (1992) documented the presence of very large black sea bass at depths of over 200 feet in 1980 prior to heavy fishing and habitat destruction, which occurred in the area prior to its closure. The *Oculina* closed area may serve as a refuge for large black sea bass in the future as the stock rebuilds in response to decrease fishing pressure. Recent evidence indicates there has been an increase in abundance of many species since the area was closed (Koenig 2001).

All alternatives to status quo management evaluated for black sea bass are intended to reduce fishing mortality or end overfishing. As a result, they are expected to directly benefit the biological environment by assisting in restoring stock status and population demographics to more natural conditions, and reducing the frequency with which the pot fishery interacts with essential fish habitat. The indirect effects of these alternatives on the ecological environment are less certain. Improving the status of stocks and/or the suitability of essential fish habitat would likely promote more natural ecological functions. However, competitor, predator, and prey relationships in marine ecosystems are complex and poorly understood. As a result, the exact nature and magnitude of the ecological effects of alternative management measures are difficult to accurately predict or distinguish.

Alternative 2 would establish a commercial quota of 346,000 lbs gutted weight and raise the commercial size limit to 11” total length. This alternative also would require the use 2” mesh back panel for the pots and changing the calendar year to June 1 through May 31. The commercial quota represents a 25.2% reduction based on commercial landings from 2001-2003 and a 27.4% reduction in landings based on data from 2000-2003. A minimum size of 11” total length (pots; hook and line) along with 2” mesh back panel in pots would provide a 22% reduction and help to keep the fishery open all year. The percent reduction provided by the increased size limit would depend on the release mortality rate and compliance rate. With a 20% release mortality rate and maximum observed non-compliance, a 20.4% reduction could be expected from an increase in the size limit to 11” total length and a 2” mesh panel in the pots. With 100% compliance and 0% release mortality, a 28.3% reduction could be expected from the proposed management measures. This alternative would end overfishing during 2007-2009. Ending overfishing on black sea bass is expected to increase stock biomass and promote a more natural population size and age structure by helping to reverse observed trends characteristic of an overexploited population. These effects would benefit black sea bass and associated species by protecting the stock against recruitment overfishing and reducing its vulnerability to adverse environmental conditions.

Gay (2002) evaluates reductions in discards (sea bass < 10” TL) and sea bass catches for 39 pot configurations. Gay (2002) provides estimates of both the number of legal and sub-legal black sea bass retained by pot type. There were no replicates of particular pot types; that is, there was only one of each of the 39 pot configuration types, and each of these types was hauled numerous times to achieve replication. Gay (2002) reports sea bass pots composed entirely of 2” mesh or with 2” mesh on three sides harvested the fewest black sea bass per haul, averaging 6.6 and 6.73 sea bass per haul, respectively. Sea bass pots with two 1.75” escape vents harvested the most black sea bass per haul. All other sea bass pot categories harvested similar quantities of black sea bass per haul.

Fisher and Rudders (2004) compare the selectivity of three sea bass pot configurations. Experimental pots were constructed using 2” square mesh on half the pot and 1.5” square mesh on the remainder of the pot. Pots constructed of 1.5” mesh with no escape vents (control pots) and with a single 2” escape vent (vented pots) were fished with the experimental pots to evaluate reductions in sub-legal black sea bass discards (sea bass less than 11” total length). Fisher and Rudders (2004) conclude experimental 2-inch mesh pots retained 78.1% and 73.7% less sub-legal sea bass (< 11” total length) than control and vented pots, respectively. The experimental pots also retained 55.7% and 59.5% less 10 to 11" total length black sea bass than vented or control pots, respectively. The pot configuration for the vented pot was similar to gear currently allowed in the South Atlantic, except only one escape vent was used.

Alternative 2 would result in an increase in the regulatory discards for black sea bass but this would be minimized in the pot fishery by the 2" mesh back panel in the pots, which would cull out small black sea bass when the pot is retrieved.

Black sea bass live for at least 10 to 20 years and achieve sizes as great as 26" total length. Increasing the minimum size limit to 11" total length would allow for a greater proportion of fish to spawn multiple times than would be provided by the no action alternative. However, there could still be an overall truncation of fish size and age if fish are removed as soon as they reach legal size. The quota in **Alternative 2** would provide some assurance that a smaller proportion of legal size fish would be removed than in the no action alternative.

Based on data from 2000-2003, it is anticipated the fishery would be open all year due to reductions provided by the increased minimum size. However, as stock biomass increases in response to reduced fishing mortality, or as the behavior of fishermen changes, the quota might be met before the end of the fishing year. This could lead to a derby situation, where fishermen attempt to catch as many fish as possible before the quota is taken. Derby fisheries can unnecessarily increase bycatch by providing participants less flexibility in deciding when, where, and how to fish. Additionally, fishermen might shift effort to other species, such as red porgy, gag, scamp, snowy grouper, vermilion snapper, and other snapper grouper species, after the black sea bass quota has been harvested.

Peak spawning for black sea bass occurs during March through May off the southeast coast of the U.S. (Wenner *et al.* 1986; McGovern *et al.* 2000). The end of the June 1 through May 1 fishing year coincides with the end of peak spawning (May 1). Therefore, if the quota was met before the fishing year ended (i.e. March), fishing pressure would be reduced on spawning black sea bass. McGovern *et al.* (2000) estimate females black sea bass spawn every three to four days during peak spawning. If the quota was met early in the June 1 through May 1 fishing year, black sea bass, including the older more fecund individuals, would be provided with more spawning opportunities, which could contribute to recruitment success of the new year class.

Alternative 3 would set the commercial quota to 309,000 lbs gutted weight, increase the minimum size limit to 11" total length, require the use of a 2" mesh back panel in the pots, and specify a trip limit of 235 lbs gutted weight for hook-and-line gear and a trip limit of 910 lbs whole weight for pots. This alternative would also change the calendar year to June 1 through May 31. The commercial quota would reduce harvest by 33.3% based on data from 2000-2003 and 35.3% based on data from 2001-2003, ending overfishing during 2007-2009.

The combined effect of an 11" total length minimum size, 2" mesh back panel in traps, and trip limit would also reduce harvest by 35%. The effect of the increased minimum size and 2" mesh back panel would be similar to **Alternative 2**. The larger size limit would allow for a greater proportion of fish to spawn multiple times than provided by the no action alternative. However, there could still be an overall truncation of fish size and age if fish are removed as soon as it reaches legal size. The lower quota in **Alternative 3** would provide greater assurance that a smaller proportion of legal size fish would be removed, overfishing would be terminated, recruitment overfishing would be avoided, the size and age structure of the stock would improve, and ecosystem overfishing would be minimized.

The trip limit would help to ensure the fishery would remain open as long as possible, given the effects of increasing the minimum size. However, it is possible a derby-situation could arise if the quota was taken before the end of the fishing year. Derby fisheries can unnecessarily increase discards by providing participants less flexibility in deciding when, where, and how to fish. Additionally, fishermen might shift effort to other species, such as red porgy, gag, scamp, snowy grouper, vermilion snapper, etc. after the black sea bass fishery is closed.

Alternative 4 would specify a commercial quota of 423,000 lbs gutted weight, increase the minimum size to 11” total length, and require the use of a 2” mesh back panel. This alternative would also change the calendar year to June 1 through May 31. The commercial quota would provide an 8.8% reduction based on data from 2000-2003 and an 11.4% reduction based on data from 2001-2003. Reductions based on the quota would allow overfishing to occur until 2011. The biological benefits resulting from **Alternative 4** would be the same as those associated with **Alternatives 2 and 3** after overfishing has ended. However, by allowing overfishing to continue over a longer period of time, **Alternative 4** could make the stock more vulnerable to adverse environmental conditions. The 11” total length minimum size combined with the use of a 2” mesh back panel would provide a 22% reduction.

Alternative 4 would result in an increase in the regulatory discards for black sea bass (similar to **Alternatives 2 and 3**). The use of the 2” mesh back panel would reduce the number of regulatory discards in the pot fishery. In addition, survival of discards is expected to be high (SEDAR 2 2003b). The larger size limit would allow for a greater proportion of fish to spawn multiple times than would the no action alternative. However, there could still be an overall truncation of fish size and age if fish are removed as soon as it reaches legal size. The higher quota proposed in **Alternative 4** would provide less assurance that a smaller proportion of legal size fish would be removed.

Based on data from 2000-2003, it is anticipated the fishery would be open all year due to reductions provided by the increased minimum size limit. However, as stock biomass increases in response to reduced fishing mortality, or as the behavior of fishermen changes, it is possible a derby-situation could arise, where fishermen attempt to catch as many fish as possible before the quota is taken. Derby fisheries can unnecessarily increase discards by providing participants less flexibility in deciding when, where, and how to fish. Additionally, fishermen might shift effort to other species, such as red porgy, gag, scamp, snowy grouper, vermilion snapper, etc. after the black sea bass fishery is closed.

Alternative 5 is identical to **Alternative 3** except it would step down quotas and trip limits over a 3-year period. The quota in year 1 would be current landings, the quota in year 2 would be a midpoint, and the quota in year 3 would be the value identified in **Alternative 3**. The trip limit for each year would be the value, which would allow the quota to be met in December. This alternative would end overfishing during 2009-2011. The effects of management measures would be similar to those described in **Alternative 3**, except they would not be achieved until year 3, which could make the stock more vulnerable to adverse environmental conditions. **Alternative 5** could result in less discards during the initial 3-year period and would give the Council time to address discards through Snapper Grouper 13B. However, overall fishing mortality would be greater under this alternative than under **Alternative 3**.

Alternative 6 would not specify a commercial quota. It would retain the 10" total length size limit, require that pots include a 2" back panel, and prohibit harvest over the bag limit during March through June. Use of a 2" mesh back panel in the pots combined with a March through June commercial closure would provide a 28% reduction. This alternative would end overfishing during 2007-2009 if the total commercial and recreational catch did not exceed a TAC of 718,000 lbs gutted weight during 2007-2009.

Without a commercial quota or TAC to keep harvest in check, overfishing could continue to occur if reductions provided by the 2" mesh panel and the seasonal closure have been overestimated. A commercial quota enables fishery managers to be proactive in preventing overfishing. However, without a quota, there would not be a derby-type situation where fishermen attempt to catch as many fish as they can before the fishery is shut down.

As the size limit would not be increased in **Alternative 6**, there would not be an increase in the regulatory discards for black sea bass. The 2" mesh back panel in the pots would be expected to cull out a large proportion of the fish less than 11" total length. However, this assumes 25% of the fishermen currently use 2" mesh in the back panel and that the design would be similar to that described by Fisher and Rudders (2004). Actual estimates of the reduction could be in error if the 2" back panel used by fishermen does not function in the same manner as described by Fisher and Rudder (2004) or the number of fishermen currently using 2" mesh in the back panel is different than the assumed 25%.

The update of the Black Sea Bass SEDAR assessment (SEDAR Assessment Update #1 2005) showed the 10" total length size limit, instituted in 1999, ensured that biomass persisted even in a heavily fished population because it was set large enough to protect several year classes of spawning fish. The age and size at 50% maturity for female black sea bass is 7" total length and 1 year, respectively. Black sea bass are 3 years old when they reach a size of 10" total length. A larger size limit would allow for a greater proportion of fish to spawn multiple times than provided by retaining the 10" total length minimum size. Furthermore, without a quota, there could still be an overall truncation of fish size and age if black sea bass are removed as soon as they reach legal size. A quota, as proposed in other alternatives, would provide some assurance that a smaller proportion of legal size fish would be removed than in **Alternative 6**.

Alternative 6 would prohibit harvest, retention, and sale during the months of March through June, which is the time of peak spawning for black sea bass. Spawning season closures may be particularly advantageous for protogynous species, such as black sea bass and gag, where large females undergo transition to males. However, the advantage of a spawning season closure would probably be greater for gag than for black sea bass. Sex reversal in some species may be partially controlled by social interactions and the frequency of male-female encounters (Robertson 1972). Therefore, the loss of larger males in schools of fishes may provide cues to large females to undergo transition to males. For species such as gag and scamp, which form seasonal spawning aggregations, these cues for sex change are probably in place for only a short period of time each year. However, for black sea bass, which are permanently schooled, the cues for changing sex could be in place throughout the year.

McGovern *et al*. (2002) report that despite a decrease in the mean size and a decrease in the size at maturity, the sex ratio of black sea bass did not show a significant change during a 20-year study period. Therefore, black sea bass are probably able to compensate for the loss of larger males in the population. Yet, through this compensation, fecundity of the population was probably reduced since many of the larger females would have transformed into males. In contrast, McGovern *et al*. (1998) report that gag, which forms seasonal spawning aggregations, showed a decrease in the percentage of males between the 1980s and 1990s, which paralleled a decrease in the mean size.

Black sea bass is just one species in a multi-species community that is targeted by fishermen. Therefore, black sea bass may still be caught by fishermen as they target other co-occurring species. Furthermore, the beneficial effects of this alternative also might be reduced by intensified fishing pressure before and after the seasonal closure. Conversely, the beneficial effects of a closure would be greater if fishermen modified their fishing behavior by not fishing in areas where black sea bass occur during March through June; thereby, reducing discards.

Alternative 7 would not specify a commercial quota. It would increase the minimum size limit to 11" total length size limit, and require pots include a 2" back panel. Use of a 2" mesh back panel in the pots, combined with a minimum size limit of 11" total length, would provide a 22% reduction. This alternative would end overfishing during 2007-2009 if the total commercial and recreational catch did not exceed a TAC of 718,000 lbs gutted weight during 2007-2009.

Without a commercial quota or TAC to keep harvest in check, overfishing could continue to occur if reductions provided by the 2" mesh panel and the season closure have been overestimated. A commercial quota enables fishery managers to be proactive in preventing overfishing. However, without a quota, there would not be a derby-type situation where fishermen attempt to catch as many fish as they can before the fishery is shut down.

Alternative 7 would increase regulatory discards of black sea bass, but this would be minimized by the 2" mesh back panel in the pot fishery, which would cull out small black sea bass when the pot is retrieved. Fisher and Rudders (2004) concluded experimental pots with 2" mesh on half the pot retained 78.1% and 73.7% fewer sub-legal sea bass (< 11 inches) than control and vented pots, respectively. Furthermore, release mortality of black sea bass is considered to be low (15%), indicating that minimum size limits are probably an effective management tool for black sea bass. The Council's Scientific and Statistical Committee recommends use of minimum size limits for species like black sea bass.

The Council's **Preferred Alternative 8** would step down quotas and trip limits over a 3-year period, require the use of a 2" mesh back panel in the pots, and change the calendar year to June 1 through May 31. The commercial quota would reduce harvest by 33.3% based on data from 2000-2003 and 35.3% based on data from 2001-2003, ending overfishing during 2009.

The quota in year 1 would represent current landings, the quota in year 2 would be a midpoint, and in year 3, the quota would be the value identified in **Alternative 3** (309,000 lbs gutted weight). As the size limit would not be increased in **Preferred Alternative 8**, there would not be an increase in the regulatory discards for black sea bass. The 2" mesh back panel in the pots would be expected to cull out a large proportion (~70%) of the fish less than 11" total length. This assumes that the design would be similar to that described by Fisher and Rudders (2004). The percentage of fish less that 11" total length could be in error if the 2" back panel used by fishermen does not function in the same manner as described by Fisher and Rudder (2004).

Closing the fishery when a quota is reached will reduce the tendency for a truncation of fish size and age of black sea bass. A quota provides assurance that a smaller proportion of legal size fish would be removed. **Alternative 8** could also result in fewer discards during the initial 3-year period and would give the Council time to address discards through Snapper Grouper 13B.

4.4.3.2 Recreational

Alternative 1 would retain the current regulations used to manage catches of black sea bass. In general, recreational regulations include a 10" total length size limit and a bag limit of 20 black sea bass per person per day. In addition, the *Oculina* HAPC is closed to all bottom fishing off the coast of Florida (an area where black sea bass are known to occur).

Minimum size limits are designed to protect a portion of a stock from fishing mortality. Bag limits are designed to reduce overall fishing mortality by reducing the number of fish landed and the amount of time spent pursuing a species. Area closures are intended to provide fish and/or valuable bottom habitat a refuge from fishing pressure. When properly designed, these types of measures are generally expected to benefit the environment in the short-term and long-term by limiting the extent to which a stock is targeted. However, the extent to which such benefits are realized depends on the appropriateness of a measure to a specific stock, as well as if and to what extent fishing effort changes or shifts in response to the select management measure. For example, discard mortality can limit the amount by which fishing mortality is reduced by bag limits, minimum size limits, and area closures, as discussed in Section 4.1.3.1.

According to SEDAR Assessment Update #1 (2005), current regulations in the black sea bass fishery are not sufficiently restrictive to prevent overfishing. Fishing mortality must be reduced to end overfishing and allow the black sea bass stock to produce its maximum sustainable yield over the long term. MRFSS data indicate the majority of recreational fishermen are not currently filling the 20-fish bag limit. Excluding trips that reported type B1 or B2 catches, the mean black sea bass catch per angler per trip for recreational trips was 2.56 during 2000-2003. The mean catch per angler per trip (includes only headboat trips that landed black sea bass) was 2.11 during 2000-2003. Non-compliance with the recreational size limit is high. During 2000-2003, the percentage of black sea bass caught by headboat and recreational fishermen that were less than 10" total length was 12% and 10%, respectively.

While the *Oculina* HAPC closed area currently provides an unquantifiable biological benefit, it is not sufficient to constrain fishing mortality on black sea bass to a sustainable level.

All the alternatives to status quo management evaluated for black sea bass are intended to reduce fishing mortality or end overfishing. As a result, they are expected to directly and significantly benefit the biological environment by assisting in restoring stock status and population demographics to more natural conditions. The indirect effects of these alternatives on the ecological environment are less certain. Improving stock status and/or the suitability of essential fish habitat would likely promote more natural ecological functions. However, competitor, predator-prey, and species-habitat relationships in marine ecosystems are complex and poorly understood. As a result, the exact nature and magnitude of the ecological effects of alternative management measures are difficult to accurately predict or distinguish.

Alternative 2 would increase the minimum size limit to 12" total length and reduce the bag limit to 15 fish per person per trip. This alternative also specifies a recreational allocation of 459,000 lbs gutted weight based on a total allowable catch of 868,000 lbs gutted weight for the recreational and commercial sectors.

Increasing the minimum size limit would allow for a greater proportion of larger, more fecund, fish to spawn multiple times. Most recreational fishermen are catching small black sea bass, so the reduction in harvest attained by an increase in the minimum size is substantial. The mean size of black sea bass caught by headboat and recreational fishermen during 2000-2003 was 11.2" total length and 12.2" total length, respectively. Black sea bass attain sizes as great as 26" total length.

The short-term benefits of reducing the bag limit are not substantial because the majority of recreational fishermen are not currently filling the bag limit. Excluding trips, which only reported type B1 or B2 catches, the mean black sea bass catch per angler per trip for recreational trips was 2.56. The mean catch per angler per trip (includes only headboat trips that landed black sea bass) was 2.11 for the years 2000-2003. However, a reduced bag limit would help to constrain harvest as stock biomass and the number of recreational fishermen increase.

Assuming a 15% release mortality, the 12" total length minimum size and 15 fish bag limit are expected to reduce harvest by 45.6% and end overfishing during 2007-2009. The 459,000 lb gutted weight allocation represents a 25.2% reduction based on landings from 2000-2003. The percent reduction provided by the increased size limit and reduced bag limit would depend on the release mortality rate and compliance rate. With a 20% release mortality and maximum observed non-compliance, a 43.4% reduction could be expected from an increase in the size limit to 12" total length and a 15 fish bag limit. With 100% compliance and 0% release mortality, a 59.6% reduction could be expected from the proposed management measures.

Alternative 2 would be expected to produce the highest number of discards of any of the recreational management alternatives. However, based on cage studies conducted by Collins (1996) and Collins *et al*. (1999), as well as high recapture rates reported by McGovern and Meister (1999), survival of released black sea bass is expected to be high. A larger size limit would allow for a greater proportion of fish to spawn multiple times than provided by any of the other recreational alternatives. Furthermore, the recreational allocation of 459,000 would help ensure that only a proportion of fish larger than 12" total length would be taken each year and avoid the truncation of fish size and age. The Council's SSC has approved the use of size limits for species with low release mortality rates (i.e. black sea bass).

Alternative 2 provides for a greater reduction in fishing mortality than any other recreational management alternative. This alternative would provide greater assurance overfishing would end, biomass would increase, and the natural population age and size structure would be restored. Furthermore, as the population of recreational fishermen increases, the effort on black sea bass and other species could also increase. Management measures in **Alternative 2** would help ensure that the age and size structure of black sea bass would be restored to natural conditions despite an increasing population of recreational fishermen.

Alternative 3 would raise the minimum size limit to 11" total length and lower the bag limit to four fish per person per trip. **Alternative 3** also would specify a recreational allocation of 409,000 lbs gutted weight based on a total allowable catch of 718,000 lbs for the recreational and commercial sectors of the fishery. Assuming a 15% release mortality, this alternative would be expected to provide a 35.4% reduction in harvest and would end overfishing during 2007-2009.

Alternative 3 specifies a lower recreational allocation than **Alternative 2**. While the reduction is not as great as provided by management measures in **Alternative 2**, the lower allocation in **Alternative 3** (if enforced) would provide greater assurance than **Alternative 2** overfishing would end, biomass would increase, and the natural population age and size structure would be restored. Furthermore, as the population of recreational fishermen increases, effort on black sea bass and other species could also increase. Management measures in **Alternative 3** would help ensure the black sea bass population would be restored to more natural conditions despite an increasing population of recreational fishermen.

The decrease in bag limit to 4 fish in addition to the increase in the minimum size limit would be expected to increase the number of regulatory discards. However, survival of released black sea bass is expected to be high (McGovern and Meister 1999; SEDAR 2 2003b).

Alternative 4 would maintain the 20 fish bag limit and increase the recreational size limit to 11" total length. It would specify a recreational allocation of 560,000 lbs gutted weight that represents an 8-11% reduction in harvest. The 11" total length size limit would provide a 24% reduction. This alternative would not end overfishing until 2011.

Alternative 4 specifies a higher recreational allocation than other alternatives and would provide less assurance than **Alternative 2** that overfishing would end, biomass would increase, and the natural population age and size structure would be restored, particularly as the population of recreational fishermen increases.

Alternative 4 does not reduce the bag limit. Although most fishermen are not catching the bag limit, a reduced bag limit would help to constrain harvest as the black sea bass population rebuilds and the number of recreational fishermen increases. An increase in the number of regulatory discards would be expected with an increase in the size limit; however, survival of released black sea bass is expected to be high (McGovern and Meister 1999; SEDAR 2 2003b). The Council's SSC approves use of minimum size limits for species with low release mortality rates like black sea bass.

Alternative 5 is similar to **Alternative 3** and would raise the minimum size limit to 11" total length and lower the bag limit to four fish in year 3 and would step down the recreational allocation and TAC to levels specified in **Alternative 3** over a three year period.

Alternative 6 would retain the 10" total length minimum size limit and would reduce the bag limit from 20 fish to 10 fish. It would not specify a TAC or recreational allocation. This alternative would provide the least reduction in harvest of any alternative. This alternative would provide the least amount of assurance that overfishing would end, biomass would increase, and the natural population age and size structure would be restored to more natural conditions. Furthermore, as the population of recreational fishermen increases, the effort on black sea bass and other species would also increase. Management measures in **Alternative 6** would provide the least amount of confidence that black sea bass would be restored to more natural conditions despite an increasing population of recreational fishermen.

Alternative 7 is similar to **Alternative 3**, except it does not specify a TAC or recreational allocation. Increasing the minimum size to 11" total length would end overfishing during 2007-2009 if the total commercial and recreational catch did not exceed a TAC of 718,000 lbs gutted weight during 2007-2009.

Without a TAC to keep harvest in check, overfishing could continue to occur if reductions provided by the 2" mesh panel and the season closure have been overestimated.

The Council's **Preferred Alternative 8** would increase the minimum size limit to 11" total length in Year 1, 12" total length in Year 2, and reduce the bag limit to 15 fish per person per trip. This alternative would also reduce the recreational allocation over three years to 409,000 lbs gutted weight based on a total allowable catch which would also be reduced over three years to 718,000 lbs gutted weight in Year 3 for the recreational and commercial sectors.

Similar to **Alternative 2**, an increase in the minimum size limit to 12" total length would allow for a greater proportion of larger, more fecund, fish to spawn multiple times. The reduction in harvest attained by an increase in the minimum size is substantial because most fishermen catch small black sea bass (mean 11.2" total length headboat and 12.2" total length MRFSS). Increasing the minimum size over two years would allow fish to "grow" into the new size limit and have less of an adverse short-term impact on recreational fishermen. Furthermore, the recreational allocation of 409,000 would help ensure that only a proportion of fish larger than 12" total length would be taken each year and avoid the truncation of fish size and age. The Council's SSC has approved the use of size limits for species with low release mortality rates (i.e. black sea bass).

Reducing the bag limit from 20 to 15 fish provides little reduction in catch because the average number of black sea bass retained by headboat and other recreational fishermen ranges from 2 to

3 fish. However, a reduced bag limit would help to constrain harvest as stock biomass and the number of recreational fishermen increase.

Assuming a 15% release mortality, the 12” total length minimum size and 15 fish bag limit is expected to reduce harvest by 45.6% and end overfishing during 2008-2011. The 409,000 lb gutted weight allocation represents a 35% reduction based on landings from 2000-2003. The percent reduction provided by the increased size limit and reduced bag limit would depend on the release mortality rate and compliance rate. With a 20% release mortality rate and maximum observed non-compliance, a 43.4% reduction could be expected from an increase in the size limit to 12” total length and a 15 fish bag limit. With 100% compliance and 0% release mortality, a 59.6% reduction could be expected from the proposed management measures.

The Council’s **Preferred Alternative 8** would be expected to produce fewer discards than **Alternative 2** since the size limit would be increased over a couple of years. However, increasing the minimum size to 12” total length in **Alternatives 2 and 8** would likely provide a greater number of discards than other recreational management alternatives.   Based on cage studies conducted by Collins (1996) and Collins *et al*. (1999), as well as high recapture rates reported by McGovern and Meister (1999), survival of released black sea bass is expected to be high.

Alternatives 2 and 8 provide for a higher reductions in fishing mortality than any other recreational management alternative. These alternatives would provide greater assurance of the alternatives considered overfishing would end, biomass would increase, and the natural population age and size structure would be restored. Furthermore, as the population of recreational fishermen increases, the effort on black sea bass and other species could also increase. Management measures in **Alternatives 2 and 8** would help ensure that the age and size structure of black sea bass would be restored to natural conditions despite an increasing population of recreational fishermen.

4.4.4 Protected Species Effects of Management Measure Alternatives

4.4.4.1 Commercial

Alternative 1 would maintain the status quo and thus keep the existing level of risk for protected species interactions as summarized in the Affected Environment.

Alternatives 2, 4 and 8 could potentially benefit protected species if the reduction in allowable harvest results in the reduction of effort (i.e., reduction of hook-and-line/pot gear in the water). However, such benefits may be reduced or negated if fishing effort was to shift into other fisheries that pose a risk to protected species (e.g., other vertical hook-and-line, gillnet fisheries) after the quota was reached. There also may be an increased risk of incidental capture of protected species by the implementation of **Alternative 2 or 4** if it results in derby-type conditions due to the catch quota (i.e., increased competition among fishermen to catch as many fish as possible before the quota is met thus increasing effort for a period of time).

Impacts to protected species from **Alternatives 3** and **5** are similar to those described for **Alternatives 2 and 4** with these alternatives possibly offering some protection against derby conditions due to the implementation of hook-and-line and pot trip limits. However, it is possible a derby-situation could arise if the quota was taken before the end of the fishing year. Potential benefits to protected species from **Alternative 5** may be delayed due to the stepped down quotas and trip limits over a three-year period.

The March though June commercial closure proposed in **Alternative 6** would likely reduce risk of sea turtle interactions by reducing the amount of pot gear in the water. Pot gear also poses an entanglement risk to large whales thus this alternative may provide some reduction of entanglement risk to humpback whales since the closure would coincide with peak months (March and April) for humpback whales to occur off North Carolina as they are migrating north to their summer feeding grounds. There may also be some benefit to northern right whales that may still be in the area during March and April (most right whales are believed to have migrated northward by the end of March). Regarding the hook-and-line commercial fishery, the March through June closure could potentially benefit protected species if the closure results in the reduction of hook-and-line gear in the water. However, such benefits may be reduced or negated if fishing effort was to shift into other vertical hook-and-line fisheries during the closure.

Alternative 7 would maintain existing risk levels of protected species interactions (as summarized in the Affected Environment) since the modification of size limits and mesh size in the black sea bass pots would not likely reduce overall effort (i.e., reducing vertical hook-and-line or pot gear in the water).

4.4.4.2 Recreational

Alternative 1 would maintain the status quo and thus keep the existing level of risk for protected species interactions as summarized in the Affected Environment.

Alternatives 2, **3**, **5**, **6, and 8** would reduce the recreational bag limit which may potentially benefit protected species if the reduction in allowable harvest results in the reduction of effort (i.e., reduction of hook-and-line gear in the water). If a reduction in effort occurred, **Alternative 3 or 5** would likely provide the greatest benefit as each has the greatest bag limit reduction; however, potential benefits from **Alternative 5** may be delayed since the reduced bag limit would not take effect until the third year after the rule was implemented. Also, such benefits may be reduced or negated if fishing effort was to shift to target other fish species. **Alternatives 4, 7, and 8** which rely primarily on modifying size limits as a management measure to reduce recreational landings would not likely benefit protected species since the modification of size limits will probably not reduce overall effort (i.e., reducing vertical hook-and-line gear in the water).

4.4.5 Economic Effects of Management Measure Alternatives

This section describes the short-term quantitative effects on the commercial fishery, the quantitative short-term effects on the recreational fishery, and provides a qualitative discussion of the long-term effects on these harvesting sectors and non-use benefits to society. Estimates of the short-term economic impacts are expressed in nominal values (i.e., not adjusted for inflation).

4.4.5.1 Commercial

The methodology employed for the analysis for the commercial sector is described in Section 4.1.5 and is incorporated herein by reference.

Under the status quo for black sea bass and base model alternatives for other species, the expected total net revenue earned by all boat owners, captains and crews is $4.77 million per year (Table 4-27a). This represents a short-term loss of $1.22 million, or 20.4%, compared with the status quo for all species. Since the **no-action alternative** for black sea bass would not impose additional restrictions on commercial fishermen in the short-term, the predicted short-term loss is attributed to the base model alternatives for the other species.

The marginal effects of the proposed alternatives for black sea bass were evaluated by holding the alternatives for other species constant at their base levels. If the proposed regulations were implemented for black sea bass, then short-term losses in net revenue would increase by an average of $0.27 million with **Alternative 2**; $0.32 million with **Alternative 3**; $0.24 million with **Alternative 4**; $0.22, $0.24, and $0.32 during years 1, 2, and 3 for **Alternative 5**; $0.26 million for **Alternative 6**; $0.22 for **Alternative 7**; and $0.07, $0.19, and $0.28 during years 1, 2, and 3 for **Preferred Alternative 8** (Table 4-27a). These losses range from 1.2% to 5.3% of the net revenues were predicted with status quo regulation for all species.

Short-term losses will vary in magnitude depending on fishing conditions that prevail in the near future. If fishing conditions in the near future most closely resemble the fishing conditions that existed in 2001, then the additional losses that would be incurred by fishermen due to the proposed alternatives for black sea bass would range from $0.03-$0.28 million; with 2002 conditions, additional losses would range from $0.02-$0.22 million; with 2003 conditions, additional losses would range from $0.00-$0.27 million; and with 2004 conditions, additional losses would range from $0.24-$0.50 million (Table 4-27b).

The simulation model predicted that all proposed quotas would have been filled with 2004 fishing conditions, that no quotas would have been filled with 2003 fishing conditions, and that quotas associated with **Alternatives 2, 3, 5 (year 3), and 8** would have been filled with 2001 and 2002 fishing conditions. Closures could have occurred as early as mid-February in 2004 with **Alternatives 2, 3, 8 and 5 (year 3)**, and as late as early May in 2004 with **Alternative 5 (year 1)**. The commercial fishery would have been closed from March through June under all fishing conditions with **Alternative 6**. As a result, the annual variability in landings of black sea bass was lowest for **Alternative 6**. The fishery would not close at all with **Alternative 7** because it does not specify a quota or a fixed seasonal closure.

Table 4-27a. Estimated change in revenues minus trip costs and opportunity costs of labor for proposed black sea bass alternatives, by year, given base model alternatives for snowy grouper (3), golden tilefish (2CE), vermilion snapper (10), and red porgy (2).

Black Sea Bass Alternative	**Revenues minus Trip Costs and Opp Costs of Labor (Millions of Dollars)**					**Cumulative Change compared to Status Quo ($Million)**	**Cumulative Percentage Change compared to Status Quo**	**Extra Change due to Black Sea Bass Alternatives ($Million)**	**Extra Percentage Change compared to Status Quo**
	2001	2002	2003	2004	Average	Average	Average	Average	Average
Status Quo	6.84	5.94	5.19	5.99	5.99	0.00	0.0%	n.a.	n.a.
No Action	4.64	4.47	4.72	5.24	4.77	-1.22	-20.4%	0.00	0.0%
2	4.40	4.29	4.50	4.79	4.50	-1.49	-24.9%	-0.27	-4.5%
3	4.36	4.25	4.45	4.74	4.45	-1.54	-25.7%	-0.32	-5.3%
4	4.43	4.31	4.50	4.88	4.53	-1.46	-24.3%	-0.24	-4.0%
5 (year 1)	4.43	4.31	4.50	4.95	4.55	-1.44	-24.0%	-0.22	-3.7%
5 (year 2)	4.42	4.31	4.50	4.88	4.53	-1.46	-24.4%	-0.24	-4.0%
5 (year 3)	4.36	4.25	4.45	4.74	4.45	-1.54	-25.7%	-0.32	-5.3%
6	4.36	4.30	4.48	4.88	4.50	-1.48	-24.8%	-0.26	-4.4%
7	4.43	4.31	4.50	4.97	4.55	-1.44	-24.0%	-0.22	-3.6%
8 (year 1)	4.61	4.46	4.72	4.99	4.70	-1.29	-21.6%	-0.07	-1.2%
8 (year 2)	4.49	4.36	4.57	4.90	4.58	-1.41	-23.5%	-0.19	-3.1%
8 (year 3)	4.38	4.26	4.57	4.74	4.49	-1.50	-25.0%	-0.28	-4.7%

Table 4-27b. The portion of total change in revenues minus trip costs and opportunity costs of labor attributable to proposed alternatives for black sea bass, by year, given base model alternatives for snowy grouper (3), tilefish (2CE), vermilion snapper (10), and red porgy (2).

Black Sea Bass alternatives, given: Snowy(3), Tile(2CE), VS (10), RPorgy (2)	**Extra Change in Revenues minus Trip Costs and Opportunity Costs of Labor due to Proposed Alternatives for Black Sea Bass, and Excluding the Simultaneous Effects of Proposed Alternatives for Other Species**				
	Change from No-Action Alternative, Millions of Dollars				
	2001	2002	2003	2004	Avg
No Action	0.00	0.00	0.00	0.00	0.00
2	-0.24	-0.18	-0.22	-0.45	-0.27
3	-0.28	-0.22	-0.27	-0.50	-0.32
4	-0.21	-0.16	-0.22	-0.35	-0.24
5(1)	-0.21	-0.16	-0.22	-0.28	-0.22
5(2)	-0.22	-0.16	-0.23	-0.35	-0.24
5(3)	-0.28	-0.22	-0.27	-0.50	-0.32
6	-0.28	-0.18	-0.24	-0.36	-0.26
7	-0.21	-0.16	-0.22	-0.27	-0.22
8(1)	-0.03	-0.02	0.00	-0.24	-0.07
8(2)	-0.15	-0.11	-0.15	-0.34	-0.19
8(3)	-0.26	-0.21	-0.15	-0.49	-0.28
Status Quo	6.84	5.94	5.19	5.99	5.99
	Extra Change as Percent of Status Quo				
	2001	2002	2003	2004	Avg
No Action	0.0%	0.0%	0.0%	0.0%	0.0%
2	-3.5%	-3.0%	-4.2%	-7.4%	-4.5%
3	-4.1%	-3.7%	-5.2%	-8.3%	-5.3%
4	-3.1%	-2.7%	-4.2%	-5.9%	-4.0%
5(1)	-3.1%	-2.7%	-4.2%	-4.7%	-3.7%
5(2)	-3.3%	-2.8%	-4.3%	-5.9%	-4.0%
5(3)	-4.1%	-3.7%	-5.2%	-8.3%	-5.3%
6	-4.0%	-3.0%	-4.7%	-6.0%	-4.4%
7	-3.1%	-2.7%	-4.2%	-4.5%	-3.6%
8(1)	-0.4%	-0.3%	0.0%	-4.1%	-1.2%
8(2)	-2.2%	-1.9%	-3.0%	-5.6%	-3.1%
8(3)	-3.8%	-3.6%	-3.0%	-8.3%	-4.7%

Although proposed regulation of the black sea bass fishery would generate relatively small short-term losses for the snapper-grouper fishery as a whole, the losses would be relatively large for fishermen that target black sea bass. In both absolute and relative terms, the effects of the proposed alternatives for black sea bass would be incurred primarily by boats that use fish pots (Table 4-27c). On average, the extra losses that would be incurred by fishermen with fish pots due to regulation of the black sea bass fishery are expected to range from $0.06 million with **Alternative 8** (year 1) to $0.28 million with **Alternatives 3 and 5** (year 3), which represents 11.2%-54.2% of their status quo earnings.

Black sea bass are landed primarily in North Carolina and South Carolina. Therefore, short-term losses would be incurred primarily in the Carolinas, with relatively minor losses incurred elsewhere (Table 4-27d). On average, short-term losses for fishermen in North Carolina would range from 2.1%-10.8% of their status quo earnings.

Total cumulative losses from the black sea bass alternatives plus base model alternatives for snowy grouper, golden tilefish, and vermilion snapper range from $1.22 million with the no-action alternative to $1.54 million with **Alternatives 3 and 5** (year 3), which corresponds to average annual losses of 20.4% to 25.7% of status quo earnings (Table 4-27a).

The number of vessels likely to experience reduced net revenues is about the same for all alternatives except for Alternatives 6 and 8 which would impact the least number of vessels (289 and 236-265 respectively) (Table 4-27e). The additional number of trips canceled in comparison to the no action alternative is greatest for **Alternative 6**, which among other measures proposes a seasonal closure for black sea bass (267 trips). In comparison, implementation of **Alternative 7** would result in the lowest number of canceled trips (54 trips) (Table 4-27e).

The predicted closure dates, net revenue losses, number of affected vessels, and canceled trips discussed previously are conditional on the assumption that fishermen will not alter targeting behavior except to cancel trips if they are not expected to be profitable. However, fishermen could change targeting behavior in other ways that cannot be incorporated into this model because of lack of information. Regulatory changes are proposed for other species, harvested along with black sea bass on the same trip in the hook and line fishery (Figure 3-11d). Fishermen's strategic responses to other measures in this amendment could result in earlier/later closures for black sea bass if harvesting strategies become more/less aggressive in the black sea bass fishery.

Table 4-27c. The portion of total change in revenues minus trip costs and opportunity costs of labor attributable to proposed alternatives for black sea bass, by primary gear, given base model alternatives for snowy grouper (3), golden tilefish (2CE), vermilion snapper (10), and red porgy (2).

Black Sea Bass alternatives, given: Snowy(3), Tile(2CE), VS (10), RPorgy (2)	**Extra Change in Revenues minus Trip Costs and Opportunity Costs of Labor due to Proposed Alternatives for Black Sea Bass, by Primary Gear, and Excluding the Simultaneous Effects of Proposed Alternatives for Other Species**						
	Change from No-Action Alternative, Millions of Dollars						
2001-2004 Average	Vert Lines	Long Lines	Pots	Trolling	Diving	Other	Total
No Action	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	-0.03	0.00	-0.24	0.00	0.00	0.00	-0.27
3	-0.04	0.00	-0.28	0.00	0.00	0.00	-0.32
4	-0.02	0.00	-0.22	0.00	0.00	0.00	-0.24
5(1)	-0.01	0.00	-0.21	0.00	0.00	0.00	-0.22
5(2)	-0.02	0.00	-0.22	0.00	0.00	0.00	-0.24
5(3)	-0.04	0.00	-0.28	0.00	0.00	0.00	-0.32
6	-0.04	0.00	-0.23	0.00	0.00	0.00	-0.26
7	-0.01	0.00	-0.20	0.00	0.00	0.00	-0.22
8(1)	-0.01	0.00	-0.06	0.00	0.00	0.00	-0.07
8(2)	-0.01	0.00	-0.18	0.00	0.00	0.00	-0.19
8(3)	-0.03	0.00	-0.25	0.00	0.00	0.00	-0.28
Status Quo	4.55	0.69	0.52	0.06	0.14	0.03	5.99
	Extra Change as Percent of Status Quo						
2001-2004 Average	Vert Lines	Long Lines	Pots	Trolling	Diving	Other	Total
No Action	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2	-0.5%	0.0%	-47.4%	-2.2%	-0.3%	-0.7%	-4.5%
3	-0.8%	0.0%	-54.2%	-2.6%	-0.3%	-4.2%	-5.3%
4	-0.4%	0.0%	-42.3%	-1.0%	-0.1%	-0.6%	-4.0%
5(1)	-0.3%	0.0%	-40.0%	-0.8%	-0.1%	-0.6%	-3.7%
5(2)	-0.4%	0.0%	-42.9%	-1.0%	-0.1%	-2.5%	-4.0%
5(3)	-0.8%	0.0%	-54.2%	-2.6%	-0.3%	-4.2%	-5.3%
6	-0.8%	0.0%	-43.8%	-3.1%	-0.3%	-0.1%	-4.4%
7	-0.2%	0.0%	-39.6%	-0.7%	-0.1%	-0.6%	-3.6%
8(1)	-0.3%	0.0%	-11.2%	-1.6%	-0.2%	-0.1%	-1.2%
8(2)	-0.2%	0.0%	-34.7%	-0.8%	-0.1%	0.0%	-3.1%
8(3)	-0.6%	0.0%	-48.3%	-2.5%	-0.2%	-1.1%	-4.7%

Table 4-27d. The portion of total change in revenues minus trip costs and opportunity costs of labor attributable to proposed alternatives for black sea bass, by area landed, given base model alternatives for snowy grouper (3), golden tilefish (2CE), vermilion snapper (10), and red porgy (2).

Black Sea Bass alternatives, given: Snowy(3), Tile(2CE), VS (10), RPorgy (2)	**Extra Change in Revenues minus Trip Costs and Opportunity Costs of Labor due to Proposed Alternatives for Black Sea Bass, by Area Landed, and Excluding the Simultaneous Effects of Proposed Alternatives for Other Species**				
	Change from No-Action Alternative, Millions of Dollars				
2001-2004 Average	North Carolina	South Carolina	Georgia & NE FL	Central & South FL	Total
No Action	0.00	0.00	0.00	0.00	0.00
2	-0.21	-0.06	0.00	0.00	-0.27
3	-0.24	-0.08	0.00	0.00	-0.32
4	-0.18	-0.05	0.00	0.00	-0.24
5(1)	-0.18	-0.04	0.00	0.00	-0.22
5(2)	-0.19	-0.05	0.00	0.00	-0.24
5(3)	-0.24	-0.08	0.00	0.00	-0.32
6	-0.20	-0.06	0.00	0.00	-0.26
7	-0.17	-0.04	0.00	0.00	-0.22
8(1)	-0.05	-0.03	0.00	0.00	-0.07
8(2)	-0.14	-0.04	0.00	0.00	-0.19
8(3)	-0.20	-0.07	0.00	0.00	-0.28
Status Quo	2.20	2.11	0.97	0.70	5.99
	Extra Change as Percent of Status Quo				
2001-2004 Average	North Carolina	South Carolina	Georgia & NE FL	Central & South FL	Total
No Action	0.0%	0.0%	0.0%	0.0%	0.0%
2	-9.4%	-2.9%	-0.2%	-0.1%	-4.5%
3	-10.8%	-3.6%	-0.2%	-0.3%	-5.3%
4	-8.4%	-2.4%	-0.1%	-0.1%	-4.0%
5(1)	-7.9%	-2.0%	-0.1%	-0.1%	-3.7%
5(2)	-8.5%	-2.4%	-0.1%	-0.2%	-4.0%
5(3)	-10.8%	-3.6%	-0.2%	-0.3%	-5.3%
6	-9.0%	-3.0%	-0.3%	-0.1%	-4.4%
7	-7.8%	-2.0%	-0.1%	-0.1%	-3.6%
8(1)	-2.1%	-1.2%	-0.1%	0.0%	-1.2%
8(2)	-6.5%	-2.0%	-0.1%	-0.1%	-3.1%
8(3)	-9.2%	-3.5%	-0.2%	-0.1%	-4.7%

Table 4-27e. Frequency distribution of annual loss in net revenue per vessel across the snapper grouper fleet that harvested black se bass, vermilion snapper, snowy grouper, and golden tilefish averaged over the period 2001-2004.
Net losses (revenues minus trip costs and opportunity costs of labor) attributable to proposed alternatives for black sea bass, given base model alternatives for golden tilefish (3), vermilion snapper (10), red porgy (2), and black sea bass (8).

Net Revenue loss category	**1**	**2**	**3**	**4**	**5(1)**	**5(2)**	**5(3)**	**6**	**7**	**8(1)**	**8(2)**	**8(3)**
NO LOSSES*	203	95	95	96	96	96	95	119	96	172	157	143
1- 100	35	84	82	88	90	88	82	58	92	45	38	42
101- 500	37	56	55	53	52	53	55	55	50	46	46	51
501- 1,000	22	29	30	28	28	28	30	29	28	24	26	27
1,001- 2,500	26	36	36	35	35	36	36	40	34	29	36	37
2,501- 5,000	20	27	26	28	28	27	26	26	28	22	26	27
5,001-10,000	27	33	32	33	33	34	32	33	33	28	34	32
10,001-20,000	19	27	29	26	26	26	29	25	25	21	23	27
20,001-30,000	14	16	16	16	16	16	16	16	16	15	15	15
30,001-100,000	6	7	7	6	6	6	7	7	6	7	7	8
Vessels incurring losses	205	313	313	312	312	312	313	289	312	236	251	265
Incremental number of canceled trips above the no action alternative scenario.		152	169	87	63	86	169	267	54	88	86	248

Non-regulatory events such as the displacement of fishing docks and/or "fish houses", which is expected to continue into the future, could contribute to a reduction in effort targeted at black sea bass. Closure of fishing docks that are engaged in the snapper grouper fishery could be accelerated by actions in this amendment since the volume of product and associated revenue from the harvest of species in this amendment would affect the profit margins of these facilities. Decreased profitability provides an additional incentive for owners to sell these properties for alternative development projects (e.g., oceanfront condominiums). This scenario would cause the reduction in effort if displaced vessels could not find alternative docking sites.

Another criterion to weigh in evaluating the relative benefits of the various alternatives is the tradeoff in keeping markets open year round versus lower trip limits. The more advantageous strategy would depend on the characteristics of the fishery such as trip duration, trip costs, the seasonality of other fisheries in which the vessel may be engaged, and the dynamics of the wholesale sector. Generally, keeping markets open year round should result in relatively higher prices for a product. In addition, trip limits would impede the development of a derby fishery if quotas are extremely limiting. However, trip limits could result in fewer trips and lost revenue not only from the regulated species but other species expected to be caught on canceled trips if the limits are overly severe. This would lead to additional disruptions in the fishing operation and associated distribution channel, support industries and consumptive sector.

4.4.5.2 Recreational

Black sea bass is one of the more frequently harvested species in the recreational snapper grouper fishery (Section 3.4.2.2.3). It is estimated that the largest share of the recreational harvest is taken by the private recreational sector (Table 3-26). In relative terms, black sea bass comprises a larger proportion of the headboat harvest in the South Atlantic (Figure 3-17a) compared to the charter and private sectors (Figures 3-19a and Figure 3-21a).

The analytical assessment procedures for the recreational sector are described in Section 4.1.5.2 and are incorporated herein by reference. As noted in Section 4.1.5, the impacts discussed below refer only to activity for this individual species and do not reflect impacts relative to all species harvested by anglers that fish for this species or all recreational snapper grouper activity.

Assuming fishing conditions in the near future are similar to conditions during 1999-2003, it is expected that **Alternative 2** and **Preferred Alternative 8** (year 2) would result in the greatest reduction in the expected numbers of fish harvested (55% reduction) and the greatest annual loss in net non-market benefits ($759,045) (Table 4-28a). These alternatives propose a 12" minimum size limit and a 15 fish bag limit. The losses are mainly attributed to the minimum size regulation. The bag limit was not a constraint on many trips after the 12" minimum size limit was applied to the data set. The lowest immediate impacts are associated with **Alternative 6**, which proposes a bag limit of 10 fish per person per day and a minimum size limit of 10 inches (Table 4.2-6a). Implementation of **Alternative 6** would result in a 13% reduction in the numbers of fish retained by anglers compared to 44% associated with **Alternative 3** and 32% associated with **Alternatives 4 and 7** (Table 4-28a). **Alternative 5** proposes a step down approach to achieve the proposed reduction in recreational fishing mortality, and for the first year the impacts are not expected to differ from the status quo. In year two, the effects of **Alternative 5** are expected to be the same as **Alternatives 4 and 7** (Table 4-28a). **Preferred Alternative 8** also proposes a step down approach and during the first year of implementation the minimum size limit increase to 11 inches while the bag limit decreases to 15 fish per person per day. In year 2, the effects of **Alternative 8** are expected to be the same as **Alternative 2** (Table 4-28a).

The analyses for the charterboat and private recreational sectors are combined since harvest distributions were not available separately for these sectors (Table 4-28b). Harvest of black sea bass in the private recreational sector is more than four times the harvest of this species in the charterboat sector (Table 3-26). Thus, these alternatives are likely to have larger negative impacts on the private recreational sector compared to the charter sector.

Table 4-28a. Summary of estimated effects associated with black sea bass alternatives in the South Atlantic recreational fishery.

	Description of Alternatives	Expected catch (num. of kept fish)	Reduction (Num.)	% change	Value of reduction
Alternative 1 (no action)	10" for black sea bass and 20 fish bag limit	553,852			
Alternative 2	12" min size limit for black sea bass - 15 fish bag limit	247,785	306,067	-55%	$759,045
Alternative 3	11" min size limit for black sea bass - 4 fish bag limit	312,447	241,405	-44%	$598,684
Alternative 4 & 7	11" min size limit for black sea bass	377,831	176,021	-32%	$436,533
Alternative 5	Year 1 - 10" min size and 20 fish bag limit (status quo)	553,852			
	Year 2- 11"min size and 20 fish bag limit (same as Alt 4&7)	377,831	176,021	-32%	$436,533
	Year 3 onwards - 11" min size and 4 fish bag limit (same as Alt. 3)	312,447	241,405	-44%	$598,684
Alternative 6	10" min size limit for black sea bass; 10 fish bag limit	479,509	74,343	-13%	$184,372
Alternative 8	Year 1 – 11" min size and 15 fish bag limit	377,381	176,471	-32%	$437,647
	Year 2 onwards- 12"min size and 15 fish bag limit (same as Alt 2)	247,785	306,067	-55%	$759,045

Table 4-28b. Summary of estimated effects associated with black sea bass alternatives in the charter and private sectors of the South Atlantic recreational fishery.

	Description of Alternatives	Expected catch (num. of kept fish)	Reduction (Num.)	% change	Value of reduction	Number of Affected Trips	
Alternative 1 (no action)	10" for black sea bass and 20 fish bag limit	371,824					
Alternative 2 (Preferred)	12" min size limit for black sea bass - 15 fish bag limit	187,846	183,979	-49%	$456,267	33,570	trips with zero harvest
Alternative 3	11" min size limit for black sea bass - 4 fish bag limit	218,280	153,544	-41%	$380,790	18,644	trips with zero harvest
Alternative 4 & 7	11" min size limit for black sea bass	269,647	102,177	-27%	$253,400	18,644	trips with zero harvest
Alternative 5	Year 1 - 10" min size and 20 fish bag limit (status quo)	371,824					
	Year 2- 11"min size and 20 fish bag limit (same as Alt 4&7)	269,647	102,177	-27%	$253,400	18,644	trips with zero harvest
	Year 3 onwards - 11" min size and 4 fish bag limit (same as Alt. 3)	218,280	153,544	-41%	$380,790	18,644	trips with zero harvest
Alternative 6	10" min size limit for black sea bass; 10 fish bag limit	308,087	63,738	-17%	$158,069	4,505	trips with zero harvest
Alternative 8	Year 1 - 11" min size and 15 fish bag limit	269,586	102,238	-27%	$253,550	18,644	trips with zero harvest
	Year 2- 12"min size and 15 fish bag limit (same as Alt 2)	187,846	183,979	-49%	$456,267	33,570	trips with zero harvest

Similar to the results for the overall recreational fishery, discussed previously, it appears that **Alternative 2** and **Alternative 8** (year 2) would cause the greatest losses in terms of numbers of kept fish and net economic benefits in the private, headboat and charter sectors (Tables 4-28b, c, and d). In fact, the impact of these alternatives on the private and charter sectors and the headboat sector are ranked in the same order as observed in the table of results of impacts to the entire recreational fishery (Tables 4-28a, b and d).

Application of the proposed size limits to the recreational data indicates that a certain proportion of recreational trips would result in zero harvest assuming that anglers do not change behavior to target larger fish. As expected, **Alternative 2** and **Alternative 8** (year 2) are associated with the greatest number of zero harvest trips (33,570 in the charter/private sectors and 89,334 angler trips in the headboat sector) and **Alternative 6** is associated with the fewest zero harvest trips (4,505 in the charter/private sectors and 1,900 angler trips in the headboat sector) (Tables 4-28b and d). Unlike the analysis of impacts in the commercial sector, the number of cancelled trips cannot be estimated as behavioral models to conduct these types of calculations have not been developed. However, it is reasonable to assume that some of these trips where the harvest is expected to be zero would be cancelled. If trips for black sea bass are cancelled anglers could choose to target other species on these fishing trips or choose not to go recreational fishing.

These alternatives are expected to have a greater total impact on the private/charter recreational sector compared to the headboat sector (Tables 4-28b and d). However, **Alternatives 2, 3, 4, and 8** would have a relatively larger impact on the headboat sector compared to the private and charter sectors (Tables 4-28b and d). For example, **Alternative 2** would reduce the numbers of kept fish by 67% in the headboat sector compared to 49% in the charter and private sectors (Tables 4-28b and d). Most of these differences can be explained by the fact that headboat patrons tend to harvest smaller black sea bass compared to anglers in the other sectors of the recreational fishery. In contrast, **Alternative 6** would have a relatively larger impact on the charter/private sector compared to the headboat sector (Table 4-28b and c).

Black sea bass are commonly harvested off North Carolina, the east coast of Florida and South Carolina by anglers in the charter and private recreational sectors (Table 4-28c). The effects of **Alternative 2** and **Alternative 8** (year 2) would be greater in magnitude and in percent reduction for the Florida component of these sectors compared to the other states (Table 4-28c). This is partly attributable to the differential effects of the minimum size limits across the various states in the South Atlantic.

In the headboat sector, most black sea bass are harvested off South Carolina (Table 4-28e). Thus, it is not surprising that the magnitude of losses associated with alternatives for black sea bass will be larger for South Carolina compared to the other South Atlantic states (Table 4-28e). However, the relative magnitude of these losses is higher for Florida and Georgia compared to the other two states (Table 4-28e).

Table 4-28c. Summary of estimated effects associated with black sea bass alternatives in the charter and private recreational sectors by state.

Alternative	Item	Florida	Georgia	South Carolina	North Carolina
Alternative 1	Number of harvest trips	57,229	12,306	26,340	36,635
	Number of fish harvested	118,235	44,732	67,510	121,556
Alternative 2	Reduction from size/bag limit	63,504	25,734	33,255	50,118
	number of kept fish	54,731	18,998	34,255	71,439
	Value of harvest reduction	$157,490	$63,821	$82,473	$124,292
	Percent change	-54%	-58%	-49%	-41%
Alternative 3	Reduction from size/bag limit	42,406	21,045	25,653	54,027
	number of kept fish	75,829	23,687	41,857	67,529
	Value of harvest reduction	$105,167	$52,191	$63,619	$133,987
	Percent change	-36%	-47%	-38%	-44%
Alternatives 4&7	Reduction from size/bag limit	33,082	15,915	14,177	33,926
	number of kept fish	85,153	28,816	53,333	87,630
	Value of harvest reduction	$82,044	$39,470	$35,159	$84,137
	Percent change	-28%	-36%	-21%	-28%
Alternative 5	First year (status quo) Second year (same as Alt. 4&7) Third year (same as Alt. 3)				
Alternative 6	Reduction from size/bag limit	2,804	2,732	5,900	9,782
	number of kept fish	115,430	42,000	61,610	111,775
	Value of harvest reduction	$6,954	$6,775	$14,633	$24,258
	Percent change	-2%	-6%	-9%	-8%
Alternative 8 (1)	Reduction from size/bag limit	33,082	15,915	14,513	34,084
	number of kept fish	85,153	28,816	52,997	87,472
	Value of harvest reduction	$82,044	$39,470	$35,993	$84,528
	Percent change	-28%	-36%	-21%	-28%
Alternative 8 (2)	Same as Alternative 2				

Table 4-28d. Summary of estimated effects associated with black sea bass alternatives in the headboat sector of the South Atlantic recreational fishery.

	Description of Alternatives	Expected catch (num. of kept fish)	Reduction (Num.)	% reduction	Value of reduction	Number of Affected Trips	
Alternative 1 (no action)	10" for black sea bass and 20 fish bag limit	182,028					
Alternative 2 (Preferred)	12" min size limit for black sea bass - 15 fish bag limit	59,940	122,088	-67%	$302,778	89,334	trips with zero harvest
Alternative 3	11" min size limit for black sea bass - 4 fish bag limit	94,167	87,861	-48%	$217,894	68,839	trips with zero harvest
Alternative 4 & 7	11" min size limit for black sea bass	108,184	73,844	-41%	$183,133	68,839	trips with zero harvest
Alternative 5	Year 1 – 10" min size and 20 fish bag limit (status quo)	182,028					
	Year 2- 11"min size and 20 fish bag limit (same as Alt 4&7)	108,184	73,844	-41%	$183,133	68,839	trips with zero harvest
	Year 3 onwards - 11" min size and 4 fish bag limit (same as Alt. 3)	94,167	87,861	-48%	$217,894	68,839	trips with zero harvest
Alternative 6	10" min size limit for black sea bass; 10 fish bag limit	171,422	10,606	-6%	$26,303	1,900	trips with zero harvest
Alternative 8	Year 1 – 10" min size and 20 fish bag limit	107,795	74,233	-41%	$184,097	68,839	trips with zero harvest
	Year 2- 12"min size and 15 fish bag limit (same as Alt 2)	59,940	122,088	-67%	$302,778	89,334	trips with zero harvest

Table 4-28e. Summary of estimated effects associated with black sea bass alternatives in the headboat sector by state.

Alternative	Item	North Carolina	South Carolina	Georgia & NE Florida	Central, South Florida and the Keys
Alternative 1	Number of harvest trips	16,341	56,867	10,623	29,393
	Number of fish harvested	44,885	100,702	22,656	13,785
Alternative 2	Numbers of kept fish	15,609	36,778	5,879	1,526
	Reduction from size/bag limit	29,276	63,924	16,778	12,259
	Value of reduction	$38,709	$91,209	$14,579	$3,784
	Percent reduction	-65%	-63%	-74%	-89%
Alternative 3	Numbers of kept fish	24,164	55,363	9,174	5,466
	Reduction from size/bag limit	20,720	45,339	13,482	8,319
	Value of reduction	$59,927	$137,301	$22,752	$13,555
	Percent reduction	-41%	-45%	-60%	-60%
Alternatives 4&7	Numbers of kept fish	27,563	62,683	12,472	5,466
	Reduction from size/bag limit	17,322	38,019	10,184	8,319
	Value of reduction	$42,959	$94,287	$25,256	$20,631
	Percent reduction	-39%	-38%	-45%	-60%
Alternative 5	First year - status quo Second year - same as Alternative 4 & 7 Third year same as alternative 3				
Alternative 6	Numbers of kept fish	42,616	95,008	20,013	13,785
	Reduction from size/bag limit	2,269	5,694	2,643	0
	Value of reduction	$105,688	$235,620	$49,633	$34,186
	Percent reduction	-5%	-6%	-12%	0%
Alternative 8 (1)	Number of kept fish	27,538	62,565	12,226	5,466
	Reduction from size/bag limit	17,346	38,137	10,430	8,319
	Value of harvest reduction	$43,019	$94,581	$25,867	$20,631
	Percent change	-39%	-38%	-46%	-60%
Alternative 8 (2)	Same as Alternative 2				

The expected reductions in net economic benefits, numbers of kept fish, and numbers of constrained trips were calculated assuming recreational fishermen and for-hire vessel operators will not change targeting preferences or decrease effort targeted at black sea bass. This may not be a reasonable assumption in the short-term since black sea bass are extremely popular to "meat" fishermen who are partly motivated to direct harvest on black sea bass because of the high bag limits. Also, with the continual increase in gasoline prices some recreational fishermen may not want to go further offshore in pursuit of larger fish if minimum size limits increase. Thus, it is likely recreational fishermen would switch targets on trips that are severely constrained by the size and bag limits.

In the long run, it is expected **Alternative 2** would result in the greatest reduction in fishing mortality provided that the level of regulatory discards and associated release mortality does not exceed the total fishing mortality resulting from the other alternatives. As the stock biomass of black sea bass increases in response to reduced fishing mortality, expected catch success rates will increase, resulting in increased net economic benefits. The statistical models to evaluate the tradeoff between the short-term reduction in benefits and the long-term increased benefits from improvements in the stock were not available for this analysis.

Long-term Economic Effects of Proposed Alternatives

Alternative 2 would end overfishing at about the same time as **Alternative 3** at a slightly lower short-term cost (Table 4-27a). **Preferred Alternative 8** would have the least adverse economic impact in the first year, but result in a slightly higher loss in the third year compared to **Alternative 2** (Table 4-27a). The difference between ending overfishing during 2007-2009 (**Alternative 2**) compared to **Alternative 8** equates to $200,000 in net dockside revenue during year 1 and $80,000 in net dockside revenue during year 2 (Table 4-27a).

The long-term effects of choosing these alternatives will depend on the rebuilding strategy the Council selects in Snapper Grouper Amendment 15. However, certain criteria should be qualitatively evaluated in making the final policy decision (Hahn and Sunstein 2005). In this amendment, the factors, which should be considered in weighing the benefits of ending overfishing early (the precautionary approach) versus ending overfishing over a longer time period are: the scientific uncertainty in estimating these stock status determination criteria; the indirect costs and benefits of restrictive management regulations including effort shifts to other fisheries; and the distribution of costs and benefits across different groups of fishermen over the time horizon for rebuilding and relaxation of restrictive harvest regulations.

The long-term effects on the commercial sector of choosing the no action alternative versus one of the other alternatives to end overfishing and rebuild the stock depends on the potential harvest (and associated benefits) over time if overfishing continued (no action) compared to the stream of benefits and costs from choosing one of the other alternatives. Under the current fishing mortality rates the black sea bass stock is rebuilding slowly; however, the stock will not rebuild to B_{MSY} within the time allowed by the National Standard Guidelines. Harvest levels are projected to remain fairly stable if the no action alternative is chosen. Also, black sea bass are characterized by faster growth rates and a shorter life span compared to snowy grouper and golden tilefish (refer to the biological impacts section for more details on this species).

Under the conditions that infrastructure exists (fish houses and docking facilities), fuel costs are not prohibitive, there is consumer demand for this product, and wild caught black sea bass are not permanently displaced by cultured fish species, the long-term economic benefits are likely to exceed the immediate, short-term rebuilding costs in the commercial harvesting sector. However, even under these conditions, it is possible the commercial fishermen who bear the losses from harvest reductions will not survive restrictions to recoup these costs in future benefits from more liberal future harvests. Alternatives for eliminating overfishing would result in an immediate loss of anywhere from 11.2% to 54.2% of net revenue to the black sea bass pot component of the commercial fishery (Table 4-27c).

Currently, black sea bass is relatively important to the recreational harvesting sector. Ending overfishing of black sea bass would impose costs on the various sectors in the recreational fishery. These measures could provide additional future opportunities for the for-hire and private/rental boat sectors of the recreational fishery if harvest regulations become more liberal, there are improvements in catch success rates, and the incidence of localized depletion becomes relatively less common. Increased benefits would be realized if black sea bass retains its popularity within the recreational sector, which will depend on the quality of other available substitute fishing experiences and the cost of fuel.

The discussion of non-use value presented in Section 4.1.5 is relevant to black sea bass also, and is incorporated herein by reference.

4.4.6 Social Effects of Management Measure Alternatives

Impacts from this suite of proposed alternatives will vary depending on sector/fishery, the specific alternative, and whether one looks at the short or long-term impacts.

In general, by ending overfishing of the black sea bass stock would provide long-term benefits to all fishery participants and to the general public. Alternatives differ in how they would allow the stock to arrive at a long-term sustainable status. Each of these alternatives differs in the degree of negative short and long-term impacts imposed on each fishing and non-fishing sector. Below is a more detailed analysis of the negative and positive short-term impacts of the proposed alternatives. Long-term benefits are discussed throughout the analysis but as there are sparse data to analyze long-term effects of management measures on communities, future conditions of fishing communities cannot be predicted with confidence.

4.4.6.1 Commercial

Black sea bass is predominantly landed in North Carolina and northern South Carolina (e.g., Little River), both recreationally and commercially. Hence, most of the impacts from new management measures will also accrue to the communities in those two states.

Alternative 1, No Action, is preferred by the Snapper Grouper Advisory Panel, but does not meet the legal requirements to address overfishing. Additionally, failing to end overfishing would compromise the long-term sustainability of the black sea bass fishery, which would negatively impact the commercial fishing communities that rely on black sea bass landings.

Alternative 2, like the other alternatives proposed, offers many different measures to provide the necessary reduction in commercial landings. The variety of proposed measures is a reflection of the different ways the fishery can be exploited (hook and line or traps) and other distinct characteristics, such as a pronounced seasonality.

The communities most likely to bear the brunt of regulations, which reduce the catch would be Sneads Ferry (where the bulk of black sea bass are landed) and geographically close communities such as Carolina and Kure Beach, Wanchese and the Outer Banks communities of Kill Devil Hills and Hatteras Village, Beaufort, Southport, and in South Carolina, Little River. Coupled with the reductions proposed for vermilion snapper and snowy grouper, an approximate 30 to 40 percent reduction in landings of black sea bass will have further serious negative impacts on the above-named communities.

Alternative 2 would set a hard quota for the commercial sector and would pose problems if the fishery closed prematurely, and that is why a change in the fishing year is being proposed. In general, a hard quota, if implemented without a trip limit, runs a risk of producing a derby fishery. In the case of black sea bass, another complication is the differential landings between different gear sectors, with the pot fishery landing more, but the hook and line fishermen worried about getting shut out. One other concern about a commercial quota is that sale of fish would be prohibited after the quota is filled. However, there is uncertainty among the fishing public about how the quota would be counted (see Section 3.5.5), and if recreational sale might somehow figure into the accounting. Fishermen are concerned about issues of fairness regarding how the quota will both be allocated between sectors and how it would be managed.

Increasing the commercial minimum size limit from 10 to 11 inches would probably not result in serious social impacts on the above-mentioned communities. There may be a problem, initially, as the markets adjust to a larger fish, but accommodations would most likely be made. However, it has been noted that it is more difficult to move large fish in the market – the larger the fish, the higher the price. It was also noted during the June 2005, Council meeting discussions that fishermen south of Sneads Ferry have a greater concern than others regarding an 11-inch fish. As no data have been collected as to why this may be the case, no further comment can be made.

The request for 2” mesh back panels on the bass pots will pose a economic cost to those pot fishermen not already employing such a panel to cull their catches when they haul the pot from the water. According to the Advisory Panel, about 25% of pot fishermen already have the cull panels on their traps. The expense of re-rigging the back panel would be less than having to re-rig the entire trap.

A change in the fishing year would work to the fishermen’s advantage by allowing them to take the most fish when they are present, and having the closing of the fishery coincide with the months of least fishing activity. The Coastal Migratory Pelagic FMP was recently amended to obtain the same benefit for the fishermen in those fisheries.

Alternative 3 would reduce the commercial quota, thus posing more hardship on fishermen (see the above discussion). Like the **Alternative 2, Alternative 3** also proposes a size increase, a 2” mesh back panel on pots, and changing the fishing year, but it also adds a trip limit. While trip limits are a management tool to slow fishing when there is a fear of a derby fishery, they can also stifle a fishery and do damage by not allowing the fishermen flexibility to respond to stock fluctuations. In addition, there will be an incentive on fishermen to ensure that few fishing trips do not reach the trip limit.

Alternative 4 would specify a higher quota than the previous alternatives, and would maintain other status quo regulations (size limit, 2" mesh back panel and change to fishing year). This alternative is hypothesized to have a less damaging short-term social impact than the previous three.

Alternative 5 would step down the quota for the commercial catch and otherwise is similar to the other alternatives. This alternative offers a benefit of allowing fishermen to adjust to lower catch levels over time.

Alternative 6 would implement a seasonal closure from March through June along with the 2" mesh back panel and no change to the 10" total length minimum size limit. This alternative may impact the commercial hook and line fisherman who would continue to catch black sea bass during the closed season. While impacting the pot fishermen less than the hook and line fishermen, there are still some potters who fish well into the spring, and so they may be impacted by this proposed regulation also.

Alternative 7 would be fairly lenient and acceptable to most sea bass pot fishermen and hook and line fishermen. Increasing the 10" total length minimum size limit to 11" total length may not be desired by fishermen in southern North Carolina and northern South Carolina, but it may not pose serious short-term impacts to the fishery overall. The 2" mesh back panel is, for the most part, acceptable to pot fishermen, and 25% of them already are using this technology to cull their catches. However, if it is insufficient to end overfishing, it would be expected to result in large adverse long-term social impacts.

Preferred Alternative 8 was developed at the December, 2005 SAFMC meeting and represents a compromise between managers and commercial fishermen. It was acknowledged that there was a need to reduce fishing effort for black sea bass, but it was also agreed some of the data used for estimating biomass were incomplete and previous proposed alternatives may have been overly precautionary.

To address concerns regarding strongly negative social and economic impacts on this fishery, another alternative was proposed and accepted by the Council. A stepped down approach to reducing the black sea bass quota was adopted and will act to mitigate the impacts of immediately instituting a quota as the regulations will be implemented over three years. Because of concerns expressed by fishermen, the Council will require that all black sea bass pots be removed from the water after the quota is met. This proposed action could have the additional benefit of reducing conflict between different factions of black sea bass pot fishermen. The increase in a minimum size requirement was also eliminated as there were concerns the 2" mesh back panel would not cull for 12" total length fish, again increasing regulatory discards. Changing the fishing year will likely further reduce impacts by shifting the potential filling of the quota to the months where the least amount of fishing effort occurs.

While **Preferred Alternative 8** mitigates some of the impacts, there is still a fear among many of the black sea bass commercial pot fishermen that the impacts will be serious enough to affect their continued participation in the fishery. Without long-term social and economic studies it will be difficult to monitor the impacts on fishermen and their associated communities.

4.4.6.2 Recreational

The black sea bass fishery is an important recreational fishery, both for private and for-hire fishers. This fishery actually extends from North Carolina to northern Florida, but the majority of the fishing effort for this species comes from North Carolina and South Carolina fishers.

The black sea bass species is a part of a diverse bottom fishing fishery and certainly is impacted by regulatory actions that are directed specifically at it as well as regulatory actions on other species that are commonly found with black sea bass. For example, the reduction in the bag limit for red porgy from 20 fish to 1 fish, had a negative impact on black sea bass fishing are sometimes found on the same fishing grounds and have caused boat captains to avoid certain productive sea bass grounds altogether because of the amount of frustration experienced by anglers who discarded large numbers of red porgy. This meant that they were placing increased amounts of effort onto other places to avoid catching and discarding red porgy.

Going from a 20 fish to 1 fish bag limit for red porgy has been good for the resource in terms of helping it to recover (as is seen in the red porgy section of this document), but the drastic nature of the cut caused many fishermen to shift their effort and more heavily rely on other species, black sea bass being one of those. A similar situation could occur if a reduction of the same magnitude were to occur in the black sea bass industry. Thus, it may shift effort to other species, which may already be stressed, or could become stressed in the future because of the additional effort.

The loss of clientele is another important consideration given the amount of money injected into local economies by recreational fishermen. Hotels, restaurants, gas stations, bait and tackle shops and the charter and head boats themselves probably will experience a loss of revenue. After having spoken with head boat and commercial fishermen, there is a willingness to do whatever it takes to protect the fishery and the resource. If a reduction in catch is required, then regulations, which still entices people to fish, but reduces the catch enough to assist in the rebuilding process, should be determined. Some headboat captains have said reducing the bag limit from 20 fish to 15 fish would be acceptable, and increasing the minimum size limit is always preferred over aggressive reductions in the bag limit.

The only socioeconomic impact associated with **Alternative 1** would occur if a reduction in effort is needed and nothing is done. In the future, more restrictive measures may be required, and the adverse short and long-term social impact would likely have a greater negative social impact on the for-hire industry than on the private boat fisher. The reason is that the for-hire industry has a much greater reliance on these species throughout specific times of the year and during times of inclement weather. A private boat angler is not likely to give up fishing because of a reduction in the bag limit, but headboat clients, especially those who travel from more than a couple of hours away, may not see it as justifiable to go fishing only to keep a small number of fish, especially when increasing costs of fuel cause ticket prices to increase.

The private recreational fisher is not likely to be impacted by **Alternative 2**, because a reduction in bag limit and an increase in size limit are not likely to stop them from targeting black sea bass. The reason they are not likely to stop fishing is they are already vested in a boat and equipment and are not likely to stop fishing because of a reduction in one fishery. The majority of these fishermen are not fishing for food, but for sport. If they were fishing for food they probably could not justify the purchase of the boat. What is more likely to occur is an outcry among the private recreational fishermen that managers are not doing enough to reduce the amount of fish taken by the commercial industry and that commercial fishermen are allocated too much of the catch. Recreational anglers have argued that more fish should be "theirs" simply based on their overwhelming numbers and the amount of economic revenue they generate for local coastal communities.

Based on interviews conducted with captains in the for-hire industry (specifically North Carolina captains), they are not opposed to a reduction in the bag limit to 15 fish, if it is truly deemed necessary (something they whole heartily question). While an increase in the minimum size limit would certainly increase the number of regulatory discards, it is not likely it would affect people to the point they discontinue participation in the fishery. However, a reduction in bag limit could eventually affect whether or not people would fish for black sea bass because they will have to determine if it continues to be economically justifiable to go on certain trips where a reduced number of fish is allowed to be taken. Half-day trips in North Carolina most commonly target bottom species such as black sea bass, porgies, and grunts (and a variety of other species). People may stop going on these kinds of trips if the cumulative impact of regulatory actions on species most often targeted and desired by the half-day trips causes them to determine that it is not worth between $50 and $70 per person to go fishing and only bring home a few fish.

Alternative 3 would reduce the bag limit to four fish bag, which would have a significant adverse impact on the for-hire industry, especially in North Carolina where a large number of trips targeting this species and others that congregate with it on bottom fishing trips. As one North Carolina headboat captain stated, "this would simply kill me. Nobody is going to come and pay $70 to not be able to keep fish. The headboat fisherman is a different kind of fisherman. He wants something to take home to eat and show for his effort. He will not simply be satisfied with catching fish and throwing them back…they will simply stop coming."

Headboat captains have commented they would more readily be able to endure an increase in the minimum size than a reduction in bag limit because in this fishery they sell the opportunity to catch fish to keep not just to release. A four fish bag limit would essentially make the cost of fishing for many unjustifiable, especially with price increases associated with the cost of fuel and because many fishermen on these boats often come from a significant distance to fish. This having been said, they would still prefer a larger size limit rather than a reduction in bag limit based on the length of these specialized trips.

Alternative 4 would maintain a 20 fish bag limit and increasing the minimum size limit to 11 inches total length, which appear acceptable for all those involved in the recreational fishery.

One potential problem is a conflict, which could arise between commercial and recreational fishers because if the commercial industry reaches a hard TAC and is closed down in late winter/early spring, the recreational fishery would still be allowed to catch fish, potentially catching an increased amount because of limiting the commercial effort. And, because the recreational catch is not able to be monitored as quickly as the commercial, there is a greater potential for overfishing, something that was experienced in the North Carolina summer flounder fishery a few years ago. Similar problems could arise for other reef fish species monitored with commercial quotas.

Alternative 5 potentially has a negative impact on the for-hire industry based on arguments made in previous sections. A reduction in the bag limit can have a negative impact on the for-hire sector because many people may not be willing to pay in excess of $70 a trip to throw fish back.

Alternative 5 is a phase-in type of management strategy in which year 2 has steeper cuts than year 1, and year 3 has steeper cuts than year 2. These cuts are likely to frustrate anglers, both in the for-hire and the private sector. The previous quote from the headboat captain still rings as relevant to this alternative as well.

Alternative 6 is a more acceptable alternative from a biological standpoint in that the number of regulatory discards would be reduced. The primary impact would be on the longer for-hire trips, those 18 hours and over. If a trip lasts over the course of two days, the catch is limited to a trip based measurement, meaning they can only catch the trip bag limit. Overall the magnitude of the impact of this alternative is unknown for the longer for-hire trips. However, for the shorter trips and the private boat angler this is not likely to have a negative impact, especially if other species such as red porgy are having the bag limits increased.

Alternative 7 is one that all recreational fishermen would support. It might increase the number of regulatory discards, but recreational fishers would be much more willing to accept a size increase rather than a bag limit decrease. Many fishers who target black sea bass do so not for the fight but because they are good to eat. Allowing more fish to be kept, though it may be more difficult to reach the bag limit because of the minimum size limit increase, is better than having a smaller bag limit, even if current size limit remains the same.

Preferred Alternative 8 was created by the Council based on input from the public with the concern that the recreational black sea bass fishery is growing rapidly and may, without constraints, exceed its share of the total allowable catch. While many recreational fishermen may not oppose a minimum size limit increase from 11 to 12" total length, the Council has proposed implementing a reduction in the bag limit from 20 fish to 15 fish. These two measures together will have an immediate negative impact on the headboat and charter boat sectors in North Carolina and South Carolina. Private recreational anglers may not be a negatively impacted. Changing the fishing year to run from June 1 to May 31 will make the regulations consistent with the commercial fishery. Restricting harvest to the TAC, however, will prevent the need to impose more severe restrictions, with greater accompanying adverse social and economic impacts, in the future.

General Non-Fishing Public
For the general non-fishing public of the U.S., the proposed alternatives to end overfishing offer long-term benefits as the management measures – outside of status quo – work to improve stock status. These actions have benefits for those in the U.S. who derive satisfaction from knowing that the marine environment is managed sustainably and is thriving. The U.S. consumer may benefit from potential increased consumption of locally caught fish as the stock increases.

There is the potential of long-term negative impacts to the general non-fishing public who enjoy coming to the coast to experience a "fishing community," eat locally caught seafood, and enjoy the heritage tourism benefits of many coastal communities. If the infrastructure for commercial fishing in the South Atlantic continues to wane, and the proposed management measures hasten that decline, communities will lose this attraction for their tourist trade, and visitors may have a diminished coastal tourism experience. However, these communities can only be expected to exist and prosper if healthy resources and fisheries also exist. So, ending overfishing of the black sea bass resource, as a component of the marine ecosystem, is essential to the existence and sustenance of these communities.

4.4.7 Administrative Effects of Management Measure Alternatives

4.4.7.1 Commercial

Retaining the current regulations (**Alternative 1**) would not represent an increased administrative burden.

Alternative 2 would specify a commercial quota of 347,000 lbs gutted weight, increases the minimum size limit to 11" total length, require the use of 2" mesh in the back panel, and change the fishing year from the calendar year to June 1 to May 31. It would represent an increased administrative burden relative to **Alternative 1** since there is no quota monitoring program in place for black sea bass. Furthermore, if the quota was met before the end of the year, which would require the fishery to shut down, NMFS would be required to provide notice. This could place an additional burden on Law Enforcement to ensure that commercial fishermen would not sell, purchase, harvest, and/or retain any black sea bass over the bag limit once the quota was met.

The administrative burden of **Alternative 3** would be greater than **Alternative 2**. Since this alternative also includes separate trip limits for hook and line and pot gear, there would be an additional burden to Law Enforcement to ensure that fishermen were in compliance.

Alternative 4 includes separate trip limits for hook and line and pot gear that are larger than Alternative 3 as well as an increased minimum size limit (13" TL). The burden of **Alternative 4** on Law Enforcement would be greater than that associated with **Alternative 3** since more fish would have to be counted and measured to ensure compliance.

Alternatives 5 and 8 (Preferred) would step down the quota and trip limits over a 3-year period to levels specified in **Alternative 3**. The frequent changes could be confusing to the public, which could increase the chance quotas or trip limits would be exceeded. There would also be an increased burden for law enforcement to ensure compliance with the quotas and trip limits.

The administrative burden of **Alternative 6** would be less than **Alternatives 2 through 5** since it does not require the implementation of a monitoring program and it retains the 10" total length minimum size limit. The effect of **Alternative 7** would be similar to **Alternative 6** with the exception that **t**here could be an increased burden on Law Enforcement to ensure compliance with the larger size limit.

4.4.7.2 Recreational

Alternative 1 would maintain the current regulations of a 10" total length size limit and 20 fish per person per day. This alternative would not increase the burden on the administrative environment and would not require landings be monitored.

Alternative 2 would specify a recreational allocation of 459,000 lbs gutted weight, increase the minimum size limit to 12" total length, and reduce the bag limit to 15 fish per person per day. **Alternative 2** would not require landings be monitored and, therefore, would not represent an additional administrative burden for MRFSS or the SEFSC's headboat survey.

Alternative 3 would specify a recreational allocation of 409,000 lbs gutted weight, increase the minimum size limit to 11" total length and reduce the bag limit 4 fish per person per day. The administrative burden would be similar to **Alternative 2**; however, a smaller bag limit would decrease the number of fish that Law Enforcement would have to count and measure.

Alternative 4 would specify a recreational allocation of 560,000 lbs gutted weight, increase the minimum size limit to 11" total length and maintain the bag limit to 4 fish per person per day. The administrative burden would be similar to **Alternative 2**; however, a larger bag limit would increase the number of fish that Law Enforcement would have to count and measure.

Alternative 5 would step down recreational allocations, size limits, and bag limits to levels specified in **Alternative 3** at the end of three years. Therefore, the administrative burden of **Alternative 5** would be greater than **Alternative 3** since the public would have to be noticed of the annual changes. The frequent changes could be confusing to the public.

The administrative burden of **Alternative 6** would be less than **Alternatives 2 through 5** since it would not establish a recreational allocation, would retain the 10" total length minimum size limit, and would reduce the bag limit to 10 fish.

The effect of **Alternative 7** would be similar to **Alternative 6**. The 20 fish bag limit could require more time for Law Enforcement to count and measure fish to ensure compliance with regulations.

Alternative 8 would decrease the recreational allocation over three years from current landings to 409,000 lbs gutted weight in Year 3, increase the size limit to 11" total length in Year 1, 12" total length in Year 2, and reduce the bag limit to 15 fish per person per day. **Alternative 2**

would not require landings be monitored and, therefore, would not represent an additional administrative burden for MRFSS or the SEFSC's headboat survey.

4.4.8 Conclusions

A black sea bass commercial quota stepped down from current landings to 477,000 lbs gutted weight in Year 1, 423,000 lbs gutted weight in Year 2, and 309,000 lbs gutted weight in Year 3 with a 2" mesh requirement for the back panel of pots, a requirement to remove pots from the water when the quota is met, and an increase in the recreational size limit to 11" total length in Year 1, 12" total length in Year 2 onwards and a reduction in the bag limit to 15 black sea bass per person per day is the Council's preferred alternative. The fishing year would also change to June 1 through May 31. The Council received public input during the public hearing and informal review process on the preferred alternative 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 changed their preferred alternative based on comments received.

SEDAR 2 (2003b) and the 2005 assessment update indicates black sea bass is overfished and experiencing overfishing. The **Preferred Commercial Alternative 8** would end overfishing during 2009 with a quota in Year 3 that represents a 35% reduction of the average landings during 2000-2003. This alternative is expected to benefit the stock in terms of restoring the natural size/age structure, sex ratio, and community balance. However, it also is expected to have large, short-term, adverse social and economic impacts on commercial fishermen, fishing communities, and associated industries. Ending overfishing of black sea bass is expected to rebuild biomass allowing for an increased harvest with time. Therefore, this alternative is expected to have net beneficial social and economic impacts in the future.

The Council received many <u>public comments</u> addressing black sea bass. There was support for a pot limit per vessel (e.g., 200 per vessel); reducing the recreational bag limit to 30 per vessel or 5 fish per person per day; have the same bag limit for charter and headboat; suggestion to eliminate black sea bass pots; suggestion to require tending of traps (i.e., take them out and bring them back in at the end of a trip); require pot fishermen to remove pots from the water for 3 months of the year; 11" total length size limit and 15 fish bag limit; stepped-up recreational size limit (11" total length in year 1 and then 12" total length in year 2); support for different regulations off each State similar to the Mid-Atlantic and New England regulations; support for taking action to end overfishing; and suggestions for a smaller size limit or no change in size limit for the Georgia/North Florida areas where larger fish are not common. Concern was expressed that there would be high-grading with the increase in size limits and/or the decrease in the bag limit. There was also concern that bycatch and discard mortality would be a problem with an increased size limit.

The <u>Snapper Grouper Advisory Panel</u> expressed much concern about the data going into the stock assessment and the stock assessment conclusions. They were also concerned the results do not incorporate recent information the North Carolina Division of Marine Fisheries has collected on black sea bass. Additional concerns included: use of the headboat survey from South

Carolina and also the MARMAP survey because it was felt these surveys did adequately represent North Carolina, where the vast majority of the catch is landed. The Advisory Panel feels that age and length frequencies show that the black sea bass resource is healthy and sustainable; MARMAP sampling locations are not representative of the fishery off North Carolina; and an eleven-inch fish will devastate the market since there is a large market for a ten-inch fish.

The Panel stated that previous management has not had sufficient time to work since the size limit was increased from 8" total length to 10" total length in 1999. This was done on a ten-year rebuilding program that started in 1999. Some Panel members felt current management measures should remain in place until the rebuilding period established in 1999 was over.

Some fishermen in North Carolina expressed support for the 2 inch back panel. However, some are fishing pots that have inch-and-a-half mesh with two-inch square mesh escape panels and biodegradable panels. Some fishermen were concerned they would lose all octopus catch with a larger mesh trap or a full two-inch back panel.

With respect to alternatives for recreational fishing, many headboat operators from the Cape Hatteras area off North Carolina would rather have a 12" total length minimum size limit and a fifteen fish bag limit rather than a 5 or 6 fish per person per day bag limit and a 10" total length minimum size limit. However, a 12" total length minimum size limit could be a hardship for boats fishing out of Murrells Inlet, Calabash, and Little River South Carolina. These fishermen would be in favor of a further reduction in bag limit with an 11" total length minimum size limit.

The Advisory Panel's consensus recommendation for black sea bass is to take no action (**Alternative 1**) until better data are collected and the science is more sound.

<u>The Law Enforcement Advisory Panel</u> preferred to have consistent size limits for all fishing sectors for ease of enforcement, and they recommended that the size and the shape of the black sea bass pots should be clarified. A two-inch mesh back panel should be specified how it is measured, diagonally, across, etc.

The <u>Scientific and Statistical Committee</u> (SSC) reviewed the SEDAR Assessment and approved the assessment as being based on the best available science. The SSC concluded the proposed alternatives that end overfishing in one to five years are sufficient to end overfishing if there is no bycatch or post-quota mortality. Discard and post-quota mortality, from bycatch and discard mortality, was not incorporated into the proposed actions and the actions might not end overfishing as soon as projected. The methodology to estimate the discard and post-quota mortality is still being developed and was not available for use in finalizing Amendment 13C. The SSC concluded the social and economic analyses were accurate and complete given the available data; however, they noted shortcoming in the biological analyses due to the lack of estimates for the bycatch and post-quota mortality.

The <u>Snapper Grouper Committee</u> 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 the need to be conservative in the face of uncertainty. Committee members were also concerned about the discard mortality and post-quota mortality. To balance the need to end overfishing with the resulting socio-economic impact on fishing communities (particularly in North Carolina), the Committee changed the preferred alternative from **Alternative 2** to **Alternative 8** which phases-in the quota reductions, requires at least 2" mesh in the back panel (effective 6 months after the final rule is published), changes the fishing year, and requires pots be removed from the water when the quota is met. This will give the Council time to evaluate alternatives to address the discard and post-quota mortality through Amendment 13B prior to the more restrictive quotas being implemented which could result in the most discards. In addition, the Council will be working with the NMFS, the States, and fishermen to improve data collection and have some of the identified data gaps filled prior to the next SEDAR Assessment (approximately 5 years from 2003). Committee members felt **Alternative 3** would not compromise their efforts to end overfishing and achieve their conservation objective; rather the additional two years as compared to **Alternative 2** would allow sufficient time for the scientists to develop their estimate of bycatch and post-quota mortality and for the Council to consider management alternatives to reduce rather than ignore this source of mortality.

The change in mesh size of the back panel will result in impacts on fishermen. Delaying the requirement for 6 months after the final rule in published will give fishermen time to replace the back panel as the gear wears out. The 2" mesh back panel is designed to cull a 10" total length black sea bass. The next largest mesh size available would cull for much larger fish (14-15" total length). The Committee was concerned that an increase in the size limit to 11" total length and the two-inch back panel would retain 10 to 11" total length fish that would have to be released when the pot was brought to the surface resulting in extra discard mortality. Therefore, the Committee supported the retention of the 10" total length size limit for black sea bass caught by commercial fishermen.

For the recreational fishery the Committee adopted a new **Alternative 8** corresponding to the TAC values contained in the new commercial **Alternative 8** which phase-in the recreational allocation over three years. In addition, the recreational size limit would increase from 10 to 11" total length in year 1 and to 12" total length in year 2. The bag limit would be reduced from 20 to 15 fish beginning in year 1 and the fishing year would also change to begin June 1. The Committee concluded phasing-in the recreational allocation and the size limit would allow the fishermen time to adapt to changes; thereby, balancing the biological objective of ending overfishing with the resulting negative social and economic impacts. The Committee considered retaining the bag limit of 20 fish with the 12" total length size limit because there is not much difference in harvest reduction between the 20 fish and 15 fish bag limits. However, the Committee felt that as the stock improves, more fishermen would target black sea bass and the catches would increase such that the bag limit would need to be reduced in the future. The Committee concluded it would be better to lower the bag limit now rather than when the stock was rebuilding. In addition, there was support for a lower bag limit of 15 as compared to 20 fish based on ethical considerations among the recreational fishing community.

The Committee discussed different size and bag limits for South Carolina south to address the impacts on nearshore fishermen and half-day for-hire trips. The Committee concluded that as the stock rebuilds a greater number larger fish would show up in nearshore waters and in the areas where half-day trips can be made thus making state by state or area regulations unnecessary. This is supported by an incident on an artificial reef seven miles off the coast of Georgia where the buoy went missing for about a year. Prior to loss of the buoy, the average size black sea bass caught was 7 to 8" total length. When that buoy was replaced and fishing resumed on that reef, the average size of black sea bass caught was 12 to 13" total length. In a year, the average size of black sea bass had increased dramatically.

For black sea bass, the preferred alternative would change the fishing year to begin June 1 and end May 31. If the final rule is published after June 1, then the quota and size limit for year 1 would be implemented during 2006. The lower quota for year 2 and the reduction in size limit for year 2 would begin on June 1, 2007. The final reduction in TAC and quotas (commercial)/allocation (recreational) would begin on June 1, 2008.

The Council concluded the commercial alternative recommended by the Committee (**Alternative 8**) best meets the conservation objective of ending overfishing while addressing concerns about bycatch and post-quota mortality. The preferred alternative phases-in the quota reductions which will give the Council time to address bycatch and post-quota mortality through Amendments 13B and 16. The phase-in also provides some time for the affected fishermen and communities to adjust to the negative short-term social and economic impacts. The Council discussed the issue of removing pots from the water when the quota is met and approved giving the Regional Administrator authority to grant a 10-day grace period for removal of traps to address weather issues, vessel break-down issues, etc. The Council was clear; however, that once the quota is met and the fishery closed, no species could be possessed while transporting traps to shore.

The Council concluded the recreational alternative recommended by the Committee (**Alternative 8**) best meets the conservation objective of ending overfishing. Phasing-in the increase in the size limit to 11" total length in year 1 and 12" total length in year 2 will give the fishermen time to adapt to the changes and addresses some of the negative short-term social and economic impacts. The bag limit would be reduced to 15 black sea bass per person per day beginning in year 1.

The Council concluded the preferred commercial and recreational alternatives best meet the purpose and need to end overfishing of black sea bass as soon as practicable and to allow as close to a year-round fishery as possible while maintaining (where possible) historic participation rates and patterns (including allocation rations), minimizing costs, meeting the objectives of the Snapper Grouper Fishery Management Plan, and complying with the requirements of the Magnuson-Stevens Act and other applicable law. **Alternative 1** (No Action) would continue to allow overfishing and was rejected by the Council.

4.5 Red Porgy

4.5.1 Background

Red Porgy are not experiencing overfishing, since the current fishing mortality (F) is less than the fishing mortality that would achieve the maximum sustainable yield (SEDAR 1 2002). Overfishing for red porgy is defined as a fishing mortality (F) that exceeds the maximum fishing mortality threshold (MFMT) that the Council has defined as F_{MSY}. $F_{2001}/F_{MSY} = 0.45$. Red porgy is overfished and in year 5 of an 18-year program that will rebuild the stock to B_{MSY} by 2017. Current recovery projections indicate average catch during 2000-2003 can be increased by 109% without overfishing or compromising stock rebuilding within the approved schedule.

SEDAR 1 (2002) Assessment

Red porgy was the subject of the first SEDAR assessment (SEDAR 1 2002) that updated previous assessments conducted by Vaughan et al. (1992), 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).

The following recommendations were made to that would strengthen futures assessments:

1. Resolve ageing discrepancies from different institutions;
2. More emphasis needs to be placed on the role of protogyny and make better use of existing sex ratio data;
3. Develop programs to better estimate discard rates of red porgy;
4. Expand MARMAP program so that it better represents the depth and geographic range of red porgy; and
5. Clean up NMFS general canvas data base.

Review of Previous Stock Assessments

The first stock assessment for red porgy was conducted in 1990 (PDT 1990) using data from 1972 through 1988/89. Spawning Stock Ratio (SSR) (considered to be the same as Spawning Potential Ratio (SPR)) was calculated separately for recreational and commercial fisheries. (Table 4-29).

Table 4-29. Spawning Stock Ratio (SSR) values for red porgy.
Source: PDT 1990.

RECREATIONAL	COMMERCIAL
Carolinas = 18%	Carolinas = 29%
FL = 45 - 19%	
SSR with 12 inch Minimum Size Limit:	SSR with 12 inch Minimum Size Limit:
33%	38%

A series of stock assessments provided estimates of SSR based on catch curves (NMFS 1991; Huntsman *et al.* 1992; Huntsman *et al.* 1994) (Table 4-30). Potts *et al.* (1998) provided an estimate of SPR for red porgy caught during 1997 (Table 4-30).

Table 4-30. Values of Spawning Stock Ratio and Spawning Potential Ratio for red porgy. Source: NMFS 1991; Huntsman et al. 1992; Huntsman et al. 1994; Potts et al. 1998; Vaughan 1999; Vaughan and Prager 2002.

Assessment Year	Catch Data From	Overall SSR	SSR with Minimum Sizes
1991	1988	11%	15%
1992	1990	8%	12%
1993	1992	13%	>30%
1997	1997	24%	
1999	VPA thru 1997	20%	>30%

The first biomass-based assessment was conducted in 1999 with data through 1997 (Vaughan 1999; Vaughan and Prager 2002). The following parameters were presented in the Snapper Grouper Amendment 12 (SAFMC 2000):

A. A maximum fishing mortality threshold (MFMT) — A fishing mortality rate (F) corresponding to a 35% Static SPR (F=0.43) based on a 14" TL minimum size limit. Current fishing mortality was estimated as 0.47 based on a 14" TL minimum size limit and data through 1996.

*B. A minimum stock size threshold (MSST) — The minimum stock size threshold is defined as the maximum of either 0.5 or 1-M (M = natural mortality = 0.28) times Bmsy. The Council is specifying the minimum stock size associated with 35% Static SPR which is 3,328 metric tons (MSST=(1-0.28)*4,622=3,328 mt) or 7.34 million lbs. Current stock size was estimated to be 685 metric tons (1.51 million pounds) based on data through 1996.*

<u>Rebuilding timeframe</u>. Red porgy cannot be rebuilt in less than 10 years (see NMFS SEFSC results as shown in Figure 1) and a generation time is estimated as 8 years. Therefore, the rebuilding timeframe for red porgy is 18 years with 1999 being Year 1 given the emergency closure was implemented on September 8, 1999.

<u>Council Determination of Stock Status</u>

The following information is from the Advisory Report resulting from the 2002 SAW/SARC Process. The full SARC Report is available from the Council office.

<u>Status of Stock</u>: *The stock is overfished but overfishing is not occurring. The current index of spawning stock biomass is low; the 2001 spawning stock size is estimated at about 43% of SSB_{MSY} and 55% of MSST. The 2001 fishing mortality rate is estimated at about 45% of F_{MSY}. Recruitment, as measured by the model, has trended down from 1972 with an upturn in 2001. The size structure of the stock has been reduced after a period of high fishing mortality.*

<u>Management Advice</u>: *Fishing mortality should not be increased. Although overfishing is not currently taking place, in the future fishing mortality may need to be reduced to meet the 2016 rebuilding requirement. However, there is very little information associated with the effects of the current management regime (Amendment 12 initiated in 1999) with which to project rebuilding. [Note: Amendment 12 was implemented on August 29, 2000.]*

<u>Forecast</u>: *There is considerable uncertainty in future rates of recovery due to: uncertainty about the biology of the species, model uncertainty, and quality of the data available. Projections simulating current fishing mortality (Amendment 12 regulations) show less than 50% probability of achieving SSBmsy in 2016 which is the last year of the Council's 18 year rebuilding program. See Figure 15. The projections show a 50% probability of exceeding the MSST in 2011. Projections simulating no directed fishing or by-catch (F = 0) would achieve SSBmsy in 2009 but the mortality from discards would increase.*

New recovery projections provided by the Population Dynamics Team in June 2003 indicate harvest can be increased. All computations, benchmarks, initial status of the stock, and operating model were based on SEDAR 1 (2002). Recovery to B_{MSY} occurs at the end of the 18-year period for all strategies examined.

Landings information

Total landings decreased from 1,500,000 lbs whole weight during 1990 to less than 200,000 lbs whole weight after 1999 (Figure 4-14). Regulations, which may have affected the catch of red porgy are shown in Table 4-31 and in Figure 4-14):

Table 4-31. Regulations for red porgy.

Regulation	Effective Date	Plan or Amendment
4" TL trawl mesh size limit	8/31/83	Original FMP SAFMC (1983)
Prohibit trawl gear	1/12/89	Amendment 1 (SAFMC 1988)
Prohibit fish traps, entanglement nets, & longlines within 50 fathoms; 12" minimum size limit; vessel permit	1/1/92	Amendment 4 SAFMC (1991)
Oculina Experimental Closed Area	6/27/94	Amendment 6 SAFMC (1993)
Limited entry program: transferable permits and 225-lb non-transferable permits	12/98	Amendment 8 SAFMC (1997)
14" minimum size limit; 5 fish bag limit & closure March & April	2/24/99	Amendment 9 SAFMC (1998)
Prohibit harvest &/or possession	9/8/99-8/28/00	Emergency Rule 64FR48324, 65FR10039
1 fish bag limit; no harvest, possession, or sale Jan. thru April; 50 lb com. trip limit 5/1 thru 12/31	8/29/00	Amendment 12 SAFMC (2000)

During 2001-2003, the commercial catch of red porgy represented about 49% of the total catch (Figure 4-15). (Note: 1999-2000 data are not included in the time series to compare commercial and recreational landings since harvest and possession was prohibited during those years.) Trends in the mean length of red porgy taken by commercial fishermen reflect changes in size limits that were imposed in 1992 and 1999 (Figure 4-16). The mean size of red porgy taken on headboats increased from 13.4” total length in 1986 to 14.5” total length in 2003.

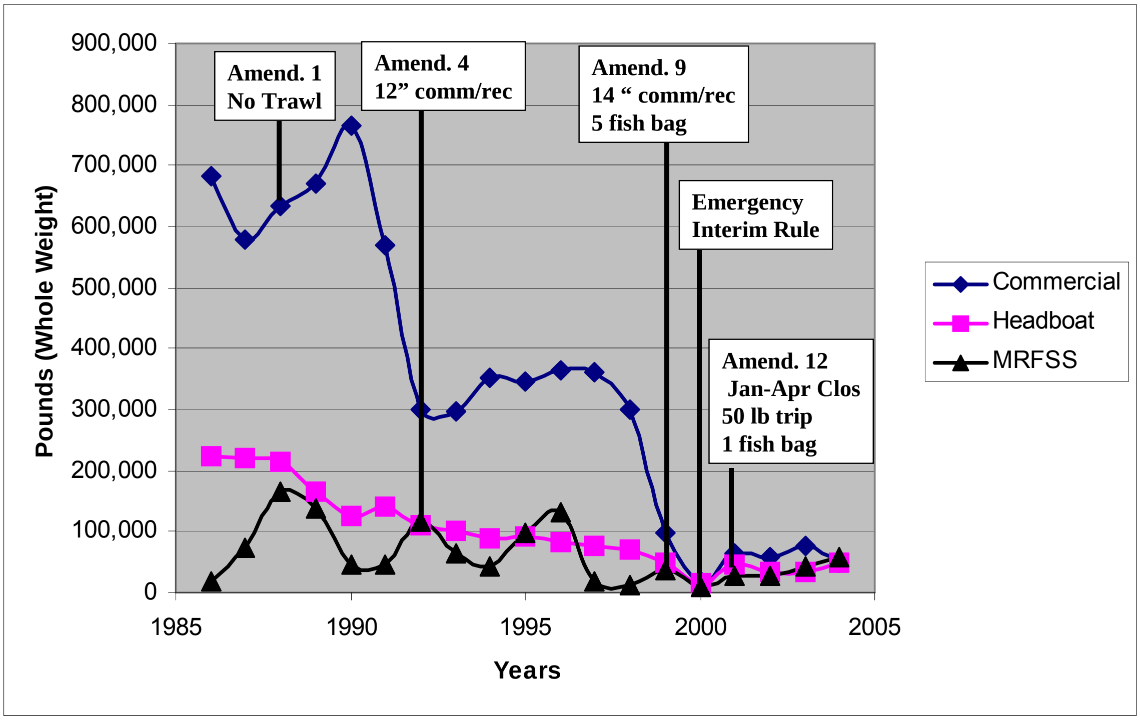

Figure 4-14. Annual landings (lbs whole weight) of red porgy.
Commercial landings are from the NMFS Accumulative Landings System (ALS), Headboat data are from NMFS-Beaufort, and MRFSS data are from the MRFSS web site.

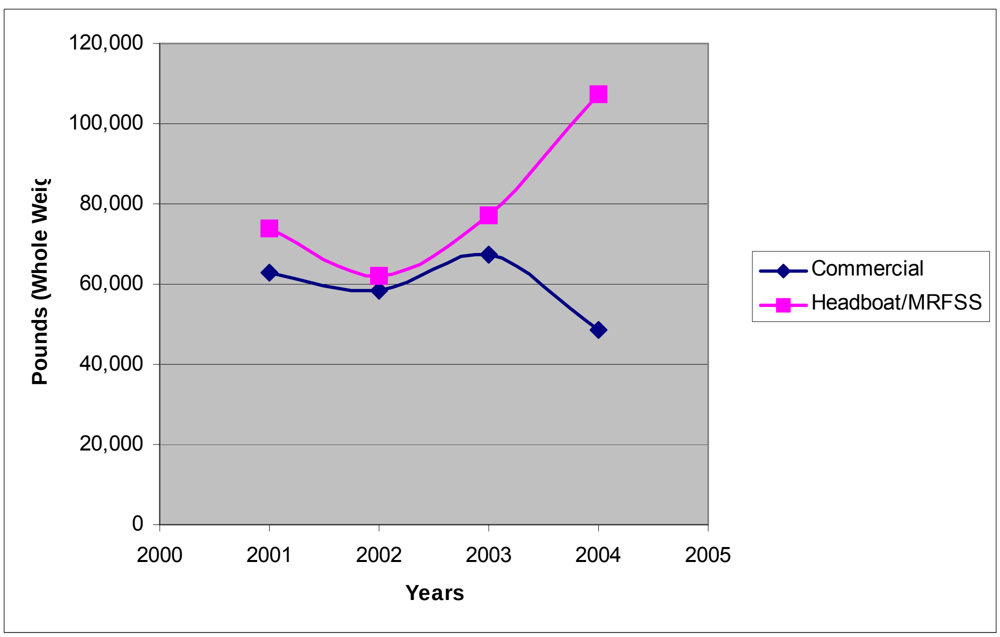

Figure 4-15. Annual landings (lbs whole weight) of red porgy (2001-2004).
Commercial landings are from the NMFS Accumulative Landings System (ALS), Headboat data are from NMFS-Beaufort, and MRFSS data are from the MRFSS web site.

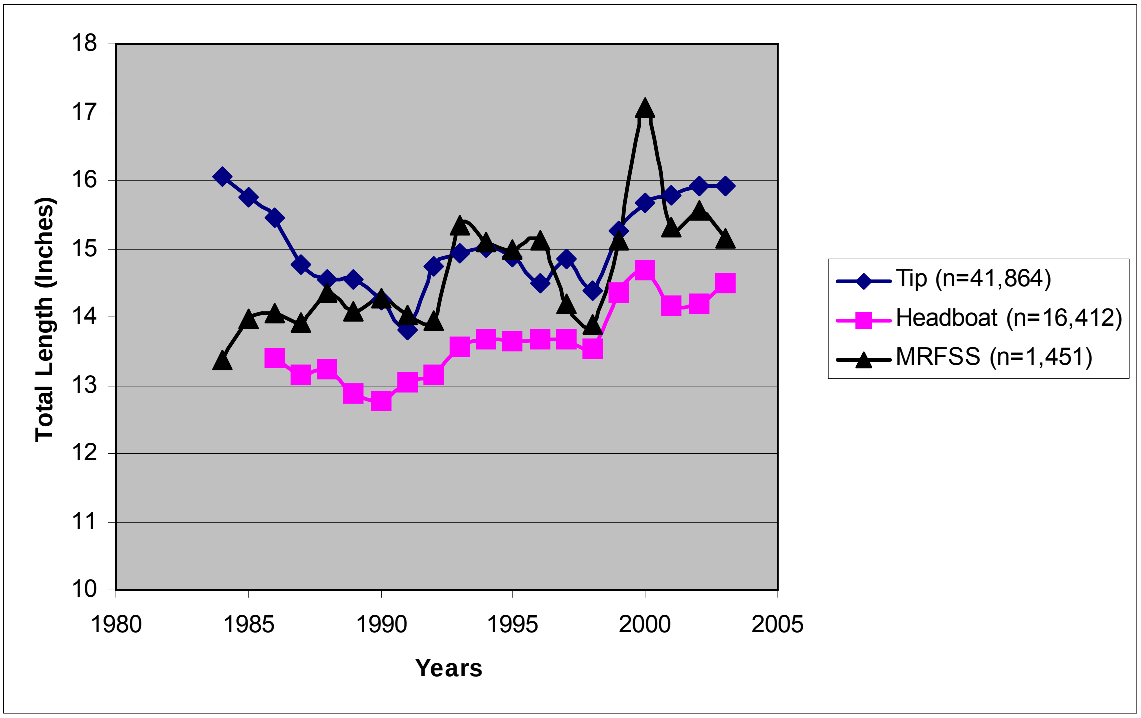

Figure 4-16. Mean lengths (inches, total length) of red porgy taken by commercial, headboat, and recreational (MRFSS) fishermen during 1984-2003.

<u>Compliance</u>

Compliance is summarized by sector in Table 4-32. See Burton (2002) for the breakout by region and for numbers of fish measured. Criteria for a finding of significant non-compliance are: number of fish measured must be greater than or equal to 15, and percent of fish below the size limit must be greater than or equal to 15 (Burton 2002).

Table 4-32. Compliance with red porgy size limits; note changes to minimum size limits as shown in Table 4-31.
Source: Burton (2002).

	Percent	Landed Below	Legal Size Limit
Year	**Commercial**	**Headboat**	**Private & Charter**
1992		23.8	66.0
1993	5.9	12.6	6.4
1994	4.7	11.1	36.5
1995	4.8	8.4	29.8
1996	5.4	9.7	5.7
1997	3.7	12.1	22.2
1998	4.6	15.5	0.0
1999	29.4	39.9	23.1
2000	13.4	24.3	9.1
2001	11.1	43.3	11.8

Significant non-compliance was found in the Georgia-North Florida and south Florida commercial fishery, the Carolinas headboat fishery, and the Georgia-North Florida MRFSS fishery. In all instances, the majority of undersized fish were within one inch of the legal size limit. Note: Only 11 fish were measured from the private/charter sector in 2000 and only 16 red porgy were measured from the private/charter sector in 1998. No red porgy were measured from the commercial fishery in 1992.

4.5.2 Management Measures

Alternative 1. **No action.** The recreational and commercial red porgy minimum size limit is 14" total length, the commercial trip limit is 50 lbs whole weight of red porgy during May through December, and the recreational bag limit is one red porgy per person per trip year-round. Possession is limited to the bag limit from January through April. Sale/purchase is prohibited during January through April.

Alternative 2. **Preferred.** Retain the recreational and commercial 14" total length minimum size limit and the seasonal closure (retention limited to the bag limit). Increase the commercial trip limit from 50 lbs whole weight of red porgy to <u>120 red porgy</u> (210 lbs gutted weight; 220 lbs whole weight) during May through December. Increase the recreational bag limit from 1 to <u>3 red porgy</u> per person per day. Specify a commercial quota of 127,000 lbs gutted weight (132,000 lbs whole weight). Prohibit purchase and sale and, prohibit harvest and/or possession beyond the bag limit when the quota is taken and/or during January through April.

Alternative 3. Retain the recreational and commercial 14" total length minimum size limit and the seasonal closure (retention limited to the bag limit). Increase the commercial trip limit from 50 lbs whole weight of red porgy to 120 red porgy (210 lbs gutted weight; 220 lbs whole weight) during May through December. Increase the recreational bag limit from 1 to 2 red porgy per person per trip. Specify a commercial quota of 127,000 lbs gutted weight (132,000 lbs whole weight). Prohibit purchase and sale and, prohibit harvest and/or possession beyond the bag limit when the quota is taken and/or during January through April.

Alternative 4. Retain the recreational and commercial 14" total length minimum size limit. Increase the commercial trip limit from 50 lbs whole weight of red porgy to 65 red porgy (115 lbs gutted weight; 120 lbs whole weight) year-round. Increase the recreational bag limit from 1 to 2 red porgy per person per trip. Specify a commercial quota of 127,000 lbs gutted weight (132,000 lbs whole weight). Prohibit purchase and sale and, prohibit harvest and/or possession beyond the bag limit when the quota is taken.

Alternative 5. Retain the recreational and commercial 14" total length minimum size limit. Increase the commercial trip limit from 50 lbs whole weight of red porgy to 65 red porgy (115 lbs gutted weight; 120 lbs whole weight) year-round. Increase the recreational bag limit from 1 to 3 red porgy per person per trip. Specify a commercial quota of 127,000 lbs gutted weight (132,000 lbs whole weight). Prohibit purchase and sale and, prohibit harvest and/or possession beyond the bag limit when the quota is taken.

4.5.3 Biological Effects of Management Measure Alternatives

Fishery management measures directly affect target and bycatch species and, sometimes, fish habitat by influencing the rate of fishing mortality, as well as the amount and distribution of fishing effort, applied to a fishery. This analysis examines the type(s) and extent of potential effects resulting from establishing or adjusting established management measures for red porgy.

Management Measure Alternative 1 would retain the current regulations used to manage red porgy. In general, this includes commercial and recreational size limits, a recreational bag limit of one per person per day, a commercial seasonal closure, trip limit, and bycatch limit. In addition, the *Oculina* HAPC area is closed to all bottom fishing off the coast of Florida (an area where red porgy are known to occur (Koenig (in press))).

Trip limits, bag limits, and seasonal closures are designed to reduce fishing effort in the form of the number of targeted fishing trips or time spent pursuing a species. Minimum size limits are generally used to maximize the yield of each fish recruited to the fishery and to protect a portion of a stock from fishing mortality. The idea behind maximizing yield is to identify the size that best balances the benefits of harvesting fish at larger, more commercially valuable sizes against losses due to natural mortality. Protecting immature and newly mature fish from fishing mortality provides them increased opportunities to reproduce and replace themselves before they are captured. If the size limit chosen is larger than the size at first reproduction for the species in question, then a sufficient pool of spawners could be retained even if fishing pressure is heavy. The minimum size limit for red porgy is set at 14" total length, which is also the size at which 100% of the fish are sexually mature (Harris and McGovern 1997). Area closures are intended to provide fish populations and/or valuable bottom habitat a refuge from fishing pressure.

These types of measures are generally expected to benefit the environment in the short term and long term by limiting the extent a stock is targeted. However, the extent to which such benefits are realized depends on the appropriateness of a measure when applied to a specific stock, as well as the extent fishing effort changes or shifts in response to the select management measure.

Minimum size limits can have detrimental effects on fish stocks because they do not protect the older year classes. Recruitment problems can occur in a fishery that has fewer age classes than an unfished population. For example, a population might live for ten years, but minimum sizes might allow for the harvesting of all fish less than four years of age. Recruitment failure could occur if there were several consecutive years of poor recruitment due to environmental conditions. The older age classes might not be present to guard against recruitment failure as they would under natural conditions. This truncation of average size is often undesirable from an economic perspective, because larger fish are sought after by recreational fishermen and because commercial markets often favor fish of a certain size.

Additionally, minimum sizes encourage the harvest of older, larger fish that have the greatest reproductive potential. For example, one 60.5 cm female red snapper can produce the same number of eggs as 212 females at 42 cm (PDT 1990). Therefore, the size of the spawner, not just the overall number of spawners, is important when considering the reproductive potential of a population, and removal of all the large spawners can be catastrophic even if some smaller spawners remain. If the size limit is set below the minimum size for reproduction, heavy fishing pressure may lead to reproductive failure, as the size limit does not protect fish of spawning size.

Discard mortality also can limit the amount by which fishing effort and mortality is reduced by trip limits, bag limits, seasonal closures, and minimum size limits, if fishermen catch and discard red porgy when targeting co-occurring species. Additionally, the environmental benefits of a closed area management strategy can be reduced or negated if not integrated with some form of control on fishing mortality and effort outside the closed area.

Alternative 1, which retains the status quo management strategy, is expected to benefit red porgy and the surrounding ecosystem. To determine the actual environmental effects of the no action management alternative on red porgy, one must first examine current trends in harvest levels, stock biomass levels, and life history characteristics, then predict the direction of future trends under status quo management. The recent SEDAR assessment determined the South Atlantic red porgy stock is overfished, but not undergoing overfishing (SEDAR 1 2002). 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 in 2004 to 2.38 fish per trap hour. Low CPUE in 2003 was probably the result of a persistent cold water upwelling event, which occurred during summer 2003. With exception of low CPUE during 2003, the increase in red porgy CPUE in recent years suggests the red porgy stock is rebuilding according to schedule.

Maintaining status quo regulations, which constrain fishing mortality well below the maximum threshold (F_{MSY}), would likely allow the stock to rebuild to B_{MSY} sooner than scheduled. Stocks at healthy biomass levels are less vulnerable to adverse environmental conditions, and better able to withstand years of poor recruitment. Additionally, rebuilding the red porgy stock is expected to benefit the South Atlantic ecosystem by promoting more natural ecological relationships and functions, as described in Section 4.1.3.1. While the biological benefits of the *Oculina* closed area provides biological benefits that cannot be quantified at this time. This area assists populations of species like red porgy in achieving their natural age and size structure. Recent evidence indicates a number of species have increased in abundance within the area since it was closed (Koenig 2001).

The 127,000 lb gutted weight commercial quota proposed in the Council's **Preferred Alternative 2** is designed to increase harvest by 109% from average landings recorded from 1999 to 2003. Additionally, it would ensure annual harvest did not exceed a level that would compromise the Council's approved 18-year rebuilding schedule. This alternative would retain the 14" total length minimum size limit and seasonal closure, and would increase the commercial trip limit would increase to 120 red porgy and the recreational bag limit would increase to 3 fish.

Evidence provided by MARMAP CPUE, as well as anecdotal information from commercial and recreational fishermen, indicates management measures the Council imposed on red porgy in 1999 have been effective and the stock is rebuilding. Recovery projections indicate catches can be increased as the stock rebuilds without overfishing or compromising the approved rebuilding schedule because more fish are available to the fishery. The quota proposed in this alternative would provide for a fishing mortality rate that remains well below the maximum threshold (F_{MSY}). Because the measures proposed in this alternative would rebuild the stock more slowly than those proposed in **Alternative 1**, they would cause the stock to be more vulnerable to adverse environmental conditions in comparison.

Red porgy are protogynous, where larger older females transition to males. Continuing the 4-month spawning season closure, as proposed in **Preferred Alternative 2**, would further protect the male/female social structure, which may be important for spawning and sex transformation. Removal of red porgy during the spawning season could reduce annual egg production and recruitment.

Bycatch from targeting other species in the same area such as vermilion snapper, red grouper, gag, snowy grouper, scamp, etc. may still result in fishing mortality of red porgy through regulatory discards and high release mortality. The beneficial effects of the spawning season closure might be further reduced by intensified fishing pressure before and after the closure. But fishermen could reduce discards by avoiding fishing in areas where red porgy occur during January through April.

Alternative 3 is identical to the Council's Preferred Alternative 2, except it would increase the recreational daily bag limit to 2 fish per person rather than 3 fish per person. Due to the lower bag limit, **Alternative 3** could be expected to rebuild the stock more quickly than Alternative 2. However, it would rebuild the stock less quickly than **Alternative 1**.

Alternative 4 is identical to **Alternative 3**, except it would institute a 65 red porgy or 120 lbs whole weight trip limit per vessel and eliminate the spawning season closure. While the lower trip limit would allow fishing to occur throughout the year, rather than just eight months, it could result in increased regulatory discards. Additionally, the male/female social structure of the red porgy population, which may be important for spawning and sex transformation, could be adversely affected in the absence of a spawning season closure. In addition, removal of red porgy during the spawning season could reduce annual egg production and recruitment.

Alternative 5 is identical to **Alternative 4**, except it would set a recreational daily bag limit of 3 fish per person. This alternative is expected to have effects similar to those described for **Alternative 4**. However, it could rebuild the red porgy stock more slowly, by comparison, because it provides for increased recreational harvest.

4.5.4 Protected Species Effects of Management Measure Alternatives

Alternative 1 would maintain the status quo and thus keep the existing level of risk for protected species interactions as summarized in the Affected Environment. Impacts to protected species from **Alternatives 2** through **5** may vary depending on potential effort shift toward red porgy due to other proposed harvest restrictions and/or closures. An increased risk of interaction with certain protected species may occur if, as a result of an increase in fishing effort targeting red porgy, hook-and-line effort was to increase in shallow waters where there may be an enhanced risk of sea turtle or smalltooth sawfish encounters. Implementation of **Alternative 4** or **5** may create the potential for overall effort to increase (i.e., more vertical hook-and-line gear in the water) due to the elimination of the closure.

4.5.5 Economic Effects of Management Measure Alternatives

4.5.5.1 Commercial

The commercial red porgy fishery has been heavily regulated since 1999 when the minimum size limit was increased from 12 inches to 14 inches, a recreational bag limit of five fish was implemented, and the commercial fishery was closed in March and April. Then, a temporary moratorium was implemented from September, 1999 through August 28, 2000. Regulations were relaxed after August 28, 2000, to include a closure from January through April and a 50-lb whole weight trip limit from May through December. Thus, data used in the analysis consisted of trips with at least 1 lb of red porgy that were reported to the logbook program from 1995-1998 because reported landings for red porgy from this period reflect catches in a less restrictive regulatory environment (**Appendix E**). Red porgy alternatives were evaluated with status quo assumptions for snowy grouper, tilefish, vermilion snapper, and black sea bass (**Appendix E**).

It is expected that short-term benefits would accrue to fishermen following implementation of the current amendment because the proposed alternatives are less restrictive than existing regulations. Each of the alternatives proposed for the commercial red porgy fishery would maintain the existing 14 inch minimum size limit and implement a 132,000 lb whole weight quota. **Alternatives 2 and 3** would maintain the January through April closure and increase the trip limit to 210 lbs whole weight between May and December or until the quota is filled and the fishery is closed. **Alternatives 4 and 5** would eliminate the closed season and increase the trip limit to 115 lbs whole weight year-round or until the quota is filled.

Given current regulations for red porgy and status quo alternatives for other species, the simulation model estimated that boat owners, captains, and crews on trips with at least one lb of red porgy earned an average of $3.48 million per year after accounting for trip costs and opportunity costs of labor (Table 4.2-9a). The simulation model also estimated owners, captains, and crews would earn an average of $3.55 million on these same trips if regulated with **Alternatives 2 and 3**, and $3.56 million if regulated with **Alternatives 4 and 5** (Table 4.2-9a). Therefore, management of the red porgy fishery would increase short-term net incomes by approximately $0.07 million (by 2.1%) with **Alternatives 2 (Council's preferred)** and 3, and by approximately $0.08 million (by 2.2%) with **Alternatives 4 and 5** (Table 4.2-9a). The status quo revenue was calculated for all trips on which red porgy were harvested.

The effects of **Alternatives 2-5** are similar because the simulation model projected the quota usually would be filled and the fishery closed. Therefore, total overall landings of red porgy would be approximately the same for all alternatives. With **Preferred Alternative 2** and **Alternative 3**, the simulation model predicted that the red porgy quota would be filled in mid-December if harvest rates for red porgy are similar to those in 1995 and 1997, that it would be filled in late November if harvest rates are similar to 1996, and that the quota would not be filled if fishing conditions are similar to 1998. With **Alternatives 4 and 5**, the simulation model projected the same red porgy quota would be filled in late September if harvest rates are similar to 1995 and 1997, in mid-October if harvest rates are similar to 1996, and in late December if harvest rates are similar to 1998.

Table 4-33a. Estimated change in revenues minus trip costs and opportunity costs of labor for proposed red porgy alternatives, by year, given status quo alternatives for snowy grouper (3), golden tilefish (2CE), black sea bass (8), and vermilion snapper (10).

Red Porgy Alternative	Revenues minus Trip Costs and Opp Costs of Labor (Millions of Dollars)					Cumulative Change compared to Status Quo ($Million)	Cumulative Percentage Change compared to Status Quo	Extra Change due to Red Porgy Alternatives ($Million)	Extra Percentage Change compared to Status Quo
	2001	2002	2003	2004	Average	Average	Average	Average	Average
Status Quo (2001-2005 Regs)	$3.63	$3.03	$3.61	$3.65	$3.48	0.00	0.0%	n.a.	n.a.
No Action	$3.63	$3.03	$3.61	$3.65	$3.48	0.00	0.0%	0.00	0.0%
Proposals 2 & 3	$3.71	$3.11	$3.68	$3.72	$3.55	0.07	2.1%	0.07	2.1%
Proposals 4 & 5	$3.70	$3.10	$3.68	$3.75	$3.56	0.08	2.2%	0.08	2.2%

Thus, **Alternatives 2-5** would result in approximately the same overall landings of red porgy. **Preferred Alternative 2 and Alternative 3** allow larger trip limits, but would result in commercial closures for approximately 5 months each year (December through April). On the other hand, **Alternatives 3 and 4** allow smaller trip limits and shorter annual closures of approximately 3 months each year (October through December), although the actual dates when quotas would be filled will vary annually.

The short-term benefits of less restrictive regulation of the commercial red porgy fishery are not expected to exhibit much annual variation because the quota would be filled in most years (Table 4-33b). Boats with vertical lines are expected to receive most of the benefits (Table 4-33c). Benefits are expected to accrue to fishermen in North Carolina, South Carolina, Georgia and northeast Florida, and central Florida (Table 4-33d).

The simulation model probably underestimates the potential short-term benefits of less restrictive regulations for red porgy because it does not account for changes in fishing behavior that likely followed implementation of restrictive regulations in 1999 and 2000. Based on observed fishing behavior and reported catch rates for 1995-1998, the simulation model estimated landings of red porgy would average approximately 68,000 lbs per year with the restrictive regulations for 2001-2004. However, actual landings of red porgy averaged less than 52,000 lbs per year. The difference between the estimated and observed landings for 2001-2004 could be due to lower catch rates associated with a smaller red porgy population. Perhaps an even more important explanation is fishermen probably responded to regulations enacted in 1999 and 2000 by modifying their fishing practices to avoid red porgy or limit their catches of red porgy. Another contributing factor could be the decline in participation in the commercial snapper grouper fishery observed over the period 1999-2004 that is described in Section 3.4.2.2.1. Thus, the simulation model overestimated landings and incomes from red porgy with status quo regulations for 2001-2004, and as a result, it underestimated the potential benefits of less restrictive regulation, which were calculated as the value of predicted landings with less restrictive regulation minus the value of predicted landings with status quo regulation.

Table 4-33b. The portion of total change in revenues minus trip costs and opportunity costs of labor attributable to proposed alternatives for red porgy, by year, given status quo alternatives for snowy grouper (3), golden tilefish (2CE), black sea bass (8), and vermilion snapper (10).

Red Porgy alternatives, given: Snowy (3), Tilefish (2CE), Vermilion (10), BSB (8)	**Extra Change in Revenues minus Trip Costs and Opportunity Costs of Labor due to Proposed Alternatives for Red Porgy and Status Quo Regulations for Other Species**				
	Change from No-Action Alternative, Millions of Dollars				
	1995	**1996**	**1997**	**1998**	**Avg**
No Action	$0.00	$0.00	$0.00	$0.00	$0.00
Proposals 2 & 3	$0.08	$0.07	$0.08	$0.06	$0.07
Proposals 4 & 5	$0.08	$0.06	$0.07	$0.10	$0.08
Status Quo	$3.63	$3.03	$3.61	$3.65	$3.48
	Extra Change as Percent of Status Quo				
	1995	1996	1997	1998	Avg
No Action	0.0%	0.0%	0.0%	0.0%	0.0%
Proposals 2 & 3	2.1%	2.4%	2.1%	1.8%	2.1%
Proposals 4 & 5	2.1%	2.1%	2.1%	2.7%	2.2%

Table 4-33c. The portion of total change in revenues minus trip costs and opportunity costs of labor attributable to proposed alternatives for red porgy, by primary gear, given status quo alternatives for snowy grouper (3), golden tilefish (2CE), black sea bass (8), and vermilion snapper (10).

Red Porgy alternatives, given: Snowy (3), Tilefish (2CE), Vermilion (10), BSB (8)	**Extra Change in Revenues minus Trip Costs and Opportunity Costs of Labor due to Proposed Alternatives for Red Porgy and Status Quo Regulations for Other Species, by Primary Gear**						
	Change from No-Action Alternative, Millions of Dollars						
1995-1998 Average	Vert Lines	LongLines	Pots	Trolling	Diving	Other	Total
No Action	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Proposals 2 & 3	$0.07	$0.00	$0.00	$0.00	$0.00	$0.00	$0.07
Proposals 4 & 5	$0.07	$0.00	$0.00	$0.00	$0.00	$0.00	$0.08
Status Quo	$3.05	$0.17	$0.12	$0.06	$0.08	$0.00	$3.48
	Extra Change as Percent of Status Quo						
1995-1998 Average	Vert Lines	LongLines	Pots	Trolling	Diving	Other	Total
No Action	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Proposals 2 & 3	2.4%	0.2%	0.4%	-0.1%	0.0%	0.5%	2.1%
Proposals 4 & 5	2.4%	0.1%	3.3%	2.3%	0.2%	2.0%	2.2%

Table 4-33d. The portion of total change in revenues minus trip costs and opportunity costs of labor attributable to proposed alternatives for red porgy, by area landed, given status quo alternatives for snowy grouper (3), golden tilefish (2CE), black sea bass (8), and vermilion snapper (10).

Red Porgy alternatives, given: Snowy (3), Tilefish (2CE), Vermilion (10), BSB (8)	**Extra Change in Revenues minus Trip Costs and Opportunity Costs of Labor due to Proposed Alternatives for Red Porgy and Status Quo Regulations for Other Species, by Area Landed**				
	Change from No-Action Alternative, Millions of Dollars				
1995-1998 Average	North Carolina	South Carolina	Georgia & NE FL	Central & South FL	Total
No Action	0.00	0.00	0.00	0.00	0.00
Proposals 2 & 3	0.03	0.02	0.02	0.01	0.07
Proposals 4 & 5	0.03	0.03	0.02	0.00	0.08
Status Quo	1.40	1.20	0.67	0.21	3.48
	Extra Change as Percent of Status Quo				
1995-1998 Average	North Carolina	South Carolina	Georgia & NE FL	Central & South FL	Total
No Action	0.0%	0.0%	0.0%	0.0%	0.0%
Proposals 2 & 3	1.9%	1.4%	3.6%	2.4%	2.1%
Proposals 4 & 5	2.2%	2.1%	2.8%	1.6%	2.2%

4.5.5.2 Recreational

The recreational fishery for red porgy has been subjected to a number of restrictive management regulations since 1999 (Figure 3-16c). These restrictive management regulations appeared to have had a more predictable effect on anglers in the headboat sector compared to anglers in the private and charterboat recreational sectors that harvest red porgy. There was a marked reduction in headboat harvests of red porgy prior to 1999 (Figure 3-16c). Thus, data from 1998 were used to determine the near-term future impacts from relaxing current red porgy harvest measures on the headboat sector. The 14" minimum size regulation was applied to the 1998 headboat data and then the effects of the proposed increases in bag limits were applied to determine the increase in the numbers of kept fish (**Appendix E**). The numbers of kept fish associated with the no action alternative is the average harvest from 2001-2003.

Data from the MRFSS were used to analyze the effects on the charter and private sectors. Harvest estimates of red porgy in the charter and private sectors during 1997 and 1998 were lower than harvests during the period 2001-2003 (Figure 3-17c). One explanation for this occurrence is anglers who caught red porgy are infrequently intercepted in MRFSS and the harvest estimates are associated with large standard errors. Also, this species is not targeted frequently by South Atlantic anglers, and harvest may have increased during the later years because of increased catches while anglers were targeting other species such as vermilion snapper and black sea bass (Table 3-22g). Therefore, harvest distributions observed in 1997 and 1998 were imposed on the harvest distributions in 2002 and 2003 to calculate the future expected harvest of red porgy in response to **Alternatives 2 through 5** (**Appendix E)**.

As noted in Section 4.1.5, the impacts discussed below refer only to activity for this individual species and do not reflect impacts relative to all species harvested by anglers that fish for this species or all recreational snapper grouper activity.

It is expected that short-term benefits will accrue to fishermen following implementation of the current amendment because the proposed alternatives are less restrictive than existing regulations. Apart from the no action alternative, each of the alternatives proposed for the recreational red porgy fishery would maintain the existing 14" minimum size limit and implement a two or three fish bag limit.

In the charter and private recreational sectors, given the fishing conditions observed in 2002 and 2003 and the harvest distributions in 1997 and 1998, it is expected harvest of red porgy would increase by 21% if **Preferred Alternative 2** or **Alternative 5** is implemented and 14% if either **Alternative 3** or **Alternative 4** is implemented (Table 4-34a). The increase in net economic benefits would be lower for these sectors compared to the headboat sector and would vary between $7,781 and $11,554 (Table 4-34a). Even though these red porgy estimates from the MRFSS are based on low sample sizes, the data appear to indicate that the charter sector is responsible for a higher level of harvest compared to the private recreational sector (Table 3-26). Thus, most of these benefits would accrue to the charter sector.

If the future headboat sector behaves in much the same way as the fishery operated in 1998 it is expected that harvest of red porgy would increase by 36% if either the **Preferred Alternative 2** or **Alternative 5** is implemented (Table 4-34b). The increase in net economic benefits would be $20,838, which as expected is greater than the net economic benefits that would accrue if either **Alternative 3 or 4** is implemented instead (Table 4-34b). These estimates are calculated under the assumption that the actions of headboat operators and angler demand for headboat trips would respond in a similar manner to conditions during 1998 in the headboat fishery. More liberal harvest regulations would result in increased catches of red porgy given that red porgy are harvested in the headboat sector along with the harvest of other targeted species such as vermilion snapper and black sea bass (Section 3.4.2.2.3). Also, headboat operators were very vocal in their objections to the restrictive harvest measures put in place when Amendment 12 was implemented and the previous measures enacted through emergency action (SAFMC 2000). However, the actual magnitude of these changes may vary depending on future circumstances. More restrictive regulations on the recreational harvest of vermilion snapper and black sea bass would have the effect of increasing harvesting demand for red porgy. On the other hand there has been a continual decline in headboat effort in the South Atlantic since 1987 (Table 3-23). This decline in effort is partly responsible for the decreasing red porgy headboat catches observed in 2001, 2002, and 2003 (Figure 3-16c). If effort continues to decline in the future, it is expected the predicted increase in harvest would be upwardly biased.

Table 4-34a. Summary of the short-term recreational impacts resulting from the red porgy alternatives in the charter and private recreational sectors.

	Description of Alternatives (assumptions)	**Expected catch (number of kept fish)**	**increase (Number of fish)**	**% change.**	**Value of increase in nos. of fish**
Alternative 1 (no action)	1 fish bag limit and 14" min size limit	21,836			
Alternative 2 (preferred) & 5	Increase bag limit to 3 fish	26,495	4,659	21%	$11,554
Alternative 3 & 4	Increase bag limit to 2 fish	24,973	3,138	14%	$7,781

Table 4-34b. Summary of the short-term recreational impacts resulting from the red porgy alternatives in the headboat sector.

	Description of Alternatives (assumptions)	Expected catch (number of kept fish)	increase (Number of fish)	% change	Value of increase in nos. of fish
Alternative 1 (no action)	1 fish bag limit and 14" min size limit	23,320			
Alternative 2 (preferred) and alternative 5	Increase bag limit to 3 fish	31,723	8,403	36%	$20,838
Alternatives 3 and 4	Increase bag limit to 2 fish	29,541	6,221	27%	$15,429

4.5.6 Social Effects of Management Measure Alternatives

4.5.6.1 Commercial

While red porgy were never considered to be an important component of the commercial snapper grouper catch, fishermen and dealers vehemently opposed the moratorium and Amendment 12. Generally, fishermen believe the stock is in better shape than the assessment indicates. These regulations have resulted in much tension and anger on the part of commercial fishermen from North Carolina, South Carolina, and Georgia. The situation has caused them to lose faith in the management process.

The most recent red porgy assessment indicates the stock is rebuilding and managers can "give something back" to the fishermen. Fishermen are not surprised by this, as they were convinced there was not a serious problem to begin with. Yet they are happy to receive some increase in catch.

The impacts of doing nothing by adopting **Alternative 1, No Action** would be more psychological than economic or biological. Failing to recognize catches can increase without compromising stock rebuilding would cause managers to lose the support of the fishermen who complied with the measures. Furthermore, not adjusting the catch in response to stock rebuilding would violate the principle of adaptive management, a principal that most managers strive to uphold.

The Council's **Preferred Alternative 2** would maintain the seasonal closure and the 14" total length minimum size limit but increases the trip limit to 120 fish, which would be approximately 2 boxes of fish. First, this would have the positive effect of letting fishermen keep some of the red porgy they encounter so frequently. It would also be a better way to measure their catch, in numbers of fish rather then weight, which is difficult to do at sea. No one is sure if there is a market for domestically caught red porgy any longer, as Amendment 12, according to one dealer, allowed for the substitution of imports into the niche red porgy once filled.

A Snapper Grouper Advisory Panel member from Murrells Inlet, South Carolina and a seafood dealer, noted:

What makes you think that there's going to be a market for red porgy if you give us some? I'm afraid there's not much of a market for it anymore because people have gotten used to something else. There's a fish that comes out of Brazil that's a whole lot cheaper and it's exactly the same thing and they're not going to want to pay any kind of money for these fish even though you're going to give them back to them. You've created a foreign market that's thriving on something that we took away from them.

While proposed increase in harvest is not great, it is probable that it will benefit the fishermen, both psychologically and financially.

Alternative 3 would pose no different impacts for the commercial sector than does **Alternative 2** (the only change for this alternative is for the recreational sector).

Alternatives 4 and 5 would reduce the trip limit to 65 red porgy but would allow the fishery to operate throughout the year until the commercial quota was taken. While any extra amount of fish "given back" to fishermen would be good, this smaller amount may still not satisfy fishermen and they may see such actions as a going back on the promise to reward fishermen for bearing the brunt of the previous regulations.

4.5.6.2 Recreational

Alternative 1 is the "No Action" alternative, and is likely to adversely impact fishermen by not allowing them to harvest additional fish when the stock is deemed able to sustain increased fishing mortality. Based on biological research, biomass appears to be at a level where increased fishing mortality can be sustained. By not allowing increased catches when there is a larger abundance of fish, the no action alternative is likely to increase the number of regulatory discards, as well as create even greater tension between fishermen and managers. The potential for increased frustration among fishermen because they are not able to keep more fish, especially when they perceive the stock to be at a level that supports increased take, could potentially be detrimental to future collaborative research and management efforts between the Council, NOAA, and the fishery.

The Council's **Preferred Alternative 2** would propose to increase the bag limit from 1 to 3 fish per person. The increase in the bag limit would be seen as a good faith effort to "return fish" to the fishers when the stock is deemed to be able to sustain increased take. It might also improve already tenuous relationships between management agencies and resource user groups, especially among the for-hire fishers.

Alternatives 3 and 4 would be the same as **Alternative 2**, except the bag limit would only be increased from 1 to 2 fish. While **Alternatives 3 and 4** are certainly better than the status quo, they would not be as acceptable to fishermen as the 3-fish bag limit in **Alternative 2** because fishermen have argued that red porgy are extremely abundant and more fish should be made available to them.

Alternative 5 again highlights that an increase in the bag limit would be seen as a good faith effort to "return fish" to the fishers when the stock is deemed to be in an improved condition and able to sustain increased take. It might also improve already tenuous relationships between management agencies and resource user groups, especially among the for-hire fishers. This is because the perception exists that management agencies always take but "never" give back when things recover. However, some are concerned that if the bag limit is raised to a level where too much pressure is put on the resource, then the stock might not rebuild according to schedule, and the industry might have to start over again.

General Non-Fishing Public

For the general non-fishing public of the U.S., the proposed alternatives for red porgy – to allow some increased catch – offer long-term benefits as the management measures continue to work to rebuild an overfished stock. These actions have benefits for those in the U.S. who derive satisfaction from knowing that the marine environment is managed sustainably and is thriving. The U.S. consumer may benefit from potential increased consumption of locally caught fish, although this benefit would only extend to those who live close to the coasts and seek out that experience. Note: Most red porgy were shipped to New York and Canada and were not consumed locally because they are considered to be poor quality compared to other available snapper grouper species.

4.5.7 Administrative Effects of Management Measure Alternatives

Retaining the current regulations (**Alternative 1**) would not represent an increased administrative burden.

Alternative 2, the preferred alternative, would increase the commercial trip limit from 50 lbs whole weight to 120 fish, specify a commercial quota of 127,000 lbs gutted weight, and increase the recreational bag limit to 3 fish per person per day. This alternative would represent an additional administrative burden since a quota monitoring system would have to be established for red porgy, and it would take more time for Law Enforcement to determine if fishermen were in compliance with regulations. However, commercial trip limits in number rather than lbs would increase the speed with which commercial catches could be checked by Law Enforcement. **Alternative 3** is identical to **Alternative 2** with the exception that the recreational bag limit would be 2 fish per person per day rather than 3 fish per person per day.

Alternative 4 would eliminate the January through April spawning season closure, increase the trip limit to 65 fish, specify a commercial quota of 127,000 lbs gutted weight, and increase the recreational bag limit to 2 fish per person per day. Removal of the spawning season closure could increase the administrative burden since Law Enforcement would need to check to ensure compliance with the trip limit year round. However the number of fish to be counted by Law Enforcement would be less that in **Alternatives 2 and 3**. **Alternative 5** would be similar to

Alternative 4 with the exception that recreational bag limit would be 3 fish per person per day rather than 2 fish per person per day.

4.5.8 Conclusions

A red porgy commercial quota of 127,000 pounds gutted weight with a trip limit of 120 red porgy (during May through December) and an increase in the recreational bag limit to three red porgy per person per day is the Council's preferred alternative. The Council received public input during the public hearing and informal review process on the preferred alternative 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 alternative based on comments received.

SEDAR 1 (2002) indicated red porgy were not experiencing overfishing but the stock was still overfished. The **Preferred Alternative 2** would allow a limited increase in harvest consistent with the rebuilding program established in Snapper Grouper FMP Amendment 12. The commercial quota would provide a safeguard against exceeding a quota that would compromise stock rebuilding. This alternative is expected to have positive social and economic impacts on commercial fishermen, recreational fishermen, fishing communities, and associated industries in the short-term and long-term. Continuation of the red porgy rebuilding program would be expected to rebuild biomass allowing for a continued increase in harvest over time. Therefore, this alternative could have beneficial social and economic impacts in the future.

The Council received a number of public comments addressing red porgy. Comments included: lowering the size limit and raising the bag limit to 3 fish; increasing the bag limit to 5 fish and a recreational boat limit of 15 or 20 fish (excluding headboats); concern the quota and size/bag limits could cause bycatch and discards; and concern that an increase in the red porgy allowable catch could return fishing to 50 fathoms resulting in bycatch and discard mortality.

The Snapper Grouper Advisory Panel approved by consensus the Council's **Preferred Alternative 2**.

The Law Enforcement Advisory Panel were in agreement with the preferred alternative, which was increasing the bag limit and the trip limit.

The Scientific and Statistical Committee (SSC) reviewed the SEDAR Assessment and approved the assessment as being based on the best available science. The SSC concluded the proposed alternatives that increase the catch are consistent with the rebuilding program previously implemented.

The SSC remains concerned about discard and post-quota mortality, from bycatch and discard mortality. The methodology to estimate the discard and post-quota mortality is still being developed and was not available for use in finalizing Amendment 13C. The SSC concluded the social and economic analyses were accurate and complete given the available data; however, they noted shortcoming in the biological analyses due to the lack of estimates for the bycatch and post-quota mortality.

The Snapper Grouper Committee reviewed the public hearing input and recommendations from the Snapper Grouper AP, Law Enforcement AP, and the SSC. Committee members modified the public hearing alternative to show the bag limit per day and to specify possession limits after the quota is met. **Alternative 2** is the preferred alternative and allows more recreational and commercial catches consistent with the established rebuilding program.

The Council concluded the combined recreational and commercial alternative recommended by the Committee best meets the conservation objective of allowing catches to increase consistent with the rebuilding program currently in place. The Council remains concerned about bycatch and post-quota mortality and will address these issues in Amendments 13B and 16. The Council's preferred alternative is **Alternative 2** which implements a commercial quota of 127,000 pounds gutted weight, increases the commercial trip limit from 50 pounds whole weight to 120 red porgy, and increases the recreational bag limit to 3 per person per day; the January through April closure remains in place.

The Council concluded these measures best meet the purpose and need to increase catches consistent with the rebuilding program for red porgy and to allow as close to a year-round fishery as possible while maintaining (where possible) historic participation rates and patterns (including allocation rations), minimizing costs, meeting the objectives of the Snapper Grouper Fishery Management Plan, and complying with the requirements of the Magnuson-Stevens Act and other applicable law.

4.6 Research Needs

Snowy grouper, golden tilefish, vermilion snapper, 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, which will be updated as new data become available.

Biological research needs that have been identified through the SEDAR process are as follows:

<u>Snowy Grouper</u>

- 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.

<u>Golden Tilefish</u>

- Develop standardized techniques for aging golden tilefish. 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 tilefish.
- 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.

<u>Vermilion Snapper</u>

- Quantify discard rates especially in commercial fishery. Estimate discard mortality rates by depth and fishery.
- Research management measures that will reduce release mortality.
- Age sampling from commercial, headboat, and MRFSS that is representative.
- Develop better abundance indices that cover a broader spatial/seasonal scale.
- Fecundity estimates by length and age.
- Collect data on the magnitude and size/age composition of vermilion snapper that are discarded by fishery and gear.

- Develop an index of recruitment.

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.

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.

Sociocultural research needs 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 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 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). NMFS is currently conducting a study.

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).

4.7 Unavoidable Adverse Effects

All action alternatives considered to end overfishing of snowy grouper, golden tilefish, vermilion snapper, and black sea bass, would have unavoidable and immediate adverse short-term impacts on fishery participants because they would result in reduced harvest and revenue. These unavoidable short-term adverse effects can be mitigated to some degree by the type of regulations the Council selects to manage reduced catch levels. For example, trip limits can be used to extend the duration of a fishery for a longer time period than would occur under a reduced quota and no trip limit restriction, reducing the risk of losing the market for a species due to its unpredictable or inadequate availability. The long-term net effects of ending overfishing of these four snapper grouper species are expected to be positive, because constraining fishing mortality to a sustainable rate will eventually enable stock biomass to increase to a level that is capable of providing maximum sustainable yield and, ultimately, optimum yield, or the greatest overall benefit to the nation. For this reason, all no action alternatives considered for snowy grouper, golden tilefish, vermilion snapper, and black sea bass would have adverse effects on the biological, ecological, social, and economic environments.

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. 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. Four proposed actions would further restrict the harvest of snowy grouper, golden tilefish, vermilion snapper, and black sea bass in the short-term. However, reductions in harvest are expected to benefit the long-term productivity of these species. A fifth action would allow increased the harvest of red porgy that is rebuilding as a result of management restrictions imposed in the emergency rule and Snapper Grouper FMP Amendment 12.

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. While the proposed actions would result in irretrievable losses in consumer surplus and angler expenditures, which are described in Section 4, failing to take action would compromise the long-term sustainability of the stocks.

4.12 Mitigation Measures

The proposed actions would adversely affect immediate, short-term net revenues of some commercial and for-hire fishermen in the South Atlantic. The proposed actions would also adversely affect short-term consumer surplus of some recreational anglers in the South Atlantic and may result in cancelled trips and reduced expenditures to the fishery and associated industries. However, it is anticipated reductions in fishing pressure, which will end or phase-out overfishing of snowy grouper, golden tilefish, vermilion snapper, and black sea bass, will 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. The short-term adverse effects of ending overfishing can be mitigated to some degree by the type of regulations the Council selects to manage reduced catch levels. For example, trip limits can be used to extend the duration of a fishery and reduce the risk of losing a market for the species. The Council's preferred alternatives contain those measures that are believed to best mitigate the unavoidable, short-term, adverse effects of ending overfishing.

4.13 Cumulative Effects

As directed by 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 these 11 steps. Cumulative effects for the socio-economic environment will be analyzed separately.

4.13.1 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)**; 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 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 vermilion snapper, black sea bass, and red porgy has not been documented (McGovern and Meister 1999). Tagging studies have not been conducted on snowy grouper or golden tilefish; however, it is believed that movement of these species is limited. However, snowy grouper, golden tilefish, vermilion snapper, 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 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 and the alternatives chosen. Ending overfishing will result in rebuilding snowy grouper and black sea bass, which are overfished. Amendment 15 will 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, vermilion snapper, black sea bass, and red porgy.

A. Past

The reader is referred to **Section 1.3 History of Management** 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.

B. Present

The proposed actions would address overfishing of black sea bass, vermilion snapper, golden tilefish, and snowy grouper, and increase red porgy harvest to a level supported by an approved rebuilding schedule. Management measures for the commercial sector would include new or adjusted: catch quotas; size limits; trip limits; seasonal closures; fishing year start dates; and gear restrictions. Management measures for the recreational sector would include new or adjusted: catch allocations; bag limits; size limits; and seasonal closures.

C. Reasonably Foreseeable Future

Snapper Grouper Amendment 13B is being developed. Amendment 13B would: redefine, divide into multi-species units, and identify indicator species within the snapper grouper fishery management unit; review and define, as needed, management reference points for data poor snapper grouper stocks; reduce directed and incidental fishing mortality on select species through new or adjusted catch quotas, seasonal closures, area closures, size limits, and/or bag limits; and change permit renewal and transferability provisions. Amendment 13B also would include a bycatch practicability analysis.

Snapper Grouper Amendment 14 is being developed. Amendment 14 would: 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, blueline tilefish, and sand tilefish).

Snapper Grouper Amendment 15 is being developed. Amendment 15 would: establish management reference points and status determination criteria for snowy grouper, golden tilefish, black sea bass, vermilion snapper, and red porgy recently assessed through SEDAR; modify rebuilding schedules for snowy grouper and black sea bass; establish rebuilding strategies for snowy grouper, black sea bass, and red porgy; prohibit the sale of recreationally-caught fishes; ensure parity among users in different states by changing the golden tilefish fishing year; reduce bycatch mortality of queen snapper by eliminating the 12” total length commercial and recreational minimum size limit; and easing the requirements for snapper grouper permit renewal and creation of family-owned corporations.

II. Non-Council and other non-fishery related actions, including natural events affecting snowy grouper, golden tilefish, vermilion snapper, 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, golden tilefish, vermilion snapper, 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, golden tilefish, vermilion snapper, black sea bass, and red porgy are described by recent stock assessments (SEDAR 1 2002, SEDAR 2 2003a, SEDAR 2 2003b, 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 that 4 times greater than F_{MSY}. Since the early 1980s, F has fluctuated around 3 times F_{MSY}.

The biomass of golden tilefish declined from about 2.5 times B_{MSY} in 1980 to slightly above B_{MSY} in the early 1980s. Since the early biomass has fluctuated around B_{MSY}. Fishing mortality (F) has shown a great deal of fluctuation over the years. In 1981, F rose very rapidly to almost 5 times F_{MSY} and then decreased well below F_{MSY} in the late 1980s. Fishing mortality rose to almost 4 times F_{MSY} in 1993 and then declined to F_{MSY} in 1996. In 2002, F was 1.5 times greater than F_{MSY}.

The SSC and the SEDAR review panel determined that estimates of vermilion snapper biomass from the stock assessment were not reliable. Estimates of F increased from around F_{MAX}, a proxy for F_{MSY}, in 1981 to almost 6 times F_{MAX} in 1986. F remained high until 1997 when it decreased to 1.3 times F_{MAX}. In 2001, F was 1.6 times F_{MAX} (SEDAR 2 2003a).

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 and golden tilefish 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 mature age, and predation. Due to the life history characteristics of snowy grouper and golden tilefish, the amount of time needed to recover from periods of heavy fishing pressure would be greater than for vermilion snapper, 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, vermilion snapper, black sea bass, and red porgy are not as long-lived, are faster growing, and mature at smaller sizes than snowy grouper or golden tilefish. Thus, recovery of vermilion snapper, black sea bass, and red porgy would require a shorter period of time than snowy grouper and golden tilefish. 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 4.13.2.

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, golden tilefish, vermilion snapper, 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, golden tilefish, vermilion snapper, 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 modified in Amendment 13B and Amendment 15 for all snapper grouper species. 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 15 may also provide new definitions of MSST for snowy grouper and golden tilefish.

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 and golden tilefish, 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 4-35.

Table 4-35. The cause and effect relationship of fishing and regulatory actions within the time period of the Cumulative Effects Analysis (CEA).

Time period/dates (Table 4-35)	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 1988).	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; SAFMC 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	Spawning potential ratio for vermilion

Time period/dates (Table 4-35)	Cause	Observed and/or Expected Effects
	biomass and overfishing continue for a number of snapper grouper species including vermilion snapper, black sea bass and red porgy.	snapper, black sea bass, and red porgy is less 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 (1998c).	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.
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, blueline tilefish, and sand tilefish).
In development	Snapper Grouper FMP Amendment 15.	Establish management reference points and status determination criteria for snowy grouper, golden tilefish, black sea bass, vermilion snapper, and red porgy; modify rebuilding schedules for snowy grouper and

Time period/dates (Table 4-35)	Cause	Observed and/or Expected Effects
		black sea bass; establish rebuilding strategies for snowy grouper, black sea bass, and red porgy; prohibit the sale of recreationally-caught fishes; change the golden tilefish fishing year; eliminate the 12" total length commercial and recreational minimum size limit for queen snapper; and ease the requirements for snapper grouper permit renewal.

9. Determine the magnitude and significance of cumulative effects.

Current management actions, as summarized in Section 2, should reduce fishing mortality in snowy grouper, tilefish, vermilion snapper, 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, vermilion snapper, 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, vermilion snapper, 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, tilefish, vermilion snapper, 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, vermilion snapper, 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.

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, golden tilefish, vermilion snapper, 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, stock assessments and stock assessment updates, life history studies, and other scientific observations.

4.13.2 Social and Economic

As described in Section 3.4.2, the snapper grouper fishery can be separated into two main components: the recreational fishery and the commercial fishery. There is some overlap between the for-hire recreational sector and the commercial harvesting sector in the South Atlantic snapper grouper fishery as some vessels or vessel owners are engaged in both for-hire recreational activities and the commercial harvest and sale of snapper grouper species.

The snapper grouper complex is important to the commercial harvesting sector in the U.S. Southern Atlantic states (South Atlantic). In 2003, landings of the five species in this amendment (red porgy, vermilion snapper, black sea bass, golden tilefish, and snowy grouper) amounted to 2.05 million lbs with an ex-vessel value of $3.99 million (Table 3-5b). Ex-vessel revenue from the species in this amendment accounts for 41% of the total snapper grouper revenue. North Carolina averaged the highest level of recorded landings of species in this amendment (1.07 million lbs), followed by South Carolina (0.80 million lbs), Florida (0.66 million lbs), and Georgia (0.21 million lbs). However, species to be addressed in this amendment are relatively more important to the snapper grouper fishery in North Carolina, South Carolina, and Georgia, where these five species comprised 49-50% of the revenue from snapper grouper landings, compared to Florida where they comprised 22% of the total snapper grouper revenue. Furthermore, in Georgia it appears these five species comprised at least 53% of the total finfish landings compared to less than 10% for North Carolina and Florida (Table 3-8c).

There is some variability among the states with respect to the species and/or species groups that dominated overall revenue from snapper grouper landings during 1999-2004. In terms of ex-vessel revenue, the top state for black sea bass landings was North Carolina ($771,802). Revenue from golden tilefish landings was concentrated in Florida ($597,194) and, to a lesser extent South Carolina ($222,970) (Table 3-12a and b). Of the five species in this amendment, vermilion snapper dominated the total harvest in Georgia ($418,213) (Table 3-12b). Also, revenue from the sale of vermilion snapper harvested in the South Atlantic comprises 20% of the total snapper grouper revenue (Figure 3-8b).

The commercial snapper grouper fishery in the South Atlantic is comprised of vessels, which utilize a number of different gear types and target a variety of species. Vessels employing hook and line gear dominate the commercial fishery and landings. However, even among this gear category there is a fair degree of heterogeneity in terms of species harvested, area fished, trip length, vessel size and horsepower, operating costs, and output of snapper grouper landings and value. During 1999-2004, commercial fishermen from Florida and North Carolina made more trips for the Amendment 13C species and engaged more vessels in the harvest of these species than compared to the other two states. However, the average trip length, the harvest per trip, and the annual harvest per vessel was considerably higher for South Carolina and Georgia compared to the other two states (Table 3-8c). Except for golden tilefish and black sea bass, most of the harvest of the remaining species is taken by some type of hook and line gear. For black sea bass, 85% of the catch is taken by traps. The longline fishery was primarily responsible for harvesting golden tilefish. Also, 28% of the snowy grouper catch was harvested by vessels employing longline gear. The longline vessels, which report to the southeast logbook, also operate in other fisheries such as the shark fishery (Table 3-13). On average, vessels primarily using traps and longlines were significantly larger and employed more crew than other vessels, and longliners fished more days than all other trips. Looking across gear types, longline and trap trips clearly incurred higher expenses but typically generated higher trip revenues as well as higher per day net operating revenues (Table 3-18).

The South Atlantic recreational fishery is comprised of a private recreational sector and a for-hire recreational sector. The former includes anglers fishing from shore (including docks), piers, and from private/rental boats while the latter is divided into the charterboat and headboat segments. Holland *et al.* (1999) defined charterboats as boats for-hire carrying 6 or less passengers that charge a fee to rent the entire boat. Headboats tend to be larger, diesel powered and generally can carry a maximum of around 60 passengers.

In the charter and private recreational fishing sectors snapper grouper species were caught on 15.3% of all saltwater fishing trips during the period 1999-2003 (Table 3-19). This proportion declines to 6.9% when considering only those trips where snapper grouper species were actually harvested. During the period 2000 to 2003, an average of 85% of all snapper grouper catch trips (private recreational and charter sector) were either inland or inshore of three miles (SAFMC 2003). The majority of trips where snapper grouper species were caught occurred in Florida. For example, in 2003 snapper grouper species were caught on 2.72 million trips in Florida compared to 0.46 million trips for the other three states combined (Table 3-21). Headboat effort on the east coast of Florida comprises a large proportion (70%) of the headboat trips in the South Atlantic (Table 3-23).

On average, during 1999-2003, it is estimated recreational fishermen incurred a total of $274 million in trip expenses to fish for snapper grouper species in the South Atlantic (Table 3-19a). A relatively large portion (84%) of expenditures incurred in the private and charter sectors impacted the economy in east Florida. The total trip expenditures for fishing off Florida was estimated at $193.8 million (Table 3-34b). The estimated average non-market value of all snapper grouper species harvested by anglers fishing in the South Atlantic during the period 1999-2003 was $18.83 million (Table 3-10a).

Based on multi-species groupings currently being considered in Snapper Grouper FMP Amendment 13B, harvest effort and target effort statistics indicate species in the shallow water snapper unit (Table 3-22b), the grunt and porgy unit (Table 3-22e), the jack unit (Table 3-22d), and the sea bass unit (Table 3-22f) are most important to saltwater anglers in the South Atlantic. Furthermore, these statistics also indicate black sea bass, white grunt, Atlantic spadefish, blue runner, yellowtail snapper, and vermilion snapper are among the most popular species in this complex to South Atlantic anglers. In contrast, species in the deep water grouper and tilefish units are of little importance in the charter and private sectors of the recreational fishery.

Of the species addressed in this amendment, black sea bass and vermilion snapper are more frequently harvested in the South Atlantic recreational snapper grouper fishery (Table 3-26). The largest share of the black sea bass recreational harvest is taken by sport anglers in the private recreational sector while the largest share of the vermilion snapper recreational harvest is taken by passengers on headboats in the South Atlantic. The harvest of snowy grouper and golden tilefish is relatively minor in the recreational sector (Table 3-26). Headboats in the South Atlantic are very dependent on the snapper grouper complex. Over the period 1999-2003, non-snapper grouper species comprised only 30% of the total headboat harvest in the South Atlantic (Table 3-29).

There are regional differences in the composition of the catch in the South Atlantic recreational fishery. Also, there are variations in the relative importance of the five species in this amendment by sector. Vermilion snapper alone comprises 24% of the headboat harvest in the South Atlantic and 30% of the total headboat harvest when the harvests in South/Central Florida and the Keys are excluded (Figures 3-17a and b). Black sea bass is the second most abundant species in the headboat harvest in North Carolina, South Carolina, Georgia, and North Florida (Figure 3-17b).

Species in the jack unit dominate snapper grouper harvests in the charterboat sector (Figure 3-20a). The jack unit comprised an average of 48% of the entire snapper grouper harvest in the charter sector during 1999 to 2003 (Figure 3-20a). Black sea bass and vermilion snapper only comprised 5% and 6% of the total South Atlantic charterboat harvest respectively (Figure 3-19a). When the harvest from East Florida is excluded from the total catch, black sea bass and vermilion snapper comprise 16% and 13% of the total charterboat harvest respectively (Figure 3-19b).

Harvest in the private recreational sector in the South Atlantic is dominated by the jacks, grunts, and porgies (Figure 3-22a). These two units comprised almost 60% of the total snapper grouper harvest during the period 1999 to 2003 (Figure 3-22a). Similar to the charterboat sector, a substantial proportion (80%) of the harvest is taken in Florida (Figure 3-22c). When East Florida harvest is not considered, black sea bass is important to the private recreational sector, which harvests snapper grouper species, as black sea bass now comprises 16% of the total harvest (Figure 3-21b).

<u>The effect of imports, fuel prices, coastal development, and past regulations</u>

The snapper grouper fishery has been heavily regulated since the fishery management plan was implemented in 1983 (Figures 3-5a; b and Section 1.3). Snapper grouper ex-vessel landings and value increased from 1986 to 1990. During this period, real ex-vessel revenue increased from around $26 million to $35 million (Figure 3-6). Since the peak in snapper grouper landings and revenue in 1990 there has been a steady decline in landings, ex-vessel revenue, and real ex-vessel revenue (Figure 3-5a and Figure 3-6). The cause of this decline can be partly attributed to restrictive regulations taken to improve/maintain the health of species in the snapper grouper complex and protect essential fish habitat. The trend in aggregate harvest of all species in this amendment follows a similar pattern to landings in the overall snapper grouper fishery (Figure 3-5b).

This fishery was first regulated in 1983 with a number of size limit measures and certain gear restrictions. In 1992, Amendment 4 prohibited fish traps, entanglements nets, longlines for wreckfish, and the use of longline gear inside of 50 fathoms for snapper grouper species in the South Atlantic EEZ. Also, additional minimum size regulations and bag limits went into effect during 1992 (Figure 3-5a). Snowy grouper and golden tilefish landings were at their highest levels during the period 1989 to 1993. The observed drop-off in 1994 is possibly correlated to the regulations implemented in 1994 on trip limits and quotas for these two species (Figure 3-5a). Further declines in harvest of these species occurred during the period 1999 through 2003 (Figure 3-9). Red porgy harvests have been declining throughout this entire time period. The drop in red porgy landings during the period 1999 through 2003 is the result of the substantial harvest reduction measures first implemented in 1999 (Figure 3-9).

Implementation of a limited access program in 1998/1999 partly contributed to the decline in the number of commercial vessels in the snapper grouper fishery (Tables 3-5a and b). Since 1999, the annual number of permitted vessels has declined by 375; the number of vessels with unlimited permits has declined by 244 (Table 3-5a). Some of the vessels that exited the snapper grouper fishery were replaced through the two for one permitting program while other vessels were not replaced. It is reasonable to hypothesize that the decrease in landings, ex-vessel (dockside) revenue, number of vessels in the fishery, number of trips, and days fished observed over the period 1999 to 2003 can be partly attributed to the 2 for 1 permitting requirement (Tables 3-5a and b). If the current permit requirements remain in effect, it is likely fishing effort will continue its decline into the future since each new entrant into this fishery will have to purchase two existing snapper grouper permits. Also, the number of non-transferable permits will decline over time as their owners stop fishing or die.

Commercial and recreational fishermen in the snapper grouper fishery have faced additional restrictive measures, which were implemented in Amendment 9 (SAFMC 1998c) and Amendment 12 (SAFMC 2000). A detailed account of these regulations is contained in the history of management section of this document (Section 1.3). Apart from the response to fishery management regulations, fluctuations in landings can also be partly attributed to changes in stock abundance and availability, water quality, market conditions (e.g., price), and fleet dynamics. Ex-vessel prices for the various species in the fishery depend on the quantity of landings, product quality, market conditions such as the availability of imports and the relative prices of substitutes, and consumer income levels.

Non-regulatory factors such as imports and increased fuel prices probably had a direct impact on the profitability of this industry and will continue to do so in the future. It appears that imports may be one contributing factor in keeping the average unit price for all snapper grouper species at about the same level from 1992 (Figure 3-7). Imports of snappers and groupers are classified into two product forms: fresh and frozen. Fresh fish comprised over 70% of total snapper grouper imports in 2004 (Table 3-7), which increased almost threefold from 16 million lbs in 1991 to 44.4 million lbs in 2003. Other factors that would influence snapper grouper prices, include landings of reef fishes and market conditions in the Gulf of Mexico.

More recently, the increasing trend in coastal development and the associated increase in property taxes, increased cost of dockage, and decreased public access to the waterfront have impacted the commercial fishing industry and possibly a segment of the private and for-hire recreational sectors. Certainly, the closure of fish houses in the South Atlantic may have had substantial effects on the snapper grouper commercial fishery. Fish houses provide support to the fishing industry that could include any or all of the following: dockage, fuel, ice, repair parts, gear and supplies, fish packing and processing, and a place for transactions with permitted snapper grouper dealers. In some cases, fish house owners have extended credit to vessel owners with negative cash flow problems. About 10 fish houses, which provided docking facilities in the South Atlantic, closed for business during the past five years. More recently, one of the main fishing docks in the snapper grouper fishery located in Murrells Inlet, South Carolina closed. The owner sold this waterfront property to a condominium developer. Vessels docked at that fish house relocated and there is a possibility that trip costs increased as a result of additional travel time needed to get to the fishing grounds. Also, these closures caused a disruption of existing business relationships with snapper grouper dealers, which meant that fishermen and wholesalers had to adapt to this new situation. It appears that an increasing number of fishermen are acting as their own dealers and selling directly to retailers and wholesalers in an attempt to increase profit margins or to adapt to the decline in the number of "fish houses" operating in the South Atlantic. It is expected these non-regulatory factors will influence the future composition and profitability of the commercial fishing industry.

The harvest of recreational snapper grouper species peaked in 1988 at 12.4 million lbs. Thereafter, landings decreased to 6.5 million lbs in 1998, and subsequently increased fluctuating between 8.0 million lbs and 11.06 million lbs (Table 3-25). A similar trend was observed in the private recreational sector (private/rental boat mode and shore mode), which accounts for 62% to 78% of total snapper grouper recreational landings. Most snapper grouper trips are taken by either private/rental or shore modes, and for the private/rental mode there appears to be an increasing trend in effort during the period 1998 to 2003 (Figure 3-14).

Since 1987, there has been a declining trend in headboat angler days in the South Atlantic (Table 3-23). In contrast to the private recreational sector, harvest by the headboat sector has been on a steady decline since 1988 (Table 3-25). In the headboat sector, there has been a continuous decline in the harvest of red porgy over the entire period 1986 through 2003 (Figures 3-16c). The decline in headboat effort could be a contributing factor in the reduction in headboat harvest of this species. Also, restrictive regulations that were implemented in 1999 and 2000 accounted for the very low harvest levels observed in the recreational fishery during 1999 and 2000. The decrease in headboat harvest of vermilion snapper after 1991 could be partly attributed to the declining trend in headboat effort and the 10 fish bag limit and 10 inch minimum size limit measures implemented in 1992.

One explanation for the decline in demand for headboat trips could be the result of the continued increase in the ownership of private recreational vessels by resident anglers in the South Atlantic states. This shift could partly account for the 54% decrease in headboat effort observed from 1988 to 2003.

The increased loss of public access to the waterfront displaced by marinas, private docks, and other development could have a negative effect on the segment of the private recreational fishery that trailer their vessels and depend on public boat ramps, or anglers who fish from shore especially in Florida.

<u>Economic effects of proposed regulations in Snapper Grouper Amendment 13C</u>
Refer to Section 4 for a detailed discussion of the incremental economic effects of the proposed measures for the five species in this regulatory amendment. Apart from red porgy, the proposed measures would impose additional restrictions on the harvest of four species (snowy grouper, golden tilefish, vermilion snapper, and black sea bass). The incremental short-term net revenue losses incurred by the commercial harvesting sector associated with the preferred alternatives follow: **Alternative 3** for snowy grouper is estimated at $0.28 to $0.43 million annually (4.7% - 7.1% of status quo revenue); **Alternative 2CE** for golden tilefish is estimated at $0.12 million annually (2.1% of status quo revenue); **Alternative 10** for vermilion snapper is estimated at $0.25 million annually (4.1% of status quo revenue); and **Alternative 8** for black sea bass is estimated at $0.07 million in year 1 (1.2% of status quo revenue), $0.19 million in year 2 (3.1% of status quo revenue), and $0.28 million in year 3 (4.7% of status quo revenue).

The cumulative losses from implementation of these proposed harvest restrictions could vary between $0.73 and $1.08 million annually (this represents about 12.3% to 18.1% of status quo income). Status quo income represents the total revenue earned from trips where these four species are harvested. Of the vessels that harvest these species, anywhere from 313 to 324 would incur losses from the combined effect of the preferred alternatives.

Snowy grouper and golden tilefish measures would disproportionately impact the longline sector that operates in the South Atlantic. Longline vessels would incur short-term losses of 23.9% of status quo income from the snowy grouper preferred alternative and 16.9% of status quo income from the golden tilefish preferred alternative. As expected, vessels that utilize trap gear would incur relatively greater losses from implementation of **Alternative 8** for black sea bass, 47.4% of status quo revenue, compared to vessels that employ other gear types.

The incremental short-term net annual revenue gain in the commercial harvesting sector associated with the **Preferred Alternative 2** for red porgy is estimated at $0.07 million annually.

The impacts of regulations on snowy grouper and golden tilefish are minimal for the recreational sector since these species are not frequently harvested by recreational fishermen. The major impact on the recreational sector is associated with management measures for vermilion snapper and black sea bass. Annual short-term reductions in non-market economic benefits associated with the preferred alternative for: snowy grouper is $5,334 and $68 for the private/charter and headboat sectors, respectively; golden tilefish is $3,615 for charter/private recreational sector; vermilion snapper is $74,803, $274,067, and $348,870 for the private/charter sector, headboat sector, and entire recreational fishery, respectively; black sea bass is $253,550 (year 1) and $456,267 (year 2) for the private/charter sector; $184,097 (year 1) and $302,778 (year 2) for the headboat sector; and $437,647 (year 1) and $759,045 (year 2) for the entire recreational sector.

The increased bag limits proposed for red porgy would increase the incremental short-term annual net economic benefits by $11,554 and $20,838 for the private/charter and headboat sectors, respectively.

The proposed actions are designed to stop overfishing and to rebuild overfished species in the snapper grouper complex. Therefore, while these regulations would reduce the short-term net revenue and net consumer surplus benefits to fishermen they are expected to improve the health of these resources and increase future economic benefits to both harvesters (recreational and commercial) and non-consumptive users. Also, as populations increase it is expected the non-use value (existence value) to society would increase. However, even if long-term economic benefits outweigh the short-term costs there is no guarantee the same individuals who experienced these negative short run impacts will benefit from projected improvements, unless they participate in the fishery when regulations become less restrictive and/or the quality of fishing improves. Similarly, recreational anglers who experience losses of net consumer surplus benefits due to reductions in bag limits, seasonal closures, increased minimum size regulations, and other measures may not benefit from more liberal regulations in the future when these stocks increase.

<u>The effects of other fishing regulations</u>
A large proportion of vessels operate in other fisheries in the South Atlantic and other regions, as well as reef fish fisheries in the Gulf of Mexico. For example, in 2004, a total of 167 vessels in the South Atlantic snapper grouper fishery held Gulf of Mexico reef fish permits. Most of these vessels were home ported in Florida (extracted from the Southeast Permits Database). Many of the longline vessels in the South Atlantic snapper grouper fishery also operate in the shark fishery and at least six of these vessels are permitted to fish in the Gulf of Mexico reef fish fisheries. Measures enacted in the Gulf of Mexico fishery and in the highly regulated shark fishery will therefore have an effect on the economic performance of these vessels.

Also, management of fisheries in the mid-Atlantic states will affect the economic performance of vessels in the black sea bass fishery since many of these vessels operate in fisheries managed by the Mid-Atlantic Fishery Management Council. However, the increased size limits for black sea bass in the preferred management alternatives (11” total length commercial and 12” total length recreational) are consistent with the commercial and recreational size restrictions for black sea bass that are currently in place in the mid-Atlantic. In addition, vessels in the South Atlantic snapper grouper fishery also participate in other state managed fisheries. This is especially the case for small vessels (under 30 feet) and medium sized vessels (31-60 feet) operating in North Carolina and Florida (Section 3.4.2). Similarly, state regulations will also affect the profitability of the snapper grouper commercial sector.

Potential effort shifts to other fisheries

Another future outcome of the proposed restrictive regulations proposed in Amendment 13C is the potential of effort flows into other fisheries. For the commercial fisheries there could be additional effort directed at dolphin, wahoo, king mackerel, Spanish mackerel, shallow water groupers, shallow water snappers, sharks, and other HMS species. In addition, other species in the mid-shelf complex and other abundant snapper grouper species could receive additional directed effort from hook and line vessels. Individuals may also increase their effort in fisheries within state waters.

In response to restrictive measures for black sea bass and vermilion snapper, there could be effort shifts in the recreational fishery to other near-shore snapper grouper and bottom fish species. Trip cancellation may also occur if substitute fishing opportunities are not available. The probability of these responses cannot be quantified as behavioral models to predict entry/exit behavior have not been developed for the recreational and commercial fisheries in the South Atlantic.

4.14 Public and Private Costs

Preparation, implementation, enforcement, and monitoring of this and any federal action involves expenditure of public and private resources which can be expressed as costs associated with the regulation (Table 27). Costs associated with Amendment 13C include:

Table 4-36. Public and private costs.

Council costs of document preparation, meetings, scoping meetings, public hearings and information dissemination	$100,000
NMFS administrative costs of document preparation, meetings and review	$100,000
NMFS law enforcement costs	unknown
Total	$200,000

4.15 Initial Regulatory Flexibility Analysis (IRFA)

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 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 the 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. 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 description of the reasons why action by the agency is being considered; (2) a succinct statement of the objectives of, and legal basis for the proposed rule; (3) an identification, to the extent practicable, of all relevant Federal rules which may duplicate, overlap, or conflict with the proposed rule; (4) a description and, where feasible, an estimate of the number of small entities to which the proposed rule will apply; (5) a description of the projected reporting, record-keeping, and other compliance requirements of the final rule, including an estimate of the classes of small entities which will be subject to the requirements of the report or record; (6) a description of significant alternatives to the proposed rule which accomplish the stated objectives of applicable statues and which minimize any significant economic impact of the proposed rule on small entities.

<u>Statement of need for, objectives of, and legal basis for the proposed rule:</u> The purpose and need, issues, problems and objectives of Snapper Grouper Amendment 13C are described in detail in Section 1.1 and are incorporated herein by reference. In summary, the objectives of the proposed rule are to reduce harvest to end overfishing for snowy grouper, golden tilefish, vermilion snapper, and black sea bass, and allow for an increase in the harvest of red porgy that is consistent with the rebuilding schedule for this species
The Magnuson-Stevens Fishery Management and Conservation Act provides the statutory basis for the proposed rule.

<u>Identification of all relevant Federal rules which may duplicate, overlap or conflict with the proposed rule:</u> No duplicative, overlapping, or conflicting Federal rules have been identified.

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: The proposed rule does not impose any reporting or record keeping requirements.

Description and estimate of the number of small entities to which the proposed rule will apply: Two general classes of small business entities would be directly affected by the proposed rule, commercial fishing vessels and for-hire fishing vessels. The Small Business Administration defines a small entity in the commercial fishing sector as a firm that is independently owned and operated, is not dominant in its field of operation, and has annual gross receipts not in excess of $3.5 million. For a for-hire business, the appropriate revenue benchmark is $6.0 million.

For the portion of the commercial finfish fishing sector that harvests species addressed in this amendment, an analysis of the gross revenue per vessel was conducted using data from the NMFS Southeast logbook program. These vessels also operate in other federally permitted fisheries, some harvests of which are also reported in the Southeast logbook program. All harvests (snapper grouper and non snapper grouper species) and associated gross revenues encompassed by this program were summarized and the results are presented in Tables 3-5b and 4-37a. During the period 2001 to 2004, average annual gross revenue did not exceed $14,000 annually for vessels that are likely to be affected by the measures in this proposed rule (Table 3-5b), and total annual gross revenue for an individual vessel did not exceed approximately $247,000 (Table 4-37a). It must be noted that these vessels may also operate in the for-hire sector and other fisheries whose landings are not covered by the Southeast logbook. Thus, this analysis may underestimate the total gross revenue for some vessels.

A comprehensive study of vessels that participated in the South Atlantic snapper grouper fishery in 1994 provided estimates of total vessel revenue from all fishing activities (Waters *et. al.* 2000). Average net incomes estimated from the boats that were sampled in this study, in declining order, were $83,224 for boats that primarily used bottom longlines in the northern area, $23,075 for boats that primarily used black sea bass pots in the northern area, $15,563 for boats that primarily used bottom longlines in the southern area, $11,649 for boats that primarily used vertical lines in the southern area, and $8,307 for boats that primarily used vertical lines in the northern area. Overall, boats in the northern area averaged $14,143 in net income based on average revenues of $48,702, while boats in the southern area averaged $12,388 net income based on average revenues of $39,745.

Although some fleet activity may exist in this fishery, the extent of such has not been determined. Thus, all vessels are assumed to be unique business entities. Given the gross revenue profile captured by the Southeast logbook program and the findings of Waters *et al.* (2000), it is assumed that it is unlikely the SBA revenue benchmark will be exceeded and it is assumed that all vessels are small entities.

Table 4-37a. Summary statistics on gross revenue per vessel for vessels that harvested snowy grouper, golden tilefish, black sea bass, vermilion snapper and red porgy (potentially affected entities) as reported to the Southeast logbook.

Year	Average gross revenue per vessel	Minimum gross revenue per vessel	Maximum gross revenue per vessel
2001	$25,062	$54	$246,722
2002	$24,489	$73	$205,561
2003	$22,485	$76	$175,872
2004	$24,105	$91	$222,391

Holland *et al.* (1999) defined charterboats as boats for hire carrying 6 or fewer passengers that charge a fee to rent the entire boat. Headboats tend to be larger, generally can carry a maximum of around 60 passengers, and the fee is paid on an individual angler basis. A description of these entities is contained in Section 3.4.2.2. Holland et al. (1999) employed two methods to determine the average gross revenue per vessel for the for-hire sector. The first method summarized the survey response of total gross revenue provided by the vessel owner. The second method calculated gross revenues based on the survey response to the average price per trip/passenger and the average number of trips/passengers taken/carried per year. The second method consistently generated higher estimates of average gross revenues, suggesting either over-reporting by survey respondents of individual components utilized in the calculated method, or under-reporting of gross revenues. This analysis assumes the alternative results provide an acceptable range of the true average gross revenues for this sector. These results are as follows: $51,000 to $69,268 for charterboats on the Atlantic coast of Florida; $60,135 to $73,365 for charterboats in North Carolina, $26,304 to $32,091 for charterboats in South Carolina; $56,551 to $68,992 for charterboats in Georgia; $140,714 to $299,551 for headboats in Florida; and $123,000 to $261,990 for headboats in the other South Atlantic states. Similar to the situation with the commercial harvest sector, some fleet activity may exist within the for-hire sector. The magnitude and identity of such is unknown, however, and all vessels are assumed to represent unique business entities. Given the gross revenue profiles provided, it is clear that vessels in the for-hire recreational sector will also not exceed the SBA revenue benchmark and all for-hire entities are determined to be small business entities.

There were 1,066 commercial snapper grouper permitted vessels in the South Atlantic during 2004 (Table 3-5a). A number of these permitted vessels were not active in the snapper grouper fishery. It is not possible to estimate the total number of true latent permits (i.e., those permits which are not expected to be fished in any given year and may exist only for speculative purposes) since permits with no associated landings could become active in a subsequent year. The number of permitted vessels, however, is an upper bound on the universe of vessels in this fishery. The assumed lower bound of the universe of vessels is the number of active vessels in the latest year for which data is available. This lower bound estimate is 906 vessels, or the number of vessels/permits with recorded landings of snapper grouper species in the South Atlantic in 2003 (Table 3-5a). Thus, the range of vessels assumed to potentially operate in the commercial snapper grouper fishery is 906 to 1,066. A subset of these snapper grouper vessels harvest the five species addressed in this Amendment and could potentially be affected by the proposed rule. The number of vessels that harvested any of these snapper grouper species ranged from 396 to 459 during the period 2001 to 2004 (Table 3-5b) and will be referred to as potentially affected entities in the following analysis. A complete description of these entities is contained in Section 3.4.2.

For the for-hire sector, 1,594 snapper grouper for-hire permits were issued to vessels in the southern Atlantic states in 2004 (Table 3-30). The for-hire fishery operates as an open access fishery and not all of the permitted snapper grouper for-hire vessels are necessarily active in this fishery. Some vessel owners have been known to purchase open access permits as insurance for uncertainties in the fisheries in which they currently operate. Holland et al. (1999) estimated that a total of 1,080 charter vessels and 96 headboats supplied for-hire services in all fisheries in Florida (east and west coast) and the rest of the South Atlantic in 1997 (Table 3-31). A complete description of these entities is contained in Section 3.4.2.2.4.

Substantial number of small entities criterion: In the commercial harvesting sector, it is estimated that 37% (396x100/1,066) to 51% (459x100/906) of the entire universe of entities (906-1,066 vessels) could be affected by measures in this amendment. Thus, it is determined that a substantial number of small entities in the commercial harvesting sector will be affected by the proposed measures.

Data on the number of for-hire vessels that actually harvest the species addressed by this action is not available. However, data on overall harvest in the for-hire sector can be used to gauge the relative dependence on species in this amendment. As described in Section 3.4.2.2.3, most (70%) of the headboat harvest is comprised of snapper grouper species and it is assumed that all headboats harvest or target snapper grouper species in the South Atlantic. The species addressed in this amendment comprise approximately 36% of the headboats' snapper grouper harvest in the South Atlantic. Thus, it is likely that a substantial number of headboats will be affected by measures in this proposed rule.

Data on the charter sector also imply that a substantial number of charterboat entities will be affected by the proposed rule. For the charter sector, snapper grouper species are caught on 28% of all trips, while 14% of the charter sector's snapper grouper harvest is comprised of species in this amendment. Although reports from charter operators indicate that there are a few charterboat operators who specialize in the harvest of snapper grouper species, some target these species at certain times of the year when other more popular species are not available.

Significant economic impact criterion: The outcome of "significant economic impact" can be ascertained by examining two issues: disproportionality and profitability.

Disproportionality: Do the regulations place a substantial number of small entities at a significant competitive disadvantage to large entities?

All vessel operations affected by the proposed FMP are considered small entities so the issue of disproportionality does not arise in the present case. However, among the small entities in the commercial harvesting sector, there is a high degree of diversity in terms of primary gear employed and level of engagement in the snapper grouper fishery. A detailed description of the heterogeneity in this fishing fleet is contained in Section 3.2.3.3.

The economic analyses of the proposed management alternatives in Section 4.1.2 contain expected losses/gains in short-term net revenue to the commercial fishery by state and gear type, and the expected short-term reduction/increase in harvest and value to the recreational fishery by sector and state. The methods used to calculate the short-term net revenue changes as a result of regulations in the proposed rule are described in Appendix E. From these analyses, it is clear the snowy grouper and golden tilefish proposed regulations would have a proportionally higher negative short-term impact on vessels which employ long line gear (Table 4-7c and Table 4-14c) and vessels which fish off South and Central Florida (Table 4-7d and Table 4-14d). The vermilion snapper quota would have a relatively larger negative impact on vessels which employ hook and line gear fishing off Georgia and Northeast Florida (4-20c and Table 4-20d). In addition, the black sea bass management measures would have a proportionally higher negative impact on vessels which utilize black sea bass pots in North Carolina (Table 4-27c and Table 4-27d). Red porgy management measures would increase the allowable harvest and revenues in the commercial fishery. Most of the increase in revenue would be realized by vessels which employ hook and line gear (Table 4-33c). It should be noted that some vessels/entities employ different gear types throughout the year and engage in the harvest of more than one species addressed in the proposed rule. The section on profitability presented below discusses the cumulative effects of the proposed management measures.

The short-term impacts on the for-hire sector from the proposed measures for snowy grouper and golden tilefish are expected to be minimal (Table B). In contrast, for-hire vessels in the recreational sector would bear substantially larger short-term negative impacts associated with implementation of the proposed regulations for vermilion snapper and black sea bass (Table B). Assessment of the impacts on for-hire vessels is limited to expected reductions in harvest since the econometric models to predict changes in for-hire trips and subsequent changes in revenues as a result of the proposed regulations are not available. The short-term reduction in harvest of these two species is expected to be proportionally greater in the headboat sector than the charterboat or private boat sectors. In the case of vermilion snapper, the proposed regulation would reduce vermilion snapper harvests by 21% in the private/charter sector (Table 4-21b) compared to 30% in the headboat sector (Table 4-21d). Similarly, the proposed regulation for black sea bass would reduce black sea bass harvests by 27% (year 1) in the charter/private sector (Table 4-28b) compared to 41% (year 1) in the headboat sector (Table 4-28d).

The proposed red porgy regulation is expected to result in an increase in recreational harvest and associated benefits (Section 4.5.5.2). The proposed regulation for red porgy is expected to increase red porgy harvest in the headboat sector by 36% and 21% in the charter/private recreational fishery sector (Tables 4-3a and 4-3b).

Profitability: Do the regulations significantly reduce profit for a substantial number of small entities?

Information on the profitability of the for-hire sector in the South Atlantic is depicted in Table 4-37b. These business entities would be expected to lose revenues and profits as a result of trip cancellation by clients who determine that the proposed measures will significantly affect the quality of the fishing experience. As previously discussed, these losses cannot be estimated at this time due to data limitations. However, it is reasonable to assume that the greater the reduction in harvest, the higher the potential revenue losses from cancelled trips. Even though it is not possible to calculate the change in profitability expected to arise from the proposed rule, given the dependence of the for-hire sector (particularly headboats) on the harvest of vermilion snapper and black sea bass, it is reasonable to assume that these harvest reductions may have a substantial adverse impact on the profitability of affected for-hire entities. The estimated reduction in consumer surplus in the headboat sector (approximately $577,000) as a result of the proposed regulations in these two fisheries is approximately 19% of total estimated consumer surplus generated from the snapper grouper fishery (approximately $2.978 million). Similar analysis is not possible for the charter sector due to this sector being combined with the private recreational sector in the assessment results. While it is inappropriate to translate these results one-for-one into expected trip cancellations, they demonstrate the potential magnitude of trip cancellation and provide insight on potential business revenue and profit changes.

Table 4-37b. Average gross revenue per vessel and average net revenue per vessel by state and vessel type in the for-hire recreational sector.

	Gross Revenue Estimate 1	Gross Revenue Estimate 2	Annual Operating Cost*	Net Revenue Estimate 1	Net Revenue Estimate 2
Charter					
Florida	$51,000	$69,268	$68,578	-$17,578	$690
North Carolina	$60,135	$73,365	$46,888	$13,247	$26,477
South Carolina	$26,304	$32,091	$23,235	$3,069	$8,856
Georgia	$56,551	$68,992	$41,688	$14,863	$27,304
Headboats					
	Gross Revenue Estimate 1	Gross Revenue Estimate 2	Annual Operating Cost *	Net Revenue Estimate 1	Net Revenue Estimate 2
Florida	$140,714	$299,551	$135,737	$4,977	$163,814
North Carolina	$123,000	$261,990	$79,190	$43,810	$182,800
South Carolina**	$123,000	$261,990	$79,190	$43,810	$182,800
Georgia	$123,000	$261,990	$79,190	$43,810	$182,800

*Includes reported expenditures on wages and salaries, fuel, maintenance, and engine replacement (Holland et al., 1999).
**The estimate of annual expenses per vessel calculated for North Carolina and Georgia was used to calculate net revenue for the average vessel in South Carolina.

In the commercial harvesting sector, data from 2001 through 2004 were used to examine the profitability of vessels that are likely to be affected by the proposed measures for black sea bass, vermilion snapper, golden tilefish and snowy grouper. Since the analysis for red porgy was conducted using data during a different time period (1995 through 1998; see Appendix E) the revenue increase associated with this measure was not included in the assessment of the short-term cumulative effects of the proposed rule. Instead this estimated increase in net cash flow in the commercial harvesting sector due to red porgy regulations is presented separately.

The current estimated net revenue performance of commercial entities that harvested the four species for which harvest restrictions are proposed is contained in Table 4-37c. Vessel revenue represents net revenue (gross revenue minus trip costs and opportunity cost of labor) derived from landings reported to the Southeast logbook (Appendix E). Over the period 2001 to 2004 a large proportion (67%) of these entities reportedly earned less than $10,001 per year (Table 4-37b). Also, a number of these vessels appeared to operate at a loss or break-even condition. This composition of the fleet could be reflective of a high proportion of part-time commercial fishermen in the Southeast who supplement household income by other employment. Another explanation is that not all these vessels' commercial landings are reported to the Southeast logbook and/or they are engaged in for-hire activities. Revenues and costs associated with commercial fishing on trips included in the Southeast logbook data that did not harvest any of the species covered by this proposed action, commercial fishing not captured by the Southeast logbook program, and for-hire activities are not reflected in the results contained in the following analyses. As such, while expected losses can be determined, total and net revenues for entire fishing business operations are unknown and, hence, the following analysis likely overstates total and average individual impacts on the affected entities. The magnitude of this overstatement, however, cannot be determined.

Table 4-37c. Profitability of the potentially affected entities prior to evaluation of the proposed regulations during the period 2001-2004. Number of vessels by net revenue category.

Net Revenue Category	**2001**	**2002**	**2003**	**2004**	**Average 2001-2004**	**% of vessels (2001-2004)**
$0 or net loss*	48	40	32	38	40	10%
$1 to $1,000	101	79	81	86	87	21%
$1,001 to $5,000	94	103	111	102	103	25%
$5,001 to $10,000	53	47	35	30	41	10%
$10,001 to $15,000	19	22	23	24	22	5%
$15,001 to $25,000	40	36	20	24	30	7%
$25,001 to $50,000	49	48	56	35	47	12%
$50,001 to $100,000	36	30	25	38	32	8%
$100,000	9	6	4	8	7	2%
Total	**448**	**411**	**387**	**385**	**408**	

*A number of vessels were not profitable (revenue calculated from landings reported to the Southeast logbook was equal to or exceeded by the predicted trip cost and opportunity cost of labor).

On average, during the first year of implementation, the proposed harvest restrictions for golden tilefish, snowy grouper, vermilion snapper and black sea bass are expected to result in a total net short-term annual loss of $0.735 million to the commercial harvesting sector, or 12% of the total net revenue for trips that harvested any of the affected species (Table 4-37d). The proposed rule will implement a stepped-down approach on harvest restrictions for snowy grouper and black sea bass over a three-year period. The cumulative effects of the proposed measures for these four species will increase to $1.085 million in the third year (Table 4-37d).

For red porgy, the proposed rule is expected to increase short-term revenue to the commercial harvesting sector by $0.07 million (Table 4-33e).

Table 4-37d. Comparison of the cumulative effects on all entities associated with harvest restrictions in the proposed rule and the preferred alternatives identified in the Public Hearing Draft of Amendment 13C. Net revenue represented in thousands of dollars.

Data	2001	2002	2003	2004	Average 2001-2004
Proposed Rule (Year 1)					
Net revenue of all entities affected by the **regulations in the proposed rule.**	$5,383	$5,241	$4,894	$5,497	$5,254
Net losses associated with the restrictive harvest measures	-$1,460	-$693	-$294	-$490	-$735
Percent Reduction	-21%	-12%	-6%	-8%	-12%
Proposed Rule (Year 2)					
Net revenue of all entities affected by the **regulations in the proposed rule.**	$5,185	$5,074	$4,671	$5,342	$5,068
Net losses associated with the restrictive harvest measures	-$1,658	-$860	-$517	-$646	-$920
Percent Reduction	-24%	-14%	-10%	-11%	-15%
Proposed Rule (Year 3)					
Net revenue of all entities affected by the **regulations in the proposed rule.**	$5,006	$4,895	$4,596	$5,117	$4,904
Net losses associated with the restrictive harvest measures	-$1,837	-$1,040	-$592	-$871	-$1,085
Percent Reduction	-27%	-18%	-11%	-15%	-18%
Preferred Alternatives in the Public Hearing Draft					
Net revenue of all entities affected by the **preferred alternatives in the Public Hearing draf**t	$7,018	$6,097	$5,343	$6,161	$6,155
Net losses associated with the restrictive harvest measures	-$2,517	-$1,714	-$719	-$1,227	-$1,544
Percent Reduction	-36%	-28%	-13%	-20%	-25%

When evaluated at the individual vessel/entity level, the average annual loss per affected entity associated with the proposed rule in the first year is expected to vary between $760 and $3,261 and the maximum net loss per boat is expected to vary between $26,533 and $76,390 per year (Table 4-37e). In comparison, the preferred alternatives taken out to public hearings would have resulted in an average annual loss between $1,863 and $5,659 and a maximum net loss per boat between $39,159 and $77,854 per year (Table 4-37e).

Table 4-37e. Summary statistics on the Short-term net revenue losses at the vessel level associated with harvest restrictions on snowy grouper, golden tilefish, vermilion snapper and black sea bass. A comparison of the Council's proposed rule and the preferred alternatives in the Public Hearing Draft of Amendment 13C. Net revenue losses presented in thousands of dollars.

Year	Number of Boats	Minimum Loss per Boat	Median Loss per Boat	Maximum Loss per Boat	Mean Loss per Boat	Std Error of Mean Loss per Boat
Proposed Rule (Year 1)						
2001	448	$0	$63	$76,390	$3,261	$380
2002	411	$0	$4	$61,270	$1,687	$298
2003	387	$0	$0	$38,170	$760	$185
2004	385	$0	$0	$26,533	$1,279	$194
Preferred Alternatives in the Public Hearing Draft						
2001	448	0	650	77,854	5,659	515
2002	411	0	375	68,537	4,203	416
2003	387	0	41	45,493	1,863	269
2004	385	0	194	39,159	3,201	331

The frequency distribution of the number of affected entities by net revenue loss category provides insight into the distribution of revenue losses across the fleet (Table 4-37f and Table 4-37g). On average, 219 vessels (54% of potentially affected entities) would not be expected to incur losses under the proposed rule (Table 4-37f and Table 4-37g). In contrast, an average of 92 vessels (23% of potentially affected entities) would not have sustained net revenue losses if the preferred alternatives in the public hearing draft were implemented.

Revenue loss per vessel was re-classified as Range I ($1-$500), Range II ($501 to $10,000) or Range III (greater than $10,000), and the frequency distribution of expected impacts of the proposed action is presented in Table 4-37g. It is clear that short-term economic effects will not be distributed evenly across all affected entities. During the first year of implementation of the proposed rule, it is expected that 21 vessels will sustain Range III losses (an average of $22,764 per vessel) and collectively account for 62% of the total net loss in the commercial harvesting sector (Table 4-37g). On the other hand, 82 entities will sustain Range I losses ($102 per vessel) and 86 entities are likely to sustain Range II losses ($3,165 per vessel) and account for 37% of the total net loss in the commercial harvesting sector (Table 4-37g).

Table 4-37f. Frequency distribution of the number of affected entities by net revenue loss category. Net revenue loss represents the cumulative annual loss in net revenue per vessel associated with harvest restrictions on black sea bass, vermilion snapper, golden tilefish and snowy grouper. A comparison of the Council's proposed rule and the preferred alternatives in the Public Hearing Draft of Amendment 13C.

Proposed Rule (Year 1)					
Net Revenue Loss Category	2001	2002	2003	2004	Average
No Losses	166	193	321	197	219
1- 100	68	55	3	48	44
101- 500	46	43	15	49	38
501- 1,000	23	23	6	16	17
1,001- 2,500	36	34	18	32	30
2,501- 5,000	27	31	10	10	20
5,001-10,000	34	19	7	19	20
10,001-20,000	32	6	2	7	12
20,001-30,000	9	3	3	7	6
30,001-100,000	8	4	2	0	4
Preferred Alternatives in the Public Hearing Draft					
Net Revenue Loss Category	2001	2002	2003	2004	Average
No Losses	93	76	108	91	91
1- 100	65	79	113	81	85
101- 500	58	55	44	51	52
501- 1,000	31	28	30	25	29
1,001- 2,500	45	47	36	32	40
2,501- 5,000	37	26	14	25	26
5,001-10,000	34	40	24	42	35
10,001-20,000	42	42	8	22	29
20,001-30,000	28	13	6	12	15
30,001-100,000	16	5	4	4	7

Table 4-37g. Frequency distribution of the number and percent of potentially affected entities by net revenue loss category. Net revenue loss represents the cumulative annual loss in net revenue per vessel associated with harvest restrictions on black sea bass, vermilion snapper, golden tilefish and snowy grouper. A comparison of the Council's proposed rule and the preferred alternatives in the Public Hearing Draft of Amendment 13C. The total revenue loss and percent loss by net revenue loss category.

Descriptive Revenue Loss Category	Numerical Revenue Loss Category	Average Number of vessels (2001-2004)	Average % of vessels (2001-2004)	Average net Losses (2001-2004)	% of average lost revenue (2001-2004)	Average Loss Per vessel
Proposed Rule (Year 1)						
No losses	No losses	219	54%			
Range I	1- 500	82	20%	$10,923	1%	$102
Range II	501-10,000	86	21%	$269,051	37%	$3,165
Range III	10,001 - 100,000	21	5%	$455,276	62%	$22,764
Preferred Alternatives in the Public Hearing Draft						
No losses	No losses	91	23%			
Range I	1- 500	137	33%	$15,148	1%	$111
Range II	501-10,000	129	32%	$433,216	28%	$3,358
Range III	10,001 - 100,000	51	12%	$1,089,399	71%	$21,572

As mentioned previously, the red porgy analyses could not be combined with the analyses on harvest restrictions and these results are presented separately. The proposed action on the red porgy fishery is expected to increase net revenue to the entire industry by $70,000 annually (Table 4-33c). The distribution of these net revenue increases across the red porgy fleet is contained in Table 4-37h. The estimated earnings of 32 vessels (10% of the fleet) are expected to exceed $2,500 per vessel annually (Table 4-37h). The estimated average net revenue increase per vessel within the red porgy fishery is $221 ($70,000/317) per year.

Table 4-37h. Frequency distribution of the number of affected entities by net revenue category associated with an increased trip limit and harvest increase for red porgy.*

Net revenue category	Average Number of Vessels (1995-1998)	Percent of total vessels
No gain	2	1%
$1-$100	129	41%
$101-$500	74	23%
$501-$1000	39	12%
$1,001-$2500	42	13%
$2,501-$5000	23	7%
$5,001-$20,000	9	3%
Total	317	

* The red porgy harvest increase measure recommended in the proposed rule is the same as the Preferred Alternative in the Public Hearing Draft of Snapper Grouper Amendment 13C.

Estimates of the proportional reduction in vessel profitability for all affected entities are summarized in Table 4-37i. It should be recalled, however, that the estimates may over-estimate actual impacts since revenues and profits from all commercial fishing activity by the affected entities is unknown and the following results only refer to activity on trips that recorded harvests of the species addressed by this action.

Vessel profitability is expected to decrease by more than 10% for 86 vessels (21% of all 408 potentially affected entities) during the first year of implementation of this proposed rule. This compares to 140 vessels (34% of all 408 potentially affected entities) under the preferred alternatives taken out to public hearing (Tables 4-37i and 4-37j).

The proposed rule will result in a loss in net revenue of more than 10% for the 20 vessels that experience a Range III reduction (Tables 4-37i and 4-37j). Also, 80% of all affected entities (16 vessels) that experience a Range III decrease in net revenue will realize more than a 25% reduction in profitability (Tables 4-37i and 4-37j). In contrast, profitability will decrease by more than 10% for only 24% (7 vessels) of all vessels that are likely to sustain Range I losses (Tables 4-37i and 4-37j).

Table 4-37i. Frequency distribution of the number of affected entities by decrease in profitability category for each net revenue loss classification. *

Category of Reduction in vessel profitability	Range I**	Range II**	Range III**	Total
Proposed Rule (Year 1)				
0%				243
>0%-1%	23	2	0	25
>1%-5%	15	18	0	33
>5%-10%	9	16	0	25
>10%-25%	7	24	5	36
>25%-50%	3	16	12	31
>50%-100%	4	11	4	19
Total	60	85	20	408
Preferred Alternatives Public Hearing Draft				
0%				144
>0%-1%	32	11	0	43
>1%-5%	14	13	0	27
>5%-10%	18	29	8	55
>10%-25%	8	36	24	67
>25%-50%	6	18	13	37
>50%-100%	9	20	5	36
Total	86	127	50	408

*Vessels that were unprofitable before imposition of the restrictive harvest regulations are not included in this analysis.
**Range I = $1-$500, Range II = $501-$10,000, Range III = more than $10,000.

Table 4-37j. Frequency distribution of the percent of affected entities by decrease in profitability category for each net revenue loss classification.

Category of Reduction in vessel profitability	Range I**	Range II**	Range III**	Total	Percent of potentially affected entities*
Proposed Rule (Year 1)					
0%					60%
>0%-1%	38%	2%	0%	15%	6%
>1%-5%	25%	21%	0%	20%	8%
>5%-10%	15%	19%	0%	15%	6%
>10%-25%	12%	28%	25%	22%	9%
>25%-50%	5%	19%	60%	19%	8%
>50%-100%	7%	13%	20%	12%	5%
Total	100%	100%	100%	100%	100%
Preferred Alternatives Public Hearing Draft					
0%					35%
>0%-1%	37%	9%	0%	16%	11%
>1%-5%	16%	10%	0%	10%	7%
>5%-10%	21%	23%	16%	21%	13%
>10%-25%	9%	28%	48%	26%	16%
>25%-50%	7%	14%	26%	14%	9%
>50%-100%	10%	16%	10%	13%	9%
Total	100%	100%	100%	100%	100%

*The total number of potentially affected entities includes all vessels that landed the four species in this amendment. The average number of vessels for the period 2001 to 2004 was 408.
**Range I = $1-$500, Range II = $501-$10,000, Range III = more than $10,000.

In summary, the proposed rule is expected to result in a 12% loss in short-term net revenue to the commercial harvesting sector; at least 26% of potentially affected entities are expected to sustain more than $501losses in net revenue (Table 4-37g), and 31% of all affected entities (13% of all potentially affected entities) are expected to experience more than a 25% decrease in profitability (Table 4-37j). These impacts reflect reductions in profitability during the first year of implementation of the proposed action. As previously discussed, the reductions in profitability are expected to increase through the third year as total target harvest reductions are achieved. Thus, both the magnitude and distributional effects of the reduction in net revenues could increase over this period of time. However, the delayed implementation of the full harvest reductions could allow operational adaptation by the affected entities, resulting in reduced total impacts and reduced distributional effects than those discussed above. In addition to the impacts described for the commercial finfish harvest sector, certain segments of the for-hire sector will experience substantial reductions in allowable harvests of certain species as a result of the proposed rule and may experience commensurate reductions in revenues if unable to maintain service demand through the substitution of other species.

Description of significant alternatives: Detailed discussion of the expected impacts of the alternatives considered in this action is contained in Section 4.2 and is incorporated herein by reference. A summary of these alternatives follows.

Three alternatives, including the status quo, were considered for the proposed action to establish management measures for the commercial fishery consistent with ending overfishing in the snowy grouper fishery. The status quo would have allowed continued overfishing and would, therefore, not achieve the Council's objective.

The second alternative would have achieved the full commercial quota reduction in the first year of implementation, rather than the step-down provision of the proposed action and, as such, would result in greater short term adverse economic impacts than the proposed action.

Three alternatives, including the status quo, were considered for the proposed action to establish management measures for the recreational fishery consistent with ending overfishing in the snowy grouper fishery. The status quo would have allowed continued overfishing and would, therefore, not achieve the Council's objective.

Due to the low catch per unit effort in the recreational fishery, the second alternative would not have resulted in sufficient harvest reduction consistent with the goal of ending overfishing. Therefore, although this alternative would have resulted in lower short-term adverse economic impacts to the recreational sector, this alternative would not achieve the Council's objective.

Three alternatives, including the status quo, were considered for the proposed action to establish management measures for the commercial fishery consistent with ending overfishing in the golden tilefish fishery. The status quo would have allowed continued overfishing and would, therefore, not achieve the Council's objective.

For each quota alternative, five step-down trip limit alternatives, including the status quo no trip limit, and two step-down trigger date control options, including the status quo no control trigger date, were considered. Under the quota specified by the proposed action, the trip limit alternatives encompassed either a lower trip limit, 3,000 pounds, than the proposed action or a less restrictive harvest trigger, 85% of the quota, for the step down. The short-term adverse economic impacts of all trip limit alternative combinations that include the 75% harvest trigger would be expected to be approximately equal or greater than those of the proposed action. The trip limit alternative combinations that include the 85% harvest trigger would generate lower short-term adverse economic impacts than the proposed action. However, this higher trigger would result in a shorter fishing season, on average, than the proposed action. Although these impacts were not able to be quantified, shorter fishing seasons are recognized to result in adverse price effects, market disruptions, and disruptions of business operation. Therefore, the expected longer season projected under the proposed action was determined to best meet the Council's objectives.

Under the alternative quota specification, the expected adverse short-term economic impacts of seven of the ten trip limit and trigger date combinations are projected to be less than those of the proposed action. This is due to the three-year progression to the target quota of 295,000 pounds, which is established in the first year of the proposed action, but not until the third year under this alternative, resulting in larger allowable harvests the first two years. This alternative would not end overfishing immediately, and would, therefore, not meet the Council's objective.

Four alternatives, including the status quo, were considered for the proposed action to establish management measures for the recreational fishery consistent with ending overfishing in the golden tilefish fishery. The status quo would have allowed continued overfishing and would, therefore, not achieve the Council's objective.

Due to the low catch per unit effort in the recreational fishery, the second alternative would not have resulted in sufficient harvest reduction consistent with the goal of ending overfishing. Therefore, although this alternative would have resulted in lower short-term adverse economic impacts to the recreational sector, this alternative would not achieve the Council's objective.

The third alternative would impose greater restrictions on recreational golden tilefish harvest, resulting in greater adverse economic impacts than the proposed action.

Ten alternatives, including the status quo, were considered for the proposed action to establish management measures for the commercial fishery consistent with ending overfishing in the vermilion snapper fishery. The status quo would have allowed continued overfishing and would, therefore, not achieve the Council's objective.

Eight alternatives, would have established lower commercial quotas, either 757,000 or 821,000 pounds gutted weight, than the proposed action, in addition to alternative minimum size and trip limits. These quotas represent reductions in allowable harvest greater than is necessary to end overfishing of this resource. Further, each of the eight alternatives would result in greater adverse economic impacts than the proposed action.

Nine alternatives, including the status quo, were considered for the proposed action to establish management measures for the recreational fishery consistent with ending overfishing in the vermilion snapper fishery. The status quo would have allowed continued overfishing and would, therefore, not achieve the Council's objective.

In addition to the minimum size limit increase of the proposed action, one alternative to the proposed action would reduce the daily bag limit to six fish. Although this alternative would increase the likelihood of ending overfishing relative to the proposed action, this alternative would result in greater adverse economic impacts than the proposed action.

A similar alternative would, in addition to the minimum size limit increase, impose lower, but differential, bag limits on the for-hire and recreational sectors. Similar to the alternative discussed above, this alternative would increase the likelihood of ending overfishing relative to the proposed action, this alternative would result in greater adverse economic impacts than the proposed action.

Two alternatives to the proposed vermilion snapper recreational action would maintain the current minimum size limit, but impose fishery closures for different periods, October through December and January through February. Both alternatives are projected to result in lower adverse economic impacts than the proposed action. However, these estimates do not incorporate additional potential adverse impacts associated with potential fishing trip cancellation as a result of the closures. These impacts cannot be determined at this time. The addition of these impacts, however, may result in the total adverse impacts of these alternatives exceeding those of the proposed action. Further, while the proposed action may not end overfishing, depending on what the current vermilion snapper biomass is, these alternatives are not expected to achieve as much progress towards the goal of ending overfishing and, as such, do not meet the Council's objectives.

Two alternatives retain the closures specified in the alternatives discussed above, and add reductions in the bag limit to six fish and five fish, respectively. While each of these alternatives would be expected to achieve greater progress towards ending overfishing relative to the proposed action, each would also result in greater adverse economic impacts than the proposed action.

The final alternative to the proposed action for the recreational vermilion snapper fishery would include the minimum size limit increase in the proposed action and close the fishery from January through February. This alternative would achieve greater harvest reductions than the proposed action, thereby accomplishing more progress towards ending overfishing. This action would also, however, result in greater adverse economic impacts than the proposed action. The Council determined that, given the uncertainty associated with the stock assessment for vermilion snapper, the harvest reductions achieved by the proposed action, while not achieving an immediate end to overfishing, would be sufficient until further knowledge is gained through the next stock assessment.

Eight alternatives, including the status quo, were considered for the proposed action to establish management measures for the commercial fishery consistent with ending overfishing in the black sea bass fishery. The status quo would have allowed continued overfishing and would, therefore, not achieve the Council's objective.

One alternative would have established a lower quota than that specified for the first two years under the proposed action, but 10% greater than the third year quota. Thus, this alternative would be expected to result in greater adverse economic impacts than the proposed action in the first two years, but slightly less impacts in subsequent years. Although the effects of such could not be quantified, the Council determined that a more gradual progression to a lower quota would support greater adaptive behavior by participants and result in lower total adverse economic impacts.

A second alternative would have established the lower third year quota target of the proposed action immediately, and would also establish an increased minimum size limit and trip limits. This alternative would result in greater adverse economic impacts than the proposed action.

A third alternative would have established a quota equal to that specified in the second year of the proposed action and an increased minimum size limit. This alternative would result in greater adverse economic impacts in the first two years than the proposed action, but less impacts thereafter. This alternative would not, however, achieve the necessary harvest reductions to meet the Council's objective of ending overfishing.

A fourth alternative would add in increase in the minimum size limit and trips limits to the measures contained in the proposed action. Because it is would add additional restrictions, this alternative would result in greater adverse economic impacts than the proposed action.

A fifth alternative would not impose a quota, but would, instead, in addition to mesh size specification of the proposed action, limit harvest and/or possession of black sea bass to the recreational bag limit. This alternative would result in greater adverse economic impacts than the proposed action.

The final alternative to the proposed action on the commercial black sea bass fishery would impose the mesh size specification of the proposed action and increase the minimum size limit. Although this alternative would result in less adverse economic impacts than the proposed action, this alternative would not achieve the necessary harvest reductions to meet the Council's objective of ending overfishing.

Eight alternatives, including the status quo, were considered for the proposed action to establish management measures for the recreational fishery consistent with ending overfishing in the black sea bass fishery. The status quo would have allowed continued overfishing and would, therefore, not achieve the Council's objective.

One alternative to the proposed action would immediately establish a lower allocation than the first two years of the proposed action, but greater than that of the third and subsequent years, as well as an immediate increase in the minimum size limit matching the specification in the second year of the proposed action. The bag limit specifications of both alternatives are identical. Since this alternative is more aggressive in achieving desired reductions, the short-term adverse impacts are greater than those of the proposed action. Further, the progressive achievement of the target restrictions in the proposed action allow for more gradual adaptation to the new restrictions and the changes to the business environment they may engender.

A second alternative to the proposed action would immediately establish the third year allocation of the proposed action, forgo the second increase in the minimum size limit, and reduce the bag limit to four fish per person per day. While the quantifiable adverse economic impacts of this alternative are lower than those of the proposed action, these impacts do not account for additional potential adverse impacts associated trip cancellation due to the severe reduction (80%) in the daily bag limit. These additional adverse impacts are expected to result in this alternative having a greater adverse economic impact than the proposed action.

A third alternative would establish a recreational allocation equal to that of the second year under the proposed action limit the increase in the minimum size limit to one inch. Although this alternative would result in lower adverse economic impacts than the proposed action, the resultant harvest reductions would be insufficient to meet the Council's objective.

A fourth alternative would mimic the allocation specifications of the proposed action, but would limit the minimum size limit increase to one inch while reducing the daily bag limit to four fish. Similar to the discussion of the second alternative above, the analytical results do not capture the full potential impacts associated with the bag limit reduction and this alternative is expected to result in this alternative having a greater adverse economic impact than the proposed action.

A fifth alternative would simply reduce the bag limit to ten fish per person per day. This alternative would not achieve the necessary harvest reductions to meet the Council's objective.

The final alternative to the proposed action for the recreational black sea bass fishery would simply increase the minimum size limit one inch. This alternative would not achieve the necessary harvest reductions to meet the Council's objective.

Five alternatives, including the status quo, were considered for the proposed action to establish management measures to increase the allowable harvest in the recreational and commercial fisheries for red porgy. The status quo would have allowed continued overfishing and would, therefore, not achieve the Council's objective.

One alternative would be identical to the proposed action except for allowing a smaller the recreational bag limit. This alternative would result in lower economic benefits than the proposed action.

A second alternative similarly impose the smaller bag limit and reduce the number of fish that can be harvested per commercial trip relative to the proposed action, while allowing the limit to occur year-round rather than just May through December. While this alternative would result in slightly greater benefits to the commercial sector, the benefits to the recreational sector would be less than those of the proposed action and the Council determined that overall the proposed action would be more effective in allowing increased benefits relative to the status quo while protecting against harvest overages.

The final alternative to the proposed action on the red porgy fishery would implement the commercial trip limits of the second alternative discussed above, while allowing the higher daily recreational bag limit of the proposed action. While this alternative would result in the higher economic benefits associated with the more liberal increases for both harvest sectors, the Council determined that the more conservative harvest potential associated with the commercial trip limits of the proposed action would be more effective in insuring that harvest overages do not occur.

4.16 Bycatch Practicability Analysis

The South Atlantic Council is required by MSFCMA §303(a)(11) to establish a standardized bycatch reporting methodology for federal fisheries and to identify and implement conservation and management measures that, to the extent practicable and in the following order, (A) minimize bycatch and (B) minimize the mortality of bycatch that cannot be avoided. The MSFCMA defines bycatch as "fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards. Such term does not include fish released alive under a recreational catch-and-release fishery management program" (MSFCMA §3(2)). Economic discards are fish that are discarded because they are undesirable to the harvester. This category of discards generally includes certain species, sizes, and/or sexes with low or no market value. Regulatory discards are fish that are required by regulation to be discarded, 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.

4.16.1 Population Effects for the Bycatch Species

4.16.1.1 Background

The directed commercial fishery for snowy grouper is prosecuted primarily with hook and line gear (70%) followed by bottom longline gear (28%). Other gear types capture 2% of the landings. Snowy grouper is largely a commercial fishery as only 4% of the landings are from recreational sources. Golden tilefish are also primarily taken by commercial fishermen (97%) and most are caught with bottom longline gear (93%). The catch of vermilion snapper is dominated by commercial landings (68%). Almost all vermilion snapper are caught with hook and line gear. Based on data from ALS, MRFSS, and the Headboat survey during 2000 to 2003, landings from the commercial and recreational sectors were evenly split for black sea bass. 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 (85%) are from pots. Red porgy landings are fairly evenly split between the commercial (49%) and recreational (51%) sectors, and are almost entirely taken with hook and line gear.

Restrictions, which are currently being used to manage these species, include quotas (snowy grouper, golden tilefish), size limits (vermilion snapper, black sea bass, and red porgy), bag limits (snowy grouper, golden tilefish, vermilion snapper, black sea bass, and red porgy), closed seasons (red porgy), and minimum size limits (vermilion snapper, black sea bass, and red porgy).

Management measures proposed in Amendment 13C would establish or reduce commercial quotas for snowy grouper, golden tilefish, vermilion snapper, black sea bass, and red porgy; modify trip limits for snowy grouper, golden tilefish, and red porgy; modify bag limits for snowy grouper, golden tilefish, black sea bass, and red porgy; establish a recreational closed season for vermilion snapper; and modify the size limits for black sea bass and vermilion snapper.

4.16.1.2 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. A small number of trips that reported discards but did not report numbers or species were not included in analyses. During 2001-2005, an average of 64% of the trips in the South Atlantic reported discards (Table 4-37). Data from 2004 and 2005 are incomplete. The average number of trips per year during 2001 to 2003 was 16,639 (Table 4-38). Fishermen spent an average of 1.72 days at sea per trip.

Table 4-38a. Discard logbook gross effort for South Atlantic.
Source: NMFS SEFSC Logbook Program.

YEAR	#Trips reporting Discards	#Trips reporting no Discards	# Trips Sampled	% Trips with Discard
2001	1223	514	1737	70
2002	2,747	1,216	3,963	69
2003	2,753	1,808	4,561	60
2004	1,950	1,558	3,508	56
2005	388	119	507	77
Total	9,061	5,215	14,276	64
Mean	1,812	1,043	2,855	64

Note: Data from 2004 and 2005 may be incomplete.

Table 4-38b. Snapper grouper fishery effort for South Atlantic.
Source: NMFS SEFSC Logbook Program.

YEAR	Trips	Days	Days per Trip
2001	16,922	29,567	1.75
2002	16,820	29,243	1.74
2003	16,176	27,227	1.68
Total	49,918	86,037	1.72
Mean	16,639	28,679	1.72

For species in Amendment 13C, the number of trips that reported discards was greatest for red porgy followed by vermilion snapper and black sea bass (Table 4-39). Discards of snowy grouper and golden tilefish were rare. The percentage of trips that reported discards ranged from 4.03% for red porgy to 0.05% for snowy grouper (Table 4-40).

Table 4-39. Annual number of trips reporting discard of red porgy, black sea bass, vermilion snapper, snowy grouper, and golden tilefish in the South Atlantic.
Source: NMFS SEFSC Logbook Program.

YEAR	Red Porgy	Black Sea Bass	Vermilion Snapper	Snowy Grouper	Golden Tilefish
2001	92	70	107	4	125
2002	242	112	212	2	0
2003	151	111	116	1	0
2004	81	61	63	0	0
2005	10	9	9	0	0
Total	576	363	507	7	125
Mean	115.2	72.6	101.4	1.4	25

Note: Data from 2004 and 2005 may be incomplete.

Table 4-40. Percentage of trips that discarded red porgy, black sea bass, vermilion snapper, snowy grouper, or golden tilefish in the South Atlantic.
Source: NMFS SEFSC Logbook Program.

YEAR	Red Porgy	Black Sea Bass	Vermilion Snapper	Snowy Grouper	Golden Tilefish
2001	5.30	4.03	6.16	0.23	7.20
2002	6.11	2.83	5.35	0.05	0.00
2003	3.31	2.43	2.54	0.02	0.00
2004	2.31	1.74	1.80	0.00	0.00
2005	1.97	1.78	1.78	0.00	0.00
Mean	4.03	2.54	3.55	0.05	0.88

During 2001-2005, the average number of individuals discarded per trip was greatest for black sea bass followed by vermilion snapper and red porgy (Table 4-41). Snowy grouper and golden tilefish were rarely discarded.

Table 4-41. Average number of red porgy, black sea bass, vermilion snapper, snowy grouper, and golden tilefish discarded per trip in the South Atlantic.
Source: NMFS SEFSC Logbook Program.

YEAR	Red Porgy	Black Sea Bass	Vermilion Snapper	Snowy Grouper	Golden Tilefish
2001	46.1	612.7	78.0	1.8	0.01
2002	74.4	231.9	77.5	2.5	-
2003	62.7	195	67.2	2	-
2004	51.1	30.7	62.3	-	-
2005	104.4	25.1	66.1	-	-
Mean	67.7	219.1	70.2	1.3	<0.01

Since the discard logbook database represents a sample, data were expanded to estimate the number of discard 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 2001-2005, an average of 124,231 black sea bass were discarded per year (Table 4-42). The number of discarded red porgy and vermilion snapper was lower (~40,000). Snowy grouper and golden tilefish were rarely discarded.

Table 4-42. Expanded number of discarded red porgy, black sea bass, vermilion snapper, snowy grouper, and golden tilefish for the South Atlantic.

YEAR	Red Porgy	Black Sea Bass	Vermilion Snapper	Snowy Grouper	Golden Tilefish
2001	41,316	417,828	81,298	68	10
2002	76,397	110,253	69,716	21	0
2003	33,604	76,780	27,646	7	0
2004	19,637	8,879	18,603	0	0
2005	34,263	7,417	19,527	0	0
Total	205,217	621,157	216,790	96	10
Mean	41,043	124,231	43,358	19	2

Black sea bass, vermilion snapper, and red porgy were the top three discarded species during 2001-2005 (Tables 4-43 and 4-44).

Table 4-43. The 50 most commonly discarded species in order of occurrence from highest number of trips to lowest for the South Atlantic.
Count is number of trips that reported discarding the species. Sum is the reported number discarded.

SPECIES_NAME (Table 4-43)	COUNT	SUM
SNAPPER,YELLOWTAIL	1006	9539
KING MACKEREL and CERO	579	4175
PORGY,RED,UNC	577	36910
SNAPPER,VERMILION	508	37103
GROUPER,GAG	494	3484
SCAMP	490	6207
GROUPER,RED	384	1843
SEA BASSE,ATLANTIC,BLACK,UNC	363	92613
GROUPER,BLACK	286	1950
AMBERJACK,GREATER	244	1665
SNAPPER,RED	240	8105
BONITO,ATLANTIC	217	918
SHARK,UNC	211	1151
TUNA,LITTLE (TUNNY)	192	994
SNAPPER,MANGROVE (Duplicate of 3760)	190	1588
BARRACUDA	151	338
HIND,SPECKLED	145	2097
SNAPPER,MUTTON	133	411
DOLPHINFISH	116	650
AMBERJACK	106	370
BLUE RUNNER	105	701
SEA BASS,ROCK	105	9135
GRUNTS	101	2800
TRIGGERFISH,GRAY	99	1469
SHARK,ATLANTIC SHARPNOSE	96	2232
FINFISHES,UNC FOR FOOD	93	730
TRIGGERFISHES	91	926
SCUPS OR PORGIES,UNC	85	992
REMORA	82	205
SHARK,BLACKTIP	75	487
GRUNT,WHITE	63	4469
COBIA	60	101
GROUPERS	60	3837
SHARK,NURSE	52	143
PARROTFISH	50	90
SPANISH MACKEREL	50	593
CERO	44	138
RUDDERFISH (SEA CHUBS)	44	312
FINFISHES,UNC,BAIT,ANIMAL FOOD	42	4251

SPECIES_NAME (Table 4-43)	COUNT	SUM
CREVALLE	41	129
KING MACKEREL	38	151
GROUPER,WARSAW	37	226
GROUPER,NASSAU	33	47
TILEFISH,SAND	33	223
BALLYHOO	27	1449
BONITO,UNC	27	216
SHARK,SANDBAR	27	251
BLUEFISH	26	236
SNAPPERS,UNC	26	597
PINFISH,SPOTTAIL	25	487

Table 4-44. The top 50 discarded species based on number of fish discarded ordered from highest to lowest for the South Atlantic.
Count is the number of trips reporting discard of the species; sum is the total reported fish discarded.

SPECIES_NAME (Table 4-44)	COUNT	SUM
SEA BASSE,ATLANTIC,BLACK,UNC	363	92613
SNAPPER,VERMILION	508	37103
PORGY,RED,UNC	577	36910
SNAPPER,YELLOWTAIL	1006	9539
SEA BASS,ROCK	105	9135
SNAPPER,RED	240	8105
SCAMP	490	6207
GRUNT,WHITE	63	4469
FINFISHES,UNC,BAIT,ANIMAL FOOD	42	4251
KING MACKEREL and CERO	579	4175
GROUPERS	60	3837
GROUPER,GAG	494	3484
GRUNTS	101	2800
SHARK,ATLANTIC SHARPNOSE	96	2232
HIND,SPECKLED	145	2097
GROUPER,BLACK	286	1950
GROUPER,RED	384	1843
AMBERJACK,GREATER	244	1665
SNAPPER,MANGROVE (Duplicate of 3760)	190	1588
TRIGGERFISH,GRAY	99	1469
BALLYHOO	27	1449
GRUNT,TOMTATE	16	1401
SHARK,UNC	211	1151
TUNA,LITTLE (TUNNY)	192	994
SCUPS OR PORGIES,UNC	85	992
TRIGGERFISHES	91	926
BONITO,ATLANTIC	217	918
FINFISHES,UNC FOR FOOD	93	730
BLUE RUNNER	105	701

SPECIES_NAME (Table 4-44)	COUNT	SUM
DOLPHINFISH	116	650
SNAPPERS,UNC	26	597
SPANISH MACKEREL	50	593
SHARK,TIGER	14	552
SHARK,BLACKTIP	75	487
PINFISH,SPOTTAIL	25	487
AMBERJACK,LESSER	8	484
SNAPPER,MUTTON	133	411
BIGEYE SCAD	7	395
AMBERJACK	106	370
SHARK,DOGFISH,SPINY	21	345
BARRACUDA	151	338
RUDDERFISH (SEA CHUBS)	44	312
LOBSTER,SPINY	22	264
SHARK,SANDBAR	27	251
SNAPPER,SILK	22	238
BLUEFISH	26	236
GROUPER,WARSAW	37	226
TILEFISH,SAND	33	223
BONITO,UNC	27	216

4.16.1.3 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 (79.8%) and lowest for golden tilefish (13.4%). However, estimates of released golden tilefish and snowy grouper may not be reliable due to small sample size. The number of fish released per year was greatest for black sea bass (6,685,702 individuals) and lowest for snowy grouper (3,655 individuals).

Table 4-45. Estimated number of released fish from MRFSS interviews, percent released, total catch (A+B1+B2) for South Atlantic, total number released, and average number released per year.
Source: MRFSS Web Site.

Years	Species	Est Total	Est Released	% Released
2001-2003	red porgy	164,593	106,550	64.7
2000-2003	black sea bass	8,376,130	6,685,702	79.8
1999-2003	vermilion snapper	1,756,661	849,086	48.3
1999-2003	snowy grouper	27,188	3,655	13.4
1999-2003	golden tilefish	22,228	4,088	18.4

4.16.1.4 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 is extremely high. The Council's Scientific and Statistical Committee (SSC) indicates release mortality rates are probably near 100%.

Release mortality rates for vermilion snapper are also considered to be high. SEDAR 2 (2003) estimates release mortality rates of 25% and 40% for vermilion snapper taken by recreational and commercial fishermen, respectively. However, release mortality rates might be higher than 40%. Release mortality rates from SEDAR 2 (2003a) are based on cage studies conducted by Collins (1996) and Collins *et al*. (1999). Burns *et al*. (2002) suggest that release mortality rates of vermilion snapper may be higher than estimated from cage studies because cages protect vermilion snapper from predators. A higher release mortality rate is supported by low recapture rates of vermilion snapper in tagging studies. Burns *et al*. (2002) estimate a 0.7% recapture rate for 825 tagged fish; whereas, recapture rates for red grouper, gag, and red snapper range from 3.8% to 6.0% (Burns *et al*. 2002). McGovern and Meister (1999) estimate a 1.6% recapture rate for 3,827 tagged vermilion snapper. Higher recapture rates are estimated for black sea bass (10.2%), gray triggerfish (4.9%), gag (11%), and greater amberjack (15.1%) (McGovern and Meister 1999; McGovern *et al*. 2005). Burns *et al*. (2002) suggest released vermilion snapper do not survive as well as other species due to predation. Vermilion snapper that do not have air removed from swim bladders are subjected to predation at the surface of the water. Individuals with a ruptured swim bladder or have air removed from the swim bladder are subject to bottom predators since fish would not be able to join schools of other vermilion snapper hovering above the bottom (Burns *et al*. 2002). Alternatively, recapture rates could be low if population size was very high or tagged fish were unavailable to fishing gear. However, preliminary results from a Cooperative Research Program proposal indicate that approximately 50% of released vermilion snapper caught by one commercial fisherman were unable to return to the bottom. As a certain percentage of vermilion snapper that do return to the bottom probably die, it is possible release mortality rates could be greater than 50%.

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. SEDAR 2 (2003b) recommends a release mortality rate of 15% for black sea bass based on cage studies conducted by Collins (1996) and Collins *et al*. (1999). 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. It is likely release mortality rates of black sea bass taken by recreational fishermen is lower than those caught by commercial fishermen. Recreational catch is mainly in shallow water with hook and line gear; whereas, most of the commercial catch is with pots and in deeper water. Individual fish caught with hook and line gear have a better chance of returning to the bottom than many undersized fish caught in pots. The Council's SSC supports use of minimum size limits for black sea bass.

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.

4.16.1.5 Practicability of Management Measures in Directed Fisheries Relative to their Impact on Bycatch and Bycatch Mortality

Snowy Grouper

Bycatch of snowy grouper is very low (Table 4-42). Since there is no size limit and the current quota is rarely met, there is little incentive to release this species. Snowy grouper is in the five grouper per person per day aggregate; however, the aggregate limit is rarely met. Therefore, there are very few recreational discards (Table 4-45).

The preferred measures to reduce fishing mortality of snowy grouper could increase the number of regulatory discards. The earliest Amendment 13C would be implemented is April 2006. Without the 100 lbs gutted weight trip limit, it is expected that the quota of 151,000 lbs gutted weight would be met during June 2006 (Table 4-46). Once Amendment 13C is implemented, the 100 lb gutted weight bag limit should allow the fishery to stay open all year in 2007 onwards. However, it is possible that after the trip limit is met, snowy grouper could still be caught when fishermen target co-occurring species.

If a quota is met for snowy grouper before the end of the year or when a 100 lbs gutted weight trip limit is met, discards of snowy grouper could occur when fishermen target golden tilefish or blueline tilefish in deep water and while targeting mid-shelf species. For longline trips that caught at least 100 lbs of golden tilefish, snowy grouper made up about 10% of the catch. Therefore, incidental catch of snowy grouper could occur when fishermen were targeting golden tilefish. However, fishermen might be able to avoid taking snowy grouper by setting longline gear over mud away from hard bottom areas that hold snowy grouper.

If fishermen target blueline tilefish, incidental catch of snowy grouper could be high since both species occur over rough bottom. For longline trips that landed at least 100 lbs of blueline tilefish during 1999-2003, golden tilefish and snowy grouper constituted 32.0%, and 18.7% of the landings, respectively. However, it is likely catch of blueline tilefish would remain incidental to the targeted catch of snowy grouper or golden tilefish. Blueline tilefish do not appear to be as abundant or as desirable to fishermen as snowy grouper and golden tilefish. An economic analysis in Section 3 indicated blueline tilefish are less valuable than golden tilefish and many other snapper grouper species.

Golden tilefish

Bycatch of golden tilefish is very low (Table 4-42). Since there is no size limit and the current quota is rarely met, there is little incentive to release this species. Golden tilefish is in the five grouper per person per day aggregate; however, the aggregate limit is rarely met. Therefore, there are very few recreational discards (Table 4-45).

The preferred measures to reduce fishing mortality of golden tilefish could increase the number of regulatory discards. The preferred alternative reduces the quota to 295,000 lbs gutted weight and reduces the trip limit from 5,000 to 4,000 lbs gutted weight until 75% of the quota is met, at which point, the quota would be reduced to 300 lbs. The trip limit would not be reduced if 75% of the quota was not achieved by September 1. Since the trip limit would not be reduced until April 2006, at the earliest, there is a chance that the quota could be met before December. Therefore, the number of regulatory discards could be higher in 2006 than in 2007 and onwards.

The lower quota and trip limit could be expected to increase the number of discarded golden tilefish. However, most (93%) golden tilefish are taken with bottom longline gear. Some snowy grouper, blueline tilefish, blackbelly rosefish, and other deepwater species are taken with golden tilefish when longline gear is deployed near rocky bottom. The Snapper Grouper Advisory Panel indicated that interaction with these species could be avoided by fishing longline gear away from the rocks and on mud bottom.

Restricting harvest is going to increase the number of regulatory discards. However, overall mortality is expected to decrease even after accounting for the expected increase in bycatch mortality. The Council is considering ways to further minimize bycatch in Snapper Grouper FMP Amendment 13B.

Table 4-46. Average cumulative commercial landings (lbs gutted weight) for snowy grouper (99-03), golden tilefish (99-03), vermilion snapper (99-03), black sea bass (00-03), and red porgy (01-03).
Source: Accumulative Landings System.

Species	January	February	March	April	May	June	July	August	September	October	November	December
Snowy Grouper	18,689	49,244	80,461	**111,726**	150,248	190,300	219,803	244,957	264,952	281,951	294,797	307,684
Golden Tilefish	18,314	43,279	79,022	**123,745**	173,230	218,408	237,488	283,837	323,879	371,085	418,964	457,302
Vermilion Snapper	51,473	102,865	182,089	**276,172**	365,659	476,010	559,931	670,121	788,712	911,157	1,020,266	1,097,405
Black Sea Bass	337,741	399,088	435,034	**461,872**	490,332	17,324	34,295	57,294	70,636	95,099	150,253	250,099
Red Porgy	1,091	1,182	1,216	**1,427**	16,138	24,931	33,114	41,382	47,768	52,763	58,479	63,307

NOTES:

Only 2000-2003 and 2001-2003 are considered for black sea bass and red porgy since management measures probably affected landings in 1999 (black sea bass) and 1999-2000 (red porgy). Shaded area represents time when an increase in the number of regulatory discards could be expected in 2006. Start counting quota for snowy grouper, golden tilefish, vermilion snapper, and red porgy on January 1; black sea bass on June 1. Red porgy closed January-April and no sale (Shaded Area). Projected times for quota (lbs gutted weight) to be met in 2006 for snowy grouper and vermilion snapper are represented by shaded areas. Lightly shaded area for golden tilefish represents time when reduced quota of 300 lbs is expected to be implemented in 2006. There is a possibility the black sea bass fishery could close sometime during May 2007. Time of closure depends on when increased size limit is implemented in 2006. A closure in the black sea bass fishery is not expected for 2008.

April 1, 2006 = earliest possible date that regulations could be implemented.

Snowy grouper quota = 151,000 lbs gutted weight and trip limit of 275 lbs gutted weight (year 1).

Golden tilefish quota = 295,000 lbs gutted weight. Trip limit = 4,000 lbs gutted weight until 75% of quota met then trip limit = 300 lbs gutted weight. Trip limit not reduced if 75% of quota not met by September 1.

Vermilion snapper quota = 1,100,000 lbs gutted weight.

Black sea bass quota = 477,000 lbs gutted weight; quota begins June 1.

Red porgy quota = 127,000 lbs gutted weight. Closed January-April.

Greater amberjack quota = 1,169,931 lbs gutted weight; 1,000 lb trip limit until quota met.

Gag and Black Grouper, March-April Closure

Mutton Snapper May-June Closure.

Vermilion Snapper

Vermilion snapper was one of the most commonly discarded species in the commercial fishery in recent years (Table 4-44). In the recreational fishery, approximately 48% were discarded, presumably due to minimum size limits (Table 4-45). The preferred commercial alternative retains the 12" total length minimum size and sets a commercial quota of 1,100,000 lbs gutted weight. This is equivalent to the average catch during 1999-2003 and, on average, would allow the fishery to remain open all year. The number of regulatory discards could increase if the quota was met since fishermen might target co-occurring species. Vermilion snapper are commonly taken on trips where fishermen catch gag, greater amberjack, and gray triggerfish. However, if the quota was met, fishermen may be able to avoid areas where vermilion snapper occur and reduce the chances of bycatch.

The preferred recreational alternative would increase the minimum size from 11" total length to 12" total length, retain the 10 fish bag limit, and close the fishery during January and February. While the increased minimum size could be expected to increase the number of discards, a closed season could be expected to reduce bycatch. It is possible that vermilion snapper might still be caught when fishermen target co-occurring species. However, recreational fishermen may be able to avoid locations where vermilion snapper occur.

Restricting harvest is going to increase the number of regulatory discards. However, overall mortality is expected to decrease even after accounting for the expected increase in bycatch mortality. The Council is considering ways to further minimize bycatch in Snapper Grouper FMP Amendment 13B.

Black Sea Bass

Black sea bass is the most commonly discarded species in the commercial fishery (Table 4-44). In the recreational fishery (MRFSS), 80% of black sea bass are released (Table 4-45). Most black sea bass in the commercial and recreational fishery are probably discarded because they are less than the current 10" total length minimum size. Landings of black sea bass are dominated by small fish. During 2000-2003, the proportion of black sea bass less than or equal to 12" total length was 82% (headboat), 59% (MRFSS), 52% (pots), and 29% (commercial hook and line). Increasing the minimum size to 11" TL in the commercial fishery and 12" TL in the recreational fishery is likely to increase the number of regulatory discards. Furthermore, if the quota is met before the end of the June 1 to May 31, regulatory discards could increase when fishermen target species that co-occur with black sea bass.

Increasing the minimum size to 11" total length in the commercial fishery may provide enough reduction to allow the fishery to remain open all year. If the quota is met early, fishermen may be able to avoid areas where black sea bass occur. The majority of the commercial harvest (85%) is taken with pots. Since it would be less likely that pots would be used after the fishery was closed, bycatch of black sea bass might not be as much of a factor. Furthermore, the preferred alternative would increase the mesh size in the back panel of the pots, which would cull out many of the black sea bass less than 11"total length.

Restricting harvest is going to increase the number of regulatory discards. However, overall mortality is expected to decrease even after accounting for the expected increase in bycatch mortality. The Council is considering ways to further minimize bycatch in Snapper Grouper FMP Amendment 13B.

Red Porgy

Red porgy is the third most commonly discarded species in the commercial fishery (Table 4-44). Approximately 65% of red porgy are released by recreational fishermen (Table 4-45). The preferred alternative would retain the January–April commercial spawning closure and the 14”total length minimum size limit (commercial and recreational). However, the preferred alternative would specify a commercial quota of 127,000 lbs gutted weight, increase the commercial trip limit to 120 fish, and increase the recreational bag limit to 3 fish. The number of regulatory discards would probably remain high with a 14” TL minimum size limit and a January-April spawning season closure. However, an increase in the commercial quota and recreational bag limit would lower the number of regulatory discards.

Regulatory discards are expected to increase as the stock rebuilds. Proposed action would minimize bycatch to the extent practicable by allowing fishermen to retain more fish while still ensuring harvest is below the level that could compromise rebuilding.

4.16.2 Ecological Effects Due to Changes in the 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 preferred alternative for red porgy is likely to reduce the number of discards by increasing the allowable harvest in the recreational and commercial sectors. The January-February vermilion snapper closure for the recreational sector may reduce the number of discards to some extent. Furthermore, the 2” mesh back panel in the pots is likely to substantially reduce the number of undersized black sea bass in the commercial fishery. Fisher and Rudders (2004) estimate that a 2” mesh back panel could cull out up to 73% of black sea bass less than 11” TL.

Other management alternatives for snowy grouper, golden tilefish, vermilion snapper, and black sea bass could increase the number of regulatory discards in Amendment 13C. However, overall fishing effort could decrease in the commercial and recreational sectors in response to more restrictive management measures, thereby reducing the potential for bycatch. Furthermore, the extent to which the discards increase would depend on the ability of fishermen to avoid regulated species when a quota or trip limit would be met and the extent to which effort would shift to other species and fisheries. Reduced fishing pressure would be expected to result in an increase in the mean size/age of snowy grouper, golden tilefish, vermilion snapper, and black sea bass. In addition, biomass of red porgy and black sea bass would be expected to increase. Thus ecological changes could occur in the community structure of reef ecosystems through actions that would end overfishing. These ecological changes could affect the nature and magnitude of bycatch of species in Amendment 13C as well as other species, which have spatial and temporal coincidence with snowy grouper, golden tilefish, vermilion snapper, black sea bass, and red porgy.

There is likely to be an interactive effect of the preferred management measures in Amendment 13C on bycatch of snowy grouper, golden tilefish, vermilion snapper, black sea bass, red porgy, and associated species. Once a quota or trip limit is met for a species, effort could shift to other species or fisheries. This is difficult to quantify. Species in Amendment 13C could continue to be caught when species, which have fewer regulations, are targeted. However, fishermen may be able to avoid “hot spots” where a restricted species occurs thereby reducing the potential for bycatch. Furthermore, closures are already in place for black grouper (March-April), gag (March-April), greater amberjack (April), mutton snapper (May-June), and red porgy (January-April), and a quota is in place for greater amberjack (Table 4-46). These existing management measures, in combination with new quotas and trip limits proposed in Amendment 13C, could increase the number of discards or result in effort shifts to other species and fisheries.

Data from North Carolina presented to the Council indicated fishermen with snapper grouper permits also fish in the nearshore gillnet fisheries. Fishermen with snapper grouper permits in other areas also participate in various state fisheries. It is expected that if efforts shift to these fisheries, there could be impacts to protected species.

An IFQ program is being considered for the snapper grouper fishery that could substantially reduce bycatch by providing fishery participants an incentive to fish efficiently and to better handle their catch to maximize profits. An IFQ program could stabilize markets and prices by allowing catches to be delivered on demand. This would help fishermen target when they wanted to fish, where they wanted to fish, and which species they wanted to catch thereby reducing bycatch.

Amendment 13B to the Snapper Grouper FMP will propose additional measures to reduce bycatch in the snapper grouper fishery. For example, species grouping based on biological, geographic, economic, taxonomic, technical, social, and ecological factors have been proposed in Amendment 13B. Each group would be represented by an indicator species that has been recently assessed or is scheduled for a SEDAR assessment in the future. It is likely that species in Amendment 13C would be indicator species of groups specified in Amendment 13B. One alternative in Amendment 13B would close fishing for all species in a species grouping once the quota was met for an indicator species. Since species in a group would likely be caught together, such an alternative could reduce bycatch.

4.16.3 Changes in the Bycatch of Other Fish Species and Resulting Population and Ecosystem Effects

Management measures proposed in Amendment 13C will end overfishing in snowy grouper, golden tilefish, vermilion snapper, and black sea bass as well as allow for increased harvest of red porgy. These regulations are expected to change the magnitude of discards for species in Amendment 13C. Increased harvest for red porgy, a recreational seasonal closure for vermilion snapper, and a 2” mesh back panel in black sea bass pots could reduce the number of discards in these fisheries.

More restrictive management measures proposed in Amendment 13C could result in an effort shift to other species and fisheries causing a change in the magnitude of harvest and number of discards in those fisheries. Reduced fishing pressure on species in Amendment 13C would be expected to result in an increase in the mean size/age of snowy grouper, golden tilefish, vermilion snapper, and black sea bass. In addition, biomass of red porgy and black sea bass would be expected to increase. The relative abundance, size structure, and age structure of other species in reef communities could be expected to changes in response to reduced fishing pressure on species in Amendment 13C as well as potential shifts in effort. Thus, ecological changes could occur in the community structure of reef ecosystems through actions that would end overfishing. These ecological changes could affect the nature and magnitude of bycatch over time.

4.16.4 Effects on Marine Mammals and Birds

Under Section 118 of the Marine Mammal Protection Act (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 2004 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 (69 FR 153; August 10, 2004). 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 due to their distribution and occurrence, sperm, fin, sei, and blue whales are unlikely to overlap with the black sea bass pot fishery operated within the snapper grouper fishery since it 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.

Efforts to reduce fishing effort has the potential to reduce the amount of interactions with marine mammals and birds. A quota for the commercial black sea bass fishery could reduce the number of pots that are fished each year and reduce the risk of entanglement with right whales and humpback whales, which may overlap both spatially and temporally with the black sea bass pot fishery. Although, the Bermuda petrel and roseate tern occur within the action area, these species are not commonly found and neither has been described as associating with vessels or having had interactions with the snapper grouper fishery. Thus, it is believed that the snapper grouper fishery is not likely to negatively affect the Bermuda petrel and the roseate tern.

4.16.5 Changes in Fishing, Processing, Disposal, and Marketing Costs

Preferred management alternatives in Amendment 13C, which are most likely to reduce bycatch, would be expected to affect the cost of fishing operations. It is likely that east Florida would be impacted most since fewer trips would be taken off North Carolina, South Carolina, and Georgia when the temperatures are cold and weather is poor. Alternatively, an increased commercial trip limit and recreational bag limit for red porgy would represent a small economic gain for some fishermen that are impacted by the restricted take of other species. The 2" mesh back panel in the pots could cull out 73% of the black sea bass less than 11" total length. This could represent a savings in term of the time required to cull out undersized fish on deck and could represent a major reduction in the number of regulatory discards.

The Council is considering an IFQ program. An IFQ program may provide greater efficiency in fishing, processing, and disposal. IFQ programs may be an effective method for controlling fishing effort, removing excess capital, generating profits, reducing the incentive to fish during unsafe conditions, and extending the availability of fresh fish products. Additionally, factors such as waterfront property values, availability of less expensive imports, etc. may affect economic decisions made by recreational and commercial fishermen.

4.16.6 Changes in Fishing Practices and Behavior of Fishermen

Management regulations proposed in Amendment 13C could result in a modification of fishing practices by commercial and recreational fishermen, thereby affecting the magnitude of discards. There is a potential for increased discards with new or reduced quotas, reduced trip limits, and increased size limits. It is expected some species would continue to be caught after a quota or trip limit is met since fishermen might target species, which co-occur with the restricted species. 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. However, it is not clear that changes in behavior could substantially affect the amount of bycatch incurred. Fishermen may target species with low quotas (e.g. snowy grouper and golden tilefish) early in the year and once these quotas are met, switch to other species such as vermilion snapper. This has the potential to increase discards during 2006.

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. Measures in Amendment 13B, such as closing a species group 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.

4.16.7 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. Additional work is needed to determine the effectiveness of measures being developed in Amendment 13B 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.

4.16.8 Changes in the Economic, Social, or Cultural Value of Fishing Activities and Non-Consumptive Uses of Fishery Resources

Preferred management measures, including those that are likely to increase discards as well as those that are likely to decrease discards could result in social and/or economic impacts as discussed in Section 4.

4.16.9 Changes in the Distribution of Benefits and Costs

Attempts were made to ensure reductions provided by preferred management measures are equal in the commercial and recreational sectors. The extent to which these management measures will increase or decrease the magnitudes of discards is unknown. Some measures such as increased allowable catch in red porgy, a recreational seasonal closure for vermilion snapper, and a 2” back panel in the black sea bass pots could help to reduce bycatch. It is likely that some management measures such as reduced or new quotas, trip limits, increased size limits could increase the number of discards. However, this depends on if fishermen shift effort to other species, seasons, or fisheries and if effort decreases in response to more restrictive management measures as well as changes in community structure and age/size structures that could result from ending overfishing.

Despite equal reductions, it is unlikely that the magnitude of discards will be the same in the commercial and recreational sectors. For example, a very large percentage of the recreational catch of black sea bass is from small fish. Commercial fishermen catch fewer smaller fish. Furthermore, the 2” mesh back panel in the black sea bass pots will likely cull out many of the smaller fish before they reach the surface. Therefore, an increase in the minimum size in the recreational fishery is likely to produce a much higher percentage of discards than an increase in the minimum size in the commercial fishery.

4.16.10 Social Effects

The Social Effects of all the management measure, including those most likely to reduce bycatch are described in Section 4.

4.16.11 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 alternative for red porgy is likely to reduce the number of discards by increasing the allowable harvest in the recreational and commercial sectors. Furthermore, the 2" mesh back panel in the pots is likely to substantially reduce the number of undersized black sea bass. Other management alternatives for snowy grouper, golden tilefish, vermilion snapper, and black sea bass are likely to increase the number of regulatory discards in Amendment 13C. However, an increase in bycatch of vermilion snapper and golden tilefish is not expected to be substantial since the vermilion snapper commercial quota is equivalent to the average catch during 1999-2003, and the proposed golden tilefish quota would not have been met in 2003-2004. Furthermore, overall fishing effort could decrease in the commercial and recreational sectors in response to more restrictive management measures, thereby reducing the potential for bycatch.

There is likely to be an interactive effect of the preferred management measures in Amendment 13C on bycatch of snowy grouper, golden tilefish, vermilion snapper, black sea bass, red porgy, and associated species in reef ecosystems. Once a quota or trip limit is met for a species, effort could shift to other species or fisheries. Species in Amendment 13C could continue to be caught when species with fewer regulations are targeted. However, fishermen may be able to avoid areas where a restricted species occurs thereby reducing the potential for bycatch. Reduced fishing pressure on species in Amendment 13C would be expected to result in an increase in the mean size/age of snowy grouper, golden tilefish, vermilion snapper, and black sea bass. In addition, biomass of red porgy, and black sea bass would be expected to increase. The relative abundance, size structure, and age structure of other species in reef communities could be expected to change in response to reduced fishing pressure on species in Amendment 13C as well as potential shifts in effort. Thus, ecological changes could occur in the community structure of reef ecosystems through actions that would end overfishing. These ecological changes could affect the nature and magnitude of bycatch over time.

Additional measures to reduce bycatch in the snapper grouper fishery are being developed. Amendment 13B to the Snapper Grouper FMP will propose additional measures to reduce bycatch in the snapper grouper fishery. For example, species grouping based on biological, geographic, economic, taxonomic, technical, social, and ecological factors have been proposed in Amendment 13B. Each group would be represented by an indicator species, which has been recently assessed or is scheduled for a SEDAR assessment in the future. It is likely that species in Amendment 13C would be indicator species of groups specified in Amendment 13B. One alternative in Amendment 13B would close fishing for all species in a species grouping once the quota was met for an indicator species. Since species in a group would be likely to be caught together, such an alternative could reduce bycatch.

An IFQ program 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.

5.0 OTHER APPLICABLE LAW

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) (16 U.S.C. 1801 et seq.) governs the conservation and management of ocean fishing in the United States. The purpose of the MSFCMA is to create sustainable fisheries in United States waters through the elimination of overfishing and rebuilding of overfished stocks important to commercial, recreational, and subsistence fisheries. In addition to the MSFCMA, the Council and NMFS must comply with many applicable laws during the production of Fishery Management Plans (FMPs) and FMP amendments. Major laws affecting Federal fishery management decision making in the South Atlantic are summarized below.

5.1 Administrative Procedures Act

All federal rulemaking is governed under the provisions of the Administrative Procedure Act (APA) (5 U.S.C. Subchapter II), which establishes a "notice and comment" procedure to enable public participation in the rulemaking process. Under the APA, 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.

5.2 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.

The Council believes this amendment is consistent to the maximum extent practicable with the Coastal Zone Management Plans of Florida, Georgia, South Carolina, and North Carolina. This determination was submitted to the responsible state agencies under Section 307 of the CZMA administering approved Coastal Zone Management Programs in the States of Florida, South Carolina, Georgia, and North Carolina. The States of Florida, Georgia, and South Carolina agreed with the Council's determination; however, the State of North Carolina requested additional information. As per the Coastal Zone Management Act (CZMA), NMFS is the Federal agency responsible for compliance with the CZMA, and they will respond to North Carolina's requests.

5.3 Endangered Species Act

Section 7(a)(1) of the Endangered Species Act (ESA) of 1973, as amended, requires all Federal agencies to participate in the conservation and recovery of listed threatened and endangered species. Section 7(a)(2) states that federal agencies must ensure that any activity they authorize, fund or carry out is not likely to jeopardize the continued existence of listed species or result in destruction or adverse modification of designated critical habitat. To facilitate compliance with Section 7(a)(2), a biological assessment or evaluation is prepared by the action agency to evaluate the likely effects of the proposed fishery action(s) on endangered and threatened species and designated critical habitat(s) occurring within the area of the proposed action(s) [Section 7(c)]. The biological evaluation aids NMFS' Division of Protected Resources (the consulting agency) in determining what further action (informal/formal consultation) is required. Consultations are concluded informally when proposed actions "may affect but are not likely to adversely affect" endangered or threatened species or designated critical habitat. Formal consultations, resulting in a biological opinion, are required when proposed actions may affect and are "likely to adversely affect" endangered or threatened species or designated critical habitat. If jeopardy or adverse modification is found, the consulting agency is required to suggest reasonable and prudent alternatives.

The reader is referred to Section 3.3.2 for a list of the protected species known to occur in the action area and a detailed assessment of possible impacts to these species. SERO's Sustainable Fisheries Division will request the SERO's Division of Protected Resources conduct a consultation under Section 7 of the ESA on the impacts of the actions in this amendment.

5.4 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.

5.5 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.

5.6 Executive Order 12898: Environmental Justice

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

5.7 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.

5.8 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.

5.9 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 to address MPAs in Amendment 14.

5.10 Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA) (16 U.S.C. 1361 et seq.), originally enacted in 1972, 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 as well as on the importation of marine mammals and marine mammal products into the United States. The term "take" is statutorily defined to mean "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture or kill any marine mammal". Jurisdiction over marine mammals is divided between the U.S. Fish and Wildlife Service and NMFS. The former manages sea otters, polar bears, manatees, dugongs and walrus, while the latter manages whales, dolphins, porpoises, seals and sea lions. The primary goals of the two agencies are to ensure that marine mammal stocks are maintained at, or in some cases restored to, their optimum sustainable population (OSP) level within the carrying capacity of the habitat and to maintain the health and stability of the marine ecosystem.

The 1994 reauthorization of the MMPA introduced substantial changes to the provisions of the MMPA of 1972. One of the more notable changes involved the development of a long-term strategy for governing interactions between marine mammals and commercial fishing operations (Sections 117 and 118). Section 118 established the immediate goal of reducing the incidental mortality or serious injury of marine mammals occurring in the course of commercial fishing operations to below the Potential Biological Removal (PBR) level and a long-term goal of reducing significant injury and mortality of marine mammals in commercial fishing operations to insignificant levels approaching a zero mortality and serious injury rate goal (ZMRG).

An over-arching objective of the MMPA, as amended, is to meet the above listed goals while taking into account the economics of the fishery and the availability of existing technology and management strategies already in place under state and/or regional FMPs.

To aid in achieving these goals, the MMPA Amendments of 1994 mandated the preparation of marine mammal stock assessment reports, a registration and incidental take monitoring program for certain commercial fisheries, a marine mammal incidental injury and mortality self-reporting requirement for all fisheries, and the development and implementation of take reduction plans. In addition, NMFS instituted a mechanism for issuing permits to incidentally take endangered and threatened marine mammals provided that, together with other restrictions, incidental mortality and serious injury from commercial fisheries will have a negligible impact on the stock and that a recovery plan has been or is being developed for the species [Section 101(a)(5)(E)].

Under the registration and incidental take monitoring program, NMFS created a three tier classification for commercial fisheries based primarily on the level of serious injury and mortality of marine mammals that occur incidental to that fishery. Category I includes commercial fisheries determined to have frequent incidental mortality and serious injury of marine mammals, Category II includes commercial fisheries determined to have occasional incidental mortality and serious injury of marine mammals, and Category III includes commercial fisheries determined to have a remote likelihood of or no known incidental mortality and serious injury of marine mammals.

Other factors are also considered when determining the category for a fishery including the type of gear used in the fishery, fishing techniques employed and areas and seasons fished in relation to the distribution and seasonal occurrence of marine mammals within fished areas. Category I and II fisheries are required to register with the Marine Mammal Authorization Program (MMAP) and must comply with take reduction plans and additional MMAP requirements such as carrying an on-board observer when requested.

Under Section 118 of the Marine Mammal Protection Act (MMPA), NMFS must publish, at least annually, a List of Fisheries (LOF) that places all U.S. commercial fisheries into one of three categories based on the level of incidental serious injury and mortality of marine mammals that occurs in each fishery. The southeast U.S. Atlantic black sea bass pot fishery is included in the grouping of the Atlantic mixed species trap/pot fisheries, which the 2004 List of Fisheries classifies as a Category II fishery (69 FR 153; August 10, 2004). Gear types used in these fisheries are determined to have occasional incidental mortality and serious injury of marine mammals. The 2004 LOF classifies the southeastern U.S. Atlantic snapper grouper bottom longline/hook-and-line fishery and the dive, hand/mechanical collection fishery in the Atlantic Ocean as Category III fisheries, meaning each fishery is determined to have a remote likelihood of or no known incidental mortality or serious injury of marine mammals (69 FR 153; August 10, 2004).

5.11 Migratory Bird Treaty Act and Executive Order 13186 – (Migratory Birds)

Seabirds, and other migratory birds, are protected under the Migratory Bird Treaty Act (MBTA) of 1918. The MBTA prohibits taking any migratory bird except as permitted by regulations issued by the Department of the Interior. However, conservation law to protect seabirds with regard to fisheries has been lacking until recently. To address on-going concerns with seabird and fisheries interactions, NMFS recently initiated an Interagency Seabird Working Group (ISWG). The group includes representatives from NMFS, the U.S. Fish and Wildlife Service, regional Councils and coastal states. This new initiative looks to find practicable and effective solutions for reducing or eliminating seabird/fishery interactions.

Another recent initiative, Executive Order 13186, signed January 2001, requires every Federal agency that takes action(s) likely to have a measurable negative impact on migratory birds to enter into a Memorandum of Understanding (MOU) with the U.S. Fish and Wildlife Service, which is the lead federal agency for managing and conserving seabirds. The MOU is to outline how an agency will promote the conservation of migratory birds and is published in the *Federal Register*. Other obligations under E.O. 13186 include supporting various conservation planning efforts already underway (e.g., Partners in Flight initiative and the North American Waterfowl Management Plan) and incorporating bird conservation considerations into agency planning. The latter includes considering impacts on migratory birds while conducting National Environmental Policy Act (NEPA) analyses and reporting annually on the level of take that is occurring.

NMFS is currently drafting an MOU with the U.S. Fish and Wildlife Service. The NPOA and E.O. 13186, together with existing law, provide guidance to NMFS in pursuing ways to better measure, monitor and reduce bycatch of seabirds in fishing operations both domestically and internationally.

To date, no specific seabird/gear interaction assessments have been conducted for the fisheries managed by the South Atlantic Council. However, the potential for seabird interactions with the snapper grouper fishery has been described as moderate to low within NMFS' Southeast Region Current Bycatch Priorities and Implementation Plan FY04 and FY05. In addition, as part of NMFS regional implementation of national seabird directives, the Council has participated in ISWG meetings and has contributed to the progress/status report on seabird bycatch assessments in longline fisheries in the form of providing detailed descriptions of longline fisheries currently managed by the South Atlantic Council.

5.12 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 Draft Environmental Impact Statement (DEIS) integrated into Amendment #13C to the FMP serves as the documentation to satisfy the requirements of NEPA.

5.13 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.

5.14 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.

5.15 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.

5.16 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.

5.17 Public Law 99-659: Vessel Safety

Public Law 99-659 amended the MSFCMA 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.

6.0 LIST OF PREPARERS

Name	Title	Agency	Division	Location
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7.0 LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS CONSULTED

<u>Responsible Agency</u>

Regulatory Amendment:	Environmental Impact Statement:
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<u>List of Agencies, Organizations, and Persons Consulted</u>

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

National Oceanic and Atmospheric Administration
- General Counsel
United States Coast Guard
United States Environmental Protection Agency, Region IV
Monroe County Commercial Fishermen, Inc.
North Carolina Fisheries Association, Inc.
National Fisheries Institute
Ocean Conservancy
Atlantic Coast Conservation Association
Environmental Defense
Project Reefkeeper
Marine Conservation Network
South Atlantic Sustainable Fisheries Association

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9.0 INDEX

10.0 APPENDICES

10.1 Appendix A. Alternatives the Council considered but eliminated from detailed study, and a brief discussion of the reasons for their elimination.

This section describes alternatives the Council considered in developing this document, but decided not to pursue. The description of each alternative is followed by a summary statement of why it was eliminated from more detailed study.

Snowy Grouper

Rejected Alternative 1: Reduce the annual commercial snowy grouper quota from 344,508 lbs gutted weight (406,519 lbs whole weight) to 151,000 lbs gutted weight (178,000 lbs whole weight). Specify a commercial trip limit of 275 lbs gutted weight (325 lbs whole weight) until the quota is met. Prohibit sale and prohibit harvest and/or retention of snowy grouper over the bag limit after the quota is taken.

Rationale for elimination**:** This alternative would not end overfishing until 2022. The Council feels this is too risky due to the poor status of the snowy grouper stock and life history characteristics that make it vulnerable to overfishing.

Rejected Alternative 2: Reduce the annual commercial quota for snowy grouper from 344,508 pounds (gutted weight) to 84,028 pounds gutted weight (99,154 pounds whole weight), and institute an 847 pound gutted weight (1,000 pound whole weight) snowy grouper trip limit per commercial vessel. Prohibit the harvest, possession, and retention of all species in the unit after the quota is met, as well as the sale or purchase of all species in the unit taken from the South Atlantic EEZ.

Rationale for elimination**:** The Council's objective in choosing commercial quota and trip limit combinations is to maintain for as long as possible to allow for incidental catch and reduce bycatch. The trip limit proposed in this alternative is projected to close the fishery sometime in April of each year. Because the discard mortality rate of snowy grouper is estimated to be near 100%, most of the fish incidentally captured after the fishery is closed would die when released.

A year-round fishery would discourage derby-type conditions, where fishermen compete with each other to catch as many fish as possible before the quota is taken and the fishery is closed for the remainder of the fishing year. Derby fisheries can unnecessarily increase bycatch by providing participants less flexibility in deciding when, where, and how to fish. Derby fisheries may also send fishermen offshore in bad weather or during times of potential mechanical difficulties.

Closed seasons would encourage the incidental take of snowy grouper in pursuit of other species, such as golden and blueline tilefish, after the snowy grouper fishery was closed. For longline trips that caught at least 100 pounds of golden tilefish, snowy grouper made up about 10% of the catch.

Finally, derby-type fisheries encourage periods of excess fish in the market as well as times when fish are not available. An excess of snowy grouper on the market could equate to decreased revenue to the commercial industry through lower fish prices. During closed seasons, public demand for snowy grouper may decrease if it is replaced on the market by more readily available alternatives. In addition, a reduced supply of snowy grouper in combination with a static demand may cause increased prices to the consumer. As such, the Council's objective is to avoid a disruption when snowy grouper are available in the market.

Rejected Alternative 3: Prohibit commercial and recreational retention of snowy grouper during certain times of the year.

Rationale for elimination: In addition to reducing directed fishing mortality on snowy grouper, the Council's objective is to extend the fishery for as long as possible to allow for incidental catch and reduce bycatch. Incidental take of snowy grouper during a closed season would likely reduce the biological benefits of the Council's proposed harvest reduction, as release mortality is estimated to be nearly 100% for snowy grouper. For longline trips that caught at least 100 pounds of golden tilefish, snowy grouper made up about 10% of the catch. Therefore, incidental catch of snowy could occur when fishermen were targeting tilefish.

If fishermen targeted blueline tilefish, incidental catch of snowy grouper could be high since both species occur over rough bottom. For longline trips that landed at least 100 pounds of blueline tilefish during 1999-2003, golden tilefish and snowy grouper constituted 32.0%, and 18.7% of the landings, respectively. However, it is likely that catch of blueline tilefish would remain incidental to the targeted catch of snowy grouper or golden tilefish. Blueline tilefish do not appear to be as abundant or as desirable as snowy grouper and golden tilefish.

The Council believes closed seasons for snowy grouper are not necessary at this time as the proposed trip limits are so low that the fishery will probably develop into an incidental catch fishery where fishing aggregations are not targeted.

Rejected Alternative 4: Prohibit the recreational possession of snowy grouper year-round (institute a bag limit of zero).

Rationale for elimination: The Council does not believe a total prohibition on recreational harvest of snowy grouper is needed as the recreational harvest is a relatively small (4%) component of the total harvest (based on the average harvest from 1999-2003). Also, the incidental take of snowy grouper by recreational fishermen pursuing other species during a closed season would likely reduce or negate the biological benefits of a 0-fish bag limit as release mortality is estimated to be nearly 100% for this species (SEDAR 4, 2004).

Rejected Alternative 5: Prohibit commercial and recreational retention of snowy grouper at certain locations.

Rationale for elimination: The Council has initiated a process in to protect the size and age structure of deep water groupers through Marine Protected Areas (MPA) in the Snapper Grouper FMP Amendment 15. Due to the highly controversial nature of spatial closures, the Council has decided not to move forward with MPAs in Snapper Grouper FMP Amendment 13C.

The primary purpose of the Council's proposed actions in this amendment is to reduce fishing mortality in order to end overfishing as quickly as possible taking into consideration the needs of the fishing community, fishery participants, and support industries. The effectiveness of area closures in reducing fishing mortality is difficult to estimate compared to the effects of more traditional management measures because of the uncertain effects of spatial closures on the distribution of fishing effort and bycatch.

Rejected Alternative 6: Institute two separate commercial quotas for snowy grouper; one for fish landed in North Carolina and one for fish landed in the remaining three South Atlantic states.

Rationale for elimination: The Council considered this alternative as unreasonable due to administrative and legal concerns. There are administrative concerns with the institution of a quota set at low landing levels (the approximate North Carolina allocation of a 84,000 gutted pound commercial quota would be 19,320 gutted pounds) as it takes at least two weeks to close a fishery.

The Council is concerned this alternative would violate National Standard 4 of the Magnuson-Stevens Fishery Conservation and Management Act by allocating 23% of the snowy grouper catch to only a few fish houses. National Standard 4 dictates that management measures must not discriminate between residents of different states, allocation should be fair and equitable among fishermen, and no particular individual, corporation, or other entity may acquire an excessive share of such privileges.

Golden tilefish

Rejected Alternative 7: Prohibit commercial and recreational retention of golden tilefish certain times of the year.

Rationale for elimination: In addition to reducing directed fishing mortality on golden tilefish, the Council's objective for the this action is to reduce bycatch mortality by extending the duration of the fishery for as long as possible. Incidental take of golden tilefish during a closed season would likely reduce the biological benefits of the Council's proposed harvest reduction, as release mortality is estimated to be nearly 100% (SEDAR 4, 2004). Fishermen would be forced to discard golden tilefish taken incidentally in pursuit of other species, such as the snowy grouper, after the tilefish fishery was closed.

Rejected Alternative 8: Prohibit commercial and recreational retention of golden tilefish at certain locations.

Rationale for elimination: The Council has initiated a process in to protect the size and age structure of deep water groupers through Marine Protected Areas (MPA) in the Snapper Grouper FMP Amendment 15.
The primary purpose of the Council's proposed actions in this amendment is to reduce fishing mortality in order to end overfishing as quickly as possible taking into consideration the needs of fishing communities, fishery participants, and support industries. The effectiveness of area closures in reducing fishing mortality is difficult to estimate compared to the effects of more traditional management measures because of the uncertain effects of spatial closures on the distribution of fishing effort and bycatch.

Rejected Alternative 9: Reduce the annual commercial tilefish (golden) quota from 1,001,663 pounds gutted weight to 326,554 pounds whole weight (291,566 pounds gutted weight), and institute a 1,430 pound gutted weight (1,600 pound whole weight) tilefish trip limit per commercial vessel. This total allowable catch quota would equal the estimated optimum yield for tilefish. Prohibit the harvest, possession, and retention of all species in the unit after the quota is met, as well as the sale or purchase of all species in the unit taken from the South Atlantic EEZ.

Rationale for elimination: The Council believes the trip limit proposed in this alternative would have an unnecessary disproportionate impact on the longline sector, which operate large vessels fish far offshore, and require catches as great as 4,000 to 5,000 lbs gutted weight per trip to cover costs of operations.

Rejected Alternative 10: Prohibit the recreational possession of golden tilefish year-round (institute a bag limit of zero).

Rationale for elimination: The Council does not believe a total prohibition on recreational catch is needed as the recreational harvest of golden tilefish is a relatively small (2%) component of the total harvest (based on the average harvest from 1999-2003). Also, incidental take of golden tilefish by recreational anglers during a closed season would likely reduce the biological benefits associated with a 0-fish bag limit as release mortality is estimated to be nearly 100% (SEDAR 4, 2004).

Vermilion Snapper

Rejected Alternative 11: Institute commercial quotas that decease over time to allow overfishing to be phased-out over time.

Rationale for elimination: The Council concluded larger reductions in the quota are not necessary at this time and chose an alternative to cap landings and prevent high landings that would result in overfishing.

Rejected Alternative 12: Raise the size limit of vermilion to 14 inches TL.

Rationale for elimination: The Council is concerned that increasing the size limit above 13" total length would substantially increase discard mortality as fish larger than 13" total length are generally caught in deeper water release mortality rates are higher. SEDAR 2 (2003 a) estimate release mortality rates at 25% and 40% for recreational and commercial, respectively.

Rejected Alternative 13: Increase the commercial vermilion snapper minimum size limit from 12" TL to 13" TL.

Rationale for elimination: This alternative would not end overfishing of vermilion snapper.

Rejected alternative 14: Prohibit commercial retention of vermilion snapper during certain times of the year.

Rationale for elimination: The Council wants to avoid the detrimental impacts of closed seasons to the commercial industry, including fish houses. Derby-type fisheries resulting from seasonal closures often depress the market price of fish during the open season by causing them to be in excess supply. During closed seasons, public demand for vermilion snapper may decrease if it is replaced on the market by more readily available alternatives. In addition, a reduced supply of vermilion snapper in combination with a static demand may cause increased prices to the consumer. As such, the Council's objective is to avoid a disruption when vermilion snapper are available in the market.

Incidental take of vermilion snapper during a closed season would likely reduce the biological benefits as release mortality is estimated to be nearly 40% for commercially-caught vermilion snapper (SEDAR 2 2003a).

Rejected Alternative 15: Prohibit recreational retention of vermilion snapper during summer months (May through September).

Rationale for elimination: The Snapper Grouper Advisory Panel advised the Council that prohibiting harvest of vermilion snapper during the summer months would have significant impacts to the headboat industry. Between 1999 and 2003, 57% of the recreational vermilion harvest occurred during May through September. Allowing fishing to occur year-round with reductions would mitigate hardships associated with more restrictive management regulations.

Rejected alternative 16: <u>Commercial:</u> Raise the vermilion size limit to 13 inches TL. Institute a 2,500 pound limit (whole weight) per trip with a June 1 to July 31 closure. <u>Recreational:</u> Raise the vermilion minimum size limit to 12 inches TL and reduce the bag limit to 5 vermilion.

<u>Rationale for elimination</u>: The Council believes the combination of an increase in size limit and implementation of a seasonal closure would result in excessive bycatch mortality of vermilion snapper in the commercial fishery, where release mortality is estimated to be 40% (SEDAR 2 2003a). Alternative 3 and 8 evaluated by the Council for the vermilion snapper fishery, are similar to the minimum size limit/bag limit proposed in rejected Alternative 14.

Rejected Alternative 17: Prohibit commercial and recreational retention of vermilion snapper at certain locations.

<u>Rationale for elimination</u>: The primary purpose of the Council's proposed actions in this amendment is to reduce fishing mortality to end overfishing as quickly as possible taking into consideration the needs of the fishing communities, fishery participants, and support industries. The effectiveness of area closures in reducing fishing mortality is difficult to estimate compared to the effects of more traditional management measures because of the uncertain effects of spatial closures on the distribution of fishing effort and bycatch.

Rejected Alternative 18: Establish an annual commercial quota of 826,646 pounds gutted weight for vermilion and red snapper (919,798 pounds whole weight), and institute a 720 pound gutted weight (800 pound whole) vermilion snapper trip limit. Prohibit the harvest, possession, and retention of all species in the unit after the quota is met, as well as the sale or purchase of all species in the unit taken from the South Atlantic EEZ.

<u>Rationale for elimination</u>: The primary purpose of the vermilion snapper action is to end overfishing as quickly as possible taking into consideration fishing communities, fishery participants, and support industry. As a result, the Council considers an alternative, which would also cap red snapper landings, as unnecessarily restrictive. The Council is currently examining a multi-species approach to management in Snapper Grouper Amendment 13B that would apply quotas, seasonal closures, and other management measures to multiple co-occurring species rather than to single stocks to reduce bycatch.

<u>Black Sea Bass</u>

Rejected Alternative 19: Prohibit commercial and recreational retention of black sea bass during certain times of the year.

<u>Rationale for elimination</u>: The Council wants to avoid the detrimental impacts of closed seasons to the commercial industry, including fish houses. Derby-type fisheries resulting from seasonal closures often depress the market price of fish during the open season by causing them

to be in excess supply. In the South Atlantic, black sea bass spawn March to July and September and November with a March through May peak. Therefore, the June 1 start date makes it less likely fishing will occur during spawning season. The 10” total length minimum size limit provides the fish the opportunity to spawn three times before they are captured. And, spawning season closures provide no specific benefit to these species because their vulnerability is not increased during that period of time. As a result, the Council believes other alternatives retained for detailed analysis better accomplish the primary objective of the proposed action, which is to end overfishing of black sea bass as quickly as possible, taking into consideration the needs of fishery participants, fishing communities, and support industries.

Rejected Alternative 20: Prohibit commercial and recreational retention of black sea bass at certain locations.

Rationale for elimination: The primary purpose of the Council’s proposed actions in this amendment is to reduce fishing mortality to end overfishing as quickly as possible taking into consideration the needs of the fishing communities, fishery participants, and support industries. The effectiveness of area closures in reducing fishing mortality is difficult to estimate compared to the effects of more traditional management measures because of the uncertain effects of spatial closures on the distribution of fishing effort and bycatch.

Rejected Alternative 21: Establish different size limits between handline and the pot fishery.

Rationale for elimination: The Council concluded that separate size limits between sectors would significantly hinder the effectiveness of law enforcement.

Rejected Alternative 22: Require fishermen to bring their pots in at night.

Rationale for elimination: The Council believes sufficient reductions are achieved through the proposed management measures. Furthermore, the new preferred alternative requires that after the commercial quota is met, fishermen will not longer be allowed to fish blackfish pots. The Council believes that this will restrict the number of pots fishermen use over the course of a year. Additionally, rejected Alternative 21 would have unnecessarily disproportionate impact of fishermen with smaller vessels by limiting the number of pots by the number of pots they can transport on their vessels.

Rejected Alternative 23: Restrict the number of pots commercial fishermen can use per trip.

Rationale for elimination: The new preferred alternative requires that after the commercial quota is met, fishermen will not longer be allowed to fish blackfish pots. The Council believes that this will restrict the number of pots fishermen use over the course of a year.

Rejected Alternative 24: Increase size limit to 11" total length and decrease bag limit to 5 fish.

Rationale for elimination: The Council fully evaluated a similar alternative for the recreational black sea bass fishery, which combined an 11" total length size limit with a 5-fish bag limit, and recreational allocation of 409,000 lbs gutted weight (**Alternative 3**). Additionally, the Snapper Grouper Advisory Panel advised the Council that a 5-fish bag limit would have a much more significant impact on the headboat industry than would other management measures, which would achieve the same biological goal.

Red Porgy

Rejected Alternative 25: Prohibit recreational harvest of red porgy from January through April to complement the existing commercial closure.

Rationale for elimination: Since the recent stock assessment indicates landings can be increased, the Council does not feel that more restrictive measures are necessary at this time.

Rejected alternative 26: Retain all commercial regulations currently in place for South Atlantic snapper grouper species. Allow each permit holder to designate two months when no commercial fishing for snapper grouper species would occur. These months would be printed on the permit or on a sticker to aid enforcement.

Rationale for elimination:

Biological

It is not possible to determine if this strategy would end overfishing of snowy grouper, black sea bass, vermilion snapper, and black sea bass without knowing which months each fisherman would choose to refrain from fishing. Little reduction in harvest would be achieved if all fishermen selected months of historically lowest catches. The Council examined average aggregate snapper grouper landings by month for all permit holders to determine if the two months of lowest catch would provide an adequate reduction in harvest (see Table x). If December and January (anecdotally the months when fishing is least desirable) were closed for all permit holders, approximately a 14% reduction in snapper grouper landings would result, which is not adequate to end overfishing for any of the species (black sea bass, vermilion snapper, snowy grouper, and golden tilefish).

Table A1(a). 1999-2003 commercial monthly landings of all snapper grouper species from logbook.

Table A1(b). 1999-2003 commercial monthly landings of all snapper grouper species from logbook for fishermen that caught at least 1,000 pounds during any trip.

Table A1(a)

	Landings (lbs whole weight)		
Month	Total	Average	% total
1	3,083,657	616,731	7.5
2	3,164,743	632,949	7.7
3	3,282,529	656,506	8.0
4	3,016,202	603,240	7.3
5	4,563,948	912,790	11.1
6	4,138,563	827,713	10.1
7	3,702,809	740,562	9.0
8	3,377,660	675,532	8.2
9	2,963,303	592,661	7.2
10	3,383,665	676,733	8.2
11	3,253,234	650,647	7.9
12	3,216,362	643,272	7.8

Table A1(b)

	Landings (lbs whole weight)		
Month	Total	Average	% total
1	1,858,261	371,652	7.2
2	1,842,320	368,464	7.2
3	1,989,459	397,892	7.7
4	1,807,356	361,471	7.0
5	2,754,219	550,844	10.7
6	2,531,186	506,237	9.8
7	2,239,693	447,939	8.7
8	2,232,589	446,518	8.7
9	1,906,474	381,295	7.4
10	2,244,340	448,868	8.7
11	2,167,433	433,487	8.4
12	2,206,885	441,377	8.6

Additionally, it would be extremely burdensome to monitor and enforce differing fishing seasons for individual fishermen would be an extreme administrative burden. A considerable amount of paperwork, computer time, and personnel hours would be needed to track fishermen and their fishing seasons.

Enforcement of a closed fishing season that varied depending on the fisherman would be extremely difficult. Allowances for changing the closed season for fishermen from year to year would enhance the burden.

10.2 Appendix B. Results of trip limit analyses for snowy grouper, golden tilefish, vermilion snapper, and black sea bass.

Table B-1. Estimated effect of trip limits (whole weight) on harvest reduction of snowy grouper for all gear during 1999-2003.
Source: NMFS SEFSC logbook data.

Trip Limit (pounds whole weight)	Avg 1999-2003			
	Avg no. trips	Avg pounds over limit	% trips over limit	% reduction in catch from limit
0	1,617	363,427	100.0	100.0
100	664	264,264	41.1	72.7
115	611	254,707	37.8	70.1
150	518	235,069	32.1	64.7
175	470	222,686	29.0	61.3
200	424	211,537	26.2	58.2
225	393	201,343	24.3	55.4
250	363	191,885	22.4	52.8
300	309	175,202	19.1	48.2
325	288	167,712	17.8	46.1
350	268	160,758	16.6	44.2
500	189	127,093	11.7	35.0
600	158	109,876	9.8	30.2
700	131	95,487	8.1	26.3
800	110	83,516	6.8	23.0
900	93	73,304	5.8	20.2
1,000	83	64,478	5.1	17.7
1,100	71	56,748	4.4	15.6
1,200	64	49,962	3.9	13.7
1,300	58	43,937	3.6	12.1
1,400	52	38,482	3.2	10.6
1,500	46	33,611	2.9	9.2
1,600	41	29,202	2.5	8.0
1,700	37	25,297	2.3	7.0
1,800	33	21,778	2.1	6.0
1,900	30	18,620	1.8	5.1
2,000	26	15,802	1.6	4.3
2,250	19	10,227	1.2	2.8
2,500	14	6,064	0.9	1.7
2,750	9	3,261	0.5	0.9
3,000	2	1,916	0.1	0.5

Table B-2. Estimated effect of trip limits (whole weight) on harvest reduction of golden tilefish for all gear during 1999-2003.
Source: NMFS SEFSC logbook data.

Trip Limit (pounds whole weight)	Avg 1999-2003			
	Avg no. trips	Avg pounds over limit	% trips over limit	% reduction in catch from limit
0	541	531,997	100.0	100.0
100	348	489,171	64.4	91.9
115	334	484,049	61.6	91.0
150	305	472,956	56.4	88.9
175	290	465,536	53.5	87.5
200	278	458,446	51.3	86.2
250	263	444,918	48.5	83.6
300	251	432,093	46.4	81.2
500	224	385,057	41.4	72.4
600	213	363,194	39.4	68.3
700	202	342,491	37.4	64.4
800	192	322,695	35.4	60.7
900	181	304,073	33.5	57.2
1,000	175	286,256	32.3	53.8
1,100	165	269,327	30.5	50.6
1,200	157	253,187	29.0	47.6
1,300	149	237,899	27.6	44.7
1,400	143	223,289	26.4	42.0
1,500	134	209,448	24.8	39.4
1,600	126	196,339	23.4	36.9
1,700	120	184,055	22.1	34.6
1,800	115	172,338	21.3	32.4
1,900	110	161,101	20.3	30.3
2,000	103	150,452	19.1	28.3
2,250	91	126,145	16.8	23.7
2,500	77	105,348	14.2	19.8
2,750	65	87,594	12.0	16.5
3,000	54	72,783	9.9	13.7
3,250	45	60,533	8.2	11.4
3,500	38	50,264	7.0	9.4
3,750	34	41,229	6.3	7.7
4,000	30	33,175	5.5	6.2
4,250	25	26,297	4.6	4.9
4,500	21	20,494	4.0	3.9

Trip Limit (pounds whole weight)	Avg 1999-2003			
	Avg no. trips	Avg pounds over limit	% trips over limit	% reduction in catch from limit
4,750	17	15,695	3.2	3.0
5,000	14	11,791	2.5	2.2
5,250	11	8,678	2.1	1.6
5,500	6	6,410	1.1	1.2
5,750	2	5,630	0.4	1.1
6,000	2	5,050	0.4	0.9

Table B-3. Estimated effect of trip limits (whole weight) on harvest reduction of vermilion snapper for all gear during 1999-2003.
Source: NMFS SEFSC logbook data.

Trip Limit (pounds whole weight)	Avg 1999-2003			
	Avg no. trips	Avg pounds over limit	% trips over limit	% reduction in catch from limit
0	2,757	1,201,346	100.0	100.0
250	1,188	789,463	43.1	65.7
500	767	550,551	27.8	45.8
600	652	479,658	23.7	39.9
700	558	419,231	20.2	34.9
800	472	367,790	17.1	30.6
900	409	323,993	14.8	27.0
1,000	357	285,917	12.9	23.8
1,100	313	252,609	11.3	21.0
1,200	269	223,451	9.8	18.6
1,300	236	198,202	8.6	16.5
1,400	209	175,971	7.6	14.6
1,500	184	156,214	6.7	13.0
1,600	162	138,931	5.9	11.6
1,700	144	123,627	5.2	10.3
1,800	129	109,965	4.7	9.2
1,900	115	97,764	4.2	8.1
2,000	102	87,016	3.7	7.2
2,250	76	64,886	2.8	5.4
2,500	57	48,361	2.1	4.0
2,750	41	36,008	1.5	3.0
3,000	30	27,181	1.1	2.3
3,250	23	20,616	0.8	1.7
3,500	17	15,528	0.6	1.3
3,750	14	11,535	0.5	1.0
4,000	10	8,654	0.4	0.7

Table B-4. Estimated effect of trip limits (whole weight) on harvest reduction of black sea bass for all gear during 1999-2003.
Source: NMFS SEFSC logbook data.

	Landings by Year					%
Trip Limit	2000	2001	2002	2003	avg 00-03	reduction
TL0	556,238	600,439	507,107	565,214	557,249	100.0
TL25	509,956	543,278	458,979	523,481	508,923	91.3
TL50	478,268	502,478	425,827	493,538	475,028	85.2
TL75	451,174	467,898	397,920	468,080	446,268	80.1
TL100	426,784	436,714	373,423	444,936	420,464	75.5
TL125	404,343	408,184	351,098	423,222	396,712	71.2
TL150	383,356	381,735	330,901	402,853	374,711	67.2
TL175	363,724	357,162	312,248	383,531	354,166	63.6
TL200	345,246	334,168	294,935	364,885	334,809	60.1
TL225	327,721	313,023	278,706	347,102	316,638	56.8
TL250	311,230	293,226	263,474	330,051	299,495	53.7
TL275	295,663	274,718	248,977	313,699	283,264	50.8
TL300	280,964	257,464	235,302	298,071	267,950	48.1
TL325	267,056	241,378	222,323	283,129	253,471	45.5
TL350	253,922	226,210	209,788	268,762	239,670	43.0
TL375	241,413	212,021	197,827	255,017	226,569	40.7
TL400	229,452	198,809	186,349	241,956	214,141	38.4
TL425	218,105	186,572	175,675	229,897	202,562	36.4
TL450	207,339	175,110	165,651	218,558	191,665	34.4
TL475	197,224	164,360	156,212	208,019	181,454	32.6
TL500	187,937	154,348	147,328	198,024	171,909	30.8
TL525	179,305	145,135	138,998	188,634	163,018	29.3
TL550	171,184	136,614	131,132	179,681	154,653	27.8
TL575	163,516	128,759	123,750	171,248	146,818	26.3
TL600	156,339	121,340	116,799	163,265	139,436	25.0
TL625	149,613	114,468	110,403	155,661	132,536	23.8
TL650	143,273	108,207	104,498	148,407	126,096	22.6
TL675	137,334	102,362	98,900	141,467	120,016	21.5
TL700	131,755	96,829	93,604	134,862	114,262	20.5
TL725	126,445	91,706	88,521	128,611	108,821	19.5
TL750	121,335	86,881	83,587	122,626	103,607	18.6
TL775	116,419	82,337	78,783	116,914	98,613	17.7
TL800	111,731	77,958	74,141	111,468	93,824	16.8
TL825	107,243	73,889	69,668	106,341	89,285	16.0
TL850	102,880	70,022	65,393	101,390	84,921	15.2
TL875	98,765	66,331	61,375	96,731	80,800	14.5
TL900	94,877	62,805	57,574	92,295	76,888	13.8
TL925	91,246	59,492	53,996	88,011	73,186	13.1
TL950	87,888	56,425	50,585	83,942	69,710	12.5
TL975	84,682	53,601	47,287	80,186	66,439	11.9

	Landings by Year					% reduction
Trip Limit	2000	2001	2002	2003	avg 00-03	
TL1000	81,636	50,944	44,093	76,611	63,321	11.4
TL1025	78,738	48,596	41,111	73,233	60,419	10.8
TL1050	75,930	46,377	38,399	70,001	57,677	10.4
TL1075	73,329	44,255	35,893	66,862	55,085	9.9
TL1100	70,838	42,268	33,547	63,943	52,649	9.4
TL1125	68,462	40,391	31,338	61,200	50,348	9.0
TL1150	66,145	38,584	29,211	58,582	48,130	8.6
TL1175	63,913	36,959	27,242	56,123	46,059	8.3
TL1200	61,794	35,433	25,503	53,742	44,118	7.9
TL1225	59,816	34,070	23,916	51,514	42,329	7.6
TL1250	57,988	32,745	22,381	49,407	40,630	7.3
TL1275	56,258	31,420	20,954	47,380	39,003	7.0
TL1300	54,608	30,115	19,594	45,379	37,424	6.7
TL1325	52,991	28,823	18,291	43,448	35,888	6.4
TL1350	51,454	27,574	17,053	41,562	34,411	6.2
TL1375	50,022	26,359	15,882	39,780	33,011	5.9
TL1400	48,745	25,211	14,749	38,059	31,691	5.7
TL1425	47,522	24,149	13,722	36,409	30,451	5.5
TL1450	46,322	23,124	12,792	34,788	29,257	5.3
TL1475	45,206	22,105	11,975	33,268	28,139	5.0
TL1500	44,125	21,129	11,307	31,816	27,094	4.9
TL1525	43,075	20,206	10,707	30,409	26,099	4.7
TL1550	42,117	19,341	10,107	29,054	25,155	4.5
TL1575	41,167	18,494	9,551	27,766	24,245	4.4
TL1600	40,243	17,721	9,040	26,517	23,380	4.2
TL1625	39,343	17,085	8,569	25,339	22,584	4.1
TL1650	38,445	16,460	8,127	24,210	21,811	3.9
TL1675	37,570	15,880	7,702	23,087	21,060	3.8
TL1700	36,739	15,332	7,290	21,993	20,339	3.6

Red Porgy

Table B-5. Estimated increases in red porgy commercial harvest for various trip limits with current spawning season closure and minimum size. An average weight of 1.83 pounds was used to convert the trip limit from pounds to numbers of fish.

Trip Limit (lbs)	Trip Limit (numbers of fish)	Estimated Landings	Percent Change
50	27	51,656	0
60	33	53,924	4
70	38	57,090	11
80	44	60,411	17
90	49	63,792	23
100	55	67,196	30
110	60	70,621	37
120	66	74,053	43
130	71	77,490	50
140	77	80,945	57
150	82	84,406	63
160	87	87,869	70
170	93	91,335	77
180	98	94,802	84
190	104	98,270	90
200	109	101,740	97
210	115	105,210	104

10.3 Appendix C. Results of Bag and Size Limit Analyses

Snowy Grouper

Table C-1. Reductions provided by recreational bag limit for snowy grouper assuming a 90% and 99% release mortality. (SSC recommends 100% release mortality).

Release Mortality	Estimated Harvest Reductions				
	limit 5	limit 4	limit 3	limit 2	limit 1
0.9	0.19	1.12	2.23	3.57	5.00
0.99	0.05	0.15	0.24	0.43	0.53

Golden Tilefish

Table C-2. Reductions provided by recreational bag limit for golden tilefish assuming a 90% and 99% release mortality. (SSC recommends 100% release mortality).

Release Mortality	Estimated Harvest Reductions				
	limit 5	limit 4	limit 3	limit 2	limit 1
0.9	0.09	0.47	1.24	2.26	4.23
0.99	0.00	0.00	0.00	0.43	0.47

Vermilion Snapper

Table C-3. Estimates in recreational harvest of vermilion snapper based on various bag limits. Average data during 1999-2003 were weighted by harvest proportion for headboat and MRFSS sector.

Release Mortality	Estimated Harvest Reductions								
	limit 9	limit 8	limit 7	limit 6	limit 5	limit 4	limit 3	limit 2	limit 1
0.00	8.1	11.5	13.4	19.7	27.0	34.5	41.0	52.4	66.1
0.10	7.1	10.2	11.8	17.5	23.9	30.6	38.9	48.7	60.9
0.15	6.7	9.5	11.1	16.4	22.4	28.7	36.5	45.6	57.0
0.20	6.3	8.9	10.4	15.4	21.0	26.8	34.1	42.6	53.2
0.25	5.6	8.0	9.6	14.2	19.4	24.8	32.5	39.5	49.5
0.30	5.4	7.7	9.0	13.3	18.2	23.2	29.4	36.8	45.9
0.40	4.6	6.5	7.6	11.3	15.4	19.6	24.9	31.1	38.8

Table C-4. Estimated reduction in harvest of vermilion snapper for combined headboat and private/charterboat fishery (MRFSS) under various size limits and release mortality estimates 1999-2003.

Release Mortality	Estimated Harvest Reductions		
	12 inch	13 inch	14 inch
0.00	30.2	59.0	76.4
0.10	26.3	52.7	68.5
0.15	24.4	49.5	64.5
0.20	22.5	46.3	60.6
0.25	20.5	43.1	56.6
0.30	18.6	39.9	52.7
0.40	14.7	33.5	44.8

Table C-5. Percent reductions in recreational harvest under different combinations of bag and size limits. Release mortality = 25%.

Min Size	9 fish	8 fish	7 fish	6 fish	5 fish	4 fish	3 fish	2 fish	1 fish
12 inches	25.0	26.9	28.1	31.8	35.9	40.2	46.3	51.9	59.9
13 inches	46.3	47.7	48.5	51.2	54.1	57.2	61.6	65.5	71.3
14 inches	59.1	60.1	60.8	62.8	65.0	67.4	70.7	73.7	78.1

Table C-6. Percent reductions in commercial harvest of vermilion snapper based on various size limits for that species, considering release mortality of 0 to 40% 1999-2003.

Release Mortality	Estimated Harvest Reductions		
	13 inch	14 inch	15 inch
0.00	22.8	43.9	58.2
0.10	20.0	39.2	52.1
0.15	18.6	36.8	49.1
0.20	17.2	34.4	46.0
0.25	15.8	32.0	43.0
0.30	14.5	29.6	39.9
0.40	11.7	24.9	33.8

Black Sea Bass

Table C-7. Estimated reductions in the recreational harvest (MRFSS and Headboat combined) of black sea bass from various bag limits and release mortalities. (SEDAR recommended release mortality = 15%)

Release Mortality	Estimated Harvest Reductions									
	10 fish	9 fish	8 fish	7 fish	6 fish	5 fish	4 fish	3 fish	2 fish	1 fish
0%	4.7	6.1	8.0	10.6	13.9	17.8	23.0	30.4	41.6	58.6
10%	3.5	4.6	6.0	7.7	10.0	12.9	16.6	21.8	29.5	40.9
15%	3.1	4.1	5.3	7.0	9.1	11.7	15.1	20.0	27.4	38.9
20%	2.7	3.6	4.7	6.2	8.0	10.3	13.3	17.6	24.1	34.3

Release Mortality	Estimated Harvest Reductions									
	20 fish	19 fish	18 fish	17 fish	16 fish	15 fish	14 fish	13 fish	12 fish	11 fish
0%	0.1	0.2	0.5	0.7	1.0	1.4	1.8	2.3	2.9	3.7
10%	0.1	0.2	0.3	0.5	0.7	1.0	1.3	1.6	2.1	2.7
15%	0.1	0.2	0.3	0.5	0.7	0.9	1.2	1.5	1.9	2.5
20%	0.1	0.1	0.3	0.4	2.5	0.8	1.1	1.3	1.7	2.2

Table C-8. Percent reductions in recreational harvest (MRFSS and Headboat combined) of black sea bass from various size limits and release mortalities. (SEDAR recommended release mortality = 15%).

Release Mortality	Estimated Reduction	
	11 inches	12 inches
0%	29.5	53.9
10%	25.8	48.0
15%	23.9	45.1
20%	22.1	42.2

Table C-9. Percent reductions in recreational harvest (MRFSS and Headboat combined) of black sea bass from various size limits and bag limits. Release mortality = 15% (SEDAR Recommendation).

Size Limit	Bag Limit									
	10 fish	9 fish	8 fish	7 fish	6 fish	5 fish	4 fish	3 fish	2 fish	1 fish
11 inches	26.3	27.0	27.9	29.3	30.9	32.8	35.4	39.2	44.8	53.5
12 inches	46.8	47.3	48.0	49.0	50.1	51.5	53.4	56.1	60.2	66.4

Size Limit	Bag Limit									
	20 fish	19 fish	18 fish	17 fish	16 fish	15 fish	14 fish	13 fish	12 fish	11 fish
11 inches	24.0	24.0	24.1	24.3	24.4	24.6	24.8	25.1	25.4	25.8
12 inches	45.1	45.2	45.3	45.4	45.5	45.6	45.8	45.9	46.2	46.5

Table C-10. Percent reductions in commercial harvest (hook-and-line) of black sea bass from various size limits and release mortalities. (SEDAR recommended release mortality = 15%).

Release Mortality	Estimated Reduction		
	11 inches	12 inches	13 inches
0%	9.9	27.4	44.0
10%	9.0	24.7	39.7
15%	8.3	23.2	37.3
20%	7.6	21.7	35.0

Table C-11. Percent reductions in commercial harvest (sea bass pots) from various size limits and release mortalities. (SEDAR recommended release mortality = 15%).

Release Mortality	Estimated Reduction		
	11 inches	12 inches	13 inches
0%	26.2	52.8	74.2
10%	23.0	47.1	66.6
15%	21.5	44.3	62.8
20%	19.9	41.5	59.0

Table C-12. Percent reductions in commercial harvest (all gear types combined) of black sea bass from various size limits and release mortalities. (SEDAR recommended release mortality = 15%).

Release Mortality	Estimated Reduction		
	11 inches	12 inches	13 inches
0%	22.8	47.4	67.8
10%	20.1	42.4	60.9
15%	18.7	39.9	57.4
20%	17.4	37.4	54.0

Table C-13. Percent reductions in the commercial harvest of black sea bass from pots containing 2” mesh. Size limit = 11 inches.

% of fishermen currently using 2" mesh	Percent Reduction for Various Release Mortalities			
	0%	**10%**	**15%**	**20%**
0%	26.4%	23.3%	21.8%	20.2%
25%	26.4%	23.8%	22.5%	21.1%
50%	26.4%	24.2%	23.1%	22.0%
75%	26.4%	24.7%	23.8%	22.9%
100%	26.4%	25.1%	24.5%	23.8%

10.4 Appendix D. Landings (lbs whole weight) information for snowy grouper, golden tilefish, vermilion snapper, black sea bass, and red porgy.

	1986				1987				1988			
	COMM	HEAD-BOAT	CHARTER BOAT	OTHER REC	COMM	HEAD-BOAT	CHARTER BOAT	OTHER REC	COMM	HEAD-BOAT	CHARTER BOAT	OTHER REC
SNOWY GROUPER	475,010	4,231	0	0	395,281	4,414	1,096	2,311	335,708	3,278	97	3,578
TILEFISH (GOLDEN)	1,317,941	0	251	0	370,437	79	44	0	659,206	0	0	3,966
VERMILION SNAPPER	816,315	349,313	0	11,262	678,934	451,938	21,913	185,416	914,299	418,635	77,269	57,448
RED PORGY	682,851	224,084	2,834	16,616	578,132	220,473	24,470	49,480	632,604	215,531	71,004	94,549
BLACK SEA BASS*	663,234	562,908	56,117	418,696	546,767	646,505	96,739	946,524	760,642	635,219	937,200	534,800

	1989				1990				1991			
	COMM	HEAD-BOAT	CHARTER BOAT	OTHER REC	COMM	HEAD-BOAT	CHARTER BOAT	OTHER REC	COMM	HEAD-BOAT	CHARTER BOAT	OTHER REC
SNOWY GROUPER	521,051	4,028	0	0	604,606	2,846	0	287	499,793	2,185	0	284
TILEFISH (GOLDEN)	993,302	13	0	0	1,008,802	7	137	0	1,066,839	0	179	0
VERMILION SNAPPER	1,155,358	346,537	63,025	42,942	1,318,024	386,771	34,893	85,692	1,414,319	607,785	28,433	76,456
RED PORGY	671,134	165,047	100,501	35,889	765,787	125,263	15,602	30,898	570,131	140,818	12,697	32,497
BLACK SEA BASS*	779,602	478,022	451,991	702,712	930,784	379,567	157,603	388,761	892,466	286,235	64,627	788,693

	1992				1993				1994			
	COMM	HEAD-BOAT	CHARTER BOAT	OTHER REC	COMM	HEAD-BOAT	CHARTER BOAT	OTHER REC	COMM	HEAD-BOAT	CHARTER BOAT	OTHER REC
SNOWY GROUPER	577,062	875	0	0	468,678	1,087	1,431	87,498	322,110	730	0	0
TILEFISH (GOLDEN)	1,053,324	26	0	0	1,144,283	0	0	0	897,084	11	15,959	0
VERMILION SNAPPER	743,356	249,595	103,128	15,311	877,080	257,199	72,144	26,056	970,646	281,646	56,475	17,001
RED PORGY	299,907	109,856	71,680	44,547	297,549	101,025	41,267	23,618	352,618	87,570	22,900	21,378
BLACK SEA BASS*	799,839	215,873	222,748	504,065	715,293	143,024	263,955	295,598	772,998	132,439	198,148	425,183

	1995				1996				1997			
	COMM	HEAD-BOAT	CHARTER BOAT	OTHER REC	COMM	HEAD-BOAT	CHARTER BOAT	OTHER REC	COMM	HEAD-BOAT	CHARTER BOAT	OTHER REC
SNOWY GROUPER	395,887	728	659	12,533	339,759	3,422	0	1,005	556,941	2,209	1,470	157,748
TILEFISH (GOLDEN)	751,861	0	0	0	385,651	0	0	3,064	401,454	968	1,978	14,725
VERMILION SNAPPER	953,673	271,857	32,213	10,202	763,207	276,306	70,053	1,424	771,947	299,911	42,149	31,608
RED PORGY	345,506	93,031	93,362	5,414	365,626	82,217	35,965	96,220	359,726	75,297	11,003	6,532
BLACK SEA BASS*	581,681	127,623	381,147	241,393	694,919	146,541	260,589	400,593	822,115	147,739	173,336	359,542

	1998				1999				2000			
	COMM	HEAD-BOAT	CHARTER BOAT	OTHER REC	COMM	HEAD-BOAT	CHARTER BOAT	OTHER REC	COMM	HEAD-BOAT	CHARTER BOAT	OTHER REC
SNOWY GROUPER	337,884	1,299	5,814	0	461,777	514	14,308	672	399,474	514	963	0
TILEFISH (GOLDEN)	407,143	0	2,255	0	549,334	9	4,409	0	790,621	0	1,804	0
VERMILION SNAPPER	717,989	275,490	98,878	26,284	892,536	335,730	83,025	65,328	1,389,596	406,783	79,373	175,998
RED PORGY	299,025	69,261	7,985	3,723	98,341	48,788	24,333	11,699	17,774	13,905	8,171	580
BLACK SEA BASS*	734,356	142,502	113,977	278,546	769,422	195,566	85,350	262,455	553,181	144,587	28,310	295,638

	2001				2002				2003			
	COMM	HEAD-BOAT	CHARTER BOAT	OTHER REC	COMM	HEAD-BOAT	CHARTER BOAT	OTHER REC	COMM	HEAD-BOAT	CHARTER BOAT	OTHER REC
SNOWY GROUPER	339,431	952	28,973	10,278	316,408	578	8,510	0	298,248	467	13,412	0
TILEFISH (GOLDEN)	478,529	0	21,530	5,271	447,074	0	9,246	0	273,250	0	27,803	0
VERMILION SNAPPER	1,682,244	402,618	137,318	109,868	1,364,110	326,445	90,363	86,627	762,110	287,443	103,815	104,569
RED PORGY	63,001	46,308	18,730	9,028	58,452	33,341	23,194	5,591	76,064	34,742	19,241	23,850
BLACK SEA BASS*	629,039	172,022	81,155	497,605	510,405	123,273	71,587	259,456	621,910	134,109	104,170	320,317

	2004			
	COMM	HEAD-BOAT	CHARTER BOAT	OTHER REC
SNOWY GROUPER	267,026	382	14,811	10,809
TILEFISH (GOLDEN)	222,354	0	19,464	5,403
VERMILION SNAPPER	1,095,121	361,560	152,470	112,366
RED PORGY	48,487	49,308	28,622	29,608
BLACK SEA BASS*	761,684	237,583	127,014	793,708

* Commercial landings for black sea bass are for pots and hook and line.

10.5 Appendix E. Methods for Economic Analyses

This appendix contains a detailed description of the data sets referenced in the economic description of the fishery (Section 3.4.2) and the data sets and methods used to evaluate the economic impacts of the proposed management regulations in Amendment 13C to the Snapper Grouper Fishery Management Plan (Amendment 13C). The main contributors to this section are Vishwanie Maharaj, Jim Waters, Larry Perruso and Stephen Holiman.

Data Sources on the Commercial Fishery

Commercial snapper grouper fishery data in the South Atlantic portion of the Southeast Region is collected through the Accumulated Landings System (ALS) and the snapper grouper component of the National Marine Fisheries Service (NMFS) Fisheries Logbook System (FLS). The ALS is a cooperative program between NMFS and the states in the Southeast Region to collect and process information on the quantity and value of seafood products caught by fishermen and sold to established seafood dealers or brokers. In addition to the quantity and value (or price per pound) data, information on the gear used to catch the fish, the area where the fishing occurred, and the distance from shore are also recorded for some states, where possible. The ALS dataset maintained by the Southeast Fisheries Science Center (SEFSC) is a continuous dataset that begins in 1960.

The FLS records the fishing and non-fishing activity of fishermen who are required to report their fishing activity via logbooks for each trip taken. Although logbook systems have not been established or required for all commercial fisheries, the system for the South Atlantic snapper grouper fishery was initiated in 1992. Because of the nature of the snapper grouper fishery, requiring relatively short soak times for gear, it is infeasible to require fishermen to complete a separate form every time gear is deployed. Hence, a single logbook recording of catch and effort information is required for each trip.

The sample of data for the South Atlantic is determined by deleting records of trips in the Gulf of Mexico and records where the area fished field was blank/unknown. The logbook format also allows the addition of questions on the costs associated with the trip, and an economic add-on to the South Atlantic snapper grouper logbook was initiated in 2002. These data sets are maintained by the Office of Fishery Statistics, National Marine Fisheries Service, Southeast Fisheries Science Center, 75 Virginia Beach Drive, Miami, FL 33149.

The most current in-depth description of South Atlantic commercial reef fish fishery operations is Waters *et al.* (1997). This report summarizes the results of a survey designed to provide economic information about the financial status of commercial snapper grouper boats with home ports between Dare County, North Carolina and Dade County, Florida. The survey was administered in the summer and fall of 1994 by interviewers in face-to-face meetings with owners or operators of randomly selected boats. These data are maintained by the Social Sciences Research Group, National Marine Fisheries Service, Southeast Fisheries Science Center, 75 Virginia Beach Drive, Miami, FL 33149.

The Southeast Vessel Permits Database is another source of information on the fishing fleet. Snapper grouper permit holders can respond to a number of questions on their permit application and renewal forms that among other types of information provide data on the type of snapper grouper permit, vessel length, horse power, owner's name and address, vessel homeport location and other fishing permits. In addition, snapper grouper dealers also submit similar types of information on their permit application forms.

The National Marine Fisheries Service in Silver Spring conducts an annual survey of processors in the United States. This is a voluntary survey and respondents provide information that include: processor name and address, monthly employment estimates, product description, and pounds and value of processed products.

Data Sources on the Recreational Fishery

Catch, harvest and effort information for the recreational fishery is collected through the National Marine Fisheries Service (NMFS) Marine Recreational Fisheries Statistics Survey (MRFSS) and the NMFS Headboat (HB) Survey. The MRFSS covers shore, charter and private/rental boat fishing activity for North Carolina through Florida, and the HB survey covers headboat activity for these states. The MRFSS collects information on the total number of fish caught by species, the total number released, and the total number and weight of fish harvested through individual angler interviews. Fish are sampled for length and weight measurements from which the harvest weight estimates are produced.

The HB survey collects information via a vessel trip logbook, and has historically only collected information on harvested fish, though programs to generate estimates of discards are being implemented. It should be noted that any discussion of MRFSS data for the South Atlantic does not include the Florida Keys since this geographic region is operationally included in the Gulf of Mexico portion of the survey.

Catch harvest and effort data

Private recreational and charter sectors

Data from the Marine Recreational Fishing Statistical Survey (MRFSS) were used to analyze the impact of proposed regulations on private recreational and charterboat effort (number of trips) and harvest (number of fish kept). Monroe County is not included in the South Atlantic portion of the MRFSS and hence is excluded from this analysis. The data provided for these analyses include both type A and B1 fish which are defined as follows:

- **Type A** - Fish that were caught, were landed whole, and were available for identification and enumeration by the MRFSS interviewers. In addition, these fish were potentially available for weighing and measuring.
- **Type B1 -** Fish that were caught and not available for identification because they were filleted, released dead, given away, or disposed of in some way other than Types A or B2 (fish released alive).

Using only the A fish in the analyses would produce downward biased estimates of change in the numbers of fish retained by the angler (kept fish) as it does not include fish that are landed and given away or kept but not observed by the interviewer. On the other hand, the sum of the A and B1 fish represents an upwardly biased estimate of the numbers of kept fish since it includes fish that are released dead.

The National Marine Fisheries Service provided the following data summaries derived from the original MRFSS data sets for analyses on the charter and private recreational sectors:

a. Frequency distributions of the proportion of trips by harvest categories for each species in the South Atlantic (harvest trip frequency distributions). If there were an adequate number of observations for a species the frequency distribution was generated separately by state, wave and mode. Data from 1999 to 2003 were pooled to provide these frequency distributions.
b. Frequency distributions of the proportion of harvested fish by length categories for each species in the South Atlantic (length frequency distributions). If there was an adequate number of observations for a species, the length frequency distribution was generated separately by state, wave and mode.
c. Estimated annual number of total trips on which a species was harvested in the South Atlantic (total harvest effort). If there was an adequate number of observations for a species, estimates of harvest effort were generated separately by state, wave and mode.

Except for red porgy data for the period 1999 to 2003 were used for the recreational impact analyses. The average of the annual change in harvest and number of affected trips calculated over this period will serve as estimates of the expected short-term future annual change resulting from management measures in Amendment 13C. In the case of red porgy data from 1997 and 1998 were used to estimate the increase in the number of kept fish from an increase in the bag limit.

The Headboat Sector

The following databases were used to calculate the change in numbers of kept fish and the number of affected trips.

a. Catch and effort data observed for the trips reported through the headboat survey (catch/effort headboat data file). This is the main data source used to evaluate the effects of the various management regulations.
b. Database on harvest in weight and numbers by state/area and month for all species for the period 1999-2003.
c. A list of vessels in the headboat sector during 2003. This represents the total number of vessels that operated in the headboat industry that do not exclusively operate in the sounds and bays of a particular state.
d. Total angler days estimated for the period 1999-2003 by state/region (headboat angler days).
e. Total number of angler trips by trip type for each state/region (headboat angler trips).
f. Length frequency distributions spanning the period 1999-2003 for each species by state (headboat length frequency data).

These databases are derived from a survey conducted by NMFS on the headboat sector in the South Atlantic.

An add-on to the MRFSS was conducted in the Southeast Region in 1997 (Holiman 2000). The survey collected socio-demographic, economic and fishing behavioral information on marine recreational fishing participants in North Carolina through Louisiana over a 12-month period beginning in March 1997. For each management alternative estimates of compensating variation (CV) per fish were used to calculate the total economic value from changes in the number of kept fish. These welfare changes represent the economic losses/gains experienced by anglers from a reduction/increase in the number of kept fish. Estimates of compensating variation used in these analyses were taken from a valuation study conducted in 1997 (Haab et. al., 2001). The value of an additional fish taken in all four states is estimated to be $2.49 (pers. comm. John Whitehead). Although CV estimates were calculated from survey responses from private boat anglers they are used to evaluate welfare changes for all fishing modes as applicable welfare estimates are not available for other fishing modes. In addition, this valuation estimate was applied to all harvest trips and not only trips where the species was an expressed target.

A second add-on focusing on more detailed angler expenditure information was conducted in 1999 (Gentner *et al.* 2001). Finally, a survey to collect information on for-hire operations was conducted in 1998 (Holland *et al.* 1999).

The subsequent sections describe the methods used in the analyses of impacts for proposed regulations in Snapper Grouper Amendment 13C. First, there is a description of the analyses to estimate the short-term economic effects on the snapper grouper commercial fishery that includes the cost function estimation methodology. This is followed by the description of methods used to estimate the short-term economic effects on the recreational fishery.

Estimation of the Short-Term Economic Effects on the Commercial Fishery

An important characteristic of the commercial snapper-grouper fishery is that fishermen usually catch several species on the same trip. Therefore, the effects of proposed management alternatives for snowy grouper, (golden) tilefish, vermilion snapper and black sea bass are evaluated simultaneously to account for their joint effects on the fishery. However, the total number of combinations of proposed alternatives is too numerous to be evaluated. The method adopted in this analysis is to simulate the effects of the different alternatives that were proposed for a particular species while holding the alternatives proposed for all other species at their base levels rather than their status quo levels. The base model is defined as Alternative 2A for snowy grouper, Alternative 2AE for tilefish, Alternative 2 for vermilion snapper, Alternative 1 for red porgy, and Alternative 2 for black sea bass (Table B).

Commercial fishermen in the Atlantic snapper-grouper fishery are required to submit logbook trip reports within 7 days of the completion of each trip. The general method of analysis in this study was to hypothetically impose proposed regulations on individual fishing trips as reported to the logbook database, with output tables providing the sum of effects over all trips. A four-year average was used to estimate the expected effects of proposed regulations so that anomalies that may have affected fishing success in any one year would be averaged out. Logbook data for the four most recent years, 2001-2004, with reasonably complete data were used to simulate the fishery with the proposed management alternatives. Data from trips that landed at least 1 pound of snowy grouper or tilefish or vermilion snapper or black sea bass were included in the analysis. Without additional regulation for any species, commercial snapper-grouper fishermen are expected to earn approximately $5.99 million per year from snowy grouper, tilefish, vermilion snapper, black sea bass and other species caught on these trips.

Management alternatives that have been proposed for red porgy would relax restrictions on their allowable harvest. The simulation model cannot use logbook data for 2001-2004 to estimate the effects of red porgy alternatives because fishermen have responded to regulations enacted in 1999 and 2000 by modifying their fishing practices to avoid red porgy or limit their catches of red porgy, and we have no way of estimating by how much actual catches would increase under each of the proposed alternatives. Therefore, proposed alternatives for red porgy were examined separately with logbook data from 1996-1998 because actual regulations for red porgy have been more restrictive than proposed regulations since 1999.

Logbook trip reports include information about landings by species, but do not include information about trip revenues. Therefore, average monthly prices were calculated from the NMFS Accumulated Landings System and merged with logbook trip reports by year, month, species and state. Trip revenues for each species were calculated as the product of average monthly prices and reported pounds per trip.

Information about trip costs was obtained from a sample of snapper-grouper boats that was required to report trip costs in 2002-2003 in conjunction with their normal logbook reporting requirements. Data that were collected included their costs per trip for major variable inputs such as fuel, bait, ice, food and other disposable supplies. Trip costs were estimated for each major gear type as a function of pounds landed, days per trip away from port, crew size and other trip characteristics, with the explanatory variables chosen to match the types of information reported for each trip in the logbook database. Then, the estimated coefficients from the trip cost equations were used to calculate expected trip costs for each trip in the logbook database for 2001-2003.

Net operating revenues for trip j in year t were calculated as trip revenues from all species s, $TR_{j,t} = \sum R_{s,j,t}$, minus predicted trip costs, $TC_{j,t}$, which include fuel, oil, bait, ice, and other supplies, and exclude fixed costs. Labor costs were approximated as an opportunity cost of $50 per person per day fished, which is the minimum wage rate multiplied by a 10-hour fishing day. Thus, net operating revenues are interpreted as the combined gross incomes to boat owners, captains and crew members in excess of an opportunity cost of labor that is tied to what could have been earned in less risky land-based employments.

If trip revenues exceeded trip costs after accounting for the likely effects of proposed regulations on trip-level harvests, then short-term economic losses were measured as the resulting reduction in trip revenues. Conversely, if the combination of proposed alternatives would cause trip revenues to fall below trip costs, then the trip was recorded as not taken, and losses were measured as a reduction in net operating revenues, which included the loss in revenues from all species minus the savings of trip costs not incurred.

Net operating revenues for the combination of proposed rules denoted by a, NR_a, were totaled for all trips within each logbook year from 2001-2004, with annual totals averaged across all four years.

$$NR_a = \frac{\sum_{t=2001}^{t=2004} \sum_{j=trips} (TR_{a,j,t} - TC_{a,j,t})}{4}$$

The status quo fishery without the proposed combination of rules was evaluated as the historical 4-year average from 2001-2004, which encompasses the period of current regulations in the snapper-grouper fishery. Analyses based on earlier years would have had to account for the effects of regulations that differed from the status quo. The difference between net operating revenues with rule-combination *a* and net operating revenues for the status quo fishery is interpreted as the expected short-term economic effect that would result if combination *a* were implemented.

Method of Modeling Management Alternatives

The proposed management alternatives included minimum size limits, limits on catch per trip (a.k.a., trip limits), seasonal closures, and quotas for key indicator species in most management sub-units. In addition, one of the black sea bass alternatives included mesh regulations designed to reduce the retention of small fish caught in pots. Each type of regulation was modeled by restricting the ability to catch and/or keep fish that were reported on logbook trip reports from 2001-2004.

Analysis of minimum size limits:

Minimum size limits were modeled by assuming that an additional (when compared to the status quo) percentage, ρ_s^{msl}, of species s (to which the minimum size limit, *msl*, applies) on each trip are undersized and must be culled from the catch and discarded.

$$q_{s,j,t} = h_{s,j,t}(1 - \rho_s^{msl})$$

$$R_{s,j,t} = p_{s,j,t}\, q_{s,j,t}$$

Variable $h_{s,j,t}$ represents quantity of species s caught on trip j in year t, and $q_{s,j,t}$ denotes quantity kept after accounting for the effects of the minimum size limit. Each trip is assumed to catch the same quantity of species s as without the size limit, but that undersized fish are discarded and subject to release mortality. Revenues for species s on trip j, $R_{s,j,t}$, are based on quantities kept and price per pound, $p_{s,j,t}$. The harvest of other species on trip j, $h_{sp,j,t}$ for $sp \neq s$, is assumed not to be affected by the proposed minimum size limit for species s. If trip revenues exceeded trip costs after accounting for the proposed minimum size limit and other jointly-proposed rules, then the expected losses for trip j due to a minimum size limit were calculated as a reduction in trip revenues for species s, $p_{s,j,t}\,(q_{s,j,t} - h_{s,j,t})$. However, if the trip became unprofitable with the proposed combination of rules, then losses were measured as a reduction in net operating revenues, which included the loss in revenues from all species minus the savings of trip costs not incurred because the trip would not be taken, $\sum_s p_{s,j,t}\, h_{s,j,t}$ - $TC_{j,t}$.

In the simulation model, trip costs are a function of total catch, including discards, and are not changed by the minimum size limit. Data were not available with which to estimate the potential additional costs of culling and discarding undersized fish.

The percentages that define the additional undersized fish associated with each proposed minimum size limit were held constant throughout the analysis and regardless of the alternatives proposed for other species in the fishery. When effective biologically, minimum size limits gradually change the age and size distribution of the resource and the percentage of undersized fish landed. However, this analysis is static and does not include a biological component with which to endogenously determine changes in the proportion of undersized fish that would be landed each year.

These percentages refer to numbers of fish smaller than the proposed minimum size limits. However, the simulation model works with quantities of each species landed as reported on logbook trips rather than numbers of fish. Hence, this method of simulating the effect of minimum size limits is an approximation for the preferred method that would use numbers of fish, and is likely to overestimate the effect of the minimum size limit when the average weight per fish for species *s* exceeds 1 pound.

Analysis of mesh regulations for black sea bass pots:
Mesh regulations affect the proportion of small fish that would be retained by fish pots. Hence, they were modeled in a similar way as minimum size limits by specifying the additional percentage, ρ^{mesh}, of fish on each trip that would be too small to be retained in fish pots. The primary difference between mesh regulations and minimum size limits is that mesh regulations affect catches and revenues from all species caught in pots, whereas the effects of minimum size limits are specific to species *s*. Although black sea bass constitute the bulk of catches in fish pots, mesh regulations are modeled to reduce the catch of all species that were landed with fish pots.

$$q_{s,j,t} = h_{s,j,t}(1-\rho^{mesh}) \qquad for\ all\ s$$

$$R_{s,j,t} = p_{s,j,t}\, q_{s,j,t}$$

If trip revenues exceeded trip costs after accounting for larger mesh and other jointly-proposed rules, then losses were measured as a reduction in trip revenues for all species caught on trip *j* in year *t*, $\sum p_{s,j,t}\,(q_{s,j,t} - h_{s,j,t})$. Fish that would not be retained due to the larger mesh were assumed to have never been caught, and hence were not subject to release mortality. Therefore, trip costs could change due to implementation of mesh regulations if empirical evidence suggests that trip costs are a function of total quantity harvested.

Some combinations of proposed management alternatives would implement larger mesh regulations and larger minimum size limits. Since mesh regulations and minimum size limits both act to reduce the catch of smaller fish, the combined percentage, ρ_s^C, of species *s* that would be lost due to mesh and size limit regulations would be the greater of the two effects.

$$\rho_s^C = \max[\rho_s^{msl},\ \rho^{mesh}]$$

where ρ^{mesh} pertains to all species caught with pot gear on trip *j* and ρ_s^{msl} pertains only to species *s* for which the minimum size limit applies. The combined effects of mesh regulations and minimum size limits were modeled as:

$$q_{s,j,t} = h_{s,j,t}(1-\rho_s^C)$$

$$R_{s,j,t} = p_{s,j,t}\, q_{s,j,t}$$

Variable $\rho^{mesh} > 0$ only for pot gear. Otherwise, $\rho^{mesh} = 0$, and $\rho_s^C = \rho_s^{msl}$. If neither minimum size limits nor mesh regulations are proposed, then $\rho_s^C = 0$.

Analysis of trip limits:
Trip limits for species *s* impose a maximum allowable catch per trip, and trips with catches of species *s* in excess of the trip limit, TL_s, were modeled by restricting their catches to the trip limit. Some proposed management actions combine trip limits and minimum size limits and/or mesh regulations. In this event, the simulation model reduced catches according to the percentage, ρ_s^C, of undersized fish on trip *j* before determining if the trip limit would be restrictive.

$$q_{s,j,t} = TL_s \qquad when\ h_{s,j,t}(1-\rho_s^C) \geq TL_s$$

$$R_{s,j,t} = p_{s,j,t}\, q_{s,j,t}$$

Losses were measured as the value of the difference between catches for species *s* that would have occurred with and without the trip limit, $p_{s,j,t}\ [TL_s - h_{s,j,t}\ (1 - \rho_s^C)]$. Please note that losses due to the trip limit would be equal to the difference between the trip limit and reported catches, $p_{s,j,t}\ [TL_s - h_{s,j,t}]$, only when there were no proposed minimum size limits or mesh regulations. The portion of the overall loss measured by $[p_{s,j,t}\ h_{s,j,t}\ \rho_s^C]$ is attributable to the minimum size limit and/or mesh regulation rather than the trip limit. The quantity of species *s* in excess of the trip limit, after accounting for the effects of minimum size limits and mesh regulations, is assumed to have been caught, discarded, and subject to release mortality because the trip would continue in search of other species. In this event, trip costs would not change due to implementation of trip limits.

Trips with catches less than the trip limit, after accounting for the effects of minimum size limits and mesh regulations, would not incur additional losses due to the trip limit.

$$q_{s,j,t} = h_{s,j,t}(1-\rho_s^C) \qquad when\ h_{s,j,t}(1-\rho_s^C) < TL_s$$

$$R_{s,j,t} = p_{s,j,t}\, q_{s,j,t}$$

Trip limits create an incentive for fishermen to take shorter, but more frequent fishing trips. However, this behavioral response has not been modeled for this analysis.

Analysis of seasonal closures:
Seasonal closures for species *s* were modeled by defining variable $open_s = 0$ when the season is closed for species *s* $open_s = 1$ when it is open, and then multiplying by the reported catch of species *s* on trip *j*. Therefore, catch of species *s* would be affected by a seasonal closure policy only during the closed season; *i.e.*, $q_{s,j,t} = 0$ only when $open_s = 0$.

$$
\begin{aligned}
q_{s,j,t} &= h_{s,j,t}(1-\rho_s^C)\ open_s && when\ h_{s,j,t}(1-\rho_s^C) < TL_s \\
q_{s,j,t} &= TL_s\ open_s && when\ h_{s,j,t}(1-\rho_s^C) \geq TL_s \\
R_{s,j,t} &= p_{s,j,t}\ q_{s,j,t}
\end{aligned}
$$

Seasonal closures create an incentive for boats to re-schedule trips to minimize the likely effect of the closure. However, the model does not accommodate this type of behavioral adaptation to regulation. Logbook data record the month and day landed for each reported trip, and the duration of each trip so that start dates could be calculated. The model uses landed date to identify the trips that would be subject to the closure.

Analysis of quotas:
Fishery-wide quotas were modeled in a similar way as seasonal closures. The primary difference between seasonal closures and quotas is that seasonal closures have fixed beginning and ending dates, whereas quotas may or may not result in fishery closures. When quotas are filled, the beginning closure dates vary annually depending on the speed at which the fishery lands its quota for species *s*. The closure extends through the end of the fishing year once the quota is filled.

The equations that describe the short-term economic effects of quotas are the same as already presented for seasonal closures. The model sets variable $open_{,s} = 0$ to reflect a no-harvest rule resulting from seasonal closures or fishery closures after the quota is filled. Otherwise, it sets $open_s = 1$ to indicate that the fishery for species *s* is open and that trips are unaffected by either quota or seasonal closure.

The model compares the accumulated fishery landings of species *s* with its quota to determine if and when the fishery would be closed. This is accomplished by sorting logbook trip reports by year, month and day landed, and then performing a chronological trip-by-trip accumulation of landings that likely would occur given the selected combination of proposed management alternatives. The model sets $open_{,s} = 1$ at the beginning of each year, and sets $open_s = 0$ as soon as accumulated landings exceed the quota for species *s*.

Quotas tend to promote a race for fish as fishermen compete to maximize their shares of the overall catch before the fishery is closed. The model does not include the possibility that fishermen might accelerate their trips in anticipation of a fishery closure, or that dockside prices might fall if market gluts occur due to the accelerated harvesting activity. More work is needed on these issues since they are two of the primary outcomes of quota management.

Analysis of a limit on number of pots fished per trip:
A limit on the number of pots that may be fished per trip is modeled by restricting the number of pots to the pot limit, and reducing catch per trip proportionally. If $P_{j,t}$ denotes the number of pots reported for trip j in year t, and PL represents the pot limit, then

$$q_{s,j,t} = h_{s,j,t}\,\frac{PL}{P_{j,t}} \qquad for\ P_{j,t} > PL$$

$$q_{s,j,t} = h_{s,j,t} \qquad for\ P_{j,t} \leq PL$$

$$R_{s,j,t} = p_{s,j,t}\, q_{s,j,t}$$

Pot limits affect the ability to catch fish of all species on trips using pots. Hence, potential reductions in catch due to pot limits are considered in the model to occur prior to the effects of other kinds of management rules, such as minimum size limits and trip limits, which restrict the ability of fishermen to keep their catches.

Methodology and Results of Trip-Level Cost Function Estimation
Approximately 20% of the south Atlantic snapper grouper fleet in 2002 and 2003 was required to submit data about trip operating costs with their logbook trip reports. These data were used to estimate equations with which to predict trip costs for other trips that were reported to the logbook database. The estimated trip costs were used in a simulation model to calculate changes in net operating revenues to the snapper grouper fleet due to management alternatives proposed in Amendment 13C. Table 1 describes the variables used in the estimating equations.

Table 1. Variable Definitions

Variable Name	Description
Tot_cost	Total trip operating expenses. Dependent variable in all cost equations. The sum of fuel, bait, ice, and miscellaneous trip expenses.
Numgear	Trap – total number of traps used. Longline – total number of sets made. Hook & Line – number of lines used. Troll – number of lines used. N/A for divers or other gears.
Fished	Trap – total hours that traps were in the water. Hook & Line, Troll, and Other – total hours gear was in water. Divers – total hours divers were in the water. Longline – avg. number of hooks used per line.
Daysaway	Number of days spent away from port.
Crew	Total number of people who fished during the trip.
Tlbs	Total number of pounds of all species caught (whole weights).
ln(tot_cost)	Natural log of total trip operating costs.
ln(numgear)	Natural log of Numgear variable.
ln(fished)	Natural log of Fished variable.
ln(days)	Natural log of Daysaway variable.
ln(crew)	Natural log of Crew variable.
ln(tlbs)	Natural log of Tlbs variable.

Model Specification

The choice of the deterministic portion of the least squares estimating equations is crucial to the use of a good prediction equation in the simulation of economic effects regarding implementation of Amendment 13C. The 2002-03 economic sample was stratified based on primary gear and spatial characteristics. Summary statistics of the variables in Table 1 were utilized to help determine area and gear stratifications for the cost equations. The first column in table 2 lists the stratifications specified for the two primary gear types affected by Amendment 13C: the hook and line and longline sectors.

The first five equations were estimated using observations from the hook and line sector (i.e., electric reel/bandit gear, rod and reel, and handlines) and begin with the prefix "hand_". The last two equations were estimated with trips that primarily used longline gear and begin with the prefix "long_". The hook and line sector was further stratified by area fished which is listed in column 3 of table 2. Hook and line areas are represented by the following suffixes: 'keys' (i.e., Florida Keys); 'sfl' (i.e., south Florida from Miami-Dade to Palm Beach counties); 'cfl' (i.e., central Florida from Martin to Duval counties); 'nflga' (i.e., Duval and Nassau counties as well as Georgia); and 'car' (i.e., South and North Carolina). The longline sector was stratified by landing state (either Florida or the Carolinas) which is represented by 'fl' and 'car', respectively. Areas fished are defined by the South Atlantic Statistical Grid Map and follow lines of longitude and latitude with the first two digits being latitude degrees and the last two digits being longitude degrees.

Table 2. Specification of Estimating Cost Functions

Model	Top gear	Area fished	ln(num-gear)	ln(fished)	ln(days)	ln(crew)	ln(tlbs)
Hand_keys	H&L	2400-2499			X	X	X
Hand_sfl	H&L	2500-2699		X	X	X	
Hand_cfl	H&L	2700-2999		X	X	X	X
Hand_nflga	H&L	3000-3199	X		X		X
Hand_car	H&L	3200-3799			X		X
Long_fl	Long-line	2400-3199	X	X			X
Long_car	Long-line	3100-3799	X		X	X	

The goal of model specification was to quantify the relationship between expected costs and some independent variables while giving good predictions of costs given these same independent variables when applied to all trips during 2001-03. Table 2 lists the independent variables that were used for each equation.

Some general principles were used for the construction of all the cost models regardless of gear and area. First, we specified a complete first-order model using the variables: numgear, fished, daysaway, crew, vessel length, and tlbs. The primary measures of the goodness of fit of the model were the coefficient of determination, R^2, F-statistics, MSE, and *t*-tests on individual parameters that evaluate whether these parameters are statistically equal to 0. When multiple t-tests were performed, a Bonferroni adjustment was utilized to help reduce Type II errors resulting from inflated alpha errors. Reduced models were then estimated based on these criteria. Also, higher order terms were included and evaluated. In general, parsimony was a leading criterion in model selection; however, in certain situations transformations were implemented as a tradeoff between adhering to assumptions regarding the error structure and a simplified prediction model. In these cases residual analysis indicated that heteroskedasticity or unequal error variances may be a problem, so log-log transformations were implemented.
In most cases vessel length was a very good predictor of mean trip costs; however, the range of vessels sampled was smaller than those from the logbook population. Thus, the predicting equation was valid only within the range of vessel lengths applicable to the sample and extrapolation to the general logbook data outside of this range sometimes yielded unreasonable results. Consequently, instrumental variables were identified through correlation coefficients that were strongly related to vessel length but did not have as high a degree of heterogeneity in the general logbook population.

Hand_keys Specification and Estimation

Table 3 summarizes the summary statistics for the trips used to estimate the Hand_keys model.

Table 3. Summary Statistics for Trips Used in the Hand_keys Model

Variable	N	Mean	Std. Error of the Mean	Min	Max	Median
Tot_cost	1,012	60.33	2.34	2	1,400	40
Numgear	1,012	2.72	.03	1	7	3
Fished	1,012	7.25	.16	1	60	6
Daysaway	1,012	1.10	.02	1	9	1
Crew	1,012	2.14	.02	1	6	2
Tlbs	1,012	118.59	5.95	2	1,824	56

The estimated parameters and corresponding standard errors for the Hand_keys model are:

$$\underset{(.08)}{\ln(tot\_cost) = 2.21} + \underset{(.08)}{.60 \ln(days)} + \underset{(.04)}{.26 \ln(crew)} + \underset{(.02)}{.33 \ln(tlbs)}$$

All parameter estimates are significant to a Bonferroni adjusted alpha level of .0025. The F-statistic is 178, the R-square is .35, and MSE is .32. All 1,012 observations were used to estimate the equation.

Hand_sfl Specification and Estimation

Table 4 summarizes the summary statistics for the trips used to estimate the Hand_sfl model.

Table 4. Summary Statistics for Trips Used in the Hand_sfl Model

Variable	N	Mean	Std. Error of the Mean	Min	Max	Median
Tot_cost	686	67.38	2.53	6	620	47
Numgear	686	2.24	.04	1	10	2
Fished	686	7.94	.13	1	40	8
Daysaway	686	1.04	.01	1	4	1
Crew	686	1.69	.02	1	6	2
Tlbs	686	258.09	10.85	6	2,557	147

The estimated parameters and corresponding standard errors for the Hand_sfl model are:

$$\begin{array}{l} \ln(\text{tot\_cost}) = 3.19 + .20 \ln(\text{fished}) + .92 \ln(\text{days}) + .65 \ln(\text{crew}) \\ \qquad\qquad\qquad (.13) \qquad (.06) \qquad\qquad (.20) \qquad\qquad (.07) \end{array}$$

All parameter estimates are significant to a Bonferroni adjusted alpha level of .0025. The F-statistic is 54, the R-square is .19, and MSE is .45. All 686 observations were used to estimate the equation.

Hand_cfl Specification and Estimation

Table 5 summarizes the summary statistics for the trips used to estimate the Hand_cfl model.

Table 5. Summary Statistics for Trips Used in the Hand_cfl Model

Variable	N	Mean	Std. Error of the Mean	Min	Max	Median
Tot_cost	417	80.80	9.52	5	1,872	37
Numgear	417	2.07	.03	1	7	2
Fished	417	7.09	.44	1	75	6
Daysaway	417	1.16	.04	1	8	1
Crew	417	1.24	.03	1	5	1
Tlbs	417	338.68	23.55	7	4,726	177

The estimated parameters and corresponding standard errors for the Hand_cfl model are:

$$\begin{array}{l} \ln(\text{tot\_cost}) = 2.24 + .43 \ln(\text{fished}) + .63 \ln(\text{days}) + .79 \ln(\text{crew}) + .12 \ln(\text{tlbs}) \\ \qquad\qquad\qquad (.17) \qquad (.10) \qquad\qquad (.15) \qquad\qquad (.10) \qquad\qquad (.03) \end{array}$$

All parameter estimates are significant to a Bonferroni adjusted alpha level of .002. The F-statistic is 155, the R-square is .60, and MSE is .28. All 417 observations were used to estimate the equation.

Hand_nflga Specification and Estimation

Table 6 summarizes the summary statistics for the trips used to estimate the Hand_nflga model.

Table 6. Summary Statistics for Trips Used in the Hand_nflga Model

Variable	N	Mean	Std. Error of the Mean	Min	Max	Median
Tot_cost	89	844.94	37.12	125	1,615	884
Numgear	89	3.44	.08	1	5	4
Fished	89	52.86	3.00	2	120	45
Daysaway	89	6.35	.23	1	11	7
Crew	89	3.35	0.11	1	5	4
Tlbs	89	1,879.79	88.97	169	3,940	1,747

The estimated parameters and corresponding standard errors for the Hand_nflga model are:

$$\ln(tot\_cost) = \underset{(.44)}{3.70} + \underset{(.14)}{.65} \ln(numgear) + \underset{(.09)}{.39} \ln(days) + \underset{(.07)}{.20} \ln(tlbs)$$

All parameter estimates are significant to a Bonferroni adjusted alpha level of .0125. The F-statistic is 45, the R-square is .61, and MSE is .10. All 89 observations were used to estimate the equation.

Hand_car Specification and Estimation

Table 7 summarizes the summary statistics for the trips used to estimate the Hand_car model.

Table 7. Summary Statistics for Trips Used in the Hand_car Model

Variable	N	Mean	Std. Error of the Mean	Min	Max	Median
Tot_cost	511	469.07	22.07	20	4,347	220
Numgear	511	2.50	.05	1	7	2
Fished	511	31.37	1.42	2	195	16
Daysaway	511	3.20	.13	1	14	2
Crew	511	2.12	.04	1	4	2
Tlbs	511	933.89	41.44	3	4,446	539

The estimated parameters and corresponding standard errors for the Hand_car model are:

$$\ln(tot\_cost) = \underset{(.15)}{3.70} + \underset{(.04)}{.79} \ln(days) + \underset{(.03)}{.21} \ln(tlbs)$$

All parameter estimates are significant to a Bonferroni adjusted alpha level of .0033. The F-statistic is 777, the R-square is .75, and MSE is .26. All 511 observations were used to estimate the equation.

Long_fl Specification and Estimation

Table 8 summarizes the summary statistics for the trips used to estimate the Long_fl model.

Table 8. Summary Statistics for Trips Used in the Long_fl Model

Variable	N	Mean	Std. Error of the Mean	Min	Max	Median
Tot_cost	67	879.49	102.99	18	3,500	838
Numgear	67	5.42	.73	1	22	2
Fished	67	475.00	46.41	25	1,500	500
Daysaway	67	3.36	0.24	1	8	2
Crew	67	2.18	.05	2	3	2
Tlbs	67	1,836.44	170.28	195	5,721	1,305

The estimated parameters and corresponding standard errors for the Long_fl model are:

$$\ln(\text{tot\_cost}) = \underset{(.64)}{-1.33} + \underset{(.08)}{.35}\ \ln(\text{numgear}) + \underset{(.09)}{.98}\ \ln(\text{fished}) + \underset{(.10)}{.19}\ \ln(\text{tlbs})$$

Parameter estimates associated with ln(numgear) and ln(fished) are significant to a Bonferroni adjusted alpha level of .0125. P-values associated with the intercept and ln(tlbs) are .044 and .056, respectively. The F-statistic is 123, the R-square is .85, and MSE is .37. All 67 observations were used to estimate the equation.

Long_car Specification and Estimation

Table 9 summarizes the summary statistics for the trips used to estimate the Long_car model.

Table 9. Summary Statistics for Trips Used in the Long_car Model

Variable	N	Mean	Std. Error of the Mean	Min	Max	Median
Tot_cost	56	1,546.90	138.15	183	3,091	1,834
Numgear	56	12.39	1.03	1	24	14
Fished	56	1,096.43	73.74	200	2,000	1,500
Daysaway	56	6.09	.48	1	13	7
Crew	56	2.62	.07	1	3	3
Tlbs	56	4,072.36	338.47	208	9,160	4,117

The estimated parameters and corresponding standard errors for the Long_car model are:

$$\ln(tot\_cost) = \underset{(.26)}{4.27} + \underset{(.10)}{.53}\ln(numgear) + \underset{(.17)}{.47}\ln(days) + \underset{(.38)}{.83}\ln(crew)$$

All parameter estimates are significant to a Bonferroni adjusted alpha level of .0125 except for ln(crew), which had a p-value of .031. The F-statistic is 231, the R-square is .93, and MSE is .07. All 56 observations were used to estimate the equation.

Estimation of the Short-Term Economic Effects on the Recreational Fishery

The methods used in calculating changes in kept fish and affected trips are described for the various types of management actions proposed in Amendment 13C. In conducting these analyses it is assumed that there would be compliance with the new regulations. Other assumptions made were that angler effort, average success rates, and abundance of the stock would remain the same as the status quo. Assumptions that are specific to the analyses for a species are listed and briefly described within the table of results for that species.

Except for red porgy, estimates were calculated for each year during the period 1999-2003 and the average impacts presented in the various tables of results. In the case of red porgy data from 1997 and 1998 were used to estimate an increase in the numbers of kept fish from an increase in the bag limit.

Size limit regulations
Size limit analyses were conducted using MRFSS, headboat, and Trip Interview Program (TIP) data. Length measurements in the MRFSS database are in cm fork length (FL). Headboat lengths are total length (TL) in mm. TIP lengths are TL or FL and in mm, cm, or inches. All lengths were converted to TL inches. When conducting the analyses to determine the effects of a minimum size restriction on the recreational fishery, it was assumed that effort would remain constant and anglers would not increase targeting effort at larger fish or cancel trips with reduced expected harvest as a result of the size limit restriction.

For the charter and private modes trip frequency distributions by harvest category, total harvest effort and the length frequency distributions are used to calculate the reduction in the numbers of total fish kept. First, the total number of trips is calculated for each harvest category as the product of the percent of trips in that harvest category and the total harvest effort for that species. The total number of fish in each harvest category is calculated as the product of the total number of trips in each harvest category and the number of fish represented by end point of that harvest category (Table 10). A constant proportional reduction is multiplied by the number of fish in each harvest category. This proportional reduction is derived form the size frequency distribution of the sampled catch and represents the proportion of fish below the proposed minimum size limit. The total reduction in numbers of kept fish is calculated from the sum of the reduction in each harvest category. The average value per fish per trip is applied to the total reduction in kept fish to determine the decrease in economic value resulting from the proposed regulation.

Table 10. Percent frequency distribution of trips on which black sea bass were harvested by harvest per trip category.

Category	Harvested%
0.01-1.00	51.2
1.01-2.00	16.8
2.01-3.00	8.7
3.01-4.00	6.7
4.01-5.00	4.1
5.01-6.00	2.1
6.01-7.00	2
7.01-8.00	2.2
8.01-9.00	1.3
9.01-10.00	1.5
10.01-11.00	0.4
11.01-12.00	0.6
12.01-13.00	0.6
13.01-14.00	0.2
14.01-15.00	0.3
15.01-16.00	
16.01-17.00	0.3
17.01-18.00	0.1
18.01-19.00	0.3
19.01-20.00	0.4
>20	0.2

In order to calculate a new trip frequency distribution by harvest category, the average catch per trip is calculated for each category after adjusting for the reduction from the proposed size limit. The new frequency distribution is derived from this data. For those categories where the harvest is less than 1 fish per angler it is assumed that a proportion of trips in that category have an expected keep of zero fish. If this fraction was 0.83 it was assumed that 83 percent of all trips harvested one fish and the other 27% harvested 0 fish.

The headboat survey attempts to collect a census of headboat trips. However, not all trips are reported to the headboat survey. The level of non-compliance, determined by the port agents, is used as a raising factor to calculate the total harvest and trips in the headboat sector. Data was available on a trip level basis for the analyses of impacts on the headboat sector. For estimating the effects of a size limit, the constant proportional reduction is applied to the number of fish harvested on each trip. This proportional reduction is derived form the size frequency distribution of the sampled catch and represents the proportion of fish below the proposed minimum size limit. The total reduction in numbers of fish is calculated from the sum of the reduction on each trip multiplied by the raising factor. The average value per fish per trip is applied to the total reduction in kept fish to determine the decrease in economic value resulting from the proposed regulation.

It is assumed that a proportion of trips where the calculated harvest is less than 1 fish per angler would have an expected keep of zero fish. Trips with a calculated harvest per angler of less than 0.5 are assumed to have zero harvest.

Bag limit regulations
For the charter and private modes, trip frequency distributions by harvest category and total harvest effort are used to calculate the reduction in total fish kept. First, the total number of trips is calculated for each harvest category from the trip frequency distribution and the total harvest effort for that species or species group. The total number of fish in each harvest category is calculated from the total number of trips in each harvest category and the endpoint of the respective harvest category then summed across categories to provide estimates of expected future annual harvest in the absence of the proposed bag limit ($Keep_{w/o\ regulation}$).

For those trips where the keep is below the bag limit, the current harvest is assumed to remain the same. It is assumed that there would be no trip cancellation for those trips where the current keep is above the bag limit and that anglers constrained by the current bag limit would not increase the number of trips annually in an effort to reverse the decrease in the total fish kept. The sum of these constrained trips is calculated and presented in the results tables as the number of affected trips. In analyzing the impact of the bag limit the current keep limit for constrained trips is set at the bag limit. The sum of harvest per trip across all trips is calculated and assumed to equate to the expected future annual harvest when the bag limit is implemented ($Keep_{regulation}$).

The total reduction in numbers of fish as a result of the bag limit is calculated as follows:

$$Keep_{w/o\ regulation} - Keep_{regulation}\,.$$

The average value per fish per trip is multiplied by the total reduction in kept fish to determine the decrease in economic value resulting from the proposed regulation. In the case of a combination bag/size limit regulation the size limit reduction is applied to the number of fish by harvest category, as described previously, and the resulting harvest per trip calculated. A new harvest distribution is mapped from this modified data set and the bag limit analysis as described previously is applied to this new distribution to determine the reduction in total kept fish.

For the headboat sector, since data on each trip is available the catch per angler (CPA) is calculated for each trip as total fish harvested/total number of anglers. Then, for each trip an assessment was made as to whether the bag limit is binding. If the bag limit was binding, then the expected harvest on each angler trip was set at the proposed bag limit. If the bag limit was not binding, then the expected harvest on each angler trip was not adjusted. To estimate the total reduction in numbers of kept fish, two statistics were calculated:

$Keep_{w/o\ regulation}$ – the number of kept fish without regulation = Sum of total kept fish prior to adjusting for the proposed bag limit.
$Keep_{with\ regulation}$ – the number of kept fish assuming that the bag limit is binding = Sum of total kept fish per angler trip after adjusting for the proposed bag limit.

The total reduction in numbers of kept fish as a result of the bag limit is calculated as follows:

$$(Keep_{w/o\ regulation} - Keep_{with\ regulation}) \times \text{Raising Factor}$$

The total reduction in kept fish is multiplied by the average value per fish per trip to determine the decrease in economic value resulting from the proposed regulation.

It is assumed that there would be no trip cancellation for those trips where the current keep is above the bag limit and that anglers constrained by the current bag limit would not increase the number of trips annually in an effort to reverse the decrease in the total fish kept. The sum of these constrained trips is calculated and presented in the results tables as the number of affected trips.

In the case of a combination bag and size limit regulation, the size limit reduction is applied to the catch per trip as described previously and the resulting harvest per trip calculated. The bag limit measure is then evaluated against this adjusted harvest per trip distribution, as described previously, to determine the reduction in total kept fish.

Seasonal closures

Data tables on the number of harvest effort trips by wave (two month interval) were provided for the MRFSS database (charter and private recreational modes). The number of trips affected by a seasonal closure is extracted from these original tables and presented in the results table. For a seasonal closure analysis, it is assumed that there would be no increase in fishing effort before and after the closure period. The total number of fish during the proposed closed period is assumed to equate to the expected decrease in number of kept fish once the closure becomes effective. As described previously, the total reduction in the number of kept fish is multiplied by the average value per fish per trip to determine the decrease in economic value resulting from the proposed regulation.

For the charter and private sectors, the number of harvest effort trips was available by wave. The number of trips affected by a seasonal closure is extracted from these original tables and presented in the results table. For a seasonal closure analysis, it is assumed that there would be no increase in fishing effort before and after the closure period. The total number of fish during the proposed closed period is assumed to equate to the expected decrease in number of kept fish once the closure becomes effective. As described previously, the average value per fish per trip is applied to the total reduction in kept fish to determine the decrease in economic value resulting from the proposed regulation.

For the headboat sector, trip level data was available. For a seasonal closure, the reduction in the number of kept fish was determined as the total number of fish harvested during that time period multiplied by the raising factor. The total reduction in kept fish is multiplied by the average value per fish per trip to determine the decrease in economic value resulting from the proposed regulation. The total number of trips where harvest goes to zero is calculated as the number of trips where that species was harvested during the proposed closure multiplied by the raising factor.

10.6 Appendix F. Methods, Data Sources, Time Periods, and Assumptions for Biological Analyses in Amendment 13C.

Data Sources and Time Periods

Sources of data are listed below in conjunction with the different type of analyses. The time period used for determining the effect of various management measures was 1999-2003 for all units except Red Porgy (2001-2002) and Black Sea Bass (2000-2002). The Council determined that 1999-2003 would be the best time period for analyses of management measures because new regulations were put into place for many species during 1998. The years of 2001-2002 were chosen for red porgy because there was a harvest moratorium in place during 1999-2000. Data from 1999 were not used for black sea bass, because the size limit for black sea bass was increased in February of that year.

Assumptions

In conducting the analyses for management measures, a range of reductions were provided considering different rates of non-compliance as well as different rates of release mortality. Some analyses assumed that the rate of non-compliance by anglers would be the same regardless of the bag or size limit and would be equal to the average rate of non-compliance during 1999-2003. However, analyses were also done considering a complete range of non-compliance during 1999-2003 as well as increased non-compliance with larger size limits and reduced bag limits.

Season closure analyses assumed that there would be no release mortality during the closure. Analyses were also done that assumed effort would increase on either side of the closure and the restricted species would still be caught when co-occurring species were targeted.

Other assumptions were that catch rates per angler trip would not change, fishing effort would remain the same, and abundance of the stock would remain the same.

Release Mortality

Vermilion Snapper – SEDAR 2 (2003) used release mortality rates of 25% for the recreational fishery and 40% for the commercial fishery since the commercial fishery operates in deeper water than the recreational fishery. The range of release mortality rates considered in analyses were 0 to 40%.

Black Sea Bass – The SEDAR assessment workshop (SEDAR 2 2003) recommended using 15% release mortality for black sea bass, with a range of 10-20%. A range of 0-20% of release mortality rates was considered during analyses.

Bag Limit Analyses

Bag limit analyses were conducted using data from the Marine Recreational Fishery Statistics Survey (MRFSS) and headboat survey. Reductions were analyzed separately following modifications to methods provided by Brooks (2003).

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.

All catch types A, B1 and B2 were recorded on a per person basis. Type A catch, which is recorded for only the leader, was divided by the number of people that contributed to the total A catch. Some or all of the people contributing to the A catch are also interviewed for type B1 and B2 catch, and those are recorded on an individual basis. If the number of people contributing to the A catch was greater than the number of people contributing to the B catch, an estimate was made to account for possible under reporting of the B catch. To estimate total mortality due to fishing, A per person catch was added to B1 per person catch. In addition a proportion of B2 catch (r) was added to account for the possibility that some fish released alive later died. Only type A catch is considered to be affected by regulation, because type B1 catch is not observed, so only the estimate of type A catch per person was compared to the bag limit. Harvest reductions were adjusted to account for non-compliance (i.e., exceeding current aggregate bag limits) by subtracting the non-compliance percentage from the reduction that would be provided at a particular bag limit. If the estimate of type A catch per person was greater than the bag limit, the value was re-set to the limit (A_{limit}). If type A catch was less or equal to the bag limit then the value was retained. The difference between A and A_{limit} was multiplied by the same release mortality value r as B2 catch to account for release mortality that would be experienced with a new bag limit.

If Type A <= bag limit, then total catch = A+B1+rB2

If Type A > bag limit, the total catch = A_{limit} + B1+r(B2+A-A_{limit})

Estimated reductions for headboat data were calculated in a similar manner, except no data were available for releases (type B2) or unseen harvest (type B1). Catch per person (type A) was calculated by dividing the total number of species in the bag limit for a given trip by the total number of anglers on the boat. If the catch per angler was greater than the limit (A_{limit}), the value was re-set to the limit, as described above. The difference between the catch per angler and the bag limit was multiplied by the release mortality value r to account for release mortality that would be experienced with a new bag limit.
If Catch <= bag limit, then total catch = A
If Catch >= bag limit, then total catch = A_{limit} + r(A-A_{limit})
Averages from headboat and private/charterboat (MRFSS) were weighted according to the proportion of landings from each source to determine the overall reduction for various bag limits.

Size limits Analyses

Size limit analyses were conducted using MRFSS, headboat, and Trip Interview Program (TIP) data. Length measurements in the MRFSS database are in cm fork length (FL). Headboat lengths are total length (TL) in mm. TIP lengths are TL or FL and in mm, cm, or inches. All lengths were converted to TL inches.

The fraction of fish retained below the minimum size was calculated for each year, and it was assumed that the same fraction would have been landed under a larger minimum size. Fishing mortality for various size limits were calculated following the methods of Chih (2003).

$$\text{Fishing Mortality} = (C-G)*r + G*m+G,$$

where: $m = B/C-B$

C: catch (number of fish sampled)
G: number of fish greater or equal to the minimum size limit
r: release mortality
m: non-compliance
B: number of fish smaller than current size limit.

Average harvest reductions from headboat and private/charterboat (MRFSS) during 1999-2002 were weighted according to the proportion of landings from each source to determine the overall reduction for various bag limits.

Combination size/bag limits
The effects of combination bag and size limits were derived from the following formula (Brooks 2003):

Combination % reduction = 1-(1-bag limit% reduction)*(1-size limit% reduction).

Trip Limit Analyses
Data from the Southeast Fishery Science Center (SEFSC) logbook program were used to evaluate reductions in harvest from trip limits. The estimated reduction was determined by comparing the average harvest during 1999-2003 to a trip limit. The total annual landings in excess of a trip limit were summed and averaged for 1999-2003. The overall reduction in harvest associated with a particular trip limit was estimated by dividing the average reported landings in excess of a trip limit by the average landings for 1999-2003. The analysis assumed that either the fishing trip ended once the trip limit was met, or that fish discarded after reaching the trip limit were subject to 0% release mortality. Analyses were also done considering that portions of the populations would continue to be caught once a trip limit was met.

Seasonal Closure

Monthly commercial landings data were obtained from the NMFS' Accumulated Landings System (ALS) database. Reductions in landings were determined by comparing the average annual landings for 1999-2002 to average 1999-2002 landings for potential closed periods.

Release mortality and the possible increase in fishing effort before and after the spawning season closure were not considered in the analyses.

Annual Quotas

ALS data were used to determine an annual quota for vermilion snapper. The needed reduction in harvest was subtracted from the average landings during 1999-2003 and 1999-2001. For example, if the average landings during 1999-2003 was 1,000,000 lbs and a 30% reduction in harvest was needed, the annual quota would be 700,000 lbs. Quotas were provided in whole weight and gutted weight. Quotas for snowy grouper, golden tilefish, black sea bass, and red porgy were based on the TAC from rebuilding projections provided by the SEFSC. The historical proportion of commercial and recreational landings was used to derive the commercial quota from the TAC.

Trip Limit Increase (Red Porgy)
Data from the SEFSC's logbook program were used to evaluate increases in harvest for various trip limits. Two methods, relying on different assumptions, were used to estimate increases. Trip limits were converted from pounds to numbers of fish by dividing the trip limit by the mean weight of red porgy landed during 2001-2003. The mean length of red porgy (2001-2003) was derived from the Trip Interview Program database and a length-weight equation provided by Manooch and Potts (2001) was used to convert length to weight.

Several methods were proposed to individuals at the SEFSC. The preferred method assumed that if reported landings were less than 50 lbs then landings were retained and not changed (Table 1). If reported landings were greater than 50 pounds, but less than or equal to the new trip limit, then landings were set equal to the new trip limit. If landings exceeded the new trip limit then landings were retained and not changed. Landings were retained and not adjusted for trips reporting landings during January through April.

Example of trip limit adjustments used for analysis.

Current Landings	Current Limit	Proposed Limit	Projected Landings
25	50	60	25
50	50	60	60
55	50	60	60
75	50	60	75

Combination Trip Limit/Seasonal Closure (Red Porgy)
Combination trip limit increases and seasonal closure reductions were calculated using SEFSC logbook data. Increases in harvest associated with various trip limits were calculated using methods described above. Landings for various trip limits were calculated for each month. Increases in harvest were associated with two sources: 1) increases in landings associated with reduction of the seasonal closure and 2) increases in landings during May-December associated with increases to the trip limit. Landings were then summed for various closure and trip limit combinations to determine the total estimated harvest. Increases in harvest were calculated by subtracting 2001-2003 average landings from estimated landings and dividing by the average 2001-2003 red porgy landings.

Pot Mesh Limit (Black Sea Bass)

Two studies were available (Gay 2002; Fisher and Rudders 2004) to evaluate the selectivity of different mesh sizes in pots. Gay (2002) evaluated reductions in discards (sea bass < 10" TL) and sea bass landings for 39 pot configurations. Gay (2002) provided estimates of both the number of legal and sub-legal black sea bass retained by pot type. Estimates of the number of fish kept and released by pot type were standardized by dividing catches by the number of hauls made for each pot. No data were available to standardize catches by pot soak time. After calculating the average number of sea bass kept and released per haul, pots were grouped into categories based on each pots' escape mechanism. There were 13 different escape mechanisms used in the study, six of which are considered in this report since they are most commonly used in the fishery. These escape mechanisms are:

Pot Category	Tag Numbers	Escape Mechanism
1	38-40	All sides 2" square mesh
2	35-37	Three sides 2" square mesh, three sides 1.5" square mesh
3	32-34	20" X 24" panel of 2" square mesh on back of pot with one 2" square on front panel
4	1-3	Two 2" circular escape rings
5	7-9	Two 1.125" X 5.75" rectangular escape vents
6	4-6	Two 1.75" X 1.75" square escape vents

There were no replicates of particular pot types; that is, there was only one of each of the 39 pot configuration types, and each of these types was hauled numerous times to achieve replication. Therefore, the results of the following analyses may be confounded by other variables that could not be analyzed (e.g., differences in trap size, mesh color, etc). Estimates of the mean number of sea bass kept per haul (+/- standard deviation) and released per haul (+/- standard deviation) were calculated for each pot. An analysis of variance (ANOVA) was used to test for differences among pot categories in the mean number of sea bass kept per haul and mean number of sea bass released per haul. If means were significantly different at an alpha level equal to 0.05, a least squares means test was used to conduct pair-wise comparisons between pot categories.

Fisher and Rudders (2004) compared the selectivities of three sea bass pot configurations. Experimental pots were constructed using 2-inch square mesh on half the pot and 1.5 inch square mesh on the remainder of the pot. Pots constructed of 1.5-inch mesh with no escape vents (control pots) and with a single 2-inch escape vent (vented pots) were fished with the experimental pots to evaluate reductions in sub-legal black sea bass discards (sea bass less than 11 inches TL). The study concluded that experimental 2-inch mesh pots retained 78.1% and 73.7% less sub-legal sea bass (< 11 inches) than control and vented pots, respectively. The experimental pots also retained 55.7% and 59.5% less 10 to 11 inch black sea bass than vented or control pots, respectively. The pot configuration for the vented pot was similar to gear currently allowed in the South Atlantic, except only one escape vent was used. Because of slight differences in pot configurations between that used in the study and that used in the South

Atlantic fishery (e.g., only one escape vent was used), harvest reductions may be over or underestimated.

Reductions in harvest (discards) were estimated by first determining the number of black sea bass less than and greater than 11 inches TL that were retained by pot fishermen during 2000-2002. Data were obtained from the TIP database. Estimates of the number of fish less than 11 inches were then reduced by 73.7% (Fisher and Rudders 2004) and release mortality was applied to the remaining fish. Total estimates of catch were then calculated by adding the total catch of sea bass greater than 11 inches to the total number of discards less than 11 inches dying from release. Total reductions in harvest were estimated by dividing the total estimates of catch when 2" mesh is required by the total estimated landings reported in 2000-2002. A sensitivity analysis was conducted to evaluate how estimated reductions are affected by the proportion of fishermen assumed to be already using 2-inch mesh pots. The effects of 0, 25, 50, 75, and 100% of fishermen using 2-inch mesh during 2000-2002 were evaluated.

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10.7 Appendix G. Glossary

Bycatch: Fish harvested in a fishery, but not sold or kept for personal use. Bycatch includes economic discards and regulatory discards, but not fish released alive under a recreational catch and release fishery management program.

Catch Per Unit Effort (CPUE): The amount of fish captured with an amount of effort.

Charter Boat: A fishing boat available for hire by recreational anglers, normally by a group of anglers for a short time period.

Directed Fishery: Fishing directed at a certain species or species group.

Discards: Fish captured, but released at sea.

Discard Mortality Rate: The percent of total fish discarded that do not survive being captured and released at sea.

Effort: The amount of time and fishing power (i.e., gear size, boat size, horsepower) used to harvest fish.

Fecundity: A measurement of the egg-producing ability of fish at certain sizes and ages.

Fishery Dependent Data: Fishery data collected and reported by fishermen and dealers.

Fishery Independent Data: Fishery data collected and reported by scientists who catch the fish themselves.

Fishing Mortality: A measurement of the rate at which fish are removed from a population by fishing. Fishing mortality can be reported as either annual or instantaneous. Annual mortality is the percentage of fish dying in one year. Instantaneous is that percentage of fish dying at any one time.

Fork Length (FL): The length of a fish as measured from the tip of its snout to the fork in its tail.

Growth Overfishing: When fishing pressure on small fish prevents the fishery from producing the maximum poundage.

Head Boat: A fishing boat that charges individual fees per recreational angler onboard.

Maximum Fishing Mortality Threshold (MFMT): The rate of fishing mortality above which a stock's capacity to produce MSY would be jeopardized.

Maximum Sustainable Yield (MSY): The largest long-term average catch that can be taken continuously (sustained) from a stock or stock complex under average environmental conditions.

Minimum Stock Size Threshold (MSST): The biomass level below which a stock would be considered overfished.

Natural Mortality (M): A measurement of the rate at which fish are removed from a population by natural causes. Natural mortality can be reported as either annual or instantaneous. Annual mortality is the percentage of fish dying in one year. Instantaneous is that percentage of fish dying at any one time.

Optimum Yield (OY): The amount of catch that will provide the greatest overall benefit to the nation, particularly with respect to food production and recreational opportunities and taking into account the protection of marine ecosystems.

Overfished: A stock or stock complex is considered overfished when stock biomass falls below the minimum stock size threshold (MSST) (e.g., current biomass < MSST = overfished).

Overfishing: Overfishing occurs when a stock or stock complex is subjected to a rate of fishing mortality that exceeds the maximum fishing mortality threshold (e.g., current fishing mortality rate > MFMT = overfishing).

Recruitment Overfishing: The rate of fishing above which the recruitment to the exploitable stock becomes significantly reduced. This is characterized by a greatly reduced spawning stock, a decreasing proportion of older fish in the catch, and generally very low recruitment year after year.

Selectivity: The ability of a type of gear to catch a certain size or species of fish.

Spawning Potential Ratio (SPR): The number of eggs that could be produced by an average recruit in a fished stock divided by the number of eggs that could be produced by an average recruit in an unfished stock. SPR can also be expressed as the spawning stock biomass per recruit (SSBR) of a fished stock divided by the SSBR of the stock before it was fished.

Spawning Stock Biomass (SSB): The total weight of those fish in a stock which are old enough to spawn.

Spawning Stock Biomass Per Recruit (SSBR): The spawning stock biomass divided by the number of recruits to the stock or how much spawning biomass an average recruit would be expected to produce.

Total Allowable Catch (TAC): The total amount of fish to be taken annually from a stock or stock complex.

Total Length (TL): The length of a fish as measured from the tip of the snout to the tip of the tail.