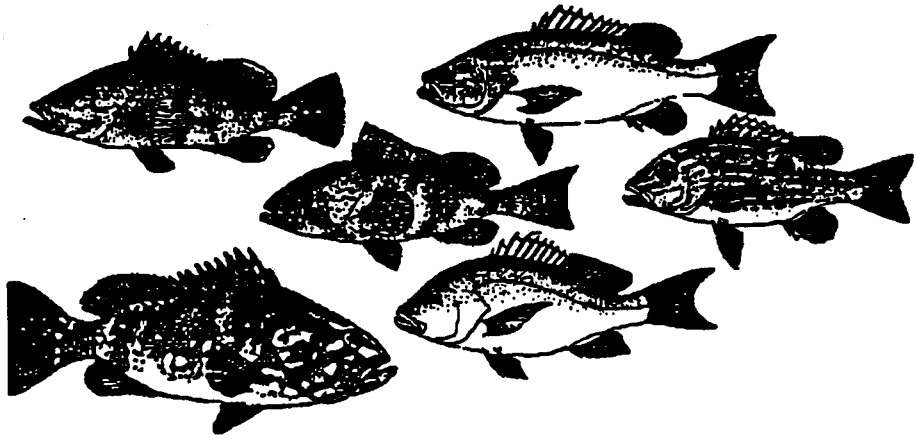
FINAL

AMENDMENT NUMBER 4,
REGULATORY IMPACT REVIEW,
INITIAL REGULATORY FLEXIBILITY ANALYSIS AND
ENVIRONMENTAL ASSESSMENT

FOR THE

FISHERY MANAGEMENT PLAN FOR THE
SNAPPER GROUPER FISHERY OF THE SOUTH ATLANTIC REGION



APRIL 1991

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prepared by the

South Atlantic Fishery Management Council

APRIL 1991

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I. INTRODUCTION

A. BACKGROUND

The Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region was prepared by the South Atlantic Fishery Management Council and implemented by the Secretary of Commerce on August 31, 1983 [48 Federal Register 39463]. The Fishery Management Plan was prepared to prevent growth overfishing in thirteen species in the snapper grouper complex and to establish a procedure for preventing overfishing in other species. The Fishery Management Plan established a 12" total length minimum size for red snapper, yellowtail snapper, red grouper and Nassau grouper; an 8" total length minimum size for black sea bass; and a four inch trawl mesh size to achieve a 12" minimum size for vermilion snapper. Additional harvest and gear limitations were also included in the original plan.

Amendment 1 was implemented by the Secretary effective January 12, 1989 [54 Federal Register 1720] to address the problems of habitat damage and growth overfishing in the trawl fishery. The amendment prohibits use of trawl gear to harvest fish in the directed snapper grouper fishery south of Cape Hatteras, North Carolina (35° 15' N Latitude) and north of Cape Canaveral, Florida (Vehicle Assembly Building, 28° 35.1' N Latitude). A vessel with trawl gear and more than 200 pounds of fish in the snapper grouper fishery (as listed in Section 646.2 of the regulations) on board was defined as a directed fishery. The amendment also established a rebuttable presumption that a vessel with fish in the snapper grouper fishery (as listed in Section 646.2 of the regulations) on board harvested its catch of such fish in the Exclusive Economic Zone (EEZ; this is later referred to as "federal waters").

Amendment 2 prohibited the harvest or possession of jewfish in or from federal waters in the South Atlantic and defined overfishing for jewfish and other snapper grouper species and was necessary due to the overfished status of jewfish and the requirement of the 602 guidelines that definitions of overfishing be included for each fishery management plan. The harvest or possession of jewfish was prohibited by emergency rule. The amendment was approved on October 10, 1990 and final regulations were effective October 30, 1990 [55 Federal Register 46213].

Amendment 3 established a management program for the recently developed wreckfish fishery. The Council was concerned that the rapid increase in effort and catch threatened the wreckfish resource with overfishing and that the concentration of additional vessels in the relatively small area where the resource seems to be located could create problems with vessel safety because of overcrowding. Actions included: (1) adding wreckfish to the management unit, (2) defining optimum yield, (3) defining overfishing for wreckfish, (4) requiring an annual permit to fish for, land or sell wreckfish, (5) collecting data necessary for effective management, (6) establishing a control date of March 28, 1990 after which there would be no guarantee of inclusion in a limited entry program should one be developed for the area bounded by 33° and 30° N Latitude, (7) establishing a fishing year beginning April 16, (8) establishing a process whereby annual total

allowable catch (annual quotas) would be specified with the initial quota being 2 million pounds, (9) establishing a 10,000 pound trip limit and (10) establishing a spawning season closure from January 15 through April 15. Actions (7), (9), (10) and the geographical limitation in Action (6) were based on public input at meetings and hearings.

An emergency rule effective August 3, 1990 [55 Federal Register 32257] added wreckfish to the management unit, established a fishing year for wreckfish commencing April 16, 1990, established a commercial quota of 2 million pounds and established a catch limit of 10,000 pounds per trip prior to enactment of Amendment 3. The Secretary closed the fishery for wreckfish in the EEZ (federal waters) effective August 8, 1990 based on the Council's TAC of 2 million pounds being reached [55 Federal Register 32635]. The Council requested an extension of the emergency rule which was approved [55 Federal Register 40181]. Amendment 3 was approved on November 9, 1990 and final regulations were effective January 31, 1991 [56 Federal Register 2443].

B. FMP PROBLEMS

The problems in the original Snapper Grouper Fishery Management Plan are:

1. Thirteen species in the complex are in a documented state of growth overfishing. Corrective action: Impose minimum sizes on six species to control growth overfishing.

2. Many of the species south of Cape Canaveral will likely experience growth overfishing in the near future. Corrective action: NMFS Regional Director is authorized to impose minimum sizes on additional species in the management unit according to evaluation procedure in this FMP. For species where minimum sizes are not beneficial because the survival of released fish is too low, the Council will amend the plan to include time/area closures, quotas, or other appropriate measures.

3. Data necessary to quantitatively document growth overfishing in other species or recruitment overfishing are very limited. Corrective action: Authorize data collection and analysis to monitor the status of the stocks.

Additional problems have surfaced since implementation of the original management plan and have resulted in amendments to the management plan. These problems should be consolidated into the list included in the original management plan (see Action 1).

ACTION 1: NEW PROBLEMS

The list of problems from the original management plan is modified and additional species from the recent stock assessment are included. Overfishing is measured in terms of spawning stock ratio (SSR) rather than yield per recruit. The resulting list of problems are:

1. Excessive fishing mortality is jeopardizing the biological integrity of the snapper grouper resource of the South Atlantic. First, thirteen species in the complex are in a documented state of overfishing, i.e., spawning stock ratio (SSR) is less than 30% (Table 1). This group consists of black sea bass, gray snapper, vermilion snapper, red snapper, red porgy, gray triggerfish, gag, scamp, red grouper, speckled hind, snowy grouper, warsaw grouper and greater amberjack. Second, fourteen species are thought to be overfished even though the SSRs are unknown. This group consists of golden tilefish, yellowedge grouper, misty grouper, Nassau grouper, black grouper, yellowmouth grouper, yellowfin grouper, schoolmaster snapper, queen snapper, blackfin snapper, cubera snapper, dog snapper, mahogany snapper and silk snapper. Third, the jewfish resource is though to be severely overfished throughout the Gulf of Mexico and South Atlantic even thought the SSR is unknown. Fourth, the rapid increase in number of vessels, effort and catch in the newly developed wreckfish fishery threatens the wreckfish resource with overfishing even though the SSR is unknown. Fifth, additional species may be overfished or are likely to experience overfishing in the near future.

2. Adequate management has been hindered by lack of current and accurate biological, statistical, social and economic information. Data necessary to document growth and/or recruitment overfishing and to calculate SSRs are very limited. Since the universe of participants is unknown, scientists are unable to estimate catch, effort and other important information with desired accuracy. The present system of fishery dependent and fishery independent data collection provides limited information for assessment purposes and practically no economic or social data.

3. Intense competition exists among recreational, part-time and full-time commercial users of the snapper grouper resources; and between commercial users employing different gears (hook and line, traps, entanglement nets, longlines and powerheads/bang sticks).

4. Habitat degradation by some types of fishing gear and poor water quality have adversely affected fish stocks and associated habitat.

5. The existence of inconsistent state and federal regulations makes it difficult to coordinate, implement and enforce management measures and may lead to overfishing. Inconsistent management measures create public confusion and hinder voluntary compliance.

Rejected Alternative for Action 1

Rejected Option 1. No action.

Discussion

Problems in the fishery have changed; additional species are now identified as being overfished. The no action alternative would not incorporate the new species, address the changes to the overfishing definition or lead to actual management measures to solve stated problems and

was rejected by the Council.

C. FMP OBJECTIVES

The management objectives in the original Snapper Grouper Fishery Management Plan are:

1. Prevent recruitment overfishing in all species and prevent growth overfishing of each species, except where growth overfishing is justified by social and economic considerations. Method of achieving objective: Minimum sizes will control growth overfishing and prevent recruitment overfishing. The Secretary is authorized to take whatever emergency action is necessary in the unlikely event of recruitment overfishing.

2. Collect the necessary data to monitor the fisheries. Method of achieving objective: Authorize data collection and analysis to monitor the status of the fishery.

3. Promote orderly utilization of the resource. Method of achieving objective: Restrictions on fish traps and prohibitions on poisons, explosives and spearing jewfish.

ACTION 2: NEW OBJECTIVES

The list of objectives from the original fishery management plan is modified as follows:

1. Prevent overfishing in all species by maintaining the spawning stock ratio (SSR) at or above target levels.

2. Collect necessary data to develop, monitor and assess biological, economic and social impacts of management measures designed to prevent overfishing, obtain desired SSR levels and address the other stated problems.

3. Promote orderly utilization of the resource.

4. Provide for a flexible management system that minimizes regulatory delays while retaining substantial Council and public involvement in management decisions, and rapidly adapts to changes in resource abundance, new scientific information and changes in fishing patterns among user groups.

5. Minimize habitat damage due to direct and indirect effects of recreational and commercial fishing activities.

6. Promote public comprehension of, voluntary compliance with and enforcement of the management measures.

Rejected Alternative for Action 2

Rejected Option 1. No action.

Discussion

The overfishing definition has changed and so must Objective 1. The Council rejected the no action alternative in order to track the new overfishing definition, to address the additional species that are now overfished and to address problems resulting from the use of certain gear types.

D. PROBLEMS REQUIRING AMENDMENT 4

The original Snapper Grouper fishery management plan (SAFMC, 1983a) established a management program for the snapper grouper resource in the South Atlantic which included minimum sizes for six species identified as being overfished at that time. In addition to various gear restrictions, a process for evaluating growth overfishing of other species was specified as Management Measure 1 and the procedure for implementing minimum sizes (regulatory amendment) was specified as Management Measure 2. Management Measure 18 specified the statistical reporting and data collection necessary to evaluate the status of species in the management unit. Research needed to refine the management program was also identified.

The first assessment of the status of species in the snapper grouper fishery was prepared by the National Marine Fisheries Service, Beaufort, North Carolina, with input from the South Atlantic Council Plan Development Team (PDT), and presented to the Council in August 1990. The report concluded that:

"...man has grossly changed the character of the reef communities. Overall there have been rapid (< one decade) and great (to < 50%) changes in mean weight of many species; apparent loss of the largest predators especially groupers; and a shift of both the commercial and recreational catch to less desirable species. These patterns are most evident in the recreational catch of Carolinas where we observed the development of the modern, intensive fishery. We believe, based on several lines of evidence, especially that of mean fish size, that most of the same dramatic changes occurred in Florida earlier, before study of its reef fishery began. And although samples from the commercial catch in some instances indicate smaller changes it is probable that the commercial fishing pattern, greater cruising range and more time at sea, results in some masking of effects evident when the study area is circumscribed. But the history of the commercial fishery indicates major shifts in abundance as catch per unit effort declined and target species changed from those easily accessible to those inhabiting great ocean depths: from gag at 20-50 fathoms, to snowy grouper at 50 to 150, to tilefish at 100 to 200 and now to wreckfish at 300 to 500. And the pattern of deterioration is evident despite greatly increased fishing power resulting from faster vessels and extraordinarily improved electronics. Thus, the PDT in addition to furnishing analyses and recommendations for individual species recognizes a serious, perhaps even tragic, change in the region's reef fish community as a whole."

The level of overfishing and need for management is supported by the conclusions of the NMFS/Plan Development Team (PDT) wherein, based on the overfished status of many species in the management unit, they recommended establishment of reef fish reserves equal in area to 20% of the "live bottom" along the southeastern United States in conjunction with the 20% spawning stock ratio. If the level of spawning stock ratio was increased or decreased, then the

corresponding percentage of area in the reserve would change accordingly. In addition, a combination of minimum sizes or bag limits for the recreational fishery and reductions in fishing mortality (i.e., reductions in catch) or minimum sizes for the commercial fishery were recommended for red porgy, red snapper, vermilion snapper, yellowtail snapper, lane snapper, gray snapper, mutton snapper, gag, scamp, snowy grouper, red grouper, black grouper, black sea bass, white grunt, gray triggerfish, and greater amberjack. A total prohibition on harvest was recommended for speckled hind, warsaw grouper, Nassau grouper and golden tilefish based on the extremely overfished nature of these species. The snowy grouper, a species harvested in deep water with some of these species, should have catches reduced by 70%. A quota of 2 million pounds was recommended for wreckfish.

The NMFS/PDT also recommended the following actions: (1) mandatory reporting of headboat catches by trip to enhance data for analysis, (2) require commercial fishermen to have a permit to sell reef fish and (3) fishermen must earn 50% of their income from commercial fishing to qualify for a permit to sell snapper grouper species.

In addition to the serious problem of overfishing, the Council is also concerned about the lack of current and accurate biological, statistical, social and economic information (including number of participants in the fishery) available for management; the intense competition among recreational, part-time and full-time commercial users of the snapper grouper resource, and between commercial users employing different gears (hook and line, traps, entanglement nets, longlines and powerheads/bang sticks); habitat degradation and destruction by some types of fishing gear and the effect of poor water quality on fish stocks and associated habitat; and inconsistent state and federal regulations which make it difficult to coordinate, implement and enforce management measures which create public confusion and hinder voluntary compliance.

The Council is taking the actions described in this amendment to reduce fishing mortality on overfished species and thereby prevent overfishing; collect the necessary data for management; promote orderly utilization of the resource; provide a flexible management system; minimize habitat damage; and promote public comprehension of, voluntary compliance with and enforcement of the management measures.

E. SPAWNING STOCK RATIO (SSR) DEFINITION

Definition of Spawning Potential Ratio (SPR) - Taken from the Gulf of Mexico Fishery Management Council's Reef fish Amendment 3 (1991):

Spawning potential ratio is an index of a population's health as measured by the biological ability of the adult fish to produce spawn or eggs. A particular estimated level of SPR is directly dependent on the estimated number of living adult fish (or females) which in turn is controlled by the prevailing fishing mortality exerted on the population. This biological spawning ability can be measured in terms of total adult fish biomass (number alive x average weight), gonad biomass (number alive x average gonad weight), or eggs produced (number alive x average number of eggs spawned) for each age class of fish.

A generation of fish in a population must produce the same number of adult fish in the next generation for a population to persist without decline or, in other words, be in equilibrium. General population dynamics theory is based on the premise that populations tend to achieve levels of equilibrium given constant environmental conditions; however, environmental fluctuations prevent this from happening in most cases. Fishing reduces the number of adults surviving from a given number of recruits by reducing their life expectancy. As a consequence, to prevent population collapse, the egg to recruit survival probability and/or the fecundities of the survivors must rise in response to the fishing-induced lowered abundance of adults (Goodyear 1989). Clearly, the above population mechanisms allow a population to be harvested without damaging its biological potential. However, as harvest pressure grows (fishing mortality increases), a point is reached where the population loses more fish through harvesting than it can replenish, and overfishing occurs. A population can also exist at an equilibrium level below its optimum level and can increase in size if fishing mortality is reduced.

Various measures of optimal fishing have been defined whereby fishing greater than the optimal level results in overfishing. The concepts of maximum sustainable yield (MSY) and maximum yield per recruit (YPR) are the two most common measures of optimal fishing. For reasons set forth in Amendment 2, the measure of optimal fishing for snapper grouper (other than jewfish) was chosen to be 30% SSR (same as SPR).

Calculation of SPR is similar to calculation of YPR except, instead of attempting to maximize yield from a year class of fish, achieving a certain level of spawning potential is attempted. This spawning potential is estimated as the fraction or ratio of spawning ability of the species when being fished divided by the spawning ability of the species under conditions of no fishing mortality, i.e., only natural mortality occurs. The SPR of a population is then controlled by the fishing mortality exerted on each age class of fish.

The spawning stock ratio (SSR) as described in the 1990 Snapper Grouper Assessment and as used in Amendments 2 and 4 is the same as the spawning potential ratio (SPR) as used in the Gulf of Mexico Fishery Management Council's Reef Fish Plan and as described by Goodyear (1989). Table 1 lists spawning stock ratios for those species that are known.

F. OVERFISHING DEFINITION

Spawning potential overfishing is defined by Goodyear (1989) as the level of fishing mortality which reduces the reproductive potential of the stock below some defined threshold where the reproductive potential of the stock is lowered sufficiently to threaten recruitment. When a stock is in a state of spawning potential overfishing a timeframe for recovery must be specified as required by the 602 guidelines.

Goodyear (1989) described the relationship between the spawning potential ratio and the compensation required for the stock to continue and noted that "simple inspection of the shape of the curve suggests that the threshold level of the slope of the curve suggests that the threshold level for the SPR should probably not be set below 20% without considerable justification, and that 30% might be a more reasonable first choice." He listed values for other fisheries as described by Gabriel et al. (1984, in press) and Bagriel (1985) as 20% for cod, 28-30% for haddock, 25-30% for yellowtail and 20% for other species.

The National Marine Fisheries Service held an overfishing workshop February 12-14, 1990 to develop guidelines for overfishing definitions in order to facilitate the Council process of developing definitions and justifications for their approval. Dr. Phil Goodyear, NMFS population dynamist, noted good correspondence of SPR values of 20-30% with $F_{0.1}$. He also presented his

work with Gulf red drum and noted that the stock continued to decline when the SPR was 28% suggesting that 30% was not a sufficiently high level for Gulf red drum. Goodyear also presented his work on Gulf red snapper and noted a SPR of 3% or less and the workshop concluded that the current definition of 20% SPR was sufficient. In a discussion of South Atlantic red snapper, growth parameters and habitat were noted to be approximately the same as for Gulf red snapper and it would be sufficient to use the same level. Doug Vaughan, NMFS Population Dynamist, presented his work on red porgy which is generally longer-lived than the snappers; a 30% SPR level was discussed for red porgy. The workshop concluded to use a level of 30% SPR for groupers.

The Council specified 30% SPR as the overfishing level for all species in the snapper grouper management unit (except jewfish which is 40%) to provide sufficient protection to the stocks in order to prevent recruitment overfishing. The example of Gulf red drum continuing to decline when it was at a 28% level led the Council to specify 30% SPR as a base level. The original idea behind the overfishing guidelines was to specify a threshold level below which a stock would not be allowed to decline due to fishing. By requiring action if a stock was below this level it was hoped that the social and political pressures resisting taking the necessary management action could be offset. If the stock is above this level, the Council shall take whatever action was necessary to achieve optimum yield, i.e., they were not to be prevented from taking action simply because the stock was above this level. Again, if below this level, action MUST be taken to protect the reproductive potential of the stock; if above, action could still be taken and in fact SHOULD be taken if necessary to achieve optimum yield.

The South Atlantic Fishery Management Council has defined "spawning potential overfishing" or overfishing as follows (Source: Snapper Grouper Amendment 2, July 1990):

E. Overfishing

The **overfishing definition for jewfish** is as follows:

1. Jewfish are overfished when the stock is below the level of 40% of the spawning stock biomass per recruit that would occur in the absence of fishing.

2. When jewfish are overfished, overfishing is defined as harvesting at a rate that is not consistent with a program that has been established to rebuild the stock or stock complex to the 40% spawning stock biomass per recruit level.

3. When jewfish are not overfished, overfishing is defined as a harvesting rate that, if continued, would lead to a state of the stock or stock complex that would not at least allow a harvest of OY on a continuing basis.

4. The threshold level is 30% SSBR; below this level, no harvest or possession of jewfish is allowed.

Overfishing for all other species in the management unit is defined as follows:

1. A snapper grouper stock or stock complex is overfished when it is below the level of 30% of the spawning stock biomass per recruit that would occur in the absence of fishing.

2. When a snapper grouper stock or stock complex is overfished, overfishing is defined as harvesting at a rate that is not consistent with a program that has been established to rebuild the stock or stock complex to the 30% spawning stock biomass per recruit level.

3. When a snapper grouper stock or stock complex is not overfished, overfishing is defined as a harvesting rate that, if continued, would lead to a state of the stock or stock complex that would not at least allow a harvest of OY on a continuing basis.

G. REBUILDING PLAN

The Council has specified a rebuilding timeframe for those species currently overfished and has included re-specification of the rebuilding timeframe in the framework procedure. It is the Council's intent to rebuild overfished stocks within the specified timeframe. However, this does not require that the Council take action in year one that would severely impact the fishery; rather, management measures may be phased-in to allow the fishery to adjust to changes in management. In a number of cases, the Council has specified a minimum size and/or combinations such as size and bag limits that, given model results for single action (e.g. bag limit only or size limit only), if maintained, would not result in rebuilding above the 30% SSR level. It is the Council's intent to monitor the status of each species from information contained in the stock assessments and to evaluate the effectiveness of current management measures in rebuilding the stock. Management measures will be adjusted, as necessary, to rebuild overfished stocks within the specified timeframe. This could result in future management being more stringent to rebuild a stock within the specified timeframe. The Council chose this approach to moderate the socioeconomic impacts of management while at the same time protecting the biological integrity of the snapper grouper resource.

Preferred Rebuilding Time Period: The timeframe for recovery of snappers (excluding red snapper), greater amberjack, black sea bass and red porgy is not to exceed 10 years. For red snapper and the groupers, the timeframe is not to exceed 15 years. Year 1 is the 1991 fishing year.

Discussion

The Council concluded that the initial rebuilding period should be specified as a fixed timeframe that could be modified through the framework procedure. The Council was concerned that the information was not available to calculate generation times for all species and that basing the time period on the modeled age structure could introduce changes simply due to differing age groupings in the stock assessments. Therefore, the Council chose upper limits of 10 and 15 years based on longevity of the species involved. As discussed below, the recovery time period may be modified as new information becomes available.

Preferred Method for Adjusting the Rebuilding Time Period: The recovery time period may be modified by inclusion in the framework amendment procedure.

Discussion

This approach would include modification of the rebuilding time period as one of the items that could be changed through the framework procedure. Once a timeframe is selected, new data in future assessments may justify changing the timeframe again to adjust to changing conditions or assessment advice.

This will provide flexibility to accommodate future changes in available data and scientific advice and also would avoid the problems associated with choosing a fixed target date as is proposed in other alternatives. As assessment advice on the condition of an overfished stock is updated, that advice can be used, not only to set management action for the following year, but also to re-specify the target date for attaining the stock goal. Since assessment advice can be expected to change as better information is obtained, it is reasonable for the Council to re-specify the timeframe each time assessment advice changes substantially and new management action must be proposed to rebuild an overfished stock. The NMFS retains authority to review and accept a recommended change in any of the framework measures. Thus, this alternative complies with National Standard 1 and NMFS guidelines for preventing overfishing and for establishing an acceptable rebuilding program for an overfished stock.

This will also allow the specification of separate rebuilding periods for each snapper grouper species. Not all species are similarly overfished and it may be possible to restore some more quickly than others. Some care will need to be exercised because many species are taken concurrently in the fishery and the most overfished species could drive the management process (e.g. closures).

Rejected Alternatives for the Rebuilding Time Period

Rejected Option 1. Establish a target date to be some multiple, for example from 1 to 1.5, of the length of a stock's modeled age structure. This alternative requires the selection of a specific year or range of years for a target date based on the characteristics of the population model used to project a species recovery period. For red snapper, which has a model age structure of 12 years, this alternative would establish a target date range of 2002 to 2008, equivalent to 1 - 1.5 times the age structure or 12 - 18 years from the baseline date of 1990.

Discussion

This alternative provides for a choice of a target date based on the characteristics of the model used to provide management advice. The projected rebuilding schedule for an overfished stock is dependent primarily on the age structure used in the projection model; for red snapper, the age structure currently used is 12 years. Therefore, advice to the Council can change dramatically depending on the age structure used in future assessments. This alternative would resolve the problems associated with specifying a fixed target date without accounting for potential changes in the age structure used. However, it would not accommodate other potential effects caused by

changes in the stock assessment parameters not related to age structure (e.g. natural mortality, maturation and fecundity schedules).

The important feature of this measure is that if the population model is changed through an extension of the age structure, the target date would automatically be extended so that the previously implemented management program would still achieve 30% SSR within the time period set by the new timeframe. Thus, instead of a model change forcing a change in the stock status and consequently more restrictive management measures because of a fixed timeframe, the model change would establish a new target date to accommodate the existing management program.

A potential drawback with this alternative is that there may be other potential model changes (e.g. natural mortality, maturation and fecundity schedules) that could affect the rebuilding period in such a way that the Council could again be forced into a plan amendment to change the timeframe.

The timeframe for species currently overfished under this option would be:

	Number of years in model
Black sea bass	8
Gray snapper	18
Vermilion snapper	8
Red snapper	12
Red porgy	11
Gray triggerfish	9
Gag	13
Scamp	18
Red grouper	16
Speckled hind	15
Snowy grouper	17
Warsaw grouper	21
Greater amberjack	7

The Council rejected this option because it could establish a constantly changing time period, and it would not account for other potential model changes (e.g. natural mortality, maturation and fecundity schedules) that could affect the rebuilding period. Thus, this option may not sufficiently resolve the problem currently presented if a time period was fixed, and the Council would be forced into a plan amendment to change the time period.

Rejected Option 2. Establish a target date to be some multiple, for example from 1 to 1.5, of the length of a stock's generation time. This alternative requires the selection of a specific year or range of years for a target date based on the characteristics of the species under consideration. For red snapper, which has a generation time of 14 years, this alternative would establish a target date range of 2004 to 2011, equivalent to 1 - 1.5 generations or 14 - 21 years from the baseline date of 1990.

Discussion

Generation time is computed as the age at which the average female achieves half of her expected lifetime egg production. This alternative provides for choice of a target date based on a biological characteristic of the species being managed. However, one potential problem is that it still results in establishment of a fixed target date that would require a plan amendment to change. For example, the population model used to project red snapper recovery currently encompasses only 12 age classes; whereas the biological life span of red snapper encompasses more than 20 ages. Future changes in management advice (e.g., ABC and TAC levels and size limits) will be more dependent on the age structure used in the population model than on the biological generation time of the species under management. Therefore, management advice could change substantially if the population model is modified, making a target date based on generation time susceptible to the same problems associated with choice of any fixed date. That is, a change in the model would require either a plan amendment to re-specify the target date or more restrictive management measures unless it is included in the framework procedure.

The Council rejected this option because of the above and because much of the information necessary to calculate generation time for these species is not available.

Rejected Option 3. Have no time period for rebuilding overfished snapper grouper stocks.

Discussion

Although there are concerns that the current data base for snapper grouper species does not allow quantitative estimates of changes in stock-wide SSR values and to make long-term projections, it is adequate to describe trends in stock status.

The Council has expressed its intention to monitor snapper grouper populations by evaluating stock assessments. If the SSR should decrease indicating the stock is not rebuilding as planned, the Council can adjust management measures as necessary to ensure that the snapper grouper stocks continue to rebuild toward the goal of 30% SSR at an acceptable rate.

The Council rejected this option because the guidelines require the specification of a recovery period for any overfished stock and the establishment of a time period for recovery was considered to provide a more focused management program.

II. DESCRIPTION OF FISHERY AND UTILIZATION PATTERNS

The Fishery Management Plan (SAFMC, 1983a), Amendment 1 (SAFMC, 1988b), Amendment 2 (SAFMC, 1990), and Amendment 3 (SAFMC, 1990) and the Source Document (SAFMC, 1983) describe the fishery and utilization patterns.

A. COMMERCIAL FISHERY

In general, total landings, mean size of fish captured, and nominal catch per trip in the commercial fishery have declined substantially. Also, the commercial sector has shifted offshore and changed target species as traditional species became less abundant. In addition, the commercial fishery developed with relatively inefficient hook-and-line gear and then switched to more efficient longline and trap gear in order to catch enough fish to operate profitably. SSRs derived from commercial samples show that gray snapper, vermilion snapper, red snapper, red grouper in south Florida, snowy grouper, and warsaw grouper are stressed (Table 2). Table 2 also shows that the SSRs for a number of species in the commercial sector are above target levels. This is due to the fact that many snapper grouper species stratify by depth, that is to say larger fish are found offshore. Because the commercial fishery mainly operates in deeper waters it catches primarily larger fish and population parameters or SSRs derived from that data subset will be larger. The resource-wide value (commercial and recreational) across all areas resembles weighted averages of all harvests.

B. RECREATIONAL FISHERY

Recreational total catches and catch rates, especially for the east coast of Florida, for traditional snapper grouper species, such as red snapper, vermilion snapper and several of the groupers, have declined substantially during the 1980s. In Florida, the declines may have taken place as early as the 1960s, however, data are not available for that period. The average size of vermilion snappers, black sea bass, and groupers are quite small in recreational catches. Part of the reason for the small average size of recreational fish is due to the fact that some species stratify in size by depth. Another equally or more important factor is that total inshore fishing pressure is so high that fish are not allowed to grow to optimum size before capture. As soon as fish reach legal size they are caught. This, of course, is a classical example of growth overfishing. SSRs derived from recreational catches of black sea bass, vermilion snapper, red porgy, red snapper, gag, scamp, red grouper, greater amberjack, snowy, and speckled hind show that these species are overfished (Table 2) and require management.

C. STATUS OF THE SPECIES

Table 2 shows SSRs, where estimates are available, for key species in the management unit. An examination of Table 2 shows that many highly prized species in the snapper grouper complex are overfished as indicated by their SSRs. Examples include red snapper, vermilion snapper, black sea bass in the Carolinas and Florida and several groupers. It is also evident that species off Florida are under more fishing pressure than those further north. This coincides with development of the fishery which originated in Florida and expanded northward, particularly in the 1970s. Similarly, the fishery moved offshore during the 1970s and 1980s with tilefish and deep water snappers and groupers being subjected to increased fishing pressure.

Presently, 13 species (described earlier) are in a documented state of overfishing. Fifteen other species are thought to be overfished. Recreational fishing pressure will likely continue to increase as the coastal population continues to grow in the South Atlantic.

The virtual absence of larger fish in the nearshore waters of the management unit as well as the shifting of target species by both recreational and commercial sectors are other indicators that many, especially the highly prized, traditional species (red snapper, gag, scamp, etc.) are under intense fishing pressure and require management.

III. ALTERNATIVE MANAGEMENT OPTIONS

Extensive public input was received during development of Amendment 4. These comments are summarized in Appendix 1. In addition to these comments, the Council received public input at a number of Council meetings while deliberating on the various options to be included in Amendment 4.

A. PERMITS

ACTION 3: PERMITS

1. To exceed bag limits, an owner or operator of a vessel that fishes in the EEZ (federal waters) must obtain an annual vessel permit. Fish may only be sold in conformance with state law and the commercial minimum size limits specified in the snapper grouper fishery management plan. It is the Council's intent that this apply to current as well as future state laws. The vessel is permitted but the owner or operator must qualify for the permit.

2. A qualifying owner or operator of a charter vessel or headboat may obtain a permit. However, a charter vessel or headboat must adhere to bag limits when under charter or carrying a passenger who fishes for a fee or when more than 3 persons are onboard, including captain and crew.

3. For a vessel owned by a corporation to be eligible for a vessel permit, the corporation or a shareholder or officer of the corporation or the vessel operator must have realized gross sales of seafood of $20,000 during one of the last three calendar years preceding the application. For partnerships to be eligible for a vessel permit, the general partner or vessel operator must qualify.

4. An owner or operator of a vessel using a black sea bass trap in the EEZ must obtain both a vessel permit and a color code from the Regional Director.

5. A vessel permit issued upon the qualification of an operator is valid only when that person is the operator of the vessel.

6. An application for a vessel permit must be submitted and signed by the owner or operator of the vessel. The application must be submitted to the Regional Director at least 60 days prior to the date on which the applicant desires to have the permit made effective.

7. For non-corporation/partnership vessels, permit applicants must provide the relevant information as required by the Regional Director. This will include a sworn statement by the applicant certifying that 50% of his or her earned income was derived from commercial, charter, or headboat fishing, or that they realized gross sales of seafood of $20,000, whichever is less, during one of the last 3 calendar years preceding the application. (Note: See # 3 above for requirements for corporations and partnerships.) The Regional Director may require the applicant to provide documentation supporting the sworn statement before a permit is issued or to substantiate why such a permit should not be denied, revoked, or otherwise sanctioned.

8. An annual fee will be charged for each permit issued. The permit fee will be the amount calculated by NMFS for the administrative costs of processing applications/permits (currently $23) and the charge for each annual black sea bass trap tag will be the cost to obtain and issue the annual tag (currently $1). The appropriate fee must accompany each permit application or request for black sea bass trap identification tags. This permit and fee will become effective for the fishing year (currently the calendar year) following implementation of this amendment. The permit year will be September 1 through August 31.

9. Except as provided in Subpart D of 15 CFR Part 904, the Regional Director will issue a permit at any time during the fishing year to the applicant. In addition, the Regional Director will issue a numbered tag for each black sea bass trap that is used in the EEZ and will designate a color code to be used for the identification of each vessel and black sea bass trap buoy when such vessel and buoys are used to fish with black sea bass traps in the federal waters.

10. Compliance with the reporting requirements is a condition for the issuance, re-issuance, or continuing validity of an issued permit. Failure to comply with those requirements may result in the denial or sanction of a permit pursuant to Subpart D of 15 CFR Part 904.

11. A permit remains valid for the remainder of the permit year for which it is issued unless revoked, suspended or modified pursuant to Subpart D of 15 CFR Part 904.

12. A permit is not transferable or assignable. A person purchasing a vessel with a permit to fish for snapper grouper species must apply for a permit. The application must be accompanied by a copy of a signed bill of sale.

13. A permit must be carried onboard the fishing vessel, and such vessel must be identified as required. The operator of a fishing vessel must present the permit for inspection upon request of an authorized officer.

Discussion

This wording is similar to most of the permit requirements contained in the GMFMC reef fish regulations although the Gulf Council does not allow sale of fish without a federal permit. Fishermen fishing in both the Gulf and South Atlantic federal waters would have the same percentage income requirements; the GMFMC did not specify a level of gross sales. This addresses the problem of part-time fishermen affecting full-time fishermen, non-compatible regulations and provides a sampling framework for data collection. Permit sanctions will also improve enforceability.

It is the Council's intent to include income earned as a crew member in the computations towards meeting the income requirements above. It is also the Council's intent that fish may only be sold in conformance with state law (i.e., state permits to sell fish) as long as the fish meets the commercial minimum size limit specified by the snapper grouper fishery management plan. Further, that this apply to current and future state laws.

In addition, the Council determined that an appropriate charge would apply for replacement of lost permits and/or black sea bass trap identification tags to cover the administrative cost of re-issuing the permit or tags.

Rejected Alternatives for Action 3

Rejected Option 1. No action.

Discussion

The no action alternative would not address the data and competition related problems identified in the fishery and was rejected by the Council.

Rejected Option 2. Determine whether a charter is recreational or commercial by the number of persons aboard (e.g., more than 4, more than 5, more than 6, etc).

Discussion

Specifying a number of persons as shown above would not be compatible with Gulf reef fish regulations (which specify 3 persons) and was rejected by the Council.

Rejected Option 3. Allow income from more than just the previous calendar year to qualify for 50% income requirement.

Discussion

Allow income from one of the last two, three (NOTE: Three years is included above with the preferred option) or last five years. The Council chose to allow income from one of the last three years concluding that one of the last three was more fair than one of the last two (too short a time

period) or five years (too long).

Rejected Option 4. Have the permit requirements and fee become effective immediately.

Discussion

Having the permit requirement become effective immediately upon implementation of the regulations would provide time to work out any problems in the system prior to beginning a full fishing year. The Council rejected this alternative in order to give NMFS sufficient time to prepare for issuance of permits and collection of fees; the permit requirements and fee will become effective for the fishing year following implementation of this amendment.

Rejected Option 5. Specify an income level different from the 50% required in the Gulf reef fish regulations (e.g., 10% for mackerel).

Discussion

Any choice other than 50% would cause incompatibility problems and public confusion particularly in Florida. If the fishery is prosecuted differently in other areas such that the Council would choose to specify a different income level, an option could be to have 50% apply in Florida and some other level apply in other areas. The Council rejected this option to reduce enforcement problems and to achieve the objectives of the management plan.

Rejected Option 6. Require a federal fisheries permit to sell snappers and groupers caught in the EEZ (federal waters).

Discussion

Requiring a federal permit to sell would track the Gulf Council's reef fish regulations but was rejected by the Council as unnecessarily impacting disposition of the recreational catch at this time. In some states (e.g. South Carolina and Georgia) a large portion of the commercial market is supplied by the sale of recreationally caught fish harvested legally under bag limits. Without this source of supply, much of the commercial market supply would be eliminated. Since no commercial quotas (except wreckfish which has essentially no recreational component) have been established, the problem of recreationally caught fish being sold and filling the commercial quota is not a problem. Should this develop into a problem in the future, the council will reevaluated it's position.

B. DATA COLLECTION

ACTION 4: DATA COLLECTION

Track the Gulf Council's reef fish regulations as closely as is feasible:

1. The owner or operator of a vessel permitted to fish with a black sea bass trap in the South Atlantic EEZ (federal waters) or who fishes black sea bass traps in adjoining state waters must, if selected, maintain a fishing record on a form available from the NMFS Science and Research Director or an authorized representative. These forms must be submitted to the NMFS Science and Research Director or an authorized representative so as to be received not later than 7 days after the

end of each fishing trip. If no fishing occurred during a month, a report so stating must be submitted on one of the forms to be received not later than 7 days after the end of each month. If fishing occurred, the following information must be reported:

a. Name and official number of vessel.
b. Permit number.
c. Pounds of catch of fish by species.
d. Date(s) of trip, depth fished and fishing location(s) by statistical area(s).
e. Number of trap hauls resulting in the catch.
f. Duration (days and hours) traps were fished before each haul.
g. Mesh size of traps.
h. Any other fishery management data requested by the NMFS Science and Research Director or an authorized representative.

2. The owner or operator of a vessel that is permitted to fish with gear other than black sea bass traps in the South Atlantic EEZ (federal waters), or that fishes in adjoining state waters, and is selected by the NMFS Science and Research Director or an authorized representative, must maintain a fishing record for each fishing trip on a form available from the NMFS Science and Research Director or an authorized representative. These forms must be submitted to the NMFS Science and Research Director or an authorized representative on a monthly basis (or more frequently, if requested by the NMFS Science and Research Director or an authorized representative) so as to be received not later than the 7th day of the end of the reporting period. If no fishing occurred during a month, a report so stating must be submitted on one of the forms. If fishing occurred, the following information must be reported for each trip:

a. Name and official number of vessel.
b. Permit number.
c. Pounds of catch of fish by species for each type of gear used.
d. Date(s) of trip, depth fished and fishing location(s) by statistical area(s).
e. Type and quantity of gear fished.
f. Duration (days and hours) of vessel fishing effort.
g. Duration (hours) gear was fished before each haul.
h. Any other fishery management data requested by the NMFS Science and Research Director or an authorized representative.

3. Any person who receives snapper grouper species by way of purchase, barter, trade or sale from a fishing vessel or person that fishes for, or lands said fish from the South Atlantic EEZ (federal waters) or from adjoining state waters, and who is selected to report, must provide the following information to the NMFS Science and Research Director or an authorized representative at monthly intervals, or more frequently if requested, on forms provided:

a. Name and address.
b. Total poundage of each species received during that month, or other requested interval.
c. Average monthly price paid for each species by market size.
d. Proportion of total poundage landed by each gear type.
e. Any other fishery management data requested by the NMFS Science and Research Director or an authorized representative.

4. Recreational fishermen are required upon request to make snapper grouper species, or parts thereof, available for inspection by the NMFS Science and Research Director or an authorized representative.

5. The owner or operator of a charter vessel who fishes for or lands snapper grouper species under the bag limits in the South Atlantic EEZ (federal waters) or in adjoining state waters, and who is selected to report, must maintain a daily fishing record for each trip on forms provided by the NMFS Science and Research Director or an authorized representative, and must submit the forms to the NMFS Science and Research Director or an authorized representative weekly within 7 days of the end of each week (Sunday). Information on the forms includes, but is not limited to the following:

a. Name and official number of vessel.
b. Permit number if one is owned.
c. Operator's Coast Guard license number.
d. Species targeted.
e. Number and estimated weight of fish caught by species.
f. Date(s) of trip, depth fished and fishing location(s) by statistical area(s).
g. Fishing methods, type and quantity of gear.
h. Duration of fishing (hours) of each trip.
i. Number of fishermen on trip.
j. Any other fishery management data requested by the NMFS Science and Research Director or an authorized representative.

6. The owner or operator of a headboat (including excursion vessels) that fishes for or lands snapper grouper species in the South Atlantic EEZ (federal waters) or in adjoining state waters, and who is selected to report, must maintain a fishing record for each trip, or portion of such trips as specified by the NMFS Science and Research Director or an authorized representative, on forms provided by the NMFS Science and Research Director or an authorized representative and must report the following information at least monthly within 7 days of the end of each month:

a. Name and official number of vessel.
b. Permit number if one is owned.
c. Operator's Coast Guard license number.

d. Species targeted.
e. Number and estimated weight of fish caught by species.
f. Date(s) of trip, depth fished and fishing location(s) by statistical area(s).
g. Fishing methods, type and quantity of gear.
h. Duration of fishing (hours) of each trip.
i. Number of fishermen on trip.
j. Any other fishery management data requested by the NMFS Science and Research Director or an authorized representative.

7. Any person described as under commercial, charter or headboat vessels, and who was not selected to report on a monthly or more frequent basis, must provide the following information when interviewed annually by the NMFS Science and Research Director or an authorized representative:

a. Name and official number of vessel.
b. Permit number if a permit is owned.
c. Length and tonnage.
d. Current home port.
e. Fishing areas by statistical area.
f. Ports where fish were landed during the last year.
g. Type and quantity of gear.
h. Number of full- and part-time fishermen or crew members.
i. Any other fishery management data requested by the NMFS Science and Research Director or an authorized representative.

8. Additional data will be collected by authorized statistical reporting agents, as designees of the NMFS Science and Research Director or an authorized representative, and by authorized officers. An owner or operator or a fishing vessel and a dealer or processor are required upon request to make snapper grouper species or parts thereof available for inspection by the NMFS Science and Research Director or an authorized representative.

Discussion

These data collection requirements, for the most part, track the GMFMC's reef fish regulations and would provide needed data for stock assessment and management. These requirements as listed above should be compatible with existing state/federal cooperative statistics program reporting activities. The Council urges the South Atlantic States to increase data collection over the next two years to improve our understanding of the status of the snapper grouper resource.

Rejected Alternative for Action 4

Rejected Option 1. No action.

Discussion

Current data collection requirements in the snapper grouper regulations have not been effective in generating specified data; therefore, the Council rejected the no action alternative.

C. ASSESSMENT GROUP & ANNUAL ADJUSTMENTS

ACTION 5: ASSESSMENT GROUP & ANNUAL ADJUSTMENTS

Establish an assessment group and annual adjustments:

1. The Council will appoint an assessment group (Group) that will assess the condition of selected snapper grouper species in the management unit (including periodic economic and sociological assessments as needed) on an annually planned basis. The Group will present a report of its assessment and recommendations to the Council.

2. The Council will consider the report and recommendations of the Group and hold public hearings at a time and place of the Council's choosing to discuss the Group's report. The Council may convene the Advisory Panel and the Scientific and Statistical Committee to provide advice prior to taking final action. After receiving public input, the Council will make findings on the need for changes.

3. If changes are needed in the maximum sustainable yield (MSY), total allowable catch (TAC), quotas, trip limits, bag limits, minimum sizes, gear restrictions, season/area closures (including spawning closures), timeframe for recovery of overfished species or fishing year, the Council will advise the Regional Director in writing of their recommendations accompanied by the Group's report, relevant background material, draft regulations, Regulatory Impact Review and public comments. This report will be submitted each year at least 60 days prior to the start of the fishing season (currently April 16).

4. The Regional Director will review the Council's recommendations, supporting rationale, public comments and other relevant information. If the Regional Director concurs that the Council's recommendations are consistent with the goals and objectives of the fishery management plan, the national standards and other applicable law, the Regional Director will recommend that the Secretary publish proposed and final rules in the Federal Register of any changes prior to the appropriate fishing season (currently April 16).

5. Should the Regional Director reject the recommendations, he will provide written reasons to the Council for the rejection, and existing regulations will remain in effect until the issue is resolved.

6. Appropriate adjustments that may be implemented by the Secretary by proposed and final rules in the Federal Register are:

a. Initial specification of MSY and subsequent adjustment of the best estimate of MSY where this information is available for a particular species.

b. Initial specification of acceptable biological catch (ABC) and subsequent adjustment of the ABC range and/or best estimate when and where this information is available for a particular species.

c. Setting TAC for a particular species. A TAC for wreckfish may not exceed 8 million pounds.

d. Modifying (or implementing for a particular species) TAC, quotas (including zero quotas), trip limits, bag limits (including zero bag limits), minimum sizes, gear restrictions (ranging from modifying current regulations to a complete prohibition) and season/area closures (including spawning closures).

e. The fishing year and spawning closure for wreckfish may not be adjusted by more than one month.

f. Authority is granted to the Regional Director to close any fishery, i.e. revert any bag limit to zero and close any commercial fishery, once a quota has been established through the procedure described above and such quota has been filled. When such action is necessary, the Regional Director will recommend that the Secretary publish a notice in the Federal Register as soon as possible.

g. Modifying (or implementing for a particular species) a timeframe for recovery of an overfished species.

Discussion

The procedure described above will allow for regular stock assessments and provide for timely adjustments to the management program to prevent overfishing and/or rebuild a stock if overfished. It is the Council's intent that all species in the management unit receive periodic assessments. Council staff and the assessment group will select species to be assessed and include those in the annual NMFS/Council planning process (called Operations Plans).

It is the Council's intent that TAC be limited by the upper end of an acceptable biological catch (ABC) range when and if one is provided; however, no limits should be placed on the lower limit of TAC so that a zero TAC could be specified if deemed necessary to protect the resource.

Rejected Alternatives For Action 5

Rejected Option 1. No action.

Discussion

The current fishery management plan specifies that additional size limits will be implemented by regulatory amendment. This process does not work expeditiously due to the lack of a statutory deadline associated with the review process, thus it was rejected by the Council. The notice

process has proven workable in the mackerel (Coastal Migratory Pelagics) plan and provides a ready mechanism for adjustments to the management program as required by additional stock assessments.

Rejected Option 2. Conduct the assessments every other year or every 3 years.

Discussion

Rejected Option 2 was suggested by the SSC and would allow more complete assessments as long as there are no time-specific requirements that would suffer in interim years. The Council rejected this alternative as being too constraining since some species may need to be assessed annually. Action 5 includes flexibility for species that may not need annual assessments.

D. MINIMUM SIZES

ACTION 6: MINIMUM SIZE OF 8" TOTAL LENGTH

Establish a minimum size of 8" total length for lane snapper and retain the 8" total length size limit for black sea bass (the black sea bass size limit applies south of Cape Hatteras due to stock differences and the measurement excludes the caudal filament).

Discussion

The 8" minimum size limit was recommended by the plan development team and NMFS stock assessment (Tables 2 and 3). This minimum size is also consistent with Florida regulations for both species, and for Georgia, South Carolina and North Carolina for black sea bass only. Current snapper grouper regulations specify an 8" total length minimum size for black sea bass.

The assessment notes that for black sea bass: "Present yield per recruit (Y/R) values for both the headboat and commercial fishery are near maximum...Conditions existing under the Carolina and northeast Florida headboat fishery are currently producing SSRs of 15% and 17% respectively. A minimum size of 203 mm (8") or a 50% reduction in F in the Carolinas and a 45% reduction in F for northeast Florida would achieve a SSR of 30%...The Carolina commercial fishery does not require a reduction in F because the SSR is already almost 40%...The PDT believes the most appropriate goal is a 30% SSR. This would require a bag limit of 7 fish in the Carolina headboat fishery and a bag limit of 3 fish in northeast Florida or stricter enforcement of the 203 mm (8 inch) minimum size limit."

Results for lane snapper indicated that conditions under the headboat fishery are producing a SSR (equilibrium, both sexes) of approximately 50%. The PDT did recommend a 8" (203 mm) minimum size limit to maintain stocks near their current levels.

Rejected Alternative For Action 6

Rejected Option 1. No action.

Discussion

No action for black sea bass is appropriate because the existing minimum size limit is 8" but it is being included above to make it very clear to the public the full range of minimum sizes either

in place, being modified or not being changed. To emphasize the need for compliance with the existing 8" black sea bass size limit, data from the recreational fishing survey (MRFSS) indicate poor compliance (i.e., a large percentage of undersize fish being landed). The Council rejected the no action alternative for lane snapper in order to protect the resource from future declines and to be consistent with Florida state regulations, the state where the majority of harvest occurs.

ACTION 7: MINIMUM SIZES OF 10" AND 12" TOTAL LENGTH

Establish a minimum size of 12" total length for yellowtail, gray, mutton, schoolmaster, queen, blackfin, cubera, dog, mahogany and silk snapper; 12" total length for red porgy; and 12" total length for commercially caught vermilion snapper and 10" total length for recreationally caught vermilion snapper.

Discussion

Action 7 minimum sizes were adjusted from the plan development team/NMFS assessment recommendations primarily for simplicity and enforceability (Tables 2 and 3). These sizes are also consistent with South and North Carolina regulations for yellowtail; with Florida regulations for queen, blackfin, cubera, dog, mahogany, silk, yellowtail and mutton snapper; and with the Gulf Council federal regulations for yellowtail, gray and mutton snapper. It is the Council's intent that if fish are sold they must conform to the commercial minimum size limit if there are differential minimum sizes for recreational and commercial fisheries.

Assessment results for vermilion indicate that "Conditions existing under the headboat fishery are producing a SSR (equilibrium, both sexes) of 19%. A 37% reduction in F or a minimum size of 290 mm (11.4") is required to achieve a SSR of 30 percent...The commercial hook and line fishery in the Carolinas is producing a SSR of 28 percent. A reduction in F or a minimum size of 272 mm (10.7") is required to achieve a SSR of 30 percent...The North Florida commercial fishery is producing a SSR of 17 percent. A 22 percent reduction in F or a minimum size of 350 mm (13.8") is needed to achieve a SSR of 30 percent...The PDT believes the most appropriate goal is a 30% SSR and recommends adoption of a 305 mm (12") minimum size which will also increase Y/R by approximately 20%." (Note: this applies to the recreational fishery.) For the commercial fishery the PDT recommended "...a minimum size of 272 mm (10.7") or a 7 percent reduction in F and for the north Florida commercial fishery a minimum size of 350 mm (13.8") or a 22 percent reduction in F are necessary to achieve a SSR of 30 percent." The Council is proposing a 12" minimum size limit for the commercial fishery. However, for the recreational fishery a 10" minimum size limit is being proposed along with a 10 vermilion recreational bag limit. The vermilion SSR will be closely evaluated and future assessments will incorporate data collected after the trawl prohibition implemented in Amendment 1. If these measures are not sufficient to rebuild the stock within the specified time period, additional measures will be implemented through the framework procedure.

Yellowtail snapper results indicate that: "Conditions existing under the headboat fishery are producing a SSR of 43 percent. Conditions existing under the commercial fishery are producing a

SSR of 42 percent." These results indicate that the current 12" minimum size limit is working.

Results for gray snapper indicate that: "Conditions existing under the South Florida headboat fishery would produce a SSR (equilibrium, both sexes) of 29 percent. A 3 percent reduction in F or a minimum size of 305 mm (12") is required to achieve a SSR of 30 percent." The North Florida commercial hook and line fishery is producing a SSR of 19 percent and a 49 percent reduction in F or a minimum size of 330 mm (13") is required to achieve a SSR of 30 percent. The PDT concluded that "...the most appropriate management goal is the adoption of a 12" minimum size limit that will complement an existing State of Florida regulation. While a greater minimum size limit gives slight increases in yield per recruit the gains are minimal and the 12 inch minimum provides a 30 percent SSR which the Team regards as sufficient, given that the stock does not show signs of overexploitation." The Council is proposing a 12" minimum size limit for the recreational and commercial fisheries which will achieve the 30% SSR and be consistent with Florida where the bulk of the gray snapper are caught.

Mutton snapper under conditions in the South Florida headboat fishery are producing a SSR of 47%. The PDT "...sensed a potential for overexploitation of mutton snapper and suggests a 14 inch minimum size to prevent a major reduction in SSR. It is also recommended that fishing be prohibited where spawning aggregations occur since fishing mortality can be very high when mutton snapper congregate to spawn." The Council is proposing a 12" total length minimum size to be consistent with GMFMC and Florida regulations.

The conditions in the headboat fishery for red porgy are producing a SSR of 18%. The assessment indicated that: "A 40 percent reduction in F or a minimum size of 315 mm (12.5") is required to achieve a SSR of 30 percent..." The PDT concluded that: "...the most appropriate goal is a 40% SSR and recommends adoption of a 332 mm minimum size (13.5 in) which will also increase Y/R by 20%." The Council has chosen 30% as their goal for all snappers and groupers except jewfish and the resulting SSR from a 12" minimum size limit exceeds 30%. The condition of red porgy will be monitored and if conditions indicate a need to increase the minimum size or impose bag limits, these will be accomplished through the framework procedure described in this amendment.

SSR results are not available for schoolmaster, queen, blackfin, cubera, dog, mahogany and silk snappers. Their life history characteristics are unknown but fall somewhere between those of gray snapper and mutton snapper. The 12" minimum size limit is being proposed to protect these species and to complement existing regulations in Florida. Juvenile cubera and gray snappers are difficult to separate and the same minimum size will allow for better enforcement. If these measures are later shown to not be sufficient, additional measures will be implemented through the framework procedure.

Rejected Alternatives For Action 7

Rejected Option 1. No action.

Discussion

The no action alternative was rejected because it would not prevent overfishing of these species. There is currently a minimum size limit of 12" for yellowtail snapper and no change is being proposed. It is included above to better inform the public about the minimum size limits.

Rejected Option 2. Species specific sizes recommended by the plan development team/NMFS assessment.

Discussion

The Council rejected Option 2 to be consistent with existing state regulations and to make the minimum size regulations more easily understood by grouping a number of species into one size category. This decision by the Council will not, however, prevent any species from rebuilding.

Rejected Option 3. A minimum size of 12" fork length is established for gray triggerfish.

Discussion

The headboat fishery for gray triggerfish is currently producing a SSR (equilibrium, both sexes) of 43% off the Carolinas, 22% off North Florida and 18% off South Florida. For the commercial fishery, the SSR is 36% off the Carolinas and 38% off North Florida. The PDT recommended a SSR of 40% and even though this is currently being exceeded in the Carolinas headboat fishery, mean weight is still decreasing. The PDT recommended "...a 13" (330 mm) fork length minimum size limit for gray triggerfish to prevent further declines in the stocks...To achieve a 40% SSR in the commercial fishery, a minimum size limit of 362 mm (14.5") fork length or a 25% reduction in F for the Carolinas and a minimum size of 370 mm (14.8") fork length or a 26% reduction in F for north Florida would be required." The Council proposed a 12" fork length minimum size for public hearings which would result in a recreational SSR of 44% in the Carolinas but only 22-26% in Florida. The commercial SSR in the Carolinas would be 39%. To increase the Florida SSR above the overfishing level of 30%, a bag limit was considered.

The Council rejected a size limit at this time (and also the proposed bag limit) based on public testimony and will readdress this issue after a more current stock assessment is available. If the stock assessment indicates that regulations are necessary to rebuild the stock, additional measures will be implemented through the framework procedure. During public hearings from North Carolina through Florida many fishermen stated that triggerfish were undergoing a population explosion and rather than limits there should be a bounty put on them due to the damage they cause to lobsters and stone crabs while in traps and the problems in getting bait through triggerfish schools to vermilion snapper below.

ACTION 8: MINIMUM SIZE OF 20" TOTAL LENGTH

Establish a minimum size of 20" total length for red snapper and gag, red, black, scamp, yellowfin and yellowmouth grouper.

Discussion

These minimum sizes were adjusted from the plan development team/NMFS assessment primarily for simplicity and enforceability (Tables 2 and 3). These sizes are consistent with Florida state regulations for gag, scamp, red, black, yellowfin and yellowmouth grouper; with North Carolina state regulations for gag and black grouper; and with GMFMC federal regulations for gag, red, black and yellowfin grouper.

Assessment results for red snapper indicate that: "Conditions existing under the headboat fishery are currently producing a SSR (equilibrium, both sexes) of 15 percent for the Carolinas, and 5 percent for North Florida. A 58 percent reduction in F or a minimum size of 490 mm (19.3") is required to achieve a SSR of 30 percent, and a 72 percent reduction in F or a minimum size of 530 mm (21") is needed to achieve a SSR of 40 percent. The commercial hook and line fishery operating off the Carolinas is producing a SSR of 24 percent. A 19 percent reduction in F or a minimum size of 392 mm (15.4") is required to achieve a SSR of 30 percent, and a 41 percent reduction in F or a minimum size of 490 mm (19.3") is needed to obtain a SSR of 40 percent. The North Florida commercial fishery is producing a SSR of 17 percent. A 37 percent reduction in F or a minimum size of 421 mm (16.6") is required to achieve a SSR of 30 percent, and 51 percent reduction in F or a minimum size of 483 mm (19.0") is needed to achieve a SSR of 40 percent...The PDT believes the most appropriate goal for management of the red snapper resource is a 40 percent SSR and recommends adoption of a 21" (530 mm) total length minimum size limit. Studies conducted by the NMFS and State of South Carolina reveal 80-100 percent survival of caught and released red snapper. The impact of imposing a bag limit was evaluated utilizing headboat data from all areas. Even with a 72 percent reduction in F needed to achieve the PDT's recommended SSR 40%, a bag limit would not be effective. For example a 1 fish per angler bag would reduce F by only 50 percent for the Carolinas 7.6 percent for North Florida, and only 45 percent for South Florida. Instead of a size limit, the north Florida commercial fishery F could be reduced 51 percent and the Carolinas commercial fishery F reduced 41 percent to achieve a SSR of 40 percent." The Council concluded that including red snapper within the 20" minimum size grouping would be appropriate. The resulting SSRs of 33% and 40% for the recreational and commercial fisheries, respectively, exceed their overfishing level of 30%. The status of red snapper will be closely monitored and if a larger minimum size or additional regulations are required, these will be implemented through the framework procedure.

The headboat fishery for gag produces SSRs of 19% in the Carolinas and about 30% in Florida; the large recruitment size in the commercial fishery provides SSRs of 47% in the Carolinas to 54% in north Florida. The assessment concluded that a "...SSR of 40 percent can be had with a minimum size of about 25-26" in the Carolinas and 20" in Florida...Based on the opportunity for both increased yield/recruit and a desired 40 percent spawning stock ratio the team recommends

establishment of a minimum size of 25" in the Carolinas and 20" in Florida." The Council is proposing a 20" total length minimum size which results in a SSR of 30% in the recreational fishery and 67% in the commercial fishery. The status of gag will be closely monitored and if a larger minimum size or additional regulations are required, these will be implemented through the framework procedure.

Results from the north Florida headboat fishery produce a red grouper SSR of 11% which would require a 50% reduction in F or a minimum size of 400 mm (15.7") to achieve a SSR of 30%. For the south Florida headboat fishery, SSR is 28% and a 6% reduction in F or a minimum size of 335 mm (13.2") would be needed to get a SSR of 30%. The south Florida trap fishery is producing a SSR of 15% which would require a 54% reduction in F or a minimum size of 440 mm (17.3") to achieve a 30% SSR. The PDT concluded that:.."the best management option for red grouper at this time is to implement a 20" (508 mm) total length minimum size limit which will provide an SSR of 40 percent and substantially increase yield per recruit." The Council concluded that a 20" total length minimum size is appropriate to prevent overfishing.

Black grouper SSRs in the southeast Florida headboat and north Florida commercial fisheries are 40% or greater. The PDT recommended a 20" (508 mm) minimum size limit. The Council is proposing a 20" size limit to be compatible with Florida regulations and to prevent overfishing from occurring in the future.

For scamp, the headboat fishery is producing a SSR of 18% which would require a 37% reduction in F or a minimum size of 17.3" (441 mm). The commercial fishery is currently producing a SSR of 28% which would require an 11% reduction in F to get to 30%. The PDT recommended a 17.2" (441 mm) size limit to achieve 40% SSR in the headboat fishery and a 19" (489 mm) size limit to achieve 30% SSR in the commercial fishery. The Council is proposing a 20" fork length minimum size which produces recreational SSRs of 42-74% and commercial SSR of 50-60%.

SSR results are not available for yellowfin and yellowmouth groupers. Their life history characteristics would likely be similar to the other groupers in this size category. The 20" minimum size limit is being proposed to provide protection for these species and to correspond with existing Florida regulations.

Rejected Alternatives For Action 8

Rejected Option 1. No action.

Discussion

The no action option was rejected because it would result in overfishing of these species.

Rejected Option 2. Species-specific sizes recommended by the plan development team/NMFS assessment.

Discussion

The Council rejected Option 2 to be consistent with existing state regulations and to make the minimum size regulations more easily understood by grouping a number of species into one size category. This will not, however, result in any species being overfished.

Rejected Option 3. A minimum size of 20" fork length is established for scamp.

Discussion

The Council rejected Option 3 because the difference in fork length and total length for a scamp of this size is minimal. The slightly smaller size that would be allowed by measuring fish as fork length is compensated by the benefits of measuring scamp uniformly. This will make educating the fishing public and enforcement easier and more effective.

Rejected Option 4. A minimum size of 25" total length is established for gag and black grouper.

Discussion

The Council rejected Option 4 because the 20" size limit results in a SSR of 43-50% for black grouper and 30-67% for gag and the Council concluded that this provided sufficient protection for these species at this time. This size limit may be adjusted, if necessary, through the framework measure in the future.

ACTION 9: MINIMUM SIZE OF 28" AND 36" FORK LENGTH

Establish a minimum size of 28" fork length in the recreational fishery and 36" fork length or 28" core length in the commercial fishery for greater amberjack. Core length means the total length of a fish with the head removed, measured from the front center edge at the de-headed end to the rear center edge of the tail. Selected commercial vessels may be required to land fish in the round with heads and fins attached for data collection/sampling purposes.

Discussion

The greater amberjack commercial minimum size was adjusted from the plan development team/NMFS assessment primarily for simplicity and enforceability (Tables 2 and 3). These sizes are also consistent with Florida and GMFMC federal regulations; the 28" fork length is consistent with Georgia regulations. It is the Council's intent that if fish are sold that they conform to the commercial minimum size limit.

The south Florida headboat fishery is producing a SSR of 7% which would require a 61% reduction in F or a minimum size of 744 mm (29.3") to achieve a 30% SSR. In the Carolinas headboat fishery the SSR is 17%, requiring a 40% reduction in F or a minimum size of 680 mm (26.8") to achieve 30% SSR. The north Florida headboat fishery is producing a SSR of 18% which requires a 41% reduction in F or a minimum size of 596 mm (23.5") to achieve a SSR of 30%. Region-wide, the commercial fishery is producing a SSR of 27% which would require an

11% reduction in F or a minimum size of 596 mm (23.5") to achieve 30% SSR. The PDT recommended a 28" (711 mm) fork length minimum size limit. They also noted that: "From North Carolina to North Florida, implementation of a one fish per trip bag limit would reduce F by only 7%, and in South Florida by 22%, causing this type management strategy to have limited value in this fishery. There is also the need to study spawning aggregations off South Florida (Keys) during the spring, and traditional fishing practices relative to these aggregations."

Action 9 proposes a 28" fork length minimum size limit which results in a recreational SSR of 27% and if a 28" fork length size was proposed for the commercial fishery, a SSR of 43% would result. The recreational fishing mortality needs to be reduced further and a bag limit of three is being proposed in conjunction with this option. Bag limits and spawning closures are discussed in greater detail in later sections (Action 13 - bag limit and Action 20 - spawning closure). The 36" fork length minimum size for the commercial fishery will result in a SSR higher than the 43% that would result if the commercial size limit was 28". The 36" total length/28" core length (equivalent to 36" total length) was chosen primarily to complement existing Florida regulations. The higher minimum size will also provide additional protection given the high catches during the spawning aggregations. If these measures are not sufficient to rebuild the stock within the specified time period, additional measures will be implemented through the framework procedure.

Rejected Alternatives for Action 9

Rejected Option 1. No action.

Discussion

The no action alternative was rejected because it would not prevent overfishing of greater amberjack.

Rejected Option 2. The greater amberjack minimum size should probably also apply to the almaco jack given the enforcement problems that have surfaced in enforcing the amberjack size limit contained in the Gulf Reef fish fishery management plan. In addition, include the lesser amberjack and the banded rudderfish for enforcement purposes.

Discussion

The Council rejected this alternative because of different growth characteristics of these jacks and because greater emphasis on species identification can solve this problem without additional regulations.

Rejected Option 3. Establish a minimum size of 36" fork length in both the recreational and commercial fisheries for greater amberjack.

Discussion

Option 3 would result in a SSR greater than the 30% overfishing level and would not require a recreational bag limit. The Council rejected this option as being overly conservative on the recreational fishery. In addition, the recreational sector expressed support of the 28" fork length

and 3 fish bag limit. The Council concluded that these two measures combined would provide adequate protection for the greater amberjack resource.

E. ZERO QUOTAS/ZERO BAG LIMITS

ACTION 10: ZERO QUOTAS & BAG LIMITS AND OTHER OPTIONS

Establish a zero quota and bag limit for Nassau grouper.

Discussion

Nassau grouper catches have been very low; only 19 were measured in 11 years of sampling in the headboat fishery. The commercial catch was 3,000 pounds in 1986, but was 0 in 1987, 451 pounds in 1988 and 515 in 1989. "The PDT believes the Nassau grouper, for reasons undetermined, is severely reduced in continental U.S. waters and may be verging on threatened or endangered status. A complete ban on retention is recommended."

Rejected Alternative for Action 10

Rejected Option 1. No action on Nassau grouper.

Discussion

The no action alternative was rejected for Nassau grouper because it would not prevent overfishing of this species, however, the Council concluded that the best option was to defer action on the deep water snapper grouper fishery pending development of Amendment 6. The Council recognizes that these species are experiencing high fishing mortality rates now and the need for management action is high. Public input to the council (during public hearings) suggests that fishing methods, areas of abundance and size composition from trip records have changed in recent years. Since the newer data from the fishery will be reflected in the catch statistics and length frequency data, assessment results might change for some of the deep water snapper grouper complex. The Council will reexamine the status of the deep water species after the assessment is updated and will propose management action in Amendment 6.

Resource status information on the other species in the deep water complex is provided under rejected Option 2. Since these species are taken in a mixed species catch, options addressing individual species are not likely even though some (warsaw and speckled hind) have shown major changes in abundance and size since the 1970s.

Rejected Option 2. The harvest or possession of the following species is prohibited: speckled hind, warsaw grouper, snowy grouper, misty grouper, yellowedge grouper and golden tilefish. Include blueline tilefish and sand tilefish for enforcement purposes.

Discussion

Option 2 was recommended by the plan development team/NMFS stock assessment (Tables 2 and 3). Any of these species that were caught incidentally to other fisheries were to be returned to the water immediately in a manner that minimized injury to the fish. These fish, exclusive of Nassau grouper, form what is known as the deep water grouper fishery and it was the Council's

intent that there would have been no fishing targeting these species. The Council had intended to have this prohibition in place for one generation time (approximately 20 years) to allow these species an opportunity to rebuild. A framework procedure is included in the amenement whereby the zero quota and zero bag limit could be changed if the status of the stock improves above the overfishing level. These species will be assessed on a periodic basis.

Speckled hind are present throughout the South Atlantic, but only the Carolinas produced sufficient catch and samples for analysis. Speckled hind attain weight in excess of 55 lb and live longer than 25 years. The headboat catch declined from about 8,600 fish in 1973 to about 2,000 per year in the 1980s with a 1988 catch of only 1,700. The total catch was probably highest in 1973 when the headboat catch alone was almost 66,000 lb. The 1988 total recreational and commercial catch in the Carolinas was only 28,600 lb. Catch per angler day is only available from the headboat fishery and declined from a high of 0.24 in 1973 to about 0.05 in 1988 in the best speckled hind area. The catch per angler day was only 0.01 over the entire Carolina region in 1988. For the entire Carolina region, mean weight declined from 9.17 lb in 1972 to 4.0 lb in 1988. The headboat fishery SSR is currently 22%, which would require a 24% reduction in F or the size at recruitment would need to be increased to 393 mm (approximately 16") to get to a 30% SSR. The PDT recommended that: "Given (1) the extraordinary decrease in mean size and abundance; and (2) the inability of bag limits to lower F in the recreational fishery because catching even one fish is extremely rare, the plan team recommends a prohibition on retaining speckled hind with a further provision that incidentally taken fish be released after puncture of any protruding air bladders or stomachs. Because speckled hind are now rare a bag limit would be both insufficient protection and useless."

Warsaw grouper live longer than 40 years and attain weights in excess of 330 lb. They occur from North Carolina to the Dry Tortugas; the majority are taken from the Carolinas through Cape Canaveral, Florida. The Carolina headboat catch peaked at 125 fish in 1976 and decreased to only 10 fish in 1987. Total weight declined from 10,340 to 264 lb over the same time. Commercial landings data are problematic due to lumping of groupers. The assessment report noted that: "South Carolina data, separated by species since 1981, shows warsaw landings highest in 1981 with 9,460 lb, bottoming out at 990 lb in 1985, and rising to 2,699 lb in 1989, still a 72% reduction from 1981 levels." Catch per angler has declined as has mean weight, with the Carolina headboat fishery showing a 50% decline from 33 lb in 1981 to 15 lb in 1988. Headboat catch per angler data from South Carolina show a decline from 39.6 lb in 1976 to 8.8 lb in 1987 (75% reduction). All areas combined indicate a SSR of 12% which would require a 60% reduction in F or a minimum size of 41" to get a SSR of 30%. The PDT recommended that: "Warsaw grouper are part of a complex of deep water fish that also includes snowy and yellowedge grouper and gray tilefish. Due to the extreme depths at which these fish are found, management of each species should be similar. The PDT believes the most appropriate goal is a 40% SSBR. To obtain this goal, an extra-ordinarily large reduction in F is needed. The minimum size limit required to accomplish this is very large, and it is doubtful that many released warsaw would survive due to

the depth of water where caught. The PDT recommends no-retention regulations for warsaw grouper in order to reduce F to the levels needed to not only rebuild the stock in numbers, but to allow the species to return to its former large average size. This regulation in conjunction with fishery reserves should prevent irreparable damage to the species."

Snowy grouper live more than 25 years and grow to weights in excess of 20 kg (44 lb). The headboat catch increased from about 1,000 fish in the Carolinas in 1972 to a peak of about 2,700 fish in 1980 but then declined to less than 1,000 fish in 1988. South Florida headboat data show a similar trend. The assessment report indicates that: "Commercial landings from 1981-1989 averaged 267,762 lb for NC, SC and GA combined, with the greatest catch 416,209 lb in 1983. Landings then dropped to 155,338 lb in 1985 before rising to 361,438 lb in 1989." Catch per angler data is only available for the headboat fishery and declined from a high of 0.04 fish per angler day for the Carolinas in 1974 to a low of 0.005 fish in 1984 and then remained around 0.01 from 1985-88. In South Florida the headboat catch per angler day remained at or below 0.001 from 1982-88 except in 1983 when it increased to 0.006 which coincides with the year of highest landings. Mean headboat weight in the Carolinas declined from 10.87 lb in 1972 to about 3.5 lb in 1988. In the Florida headboat fishery mean weight declined from 6.4 lb in 1982 to 3.3 lb in 1988. The mean fish weight in the commercial fishery declined from 8.1 lb in 1984 to 3.7 lb in 1989. SSR estimates from the Carolinas were 10% for headboats, 25% for commercial traps and 15% for a commercial "all gear" category. The South Florida commercial data indicate a SSR of 40%. The PDT was concerned about the low mean size and low SSR in the Carolinas and recommended: "(1) a 70% reduction of the commercial catch; (2) a bag limit of one fish per person per day in the recreational fishery to discourage directed harvest but simultaneously to prevent waste of this unreleasable fish; and a requirement that the species be sorted and sold separately in the commercial venue so that accurate records of landings can be achieved. Given that the snowy grouper is no longer the target of recreational anglers, at least on headboats, we believe that essentially closing the recreational season will have little repercussion."

The golden tilefish catch "reflect alarming declines since 1984 for the Carolinas and since 1982 for Florida. For both areas, the fishery has been productive for a relatively short period of time during the 1972-1989 (Carolina) and 1972-1988 (East Coast of Florida) evaluation period. For the Carolinas (actually SC only), landings increased from about 44,000 lb in 1979 to approximately 638,000 lb in 1982. Catches have declined since then and in 1987 were less than 110,000 lb. Landings for 1988 and 1989 have remained near 154,000 lb. For Florida, landings averaged less than 220,000 lb from 1972-1980, and then increased to about 3,300,000 lb in 1982. Since 1982 catches have declined to approximately 440,000 lb in 1988." The mean fish weight declined from 15.4 lb in 1984 to about 9.7 lb in 1989. The Carolina fishery is producing a SSR of 35% which would require a 13% reduction in F or a minimum size of 570 mm (22.4") to attain a SSR of 40% (SSR of 30% not applicable). In north Florida, the SSR is 28% which would require a 21% reduction in F or a minimum size of 645 mm (25.4") to achieve a 30% SSR. To get a 40% SSR, requires a 41% reduction in F or a minimum size of 704 mm (27.7"). The south Florida

commercial fishery is producing a SSR of 42%. The PDT recommends: "the closing of the fishery (moratorium), but allowing an incidental harvest by the commercial fishery for snowy grouper. The South Carolina summary (Appendix) warns that 'there exists a strong possibility of recruitment failure and stock collapse under continued fishery pressure.' The allowable level of incidental catch is to be based on records held by the State of South Carolina." (NOTE: The referenced appendix is a part of the NMFS/PDT assessment.)

SSR estimates were not available for misty and yellowedge groupers. Misty and yellowedge grouper life history characteristics would likely be similar to the other groupers in this size category.

Although the Council realizes the urgent need for management of the deep water snapper grouper fishery, it is evident from the assessment and from the comments received during the public hearings that more current information that will be available for Amendment 6 is necessary before effective management alternatives can be developed. Thus, the Council rejected Option 2 so that additional and more current information can be included in a stock assessment. This will give staff and Council the opportunity to develop alternatives for quota management and other measures. Management of the deep water complex will be the focus of Amendment 6.

Rejected Option 3. The harvest or possession of Nassau grouper is prohibited. Establish an area delineated by loran that covers the known distribution of speckled hind, warsaw grouper, snowy grouper, misty grouper, yellowedge grouper and golden tilefish and close it to fishing for species in the snapper grouper fishery for 20 years.

Discussion

Option 3 is based on the plan development team/NMFS assessment and combines the no retention recommendation and the closed area recommendation. The Council rejected this option so that additional and more current information can be included in a stock assessment and to give staff and Council the opportunity to develop alternatives for quota management. This will be examined in Amendment 6. The prohibition on harvest or possession of Nassau grouper is proposed as the preferred alternative.

Rejected Option 4. Allow a small directed fishery for snowy grouper with some bycatch allowance for other deep water groupers and tilefish.

Discussion

Option 4 would allow directed fishing for snowy grouper. A bycatch allowance for other species would be specified and the Council requested public input on what poundage limit would be appropriate to ensure no directed fishing for these other species. The Council rejected this option at this time so that additional and more current information can be included in a stock assessment and to give staff and Council the opportunity to develop alternatives for quota management. This will be examined in Amendment 6.

Rejected Option 5. Allow a one fish bag limit of these species (except Nassau grouper which would have a zero bag limit) as a bycatch in the directed, deep water vermilion and red porgy fishery.

Discussion

Option 5 would allow the directed, deep-water vermilion/red porgy fishery to continue and reduce wastage due to the incidental catch of the other deep-water species. Nassau grouper occur in shallow water and would remain under a zero bag limit. The Council requested public input on whether this option would allow the vermilion/red porgy fishery to continue while at the same time provide protection to the other deep-water species. The Council rejected this option so that additional and more current information can be included in a stock assessment and to give staff and Council the opportunity to develop alternatives for quota management. This will be examined in Amendment 6. The prohibition on harvest or possession of Nassau grouper is proposed as the preferred alternative.

F. BAG LIMITS

ACTION 11(A): VERMILION SNAPPER BAG LIMIT

Specify a vermilion snapper bag limit of 10. Possession limits are one day except for charter/headboats which may have a two day possession limit and for excursion boats which may have up to a three day possession limit. See discussion below 11(B) for further details and clarification.

ACTION 11(B): SNAPPER AGGREGATE BAG LIMIT

Specify a snapper aggregate bag limit of 10 excluding vermilion snapper and specify that no more than two can be red snappers. Possession limits are one day except for charter/headboats which may have a two day possession limit and for excursion boats which may up to a three day possession limit.

Discussion

The Gulf Council's reef fish regulations specify a 10 snapper limit excluding red, lane and vermilion snapper. Further, that a person subject to a bag limit may not possess in or from the federal waters during a single day, regardless of the number of trips or the duration of a trip, any snapper grouper species in excess of the bag limits specified except that a person who is on a trip that spans more than 24 hours may possess no more than two daily bag limits, provided such trip is aboard a charter vessel or headboat and the vessel has two licensed operators aboard as required by the U.S. Coast Guard for trips of over 12 hours and each passenger is issued and has in possession a receipt issued on behalf of the vessel that verifies the length of the trip. Further, a person who is on a qualified excursion vessel may possess up to a three day possession limit if fishing occurred over three days, i.e. the 3-days or 2-days applies to actual days fished. If the trip on the excursion vessel is less than three days, then the two day possession limit applies (provided the trip extended two days). In addition, a person who fishes in the federal waters may not

combine a bag limit with a bag or possession limit applicable to state waters and the operator of a vessel that fishes in the federal waters is responsible for the cumulative bag or possession limit applicable to that vessel, based on the number of persons aboard. Transfer of reef fish at sea is prohibited if taken in the EEZ (federal waters) or possessed in the EEZ regardless of where such reef fish was taken. It is the South Atlantic Council's intent that the above requirements for Gulf reef fish bag limits also apply for all bag limits in the snapper grouper fishery management plan.

Charterboats are usually uninspected and are limited to six or fewer passengers. Headboats are mostly inspected under designator "S" of 46 CFR Section 175.05-5(s) and normally carry more than six passengers for drift fishing parties of about four to six hours. They have no overnight accommodations and are limited to 20 miles offshore on their Certificate of Inspection. Excursion vessels are inspected under designator "L" of 46 CFR Section 175.05-5(b) and therefore are equipped with overnight accommodations to run multi-day voyages for over six passengers out to 100 miles offshore. (SOURCE: Letter from Attorney Edward R. Fink to Russell S. Nelson dated February 25, 1991, and presented to the Council at its February/March meeting.)

Florida state regulations specify 10 fish not including lane and vermilion snapper. Also, gray snapper must be 5 or fewer of the aggregate and red snapper must be 2 or fewer. When off the water, Florida state regulations specify a possession limit of 20 of which only 10 may be gray and 4 red snapper.

Analyses to estimate the SSR resulting from a combination of minimum sizes and bag limits are not available. The target SSR of 30% for vermilion snapper would be achieved with a 12" recreational size limit or a bag limit of 8 in North Florida and north and 4 in South Florida. The approved recreational size limit of 10" combined with the 10 fish vermilion bag limit is expected to achieve the target level of 30% SSR. In addition, the Council has proposed a snapper aggregate bag limit of 10 excluding vermilion snapper and specifying that no more than two can be red snappers. The aggregate bag limit will provide additional protection from overfishing, assist in achieving the target level of 30% SSR and spread out the harvest within the recreational sector. These bag limits may be modified, as necessary, through the framework procedure.

Rejected Alternative for Action 11(A) & 11(B)

Rejected Option 1. No action.

Discussion

The Council rejected the no action alternative because enforcement would have been difficult without a consistent bag limit in the South Atlantic federal waters. In addition, without the aggregate bag limit, less protection would be provided to species for which SSRs are unavailable but which are in need of management.

ACTION 12: GROUPER AGGREGATE BAG LIMIT

Specify a grouper aggregate bag limit of five excluding Nassau grouper and jewfish which would remain with zero bag limits). Possession limits are one day except for charter/headboats which may have a two day possession limit and for excursion boats which may have up to a three day possession limit.

Discussion

Analyses to estimate the SSR resulting from a combination of grouper minimum sizes and bag limits are not available. For groupers with a known SSR, the target SSR of 30% will be achieved with the 20" recreational size limits as approved. For groupers that are thought to be overfished but for which SSRs are unknown, the grouper aggregate bag limit of 10 excluding jewfish and Nassau grouper will provide additional protection from overfishing, assist in achieving the target level of 30% SSR and spread out the harvest within the recreational sector. These bag limits may be modified, as necessary, through the framework procedure.

The aggregate grouper bag limit in the Gulf Council's reef fish regulations does not exclude any species except jewfish. The plan development team/NMFS assessment has recommended no retention of golden tilefish, speckled hind and warsaw, Nassau, snowy, misty, and yellowedge groupers. The South Atlantic Council considered a five fish aggregate limit excluding these species from the bag limit. However, the Council chose to include all groupers in the bag limit to provide some protection to these species and to be compatible with the Gulf Council's reef fish regulations as much as possible. Action 12 excludes Nassau grouper and jewfish for which the bag limit is to be zero. See discussion under Action 11 for specifics of bag limit possession, etc. as they apply to headboats, charter vessels and excursion vessels.

Rejected Alternatives for Action 12

Rejected Option 1. No action.

Discussion

The Council rejected the no action alternative because enforcement would have been difficult without a consistent bag limit in the South Atlantic federal waters. In addition, without the aggregate bag limit, less protection would be provided to the deep-water species and species for which SSRs are unavailable but which are in need of management.

ACTION 13: AMBERJACK BAG LIMIT

Specify a greater amberjack bag limit of three. Possession limits are one day except for charter/headboats which may have a two day possession limit and for excursion boats which may have up to a three day possession limit.

Discussion

The minimum size of 28" fork length produces a SSR of 27% which is below the Council's definition of overfishing (30%). Some bag limit (or a larger minimum size or a spawning closure) is required to prevent overfishing. Analyses to estimate the SSR resulting from a combination of

amberjack minimum sizes and bag limits are not available. A bag limit of three with a one day possession limit should provide some additional protection to greater amberjacks and in combination with the minimum size and other measures, should prevent overfishing and spread out the harvest within the recreational sector. A three fish bag limit concurs with Georgia regulations and Gulf reef fish regulations. Florida specifies an off the water limit of six per person. This bag limit may be modified, as necessary, through the framework procedure. See the discussion under Action 11 for specifics of bag limit possession, etc. as they apply to headboats, charter vessels and excursion vessels.

Rejected Alternatives for Action 13

Rejected Option 1. Amberjack bag limit of six with a one day possession limit.

Discussion

Florida specifies an off-the-water limit of six per person. Rejected Option 1 would be incompatible with the Gulf reef fish regulations and with the 28" fork length minimum size limit, and would continue to allow overfishing. This option was rejected by the Council.

Rejected Option 2. Amberjack bag limit of 1 with a one day possession limit.

Discussion

Option 2 would be incompatible with the Gulf reef fish regulations. This bag limit would better ensure that overfishing was prevented but was rejected as being difficult to enforce and over-restrictive.

ACTION 14: GRAY TRIGGERFISH BAG LIMIT

Defer consideration of a bag limit to Amendment 6 pending an updated stock assessment.

Discussion

There is no intent on the Council's part through this action to preclude any state taking action if they deem it necessary. If regulations become necessary in federal waters, measures will be implemented through the framework procedure but at the present time the Council elected to wait for additional information that will be provided in a future stock assessment.

Rejected Alternatives for Action 14

Rejected Option 1. Specify a gray triggerfish bag limit of one with a one day possession limit.

Discussion

The 12" total length minimum size limit results in a recreational SSR of 44% in the Carolinas and between 22 and 26% in Florida. A bag limit of one would reduce the headboat catch by 16% in the Carolinas, by 4% in north Florida and by 21% in south Florida. This option was rejected as being overly restrictive and because of the many comments at public hearings that indicated that the resource was experiencing a boom and restrictions were not necessary.

Rejected Option 2. Only have the gray triggerfish bag limit of one or three apply to Florida.

Discussion

The 12" total length minimum size limit results in a recreational SSR of 44% in the Carolinas and between 22 and 26% in Florida. Having the bag limit apply only to Florida would raise the SSR level in Florida. If the SSRs for Florida and the Carolinas could be combined, the resulting level might exceed the 30% level. If this were the case, one could argue for only implementing a minimum size at this time and specify that a region-wide SSR value be provided in the next assessment. The Council rejected this option because of the many comments at public hearings that indicated that the resource was experiencing a boom and restrictions were not necessary.

Rejected Option 3. Include gray triggerfish within snapper aggregate bag limit.

Discussion

Option 3 would provide some additional protection to gray triggerfish and also to the snappers, but was rejected because of the many comments at public hearings that indicated that the resource was experiencing a boom and restrictions were not necessary.

Rejected Option 4. Specify a gray triggerfish bag limit of three with a one day possession limit.

Discussion

The 12" total length minimum size limit results in a recreational SSR of 44% in the Carolinas and between 22 and 26% in Florida. A bag limit of three would reduce the headboat catch by 4% in the Carolinas, by 0% in north Florida and by 2% in south Florida. The NMFS recreational survey data indicated an expected 30% reduction in fish killed with this bag limit. This option was rejected because of the many comments at public hearings that indicated that the resource was experiencing a boom and restrictions were not necessary.

Other Rejected Options for Bag Limits

Specify a spadefish bag limit of three with a one day possession limit.

Discussion

Data are not available for spadefish; however a bag limit might be useful in preventing a problem in the future. This option was rejected by the Council as being unnecessary at this time. Bag limits may be added through the framework measure and when information on spadefish becomes available, management action will be re-considered by the Council.

G. QUOTAS

ACTION 15: QUOTAS

Do not include commercial quotas at this time except for wreckfish, Nassau grouper and jewfish.

Discussion

Quotas do not appear to be necessary for the species currently under evaluation; minimum

size limits and bag limits are expected to control SSR overfishing levels for most species. This does not preclude action through the framework procedure and excludes wreckfish, Nassau grouper and jewfish. The Council will be examining quota management for the deep water complex of snapper groupers during development of Amendment 6. There is no intent to preclude any state from taking action if they deem it necessary. In addition, data will be available in the future from the permit system so that potential allocation problems may be examined.

Rejected Options for Action 15

Establish quotas for certain species.

Discussion

The Council rejected quotas as being unnecessary at this time (except for wreckfish, jewfish and Nassau grouper) because minimum size limits and bag limits are expected to control SSR overfishing levels for most species..

H. WRECKFISH

ACTION 16: WRECKFISH

Address enforcement concerns that have recently surfaced with the wreckfish trip limits by implementing the following until replaced with a limited entry program:

1. It shall be deemed that all wreckfish possessed by any fisherman or dealer were taken in the EEZ unless it can be established through documentation that these fish were from outside the management unit.
2. There shall be no off-loading of any fishing vessel possessing wreckfish except during the hours of from 8:00 a.m. to 4:30 p.m., local time.
3. There shall be no off-loading of any fishing vessel possessing wreckfish without 24 hours prior notice to the NMFS Law Enforcement office.
4. Dealers of snapper grouper must make available to authorized officers all records of landing and/or purchase of wreckfish upon demand.
5. The possession or landing of wreckfish without heads and fins intact is prohibited.

Discussion

The NMFS Office of Enforcement recommended the above measures because of concerns about enforcement of the 10,000 pound trip limit implemented through Amendment 3. NMFS concluded that they did not have the agent resources to count wreckfish trips to determine compliance with a trip limit regulation. They stated that even if they had an agent dedicated to wreckfish enforcement, that agent might be unable to control landings in excess of the trip limit because boats can be off-loaded to trucks at any deep water dock between North Carolina and Florida.

Documentation to support that the wreckfish was harvested from outside the management unit must contain the following: (1) the information specified in 50 CFR Part 246 for marking

containers or packages of fish or wildlife that are imported, exported or transported in interstate commerce; (2) the name and home port of the vessel harvesting the wreckfish; (3) the port and date of off-loading from the vessel harvesting the wreckfish; and (4) a statement signed by the dealer attesting that each wreckfish was harvested from an area other than the South Atlantic management unit.

It is the Council's intent to utilize an individual's record of compliance with wreckfish regulations (e.g., trip limit and closure) as a criterion for entrance into the wreckfish limited entry program currently being developed as Amendment 5.

Rejected Alternatives for Action 16

Rejected Option 1. No action.

Discussion

The Council rejected the no action alternative because the enforcement problems mentioned above would continue and benefits from the trip limit would not be realized.

Rejected Option 2. Drop the trip limit contingent upon implementation of a limited entry program for wreckfish.

Discussion

Option 2 was rejected because enforcement problems would persist until a limited entry program was put in place. Also, it is premature to adopt this option since the Council did not know the form of the specific limited entry program.

I. GENERAL

ACTION 17: ADD SPADEFISH TO THE MANAGEMENT UNIT

Add spadefish to the management unit without specifying any regulations at this time.

Discussion

The State of South Carolina requested that spadefish be added to the management unit but has not requested any regulations at this time. The Council considered including spadefish in the 8" total length minimum size grouping. Fish of this length would be approximately a year and a half old and would have had an opportunity to spawn. Recent work indicates that all males and females age 1 (6") and older were mature. A slightly larger minimum size (8") would give them the opportunity to spawn prior to being harvested. Given that the information base is limited and that there appears to be no problem with the resource at this time, the Council is not specifying any regulations. However, if action should be necessary a minimum size may be added through the framework procedure. While the Council is not proposing a minimum size at this time, data collection requirements in this amendment do apply for spadefish.

Rejected Alternative for Action 17

Rejected Option 1. No action.

Discussion

No action was rejected because the necessary data would not be collected and, if in the future management regulations became necessary, they could not be simply added through the framework procedure but would require plan amendment.

ACTION 18: ADD LESSER AMBERJACK AND BANDED RUDDERFISH TO THE MANAGEMENT UNIT

Add the lesser amberjack and the banded rudderfish to the management unit without specifying any management regulations at this time.

Discussion

The NMFS has indicated that there are problems with at-sea identification of greater amberjack, lesser amberjack, almaco jack and banded rudderfish. They note that "Mixed catches require identification using accepted structural characteristics, a time consuming and difficult process due to overlap of some of these features...many party boats, as well as private recreational fishermen, target amberjack, may mistake greater amberjack for one of the other *Seriola* species, and then fail to comply with the applicable size or bag limits. In addition, it is possible that commercial harvesters may be able to sell, either intentionally or inadvertently, undersized greater amberjack as one of the other *Seriola* species. The net result may be excessive and unregulated fishing mortality on greater amberjack, a species subjected to increased pressure, particularly after recent closures of other fisheries." NMFS recommends that these species be added to the management unit.

While the Council is not proposing minimum sizes at this time, data collection requirements in this amendment would also apply for lesser amberjack and banded rudderfish.

Rejected Alternative for Action 18

Rejected Option 1. No action.

Discussion

No action was rejected because the necessary data would not be collected and, if in the future management regulations became necessary, they could not simply be added through the framework procedure but would require plan amendment.

ACTION 19: HEADS AND FINS ATTACHED THROUGH LANDING

All species in the snapper grouper management unit (except greater amberjacks which can be cored by commercial fishermen) possessed in or taken from the EEZ (federal waters) must have its head and fins attached and such fish possessed in or taken from the EEZ must have its head and fins attached through landing. Such fish may be eviscerated, but must otherwise be maintained in a whole condition.

Discussion

Action 19 will increase enforceability of minimum sizes and no retention provisions and is being added at the request of the NMFS Office of Enforcement. The SSC also determined that this will allow for more accurate data collection. It is the Council's intent that the preparation of fish for immediate consumption onboard the vessel from which the fish were caught is not prohibited. In addition, selected vessels could be required to land greater amberjacks with heads and fins intact if needed for scientific research purposes.

Rejected Alternative for Action 19

Rejected Option 1. No action.

Discussion

No action was rejected because the necessary data would not be collected and enforcement of the minimum size limits and bag limits would be less effective.

SPAWNING AGGREGATIONS

Bohnsack (1989) summarized information relevant to the management strategy of protecting grouper spawning aggregations (Appendix 2). The information presented would be applicable to any species that forms spawning aggregations:

"...Polovina and Ralston (1987, pg 394) noted that groupers may be especially vulnerable to overexploitation because of their tendency to aggregate at traditional spawning sites and their protogynous reproductive system. A concern exists that this concentrated fishing activity exacerbates overfishing problems. Spawning aggregations have shown signs of overfishing in the Virgin Islands (Olsen and LaPlace, 1978). Evidence exists that fishing mortality can reduce or annihilate known spawning aggregations...A suggested remedy is to protect these spawning aggregations from all fishing activities...Altering catchability is a recognized management technique. Clearly, protecting spawning aggregations would reduce catchability. Spawning aggregations increase catchability (portion of the stock removed by one unit of fishing effort) by increasing fish concentration in defined areas at predictable times. Some evidence shows that in addition to concentrating grouper, grouper may be less cautious and more vulnerable to fishing gear. Johannes (1981) reported that grouper tended to be more lethargic during mass spawning aggregations and could be more easily approached by spearfishermen...Another concern is based on the fact that larger fishes (males) tend to be more aggressive and less cautious in taking baits and entering traps (Thompson and Munro 1974; 1983; pg 651, Munro 1987)...Kapuscinski and Philipp (1988) noted that harvest regulations during spawning seasons help maintain the genetic diversity within stocks...In conclusion, management actions to limit or prohibit fishing of spawning aggregations appears justified and prudent. Grouper populations in the Virgin Islands and Puerto Rico show signs of overfishing. Spawning stocks are targeted and particularly vulnerable to exploitation by a variety of fishing gear types during mass spawning aggregations. Particular spawning aggregations have disappeared or show signs of overexploitation due to fishing activities. Evidence exists that reef fish stocks are recruitment limited and recruitment success becomes increasingly uncertain with reduced stock size."

ACTION 20: GREATER AMBERJACK SPAWNING CLOSURE

The harvest and/or landing of greater amberjack in excess of the bag limit of three in or from the EEZ south of Cape Canaveral, Florida (Vehicle Assembly Building, 28° 35.1' N Latitude) is

prohibited during April. This measure does not preclude commercial fishing during this time as long as the harvest does not exceed the bag limit. The spawning closure provides additional biological protection above that provided by the approved bag limit and size limits.

Discussion

The area in the middle Keys known as the "Hump" appears to be an important spawning area for amberjacks. The Scientific and Statistical Committee pointed out that the spawning closure will raise the SSR for amberjacks and may assist in getting the combined SSR above 30%.

The Council is concerned about the high catch rates from spawning aggregations. The only known areas of spawning occur south of Cape Canaveral. Amberjack are densely aggregated and very aggressive during the spawning period making them especially vulnerable to fishing at this time. Since the commercial fishery is not currently constrained by a quota, a commercial closure of the spawning area will help prevent an excessive harvest and resultant increase in fishing mortality from occurring. Excessive harvest when fish are so vulnerable might result in increases in fishing mortality sufficient to require implementation of quotas or other measures to constrain the commercial fishery. Spawning area closures may preclude the need for further measures.

April is the peak month of spawning with catches of 151,462 pounds which represents 19% of the total 1989 Florida amberjack landings. This measure will reduce fishing mortality by 19% based on the 1989 landings assuming most amberjack landed during April in Florida were associated with spawning aggregations. It is the Council's intent that greater amberjack caught legally under the bag limit during the April spawning closure may be sold in conformance with state law and the commercial size limit. Since the area north of Cape Canaveral will be open to both commercial and recreational fishing, a prohibition on sale of fish south of Cape Canaveral would be confusing and difficult to enforce.

Harvest up to the recreational bag limit is being allowed to promote public understanding of and compliance with the bag limit regulations. Changing the bag limit to zero for one month would have limited biological benefits and create significant negative public and enforcement costs. There is equity in leaving the recreational fishery open during the April limited area commercial closure in that the commercial fishery is not limited by a quota while the recreational fishery operates under a 3-fish bag limit.

Rejected Alternative for Action 20

Rejected Option 1. No action.

Discussion

The no action alternative was rejected because it would not provide any additional protection for the greater amberjack resource during the spawning aggregations when they are most vulnerable to capture.

Rejected Option 2. The harvest and/or landing of greater amberjack is prohibited during March, April and May in the entire South Atlantic EEZ.

Discussion

Option 2 was rejected because the impacts on the fishery would be too great, and areas with no known spawning aggregations (i.e., north of Cape Canaveral) would be unduly regulated. If these areas are later identified as having spawning aggregations, modifications to the closure area may be implemented through the framework procedure.

ACTION 21: MUTTON SNAPPER SPAWNING CLOSURE

The harvest and/or landing of mutton snapper in excess of that allowed within the snapper aggregate bag limit in or from the EEZ is prohibited during May and June. This measure does not preclude commercial fishing during this time as long as the harvest does not exceed the bag limit.

Discussion

The Council is concerned about the high catch rates from spawning aggregations. May and June are believed to be the peak spawning months for mutton snapper with a combined catch of 92,000 pounds or 39% of the total annual catch. Although mutton snapper are not overfished according to the spawning stock ratio, members of the commercial industry are concerned about the status of mutton snapper and believe that a spawning closure would be beneficial. This measure received a lot of public support at the Key West scoping meeting and public hearing. It is the Council's intent that mutton snapper caught under the bag limit in May and June may be sold in conformance with state law and the commercial size limit. Mutton snapper, like greater amberjack, are especially vulnerable during their spawning season because they are densely aggregated and aggressive. Because the commercial fishery is not constrained by a quota, catches and fishing mortality could increase dramatically if vessels target these aggregations. This measure will prevent that from occurring.

Rejected Alternatives for Action 21

Rejected Option 1. No action.

Discussion

The no action alternative was rejected because it would not provide any additional protection for the mutton snapper resource during spawning aggregations when they are most vulnerable to capture.

Rejected Option 2. The harvest and/or landing of yellowtail snapper and gray snapper is prohibited during May and June. The Council encouraged public input on the impacts of a closure during this time period.

Discussion

Yellowtail snapper are not in any biological trouble and the existing 12" minimum size limit appears to be working well. Unlike mutton snapper, yellowtail snapper occur in aggregations

year-round. These schools or aggregations of fish are targeted by the fishery and hence yellowtail snapper are not especially more vulnerable during spawning. Public input indicated the impacts of a closure for yellowtail snapper would be significant. Information on gray snapper is less complete, however, they too aggregate but are not targeted in federal waters. If information becomes available such that action is required for these species, closures may be implemented through the framework procedure. In addition, these species will be reevaluated during development of Amendment 6.

ACTION 22: GAG AND VERMILION SNAPPER SPAWNING CLOSURE

Defer for consideration during development of Amendment 6.

Discussion

The Council is waiting for an updated assessment report scheduled for June, 1991 and additional information to further evaluate the impacts and benefits of a spawning closure. If necessary in the future, spawning closures/regulations for gag and vermilion snapper may be implemented through the framework procedure. Presently, information is too sparse to make informed decisions about spawning closures for these two species.

Rejected Alternative for Action 22

Rejected Option 1. The Council considered an unspecified spawning season closure where: "The harvest and/or landing of gag and vermilion snapper would be prohibited during _____."

Discussion

Sufficient information is not available to evaluate a gag and vermilion snapper spawning closure. The Council is waiting for an updated stock assessment before determining if any further action is required to protect these species.

ACTION 23: LITTLE RIVER SMZ

Delete the Little River Artificial Reef Special Management Zone (SMZ) from the management plan.

Discussion

Construction of a jetty has resulted in a redesignation of South Carolina state waters and the Little River artificial reef is now in state and not federal waters. South Carolina has requested that the Little River artificial reef SMZ be deleted from the management plan.

Rejected Alternatives for Action 23

Rejected Option 1. No action.

Discussion

The no action alternative was rejected because the SMZ is now in state waters.

ACTION 24: SPECIAL RESEARCH ZONES

The NMFS Regional Director is authorized to designate special research zones, in consultation with the Council, where fishing may either be prohibited or permitted on a controlled basis.

Discussion

Action 24 would allow an area to be designated and managed as a research zone and would provide the necessary conditions for conducting some of the research as specified in the snapper grouper management plan and its amendments. NOAA General Counsel recommended that this measure be developed as a closure through true notice action which does not require any additional public input. The NMFS Regional Director has authority to implement such a closure and will consult with the Council prior to initiating any such closure.

The plan development team/NMFS assessment included the following recommendations regarding reserves that could be considered similar to special research zones but reserves would be larger in scale and exist over a a much longer (permanent) period:

"Given that the team's knowledge of the resource was so limited, that the apparent problem was so severe, and that the impact of underestimating the protection needed by reef stocks is judged to be so great, the team believed it imperative to guard against insufficient protection, to establish an insurance policy against failure of the management measures proposed for the bulk of the resource. Thus, we herein recommend establishment of reef fishery reserves, areas that should include no less than 20 percent of the region's reefs and which should be so distributed as to protect each major type of reef and community. A full and compelling argument for marine reserves appears elsewhere, but a major essence of that discussion is that we are unsure that 'normal' management techniques will work at all to prevent further degradation of reef stocks.

Despite successful application to fishes in other countries (e.g. Australia) and to other public resources (e.g. forests, petroleum) reserves are regarded as radical, indeed, politically impossible, by some.

If as a council member, fisherman or citizen you believe the institution of reserves is too drastic, reflect on the drastic effort society expended in achieving the observed changes in the fish populations. Despite concern by scientists and the Council, as a society we went all out to harvest as many reef fish as fast as we could. Are we less capable or desirous of mustering the energy and political wherewithal to protect a system than we were in damaging it: If we were willing to enjoy the benefits of rapid and essentially uncontrolled exploitation of the reef resource, should we not be willing to pay the price of needed repairs and protection to the system?

And of course in the unlikely result that reserves prove unnecessary we have lost no fish resource. Because reef fish are long-lived, the resource is still there, in fact, enlarged by the accumulation of biomass through growth.

Given that the PDT determines that the reef fishery is in a generally depressed state, and that we are uncertain of the ability of usual management measures to improve that state or to prevent further damage, we believe it is imperative to establish fishery reserves so as to meet Finding Five of the Magnuson Act, "If placed under sound management before overfishing has irreversible effects, the fisheries can be conserved and maintained on a continuing basis."

The Council made the decision to go forward with Amendment 4 establishing minimum sizes and bag limits and to evaluate marine fishery reserves in Amendment 6. Recent published accounts of dramatic changes in the genetics of fish populations as a result of fishing lends support to establishment of reserves. This subject will be thoroughly debated during development of Amendment 6 during the later part of 1991.

OTHER REJECTED ALTERNATIVES FOR THE GENERAL CATEGORY

The following options were considered and rejected and are included here to inform the public about all options that were deliberated during development of Amendment 4.

Rejected Option 1. Fishermen are required to conform to the more restrictive regulations whether they are state or federal regulations. Provisions could be designed to address vessels or crew needing assistance while fishing in the EEZ that must unexpectedly enter state waters. The summer flounder plan has a provision such that a vessel holding a federal permit will fish under the more stringent of federal or state rules. Minimum sizes and bag limits could be designed with a possession requirement, whereas the rest of the regulations would use landing/sale laws, applying to everyone with a permit/only for state residents or to fishermen in waters adjacent to each state. This requirement could apply to the following types of regulations:

a. Minimum sizes and bag limits.

Discussion

Rejected Option 1 may work better for species that occur in a limited area of one state (e.g., yellowtail, lane and mutton snapper in south Florida). The Mid-Atlantic Council's summer flounder and bluefish fishery management plans have a requirement that vessels holding a federal permit will fish under the more stringent of federal or state regulations. Such a general provision would have the more stringent of either state or federal minimum sizes and bag limits apply.

b. Trip limits.

Discussion

Trip limits as accomplished with a landing law. This could also be structured so that the more stringent of state or federal regulations would apply.

c. Closed seasons and/or areas.

Discussion

Closed seasons and/or areas would be more difficult to enforce because they would require at-sea enforcement to be fully effective.

d. Gear restrictions.

Discussion

The Council could specify that they want to allow the more restrictive of state or federal regulations to apply to gear restrictions and prohibitions. Certain gear restrictions would be more easily accommodated, but gear prohibitions would probably be difficult given past attempts to prohibit certain gear types.

e. Quotas.

Discussion

Quotas are currently employed in the mackerel fishery in Florida, whereby once the state quota is filled, fishing must take place in the EEZ if the federal quota has not yet been reached.

f. Disposition of fish taken under a bag limit.

Discussion

Either fish could not be sold or they could be sold consistent with state regulations. This is important because in some states (e.g., Georgia) it is traditional for fish caught recreationally to be sold to supply the local market. Restrictions could be structured so that the states could specify whether fish captured under a bag limit may be sold. A commercial permit to sell could still be required. This measure would track the current mackerel program whereby mackerel caught recreationally can be sold consistent with state regulations.

g. States submit regulations to the Council for conservation equivalency.

Discussion

This is currently being done with the Mid-Atlantic Council's bluefish fishery management plan. It may be feasible if a stock assessment/review panel is convened consisting of representatives of various state and federal management agencies.

The Council rejected options (a) through (g) as being unnecessary at this time. Also, the diversity of the snapper grouper fishery would make implementation of such a measure difficult.

Rejected Option 2. Add the new South Carolina artificial reefs as SMZs.

Discussion

Six additional artificial reefs have been constructed in the EEZ off South Carolina. The State has requested that these sites be designated as SMZs using similar justification as was used for the original artificial reef sites. Similar regulations would apply although there may be some additional provisions adopted for amberjacks. The Council will address these new SMZs in a future amendment or through regulatory amendment.

Rejected Option 3. Trip limits.

Discussion

A commercial trip limit of 1,500 lb or 50 whole fish per day has been suggested for amberjacks. The bag limit would apply for vessels without a permit. The proposed minimum sizes, bag limits and spawning area closures were calculated to reduce fishing mortality and increase SSR to the target levels without trip limits. Thus, if the proposed regulations are implemented, trip limits are unnecessary at this time. Trip limits were rejected as being unnecessary at this time.

Rejected Option 4. Fishing year.

Discussion

The current management plan specifies the calendar year as the fishing year for all species. Amendment 3 (wreckfish) specifies a fishing year of April 16—April 15 for wreckfish. The Council concluded that the seasonal fishing pattern does not appear to require changes to these two

fishing years at this time.

Rejected Option 5. SMZs for research purposes.

Discussion

Some of the research needs specified in the snapper grouper management plan, as amended, would be conducted in an area with no, or only limited, fishing. The designation of areas as research SMZs solve research needs. The Council rejected this option, but has given the NMFS Regional Director authority to establish special research zones.

Rejected Option 6. Add marbled grouper (*Epinephelus inermis*) to the management unit.

Discussion

The Council considered approving this measure and including it in the grouper aggregate bag limit or having a zero possession limit. The Council concluded that this action would require additional public input as it was not included in the public hearing document and deferred consideration to Amendment 6.

J. GEAR RESTRICTIONS

ACTION 25: PROHIBIT THE USE OF ENTANGLEMENT NETS

Prohibit the use of entanglement nets (including, but not limited to, gill nets and trammel nets) for the harvest of species in the snapper grouper management unit. It is the Council's intent that the simultaneous possession of entanglement nets and species in the management unit be prohibited except as provided for under Action 31.

Discussion

Catch by entanglement nets during 1988 was 1,398 pounds from North Carolina through Georgia (less than 1% of the combined state catch) and 253,739 pounds from the Florida East Coast (6% Florida East Coast catches) (Table 5). Much of the Florida landings is from a directed stab net fishery for gray snapper that operates in the EEZ. The Gulf Council and the State of Florida have prohibited entanglement nets. Florida regulations read as follows: "No person shall harvest in or from state waters any snapper of the family of Lutjanidae or any member of the genera *Epinephelus* or *Mycteroperca* by or with the use of any gear other than those types of gears specified in SubSection 1, provided however that snapper and grouper harvested as an incidental bycatch of other species lawfully harvested with other types of gears shall not be deemed to be unlawfully harvested in violation of this section, if the quantity of snapper/grouper so harvested does not exceed the bag and possession limits as specified elsewhere." The South Atlantic Council's actions track the Florida regulations in intent with respect to limiting possession to the bag limit and for species without a bag limit, no possession is allowed. Florida prohibited entanglement nets because it is an inappropriate gear to use on live bottom. Some of the reef fish are not necessarily found on the live bottom, however, many are and fishermen use stab nets to catch gray snapper on the live bottom areas. The Council is prohibiting entanglement nets to

address the problem of intense competition among users (Problem 3) and to prevent habitat degradation (Problem 4) from nets becoming tangled in reef and live bottom material. This prohibition also address Objectives 3 (promote orderly utilization) and 5 (minimize habitat damage). There was little objection from the commercial industry over the prohibition during the public hearings and most public comment was in support of such a prohibition (Appendix 1).

Amendment 1 was developed to prevent habitat damage from the use of trawl gear in the snapper grouper fishery. The Council has concluded that entanglement nets are not an appropriate gear for the snapper grouper fishery and the prohibition will prevent use and/or expansion from North Carolina through Florida's East Coast.

Entanglement nets targeting species other than those included in the management unit (Table 1) are limited to the bag limit if the species is under a bag limit, and if no bag limit is applicable, then no retention is allowed (see Action 31). An example of where some allowance might be made is in the Spanish mackerel fishery which has a bycatch of gray snapper and gag. The shark fishery is another example that may have a bycatch of snapper grouper species.

Rejected Alternatives for Action 25

Rejected Option 1. No action.

Discussion

The no action alternative was rejected because the Council concluded that the use of entanglement nets in the snapper grouper fishery would result in problems caused by inappropriate gear in a fishery, such as ghost fishing and habitat damage.

Rejected Option 2. Any vessel with entanglement nets aboard is limited to no more than the recreational bag limit. If there is no bag limit for a particular species, then there is no retention allowed.

Discussion

Option 2 was rejected in favor of a more general approach to non-conforming gear as discussed later.

ACTION 26: REGULATE LONGLINE GEAR

A. Prohibit the practice of bottom longlining in the wreckfish fishery in the entire South Atlantic EEZ until a limited entry system is developed and then determine if the prohibition should continue. Bottom longline is defined as a stationary, buoyed, and anchored groundline with hooks attached. It is the Council's intent that the act of bottom longlining be prohibited. Recognizing that the same reels are used for vertical fishing, the Council recognizes that regulations will have to be written in a manner to prohibit simultaneous possession of wreckfish and all the necessary components for bottom longlining.

Discussion

At its February 1991 meeting, the snapper grouper committee recommended requesting that longline gear be prohibited in the wreckfish fishery by emergency action. Subsequently, the South Atlantic Council approved requesting the emergency rule. It is the Council's intent that the emergency prohibition apply to wreckfish longlining (i.e., prohibit the simultaneous possession of wreckfish and operable bottom longline gear and prohibit use of bottom longlines). The 1991/92 fishing year begins on April 16 and the Council requested that the prohibition be in place by April 16. It was noted that the same action was being included in Amendment 4 which would not be implemented prior to the April 16 start of the fishing year.

The Council is concerned about wastage of fish, gear loss, gear conflict, habitat damage and negative economic effects (both short and long run) attributable to the use of bottom longline gear in the wreckfish fishery. The bottom habitat on the wreckfish fishing grounds, which comprise an area of the Blake Plateau of approximately 50-75 square nautical miles, is characterized by a rocky ridge system having a vertical relief greater than 50 meters and a slope greater than 15° (Snapper Grouper Amendment 3). The depth range in this area is 450-600 meters; the substrates in areas of the Blake Plateau exhibiting significant relief are generally characterized as composed of manganese phosphate pavements, phosphorite slabs and coral banks (Pratt and McFarlin, 1966; Stetson et al, 1969 - citations in Snapper Grouper Amendment 3). This high relief, in conjunction with the strong tidal effects, makes gear loss probable (as reported by fishermen who have already tried longlines in the wreckfish fishery) which results in the loss of all fish on the gear as well as those which get hooked subsequently. Testimony from fishermen indicates gear loss on wreckfish longline sets was as great as 100% of the gear taken out on a single trip. According to accounts from fishermen, extensive lengths of lost longline gear have been observed on their fathometers. Fishermen can apparently see fish hooked on parted longline gear but are unable to recover the parted gear and its catch. Wreckfish fishermen use circle hooks that virtually prevent fish from working the hook free. The Council recognizes that there is also some ghost fishing potential from lost vertical gear but believes that the extent of potential loss with vertical gear is much smaller by virtue of the fewer number of hooks used and the greater control over the gear.

Approximately 74 vessels fished this area last year and approximately 83 are anticipated in the fishery during 1991/92. Although the area is 50-75 square nautical miles, virtually all wreckfish fishing takes place along limited, high relief ledge areas within this area because wreckfish are found along the ledges and are not evenly distributed over the wider area. The sub-areas that produce wreckfish are typically 300 yards wide and 1 - 4 nautical miles long. Thus far, fishermen fishing vertical drop gear have been able to work in relatively close proximity without any major conflicts. If bottom longlines were to be used in this area, vessels would not only lose gear due to the rough bottom, but lost gear would create a hazard for those using vertical lines which would result in loss of that gear. This problem will become progressively worse over time as the more gear that is lost, the more hangs will be created for both longline and vertical gear, creating even more gear loss. This condition could continue until much of the ground is

unfishable. The wire cable that is used will remain a hazard for many years as the rate of decay is slow. While extensive hangs may ultimately provide protection for the resource due to much of the fishing grounds being unfishable, it may well result in the loss of the fishery. The use of longlines will result in gear losses to vertical hook and line fishermen that far exceed their losses prior to the introduction of longlines. This will serve to reduce benefits to those fishing with the traditional vertical gear.

The potential for gear entanglement and gear conflict also raised the issue of vessel safety. It is the Council's opinion that this situation could lead to conflicts that jeopardize the safety of the vessels and fishermen participating in the wreckfish fishery.

Longline cable on the bottom has the potential to break some of the ledges, overhangs and associated organisms, and otherwise damage the habitat on which the wreckfish depend. Habitat damage caused by the longlines would violate the SAFMC habitat policy and should be avoided.

In addition, allowing longline gear may decrease benefits to wreckfish fishermen in general and defeat the intent of the 10,000 pound trip limit which was designed as an interim measure to slow down the rate at which the TAC was harvested. Wreckfish is a new product with high potential in the southeast. In order to obtain the highest valued use of a perishable product, it is important that it not be harvested in a compressed time period. The intricacies of wreckfish consumer demand apparently do not accommodate large quantities of wreckfish hitting the market in a short period of time. Short run supply gluts have flooded markets and been observed to exceed the existing capacity of the processing/distribution chain. This has contributed to prices as low as $0.80 per pound exvessel at times of oversupply when prices of $1.30 to $1.80 are possible when this situation is avoided. Low prices reduce net benefits to producers. Rapid harvest can result in society not deriving the highest value from its common property resource because of poor or extremely variable quality.

Longlines were first used when the "derby" fishery began after a TAC of 2 million pounds for fishing year 1990-91 was established. Testimony from wreckfish fishermen (including some who actually used longline gear in 1990-91) indicated that the gear was brought into the fishery to allow its users to catch more of the remaining TAC as harvest of the 2 million pound quota was approached. Under the existing trip limit for the 1991-92 season, longlines will be used to catch wreckfish faster than would occur with vertical gear. This will allow longline users to catch the trip limit in a shorter period of time; more trips will be made in a given period of time and more trip limits will be harvested. Wreckfish will be landed at a faster rate using longline gear than was anticipated by the Council. This will serve to defeat the intent of the trip limit, which attempted to slow down the fishery and was based on harvest by vertical hook and line gear. After the 1991-92 season, an individual quota-based limited entry system is expected to be in place to address temporary oversupply problems, and at the same time, reduce vessel and ocean safety problems resulting from crowding on the fishing grounds.

If use of bottom longlines were used when the trip limit was developed, the trip limit would have been set less than 10,000 pounds to effectively accomplish any real slow down of harvest.

Modifying the trip limit before the season begins would be disruptive to fishermen at this time, and even if lowered, there is evidence that a lower trip limit would adversely impact all wreckfish fishermen because of the natural scale of operation that is suited to the wreckfish fishery.

In the final analysis, it appears that the wreckfish fishery has employed efficient vertical gear since its inception, and the addition of longlines will erode benefits to the majority of fishermen and adversely impact the resource and habitat. In an extreme case, if longlines are allowed, then all or at least many wreckfish fishermen may be forced to adopt the gear in order to compete. This will involve more gear loss from parted longlines, and potential deadweight economic losses to fishermen abandoning the vertical gear.

The Council has determined that bottom longlines are not in the best interest of the wreckfish resource, habitat, fishermen or society at large. Further, the problems outlined justify prohibiting this gear/fishing method. After a limited entry system is in place, the Council will reexamine this issue to determine if there are certain areas (away from the high relief areas) that may be appropriate for the use of bottom longlines and may modify this prohibition in the future through the framework procedure.

B. Prohibit the use of bottom longline gear for snapper grouper in the South Atlantic EEZ within 50 fathoms.

Discussion

Catch by bottom longlines during 1988 was 470,306 pounds from North Carolina through Georgia (6% of the combined state catches) and 576,310 pounds from the Florida East Coast (13% Florida East Coast catch) (Table 5). The Council is concerned about the use of bottom longline gear targeting species in the snapper grouper management unit in live bottom areas. Habitat damage and intense competition among users are problems that arise when this gear is used within 50 fathoms where significant live bottom occurs and where competition with hook and line vessels occurs. The Council concluded that this gear is appropriate for use in the deep-water snowy grouper/tilefish fishery where much of the bottom is mud with sparse live bottom areas. Allowing use of this gear deeper than 50 fathoms would preserve the traditional fishery which takes place in deeper water out to 50 fathoms. Based on information from South Carolina, up until 1983 the snapper grouper fishery was limited to vertical hook and line or bandit reels. Bottom longlines were introduced in the Gulf of Mexico after hook and line gear became less effective due to decreases in resource abundance; use of the gear grew rapidly. Up until this point there has been no gear prohibition on bottom longlines. After the golden tilefish and snowy grouper fisheries were developed, bottom longlines became the predominant gear, again as resource abundance declined. For species like snowy grouper and tilefish, it was not very efficient to use vertical hook and lines as the resource abundance declined from unfished levels. As the tilefish and snowy grouper stocks off South Carolina declined, the number of people using longlines decreased. Off South Carolina virtually all of the golden tilefish occurred well outside the 50 fathom mark and there was more than enough gear to adequately harvest these resources in the mid-depth zone.

Vertical lines are much more environmentally acceptable and less damaging than bottom longlines.

This regulation essentially segments the mid-shelf and the deep-water complex to the bottom longlines. This measure was supported during the public hearing process and the Council concluded that prohibiting use of longline gear within 50 fathoms will prevent the problems of habitat damage and intense competition while at the same time allow fishermen using this gear to continue fishing in deeper water. This action effectively limits longlines to targeting the deep water component of the snapper grouper fishery and keeps the use of longlines outside of the rough bottom habitat.

The Council very briefly considered moving the line in to the 40 fathom contour but was concerned that there are substantial *Oculina* coral banks along this depth zone. It was further noted that the 50 fathoms was a compromise from the 100 fathom contour (which was mentioned) and that the 50 fathom contour effectively separates the inshore and deep water snapper grouper complexes.

Rejected Alternatives for Action 26

Rejected Option 1. Prohibit the use of longline gear in the snapper grouper fishery throughout the EEZ (federal waters).

Discussion

Rejected Option 1 would impact the fishermen by removing the catches and values indicated above. There would be some potential of capturing some of this lost catch through the use of allowable gear. The Council rejected this option as being too restrictive in that prohibiting use of longlines inside of 50 fathoms addresses the concerns about habitat damage and conflict among user groups.

Rejected Option 2. No action.

Discussion

Rejected Option 2 would allow the longline fishery to continue. During 1988 total catches were approximately 470,000 pounds, worth approximately $724,000 for North Carolina through Georgia. Catches for the Florida east coast were approximately 576,000 pounds, worth approximately $852,000. Catches within 50 fathoms were estimated to be 190,000 pounds in the entire South Atlantic (see RIR Table 33). This option was rejected because it would not address the problems of habitat damage and intense competition on the fishing grounds.

Rejected Option 3. Allow the use of longline gear but limit the number of hooks per set to some number to be specified by the Council _____.

Discussion

Rejected Option 3 was rejected because it would be very difficult to enforce, and it would not address the problems of habitat damage and intense competition on the fishing grounds.

ACTION 27: REGULATE POWERHEADS/BANG STICKS

Prohibit the use of powerheads/bang sticks for harvesting species in the management unit within designated SMZs off South Carolina. It is the Council's intent that the possession of powerheads/bang sticks and mutilated fish be prohibited; possession of powerheads/bang sticks for safety purposes is allowed.

Discussion

This would address the problem with amberjacks as documented by South Carolina (Appendix 3). Data indicated that up to 4,000 pounds of amberjack have been landed from a 4 day trip. South Carolina state biologists indicate that at least 4 boats fished in this manner during 1988 and 1989. They indicate that "...the harvest of large quantities of fish by a few individuals is inconsistent with the objectives of the state's Artificial Reef Program. Major objectives include maximizing fishing opportunities on the reefs for a large number of anglers and maximizing the economic benefits which these structures provide to the state's coastal communities. The practice of bang-sticking is not currently resulting in overfishing of reef fish species on a stock-wide basis but it has created a condition of overfishing on a localized basis. It may be as long as a year before fish recruit and repopulate a reef which has been overfished by divers using bang-sticks. As other fish stocks are overfished and depleted, this practice could grow considerably and result in significant over-harvesting of reef fish stocks and user conflicts." South Carolina is requesting that the Council prohibit the use of bang sticks to harvest species in the snapper grouper complex in those areas off South Carolina which have been declared SMZs.

The SMZs are set up so that the permit holder on the artificial reefs designated as SMZs may request that certain gear be prohibited. The basis for this request from South Carolina is well documented; the information described above and included in Appendix 3 support such a request. The South Atlantic Council's law enforcement committee recommended that the regulation be written such that it would prohibit the possession of mutilated fish in the snapper grouper complex along with bangsticks but would allow the use of bangsticks for protection. Information from South Carolina indicates that bangsticks are not used very frequently by recreational divers in South Carolina and a prohibition would not significantly impact recreational fishermen.

There is no intent, by this action, to alter any existing prohibition in the SMZs other than to add this prohibition for the SMZs off South Carolina.

Rejected Alternatives for Action 27

Rejected Option 1. Prohibit powerheads/bang sticks for harvesting species in the management unit within all designated special management zones (SMZs).

Discussion

Prohibition of powerheads/bang sticks would be in effect in all SMZs and may be necessary to prevent future problems that may surface similar to the commercial harvest of amberjack on South Carolina SMZs. The Council rejected this option as being inappropriate in that the permittee is allowed to request specific regulations within SMZs. The Council may go beyond an individual

request but does not think it is appropriate to do so in such a broad manner as is included in this option.

Rejected Option 2. No action.

Discussion

The use of spearfishing gear (which includes powerheads/bang sticks) is prohibited in the Ft. Pierce inshore SMZ and in the Key Biscayne SMZ. Taking no action would continue to provide protection in these areas but would not provide protection to the South Carolina SMZs and was rejected by the Council.

Rejected Option 3. Prohibit powerheads/bang sticks for harvesting species in the management unit within the South Atlantic EEZ.

Discussion

This measure was rejected in the original management plan (SAFMC, 1983a): "Powerheads increase safety under water because speared fish attract sharks when they do not die right away. The use of powerheads allows divers to kill 95 percent of the fish they hit instantly. Approximately 30-40 percent of fish shafted without powerheads escape and die."

Catch by diving during 1988 was 16,239 pounds from North Carolina through Georgia (less than 1% of the combined state catch) and 52,122 pounds on the Florida East Coast (1% of the Florida East Coast catch) (Table 5). Critics of the use of powerheads/bang sticks feel that this method selectively harvests larger, spawning fish and allows the harvest of fish when they are not "biting" (i.e., actively feeding) and should be prohibited to preserve the large spawners. Some fishermen also feel that the divers harvest more than their fair share when they observe a boat unloading several thousand pounds of fish. Proponents of this gear point out that they are already severely limited due to weather, bottom time (i.e., the amount of dive time that is available given the depth of water), water turbidity and physical demands of diving. Further, that they can selectively harvest by species and size; there is virtually no bycatch problem and no release mortality problem because they do not harvest undersized or unmarketable species. Letters received and public comment at the many hearings provided much input, both for and against this gear (see Appendix 1).

The Council rejected this option due to the absence of bycatch, ability to selectively harvest by size/species and limitations inherent in diving. Concerns over the use of this gear could be addressed either through a bag limit or a trip limit rather than a total prohibition. The Council will examine data concerning this gear and evaluate options to address any remaining conflicts in Amendment 6 or future amendments. Modifications to the regulations governing powerheads/bang sticks may be implemented through the framework procedure.

ACTION 28: REGULATE FISH TRAPS

Given the complexity and volume of information available on fish traps, a general discussion about this gear is presented below. It is important that this information be reviewed prior to presenting the Council's actions and rationale because it describes the context within which the Council deliberated fish trap management. This approach also reduces the duplication of material under each of the options and will reduce the paperwork required in preparing this amendment. Reviewers and the affected public are also served by this approach because everyone will be starting with the same data base.

General Fish Trap Discussion

At the August 1990 snapper grouper committee meeting Dr. John Merriner (NMFS Beaufort Lab) presented a summary of the preliminary fish trap report by D. E. Harper, J. A. Bohnsack and D. B McClellan (Harper et al., 1990). The following is an excerpt from the minutes of that meeting.

"Dr. Merriner said it was a preliminary report and was so named because it is a study in progress. It was not meant to be a region wide evaluation, but was meant to be, specifically, an attempt to fill some particular holes for the Councils dealing specifically with the commercial trap fish fishery in South Florida. He said there were very few data available historically on the fish and invertebrates that were caught in traps but not retained, and that there was potential for changes in fish trap catch composition in recent years either through areas fished, trap design, etc. and there was an attempt to define what the survival rates were among the fishes released. The primary question was whether the fish that were released actually went straight back down to the bottom or were left at the surface swimming. The researchers collected samples in May and June of 1990 by fishing with commercial fishermen. They attempted to get total catch, bycatch, size composition, released and discarded fish, live/dead fish and were able to get complete catch information only from a subsample of 189 out of 353 trap hauls. Weight biomass estimates were made by converting the measured sizes or lengths of the animals recorded to length/weight relationships as compiled for those same species by Drs. Bohnsack and Harper in a 1988 report. In dealing with survival of the fish, he said the released fish had been either punctured or not punctured and a variety of techniques were employed. It was determined whether or not the fish were still on the surface after one minute, having been thrown back and did not disappear below the surface. If it did disappear it was considered a swimmer (i. e., a survivor) and if it did not disappear it was considered a non-swimmer and presumed dead. The sampler aboard used a tape recorder to record measurements as the catch was being processed.

Dr. Merriner reported that the trap hauls were made along the southeast Florida coastline from the Miami harbor entrance out to an area approximately 35 nautical miles west of the Dry Tortugas area they considered representative of the fish trap fishery. The samples were taken on six fishing days, mean depths of water samples was 49.2 meters or 161 feet, and the depths ranged from a minimum of 100 feet to a maximum of 270 feet or 82.3 meters. The mean soak time was 6.6 days. The handling time on shipboard was fairly fast; fish were returned to the water within three minutes or less with a maximum of five minutes before the next trap was hauled.

Snappers dominated the catch by number and weight, groupers ranked second by weight and grunts ranked second by number. In total, the 1,772 fish representing 78 species were released from the 353 trap hauls. This represents a bycatch release for the fishes which averaged five fish per trap haul in the 179 hauls completely sampled. Targeted fish represented 83% of the total weight and 65% by number of the average trap yield of 5.9 kilograms and 7.5 individuals. Compared to other studies that were cited, Sutherland and Harper (1983) found that targeted fishes represented 77% of the total weight and 62% of the individuals off Dade and Broward Counties. Taylor and McMichael (1983) reported that targeted fish represented 69% total weight and 51% of the individuals in a trap study done off of Monroe County. In the study all non-targeted fish were

released alive and the records showed that some of the fish had historically been retained and sold as chum.

The bulk of the total released fish included the smooth trunk fish, bigeye, balloon fish, scorpion, planehead filefish, and small vermilions. Out of the 1,772 released fish 78.8% were classified as swimmers. He said the percentage of fish which submerged after release was intermediate between the values reported by Taylor and McMicheal (52.7%) and Sutherland and Harper (87%). The general tendency was for fishes that had the laterally compressed body form such as filefish, angelfishes, butterfly fishes appeared less likely to swim down, indicating that puncturing facilitated their swimming to greater depth. There was no conclusion about the survival of fishes once they got down, so the actual survival rates remain unknown. Studies by Pete Parker of the Beaufort Lab, done by scuba divers on red snapper which were released at the surface after being captured by hook and line at depths from 70 to 165 feet indicated variable survival rates of 64% to 89% survival. There may be differences between hook and line versus trap capture but the data presented for the traps were within the range of those for hook and line. There were some species-specific differences noted for those fish that tended to be more susceptible to dying in the trap such as barracudas.

The cumulative mortality rates as found for bycatch averaged 0.25 fish per trap haul, however, the observation was made that it might not reflect the cumulative mortality. Sutherland had reported the mortality of fishes found in traps were highly variable due to the confounding variables of depth, trap design, soak time, etc.

The researchers also looked at releases due to the minimum size limits established by the Gulf Council. Out of a total of 140 undersized snapper and grouper released, 6.4% of the number and 2.2% of the weight of all fishes caught in the 189 trap hauls were undersized. The releases ranged from no undersized mutton snapper and gray snapper to 92% for red snapper. The ability of these fish to submerge are detailed by number in the tables."

Results from a fish trap survey conducted by Kitner (1989), SAFMC Visiting Scientist, and completed in December 1987 are given below:

"In order to give a broad picture of the current state of the fish trap fishery in the South Atlantic region, the combined results of the SAFMC and SEFC studies will be described first, followed by the more detailed SAFMC questionnaire data.

By mid-December a total of 81 (31.6%) out of 253 permit-holders had responded to the SAFMC fish trap survey. Counting responses garnered from the SEFC Gulf of Mexico survey, there is a total of 140 (55.3%) fish trap fishermen accounted for in the South Atlantic region, including those fishermen who have quit the fishery. Table 1 shows the frequency of all the levels of activity in the fish trap fishery, where "yes" signifies that a person is currently fishing traps, "no" means that they are not fishing now but intend to in the future, and "quit" means that they have left the fish trap fishery entirely.

One should note that approximately 50% have either left the fishery or are not currently using traps but may do so in the future. While this study is not diachronic (that is, there is no true baseline study with which one can compare fish trapping activity through time) in scope, this number may indicate that the fishery is characterized by a large degree of flux, with a smaller number of longtime participants at the core of activity. This and other related points will be discussed below together with examination of the SAFMC data.

Table 1. Levels of Participation (LOP) in the South Atlantic Fish Trap Fishery.

LOP	Number	Percentage
YES	68	48.5%
NO	43	30.7%
QUIT	29	20.7%
TOTAL	140	100 %

The number of traps actively fished is equal to approximately 60% of the number of traps owned. Per person, the mean amount of traps owned is 60, with on average 38 being actively fished. The table below lists the summarized results of both questionnaires.

Table 2. Number of Traps Owned and Number of Traps Actively Fished (N=140)

Total Traps Owned	7962	
Total Traps Fished	5040	(63.3% of total)

These numbers, however, only give a one dimensional accounting of this particular fishery. They do not answer the questions of whether a fisherman is a full or part-time commercial fisherman, how long he has been trapping, or if he only uses fish traps on a part-time basis. The answers to these questions are illustrated by the responses to the SAFMC survey. Beginning with the questions "How many years have you been a commercial fisherman?" and "How many years have you used fish traps?", one sees the mean for "total years commercial fishing" is 14.9 years, whereas the average amount of time spent fishing traps is 4.4 years. It is hypothesized here that a sudden increase in fish trapping activity about five years ago was influenced by the State of Florida's ban on setting fish traps in state's waters. Previous to this occurrence there was a great deal of media attention given to the efficiency of fish traps. Rather than discourage the use of fish traps by describing their efficiency and ease of operation, the State of Florida and the media may have inadvertently encouraged some persons to begin setting fish traps.

Another aspect of determining participation rate in the South Atlantic fish trap fishery is measuring the degree to which fishermen are involved in other employment or fisheries. Asked if they were employed outside of commercial fishing, 29.8% replied that they were, with the remainder, 70.1% not so employed. Of those participating in another fishery besides fish traps, 36 (46.7%) were engaged in the spiny lobster fishery and 21 persons (27.6%) were involved in the stone crab fishery. Of those not engaged in any other fishery, six are not currently using fish traps and ten are currently active. Comparing full-time fishermen to part-time fishermen who are not participating in any other fishery nor occupation, one finds only nine presumably full-time fish trap fishermen among the 81 respondents to the SAFMC questionnaire. Again, this is a figure based only upon 31% of the assumed universe of fish trap fishermen.

The amount of time fish trap fishermen spent soaking their traps ranged from a few hours to approximately two weeks. The mean soak time was 3.2 days. When traps were left in the water for more than three days, they were usually set unmarked by buoys, with Loran readings used to identify location. Trap fishermen will set 10-15 traps together connected by a chain (a configuration called a "trawl") and retrieve them by dragging a grappling hook. Fishermen who employ less than 30 fish traps often will set their fish traps on the way to hauling their lobster or stone crab traps, and retrieve them on the way back into port. There were many fish trap fishermen who complained of trap loss by theft; for this reason many traps are not buoyed. However, no systematic questioning was done in the SAFMC survey to account for trap loss, and so one cannot determine the impact such activity has on the fish trap fishermen.

The mean size of the fish traps set was 20.5 cubic feet, with 44 persons (58.6%) setting fish traps in the waters off Monroe County, Florida. Table 3 gives a breakdown of the numbers of people setting traps off of certain counties. Other counties and locations mentioned singly as second and third choices in the responses were: Martin County, Indian River County, Pinellas County, and the Republic of Honduras.

Using the combined data of the two surveys, 33 persons (20%) reported using fish traps year round, or more than 10 months a year. There is a significant number of fish trap fishermen (25, or 36.7% of all those active) who use the traps primarily in the spring and summer months. As they stated in their written comments, they regularly use fish traps to supplement their income when they are not able to fish for spiny lobster or stone crab. Again, this data supports earlier statements that a good majority of those who employ fish traps are primarily pursuing their livelihood in the other large south Florida trap fisheries.

Table 3. Locations of Fish Traps by Number and Percentage of Respondents.

County	Number of Persons	Percent of Total
North and South Carolina	1	1.3%
Brevard	1	1.3%
St. Lucie	1	1.3%
Palm Beach	4	5.3%
Dade	5	6.6%
Monroe	44	58.6%
Collier	2	2.6%
Lee	1	1.3%
No Response/Not Applicable	22	27.1%
TOTAL	81	100%

Lastly, respondents to the SAFMC questionnaire were asked to "...list in order of their abundance the types of fish you most often catch throughout an average year with your traps." Tables 4 and 5 show the responses, only listing the first two responses, as the degree of redundancy thereafter increases substantially.

From the beginning of this project, it was decided to gather as much information as possible about the fish trap fishermen. Some social and demographic statistics may support other cultural or biological arguments, and so certain questions were appended to the survey form. These were primarily descriptive (age, education, marital status, etc.); one question was posed to try to determine the degree of satisfaction fishermen have for their occupation and thus, way of life. Finally, a section was left open for any comments a respondent may have, and these will be described following a summary of the demographic statistics.

Table 4. Types of Fish Caught in Fish Traps - First Named Responses Only (N= 76).

Type of Fish	Number of Respondents	Percentage
Grouper (non-specific)	21	27.6
Mutton Snapper	8	10.5
Grunts	8	10.5
Red Grouper	6	7.8
Snapper (non-specific)	3	3.9
Miscellaneous Others	9	11.8
No Response	21	27.6
TOTAL RESPONSES	76	100%

Table 5. Types of Fish Caught in Fish Traps - Second Named Responses Only (N=76).

Type of Fish	Number of Respondents	Percentage
Snapper (non-specific)	15	19.7
Grouper (non-specific)	14	18.4
Lane Snapper	5	6.5
Mutton Snapper	4	5.2
Hog Snapper	3	3.9
Miscellaneous Others	10	13.1
No Response	24	31.5
TOTAL RESPONSES	76	100%

The mean age of the respondents was 44.6 years, having an average of 12.7 years of formal education. The respondents were fairly settled in their communities, living in their current community an average of 17.1 years. This also corresponds to the data showing that they have been commercial fishing for almost 15 years, although any correlation between may be spurious.

Looking at their family history of fishing activity, 39 persons (52%) claimed to have presently (or had relatives in the past) that are (were) active in commercial fishing, and 36 (48%) responded negatively (N=75). Of those who had family who fished commercially, 14 (18%) named their father, 19 persons (25.3%) named a brother, six (8%) said their grandfather, 16 (21.3%) respondents claimed their son, and eight persons (10.6%) named a cousin. Asking if they wanted their children to also choose a career in commercial fishing a majority of 34 persons (45.3%) said they did not. However, 27 respondents (36%) wanted their offspring to become fishermen, while the remainder, 20 persons (24.6%), were either undecided or chose not to respond.

Finally, respondents were asked to comment on anything they felt to be important in the fish trapping industry or any other issue they felt to be of consequence. Forty-seven persons (58%) took the opportunity to write down their remarks and questions, while 34 respondents (41.9%) chose not to do so."

Ms. Kitner's conclusions were as follows:

"It has been shown that while the number of full-time fish trap fishermen may not be large in number, there are many who depend on this fishery to supplement their income when closures of other trap fisheries are in effect. Yet while the fish trap fishery is felt to be economically important to those who participate in it, the same persons also feel it to be underregulated, leading to unresolved problems of trap loss (by poaching) or gear and user conflict. This fishery can not be effectively managed until all participants are accounted for by number of traps and area fished. While over fifty percent of those presumed to be active in the fishery responded, one can say nothing of those who did not respond. Are they still fishing traps and simply do not want to be bothered by government questionnaires? Have they quit the fishery entirely? Have one quarter quit? Because of these unanswered questions one finds it hard to justify extrapolating other data, for example, doubling the number of traps (if approximately 50% own approximately 8,000 traps, then do 100% own 16,000 traps?).

It is therefore recommended that the SAFMC promote: 1) an annual license system that will allow for updating the numbers of persons in the fishery; and perhaps 2) a minimal charge for tags and/or licenses so that fishermen are more realistic in reporting their level of participation in the fishery (for example, wanting 2,000 tags when they only own 700 traps). There should also be a distinction on the application form between "tags requested" and "traps owned," again in hopes of gathering more accurate data. These ideas seem to have wide support within the fish trap industry, as seen in the comments received in the questionnaires.

Lastly, the broader conflict that exists between marine recreational and commercial fishing sectors is manifested in the fish trap fishery. The data presented in this report should not be read in a vacuum, but rather, as recommended by Craig (1980), seen as a part of the larger subject of managing user conflicts."

The Council also discussed the results of three publications on fish traps in South Florida. The major findings of these publications were as follows:

Sutherland and Harper (1983) - SUMMARY

1) Though most Broward and Dade County fishermen started using wire fish traps to catch reef fishes in 1975-1976, fish traps have been used in southern Florida since at least 1919.
2) There were a maximum of 8 vessels, 18 fishermen, and 675 traps in the Broward fishery, and 46 vessels, 138 fishermen, and 1,864 traps in the Dade fishery between December 1979 and October 1, 1980.
3) Broward County trap fishermen usually fished their traps in depths over 30.5 m and caught an average of 11.1 fish weighing 5.6 kg/trap haul. Dade fishermen usually set traps in 18.3-36.6 m depths.

4) Broward fishermen fished unbaited traps and hauled them once every 7-10 days. Dade fishermen fished baited traps and hauled them one or two times each day.
5) The Antillean Z trap fished by some Broward fishermen caught more total fish and target species by weight and number per trap haul than did rectangular or modified Z traps.
6) About 21% of trap-caught fishes sustained one or more injuries. The most common injury, internal gas expansion and trauma, was caused by reduced ambient pressure as fish were brought to the surface.
7) Mortalities of trap-caught fishes during this 10 month study averaged 2.9%. Mortalities averaged 7.5% during a 2 month period when fish kills occurred off Florida, but averaged 1.8% during 8 other months.
8) About 87% of the fish released after capture in traps were able to swim down toward the sea floor within 15 seconds to 2 minute periods of observation.
9) Broward fishermen annually lost about 20% of their traps and Dade fishermen about 100%.
10) Broward fishermen captured an estimated 184,000 kg of fish and landed 129,000 kg annually. No estimate was made of annual Dade County trap catches due to limited data.

Taylor and McMichael (1983) - ABSTRACT

The commercial fish-trap fishery in Monroe and Collier Counties was investigated from November 1979 through September 1980. Fishing grounds, techniques, trap design and catch composition are described. A total of 1,694 trap hauls containing 10,226 fishes of 111 species were monitored in the Monroe County fishery. Target fishes in Monroe County made up 69.2% of the total weight and 50.7% of the total number monitored. Three of the ten most numerically abundant species were target species. Serranids composed 71.0% of the target weight and 29.4% of the target number monitored in Monroe County. Average yield in Monroe County was 4.9 kg/haul; 3.4 kg were target species. Two hundred seventy trap hauls monitored in the Collier County fishery contained 3,111 fishes of 28 species. Target fishes in the Collier County fishery made up 70.1% of the total weight and 27.9% of the total number monitored. *Epinephelus morio*, the most abundant target species in the Collier County fishery, made up 91.0% of the target weight and 73.0% of the target number monitored. Average yield in Collier County was 4.4 kg/haul; 3.1 kg were target fishes. Trap loss was estimated at 63% per year; however, the fishing life and catch rate of lost traps remain unclear. There was no significant difference between the mean fork lengths of five species of serranids taken from traps constructed of two different mesh sizes. four percent of all fishes observed were dead or injured. The most commonly injured fishes were chaetodonids and pomacanthids.

Cofer-Shabica (1989) - ABSTRACT

Between 15 and 24 July 1986, over 60 km of the continental shelf and slope bottom east of Biscayne National Part off the Florida Keys were surveyed with the Research Submersible DELTA. Eighty two sightings of fish traps, lobster pots, and trap lines were made by the crews of the DELTA. Of these sightings, 24 traps were currently being fished, 4 were ghost traps, and 12 were derelict traps. The remaining observations consisted of fish trap and lobster pot lines. Of these, 34 were considered to be attached to active traps (both fish and lobster) and 8 were considered derelict. Fish traps were found at an average depth of 43 m (range: 27-82 m). No active fish traps were found shallower than 33 m. Lobster pots were found at an average depth of 31 m (range: 22-58 m). No traps or trap lines were observed on or nearby the Florida Power and Light Company turbine exhaust stacks, and the submerged freighters Pioneer 1, Santa Rita, Doc DeMilly, Almirante, and Saint Anne D'Auray artificial reefs.

More recently, a review of fish trapping was completed (Kelley, 1990). Pertinent sections are as follows:

4.0 ADVANTAGES OF FISH TRAPS

The extensive use of fish traps in the Caribbean and restricted areas around Florida is easily understood. Traps are inexpensively and easily constructed and can be made of durable, easily repairable materials. The cost can be recouped in as little as 4 to 5 hauls (Munro, 1973; Craig, 1976). Traps are easy to use and require little skill to fish, although the most successful fishing does depend on the fisherman's skill in locating productive fishing grounds. Traps can be fished from small or large boats and pulled by hand or mechanical means. Trap fishing also allows fishermen to pursue other interests or hold other jobs while the gear is fishing unattended and if foul weather precludes hauling, traps can be left for extended periods of time.

Traps capture a wide range of species of fish that are not caught by other types of gear (Luckhurst and Ward, 1986; Munro, 1973; Stevenson and Stuart-Sharkey, 1980). They also allow the economical exploitation of low density fish stocks and allow fishing where other methods are uneconomical or have become uneconomical because of overfishing (Munro, 1973; Kipness and Williams, personal communication). This last fact accounts in part for the controversy presently surrounding the use of fish traps in the United States.

Traps can be fished over a wide range of depths, bottom types, and conditions. Because traps fish passively and are not towed, they are particularly suited to coralline tropical seas where use of trawls and other nets are precluded or restricted by the presence of hermatypic corals (Munro, 1973). In most coral reef areas, fishing with traps is limited to individually buoyed traps on vertical lines. Here, even use of trawls of traps (as series of 3-10 traps attached at intervals along a length of a line) is difficult because lines can become entangled in coral and gear can be easily lost or damaged (Munro, 1973)...

The depth and location of traps can be varied to target different species assemblages, although this requires some knowledge and skill on the part of the fisherman (Craig, 1976; Luckhurst and Ward, 1986). Another advantage of fish traps is the fact that most of the fish caught are alive and in good condition.

Many of the reasons listed above make fish traps a convenient scientific tool for surveys of fish populations. A large area can be surveyed in a day using fish traps and the catch is alive for biological sampling (Miller and Hunte, 1987). The main disadvantage of fish traps is their bulk, which restricts the mobility of the fishermen. To overcome this disadvantage, stackable traps have been designed that increase the trap-carrying capacity of a fishing vessel. This allows commercial operations to be economically feasible in distant waters. This is particularly important in the Caribbean where near-shore areas are frequently over-exploited and becoming increasingly uneconomical to fish.

7.0 TRAP LOSSES

There are many reasons why fish traps are lost both inshore and offshore. A common reason is gear failure, which includes pot warp (line) parting, the buoy separating from the pot warp or the buoy breaking up. This gear failure can be caused by normal wear and tear, powerboat propellers, and sea turtles or sea gulls biting the buoys or pot warp. Theft is also a major cause of lost traps in many areas. Losses occur because of setting the traps too deep or on too steep a slope. Storm surge and wave action can cause loss of traps, particularly in shallow inshore waters. Traps without buoys are less susceptible to storm damage, but may be moved from a site by currents or wave action and become unretrievable. In coralline areas, the buoy lines may become entangled on coral, chafe, and break. Offshore, losses are primarily caused by large vessels cutting or dragging gear, gear failure, and storms. Strong currents submerging buoys or sweeping traps away from the locations where they were set and traps becoming entangled with other fishing gear and anchors have also been cited as causes of trap loss.

The percentage of traps lost varied considerably among studies by both area and depth fished. Wolf and Chislett (1974) reported pot losses of 10-20% per trip in exploratory efforts in deep water shelf edges in the Virgin Islands. They attributed these losses to pots tumbling down steep slopes. While trap fishing off Boca Raton, Florida, Craig (1976) had a trap loss approaching 20% for a period of six months, with at least some loss due to theft. In Broward County, Florida trap fishermen, had an average of 20.3% annual loss due mainly to strong currents, entanglement and theft. Dade County, Florida trap fishermen reported losing 1-5 traps per trip, with an annual loss of 100%. Losses were due to theft or loss of buoys. Traps (sic) theft was such a problem

that traps were brought back to port at the end of each fishing day in Dade (Sutherland and Harper, 1983). Munro (sic) County, Florida trap fishermen had estimated average annual trap losses of 63%. The losses were mainly from currents and severance of buoys by large ships in deep water and from vandalism inshore. Trap loss was not a problem in Collier County, Florida with an annual loss of only 5%. This was possibly due to the fact that fishermen brought back traps to the dock after each trip (Taylor and McMichael, 1983). About 85% of traps used off Key Biscayne, Florida in a study on mesh selectivity by Sutherland et al. (1987) were lost with most losses attributed to theft. Trap loss due to theft and vessels cutting of fouling lines was reported as a major problem in the Virgin Islands (Swingle et al., 1970; Olsen et al., 1974; Sylvester, 1972).

In Jamaica, Munro and Thompson (1973) had such a theft problem in their study that the use of buoyed traps had to be abandoned. While losses due to theft, storms, and vessels can not easily be controlled, the trap fishermen can inspect gear frequently for wear and tear and use more durable materials.

8.0 SPECIES COMPOSITION

...Despite the great abundance of fishes on Florida reefs, until recent years, only a few species had been targeted for food purposes. As a result, the commercial harvest of fish was directed almost entirely towards Lutjanids (snappers) and Serranids (groupers). However, in South Florida, there is a growing consumer demand for non-traditional food fish, especially among ethnic caribbean (sic) groups. These non-traditional food fishes include squirrelfish, bigeye, sand tilefish, goatfish, spadefish, angelfish, parrotfish, triggerfish, scrawled filefish, and acanthurids. These species bring about one-half the usual market price as more traditional species such as grouper and snapper in south Florida (Sutherland and Harper, 1983) and, unlike the Caribbean, some species are not saleable at all (Craig, 1976).

9.4 TRAP PLACEMENT

A number of authors noted that traps set adjacent to reefs are more effective than traps set at a distance from reefs (Munro et al., 1971; High and Beardsley, 1970; Godcharles, 1970; Stevenson and Stuart-Sharkey, 1980; Hartsuijker and Nicholson, 1981; High and Beardsley, 1970). Sylvester and Dammann (1972) found that distances as little as five feet from an underwater feature such (sic) a ledge and coral head could make a difference in the number and species caught.

High and Beardsley (1970) found that traps set in close proximity to reefs were particularly effective in catching reef fishes with restricted home ranges. Hartsuijker and Nicholson (1982) developed this concept further in their research. They used the occurrence of small serranidae, which have reef restricted home ranges, as parameters for predicting the distance between traps and reef patches.

Most fishermen prefer to set traps near rocky ledges, reef structures or steep dropoffs (Sutherland and Harper, 1983; Taylor and McMichael , 1983; Stevenson, 1978; Olsen, 1980; Sylvester and Dammann, 1972; Godcharles, 1970; Munro, 1971). However, Craig (1976) found high relief rocky areas produced unwanted reef species such as tangs, parrots, and angelfish (he was targeting Lutjanids). Olsen (1980) also noted that the fishermen in the Dry Tortugas avoided coral reef areas as unproductive of target fish and destructive to their gear. Hartsuijker and Nicholson (1981) pointed out that small individuals made up a higher percentage of the catch when traps were placed nearer a reef. High and Beardsley (1970) and Hartsuijker and Nicholson (1981) found traps set in close proximity to reefs were more effective in catching reef fish with restricted home ranges.

Hartsuijker and Nicholson (1981) noted that in areas with dense coral coverage, placement of traps relative to bottom irregularities (coral heads or ledges, for example) would probably not contribute to the trap catch rates. However, with low density coverage, a careful setting of traps near reef structures would significantly contribute to the economic viability of the fishery. According to Hartsuijker and Nicholson (1981), the effective distance between traps and reef structure should be between 10 and 30 meters.

Using a submersible for observation, Sutherland et al. (1983) found the number of juveniles in and around derelict traps appeared to be related to the distance between traps and the nearest reef area, fish were absent or rare near traps on or adjacent to reefs and present in traps on "barren" sand sea floor areas. Craig (1976) obtained his best results when deploying traps in open sandy

environments. He noted that they became the most prominent bottom feature and were approached by fish almost immediately. In contrast, Taylor and McMichael (1983) noted that when traps in their study were set on sandy bottom, they had poor catches.

Large differences in catch are found from various depths as well as from differences in proximity to structures. With depths over 27.4 m, catch rate appeared to be inversely related to depth in Sutherland and Harper's (1983) studies in South Florida. However, in the U.S. Virgin Islands, Wolf and Chislette (1974) reported spectacular results were obtained with heavily baited traps in deep water and they noted that, overall, the majority of the good catches were made at night in generally deeper waters. Larger fish were also found in deeper water by Dammann (1970) and Taylor and McMichael (1983). Munro and Thompson (1973) also made several attempts at utilizing traps in water up to 250 meters with promising results.

Stevenson and Stuart-Sharkey (1980) indicated that fish traps in shallower water of Puerto Rico caught numerically more fish but the average fish weighed less that (sic) those caught in deeper water. While their results indicated that 30 m was the optimum depth for trap fishing, they qualified the results by stating that the effects of depth, design, and soak on mean catch rates were interdependent.

10.0 INGRESS AND EGRESS

Movement in and out of traps reflects behavior and response of various species to the traps (Kumpf, 1980). Several author have observed egress from open-mouth traps (Munro, 1974; Craig, 1976; Sylvester and Dammann, 1972: Luckhurst and Ward, 1986). Divers report that fish behavior around pots follows consistent patterns (Sylvester and Dammann, 1972). Territorial fish have been observed swimming in and out of pots. Luckhurst and Ward (1986) observed behaviorally active surgeon fish which are well adapted to living around and within the complex reef system escaping and re-entering traps. They interpreted the repeated ingress and escapement of individual fish from traps with straight-neck funnels and use of the trap as a shelter site. They noted that at least the six species they reported (L. griseus, H. isabelita, H. ascensionis, H. sciurus, D. bermudensis and Acanthurus spp.) are able to come and go at will. Few escapements were recorded in traps with horseneck funnels.

While most information on ingress and egress has been gathered in the field, Harper and McClelland (1982; 1983) used holding tanks in their studies. They found that within a few days, all species tested, except the large predators (groupers, nurse sharks, jacks, and green morays), found the exit funnels. Not only did the fish learn to exit, but an equilibrium state occurred with frequent movements in and out of the trap. It was also noted that small prey-fish, such as grunts and snapper, found the exit sooner when a predator entered the trap. Eventually, only the predator remained and no other species of fish entered the trap.

11.0 INJURY AND MORTALITY

Sutherland and Harper (1983) found 20.6% of the trapped fish in their study sustained injuries caused by gas expansion, physical contact with traps, and predators. The most common injury (74.8%) was internal gas expansion caused by reduced ambient pressure as the fish were hauled to the surface. Symptoms of gas expansion injuries include inability to submerge, air bubbles within the eye or bulging eyes, internal organs or swim bladders extruded through the mouth or anus, and bleeding. They reported a mortality rate of 2.9% of the trap caught fish, or an average of 1 dead for every 3.2 traps hauled. Mortalities averaged 1.8% during eight months of the study and 7.5% during a 2 month period when fish kills were reported of (sic) southeastern Florida.

Injuries and mortalities related to trap capture were recorded by Harper and McClelland (1982) in 745 fish. Data was kept both in the field and for 699 of the surviving fish for seven additional days in holding tanks. They reported 2.7% of the fish were dead and 11.1% of the fish were injured at the time of capture. The types of injuries reported were damage from gas expansion, abrasions or frayed fins from physical contact with the trap, and disorientation/whirling syndrome that was attributed to temperature shock, or gas expansion, or both. The two most common injuries were abrasions in 48.2% of the injured fish and embolisms in 32.5% of the injured fish (from gas expansion). Harper and McClelland noted, however, that most fish with minor injuries recovered in holding tanks within 2-5 days. A total of 563 (80.5%) of the fish

survived the seven days that the fish were in the holding tanks.

Bohnsack et al. (in press, as cited in Sutherland, 1989) found 2.2% of the fish in their studies dead at the time of capture. Both the Harper and McClelland (1982) and the Bohnsack et al. studies were conducted off Key Biscayne, Florida.

In Collier County, Florida, where traps soaked for less than one hour, few injuries were recorded. The highest injuries (27%) in that study were recorded in fish captured in traps soaked for 20 days (Taylor and McMichael, 1983). They suggested that occurrence of injuries and death were probably related to the length of time fish were confined in traps and the depth fished. Taylor and McMichael reported 0.9% trap mortality.

Taylor and McMichael (1983) also monitored released sub-legal and non-targeted species of fish for one minute and indicated that 53% swam downward. The survival rate of those is unknown, but they speculated that at least some died because of injuries. Of the fish that died, 20% died immediately from gas expansion or stress or were eaten by sharks or birds. In a similar study, Sutherland and Harper (1983) indicated that 87% of the fishes swam down after release from traps.

Munro, Reeson, and Gaut (1971) stated that almost all fishes retained in traps off Jamaica for periods approaching two weeks showed signs of wounds from predators or abrasions from the wire mesh, often with secondary fungal infections. In Bermuda, secondary infections were reported to be the primary cause of trap mortality in several species including D. bermudensis, Scarus spp., Sparisoma spp., and H. sciurus (Luckhurst and Ward, 1986). Few dead fish were observed in Jamaican traps (Munro, Reeson and Gaut, 1971; Munro, 1974). The carcasses of dead fish remained in the traps for only a short times (sic) before disappearing (Luckhurst and Ward, 1986; Munro, Reeson and Gaut, 1971; Munro, 1974).

Some species of fish frequently were not able to survive confinement in fish traps. Great Barracuda (Sphyraena barracuda) and sand tilefish (Malacanthus plumieri) did not survive in traps according to Sutherland and Harper (1983). Ward (1983) also noted that great barracuda, cubera snapper, yellow jacks, and lemon sharks died shortly after entering traps in pursuit of prey. The scarids, S. croicensis and S. chrysopterum, were observed dead or dying within 2-3 days of their entry into traps (Luckhurst and Ward, 1986).

12.0 GHOST TRAPS AND DERELICT TRAPS

Fish traps that fishermen cannot locate and retrieve or that are abandoned, but still capable of catching fish, are referred to as ghost traps. Ghost traps have long been a subject of concern, but opinions have changed considerably since Olsen et al. (1978) made their observations. They noted that if traps were lost, mortality of juvenile and forage species could decimate a fishing ground. They suggested that considerable mortality could take place over the 1-2 years before the mesh corroded away, and indicated corrosion time would be longer and mortality would be greater for small sizes of mesh. A more recent study made by Harper and McClelland (1983) estimated the average fishing life of eight traps observed off Key Biscayne to be from 5.5 to 157 days before becoming unable to capture fish. While the decay and catch rates of ghost traps are not well documented, at least some evidence indicates that lost traps quickly become damaged and ineffective (Sutherland et al., 1978). Most of the reports of injury and mortality of ghost traps appear to be anecdotal. However, an underwater video was presented to the South Atlantic Fisheries Management Council on June 11, 1990 that documented dead and injured fish in ghost traps in the Florida Keys. The video was presented by Fernand Braun in an effort to persuade the council to ban fish traps. Also, in the Harper and McClelland (1983) study, 19.2% of the 130 fish known to enter their traps were reported to die.

Derelict traps are lost or abandoned traps that are incapable of catching fish due to structural damage or deterioration. Derelict traps have small holes or breaks in the wire mesh, gaps between ceiling and floor panels and walls, or entire panels deteriorated or missing (Smolowitz, 1978).

Traps become derelict in a number of ways. Predator damage, wire mesh corrosion, escape windows opening, and materials fastened to escape devices decomposing have all been documented.

Munro et al. (1971) speculated that lost traps that have accumulated large numbers of fish may be attacked and rendered ineffective by large predators such as nurse sharks (Ginglymostoma cirratum). Harper and McClelland (1983) found the funnel openings enlarged with the prongs bent back and speculated that the damage was by large predators attempting to escape. Seams were also

split by predators such as cubera snapper (Lutjanus cyanopterus), great barracuda (Sphyraena barracuda), yellow jacks (Caranx bartholomae), and lemon sharks (Negaprion brevirostris) in Harper and McClelland's study. He found mortality of these large predators to be high. In Craig's study (1976) escapement through trap holes caused by predators became a problem if traps were not hauled after 5 or 6 days. Fish are rarely caught in traps with holes or breaks in the mesh (Craig, 1976; Sutherland and Harper, 1983; Ward, 1983). Even small holes or breaks in the wire mesh apparently render them ineffective as fish traps.

Using a submersible for observation, Sutherland et al. (1983) found juvenile fish numerous in and around derelict traps. The derelict traps and other man made objects appeared to serve as artificial reefs on "barren" sand sea floor areas (Sutherland et al. 1983; Harper and McClelland, 1983). Sutherland et al. (1983) observed that fish were absent or rare near traps on or adjacent to reefs.

12.1 TRAP DESIGN AND GHOST FISHING

Various methods have been proposed to alleviate the concerns of ghost traps. Since trap design is one of the keys as to whether a ghost fishing situation will be created (Smolowitz, 1978), many of these methods deal with trap design. Designs to prevent ghost fishing were primarily developed for northern or temperate invertebrate (lobster) fisheries.

Degradable sections of hinges that rot in a specified time period are one such design requirement that has been adopted by both the Gulf of Mexico and South Atlantic Fishery Councils. When the degradable link fails, the trap no longer fishes. The self destruct devices are designed to prevent or reduce ghost fishing without reducing efficiency of the trap or significantly increasing the costs.

Kumpf (1980) conducted a limited experiment to determine the durability and suitability of 4 types of materials for self-destruct devices that were inexpensive, available locally, and simple to replace. He tested unoiled jute, sisal, 16 gauge, and 18 gauge galvanized wire in his experiments. The unoiled jute and sisal lasted 42 days while the galvanized wire was still intact at the end of the 120 days of the testing. He noted the galvanic couplings with a short life spans (sic) are available or could be manufactured if there was a sufficient demand.

Several problems are encountered in the use of self-destruct panels and hinges. They are not readily accepted by fishermen because of possible catch losses and the time lost in repair or replacement. The trap may land with the degradable panel facing down. And, time for degradable panels or hinges to deteriorate may be longer than predicted. Corrosion of metal hinging materials occurs more slowly in colder, slower moving water and biodegradable materials take longer to break down in deeper water where there are fewer organisms to attack the materials.

Gordon Sharp, a Florida Marine Patrol officer in Key West, stated that he found 95% of the traps he has seized in areas closed to trap fishing to be constructed illegally. The primary construction violations he found were uses of non-degradable hinge materials such as rubber, nylon or stainless steel or the use of illegal thicknesses of jute.

Escape vents for sublegal fish are another design element demonstrated to reduce the catch of and damage to sublegals (Smolowitz, 1978). Smolowitz also noted other advantages to the use of sublegal vents such as improving the quality of the catch and increasing trap efficiency. Fewer fish in the traps should result in fewer injuries, and in areas with large populations, sublegal escape vents should allow more legal sized fish to be caught. Currently, a minimum of two, 2 x 2 inch escape vents are required on each of two sides of a trap (four total) by the Gulf of Mexico Fishery Council.

One design feature that has received little attention is the trap funnel. The funnel size, shape, mesh size, and type of funnel (straight or horseneck) all have effects on retention of trapped fish and would therefore have an effect on the ability of a ghost trap to retain fish (see trap design and structure).

14.0 DISCUSSION

Fish traps represent a misunderstood and unresolved problem in fishery resource management. There is still a lack of substantive scientific data and much information is anecdotal or based on popular opinions, many times distorted by the media.

We are faced with the fact that near-shore stocks of fish are in a stressed condition. Stress factors include increased fishing pressure and the greater demand in South Florida for tropical reef fish as a food source and for aquarium specimens. Destruction of critical nursery habitats of mangroves, grass beds, and reefs and deterioration of water quality due to pollution are also having a severe impact. Above all, our natural resources are being depleted at the same time that the numbers of people wanting to use them are increasing. This creates problems of allocation of those declining and limited resources to the various user groups.

Fishing pressure from all user groups is heavy in near shore water accessible to small boats. Recreational and commercial fishermen, charter boat and party boat fishermen, reef fish collectors, and the scuba industry are all user groups. Conflicts between trap fishermen and other user groups are most evident in the Keys and extreme southern portion of Florida. A ban on fish traps where there is a severe conflict with other user groups would seem to be indicated. But, we are deluding ourselves if we believe that this is a magical solution to the decline in our fishery resources. Even if a total ban of fish traps is achieved, catches by other user groups are unlikely to increase, for only one percent of all reef fish reported in commercial landings were taken by fish traps from 1972-1988 (NMFS stock assessment data).

Management alternatives to a total ban of fish traps exist. However, uniform regulations in both the Gulf of Mexico and Atlantic waters should be established in order to facilitate enforcement and understanding by all concerned.

Management decisions must consider trap design. This includes restrictions on mesh size, numbers and sizes of escape windows, biodegradable panels or hinges, funnel design, and maximum traps sizes...

Enforcement is the largest problem of all. There are widespread abuses of the regulations governing the use of fish traps. There seems to be no effective way to enforce regulations in a fishery, such as trap fishing, where gear can't be observed readily by enforcement officials. The largest present day problems in the Florida Keys and South Florida are the extensive trap poaching and the use of illegally constructed or deployed traps.

Costs for at-sea enforcement of existing laws or implementing measures to prohibit fish traps will be substantial. Increasing boat registration fees (550,000 boats registered in 1988) to provide funds for law enforcement and using some of the salt water fishing license funds should be considered.

There is nothing inherently wrong with fish traps as a type of fishing gear when employed by honest and intelligent fishermen within the scope of the law. In fact, fish traps have the potential to be more selective, with proper design, than other gear such as bottom longlines, trawls, and hook and line fishing. Unfortunately, due to the widespread abuses of the law, and the impossibility of enforcement, there may be no alternative to banning the use of fish traps.

Council Preferred Options for Fish Traps

The South Atlantic Council approved two options addressing fish traps:

A. Add gear, vessel and trap identification and permit requirements for black sea bass traps.

Discussion

Option A would bring black sea bass traps under the same regulations as have been applied to other fish traps prior to this amendment. It would provide an estimate of the number of traps being used and would limit the use of black sea bass traps to those fishermen able to qualify for a permit.

Black sea bass traps and buoys shall be identified with the boat or vessel fishing the traps to improve enforcement of measures designed to prevent trap poaching and theft. The cost to fishermen for materials for color coding and numbering buoys and vessels is expected to be approximately $20 per vessel. Not counted is the time required by fishermen to apply the identification to vessels, traps and buoys. Fishermen frequently code buoys as an aid in distinguishing their traps from those of others; therefore only a small part of the cost will be additional. This measure applies when trap buoys are used, but there is no requirement that buoys

be used.

Traps must always be permanently identified. In the original management plan (SAFMC, 1983a) tended black sea bass traps were excluded; this action repeals that exclusion and all black sea bass traps must comply with all trap measures.

B. Prohibit the use of fish traps in the South Atlantic EEZ; however, black sea bass traps may be used north of Cape Canaveral (Vehicle Assembly Building, 28° 35.1' N Latitude).

Discussion

The subject of fish traps generated the majority of public input (see Appendix 1) including some 6,800 comments. Fish traps have been used in South Florida on a limited basis since 1919 but expanded during 1975/76. Data from 1987 (Kitner, 1989) indicate that the average length of time trap fishing was 4.4 years which would now be approximately 7-8 years; 30% are employed outside commercial fishing; 47% fish for spiny lobster and 30% for stone crab. Traps are inexpensive, easily constructed, easy to use and require little skill (although the most successful fishing depends on skill in locating productive fishing grounds), fish unattended, catch a wide range of species not caught by other gear, allow economic exploitation of low density fish stocks, allow fishing where other methods are uneconomical or have become uneconomical because of overfishing and are able to be fished over a wide range of depth, bottom types and conditions. On the other hand, traps are bulky, result in trap loss and ghost fishing, catch species that were not traditional food fish, are fished near live bottom causing habitat damage, result in a bycatch of which a portion dies upon release, result in gear and user group conflict, and existing regulations are extremely difficult or impossible to enforce.

The Council concluded that the issue of traps is a critical issue to the State of Florida and in the long term to the entire South Atlantic as well. Florida deliberated the issue of traps for many years and the Florida State Legislature prohibited the use of fish traps in 1980. There have been many problems since then due to the inconsistency between state and federal regulations. The snapper grouper resource off the Florida Atlantic coast has continued to decline. The snapper grouper stocks are more overfished off Florida than they are anywhere else in the South Atlantic.

The Council concluded that if they cannot prohibit fish traps, they will never be able to stop overfishing of the snapper grouper resource. Available data indicate that approximately 9% of all Florida snapper and grouper are taken by fish traps. The Council concluded that the 9% figure was an underestimate of actual fish trap harvest for the following reasons. The 1988 reported fish traps landings in Florida were 410,791 pounds harvested by approximately 30 vessels. This works out to be 13,693 pounds per vessel and at $3 per pound, the gross per vessel was $41,079. Net revenue per vessel for the captain and crew would be $14,788 assuming net revenue was 36% of gross revenue. This figure is unrealistically low and lends support that the 1988 reported landings were significantly underestimated.

Information provided by Organized Fishermen of Florida at the June scoping meeting in Key West contained documentation of catches by 6 fish trap fishermen. Their total catch for 1988 was 354,609 pounds which represents 86% of the total of 410,791 pounds reported caught by traps in Florida (Table 5). The catch per fisherman, based on this data, was 59,102 pounds and when extrapolated for the 30 vessels results in an industry total catch of 1,773,060 pounds (39% of the total 1988 commercial catch).

Another approach that can be used to estimate actual fish trap catches is available based on public input that net earnings per captain are approximately $40,000 and for crew $15,000 (assuming an average of 1.5 crew per vessel). Net earnings per captain ($40,000) multiplied by the number of vessels (30) was $1.2 million and, when added to the net earnings for all crew of $675,000 (30 x 1.5 x $15,000), yield a total industry net earnings of $1,875,000. Dividing this figure by 36% yields an estimate of $5.21 million gross value. Total Florida commercial landings during 1988 was 4,597,000 pounds and assuming an average price per pound of $3, yields a total gross value of $13.791 million. Based on gross value, fish traps generated 38% of the total gross value. This percentage is significantly greater than the 9% reported in Table 5 and is very close to our other estimate and lends additional support that the 9% figure is an underestimate.

Assuming that fish traps are responsible for some 38% of the annual commercial harvest, the Council's contention that rebuilding the snapper grouper resource will be negatively impacted by the fish trap harvest appears supportable.

The Council concluded that traps are non-selective by size and by species (e.g., red grouper recruit to the hook and line fishery at around 19" and to the trap fishery at around 11"). Bohnsack et al. (1989) do note that modifications to mesh size will alter the size of fish caught. They noted that total value, species caught, number of individuals and mean total weight per haul declined with meshes larger or smaller than 1.5" hexagonal mesh. The mesh sizes required to correlate with the 20" minimum sizes would be so large as to result in de facto prohibition on use of fish traps.

Traps unnecessarily kill an abundance of tropical fish because they harvest angel fish, tangs, parrot fish, etc. The Council has based this conclusion on input from commercial and recreational fishermen and from processors and dealers. In addition, information contained in Bohnsack et al. (1989) document the catch of these species. Unfortunately, these species were not recorded separately in the commercial landings data until recently, thus the commercial landings data are not available to quantify the extent to which catches of these species have increased.

Since March 1, 1991 the State of Florida has prohibited the harvest of tropical fish: "The purpose and intent of this Chapter is to protect and conserve Florida's tropical marine life resources and to ensure the continued health and abundance of these species. The further intent of this Chapter is to ensure that the harvesters in this fishery use non-lethal methods of harvest and that the fish, invertebrates and plants so harvested be maintained alive for the maximum possible conservation and economic benefits." Allowing fish traps in federal waters would make Florida's regulations difficult, if not impossible, to enforce and would not address Problem #5 which is, that "the existence of inconsistent state and federal regulation makes it difficult to coordinate, implement

and enforce management measures and may lead to overfishing. Inconsistent management measures create public confusion and hinder voluntary compliance."

The way in which fish traps are used makes enforcement extremely difficult. All other kinds of fishing gear are eventually brought back to the dock where they can be examined by state marine patrol officers or other law enforcement personnel. Once traps are placed in the water, they seldom are brought back to the dock. Testimony documents the various kinds of violations recorded in the Key West area (e.g., biodegradable panel requirement violations). The loss of traps is high ranging from 20% to 63% and in certain sectors trap loss may be as high as 100%.

The SAFMC Law Enforcement Committee and Advisory Panel were established to advise the Council on enforceability of various management approaches. They noted that the existing system is difficult to enforce and is incompatible with Florida state law, that the 100 foot contour limitation is difficult to enforce and that poaching is a big law enforcement problem in the fish trap fishery. These two bodies recommended to the Council that a total prohibition on use of fish traps in the South Atlantic EEZ was the most enforceable of all alternatives considered.

The enforcement issue was summarized by Kelley (1990): "Enforcement is the largest problem of all. There are widespread abuses of the regulations governing the use of fish traps. There seems to be no effective way to enforce regulations in a fishery, such as trap fishing, where gear can't be observed readily by enforcement officials. The largest present day problems in the Florida Keys and South Florida are the extensive trap poaching and the use of illegally constructed or deployed traps." In addition, Officer Gordon Sharp (a Florida Marine Patrol officer in Key West) presented information at public hearings and Council meetings indicating the great difficulty in enforcing existing regulations and noted a large number of violations of existing regulations.

The Council recognizes that gear that is not brought back to shore at the end of a fishing trip makes enforcement extremely difficult. The Council considered other, less drastic measures that would allow traps to be used but concluded that the at-sea enforcement required to effectively monitor and ensure compliance with existing regulations does not and will not exist. Therefore, the Council was persuaded that nothing short of a total ban would be enforceable.

Continued use of such highly efficient gear in a stressed fishery is no longer biologically tolerable. Thirteen of 27 species identified in Amendment 4 are documented as overfished with SSRs of less than 30%. Although insufficient data are available to determine SSRs for the remaining 15 species, they are also thought to be overfished. From a socioeconomic perspective, continued use of fish traps will result in a small group of fishermen removing a disproportionate share of the available fish, thus precluding their use by all other user groups at best and at worst leading to overfishing.

There is some evidence that fish trapping causes habitat damage where fish traps are set in trawls on live bottom and where grappling hooks are dragged across live bottom to retrieve them. Testimony and video records of damaged *Oculina* reefs off Palm Beach County, Florida shown to the Council at the February 1991 meeting, depicted significant and measurable damage to coral reef and live bottom communities. These activities leave an imprint of the trap upon the bottom

communities and trenches caused by grappling hooks dragged over the bottom for the purpose of locating and recovering traps. Lost traps not only continue to fish, as it has been pointed out in the ghost trap discussion, but may contribute considerable secondary habitat damage by becoming mobilized at times of storm activity and impacting delicate bottom communities. These problems cannot be alleviated by trap design modifications even if such modifications could be enforced.

The affect of selective removal of herbivores on the health of coral reefs is discussed in an article by LaPointe (1989). These species are harvested by fish traps more frequently than by hook and line gear. Again, due to the fact that commercial statistics do not record these fish by species, data are unavailable to document the level of harvest by fish traps or by hook and line.

Prohibiting fish traps would be consistent with Florida's Coastal Zone Management Plan. Also, internationally, a number of countries (e.g., Bermuda) have tried to manage fish trap gear only to end up prohibiting their use. Bermuda has managed their snapper grouper fishery for a number of years and imposed a limited entry system with trap limitation. In addition, modifications to mesh size were also attempted. The Bermudian Government concluded that regulation the fish trap fishery was not effective and recently imposed a total ban on use of fish traps. The Council concluded that a total prohibition on the use of fish traps is the most effective alternative to address the stated problems and to achieve the plan's stated objectives.

Rejected Alternatives for Action 28

Rejected Option 1. No action. Existing regulations are:

(1) Fish traps may be pulled or tended only during the period beginning one hour before official sunrise to one hour after official sunset in the South Atlantic portion of the EEZ south of 28° 25.5' N Latitude (Cape Canaveral, Florida).

(2) Fish traps may be tended or pulled only by persons (other than authorized officers) aboard the fish trap owner's vessel(s), or aboard another vessel if such vessel has on board written consent of the fish trap owner.

(3) A fish trap in the EEZ is required to have on at least one side, excluding top and bottom, a panel or door with an opening equal to or larger than the interior axis of the trap's throat (funnel). The panel or door fasteners or hinges must be made of one of the following degradable materials:

i. untreated hemp, jute, or cotton string of 3/16-inch diameter or smaller.

ii. magnesium alloy, timed float releases (pop-up devices) or similar magnesium alloy fasteners.

iii. ungalvanized or uncoated iron wire of 0.062-inch diameter or smaller.

(4) A fish trap in the EEZ must meet all of the following mesh size requirements:

i. Two square inch minimum open mesh area.

ii. One inch minimum length for shortest side.

iii. Minimum distance of one inch between parallel sides of rectangular openings, and 1.5" between parallel sides of mesh openings with more than four sides.

iv. One and nine-tenths inches minimum distance for diagonal measurement.

(5) A fish trap may not be placed in the South Atlantic EEZ south and west of 25° 35.5' N Latitude (off Fowey Rocks Light, Florida) to 82°40' W Longitude shoreward of the 100-foot contour that is closest to the shore and continuous along the coast and Florida Keys. West of 82° 40' W Longitude, traps may not be placed in the South Atlantic EEZ north of a line connecting 24° 24.86' N Latitude, 82° 40' W Longitude, 24° 28.6' N Latitude and 83° 00' W Longitude. A fish trap so placed will be considered unclaimed or abandoned property and may be disposed of in any appropriate manner by the Secretary (including an authorized officer).

(6) A buoy line attached to a fish trap possessed or fished shoreward of the outer boundary of the EEZ and south of 25° 35.5' N Latitude must be a minimum of 125 feet in length.

(7) It is unlawful to fish with fish traps, except black sea bass traps, without an assigned vessel and gear identification number; possess aboard a fishing vessel unmarked fish traps; use, or possess aboard a fishing vessel, buoys not marked with the assigned gear identification number and color code; or falsify or fail to affix and maintain vessel or gear markings, as required.

Discussion

Reported landings indicate that trap fishermen accounted for 9% of all commercially caught snapper and grouper species in 1988 (Table 5); some Council members have concluded that this is a significant underestimate of the actual fish trap harvest (see discussion under the fish trap prohibition above). The no action alternative would continue the problems associated with fish traps and would not achieve the management plan's stated objectives and was rejected by the Council.

Rejected Option 2. Industry proposal to regulate fish traps:

(1) Require a snapper grouper permit ($23) and a individual identification tag for each fish trap ($1); however, in the event of a natural disaster, trap tags should be reissued free of charge.

(2) A 50% income requirement from commercial fishing to obtain a fish trap permit. The industry feels that only professional commercial fishermen will use fish traps with this requirement.

(3) A reduction of 70% of the current 51,000 fish trap tags to a total of 15,000 tags, with a cap at 15,000. The industry believes the 50% income requirement and the fees for reef fish permits and fish trap tags, which are compatible with the GMFMC's requirements, will accomplish this reduction. It would give a more accurate count of traps in use. The industry does not believe there are 51,000 fish traps currently in use.

(4) Use the Florida trip ticket system or a monthly reporting system for data collection rather than a weekly reporting system.

(5) Require two 2" by 2" escape windows on each of the two sides of each fish trap.

(6) Require untreated 3/16-inch jute or magnesium door fasteners for the escape windows.

(7) Prohibit the sale of angelfish as a food fish.

(8) Minimum sizes of 8" for lane and vermilion snapper; 12" for gray, mutton and

yellowtail snapper; 13" for red snapper; and 20" for red, Nassau, yellowfin, black and gag groupers.

(9) The industry would like to see the following fish included in the management plan with the size limits recommended: Doctorfish and blue tang (family Acanthuridae) - 8"; parrotfish (family Scaridae) - 10"; and hogfish - 10". The industry feels that these are conservation measures to protect juvenile fish.

(10) Support an industry approved limited entry program with a cut-off date supplied by the Council.

(11) A control date to be set by the Council after which any permit applicant who could not show previous involvement in the fish trap industry would not be guaranteed inclusion in a limited entry program, should one be developed. Requirements for permits would be similar to those for the wreckfish industry.

At the February 25 - March 1, 1991 Council meeting the industry further modified their proposal:

(1) Limit trap permits to 40 and limit to 100 traps per permit. Permit fee of $23 and trap tag fee of $1. Income requirement of 50%.

(2) Escape window of 2" by 2" as required by GMFMC. If the SAFMC wants a larger panel, they recommend 12" by 12" panel of 2" by 3" mesh on one side of all fish traps.

(3) Require untreated jute, cotton or sisal twine to be used for door fasteners as required by GMFMC.

(4) Size and trip limits — 8" doctorfish and blue tang, 10" parrotfish, 10" hogfish and 200 pounds per trip limit on fish of the family Acanthuridae and Scaridae.

(5) Permit is permanently revoked after 2 major fish trap fishery violations — fishing inside state waters or inside the 100 foot contour, improper door fasteners or improper escape devices.

(6) Fishermen using fish traps are required to take a trained observer on trips selected by the Regional Director to ensure compliance with all laws pertaining to fish traps. This observer will be paid by the fishermen. The Regional Director would administer this program.

Discussion

These measures have been suggested by the trap industry and are supported by Organized Fishermen of Florida. The Council discussed the industry's proposal and in fact this was the basis of a motion debated during the Council meeting wherein a two-tiered management system would have been established with the industry proposal (or some modification) applying in the south Florida area and another type of approach north of this area. The Council concluded that the problems associated with fish traps (e.g., non-selectivity by size and species; non-compliance with escape panels; enforcement problems; inability of mesh sizes to let 20" groupers escape; ghost fishing; habitat damage; inconsistency with Florida's CZM management plan; incidental harvest of ornamental fish) would continue even under the suggested modifications. This would not achieve the management plan's stated objectives and was rejected by the Council.

Rejected Option 3. Modify the mesh size of fish traps. Black sea bass traps may require a separate mesh size.

Discussion

The current legal mesh sizes include 1 x 2", 1.5 x 1.5", 1.5" Hex and meshes larger than these sizes. Bohnsack et al. (1989) examined catch and mesh selectivity of wire-meshed fish traps for 11 different mesh sizes ranging from 0.5 x 0.5" to 3 x 6". They included the three sizes currently considered legal. The traps were fished in depths of 7-40 m about 5-7 km east of Key Biscayne, Florida in an area that had received relatively little trap fishing effort. The authors report that:

"All traps used vinyl-coated wire and were rectangular, measuring Approximately 61 x 71 x 91 cm (2' high x 2.3' wide x 3' long). Each trap had a single funnel entrance in one end that terminated in a 6 x 465 cm (2.5 x 18") vertical opening. The top and bottom panels of the traps were constructed of the tested mesh. The side and end panels of all traps were constructed of 1 x 2" (25 x 51 mm) vinyl-coated wire mesh to present the same silhouette and presumably the same amount of visual attractiveness to fish...The traps were fished unbaited in trawls (strings) of four traps. Each trawl had traps attached at 50 m intervals to a 250 m groundline with a concrete or steel weight anchoring each end of the groundline. A subsurface or surface buoy was often attached to one end of each groundline to aid in relocation and retrieval. The traps were randomly attached to the groundline to prevent sampling bias and each set was fished under similar conditions of depth and bottom type to avoid confounding effects on mesh size. Soak times averaged 7 days but varied considerably (range 1-19 days) due to weather factors...The effects of mesh size on the value of catches were analyzed based on voluntarily reported mean wholesale prices for each species by 30 seafood dealers from 6 Florida counties for May 1988 (Economics and Statistics Office, NMFS Southeast Fisheries Center, Miami, Fla., personal commun.). Wholesale price per pound was converted to mean price per gram and multiplied by the weight for each species from a standardized sample of 30 trap hauls per mesh size. Prices were adjusted according to fish size for some species as commonly done in the fishery. We assigned large individuals (> 5 pounds, 2.3 kg) the highest values, medium sizes (2-5 pounds, 0.9-2.3 kg) the lower range of values, and small sizes (< 2 pounds, 0.9 kg) a standard value of $0.5/pound ($1.10/kg)...The largest mesh that would retain a particular fish was determined during laboratory and field trials." Their catch results (from their Table 2) were as follows: "A total of 1,810 fish, representing 85 species in 28 families and weighing 757 kg. were captured during 330 trap hauls...A 1979-80 survey of commercial trap catches off Dade and Broward counties showed that snapper, grouper, triggerfish, and grunts, in decreasing order of abundance, dominated commercial trap catches (Sutherland and Harper, 1983). The 1987-88 catches, were dominated by grouper, triggerfish, and grunts, with snapper ranking 6th in weight. In the current study, mean catches ranged from a low of 0.58 fish/haul for a 4 x 4" mesh to 12.77 fish/haul for the 1.5" hexagonal mesh...With the exception of the 0.5 x 0.5" mesh (which had the second highest average catch in numbers) the average number of fish per haul tended to decline with meshes larger or smaller than 1.5" hexagonal. The total number of species caught in larger mesh traps was considerably less than with smaller mesh...Mean total weight per haul tended to decline with meshes larger or smaller than 1.5" hexagonal, ranging from a low of 0.65 kg for a 3 x 6" mesh to a high of 4.59 kg for the 1.5" hexagonal mesh...Mean weight per fish tended to increase with mesh size, especially for meshes 2 x 3" and larger."

Mesh options based on Bohnsack et al. (1989) are as follows:

Mesh	Catch	Catch/H	Weight	Mean Wt/H	Mean Wt/Fish	Species	Value
0.5 x 0.5	322	11.50	50.46	1.80	0.16	35	$79.40
1.0 x 2.0	210	6.18	80.65	2.37	0.38	43	99.18
1.5 x 1.5	259	8.63	128.13	4.27	0.50	41	135.01
1.5 Hex	396	12.77	142.24	4.59	0.36	47	162.54
2.0 x 2.0	153	5.67	53.98	2.00	0.35	33	42.84
1.5 x 3.0	213	6.87	84.40	2.69	0.39	32	100.63
2.0 x 3.0	76	2.45	73.71	2.38	0.97	25	67.11
2.0 x 4.0	78	2.89	59.14	2.19	0.76	18	110.01
3.0 x 3.0	67	2.31	40.88	1.41	0.61	15	35.56
4.0 x 4.0	19	0.58	25.10	0.76	1.32	7	12.31
3.0 x 6.0	17	0.59	18.89	0.65	1.11	7	40.85
Totals	1,810		757.58				$885.44

Notes:

Value = value of catches standardized for 30 trap hauls. The authors note that:

"The estimated commercial wholesale value, based on a standardized sample of 30 trap hauls per mesh, ranged from $0.41/haul for the 4 x 4" mesh to $5.42/haul for the 1.5" hexagonal mesh...Catch value, although variable, tended to decrease for meshes smaller and larger than the 1.5" hexagonal mesh and was roughly correlated to total numbers and weight per haul."

These results are shown in the two graphs on the next page.

The proposed 20" total length minimum size for red snapper; gag, red, black, yellowfin and yellowmouth groupers equates to approximately 51 cm total length which exceeds the sizes landed in the Bohnsack et al. (1989) study as shown by their Table 9. Meshes > 3 x 3" retained groupers measuring between 38 and 44 cm fork length. The proposed 12" total length minimum size for vermilion (commercial), yellowtail, gray, mutton, schoolmaster, queen, blackfin, cubera, dog, mahogany and silk snapper; and red porgy equates to approximately 31 cm total length. A mesh size of 2 x 3" or larger would be required to ensure escapement of fish smaller than the minimum size limit.

Bohnsack et al. (1989) noted that:

"Total value, total species caught, number of individual, and mean total weight per haul tended to decline with meshes larger and smaller than the 1.5" hexagonal mesh (Fig. 4). Two of the minimum mesh sizes currently legally specified (1.5 x 1.5", and 1.5" hexagonal) had the greatest percentage contribution to total weight and total value. Mesh sizes 2 x 3" and larger, especially, tended to catch larger fish but fewer species and individuals. Based on these results, the presently specified legal minimum mesh sizes appear to do little to reduce bycatch...Results show that catchability (the proportion of a population removed by one unit of fishing effort) can be greatly

influenced by mesh size and shape. Fewer primary commercial species were caught with the largest mesh sizes. This reduced catch partially reflects the lower availability of large fish that can be retained in large meshes. Also, fish may be less willing to enter large meshed traps, perhaps because fewer retained fish make the trap less attractive...Assuming constant effort, a larger mesh size would have immediate effects on total revenue of the trap fishery by lowering catchability. Larger mesh sizes would provide less revenue per trap haul. With larger mesh sizes, more effort (number of hauls) must be expended to obtain total revenue comparable with that of the smaller sized mesh. To achieve the same revenue with larger meshes as obtained with a 1.5" hexagonal mesh, fishermen would have to increase their number of trap hauls anywhere from 1.5 to 13 times depending on the mesh size (Fig. 3,4). The number of trap hauls fishermen can make is limited by their skill, manpower, time, and equipment."

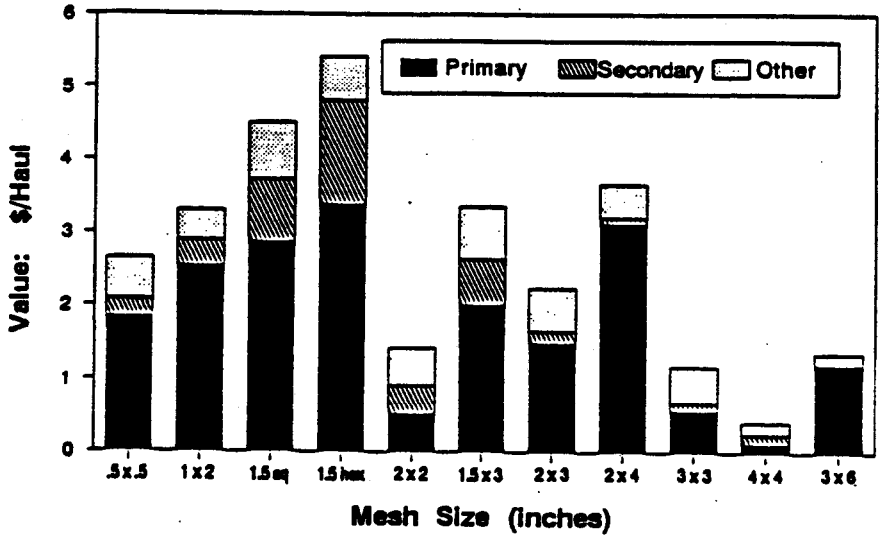

Figure 3.—Relative catch value by mesh size.

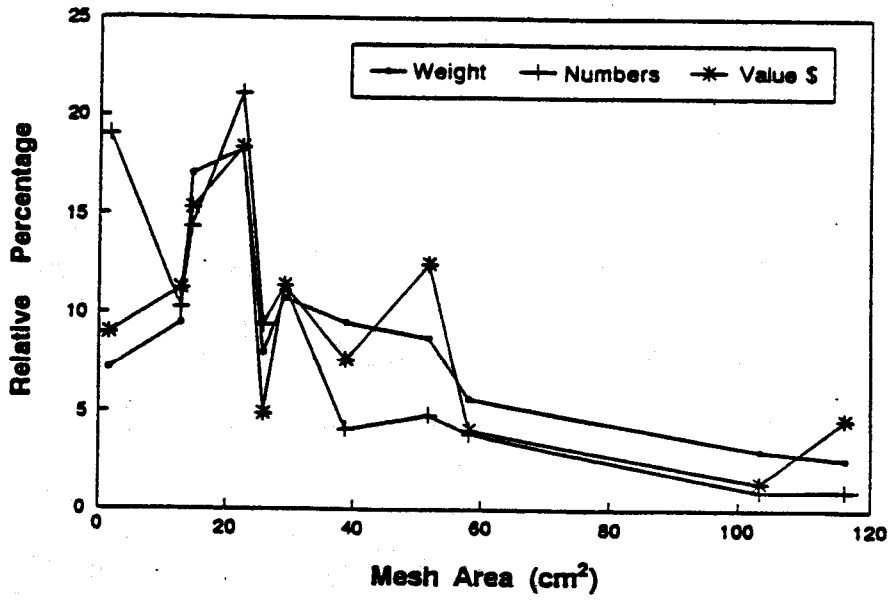

Figure 4.—Relative effects of mesh area on mean total weight, mean total numbers, and mean total value per haul.

The Council rejected altering mesh sizes because it would not address concerns about efficiency, habitat damage, intense competition and inconsistent state/federal regulations. The Council's objective to promote orderly utilization of the resource will not be achieved due to the intense competition among users and concerns about the overly efficient nature of fish traps. The Council's objective to minimize habitat damage would not be achieved if fish traps were allowed. In addition, the Council is rebuilding the overfished species using minimum size limits. The mesh sizes that would be practical in the fishery do not release sublegal red snappers and groupers. A mesh size of 2 x 3" or larger would be required to release fish smaller than the 12" minimum size limit which would significantly reduce the trap catches and result in a de facto prohibition.

The Council examined the Bermuda experience with increasing mesh size to prevent the overexploitation of their snapper grouper fishery and found that the Bermudian government has prohibited the use of fish traps after attempting to protect the resource through increasing mesh sizes. The Council concluded that altering the mesh size would not effectively manage the snapper grouper fishery and rejected this option.

Rejected Option 4. Limit the number of traps to 100 per permit holder.

Discussion

Rejected Option 4 would essentially track the Gulf reef fish regulations except that they specify 100 per vessel. Kitner (1989) indicated that on average fishermen owned 60 traps and actively fished on average 38 of the 60 traps. Information provided by Organized Fishermen of Florida at the August 1990 scoping meeting indicate that six fish trap fishermen in southeast Florida used 790 traps in 1987, 900 in 1988 and 920 in 1989. Catches were 201,181 pounds in 1987, 354,609 pounds in 1988 and 441,205 pounds in 1989. In 1989, these fishermen averaged 153 traps each and caught 73,534 pounds of fish each. Reducing their number of traps to 100 represents a 35% reduction and could reduce their catch by the same percentage. The amount of reduction could be as high as 25,737 pounds of fish per fisherman if they cannot make up some of the loss by fishing the allowable 100 traps more efficiently.

Fishermen have offered that the 50% income requirement will reduce the number of qualifying trap fishermen to approximately 40 and if they were limited to 100 per permit holder, the total number of traps would be approximately 4,000. The income requirement would reduce the current number of fish trap fishermen but, under this option, any of the hook and line fishermen qualifying for a permit could switch over to the fish trap fishery and increase the number of traps that would be allowed. The Council rejected this option because it would not satisfactorily address concerns about efficiency, habitat damage, intense competition and inconsistent state and federal regulations. The Council's objective to promote orderly utilization of the resource will not be achieved due to the intense competition among users and concerns about the overly efficient nature of fish traps. The Council's objective to minimize habitat damage would not be achieved if fish traps were allowed.

Rejected Option 5. Limit the number of traps to 100 per permit holder and limit the number of permit holders to _____(Council to specify) for a period of _____years (Council to specify) and require weekly reporting. The Council will review the data and determine whether fish traps should be an allowed gear type in the snapper grouper fishery.

Discussion

There appears to be a difference in how the fishery is prosecuted by full-time versus part-time or seasonal fish trap fishermen. Option 5 would limit the number of permits (if we can do so without going into a full limited entry program) and presumably these would go to the full-time or more full-time trap fishermen. In this way the Council could further evaluate the fishery before making a final determination.

The Council rejected this option because it would not satisfactorily address concerns about efficiency, habitat damage, intense competition and inconsistent state/federal regulations. The Council's objective to promote orderly utilization of the resource will not be achieved due to the intense competition among users and concerns about the overly efficient nature of fish traps. The Council's objective to minimize habitat damage would not be achieved if fish traps were allowed.

Rejected Option 6. Prohibit use of fish traps in the EEZ off Florida.

Discussion

The continental shelf off Florida, particularly south Florida, is narrow and there is intense competition among recreational, part-time and full-time commercial users of the snapper grouper resource; and between commercial users employing different gears. The State of Florida has prohibited fish traps and would like to have compatible regulations in the EEZ off Florida.

The coral reef system is very complex with many interconnecting feed-back loops to rechannel energy within the system. If the herbivores and other species in these feed-back loops are removed in addition to the removal of top carnivores, unknown damage may result. Recent increases in green algal blooms on reefs may be due to natural causes, may result from increased wastewater run-off or some combination of the two. There may also be some complicating factor with the removal of herbivores that in the past may have grazed the algae, thereby preventing blooms (see LaPointe, 1989).

The Council considered Option 6 and a slight modification to prohibit use of traps south of Cape Canaveral. Some Council members believe that there are two separate fisheries using somewhat different gear and fishing them in entirely different styles. If the traps are to be retained they need two different sets of regulations above and below Cape Canaveral, Florida. Regulations for the areas south of Cape Canaveral or for all of Florida would approach the industry proposal (Rejected Option 2). In general, north of Cape Canaveral or north of Florida, regulations would have included the use of trap limitations in number and allowing only the use of tended traps with certain mesh regulations. Florida prohibited fish traps in 1980 and some Council members felt that it was important for Florida's management to have a similar ban in federal waters.

There are only a few fishermen utilizing fish traps north of Cape Canaveral, sporadically, filling-in from some other fishery. For example, wreckfish fishermen have participated in the fish trap fishery during the wreckfish closed season.

The impacts of Option 6 on six southeast Florida fishermen can be estimated from the analysis shown above. Losses could be as high as 73,534 pounds of fish per fisherman. This should be considered an upper estimate because they would have the opportunity to fish using other commercial gear and would have the opportunity to catch some, if not all, of this lost catch.

Even though Option 6 would solve the problems with fish traps in Florida, the Council rejected this option because it would not satisfactorily address concerns about efficiency, habitat damage, intense competition and inconsistent state and federal regulations in the entire South Atlantic region as a whole. The Council's objective to promote orderly utilization of the resource will not be achieved due to the intense competition among users and concerns about the overly efficient nature of fish traps.

Rejected Option 7. Phase-out fish trapping over the time period vessels and gear currently in use in the fishery would be depreciated.

Discussion

Option 7 would give fishermen a period over which to prepare to stop trapping. The Council rejected this option because it would not satisfactorily address concerns about efficiency, habitat damage, intense competition and inconsistent state/federal regulations. The Council's Objective #3 to promote orderly utilization of the resource will not be achieved due to the intense competition among users and concerns about the overly efficient nature of fish traps. The Council's Objective #5 to minimize habitat damage would not be achieved if fish traps were allowed during the phase-out period.

Rejected Option 8. Limit the use of fish traps to 10 tended traps per vessel. It is the Council's intent that this option excludes black sea bass traps; further, that "tended" means that traps are collected and carried back into shore at the end of each trip.

Discussion

Option 8 would give fishermen the opportunity to continue to use fish traps while eliminating many of the problems associated with this gear. Tended traps would not work off south Florida because the Florida snapper grouper resource has been reduced to such low levels that it requires much more effort such that traps can not soak for just a few hours and catch fish. In the northern part of the fishery, traps could be fished as tended traps with low numbers of traps. The Council rejected this option because it would not satisfactorily address concerns about efficiency, habitat damage, intense competition and inconsistent state/federal regulations. The Council's Objective #3 to promote orderly utilization of the resource will not be achieved due to the intense competition among users and concerns about the overly efficient nature of fish traps. The Council's Objective #5 to minimize habitat damage would be addressed somewhat but the fish traps allowed by this

option would continue to damage the habitat as documented in south Florida.

ACTION 29: SPECIFY ALLOWABLE GEAR

It was the Council's intent to draft regulations specifying allowable gear after public hearings and NMFS informal review. The type of gear that would be allowed in the fishery would be listed and all other gear types prohibited. Action 30 provides a mechanism for experimental gear to be evaluated. The Council deferred this item to a forthcoming amendment to further develop this option based on the extensive public input received and the NMFS recommendation to address gear items in a separate amendment.

ACTION 30: EXPERIMENTAL GEAR

In consultation with the Council, the Regional Director may issue permits for experimental gear on a limited basis provided that a process is implemented to collect data on the use of the particular gear concurrently with issuance of the permit. The data collected would be reviewed by the assessment group as soon as possible after the gear has been in use for 12 months or some specified period of time. The Council would review the data and the group's report and determine whether the gear should be allowed. Any changes would be made by plan amendment. It would be the Council's intent to allow the sale of catch from experimental gear. The law enforcement committee recommended a consistent policy to allow the sale of fish from experimental gear.

The Council deferred this item to a forthcoming amendment to further develop this option based on the extensive public input received and the NMFS recommendation to address allowable gear in a separate amendment.

ACTION 31: NON-CONFORMING GEAR LIMITED TO BAG LIMIT

Non-conforming gear is limited to the bag limit for species with a bag limit; for species with no bag limit, no retention is allowed.

Discussion

Any gear that is legal in a fishery (e.g., black sea bass traps, spiny lobster traps, shark longline gear, mackerel nets, etc.) is limited to the bag limit for snapper grouper species caught incidentally to their normal fishing operation. For those species without a bag limit, no retention is allowed and fish must be released in a manner that ensures the maximum chance of survival. This measure will aid enforcement, prevent a possible loop-hole whereby black sea bass traps might be used to target other snapper grouper species and prevent wastage where a limited bycatch exists in other fisheries.

REJECTED ALTERNATIVES FOR GEAR RESTRICTIONS

Rejected Option 1. Only allow the use of vertical hook and line gear, not to exceed 6 hooks per line and the lines must be attached to the vessel. Rejected Option 1 would include hand lines, both manual and powered rod and reel gear, and fixed manual or powered bandit type reels as long as

the number of hooks per line did not exceed 6.

Discussion

Generally, the first gear in a fishery is hook and line and the fishermen make a sufficient catch and earn sufficient money when there is a high standing stock. As the stocks decline, catch and earnings decline and fishermen look to other, more efficient gear.

Having the lines attached to the vessel will prevent the use of buoy gear that was developed in the Gulf of Mexico. The Council deferred this item to a forthcoming amendment.

Alternatives to Rejected Option 1 That Were Considered But Rejected

a. A limit of 3 hooks/line was suggested by the Ft. Pierce Sportfishing Club.

b. Exclude black sea bass traps for catching black sea bass. The predominant gear used to catch black sea bass are traps. The prohibition on use of traps would essentially eliminate the black sea bass commercial fishery.

c. Allow more than 6 hooks per line while fishing for wreckfish.

d. Exclude spearfishing.

e. Exclude tended fish traps.

f. Exclude fish traps.

The Council deferred consideration of these items to a forthcoming amendment when they will deliberate specifying allowable gear.

IV. REGULATORY IMPACT REVIEW AND INITIAL REGULATORY FLEXIBILITY ANALYSIS

A. INTRODUCTION

The Regulatory Impact Review (RIR) and Initial Regulatory Flexibility Analysis (IRFA) analyze expected impacts resulting from the proposed measures for snapper grouper species in the South Atlantic. The RIR (Appendix 4) describes changes in appropriate consumer and producer welfare of user groups which are expected to result from the proposals. The IRFA serves as a basis for determining whether the proposed regulations would have a significant economic impact on a substantial number of small entities. In accordance with the Regulatory Flexibility Act, the IRFA enables regulators to relieve, to the greatest extent possible, small entities of burdensome regulations and recordkeeping requirements. The RIR and IRFA have been revised according to recommendations from informal review by NMFS and comments from the public after completion of the public hearing process.

B. PROBLEMS, OBJECTIVES AND MANAGEMENT MEASURES

Problems in the fishery, as well as the objectives and measures considered in this Amendment, have been outlined in Section I.

C. IMPACTS OF MANAGEMENT MEASURES

The impacts of the various alternatives are discussed in the RIR which is included in Appendix 4. This information has been modified after public hearings and NMFS informal review.

Initial Regulatory Flexibility Analysis

The Regulatory Flexibility Analysis focuses on regulatory impacts and paperwork requirements on small entities or firms. Most firms in the snapper grouper fishery are small, owner-operated vessels that fit into the rubric of "small entity." The impact of proposed management measures on fishing firms are detailed in the Regulatory Impact Review.

V. HABITAT CONCERNS

The habitat section for the snapper grouper fishery management plan was updated as part of Amendment 1. No additional material has become available since that amendment.

VI. VESSEL SAFETY CONSIDERATIONS

P.L. 99-659 amended the Magnuson Act to require that a fishery management plan or 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 the fishery for vessels otherwise prevented from harvesting because of weather or other ocean conditions affecting the safety of the vessels.

No vessel will be forced to participate in the fishery under adverse weather or ocean conditions as a result of the imposition of management regulations set forth in this amendment to the Snapper Grouper Fishery Management Plan. Therefore, no management adjustments for fishery access will be provided.

There are no fishery conditions, management measures or regulations contained in this amendment which would result in the loss of harvesting opportunity because of crew and vessel safety effects of adverse weather or ocean conditions. No concerns have been raised by the people engaged in the fishery or the 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, there are no procedures for making management adjustments in this amendment due to

vessel safety problems because no person will be precluded from a fair or equitable harvesting opportunity by the management measures set forth.

There are no procedures proposed to monitor, evaluate and report on the effects of management measures on vessel or crew safety under adverse weather or ocean conditions.

VII. COASTAL ZONE CONSISTENCY

Section 307(c)(1) of the Federal Coastal Zone Management Act of 1972 requires that all federal activities which 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 Council to have complementary management measures with those of the states, federal and state administrative procedures vary and regulatory changes are unlikely to be fully instituted at the same time. Based upon the assessment of this amendment's impacts in previous sections, the Council has concluded that this amendment is an improvement to the federal management measures for the snapper grouper fishery.

This amendment is consistent with the Coastal Zone Management Program of the States of Florida, South Carolina and North Carolina to the maximum extent possible; Georgia does not participate in the Coastal Zone Management Program.

This determination of consistency has been submitted to the responsible state agencies under Section 307 of the Coastal Zone Management Act administering approved Coastal Zone Management Programs in the States of Florida, South Carolina and North Carolina.

VIII. ENDANGERED SPECIES AND MARINE MAMMAL PROTECTION ACTS

NOAA initiated consultation under Section 7 of the Endangered Species Act (ESA) regarding the impact of this proposed rule on endangered and threatened sea turtles and marine mammals. A biological opinion concluded that neither the snapper grouper fisheries nor the proposed actions will have an adverse impact on threatened or endangered species or marine mammals, or result in the destruction or adverse modification of habitat that may be critical to those species.

Historically, NOAA initiated consultation under Section 7 of the ESA on the management measures before federal regulations implemented the original fishery management plan in 1983, Amendment 3 in 1989 and two emergency rules for the wreckfish fishery in 1990 and 1991. These consultations concluded that none of these actions were likely to jeopardize the continued existence of threatened or endangered animals or result in the destruction or adverse modification of habitat that may be critical to those species.

IX. 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 proposes, through this amendment, to establish additional permit and data collection programs. The public reporting burdens for these collections of information are estimated to average 15 minutes per response, respectively, including the time for reviewing instructions, searching existing data sources, getting and maintaining the data needed, and completing and reviewing the collection of information.

X. FEDERALISM

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 adoption of this amendment.

XI. NATIONAL ENVIRONMENTAL POLICY ACT -- ENVIRONMENTAL ASSESSMENT

The discussion of the need for this amendment, proposed actions and alternatives and their environmental impacts are contained in Section III of this amendment. A description of the fishery is contained in material cited in Section II.

The proposed amendment is not a major action having significant impact on the quality of the marine or human environment of the South Atlantic. The proposed action is an adjustment of the original regulations of the FMP to protect the snapper grouper resource from depletion. The proposed action should not result in impacts significantly different in context or intensity from those described in the Environmental Impact Statement (EIS) published with the initial regulations implementing the approved FMP. The preparation of a formal EIS is not required for this amendment by Section 102(2)(c)(c) of the National Environmental Policy Act or its implementing regulations. For a discussion of the need for this amendment, please refer to Sections I and II.

Mitigating measures related to proposed actions are unnecessary. No unavoidable adverse impacts on protected species, wetlands or the marine environment are expected to result from the proposed management measures in this amendment.

The proposed regulations will protect the resource from depletion, better achieve the objectives of the FMP and lessen the environmental impacts of the fishery. Overall, the benefits to the nation resulting from implementation of this amendment are greater than management costs incurred. The economic impacts are discussed in the RIR which is included in Appendix 4.

Finding of No Significant Environmental Impact (FONSI)

Having reviewed the environmental assessment and the available information relating to the proposed actions, I have determined that there will be no significant environmental impact resulting from the proposed actions.

Approved: _____

Assistant Administrator for Fisheries Date

RESPONSIBLE AGENCY:

South Atlantic Fishery Management Council
1 Southpark Circle
Southpark Building, Suite 306
Charleston, South Carolina 29407-4699
(803) 571-4366

LIST OF AGENCIES AND PERSONS CONSULTED:

Comments were solicited from the following on Amendment 4:

Atlantic Coast Conservation Association
Atlantic States Marine Fisheries Commission
Snapper Grouper Advisory Panel
SAFMC Scientific and Statistical Committee
North Carolina Coastal Zone Management Program
South Carolina Coastal Zone Management Program
Florida Coastal Zone Management Program
Florida Department of Natural Resources
Florida Marine Fisheries Commission
Georgia Department of Natural Resources
South Carolina Wildlife and Marine Resources
North Carolina Department of Natural Resources and Community Development
National Marine Fisheries Service
- Southeast Region
- Southeast Center
United States Coast Guard
U.S. Environmental Protection Agency, Region IV
Center for Environmental Education
Gulf of Mexico & MidAtlantic Fishery Management Councils
Florida League of Anglers
South Atlantic Fisheries Development Foundation
Marine Advisory Agents
National Coalition for Marine Conservation
North Carolina Fisheries Association Inc.

Organized Fishermen of Florida
Southeastern Fisheries Association
Sportfishing Institute

LIST OF CONTRIBUTORS

Gregg T. Waugh, Deputy Executive Director, South Atlantic Fishery Management Council

John R. Gauvin, Fishery Economist, South Atlantic Fishery Management Council

Jane DiCosimo, Fishery Statistician, South Atlantic Fishery Management Council

Roger Pugliese, Fishery Biologist, South Atlantic Fishery Management Council

James R. Waters, Fishery Economist, Beaufort Lab, National Marine Fisheries Service

LOCATION AND DATES OF PUBLIC HEARINGS

All hearings began at 6:00 p.m. and ended at 10:00 p.m.

January 7, 1991 — Holiday Inn Beachside, 1111 N. Roosevelt Blvd., Key West, Florida
January 8, 1991 — Royce Hotel, 1601 Belvedere Rd., West Palm Beach, Florida
January 9, 1991 — Holiday Inn Oceanfront, 1617 First St., N., Jacksonville Beach, Florida
January 10, 1991 — Holiday Inn Midtown, 7100 Abercorn St., Savannah, Georgia
January 11, 1991 — South Carolina Wildlife, Marine Resources Div., 240 Ft. Johnson Rd., Charleston, South Carolina
January 14, 1991 — Quality Royale Beach Cove Inn, 4800 S. Ocean Blvd., North Myrtle Beach, South Carolina
January 15, 1991 — Hilton Inn, 301 N. Water St., Wilmington, North Carolina
January 16, 1991 — Carteret Community College, 3505 Arendell St., Morehead City, North Carolina

XII. LITERATURE CITED

Bohnsack, J.A. and D.E. Harper. 1988. Length-weight relationships of selected marine reef fishes from the southeastern United States and the Caribbean. NOAA Technical Memorandum NMFS-SEFC-215.

Bohnsack, J.A., D.L. Sutherland, D.E. Harper, D.B. McClellan, M.W. Hulsbeck and C.M. Holt. 1989. The effects of fish trap mesh size on reef fish catch off southeastern Florida. Marine Fisheries Review 51(2): 36-46.

Cofer-Shabica, S.V. 1989. Fish traps in the coral reefs of South Florida. In: Proc. Sixth Symp. on Coastal and Ocean Management, Coastal Zone 1989, 4:3030-3044.

Craig, A.K. 1976. Trapping experiments with snappers in south Florida. In: A.C. Jones (ed) Proc. Colloq. Snapper-Grouper Fish Res. of West. Cntrl. Atl. Ocean, FL SG Rep. No. 17:222-236.

Goodyear, C.P. 1989. Spawning stock biomass per recruit: The biological basis for a fisheries management tool. ICCAT Working Doc. SCRS/89/82:8 pp.

Harper, D.E., J.A. Bohnsack and D.B. McClellan. 1990. Preliminary report on bycatch from the southern Florida wire fish-trap fishery. NMFS SEFC Miami, Florida. MIA-89/90-19. 23 pp.

Keithly, W.R. and F.J. Prochaska. 1985. The demand for major reef fish species in the Gulf and South Atlantic regions of the United States. Proceedings of the Tenth Annual Tropical and Subtropical Fisheries Technological Conference of the Americas, Texas A&M Sea Grant TAMU-SG-86-102:59-72.

Kelley, G.H. 1990. A review of fish trapping. A non-thesis option paper submitted in partial fulfillment of the requirements for the degree of Master of Science in Ocean Science with a speciality in: Marine Biology. Nova University, 61+ pp.

Kitner, K.R. 1989. Fish trapping in the South Atlantic: Report to the South Atlantic Fishery Management Council, Charleston, South Carolina. Report completed December 1987, Published December 1989. SAFMC Technical Report Number 10, SAFMC Contribution Number 15, 18 pp.

SAFMC. 1983a. South Atlantic Fishery Management Council. Fishery Management Plan, Regulatory Impact Review and Final Environmental Impact Statement for the Snapper Grouper Fishery of the South Atlantic Region.

SAFMC. 1983b. South Atlantic Fishery Management Council. Source Document for the Snapper Grouper Fishery of the South Atlantic Region.

SAFMC. 1988. South Atlantic Fishery Management Council. Amendment Number 1 and Environmental Assessment and Regulatory Impact Review to the Fishery Management Plan, for the Snapper Grouper Fishery of the South Atlantic Region.

SAFMC. 1990a. South Atlantic Fishery Management Council. Amendment Number 2 (Jewfish), Regulatory Impact Review, Initial Regulatory Flexibility Analysis and Environmental Assessment for the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region.

SAFMC. 1990b. South Atlantic Fishery Management Council. Amendment Number 3 (Wreckfish), Regulatory Impact Review, Initial Regulatory Flexibility Analysis and Environmental Assessment for the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region.

SAFMC. 1991. South Atlantic Fishery Management Council. Updated Source Document for the Snapper Grouper Fishery of the South Atlantic Region.

Sutherland, D.L. 1989. Mortalities of reef fish in traps. NOAA, NMFS, SEFC, Miami Laboratory, Coastal Resources Division Contribution No. CRD-88/89-03, 10 pp.

Sutherland, D.L. and D.E. Harper. 1983. The wire fish-trap fishery of Dade and Broward counties, Florida, December 1979 - September 1980. Fla. Mar. Res. Publ. No. 40, 21 pp.

Taylor, R.G. and R.H. McMichael, Jr. 1983. The wire fish-trap fisheries in Monroe and Collier counties, Florida. Fla. Mar. Res. Publ. No. 39, 19 pp.

TABLE 1. SPECIES IN THE MANAGEMENT UNIT GROUPED ACCORDING TO KNOWLEDGE ABOUT SSR.

SNAPPERS - Lutjanidae

SSR Estimates Available

Lane snapper	*Lutjanus synagris*
Yellowtail snapper	*Ocyurus chrysurus*
Gray snapper	*Lutjanus griseus*
Mutton snapper	*Lutjanus analis*
Vermilion snapper	*Rhomboplites aurorubens*
Red Snapper	*Lutjanus campechanus*

SSR Estimates Unavailable

Black snapper	*Apsilus dentatus*
Queen snapper	*Etelis oculatus*
Schoolmaster	*Lutjanus apodus*
Blackfin snapper	*Lutjanus buccanella*
Cubera snapper	*Lutjanus cyanopterus*
Mahogany snapper	*Lutjanus mahogoni*
Dog snapper	*Lutjanus jocu*
Silk snapper	*Lutjanus vivanus*

SEA BASSES - Serranidae

SSR Estimates Available

Black sea bass	*Centropristis striata*

SSR Estimates Unavailable

Bank sea bass	*Centropristis ocyurus*
Rock sea bass	*Centropristis philadelphica*

GROUPERS = Serranidae

SSR Estimates Available

Gag	*Mycteroperca microlepis*
Scamp	*Mycteroperca phenax*
Red grouper	*Epinephelus morio*
Black grouper	*Mycteroperca bonaci*
Speckled hind	*Epinephelus drummondhayi*
Snowy grouper	*Epinephelus niveatus*
Warsaw grouper	*Epinephelus nigritus*

SSR Estimates Unavailable

Rock hind	*Epinephelus adscensionis*
Graysby	*Epinephelus cruentatus*
Yellowedge grouper	*Epinephelus flavolimbatus*
Coney	*Epinephelus fulva*
Red hind	*Epinephelus guttatus*
Jewfish	*Epinephelus itajara*
Misty grouper	*Epinephelus mystacinus*
Nassau grouper	*Epinephelus striatus*
Yellowmouth grouper	*Mycteroperca interstitialis*
Tiger grouper	*Mycteroperca tigris*
Yellowfin grouper	*Mycteroperca venenosa*
Wreckfish**	*Polyprion americanus*

PORGIES - Sparidae

SSR Estimates Available

Red porgy	*Pagrus pagrus*

SSR Estimates Unavailable

Sheepshead	*Archosargus probatocephalus*
Grass porgy	*Calamus arctifrons*
Jolthead porgy	*Calamus bajonado*
Saucereye porgy	*Calamus calamus*
Whitebone porgy	*Calamus leucosteus*
Knobbed porgy	*Calamus nodosus*
Longspine porgy	*Stenotomus caprinus*
Scup	*Stenotomus chrysops*

TRIGGERFISHES - Ballstidae

SSR Estimates Available

Gray triggerfish	*Balistes capriscus*

SSR Estimates Unavailable

Queen triggerfish	*Balistes vetula*
Ocean triggerfish	*Canthidermis sufflamen*

JACKS - Carangidae

SSR Estimates Available

Greater amberjack	*Seriola dumerili*

SSR Estimates Unavailable

Yellow jack	*Caranx bartholomaei*
Blue runner	*Caranx crysos*
Crevalle jack	*Caranx hippos*
Bar jack	*Caranx ruber*
Almaco jack	*Seriola rivoliana*
Lesser amberjack*	*Seriola fasciata*
Banded rudderfish*	*Seriola zonata*

TABLE 1. SPECIES IN THE MANAGEMENT UNIT GROUPED ACCORDING TO KNOWLEDGE ABOUT SSR.

SSR ESTIMATES ARE UNAVAILABLE FOR THE FOLLOWING SPECIES

SPADEFISHES - Ephippidae

Spadefish*	*Chaetodipterus faber*

GRUNTS - Pomadasyidae

Black margate	*Anisotremus surinamensis*
Porkfish	*Anisotremus virginicus*
Margate	*Haemulon album*
Tomtate	*Haemulon aurolineatum*
Smallmouth grunt	*Haemulon chrysargyreum*
French grunt	*Haemulon flavolineatum*
Spanish grunt	*Haemulon macrostomum*
Cottonwick	*Haemulon melanurum*
Sailors choice	*Haemulon parrai*
White grunt	*Haemulon plumieri*
Blue striped grunt	*Haemulon sciurus*

TILEFISHES - Malacanthidae

Blueline tilefish	*Caulolatilus microps*
Tilefish (Golden)	*Lopholatilus chamaeleonticeps*
Sand tilefish	*Malacanthus plumieri*

WRASSES - Labridae

Hogfish	*Lachnolaimus maximus*
Puddingwife	*Halichoeres radiatus*

*Proposed to be added to the management unit in Amendment 4.

**Added to the management unit in Amendment 3.

TABLE 2. PROPOSED MINIMUM SIZES FOR AMENDMENT 4 COMPARED WITH SSR VALUES AND OTHER REGULATIONS..

	COUNCIL'S	PDT/NMFS	CURRENT SSR %		SSR % with Minimum Size		GMFMC	GMFMC	FLORIDA	GEORGIA	SOUTH	NORTH
	OVERFISHED SSR%	GOAL SSR%	Recreational	Commercial	Recreational	Commercial	Recreational	Commercial			CAROLINA	CAROLINA
I. MINIMUM SIZE = 8" (203 MM) TOTAL LENGTH												
Lane snapper	30%	40%	FL=47-50%	NFL = 47%	31%	47%	8" TL	8" TL	8" TL			
Black sea bass (SAFMC currently 8" TL)	30%	30%	Car = 15%	CarHLL=39%	30%	47%	8" TL	8" TL	8" TL	8" TL	8" TL	8" TL
			FL=17-26%	CarTRPS=40%								
II. MINIMUM SIZE = 12" (305 MM) TOTAL LENGTH												
Yellowtail snapper (SAFMC currently 12" TL)	30%	40%	FL=43-40%	SFL = 42%	56%	55%	12" TL; 10 fish*	12" TL	12" TL		12" TL	12" TL
Gray snapper	30%	30%	FL=56-29%	NFL/HLL=19%	32%	25%	12" TL; 10 fish*	12" TL	10" TL			
Mutton snapper	30%	40%	FL=49-47%		49%		12" TL; 10 fish*	12" TL	12" TL			
Vermilion snapper	30%	30%	Car = 19%	Car=20-28%	30%	25%	8" TL	8" TL	8" TL			
			FL=26-19%	FL=17-27%								
Red porgy	30%	40%	Car = 18%	Car = 29%	33%	38%						
			FL=45-19%									
Gray triggerfish (Fork Length)	30%	40%	Car = 43%	Car = 36%	Car = 44%	Car = 39%						
			FL=22-18%	NFL = 38%	FL= 26-22%							
Schoolmaster snapper	30%								10" TL			
Queen snapper	30%								12" TL			
Blackfin snapper	30%								12" TL			
Cubera snapper	30%								12" TL			
Dog snapper	30%								12" TL			
Mahogany snapper	30%								12" TL			
Silk snapper	30%								12" TL			
III. MINIMUM SIZE = 20" (508 MM) TOTAL LENGTH												
Red snapper (SAFMC currently 12" TL)	30%	40%	Car = 15%	Car = 24%	33%	40%	13" TL; 7 fish	13" TL; quota	13" TL	12" TL; 10 fish	12" TL	12" TL
			NFL = 5%	FL=17-55%								
Gag	30%	40%	Car = 19%	Car = 47%	30%	67%	20" TL; 5 fish+	20" TL; shallow quota	20" TL	12" TL; 10 fish		20" TL
			FL=32-30%	FL=54-56%								
Scamp (Fork Length)	30%	40%	Car = 18%	Car = 28%	Car = 42%	Car = 50%			20" TL			
			NFL = 42%	NFL = 49%	NFL = 74%	NFL = 60%						
Red grouper (SAFMC currently 12" TL)	30%	40%	Car = 24%	Car = 34%	FL=51-62%	FL = 37%	20 " TL; 5 fish+	20" TL; shallow quota	20" TL		12" TL	12" TL
			FL=11-28%	SFL/TRP=15%								
				SFL/HLL=45%								20" TL
Black grouper	30%	40%	SFL = 40%	NFL = 45%	43%	50%	20 " TL; 5 fish+	20" TL; shallow quota	20" TL			
Yellowfin grouper	30%						20 " TL; 5 fish+	20" TL; shallow quota	20" TL			
Yellowmouth grouper	30%											
IV. MINIMUM SIZE = 28" (711 MM) FORK LENGTH												
Greater amberjack	30%	40%	Car = 17%	27%	27%	43%	28" FL; 3 fish	36" FL	28" FL; no sale <36"FL	28" FL; 3 fish		
			NFL = 18%						or 28" w/o head			
V. NO RETENTION							20 " TL; 5 fish+	20" TL; shallow quota	20" TL		12" TL	12" TL
Nassau grouper (SAFMC currently 12" TL)	30%	40%										
Speckled hind	30%	40%	Car = 22%	Car = 37%								
			SFL = 48%	FL=42-45%								
Snowy grouper	30%	40%	Car = 10%	Car = 15%			-	deep water quota				
				FL=36-40%								
Warsaw grouper	30%	40%		12%			-	deep water quota				
Misty grouper	30%						-	deep water quota				
Yellowedge grouper	30%						-	deep water quota				
Golden tilefish	30%	40%		Car=35%								
				NFL=28%;SFL=42%								

Abbreviations: FL=Florida; Car=Carolinas; NFL=North Florida; SFL=South Florida, HLL=hook&line,longline; TRP=traps

*10 fish in aggregate includes all snappers other than red, vermilion and lane.

+5 fish in aggregate includes all groupers in addition to those listed.

TL = total lenght measure: Tip of snout to tip of tail.

FL = fork length measure: Tip of snout to fork of tail.

Shallow water quota includes all groupers other than misty, snowy, yellowedge & Warsaw.

Amberjack in Florida are a restricted species; also off-the-water limit of 6/person.

Florida snapper - 10 fish daily not incl. lane & vermilion; no more than 5 may be gray & no more than 2 red snapper; off-water limit of 20 (10 gray; 4 red); illegal to sell gray snapper less than 12" TL.

Table 3. Summary of PDT Recommendations

The PDT highly recommends establishment of reef fish reserves equal in area to 20% of the "live bottom" along the southeastern United States as well as the following:

		Recreational		Commercial	
Species	SSR	Minimum Size Limit or	Bag Limit	Minimum Size Limit or	Reduce F
Red Porgy	40%	13.5 inches	5	13.5 inches	31% Entire Region
Red Snapper	40%	21 inches	-	21 inches	41% NC,SC,GA 51% NFL
Vermilion Snapper	30%	12 inches	8 NC,SC,GA 8 NFL 4 SFL	10.7 inches 13.8 inches 12 inches	7% NC,SC,GA 22% NFL No data SFL
Yellowtail Snapper	40%	12 inches	-	12 inches	-
Lane Snapper	40%	8 inches	-	8 inches	-
Gray Snapper	30%	12 inches	? NFL 8 SFL	- 12 inches	40% NFL ? SFL
Mutton Snapper	40%	14 inches	-	14 inches	No Data
Gag	40%	NC, SC, GA 25 inches	5 Grouper Aggregate	NC,SC,GA 25 inches	-
		NLF, SFL 20 inches	(Gag, Scamp Red, Black)	NFL, SFL 20 inches	-
Scamp	40%	17 inches	5 Grouper Aggregate (Gag, Scamp, Red, Black)	19 inches	32%
Speckled Hind	40%	-	0	-	100%
Snowy Grouper	40%	-	1	-	70%

		Recreational		Commercial	
Species	SSR	Minimum Size Limit or	Bag Limit	Minimum Size Limit or	Reduce F
Red Grouper	40%	20 inches	5 Grouper (Gag,Scamp, Red,Black)	20 inches	-
Warsaw Grouper	40%	-	0	-	100%
Nassau Grouper	40%	-	0	-	100%
Black Grouper	40%	20 inches	5 Grouper Aggregate (Gag,Scamp, Red, Black)	20 inches	No data for SFL
Black Sea Bass	30%	8 inches	7 NC,SC,GA 3 NFL	8 inches	- -
White Grunt	40%	-	-	-	-
Gray Triggerfish	40%	13 inches	1 NFL 1 SFL	14.5 inches 15 inches No data	25% NC,SC,GA 26% NFL No data SFL
Greater Amberjack	40%	28 inches	-	26 inches	29% All Areas
Golden Tilefish	40%	-	0	-	100%
Wreckfish	?	-	-	-	Season Quota of 2 million pounds

The PDT also recommends the following actions:

1. Mandatory reporting of headboat catches by trip to enhance data for analysis.

2. Require commercial fishermen to have a permit to sell reef fish.

3. Fishermen must earn 50%, of their income from commercial fishing to qualify for a permit to sell reef fish.

TABLE 4. RECREATIONAL CATCHES AND IMPACTS OF SIZE LIMITS.

						% REC CATCH	% HEADBOAT
	MRFSS—1986		HEADBOAT FOR 1989			Below Min Size	Below Min Size
	NUMBERS	WEIGHT(LB)+	NUMBERS	WEIGHT (KG)	WEIGHT (LB)	(1989 Data)	(1989 Data)
I. 8" (203MM) TL							
Lane Snapper	45,000	33,377	140,096	47,134	103,912	FL 0%	0%
Black Sea Bass	1,677,000	1,031,643	808,497	225,603	497,364	NC 17%; SC 16%	9%
						GA 29%; FL 5%	
II. 12" (305MM) TL							
Yellowtail Snapper	278,000	381,329	160,021	99,564	219,499	FL 21%	4%
Gray Snapper	529,000	1,093,472	28,963	27,156	59,868	FL 79%	22%
Mutton Snapper			25,948	48,801	107,587	FL 0%	0%
Vermilion Snapper	56,000	29,348	661,251	157,189	346,539	NC79%;GA100%	86%
Red Porgy	11,000	12,394	146,488	74,865	165,047	NC 44%;SC 80%	40%
Gray Triggerfish (FL)			37,367	38,725	85,373	NC 7%; FL 39%	48%
Schoolmaster Snapper			989	493	1,087		50%
Queen Snapper							
Blackfin Snapper							91%
Cubera Snapper			53	208	459		0%
Dog Snapper							
Mahogany Snapper							
Silk Snapper			3,919	1,241	2,736		92%
Snappers	134,000	64,560	2,082	455	1,003		
Triggerfishes	45,000	102,812					
III. 20" (508MM) TL							
Red Snapper	210,000	633,916	23,453	32,113	70,796	NC 63%;SC100%	81%
						GA100%;FL 88%	
Gag						NC 54%;SC 36%	25%
Scamp (FL)							80%
Red Grouper						NC 73%	46%
Black Grouper							25%
Yellowfin Grouper							100%
Yellowmouth Grouper							
Groupers	156,000	672,371					
Groupers (Epinephelus)			8,518	16,653	36,713		
Groupers (Mycteroperca)			35,248	102,498	225,967		
IV. 28" (711MM) FL							
Greater Amberjack	123,000	2,656,577				NC 5%; FL 0%	63%
V. NO RETENTION							
Nassau Grouper							
Speckled Hind							
Snowy Grouper							
Warsaw Grouper							
Misty Grouper							
Yellowedge Grouper							
Golden Tilefish							
TOTALS	3,264,000	6,711,800	2,082,893	872,698	1,923,950		

% Recreational catch below the minimum size is from 1989 MRFSS data; Roger Pugliese & John Gauvin.

%Headboat catch below the minimum size is from Huntsman & Dixon; NMFS Beaufort Lab.

+Recreational weight from the MRFSS was calculated from MRFSS numbers and Headboat avg. wt.

Total weight for MRFSS include amberjacks with avg. wt. from MRFSS.

TABLE 5. SUMMARY OF RECREATIONAL AND COMMERCIAL SNAPPER GROUPER CATCH BY GEAR.

	Hand Line+		Elec/Hyd Reel		Rod & Reel		Bottom LL		Fish Traps		Diving		Entanglement Net		Other gear*		All Gear	Total
	Pounds	%	Pounds	%	Pounds	%	Pounds	%	Pounds	%	Pounds	%	Pounds	%	Pounds	%	Pounds	
Commercial (1988)																		
NC->GA	3,069,334	41%	66,988	1%	13,479	0%	470,306	6%	553,363	7%	16,239	0%	1,398	0%	3,380,818	45%	7,571,925	100%
Florida	3,219,115	70%	0	0%	0	0%	576,310	13%	410,791	9%	52,122	1%	253,739	6%	84,979	2%	4,597,056	100%
Total	6,288,449		66,988		13,479		1,046,616		964,154		68,361		255,137		3,465,797		12,168,981	
Recreational																		
MRFSS**					6,711,800													
Headboat (1989)					1,923,950													
Total					8,635,750												8,635,750	
Grand Total	6,288,449		66,988		8,649,229		1,046,616		964,154		68,361		255,137				20,804,731	

+Handline includes catches by electric/hydraulic reels.

*Other gear includes catches for which the gear type is unknown as well as catches by other gear types.

**MRFSS=Marine Recreational Fishing Statistical Survey= (1986 MRFSS Number Fish) X (1989 Headboat Average Weight)

SOURCE: MRFSS; NMFS BEAUFORT; NMFS MIAMI; PREPARED BY JANE DICOSIMO 2/14/91.

APPENDIX 1

SUMMARY OF PUBLIC COMMENTS RECEIVED DURING DEVELOPMENT OF

AMENDMENT 4 TO THE
SNAPPER GROUPER FISHERY MANAGEMENT PLAN

SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL

1 SOUTHPARK CIRCLE, SUITE 306 CHARLESTON, S.C. 29407-4699
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SUMMARY OF SCOPING MEETING COMMENTS

The South Atlantic Fishery Management Council held a public scoping meeting on June 11, 1990 in Key West, Florida. The purpose of this meeting was to provide members of the public with an opportunity to have input on items for Council consideration for Amendment 4 to the Snapper Grouper Fishery Management Plan. In addition to this summary, summary minutes and information submitted to the Council during the meeting are also available. These items will be considered by the Snapper Grouper Committee and appropriate suggestions incorporated into an options paper for the Committee and Council to work with during development of Amendment 4.

Presented to the:
SNAPPER GROUPER COMMITTEE
THE OMNI HOTEL AT CHARLESTON PLACE
130 MARKET STREET, CHARLESTON, SC 29401

AUGUST 20-21, 1990

SUMMARY OF COMMENTS FROM THE SCOPING MEETING	
	NUMBER OF SPEAKERS
FISH TRAP COMMENTS	
Prohibit fish traps.	15
Support proposal by fish trap industry.*	14
Fish traps need to be controlled.	1
Fish trap fish are needed in the market.	1
Fish traps are an enforcement problem.	1
If don't ban traps then modify mesh size to allow undersized fish to escape.	1
(2x4 releases 14-15" grouper; 3x3 releases 19" grouper)	
Define allowable gear and not include fish traps or entanglement nets.	1
Prohibit fish traps on all artificial reefs.	1
If violate regs take permit for 1 year; repeat and permit is gone for life.	1
Regulate fish traps, hook & line & other gear to protect the fishery.	1
LIVE ROCK/TROPICAL FISH COMMENTS	
Ban live rock harvesting.	2
No anglefish over 10" taken.	1
Regulate tropical fish collecting industry with size & bag limits.	1
MARINE FISHERY RESERVES/CLOSED AREAS	
Support Marine Fishery Reserves	2
Support closed areas during spawning season.	4
Oppose Marine Fishery Reserves/closed areas.	8
GENERAL COMMENTS	
Complementary bag limits, size limits and safe levels of commercial quota.	1
Hook & line size limits, trip limits, quotas and reef permits.	1
Oppose spearfishing.	1
Support the use of powerheads.	1
Yellowtail size limit should be at least 14".	1
Prohibit bangsticks on SC artifical reefs.	1
Add spade fish to the management unit.	1
Add SMZ staus for other artificial reefs off SC.	1
Manage amberjacks with 1500 lb trip limit & quota; close during May.	2
Manage amberjacks with bag limits.	1
*Reef fish permit ($23), trap ID ($1); in the event of a natural disaster, tags issued free.	
Use FL trip ticket system or monthly system but not weekly.	
Two 2 by 2 escape windows on each of the two sides of the trap.	
Untreated 3/16 jute or magnesium door fasteners.	
Lane & vermilion snapper (8"); red, nassau, yellowfin, black & gag groupers (20")	
red snapper (13"); gray, mutton & yellowtail (12")	

Angelfish not to be sold as a food fish.	
Fish trap industry will support an industry approved limited entry program.	
A cut-off date to be supplied by the Council.	

SUMMARY OF WRITTEN COMMENTS ON AMENDMENT 4.

FORM LETTERS	
6	Ban traps-wasteful killing & depletion of the resource.
5	Ban traps-extremely wasteful commercial method.
7	Ban traps-kill reefs and animals on them.
6	Ban traps-current measures not effective/enforceable; tourism & reef fish
	populations being damaged; interfers with spawning cycle.
35	Ban traps-destroying reefs & fish; not selective & harvest non-edible fish;
	dangerous to fishermen whose anchors & lines get caught in them, to divers,
	to sea animals & the fish; dragging grappling hooks along bottom mutilates reefs.
POST CARDS/NOTES/PHONE MESSAGES	
(1-phone; 21-Last Stand; 25-others; IN, MA, NH, NY, CO, FL, NJ, NC, TX & PA)	
42	Ban traps-wasteful, indiscriminate, fish gone, preserve for the future, grappling
	damages reef.
2	Support & strengthen trap regulations-prohibit setting on reefs.
1	Limit commercial activities including fish traps, longlines & netting.
3	Need more enforcement.
1	Prevent a total collapse of fishery.
1	Prohibit longlines & purse seines.
19	Ban live rock harvest.
1	Limit on collection of tropicals.
2	Prohibit use of chemicals for catching tropicals.
1	Support use of TEDs.
1	No oil wells.
SURVEY BY COMMERCIAL FISHERMEN (FLORIDA)	
	Purpose of the survey is to determine the approximate ratio of commercial fishermen
	in the Key West area that are opposed to the use of wire fish traps for the harvest of
	reef fish to those that are in favor of the use of wire fish traps for the harvest of
	reef fish.
96	OPPOSED - ghost traps, undersized fish, targeting tropicals, non-selective, release
	mortality is high, hook & line only, bycatch.
6	FAVOR - with proper regulations, ghost traps exaggerated, need very strict
	regulations, should have biodegradable panels that degrade in 3 days.
PETITIONS	
85	To N.C. Mar.Fish.Comm.-uncertain pressures are reducing availability of fish; strongly
	believe conservation measures are necessary e.g. size limits; we are in competition
	with pseudo-commercial fishermen & want a federal permit be required to fish in
	the snapper grouper fishery and that at least 50% of total earnings during the
	previous year have been derived from commercial fishing.
369	We the people of the USA, do not want a "no fishing zone" in our waters (Florida).
46	We the undersigned wish to express our opposition to the idea of making a sanctuary
	out of the Florida Keys reef as a whole. We do believe in conservation and protection,
	but we think this can be accomplished in other ways; such as taking smaller areas

	and sinking old ships or rock piles for increased habitat for fish, then put these areas
	off limits to all activity, fishing, diving, etc. This would be easier to patrol and
	monitor results. Also close the season on different species of fish during spawning
	seasons, and stop fish traps all together (Florida).
36	We the undersigned protest the use of wire traps for commercial fishing in federal
	waters due to their destructive nature to reefs and the indiscriminate killing of
	reef fish that are not of a commercial nature (Florida).
12	Ban fish traps in federal waters - indiscriminately kill all sizes & species; difficult
	to regulate; continued use will result in complete collapse as has happened in Haiti,
	Bermuda & Jamaica; dragging grapples to snag traps damages reefs; unfair to allow
	a small minority of commercial fishermen to profit from the complete destruction
	of a natural resource at the expense of the general public (Florida).
LETTERS FROM INDIVIDUALS	
(WY, MN, CA, MS, TN, AL, OH, PA, LA, VA, TX, IL, WA, DC, DE, NY, MD, NJ, CO, MA, NC->FL)	
262	Ban fish traps-non-selective; decline in quantity & quality of bottom fishing; lost
	tourism revenue; danger of total collapse; ghost traps; even if cost of seafood
	increases in restaurants need a ban; grappling hooks damage reefs; bycatch;
	current regulations not sufficient; interfer with spawning movements; ornamentals
	being sold as food fish; the cry of taking someones livelihood is not valid, there are
	no professional duck, buffalo or beaver hunters left cos they killed until there
	were no more.
1	Prohibit fish traps and longlines.
4	Prohibit drift nets, longlines and fish traps; don't take so long to take action.
16	Prohibit fish traps and netting.
1	Prohibit trapping within 1/4 mile of any reef.
1	Ban traps-money from saltwater license would be well spent to buy out commercial
	trap fishermen with existing investments in trap gear.
1	Prohibit commercial use of traps but allow use for a meal every once in a while.
1	If not prohibited at least make traps of materials that decompose when trap is lost.
2	Prohibit spearfishing; unfair for sports fishermen to sell; favor limits, size & creel
	and feel we need more enforcement.
1	Just enforce existing laws-that will solve problem.
2	Need better enforcement of size limits.
1	Amberjacks-need to manage cos none caught in 1990 vs schools in 1989.
1	Prohibit commercial harvest of amberjacks.
1	Prohibit bangsticks on artificial reefs.
1	Wreckfish-Jan-April best time for closing; 10,000 lb trip limit; fish rest of 1990;
	4 mill lb quota reasonable; limited entry with trip limit, quota & closed system-ideal.
3	Regulate commercial & recreational with size, creel & seasons.
1	Prohibit commercial tropical collecting.
1	NC Fisherman: 1) black sea bass 10" or more, Mass. has 12"; 2) mesh=1.5" sq or
	larger depending on minimum sizes, hexagonal mesh only if 12" sq panel of
	rectangular wire in trap; 3) traps in federal waters on trawls of 5 or more with
	18 ftms or more between traps; 4) release undersized fish ASAP; and
	5) enforce the regulations.

2	Support Marine Fishery Reserves - Friends of the Oleta River; 1 individual.
3	Oppose Marine Fishery Reserves.
1	Prohibit trawling close to shore.
CLUBS & ORGANIZATIONS	
550	**Stuart Sailfish Club-concerned about amberjacks:**
	1) Commercial trip limit of 1,500 lb or 50 whole be implemented by
	emergency action and in Amendment 4.
	2) The "Hump" and similar spawning concentrations off the Florida Keys
	should be declared a spawning sanctuary.
	3) Recreational bag limits be harvested only by both user groups.
	4) Pressure should be applied on Florida and other states to get a handle on
	unreported "backdoor sales" of amberjack, snapper and grouper as well as
	other species.
	Project Reefkeeper-the following options be developed:
	1) A total ban on fish traps.
	2) Change of mesh size to 2" x 4".
	3) Change of mesh size to 3" x 3".
	4) Increase of escape window size to 2" x 4".
	5) Increase of escape window size to 3" x 3".
	6) Increase of the number of escape windows to 2 per side.
	Develop a separate FMP for tropical ornamental fish; consider adding other
	species to the management unit; establishment of spawning season closures.
	ACCA of Georgia
	1) Opposed to the use of fish traps and strongly support their prohibition.
	Florida League of Anglers, Inc.
	1) Use of wire mesh fish traps be prohibited in all federal waters.
	Ft. Pierce Sportfishing Club
	1) Specify allowable gear - hook & line with a max. of 3 hooks per line.
	2) Commercial trip limits & quotas e.g. 1,500 lb/trip for amberjacks.
	3) Find a way to reduce or eliminate the bycatch in the shrimp fishery.
	Tourist Development Council of Palm Beach County
	1) Tourism benefits exceed the benefits from trap fishing.
	Center for Marine Conservation
	1) Ban the use of all wire fish traps immediately.
	2) Prohibit live rock mining in federal waters.

	Metropolitan Dade County, Florida
	1) Ban the use of fish traps in South Florida's Federal waters.
	2) Emergency rule banning fish traps from all permitted
	artificial reef sited in Federal waters - intermediate action.
	Covered Bridge Fishing Club, Lake Worth, Florida
	1) Ban fish traps.
	Georgetown Sportfishing Association
	1) Agree with the concept of marine fishery reserves.
	2) Size & bag limits for recreational & commercial fishermen
	with stiff mandatory penalties.
	3) Stiff mandatory penalties for using fish traps on AR's.
	4) Bangsticks should be outlawed altogether.
	5) Number of commercial licenses be limited; first to those
	deriving 50% or more of their income from fishing; ideal number
	could be established and reduced by attrition.
	Miami Rod & Reel Club
	1) Opposed to the use of fish traps.
560	**Stuart Sailfish Club**
	1) Ban the use of fish traps in South Florida.
	2) Bottom longlining should be banned.
>1,100	**West Palm Beach Fishing Club**
	1) Ban fish traps from federal waters.
	2) Recreational bag limits & minimum sizes should correspond with
	the stricter Florida regulations currently in place.
>7,000	**Florida Keys Citizens Coalition, Inc.**
	1) Oppose the use of fish traps in surrounding federal waters.
	Florida Sportsman Magazine
	1) Fish traps should be eliminated from federal waters.
	2) If need phase-out, immediate escape gaps must be required
	that would allow escape of groupers under 20".
	International Game Fish Association
	1) Stop fish trapping until a complete scientific study is completed.
	2) Something needs to be done to rebuild this fishery so that
	recreational anglers can again participate.
	Greater Ft. Lauderdale Chamber of Commerce

	1) Express major concern regarding the indiscriminate use of fish traps
	in Federal and State waters and the lack of enforcement/inadequate
	control thereof.
	Reef Relief
	1) Permanently ban the use of fish traps in federal waters.
LETTERS FROM AGENCIES	
	South Carolina Wildlife & Marine Resources Department
	1) Ban the use of bang sticks on AR's off SC with SMZ status.
	2) Seek SMZ designation for new AR's off SC.
	3) Add spadefish (Chaetodipterus faber) to the management unit.
	4) Delete the Little River AR SMZ cos now in State waters
	NC Division of Marine Fisheries responses to letters that:
1	1) Support proposal for marine fishery reserves.
1	2) Request action based on recommendation from a fisherman.
	Letter from SAFMC Chairman indicating need for:
	1) Headboat data collection
	South Carolina Wildlife & Marine Resources Department
	1) Staff review comments on marine fishery reserve concept.

SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL

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SUMMARY OF PUBLIC HEARING INPUT

The following general comments were extracted from the minutes of the public hearings. The tables that follow contain a summary of the recommendations by Action number and a summary of recommendations from the forms distributed and received at the public hearings.

Deepwater Species

1. Snowy and golden tilefish SSR in Florida is 40%, why regulate in Florida?
2. Gray tilefish are OK in Florida and shouldn't be prohibited.
3. Tilefish decline is from the large pulse effort by Beeline Seafoods out of Pt. Canaveral in the early 1980's. Over 26 months vessels 60-65' fished 8-10 miles of bottom longline gear with 2,500 hooks/set and made 3 sets/day. The size and catch/hook are OK now. March is the spawning season. Use a trip limit.
4. Oppose zero quota/zero bag limit.
5. Golden tilefish & snowy - issue permits and collect data prior to taking action.
6. Warsaw & speckled hind are not target species and should not be prohibited.
7. The deepwater vermilion & red porgy fishery would be eliminated because of the bycatch.
8. Set a 200 lb trip limit for snowy grouper.
9. If have no retention, then the vessels that fish in deep water will move inshore and conflict with the vessels that fish inshore.
10. Conduct more research before taking action.
11. Limited entry rather than no retention. Combine with wreckfish limited entry and pick either the wreckfish fishery or the deepwater fishery but not both.
12. The information used in the assessment is based primarily on headboat data. In early years the headboats fished farther offshore with electric reels and caught larger fish. In addition, the commercial fishery was new and the average size relatively large as would be expected. The headboats moved closer to shore due to problems with maintaining electric reels and long distance to travel and the fish are smaller. Commercial vessels have a bycatch of these species generally land smaller fish. Commercial vessels that target these species generally land larger fish. See the data presented at the Wilmington hearing.

Bag Limits

1. Vermilion summary: 1:10, 1:15-20 and 1:20. Exclude vermilion - 2 speakers.
2. Red porgy summary: 1:20.
3. Snappers 20 with less than 6 being red snapper - 2 speakers; 1:10 without yellowtail.
4. Yellowtail - 2:exclude.
5. Multiday limit (3 days) for headboats - 8 speakers.
6. Multiday limit (2 or 3 days) for recreational overnight trips - 1 speaker.
7. Mutton snapper bag limit of 2 per person - 1 speaker.
8. Black, gag and red groupers limit of 1 per person - 1 speaker.
9. Red snapper summary: 1:10 or less, 1:4-6, 1:4-5 and 4:5 fish.

Minimum Size Limits

1. Possibly vermilion and red porgy should be reduced from 12" to 10". Particularly for vermilion the population is increasing and the data used is only through 1988. Go with 10" now and monitor for a few years and if not above the 30% then look at additional regulations. Vermilion spawn at less than 10" and this should be sufficient protection. Summary: Vermilion 4:No, 3:12" high, 18:12" OK, 13:10" and 11:8"; Red porgy 2:No, 17:12" high, 7:10" and 1:8".
2. Mutton snapper should be larger: 14-18" with the majority suggesting 14".
3. Gray triggerfish are a pest species. Called reef rats because they bite divers; they enter lobster and stone crab traps and eat the catch; they prevent hooks from getting to the bottom for vermilion and red porgy. Need to put a bounty on them not size limits and bag limits.
4. Gray snapper should be 10" not 12".
5. Red snapper summary: 1:20" high, 1:20", 1:12-20", 1:15-16", 3:16", 3:15", 1:12-15", 1:14", 2:12-13" and 3:12".
6. Black grouper summary: 2:24", 5:25" and 1:26-28".
7. Red grouper summary: 1:24" high, 2:24", 2:18", 1:16-18", 1:16", 1:15" and 3:14".
8. Yellowfin summary: 2:24", 1:18" and 1:15".
9. Gag summary: 2:25", 4:24", 7:20", 3:18" and 1:15".
10. Scamp summary: 1:20", 1:18", 2:16", 1:15-16", 1:14-16", 1:15" and 2:14".
11. Yellowfin summary: 1:20" and 1:16".
12. Groupers summary: 1:20", 1:18", 1:16" and 3:15".

Regional Management

1. The SSR values show some problems in Florida and some problems in the Carolinas depending on the species. Why not just put in regulations where needed rather than throughout the entire area.
2. The fisheries are different and should be managed differently.
3. Ft. Lauderdale south should be managed separately given the higher exploitation in that area.
4. Florida should be managed separately.
5. North Carolina should be managed separately.
6. Need simplicity & conformity.
7. Agree that simplicity & conformity are important but don't ignore areas where the situation is different and may not require management at this time. Don't manage just to be consistent with Florida's regulations.

Data/Research/Economic Impact Analysis

1. Economic impacts are not adequately understood.
2. The data is poor and there is not a satisfactory data collection effort.
3. Mandatory compliance with data reporting.

Spawning Closures

1. Close to spearing during the spawning period.
2. Use closures instead of minimum sizes.
3. Use a trip limit during spawning season.
4. Time periods suggested are too long. Target the full moon time period.
5. Oppose spawning closures.
6. Support if no commercial trip limit or if use small areas.
7. Limit all fishing to the recreational bag limit during the spawning season.

Survival of Released Fish

1. The survival of released fish is too low for size limits to work.
2. Fish from the deepwater fishery are dead when pulled to surface and would be wasted if released.

General

1. No wreckfish limited entry until all snapper grouper species are included. Need to limit effort in the snapper grouper fishery.
2. The SAFMC should not be involved with gear restrictions.
3. Use size limits and don't ban gear.
4. Need better **ENFORCEMENT!!!!!!**
5. Support the idea of reserves.
6. Use commercial quotas & recreational bag limits with some bycatch allowances. For some species zero quotas/bag limits are appropriate.
7. Need to allow a 15% tolerance for minimum sizes.
8. No regulations for 1 or 2 years and concentrate on getting better information.
9. This Amendment is too complex and should be split into several amendments.
10. Support a saltwater license.
11. No bag limits on headboats due to difficulty in enforcement.
12. No bag limits without commercial quotas and trip limits. Without quotas and trip limits you would be reallocating from the recreational to the commercial fishery.
13. Pollution is a significant problem.
14. No commercial fishing on weekends; this would eliminate the "weekend warriors".
15. The Council needs to address the shrimp bycatch.
16. Phase-in the regulations rather than trying to get such significant increases in the level of regulations all in one fell swoop.
17. Have a bag limit of 10-20 fish without any of the minimum size limits.
18. Add the marbled grouper (*Epinephelus inermis*) to the list of prohibited species.
19. Use an upper size limit.
20. A 20% SSR is better than 30% for the snappers because they reproduce at an earlier age than the groupers.

SUMMARY OF PUBLIC HEARING COMMENTS ON AMENDMENT 4									
(The page numbers that appear after the Action Number refer to where each item is discussed in the Amendment 4 document.)									
Action	**Proposed Actions Are Shown in Bold Print.**		West Palm	Jacksonville			N. Myrtle		Morehead
Number	Description	Key West	Beach	Beach	Savannah	Charleston	Beach	Wilmington	City
1(4)	**Modify the list of problems & include additional species from the**	1-30%							
	stock assessment.								
	Rejected Alternative 1. No action.								
2(6)	**Modify objectives one and three.**								
	Rejected Alternative 1. No action.								
3(9)	**Track the Gulf Council's reef fish permit regulations.**	8	1 yes	2:fulltime	1:50%	3:yes, 1:50%	2:ok, 1:only	1:100%	1:$10K,2:10%
	Rejected Option 1. No action.	3	5@50%	1:80%	1>50%		fulltime	1 w/ alloc	5:50%;1;$
	Rejected Option 2. Define charter as recreational or commercial		or $20K	1:upper	1:50-80%			1:10% or	1
	by the number of fishermen aboard as was done with mackerel.		1@30%	1:bag not				$5K,$10K C	
	Rejected Option 3. Allow more than income from last year for the 50%.			sold		1		2:50%	
	Rejected Option 4. Require a permit to exceed the bag limit but do not							1:ok rec sell	2:bag not sold
	prevent sale of fish caught under the bag limit..							1 w/lower	
	Rejected Option 5. Have the permit requirements and fee become							requirements	
	effective immediately.								
	Rejected Option 6. Specify income level different from the 50% required								
	in the Gulf reef fish regulations (e.g. 10% as for mackerel plan).								
4(12)	**Track the Gulf Council's reef fish data regulations.**		1 no		2	3			
	Rejected Option 1. No action.								
5(15)	**Establish an assessment panel and annual adjustments similar to**				1			1	1
	the mackerel plan.								
	Rejected Option 1. No action.								
	Rejected Option 2. Conduct the assessments every other year or every					1			
	3 years.								
6(17)	**Minimum size of 8" total length for lane snapper & black sea bass**	2	5 yes		2:BSB ok	1:10" BSB		1:ok BSB	3:ok BSB
	Rejected Option 1. No action.				1:12" BSB			1:9" BSB	1:9" BSB
7(17)	**Minimum size of 12" total length for yellowtail, mutton, school-**	3 yes all	6 yes/1 no	1	1:12" verm hi	large impact	impact large	1:no; Verm	1:ok;Verm 1:
	master, queen, blackfin, cubera, dog, mahogany & silk snapper;	mutton,	1 higher	1:no vermil.	5:8" verm.	Verm 1:no,	1:12"FL ok	1:10",1:12"	no, 6:10"
	12" total length for red porgy;	gray &	modify*	1:verm. hi	1:8" Red porgy	1:8" & 3:10"	for verm.	R.porgy1:12"	R. porgy 2:
	12" total length for recreational vermilion & gray snapper;	Cubera		4:8" verm.		R. porgy 1:10"	Verm&R.porgy	Verm&R.porg	10" & 1:12"
	13" total length for commercial vermilion & gray snapper;	change*		1:10" verm.			2:10", 2:12"	2:10",1:12"	
	12" fork length for gray triggerfish.	4 no		1:12" verm.					8:no trigger
	Rejected Option 1. No action.								
	Rejected Option 2. Species specific sizes recommended by the plan								
	development team/NMFS stock assessment.								

Action Number	Proposed Actions Are Shown In Bold Print. Description	Key West	West Palm Beach	Jacksonville Beach	Savannah	Charleston	N. Myrtle Beach	Wilmington	Morehead City
8(20)	**Minimum size of 20" total length for red snapper;**	2 yes	Yes but red	1:ok	modify*	1:gag ok	1:16" grouper	1:20->15"	1:ok,2:20->
	20" total length for gag, red, black, scamp, yellowfin &	modify*	grouper lg	1:20" grouper		modify*	1:18" gag,	modify*	15", modify*
	yellowmouth grouper.		slot limits	'ls ok			scamp&yellin		
	Rejected Option 1. No action.		for grouper	modify*			R.snap 1:12-		
	Rejected Option 2. Species specific sizes recommended by the plan		modify*				20"		
	development team/NMFS stock assessment.								
	Rejected Option 3. Minimum size of 20" fork length for scamp grouper.								
	Rejected Option 4. Minimum size of 25" total length for gag and								
	black grouper.								
The Council does not have a preferred option among those listed below and is									
calling for public input on which of these is most appropriate.									
9(22)	**Option 1. Minimum size of 28" fork length (recreational) and 36"**	3	4	1	1:yes			1	2:1 or 2
	fork length (commercial) for greater amberjack (w/bag limit).		1 allow		1:28" both				
	Option 2. Minimum size of 36" fork length recreational and		cores			1	1		
	commercial for greater amberjack (without bag limit).								
	Rejected Option 1. No action.								3
	Rejected Option 2. Apply minimum size to Almaco, Lesser amberjack								
	and the Banded rudderfish.								
The Council does not have a preferred option among those listed below and is									
calling for public input on which of these is most appropriate.									
10(24)	**Option 1. Harvest/possession of speckled hind, Warsaw grouper,**	2 no	1:no	1:no; 1: quota	1:no directed	1:ok for War.			
	Nassau grouper, snowy grouper, misty grouper, yellowedge		2:quotas	for tilefish	fishing	& Nas.; 1: vert			
	grouper and golden tilefish is prohibited.		1:rec. limit			H&L; 1:reg LL			
	Include blueline and sand tilefish for enforcement purposes.		of 10-20			Snowy 5%SC's			
	Option 2. Harvest or possession of Nassau grouper is prohibited.				1	catch			
	Establish an area that covers the distribution of the others								
	and close to fishing for species in the SG fishery for 20 years.								
	Option 3. Allow a small directed fishery for snowy grouper with		100-300					1:this best	1:best
	some bycatch allowance for other deepwater groupers/tilefish.		lb bycatch						
	Option 4. Allow a 1 fish bag limit (except Nassau grouper which		3		1:rec only w/	1		1:Warsaw	1:Warsaw
	would have a zero bag limit) as a bycatch in the directed, deep-				a bag limit				
	water vermilion and red porgy fishery.								
	Rejected Option 1. No action.	1 Nassau	1					1:prefer	3:ok; modify*
11(27)	**Snapper aggregate bag limit of 10 w/ a one day possession limit.**	6 ok, 1 hi	1:hi	modify*	modify*	2:ok, 1: excl	1:ok;1:20/da	modify*	modify*
	Rejected Option 1. No action.	modify*	modify*			headboats	headboats		2:Verm
12(28)	**Shallow-water grouper bag limit of 5 with a one day possession**	2 ok, 3 hi	1:hi; 1:ok	1:ok	1:yes, 1:no	1:ok, 1: excl	2:2 day rec	1:ok,1:10fish	1:10 grouper
	limit. This excludes Nassau grouper which remains at zero.		modify*		modify*	headboats	for S/G bag		1:10 gag
	Rejected Option 1. No action.								
13(29)	**Greater amberjack bag limit of 3 with a one day possession limit.**		1	1:ok	2				2:no
	Rejected Option 1. Bag limit of 6 with a one day possession limit.								
	Rejected Option 2. Bag limit of 1 with a one day possession limit.	1							

Action Number	Proposed Actions Are Shown In Bold Print. Description	Key West	West Palm Beach	Jacksonville Beach	Savannah	Charleston	N. Myrtle Beach	Wilmington	Morehead City
14(29)	Gray triggerfish bag limit of 3 with a one day possession limit.	4 no	1:no		2:ok			1:no; 1:@15	8:no,1:@15
	Rejected Option 1. Bag limit of 1 with a one day possession limit.								
	Rejected Option 2. Bag limit in Florida of 1 or 3 with a one day possession limit.								
	Rejected Option 3. Include gray triggerfish in snapper aggregate bag limit.								
	Other Rejected Option for bag limits: Spadefish bag limit of 3 with a one day possession limit.								
15(30)	Do not include commercial quotas at this time.	1 yes & 1	AJ quota*	1	3:AJ trip or Q				
	Rejected Option 1. Establish quotas for certain species.	yes for AJ	2		1:for bag sp.	4	1		
16(31)	Wreckfish measures until replaced with a limited entry program:		1						
	1. It shall be deemed that all wreckfish possessed by any fishermen or dealer were taken in the EEZ unless it can be established through documentation that these fish were from outside the management unit.								
	2. There shall be no off-loading of any fishing vessel possessing wreckfish except during the hours of 8 a.m. to 4:30 p.m., EST.								
	3. There shall be no off-loading of any fishing vessel possessing wreckfish without 24 hours prior notice to NMFS Law Enforcement.								
	4. Dealers of snapper grouper must make available to authorized officers all records of landing and/or purchase of wreckfish upon demand.								
	5. The possession or landing of wreckfish without heads and fins intact is prohibited.								
	Rejected Option 1. No action.								
	Rejected Option 2. Drop the trip limit contingent upon implementation of a limited entry program for wreckfish.								
17(32)	Add spadefish to the management unit.				1:ok;1:ok,3 lo				
18(33)	Add Lesser amberjack & Banded rudderfish to the management unit.				2				
19(33)	All species in the snapper grouper management unit possessed in the EEZ must have its head and fins intact through landing.		2		2		1		
20(33)	Harvest and/or landing of greater amberjack is prohibited during March, April and May in the entire South Atlantic EEZ.	3 yes 5 no	6:no	2	1:no;1:ok if know time				
21(34)	Harvest and/or landing of mutton, yellowtail and gray snapper is prohibited during May and June.	1 yes* 2 no*	7:no		1:no;1:ok if know time				
22(34)	Harvest and/or landing of gag grouper and vermilion snapper is prohibited during _____.	3 yes 4 no	6:no	1:Gag March	1:no;2:ok if know time				
23(34)	Delete the Little River artificial reef SMZ.					1			
24(34)	The NMFS Regional Director is authorized to designate special research zones, in consultation with the Council, where fishing may either be prohibited or permitted on a controlled basis.	1 no	1		1:no		1	1:no	1

Action Number	Proposed Actions Are Shown In Bold Print. Description	Key West	West Palm Beach	Jacksonville Beach	Savannah	Charleston	N. Myrtle Beach	Wilmington	Morehead City
Rejected Alternatives for the General Category									
	Rejected Option 1. Fishermen are required to conform to the more								
	restrictive regulations whether they be state or federal regulations:								
	a. Minimum sizes and bag limits.								
	b. Trip limits.								
	c. Closed seasons and/or areas.								
	d. Gear restrictions.								
	e. Quotas.								
	f. Disposition of fish taken under a bag limit.								
	g. States submit regulations to the Council for conservation equivalency.								
	Rejected Option 2. Add the new South Carolina artificial reefs as SMZs.								
	Rejected Option 3. Trip limit of 1,500 lb or 50 whole fish per day for								
	amberjack.								
	Rejected Option 4. Fishing year changes.								
	Rejected Option 5. SMZs for research purposes.								
25(36)	**Prohibit the use of entanglement nets.**	2 yes	8		9	1	2	1	1
	Rejected Option 1. No action.								
	Rejected Option 2. Any vessel with entanglement nets aboard is limited								
	to no more than the recreational bag limit. If there is no bag limit for								
	a particular species, then there is no retention allowed.								
The Council does not have a preferred option among those listed below and is									
calling for public input on which of these is most appropriate.									
26(37)	**Regulate longline gear:**		1:regulate						
	Option 1. Allow the use of longline gear for snapper-grouper.					1			
	Option 2. Prohibit the use of longline gear for snapper-grouper.	2	6		7		3	1:ok;modify*	1:ok;1w/i40
	Option 3. Prohibit the use of longline gear for wreckfish.			1			1	2	1
	Rejected Option 1. No action.								
	Rejected Option 2. Allow the use of longline gear but limit the number of					1:regulate LL	regulate LL		
	hooks per set to some number to be specified by the Council _____.								
The Council does not have a preferred option among those listed below and is									
calling for public input on which of these is most appropriate.									
27(38)	**Regulate powerheads/bang sticks:**								
	Option 1. No action.	4	1	4	3				
	Option 2. Prohibit for harvesting species in the management							1	1
	unit within designated SMZs off South Carolina.						6		
	Option 3. Prohibit for harvesting species in the management		7	1	3	2			
	unit within the South Atlantic EEZ.								
	Rejected Option 1. Prohibit for harvesting species in the management								
	unit within all designated special management zones.								
							1 Gp:prohibit		
							spearing		

Action Number	**Proposed Actions Are Shown In Bold Print.** Description	Key West	West Palm Beach	Jacksonville Beach	Savannah	Charleston	N. Myrtle Beach	Wilmington	Morehead City
The Council does not have a preferred option among those listed below and is									
calling for public input on which of these is most appropriate.									
28(39)	**Regulate fish traps:**							navig. pblm.	
	Option 1. No action - continue with existing regulations.	2				1		1	1
	Option 2. Industry proposal to regulate fish traps.	16	7	1	2				
	Option 3. Modify the mesh size of fish traps.				1:let sm. go				
	Option 4. Limit the number of traps to 100 per permit holder.					200	1:<100tended		
	Option 5. Limit the number of traps to 100 per permit holder								
	and limit the number of permit holders to _____(Council to								
	specify) for a period of _____years (Council to specify) and								
	require weekly reporting.								
	Option 6. Prohibit use of fish traps in the EEZ off Florida.								
	Option 7. Prohibit use of fish traps in the South Atlantic EEZ.	9	6	1	9	1	1;1:incl BSB		1
	Option 8. Phase-out fish trapping over the time period vessels						1		
	and gear currently in use in the fishery would be depreciated.								
	Option 9. Limit the use of fish traps to 10 tended traps per							1:20	
	vessel. It is the Council's intent that this option excludes black								
	sea bass pots; further, that tended means that at the end of each								
	trip, traps are collected and carried back into shore.								
	Option 10. Add gear, vessel and trap identification and permit							1	2:ok;1:30 per
	requirements for black sea bass pots.								boat tended*
29(52)	**Specify allowable gear in the snapper grouper fishery.**	1	1:H&Line		2:ok, 1:H&L	1:H & Line	modify*		
30(52)	**Establish a procedure to deal with experimental gear.**				2:ok no sale				
31(53)	**Non-conforming gear be limited to the bag limit. For species**	1							
	with no bag limit, no retention would be allowed.								
Rejected Alternatives for Gear Restrictions:									
	Rejected Option 1. Only allow the use of vertical hook & line gear, not to								
	exceed 6 hooks per line and the lines must be attached to the vessel.								
	Alternatives to Rejected Option 1 that were considered but rejected:								
	a. A limit of 3 hooks/line.								
	b. Exclude black sea bass pots for catching black sea bass.								
	c. Allow more than 6 hooks/line while fishing for wreckfish.								
	d. Exclude spearfishing.								
	e. Exclude tended fish traps.								
	f. Exclude fish traps.								
Public hearing comments indicated by an asterisk are explained in more detail on the following page.									

	Hearings & Additional Explanation:
	Key West: Mutton 4:14", 2:15", 2:15-16", 1:15-18" & 2:18"; Gray 1:8", 1:10"R, 3:12"C & 1:12/13"; Cubera 18" or 24-30"; Red snapper 20" hi, 1:16" & 1:20".
	Groupers—Black 4:24", 1:25" & 1:26-28"; Red 24" hi, 1:16-18", 2:18" & 2:24"; Yellowfin 2:24"; Gag 2:24" & 1:25", Scamp & Yellowfin 1:16" & 1:20".
	Bag limits— don't include yellowtail; 4 multiday for headboats; 1 no multiday; mutton 2/person; mutton: 1 no & 4 yes; yellowtail: 1 yes & 9 no; gray snapper 3 no.
	West Palm Beach: Vermilion 1:12" hi, 1:8" & 4:10"; Mutton 2:14" & 1:15"; Gray 3:10"; Yellowt. 1:14"; Gag/Blk 2:24" & 1:25"; Scamp 1:14-16"; Red Sn 2:16"; Red G 1:14" & 1:16"
	Bag limits—3:headboat 3 day limit; rec-1:3 day & 1:2 day; 1:yellowtail separate; 1:10 w/o yellowtail ok; 1:black/gag/red groupers 1/person.
	Amberjack 1:500-1,000 & 1:800-1,000 lb/trip, 1:1,500 lb/person, 1:2,500 lb cores/trip
	Jacksonville Beach: Gag 2:20"; Scamp 2:smaller & 1:16"; Red snapper 1:too hi, 1:12", 2:12-13" w/closure, 1:14", 1:try max. size, & close for 4-5 yrs
	(supported by 50% of people at hearing); Bag Limits—Red Snapper 1:4-6 & 1:5, Vermilion 1:10 & 1:15-20.
	Savannah: Sizes—Red snapper 1:no, 1:hi, 2:12" & 2:12-15", Scamp hi, 1:15" groupers, 1:20" gag; Bag limits—1:multi day for headboats for snapper & grouper, Red snapper 1:4-5 &
	1:10 or lower, 1:yes w/o vermilion & 1:20 vermilion
	Charleston: Sizes—R.snapper 1:hi, 1:15-16", 1:15", 1:12-20"; Scamp 1:hi, 1:15-16"; Gag, Scamp & yellowfin 1:18"
	N. Myrtle Beach: Allowable gear—1:2-3 hooks/line, 1: vertical H&L w/<6 hooks and attached to vessel, 1:H & L only.
	Wilmington: Sizes—Gag 1:18" &3:20", Scamp 1:15", Scamp/R.grouper 1:14", Scamp/Yellowfin/R.grouper 1:15"; Bag limits—1:no limit on Verm., 1:20 porgies,
	1:5 R.snapper & 1:20 snapper w/<6 R.snapper; Longlines: 2:prohibit w/i 40 fm, 1:prohibit w/i 30 fm
	Morehead City: Sizes—Gag 1:15", 1:18" & 2:20"; R.snapper 2:15"; Scamp/R.grouper 1:14"; Action 10-1:no closure but 3 lb size limit, 1:no action on speck. hind
	Bag limits—1:20 snapper w/<6 R.snapper & 2:5 R.snapper; 1:Black sea bass trap season of Nov 1-March 1 only.

SUMMARY OF FORM COMMENTS FROM PUBLIC HEARINGS ON AMENDMENT 4									
(The page numbers that appear after the Action Number refer to where each item is discussed in the Amendment 4 document.)									
			(N=9)	(N=13)			(N=18)		(N=7)
Action	**Proposed Actions Are Shown In Bold Print.**	(N=58)	West Palm	Jacksonville	(N=0)	(N=0)	N. Myrtle	(N=2)	Morehead
Number	Description	Key West	Beach	Beach	Savannah	Charleston	Beach	Wilmington	City
1(4)	**Modify the list of problems & include additional species from the**	9Y:7N	2Y:1N	4Y:5N			6Y:1N	2Y	1Y:4N
	stock assessment.								1N
	Rejected Alternative 1. No action.	3Y:3N		1Y					3Y:1N
2(6)	**Modify objectives one and three.**	7Y:7N	2Y	3Y:4N			4Y:2N		4N
	Rejected Alternative 1. No action.	2N		1Y				2Y	2Y
3(9)	**Track the Gulf Council's reef fish permit regulations.**	12Y:6N	5Y	3Y:2N			7Y:1N	2Y	4N
	Rejected Option 1. No action.	3Y:5N		2Y				1Y	4Y
	Rejected Option 2. Define charter as recreational or commercial	7Y:2N		3N			1Y:1N		2Y:1N
	by the number of fishermen aboard as was done with mackerel.								2Y:1N
	Rejected Option 3. Allow more than income from last year for the 50%.	3Y:7N		5Y			1Y		2Y
	Rejected Option 4. Require a permit to exceed the bag limit but do not	7Y:3N		2Y:1N			3Y		4Y:1N
	prevent sale of fish caught under the bag limit.								
	Rejected Option 5. Have the permit requirements and fee become	5Y:5N		2Y:3N			3Y:1N		1Y:4N
	effective immediately.								
	Rejected Option 6. Specify income level different from the 50% required	5Y:4N		2Y:2N			1Y:1N		4Y:2N
	in the Gulf reef fish regulations (e.g. 10% as for mackerel plan).								
4(12)	**Track the Gulf Council's reef fish data regulations.**	13Y:4N	2Y:4N	4Y			6Y:1N	2Y	1Y:4N
	Rejected Option 1. No action.	4N							4Y
5(15)	**Establish an assessment panel and annual adjustments similar to**	8Y:11N	1Y:3N	3Y:1N			9Y:1N	2Y	1Y:3N
	the mackerel plan.								1N
	Rejected Option 1. No action.	1Y:4N		1Y					2Y:1N
	Rejected Option 2. Conduct the assessments every other year or every	7Y:2N		2Y			1Y:1N		3Y
	3 years.								
6(17)	**Minimum size of 8" total length for lane snapper & black sea bass.**	23Y:6N	6Y:2N	8Y			12Y:2N	2Y	6Y:1N
	Rejected Option 1. No action.	9Y:2N	1Y				3Y		1Y:1N
7(17)	**Minimum size of 12" total length for yellowtail, mutton, school-**	42Y:3N	7Y:1N	4Y:6N			7Y:2N	2Y	1N
	master, queen, blackfin, cubera, dog, mahogany & silk snapper;								
	12" total length for red porgy;	20Y:9N	4Y:3N	4Y:5N			3Y:13N	2Y	1Y:6N
	12" total length for recreational vermilion & gray snapper;	26Y:14N	3Y:4N	1Y:9N			3Y:11N	2Y	1Y:6N
	13" total length for commercial vermilion & gray snapper;	18Y:21N	5Y:3N	1Y:9N			6Y:9N	2Y	6N
	12" fork length for gray triggerfish.	15Y:22N	5Y:3N	6Y:4N			7Y:6N	2Y	1Y:6N
	Rejected Option 1. No action.	1Y					1Y		
	Rejected Option 2. Species specific sizes recommended by the plan	2Y:1N		1Y			1Y		
	development team/NMFS stock assessment.								

Action Number	Proposed Actions Are Shown In Bold Print. Description	Key West	West Palm Beach	Jacksonville Beach	Savannah	Charleston	N. Myrtle Beach	Wilmington	Morehead City
8(20)	**Minimum size of 20" total length for red snapper;**	29Y:13N	5Y:2N	2Y:9N			11Y:2N	2N	1Y:6N
	20" total length for gag, red, black, scamp, yellowfin &	2N	1Y:1N	2Y:1N					
	yellowmouth grouper.			1N				2Y	4N
	Rejected Option 1. No action.	1Y:3N					1Y		1N
	Rejected Option 2. Species specific sizes recommended by the plan	3Y:3N		2Y			2Y		
	development team/NMFS stock assessment.								1N
	Rejected Option 3. Minimum size of 20" fork length for scamp grouper.	6Y:3N	1Y	2N			5Y:2N		3N
	Rejected Option 4. Minimum size of 25" total length for gag and	5Y:7N	1N	3N			3Y:4N		3N
	black grouper.								
The Council does not have a preferred option among those listed below and is									
calling for public input on which of these is most appropriate.									
9(22)	**Option 1. Minimum size of 28" fork length (recreational) and 36"**	18Y:8N	4Y:2N	5Y:2N			8Y:2N		2Y:5N
	fork length (commercial) for greater amberjack (w/bag limit).								
	Option 2. Minimum size of 36" fork length recreational and	11Y:11N	3Y:2N	4Y:3N			2Y:4N	2Y	1Y:5N
	commercial for greater amberjack (without bag limit).			1Y					
	Rejected Option 1. No action.	3Y:2N		1N			1Y		1N
	Rejected Option 2. Apply minimum size to Almaco, Lesser amberjack	1Y:6N					1Y		1Y:1N
	and the Banded rudderfish.								
The Council does not have a preferred option among those listed below and is									
calling for public input on which of these is most appropriate.									
10(24)	**Option 1. Harvest/possession of speckled hind, Warsaw grouper,**	5Y:32N	3Y:6N	3Y:3N			4Y:6N	2N	6N
	Nassau grouper, snowy grouper, misty grouper, yellowedge								
	grouper and golden tilefish is prohibited.								
	Include blueline and sand tilefish for enforcement purposes.			1Y			2N		1N
	Option 2. Harvest or possession of Nassau grouper is prohibited.	9Y:30N	3Y:6N	4N			5Y:5N	2N	1Y:2N
	Establish an area that covers the distribution of the others								1N
	and close to fishing for species in the SG fishery for 20 years.								
	Option 3. Allow a small directed fishery for snowy grouper with	15Y:17N	6Y:2N	1Y:3N			8Y:3N	2Y	4Y:2N
	some bycatch allowance for other deepwater groupers/tilefish.								
	Option 4. Allow a 1 fish bag limit (except Nassau grouper which	3Y:22N	2Y:4N	1Y:2N			2Y:5N	2N	1Y:3N
	would have a zero bag limit) as a bycatch in the directed, deep-								
	water vermilion and red porgy fishery.								
	Rejected Option 1. No action.	4Y		1Y			2Y		2Y
11(27)	**Snapper aggregate bag limit of 10 w/ a one day possession limit.**	15Y:18N	8N	2Y:6N			4Y:8N		7N
	Rejected Option 1. No action.	2Y:1N					1Y	2Y	1Y
12(28)	**Shallow-water grouper bag limit of 5 with a one day possession**	18Y:15N	2Y:6N	6Y:6N			7Y:5N		2Y:6N
	limit. This excludes Nassau grouper which remains at zero.			1N					
	Rejected Option 1. No action.	1Y					1Y	2Y	1Y
13(29)	**Greater amberjack bag limit of 3 with a one day possession limit.**	19Y:13N	4Y:4N	5Y:6N			9Y:3N	2N	1Y:5N
	Rejected Option 1. Bag limit of 6 with a one day possession limit.	1Y:4N		3Y:1N			2Y		1Y:2N
	Rejected Option 2. Bag limit of 1 with a one day possession limit.	2Y:4N		1Y:2N					1Y:1N

Action	**Proposed Actions Are Shown in Bold Print.**		West Palm	Jacksonville			N. Myrtle		Morehead
Number	Description	Key West	Beach	Beach	Savannah	Charleston	Beach	Wilmington	City
14(29)	**Gray triggerfish bag limit of 3 with a one day possession limit.**	6Y:33N	3Y:5N	3Y:7N			11Y:2N	2N	6N
	Rejected Option 1. Bag limit of 1 with a one day possession limit.	2Y:8N		2N					1N
	Rejected Option 2. Bag limit in Florida of 1 or 3 with a one day	2Y:6N		2N					1Y
	possession limit.								
	Rejected Option 3. Include gray triggerfish in snapper aggregate bag limit.	3Y:6N	1N	2N					
	Other Rejected Option for bag limits: Spadefish bag limit of 3 with a one	2Y:4N					1N		
	day possession limit.								
15(30)	**Do not include commercial quotas at this time.**	13Y:10N	2Y:4N	5Y:4N			6Y:6N	2Y	5Y:1N
	Rejected Option 1. Establish quotas for certain species.	6Y:3N		1Y			1Y		1N
16(31)	**Wreckfish measures until replaced with a limited entry program:**	5Y:6N	4Y:1N	5Y:1N			6Y	2N	
	1. It shall be deemed that all wreckfish possessed by any fishermen or	10Y:6N		3Y			5Y		2Y:2N
	dealer were taken in the EEZ unless it can be established through								
	documentation that these fish were from outside the management unit.								
	2. There shall be no off-loading of any fishing vessel possessing	7Y:7N		2Y:1N			5Y:1N		1Y:3N
	wreckfish except during the hours of 8 a.m. to 4:30 p.m., EST.	9Y:7N							
	3. There shall be no off-loading of any fishing vessel possessing			2Y:1N			4Y:1N		4N
	wreckfish without 24 hours prior notice to NMFS Law Enforcement.								
	4. Dealers of snapper grouper must make available to authorized	12Y:2N		3Y			6Y		2Y:2N
	officers all records of landing and/or purchase of wreckfish								
	upon demand.								
	5. The possession or landing of wreckfish without heads and fins	18Y:3N		3Y			5Y		2Y:4N
	intact is prohibited.								1N
	Rejected Option 1. No action.	1Y:1N		1N					2Y:1N
	Rejected Option 2. Drop the trip limit contingent upon implementation	2N		1N					1Y
	of a limited entry program for wreckfish.								2Y:2N
17(32)	**Add spadefish to the management unit.**	7Y:21N	3Y:3N	2Y:6N			8Y	2N	4N
18(33)	**Add Lesser amberjack & Banded rudderfish to the management**	5Y:22N	2Y:5N	4Y:4N			5Y:2N	2N	1Y:5N
	unit.								
19(33)	**All species in the snapper grouper management unit possessed**	20Y:13N	6Y:1N	7Y:1N			8Y:2N		2Y:5N
	in the EEZ must have its head and fins intact through landing.							2Y	
20(33)	**Harvest and/or landing of greater amberjack is prohibited during**	7Y:32N	2Y:7N	4Y:4N			6Y:6N	2N	1Y:6N
	March, April and May in the entire South Atlantic EEZ.								
21(34)	**Harvest and/or landing of mutton, yellowtail and gray snapper**	6Y:37N	3Y:6N	3Y:5N			2Y:7N	1N	6N
	is prohibited during May and June.								
22(34)	**Harvest and/or landing of gag grouper and vermilion snapper is**	2Y:37N	1Y:8N	5Y:3N			8N		1Y:2N
	prohibited during _____.								2Y:6N
23(34)	**Delete the Little River artificial reef SMZ.**	7Y:3N	3Y	3N			5Y:2N		
24(34)	**The NMFS Regional Director is authorized to designate special**	11Y:22N	3Y:6N	3Y:4N			5Y:3N	2N	
	research zones, in consultation with the Council, where fishing								
	may either be prohibited or permitted on a controlled basis.								

Action Number	Proposed Actions Are Shown In Bold Print. Description	Key West	West Palm Beach	Jacksonville Beach	Savannah	Charleston	N. Myrtle Beach	Wilmington	Morehead City
Rejected Alternatives for the General Category									1Y
	Rejected Option 1. Fishermen are required to conform to the more	3Y:7N	1Y:2N	4Y			1Y:1N	2Y	2N
	restrictive regulations whether they be state or federal regulations:								
	a. Minimum sizes and bag limits.	4Y:3N		5Y			3Y:3N		2Y:2N
	b. Trip limits.	5Y:4N		4Y:1N			1Y:5N		3N
	c. Closed seasons and/or areas.	3Y:9N		4Y:1N			5N		4N
	d. Gear restrictions.	5Y:7N		6Y			5Y:2N		2Y:1N
	e. Quotas.	6Y:1N		4Y			4N		1Y:2N
	f. Disposition of fish taken under a bag limit.	3Y:3N		2Y:2N			1Y:3N		3N
	g. States submit regulations to the Council for conservation equivalency.	1Y:1N		2N			1Y		
	Rejected Option 2. Add the new South Carolina artificial reefs as SMZs.	2Y:2N	1Y	3N			3Y:1N		1Y
	Rejected Option 3. Trip limit of 1,500 lb or 50 whole fish per day for	5Y:3N	1Y	3Y:2N			3Y:5N		1Y
	amberjack.								
	Rejected Option 4. Fishing year changes.	1Y:4N		1Y:1N			2N		1N
	Rejected Option 5. SMZs for research purposes.	3Y:3N		1Y:1N			2Y		1N
25(36)	**Prohibit the use of entanglement nets.**	31Y:6N	5Y	11Y			11Y	2Y	3Y:1N
	Rejected Option 1. No action.	2Y:3N		1Y			1Y		2N
	Rejected Option 2. Any vessel with entanglement nets aboard is limited	11Y:1N	1Y	3Y:1N			2Y		1Y
	to no more than the recreational bag limit. If there is no bag limit for								
	a particular species, then there is no retention allowed.								
The Council does not have a preferred option among those listed below and is									
calling for public input on which of these is most appropriate.									
26(37)	**Regulate longline gear:**	7Y:2N		2Y			4Y		
	Option 1. Allow the use of longline gear for snapper-grouper.	13Y:17N	3Y:4N	2Y:8N			3Y:7N	2Y	1Y:3N
	Option 2. Prohibit the use of longline gear for snapper-grouper.	23Y:8N	4Y	11Y:1N			8Y:4N		4Y:1N
	Option 3. Prohibit the use of longline gear for wreckfish.	17Y:9N	3Y	11Y:1N			10Y:1N	2Y	4Y:1N
	Rejected Option 1. No action.	1Y:3N							3N
	Rejected Option 2. Allow the use of longline gear but limit the number of	7Y:1N		1N			2Y:2N		1Y:2N
	hooks per set to some number to be specified by the Council ____.								
The Council does not have a preferred option among those listed below and is									
calling for public input on which of these is most appropriate.									
27(38)	**Regulate powerheads/bang sticks:**	11Y:10N	2Y	5Y			8Y	2N	3Y:1N
	Option 1. No action.	10Y:7N	1N	5Y:2N			3Y:1N		4N
	Option 2. Prohibit for harvesting species in the management	12Y:3N	3Y	3Y:7N			8Y		3Y:1N
	unit within designated SMZs off South Carolina.								1Y
	Option 3. Prohibit for harvesting species in the management	12Y:8N	2Y	5Y:6N			7Y		4Y:2N
	unit within the South Atlantic EEZ.								
	Rejected Option 1. Prohibit for harvesting species in the management	2Y:1N					2N		1Y
	unit within all designated special management zones.								

Action Number	Proposed Actions Are Shown In Bold Print. Description	Key West	West Palm Beach	Jacksonville Beach	Savannah	Charleston	N. Myrtle Beach	Wilmington	Morehead City
The Council does not have a preferred option among those listed below and is									
calling for public input on which of these is most appropriate.									
28(39)	**Regulate fish traps:**	8Y:3N	1Y	5Y			3Y		3Y
	Option 1. No action - continue with existing regulations.	7Y:11N	1Y:1N	1Y:5N			1Y:4N	2Y	1Y:2N
	Option 2. Industry proposal to regulate fish traps.	22Y:6N	4Y:1N	5Y:2N			3Y:2N		2Y:1N
	Option 3. Modify the mesh size of fish traps.	10Y:12N	2Y:1N	4Y:2N			5Y:2N		4Y
	Option 4. Limit the number of traps to 100 per permit holder.	4Y:13N	4N	2Y:3N			3Y:4N	2Y	4Y:1N
	Option 5. Limit the number of traps to 100 per permit holder	8Y:13N	4N	2Y:3N			6N	2Y	2Y:2N
	and limit the number of permit holders to _____(Council to								
	specify) for a period of _____years (Council to specify) and								
	require weekly reporting.								
	Option 6. Prohibit use of fish traps in the EEZ off Florida.	17Y:12N	2Y:2N	10Y:1N			3Y:1N		3Y:1N
	Option 7. Prohibit use of fish traps in the South Atlantic EEZ.	24Y:15N	3Y:2N	11Y:1N			5Y:6N	2N	3Y:1N
	Option 8. Phase-out fish trapping over the time period vessels	9Y:12N	1Y:2N	6Y:1N			3Y:6N	2N	3Y:2N
	and gear currently in use in the fishery would be depreciated.								
	Option 9. Limit the use of fish traps to 10 tended traps per	6Y:12N	1Y:3N	4Y:1N			5Y:5N	2N	3Y:2N
	vessel. It is the Council's intent that this option excludes black								
	sea bass pots; further, that tended means that at the end of each								
	trip, traps are collected and carried back into shore.								
	Option 10. Add gear, vessel and trap identification and permit	9Y:8N	2Y:3N	2Y			5Y:6N	2Y	5Y
	requirements for black sea bass pots.								
29(52)	**Specify allowable gear in the snapper grouper fishery.**	19Y:13N	3Y:4N	6Y:2N			8Y:4N	2Y	4Y:1N
30(52)	**Establish a procedure to deal with experimental gear.**	12Y:8N	2Y:2N	6Y:2N			6Y:4N	2Y	3Y:1N
31(53)	**Non-conforming gear be limited to the bag limit. For species**	13Y:19N	2Y:2N	6Y;1N			5Y:4N	2N	3Y:1N
	with no bag limit, no retention would be allowed.								
Rejected Alternatives for Gear Restrictions:									
	Rejected Option 1. Only allow the use of vertical hook & line gear, not to	4Y:4N		3Y:1N			3Y		3Y
	exceed 6 hooks per line and the lines must be attached to the vessel.								
	Alternatives to Rejected Option 1 that were considered but rejected:								
	a. A limit of 3 hooks/line.	1Y:7N	1Y	1Y			1Y:4N	2N	1Y:1N
	b. Exclude black sea bass pots for catching black sea bass.	3Y:5N	1N	1Y			2Y:3N	2N	1Y:1N
	c. Allow more than 6 hooks/line while fishing for wreckfish.	4Y:3N	1N	1Y:1N			2Y	2Y	2N
	d. Exclude spearfishing.	6Y:4N	1N	2Y:2N			3Y:1N	2Y	1Y:1N
	e. Exclude tended fish traps.	5Y:6N	1N	1Y			3Y:2N	2N	1Y:1N
	f. Exclude fish traps.	3Y:9N	1N	2Y			4N	2N	1Y:1N

WRITTEN COMMENTS POSTMARKED BY FEBRUARY 8, 1991

FORM LETTERS	
6,800	Support Organized Fishermen of Florida proposal on regulating fish traps.
254	1) Propose 16 inch minimum size for mutton snapper. (ACTION 7)
	2) Propose 25 inch minimum size for gag and black grouper. (ACTION 8)
	3) Modify bag limit to 1 for any combination of gag, black, scamp or red grouper. (ACTION 12)
	4) Consider a 45 day closure for mutton snapper during spawning (to be determined). (Reject ACTION 21)
	5) Prohibit the use of entanglement nets. (ACTION 25)
	6) Regulate powerheads/bangsticks - Option 3. Prohibit for harvesting species in the management unit within the South Atlantic EEZ. (ACTION 27)
	7) Regulate fish traps - Option 6. Prohibit the use of fish traps in the EEZ off Florida. (ACTION 28)
404	Agree with all the preferred management options in Amendment 4 except the following:
	Favor a commercial quota for snappers and groupers.
	1) Propose 10 inch minimum size for vermilion snapper and red porgy (opposed to 12").
	2) Propose two daily possession limits on headboat trips exceeding 18 hours.
	3) Oppose spawning closures because of geographical variation in time of spawning.
	4) Prohibit any nets, longlines, powerheads, bangsticks, spears, or fish traps.
	5) Allowable gear should be only vertical hook and line, not to exceed six hooks per line, with the line attached to the vessel.
4	1) Include commercial quota.
	2) Support 10 (not 12) inch TL size limit for recreational vermilion snapper and red porgy.
	3) Support 20 (not 10) fish aggregate bag limit for recreationally caught snapper.
	4) Allow 2 daily bag limits for headboat trips exceeding 18 hours.
	5) Do not support spawning season closures.
	6) Prohibit any nets, longlines, powerheads, bangsticks, spears or fish traps.
10	ACTION 28, Option 7. Prohibit fish traps in the South Atlantic EEZ.
PETITIONS	
23	Opposed to proposed creel limits on recreational fishermen.
33	Do not support ACTIONS 7, 8, 9, and 10; against creel limits on these species, but
	support zero bag limit on Nassau grouper; Do not support commercial quota (ACTION 15);
	Support head and fins intact (ACTION 19); No closed seasons off NC coast (ACTIONS 20-21);
	Prohibit longlines and traps (ACTIONS 26 + 28).
58	Do not support 20 inch limit on gag/black grouper and red snapper.
	Fisheries data is incomplete and incorrect.
	Separate states out of South Atlantic Council.
	Minimum sizes cause waste of fish, as deepwater species do not survive.

CLUBS AND ORGANIZATIONS	
>2000	**Sierra Club, Loxahatchee Group, Florida Chapter**
	Prohibit fish traps in EEZ (2 letters)
	Islamorada Charteboat Association, Inc
	Follow State of Florida's lead and ban fish traps in the entire South Atlantic EEZ
	via phase-out to reduce economic hardship.
	1) ACTION 3. Require 50% of earned income be from commercial, charter or party
	boat operations.
	2) ACTION 7. Agree with all minimum sizes, except mutton snapper to be 16–18 inch.
	3) ACTION 8. Agree with minimum sizes for red snapper, red, scamp and
	yellowmouth grouper. Minimum sizes for gag, black and yellowfin grouper should be
	at least 24 inches.
	4) ACTION 9. Prefer Option 1.
	5) ACTION 10. Prefer Option 3.
	6) ACTION 11. Aggregate bag limit of 10 is adequate, but allow for multi–day trips.
	7) ACTION 12. Lower shallow water grouper bag limit from 5 to 1 fish/person/day.
	8) ACTION 13. Prefer rejected Option 2 (1 fish/person/day).
	9) ACTION 15. Establish commercial quotas.
	10) ACTION 17. Add spadefish to management unit.
	11) ACTION 18. Add lesser amberjack and banded rudderfish to management unit.
	12) ACTION 20. Prohibit harvest and landing of greater amberjack during March,
	April and May in entire South Atlantic EEZ.
	13) ACTION 21. No prohibition of yellowtail or gray snapper during May and June,
	but do prohibit for mutton snapper.
	14) ACTION 25. Prohibit entanglement nets throughout snapper/grouper fishery.
	15) ACTION 26. Prohibit longline gear throughout snapper/grouper fishery.
	16) ACTION 27. Support rejected Option 1.
	17) ACTION 28. Overwhelmingly support Option 7 to prohibit fish traps in EEZ.
	18) ACTION 29. Allow only hook and line gear in fishery.
	The South Carolina Wildlife Federation
	1) Support minimum sizes for both the commercial and recreational sector.
	2) Species under severe stock decline should be protected through strict limited quotas
	and bag limits or through zero quota/bag limit.
	3) Protect recreational sector by lowering commercial quota, if necessary.
	4) Consider selected "no fish" conservation areas throughout the EEZ off limits to
	snapper-grouper fishery, but open to top water recreational pelagic fishing.
	Locate these areas on selected significant "live-bottom" reefs and other prime habitats.
	5) Strongly support prohibition of entanglement nets, longline gear, and fish traps
	and support prohibition of other non-conforming gear.
	6) Consider limited entry into the snapper-grouper fishery for commercial sector,
	including headboat vessels via annual vessel permit. Permit funds should go to
	research, data collection, etc. Headboats and hook&line fishermen given priority.
	7) Support a comprehensive catch reporting program where stock assessment and
	quotas can e monitored.
268	**Southeastern Fisheries Association, Inc.**
	Support OFF proposal on fish traps. (15,000 employees)
	Reef Relief
	1) Prohibit fish traps.
	2) Prohibit lharvest of live rock at coral reef habitats.

	Atlantic Coast Conservation Association of Georgia (received 2 letters)
dated	1) ACTION 3. Income requirements should be set (at 80%).
1–14	2) ACTIONS 6–9. Support size limits, except recommend 12 inch for red snapper and
	8 inch for vermilion.
	3) ACTION 10. Recommend 1 fish bag limit for deepwater fish to reduce waste.
	4) ACTIONS 11–14. Support proposed receational bag limits, if commercial quotas are
	established for comparable reductions.
	5) ACTION 15. Impose equitable commerical quota.
	6) ACTION 17. Add spadefish to management unit, with 5 fish/day posession limit.
	7) ACTIONS 20–22. Support spawning closures; opposed to to unspecified closures
	for gag grouper and vermilion snapper; should apply to total fishery.
	8) ACTION 24. Support research zones after detailed public hearing.
	9) ACTION 25–26. Prohibit entanglement nets and longlines.
	10) ACTION 27. Support use of powerheads both recreationally and commercially,
	with equitable bag limits and quotas.
	11) ACTION 28. Prohibit all fish traps.
	12) Commercial exclsuion from quotas is at expense of recreational & charter
	fishermen.
	13) Fisheries stock and economic assessment data is inadequate related to Georgia fishery.
dated	1) ACTION 3. Income requirements should be set (at 80%).
2–7	2) ACTIONS 6–8. Support proposed size limits, if commerical quotas are set. Reexamine
	recreational limits for possible smaller sizes.
	3) ACTION 9. Support Option 1 only if effective commercial quotas are imposed.
	4) ACTION 10. Support Option 1.
	5) ACTIONS 11–14. Support proposed receational bag limits, if commercial quotas are
	established for produce significant reductions in commercial harvest.
	6) ACTION 15. Strongly supports imposing immediate commerical quota.
	7) ACTION 22. May support spawning closures when specified.
	8) ACTION 24. Do not support research zones as proposed; maybe after public hearing.
	9) ACTION 25. Prohibit entanglement nets.
	10) ACTION 26. Support Option 2, Prohibit longlines for snapper-grouper.
	11) ACTION 27. Support Option 1, if equitable bag limits and quotas are imposed.
	Powerheads result in fewer wounded or lost fish than other means of spearfishing.
	12) ACTION 28. Prohibit all fish traps in the EEZ.
	13) ACTION 30. Support limited permits for experimental gear, but oppose sale of such fish.
550	**Stuart Sailfishing Club**
	1) Support proposed minimum sizes, except recommend gray snapper at 10 inch and
	vermilion snapper at 8 inch.
	2) All species should be landed with head and fins intact, particularly amberjack.
	3) Do not allow "coring."
	4) Spawning closures are necessary, only for commercially caught amberjack.
	5) Prohibit entanglement nets, longlines, powerheads/bangsticks (including on amberjack)
	and especially fish traps.
>500	**Grand Strand Salt Water Anglers Association**
	1) Choose a size limit 1 inch over proposed minimum sizes and eliminate bag limits.
	2) Commerical fishermen adhere to proposed size limits.
	3) Eliminate all gear except hook and line.
	4) Eliminate bangsticks.
	5) Encourage their reef to come under a SMZ.
	Florida Marine Life Association
	Include management measures for tropical marine life in Amendment 4 for
	consistency with Florida plan.

	Organized Fishermen of Florida, Gold Coast Chapter
>6800	Support industry proposal on fish traps.
150	**Florida Sportfishing Association**
	1) Agree with proposed minimum sizes, except recommend 10 inch for gray snapper
	and 8 inch for vermilion snapper, consistent with Florida law.
	2) Agree with recreational bag limits; demand control of commercial amberjack
	fishing; either 500 lb trip limit or quota based on 1975 commercial landings.
	3) Agree with proposed wreckfish regulations.
	4) Agree with remainder of Amendment 4, except:
	require all species in management unit to be landed with head and fins intact.
	do not allow "coring"; this allows 30–35% more fish to be taken per trip.
	spawning closures are necessary, only commercially caught amberjack.
	5) Prohibit entanglement nets, longlines, powerheads/bangsticks and fish traps.
	Atlantic Coast Conservation Association of South Carolina
	1) Set quotas for both recreational and commercial fisheries.
	2) Prohibit all gears except hook and lline.
	3) Allow multi-day bag limits on charerboats for trips exceeding 18 hours.
	4) Reexamine proposed 12 inch minimum size for vermilion and red porgy for
	possible smaller size requirement.
	5) Allow only recreational hook and line fishery with bag limits on overfished
	grouper and tilefish stocks until fishery recovered from overfishing.
	6) Do not allow directed fishery for deep water grouper or tilefish.
	7) Strict enforcement is necessary.
	8) Support all other measures in Amendment 4.
	National Coalition for Marine Conservation
	Prohibit fish traps in federal waters.
	Florida Sportsman Magazine
	Prohibit fish traps in waters off Florida.
	Capt. Dick's Marina
head	Support recreatioal bag limits, with commercial quota.
boat	Support 10 inch total length minimum size for vermilion and red porgy instead of 12 inch
fleet	Increase snapper aggregate bag limit from 10 to 20 fish/person/day.
	Allow 2 daily possession limits for headboat trips exceeding 18 hours.
	Do not support spawning closures due to geographic variability.
	Prohibit any nets, longlines, powerheads, bangsticks, spears or fish traps in the EEZ.
	Allowable gear should be vertical hook and line, not to exceed 6 hooks per line, with the
	line attached to the vessel.
	Carteret County, NC/Economic Development Council, Inc.
	Amendment 4 will have severe economic impacts on state of North Carolina.
	RIR is inadequate in quantifying impacts.
	Simplicity of regulations should not outweigh economic impacts.
	Conformity of regulations should not outweigh economic impacts.
	Enforceability of regulations should not outweigh economic impacts.
	West Palm Beach Fishing Club
	Support series of habitat preserves.
	Prohibit entanglement nets, bottom longlines, fish traps, bangsticks and spearfishing.
	Prohibit sale of catch from non-professionals.
	Support same regulations in federal and state waters.

	Fort Pierce Sportfishing Club
	Support prohibitions on fish traps, longlines, entanglement nets, and powerheads in EEZ.
	Support specifying allowble gear; set maximum number of hooks and prohibit buoy gear.
	36 inch size for amberjack is insufficient; add 1500 lb or less trip limit.
	Support spawning area closures; are necessary if no commerical trip limit.
	Prohibit coring of fish.
	Proposed recreational bag limits are acceptable.
	Warsaw should have 1 bag limit; won't survive anyway.
	Snowy grouper should be restricted with deepwater groupers.
	Size limits should track states.
	Prefer 25 inch limit for gag and black grouper.
	Prefer 5 grouper recreational bag limit, with a commercial trip limit.
	Limit special research zones to no more than 1 square mile.
	Prohibit powerheads on all SMZs.
	Enforcement is currently minimal.
	Ocean Fleet Inc. (same signatory as Captain Dick's Marina)
50	Support recreatioal bag limits, with commercial quota.
	Support 10 inch total length minimum size for vermilion and red porgy instead of 12 inch
	Increase snapper aggregate bag limit from 10 to 20 fish/person/day.
	Allow 2 daily possession limits for headboat trips exceeding 18 hours.
	Do not support spawning closures due to geographic variability.
	Prohibit any nets, longlines, powerheads, bangsticks, spears or fish traps in the EEZ.
	Allowable gear should be vertical hook and line, not to exceed 6 hooks per line, with line to vessel.
8,000	**Florida Conservation Association**
	1) Commercial fishery is regulated by minimum sizes, while recreational fishery has
	bag limits and minimum sizes. Implement commercial quotas/trip limits, gear
	restrictions, and/or season closures.
	2) Prohibit fish traps.
	3) Support ACTION 6.
	4) Support ACTION 7.
	5) Support ACTION 8.
	6) Support ACTION 9, Option 1.
	7) Support ACTION 11, only with a limit in harvest imposed on commercial fishery.
	8) Support ACTION 12, only with a limit in harvest imposed on commercial fishery.
	9) Support ACTION 13, only with a limit in harvest imposed on commercial fishery.
	10) Support ACTION 14.
	11) Do not support ACTION 15 on commercial quotas.
	12) Support ACTION 19 on head and fins intact.
	13) Support ACTION 20 for commercial fishery only.
	14) Support ACTION 21 for commercial fishery only.
	15) Support ACTION 25 to prohibit entanglement nets.
	16) Support ACTION 26 to prohibit longlines.
	17) Allow powerheads if commercial fishery trip limit is also imposed. ACTION 27
	18) Support ACTION 28 to prohibit the use of fish traps.
	19) Support ACTION 29 to specify allowable gear.
	20) Support ACTION 30 to allow experimental gear.
2500+	**Florida Fish Finder**
	Alow multiday bag limit.
	Income requirement - crews depend on fish sales.
	Support commercial quota.
	Miami Rod & Reel Club
	Prohibit fish traps.

ADVISORY PANEL	
22	**Dean Adams**
	1) Recommend 10% earned income requirement.
	2) Recommend 10 inch for commercial and recreational vermilion snapper and
	12 inch for red porgy.
	3) Recommend 20 inch for gag or black grouper; 15 inch for scamp, yellowfin and red grouper.
	4) Recommend proposed recreational bag limits.
	5) Recommend 1 fish bag limit on Warsaw grouper.
	6) Recommend no action on speckled hind
	7) Recommend no action on snowy grouper or golden tilefish, but increase scientific sampling.
	8) Recommend no action on wreckfish limited entry until similar programs for
	snowy grouper and golden and gray tilefish can be implemented.
	9) Fish traps come and go with vessel; permit vessel for 20 traps.
	Richard B. Nielsen, Jr.
	1) Spawning season closures would be premature– allow 12 inch size for yellowtail
	snapper to continue.
	2) Support proposed minimum sizes, except recommend 10 inch for vermilion and
	gray snappers, 16 inch for scamp and red grouper; exclude Florida from 13 inch triggerfish limit.
	3) Include in management unit and recommend size limits of 8 inch for doctorfish and
	blue tang, 10 inch for parrotfish and 10 inch for hogfish.
	4) Allow minimum size to work for amberjack before setting a spawning closure.
	5) Not enough info to close deep water grouper fishery for 20 years.
	6) Keep requirement to conform to more restrictive regulations as an rejected option.
	7) Support industry proposal.
	Don De Maria
	1) Do not prohibit powerheads; they are highly selective fishing gear.
	Ben Hartig
	submitted 2 sets of written comments (in separate attachment)

LETTERS FROM AGENCIES	
	National Marine Fisheries Service
	see detailed report
	Florida Department of Environmental Regulation
	Draft Amendment 4 does not meet federal consistency requirements in regards to prohibtion of
	fish traps in adjacent federal waters, establishment of bag and size limits consistent with state
	waters and between the Atlantic and Gulf of Mexico federal jurisdictions, and the modification of
	closed seasons to control reef fish mortality.
	Florida Marine Fisheries Commission
	Draft Amendment 4 does not meet federal consistency requirements in regards to prohibtion of
	fish traps in adjacent federal waters, establishment of bag and size limits consistent with state
	waters and between the Atlantic and Gulf of Mexico federal jurisdictions, and the modification of
	closed seasons to control reef fish mortality.
	South Carolina Coastal Council
	Draft Amendment 4 meets federal consistency requirements.
	Palm Beach County, FL/Board of County Commissioners
	Prohibit fish traps off Florida.
	State of North Carolina/Dept. Environment, Health, and Natural Resources
	Proposed measures are much too drastic.
	1) ACTION 3. Support a permitting system; no preference on income requirement.
	2) ACTION 5. Support assessment panel and annual adjustments; improve data collection.
	3) Can support minimum sizes for shallow water species but not for deepwater.
	4) ACTION 6. Support 8 inch size limit for black seabass
	5) ACTION 7. Recommends 10 inch TL vermilion snapper, 12 inch TL red porgy size limit;
	allow tolerance. Opposes any restrictions on gray triggerfish. Use bag limit for Florida.
	6) ACTION 8. Suport 20 inch limit for gag and black grouper; currently in effect in NC.
	Recommend 15 inch for red snapper, red grouper, scamp, yellowfin and yellowmouth grouper.
	7) ACTION 9. Support Option 1 on amberjack.
	8) ACTION 10. Recommend 1 fish bag limit for commercial and recreational Warsaw grouper;
	no retention of Nassau grouper; no action on speckled hind; no action on deepwater fishery
	for snory grouper and golden tilefish; keep wreckfish fishery open by realistic quota or
	allowing fishing in new areas.
	9) ACTION 11. Recommend a aggregate bag limit of 20 snapper, with no more than 5 to be
	red snapper and does not include red porgy, with 1 day possession limit.
	10) ACTION 12. Support aggregate bag limit of 5 grouper (all species) w/1 day possession limit.
	South Carolina Wildlife and Marine Resources Department
	1) Split Amendment 4 into several amendments with separate public hearings.
	2) New management measures must be established and enforced.
	3) Recommend improving current landings reporting by requiring mandatory compliance.
	4) Recommend commercial quotas and recreational aggregate bag limits, with special
	provisions for incidental catches of some species.
	5) Recommend prohibition on fish trapping,excluding black seabass trapping.
	6) Recommend prohibition on bangsticks.
	7) Consider implementation of marine reserves, as recommended by PDT.
	see attached comments submitted by individual scientists.

WRITTEN COMMENTS POSTMARKED BY FEBRUARY 8, 1991

LETTERS AND PHONE CALLS FROM INDIVIDUALS (NC,SC,GA,FL)	
6	Support Amendment 4.
2	Do not support Amendment 4.
7	Fisheries data is incomplete and incorrect.
	Implement Actions 3 and 4.
	Evaluate impacts of two new fisheries in the Cape Canaveral area. Scallop and rock
	shrimping boats may have detrimental effect on snapper-grouper habitat.
	Do not allow sale of headboat or charter boat fish.
	Oppose limited entry.
3	NMFS headboat data is unreliable for analyzing entire fishery.
	Increase fish stocks through artificial reef construction and enhancing existing reefs.
	Private boat fisherman who sell their catch should be counted as commercial.
	SAFMC newsletters and announcements are good, but mail options papers (draft
	amendments/plans) to all fishermen on SAFMC mailing list. Not all can come to meetings.
	Ornamental reeffish need regulation.
	How can species be considered overfished if their SSRs are unknown?
	Since many are hermaphroditic, how can be it overfished if abundant replacements are available?
	Closing a fishery for 20–25 years is contrary to goals of Magnuson Act.
2	30% SSBR goal is not a scientific estimate bit a best guess.
	Bag limits are unnecessary, if sales are prohibited by unpermitted fishermen.
	RIR is insufficient.
	Do not support bag limits in North Carolina waters, minimum size is sufficient.
2	Support requirement for keeping head and fins intact. (ACTION 19)
	Safety concerns for Amendment 4 measures is ludicrous.
SPAWNING CLOSURES	
3	Do not support spawning closure for amberjack during March, April or May in South
	Atlantic EEZ. (ACTION 20)
7	Do not support spawning closure for gray or vermilion snapper during May or June
	in South Atlantic EEZ. (ACTION 21)
	Support the concept or research zones. (ACTION 24)
	Instead of spawning closures, put maximum sizes on fish, ban the sale during spawning,
	and prohibit sale of fish from recreational fishing.
	Support May and June closure for yellowtail, mutton and mangrove snappers.
2	Do not close down yellowtail fishing during prime charter season in Keys in summer.
	Do not close deepwater fishery for 20 years.
5	Do not support area closures.
	Support spawning closure for amberjack during March, April or May in EEZ.
2	Against closing fishing for yellowtail in April and May.
	Support closed season for gray snapper to allow recovery.
	Support closed spawning seasons for snappers.
	Propose a geographical line running east and west of Cape Canaveral for an amberjack
	spawning closure.
	Alternate closed seasons each year:close kingfish as necessary + include muttonfish bag limit
	with next year: close muttonfish as necessary + include kingfish bag limit.
	Support May-June closing for mutton, yellowtail and gray snapper.
6	Support closed spawning seasons.
	Support season closures for amberjack, Nassau, snowy, misty and yellowedge groupers.
	Consider closure for grouper spawning.
2	Do not support spawning closures for vermilion snappers and groupers until actual time
	of spawning is determined.
	Reduce recreational catches during spawning season.
	Limit recreational and commercial catches of amberjack during March, April + May to 1/person/day.

GEAR	
	Support ACTION 28, Option 2 - industry proposal on fish traps.
	Restrict netters from killing whole schools of fish.
	Institute more controls or ban fish traps.
3	Spearfishing is ecologically better than hook and line fishing; fewer undesirable,
	undersized or prohibited fish are caught.
3	Prohibit all spearfishing.
	Allow bangsticks only for protection of the diver.
16	Prohibit entanglement nets.
22	Support prohibiting longlines for snapper-grouper fishery. (ACTION 26)
12	Support Option 3, prohibit powerheads/bangtsick in South Atlantic EEZ. (ACTION 27)
2	Support Option 8, phase-out fish trapping, including black sea bass pots. (ACTION 28)
2	Prohibit fish traps off Florida.
47	Prohibit fish traps.
	Regulate powerheads.
	Prohibit harvest and possession of angelfish by fish trap gear (ACTION 28, Option 7);
	matches Florida law.
	Impose minimum size limits on parrotfish + surgeonfish from fish traps (ACTION 28, 7).
	Impose periodic bans on overfished inshore species from spearfishing.
	50 percent of amberjacks in St. Simons, GA area market have bullet holes.
	Support prohibiting longlines for wreckfish fishery. (ACTION 26, option 3)
	Bohnsack trap study is flawed by relying on fish trap fishermen for participation.
	If deepwater fishing or longlining is prohibited, fishing effort will shift inshore
	and impact bandit fishing.
	Prohibition of commercial gear will eliminate the fishery.
	Require license and tagging of fish with quota for recreational spearfishing snappers and
	groupers; no commercial spearfishing.
2	Do not support prohibition of longlining.
	Do not ban fish traps based on coral reef section, option 6, page 45, par.2.
	Black seabass pots should be included in any fish trap regulation.
	Regulate, don't ban, fish traps.
2	Support specifying allowable gear types.
INCOME REQUIREMENT	
	Do not support compatability with Gulf Council plan if it injures South Atlantic fishermen.
	Recreational sale of fish hurts industry more than part time commercial fishermen.
2	Do not require annual permit; already over-regulated.
	Do not raise income requirement.
3	Do not support income requirement; bucket fishermen who sell their catch are not
	Increase income requirement to 80%.
	Support 10 % in 1 of last 3 years income requirement.
2	Support 10 % and $5,000 income requirement.
	Increase income requirement from 10 to 51 percent.
	Support 35 % or $9,000 income requirement.
5	Support 50% income requirement.
2	Permit requirements should be same as for mackerel.
	Charge for commercial permit so people getting started in fishery would have opportunity to do so.

QUOTAS	
5	Support a commercial quota.
	Support commercial quotas on Warsaw, Nassau, & speckled hind groupers.(ACTION 15)
	Recommend quota sysytem for commerical and recreational fisheries, coupled
	w/reasonable size limits and a commercial permit (limited entry) system.
	Replace 20 inch minimum size with landing quotas.
	Impose quotas on each species, rather than minimum size for commercial and minimum
	size and bag limits for recreational fishermen.
3	Support recreational limits, if commercial quota is imposed.
	Without quotas, consider limited entry for recreational fishery.
2	Support daily landing law of pounds per boat.
	Support limit of number of fish taken.
3	Develop quota system along lines of mackerel plan.
	Amendment 4 does not justify zero quotas
CATCH RESTRICTIONS	
	Support NC Division of Marine Fisheries recommendations on bag limits and minimum sizes.
	Size limits should reflect sexual maturity; draft Amendment 4 does not reflect this information.
3	May not need to regulate over entire range if problem is in s small portion (i.e., south Florida).
	Current recreational regulations are sufficient.
MINIMUM SIZES	
3	Size limits should be same for recreational and commerical fisheries.
	Allow 10-15% tolerance on regulations.
4	Do not add any more recreational regulations.
2	Require proposed bag limits on recreational, as well as commercial fishery.
	Proposed size limits are too large for snappers and groupers. Prefer smaller limits
	w/bag limits to larger sizes w/no bag limits.
	Support a mximum size on snappers and groupers to protect spawners.
	Limit groupers and snapper to a legal size range.
	Recreational bag limits will put charter boats out of business.
2	Recreational fishermen will throw small(dead) fish overboard to stay at bag limit.
	Add dolphin to management unit and add minimum size of 18 inch FL. Florida law
	(22 inch) is too restrictive.
	Support restrictions on snappers and groupers for both recreational and commercial fisheries.
	Amendment 4 proposed recreational measures provides unfair burden on coastal Georgia.
	Support all size limits, bag limits, outlawed gear + fish sanctuaries proposed by Mr. Bohnsack.
	Allow up to 3 days cumulative bag limit for 3 day trips.
	Prefer bag limits to closures.
3	Proposed bag and size limits are too restrictive for Georgia waters.
	Sale of fish caught under bag limit should be prohibited.
	Wastage through dead fish from minimum size restrictions.
	Support trip limit on commercial and bag limits on recreational fisheries.
	Shorten commercial fishing season, rather than minimum sizes.
	Proposed minimum sizes would reduce catch by 25-30 percent.
2	Proposed bag and size limits are too restrictive.
	Allow a commercial catch of 300 total snappers and groupers.
	Data indicates 16.6 inch for commercial and 19.3 inch for recreational red snapper;
	do not support 20 inch proposed minimum length.
	Support proposed minimum sizes.

	SNAPPERS
	Support a commercial 12 inch total length on gray and vermilion snappers, red
	porgy and gray triggerfish. (ACTION 7)
	Support a recreational 10 inch total length minimum size for red porgy, vermilion
	and gray snapper. (ACTION 7)
	Support 16 inch TL for red snappers. (ACTION 8)
	Support no bag limit on vermilion snapper; impose 10 inch recreational and 12 inch
	commercial minimum size for groupers and tilefish. (ACTION 11)
	Support proposed minimum size and bag limits on yellowtail.
	No limits on mangrove snapper.
2	Support minimum size of 10 inch TL for commercial and recreational vermilion.
	Support 20 TL sizes in ACTION 8, except recommend 15 inch for red snapper.
	Support Option 4, ACTION 10.
	Support aggregate bag limit of 15-20 fish in ACTION 11; separate red snapper to a
	10 fish limit.
	Support snapper aggregate limit of 45 fish, with only 5 being red snapper,with a
	2 day bag limit for trips over 18 hours.
	Do not support proposed minimum sizes on vermilion snapper and red porgy.
	Do not support proposed bag limits on snappers, groupers and red porgy.
	Support 8 inch sea bass limit, but increase bag limit to at least 15 fish.
	Support 10 inch rather than 13 inch minimum size on vermilion due to great economic
	effect (submitted data).
	Support restrictions on mangrove snapper and groupers.
	Do not support restrictions on yellowtail snapper.
	Support 8 inch vermilion snapper size limit.
	Yellowtail do not need management.
	Impose 10 fish limit on yellowtail snapper in addition to 10 snapper aggregate limit.
	Do not support 8 inch size for vermilion
	Support 20 inch size for red snapper and shallow water groupers.
	Support 12 inch minimum size for red snapper, gag and scamp grouper.
	Establish a 8 inch minimum size for vermilion snapper.
	Establish a 10 fish bag limit for red snapper.
	Support ACTION 11.
3	Support 10 inch FL or 12 inch TL for recreational vermilion snapper and red porgy.
2	Support red snapper limit of 16 inches.
2	Support aggregate bag limit of 30 for snapper or limit of 15 for each species.
2	Allow 2-3 possession limit for all trips exceeding 12 hours.
	Support a 10 inch limit on vermilion snapper.
	Support gray snapper 8 inch minimum size, with 5 fish bag limit.
	Support 16 inch size limit for all snappers.
	Support 24–30 inch minimum size for all grouper;12–14 inch for triggerfish and 10–12 inch
	for sea bass; maximum size based on large spawning females; bag limit of 1 grouper,
	4 triggerfish and 4 seabass.
	Support 16–20 inch minimum size for red snapper; all other snapper at 12–14 inch;
	maximum size based on large spawning females; bag limit of 2 red snapper+4 total all other snappers..
	Support 15 TL length for red and 10 TL for vermilion snapper and 10 inch TL for red porgy.
	Support 16 inch size limit for red snappers.
	Support state of Florida's snapper size limits; those proposed are too high.
	Support a 9 or 10 inch limit for lane snapper and black seabass.
	Support 12 inch TL for yellowtail, mutton, schoolmaster, queen, blackfin, cubera, dog,
	mahogany and silk snapper.

GROUPERS	
	Scamp minimum size should be 20 inch total length.
	Support 20 inch TL for gag, red, black, scamp, yellowfin, and yellowmouth groupers for commercial and recreational fisheries. (ACTION 8)
	Support Option 3, for small directed fishery for snowy grouper, w/bycatch allowance for groupers and tilefish. (ACTION 10)
	Support 5 fish bag limit for shallow water groupers, but allow multi-day possession limit on special overnight recreational trips. (ACTION 12)
2	Support proposed aggregate bag limit on groupers in ACTION 12.
	Increase minimum size of grouper from 12 inch to 20 inch
	Warsaw, yellowedge and misty grouper can not be obtained by hook and line. Recommend 8 inch for black seabass, vermilion, silk and gray snapper; 10 inch for red porgy; 12 inch for mutton, schoolmaster, queen, blackfin, cubera, dog, mahogany snapper and grya triggerfish; 14 inch for red snapper; 20 inch for gag, black, red, yellowfin, yellowmouth and scamp grouper; 28 inch for amberjack. Calibrate FL to TL.
	Limit two on all groupers with 20 inch size limit; 1 amberjack per angler/day; 10 yellowtail at 14 inch.
	Proposed 21 inches on red grouper will close Georgia out of the fishery.
	Remove golden tilefish from deepwater grouper restrictions and regulate separately (no zero retention, 20 yr moratorium) (DATA).
	Establish a 10 fish bag limit for grouper.
	Support grouper size limit of 14 inch, with 2 or 3 fish bag limit.
	Speckled hind will not survive release.
	Do not group snowy grouper and gray tilefish with Nassau and Warsaw grouper and golden tilefish because no deep water fishermen catch the latter species.
	Jewfish can be caught by hook and line (Article attached).
	Support 20 inch limit on grouper, but recommend 18 inch limit on scamp.
	Support 24 inch limit on all groupers.
	Support 15 inch TL for scamp, 18 inch TL for gag, 9 inch TL for sea bass and no regulation of triggerfish; support no change for snowy grouper.
	Do not support ACTION 10 because of wastage of fish thrown back.
	Deepwater groupers will not survive if released.
	Set aside restricted fishing zones 10–20 miles wide along the coast to protect deepwater groupers.
AMBERJACK	
	Support regulation of commerical fishing on amberjack.
	Support ACTION 13 on amberjack.
	Support 1 fish/day bag limit for amberjack.
	Limit amberjack to hook and line, with 2,000 lb trip limit
	Support 6 fish amberjack limit with 2 day possession limit for special overnight recreational trips. (ACTION 13)
	Support 24 inch TL for amberjack w/no bag limit for both recreational and commercial fishery. (ACTION 9)
	Support ACTION 9, Option 2 - 36 inch for recreational and commercial amberjack.
TRIGGERFISH	
3	Do not support regulation of triggerfish.
	Support ACTION 14 on gray triggerfish.
	Support 5 fish bag limit for gray triggerfish with 2 day possession limit for special overnight recreational trips. (ACTION 14)
	Support a recreational 12 inch total length size for gray triggerfish. (ACTION 7)
WRECKFISH	
	Support better enforcement of 10,000 lb trip limit.
2	Do not support offloading procedure for wreckfish fishery.
	When wreckfish fishery is closed effort will be directed at scamp and gag grouper.

SUMMARY OF COMMENTS RECEIVED BY MAIL ON AMENDMENT 4		
(The page numbers that appear after the Action Number refer to where each item is discussed in the Amendment 4 document.)		n=52
		Mailed in
Action	**Proposed Actions Are Shown In Bold Print.**	Comments
Number	Description	
1(4)	**Modify the list of problems & include additional species from the**	46Y:4N
	stock assessment.	
	Rejected Alternative 1. No action.	5Y:4N
2(6)	**Modify objectives one and three.**	40Y:9
	Rejected Alternative 1. No action.	5Y:2N
3(9)	**Track the Gulf Council's reef fish permit regulations.**	37Y:4N
	Rejected Option 1. No action.	5Y:2N
	Rejected Option 2. Define charter as recreational or commercial	8Y:4N
	by the number of fishermen aboard as was done with mackerel.	
	Rejected Option 3. Allow more than income from last year for the 50%.	4Y:14N
	Rejected Option 4. Require a permit to exceed the bag limit but do not	6Y:8N
	prevent sale of fish caught under the bag limit.	
	Rejected Option 5. Have the permit requirements and fee become	5Y:11N
	effective immediately.	
	Rejected Option 6. Specify income level different from the 50% required	4Y:13N
	in the Gulf reef fish regulations (e.g. 10% as for mackerel plan).	
4(12)	**Track the Gulf Council's reef fish data regulations.**	49Y:2N
	Rejected Option 1. No action.	4Y:1N
5(15)	**Establish an assessment panel and annual adjustments similar to**	46Y:1N
	the mackerel plan.	
	Rejected Option 1. No action.	3Y:2N
	Rejected Option 2. Conduct the assessments every other year or every	4Y:3N
	3 years.	
6(17)	**Minimum size of 8" total length for lane snapper & black sea bass.**	56Y:6N
	Rejected Option 1. No action.	3Y:1N
7(17)	**Minimum size of 12" total length for yellowtail, mutton, school-**	55Y:7N
	master, queen, blackfin, cubera, dog, mahogany & silk snapper;	
	12" total length for red porgy;	42Y:20N
	12" total length for recreational vermilion & gray snapper;	34Y:31N
	13" total length for commercial vermilion & gray snapper;	52Y:15N
	12" fork length for gray triggerfish.	47Y:16N
	Rejected Option 1. No action.	4Y:3N
	Rejected Option 2. Species specific sizes recommended by the plan	2Y:2N
	development team/NMFS stock assessment.	

Action Numbe	**Proposed Actions Are Shown in Bold Print.** Description	
8(20)	**Minimum size of 20" total length for red snapper;**	34Y:29N
	20" total length for gag, red, black, scamp, yellowfin &	9Y:14N
	yellowmouth grouper.	
	Rejected Option 1. No action.	5Y:6N
	Rejected Option 2. Species specific sizes recommended by the plan	4N
	development team/NMFS stock assessment.	
	Rejected Option 3. Minimum size of 20" fork length for scamp grouper.	1Y:11N
	Rejected Option 4. Minimum size of 25" total length for gag and	2Y:11N
	black grouper.	
The Council does not have a preferred option among those listed below and is		
calling for public input on which of these is most appropriate.		
9(22)	**Option 1. Minimum size of 28" fork length (recreational) and 36"**	27Y:5N
	fork length (commercial) for greater amberjack (w/bag limit).	
	Option 2. Minimum size of 36" fork length recreational and	3Y:21N
	commercial for greater amberjack (without bag limit).	
	Rejected Option 1. No action.	3Y:1N
	Rejected Option 2. Apply minimum size to Almaco, Lesser amberjack	7Y:4N
	and the Banded rudderfish.	
The Council does not have a preferred option among those listed below and is		
calling for public input on which of these is most appropriate.		
10(24)	**Option 1. Harvest/possession of speckled hind, Warsaw grouper,**	8Y:47N
	Nassau grouper, snowy grouper, misty grouper, yellowedge	
	grouper and golden tilefish is prohibited.	
	Include blueline and sand tilefish for enforcement purposes.	1N
	Option 2. Harvest or possession of Nassau grouper is prohibited.	5Y:50N
	Establish an area that covers the distribution of the others	
	and close to fishing for species in the SG fishery for 20 years.	
	Option 3. Allow a small directed fishery for snowy grouper with	47Y:13N
	some bycatch allowance for other deepwater groupers/tilefish.	
	Option 4. Allow a 1 fish bag limit (except Nassau grouper which	39Y:16N
	would have a zero bag limit) as a bycatch in the directed, deep-	
	water vermilion and red porgy fishery.	
	Rejected Option 1. No action.	6Y
11(27)	**Snapper aggregate bag limit of 10 w/ a one day possession limit.**	47Y:17N
	Rejected Option 1. No action.	3Y
12(28)	**Shallow-water grouper bag limit of 5 with a one day possession**	52Y:10N
	limit. This excludes Nassau grouper which remains at zero.	
	Rejected Option 1. No action.	1Y
13(29)	**Greater amberjack bag limit of 3 with a one day possession limit.**	55Y:4N
	Rejected Option 1. Bag limit of 6 with a one day possession limit.	3Y:7N
	Rejected Option 2. Bag limit of 1 with a one day possession limit.	2Y:6N

Action Number	**Proposed Actions Are Shown In Bold Print.** Description	
14(29)	**Gray triggerfish bag limit of 3 with a one day possession limit.**	51Y:11N
	Rejected Option 1. Bag limit of 1 with a one day possession limit.	7N
	Rejected Option 2. Bag limit in Florida of 1 or 3 with a one day	2Y:5N
	possession limit.	
	Rejected Option 3. Include gray triggerfish in snapper aggregate bag limit.	1Y:9N
	Other Rejected Option for bag limits: Spadefish bag limit of 3 with a one	5Y:3N
	day possession limit.	
15(30)	**Do not include commercial quotas at this time.**	35Y:18N
	Rejected Option 1. Establish quotas for certain species.	6Y:1N
16(31)	**Wreckfish measures until replaced with a limited entry program:**	3N
	1. It shall be deemed that all wreckfish possessed by any fishermen or	44Y:7N
	dealer were taken in the EEZ unless it can be established through	
	documentation that these fish were from outside the management unit.	
	2. There shall be no off-loading of any fishing vessel possessing	46Y:5N
	wreckfish except during the hours of 8 a.m. to 4:30 p.m., EST.	
	3. There shall be no off-loading of any fishing vessel possessing	44Y:8N
	wreckfish without 24 hours prior notice to NMFS Law Enforcement.	
	4. Dealers of snapper grouper must make available to authorized	52Y:2N
	officers all records of landing and/or purchase of wreckfish	
	upon demand.	
	5. The possession or landing of wreckfish without heads and fins	56Y:1N
	intact is prohibited.	
	Rejected Option 1. No action.	4Y
	Rejected Option 2. Drop the trip limit contingent upon implementation	1Y:2N
	of a limited entry program for wreckfish.	
17(32)	**Add spadefish to the management unit.**	33Y:40N
18(33)	**Add Lesser amberjack & Banded rudderfish to the management**	48Y:14N
	unit.	
19(33)	**All species in the snapper grouper management unit possessed**	61Y:2N
	in the EEZ must have its head and fins intact through landing.	
20(33)	**Harvest and/or landing of greater amberjack is prohibited during**	45Y:20N
	March, April and May in the entire South Atlantic EEZ.	
21(34)	**Harvest and/or landing of mutton, yellowtail and gray snapper**	41Y:25N
	is prohibited during May and June.	
22(34)	**Harvest and/or landing of gag grouper and vermilion snapper is**	4Y:59N
	prohibited during _____.	
23(34)	**Delete the Little River artificial reef SMZ.**	44Y:7N
24(34)	**The NMFS Regional Director is authorized to designate special**	40Y:18N
	research zones, in consultation with the Council, where fishing	
	may either be prohibited or permitted on a controlled basis.	

Action Number	**Proposed Actions Are Shown In Bold Print.** Description	
Rejected Alternatives for the General Category		
	Rejected Option 1. Fishermen are required to conform to the more	4Y:29N
	restrictive regulations whether they be state or federal regulations:	
	a. Minimum sizes and bag limits.	37Y:2N
	b. Trip limits.	7Y:9N
	c. Closed seasons and/or areas.	2Y:34N
	d. Gear restrictions.	38Y:3N
	e. Quotas.	35Y:5N
	f. Disposition of fish taken under a bag limit.	34Y:3N
	g. States submit regulations to the Council for conservation equivalency.	33Y:2N
	Rejected Option 2. Add the new South Carolina artificial reefs as SMZs.	30Y:3N
	Rejected Option 3. Trip limit of 1,500 lb or 50 whole fish per day for	35Y:6N
	amberjack.	
	Rejected Option 4. Fishing year changes.	3Y:31N
	Rejected Option 5. SMZs for research purposes.	2Y:33N
25(36)	**Prohibit the use of entanglement nets.**	62Y:1N
	Rejected Option 1. No action.	2Y:1N
	Rejected Option 2. Any vessel with entanglement nets aboard is limited	9Y:30N
	to no more than the recreational bag limit. If there is no bag limit for	
	a particular species, then there is no retention allowed.	
The Council does not have a preferred option among those listed below and is		
calling for public input on which of these is most appropriate.		
26(37)	**Regulate longline gear:**	8Y:1N
	Option 1. Allow the use of longline gear for snapper-grouper.	4Y:54N
	Option 2. Prohibit the use of longline gear for snapper-grouper.	59Y:4N
	Option 3. Prohibit the use of longline gear for wreckfish.	53Y:7N
	Rejected Option 1. No action.	2Y
	Rejected Option 2. Allow the use of longline gear but limit the number of	1Y:34N
	hooks per set to some number to be specified by the Council _____.	
The Council does not have a preferred option among those listed below and is		
calling for public input on which of these is most appropriate.		
27(38)	**Regulate powerheads/bang sticks:**	5Y:4N
	Option 1. No action.	19Y:31N
	Option 2. Prohibit for harvesting species in the management	38Y:11N
	unit within designated SMZs off South Carolina.	
	Option 3. Prohibit for harvesting species in the management	52Y:12N
	unit within the South Atlantic EEZ.	
	Rejected Option 1. Prohibit for harvesting species in the management	3Y:2N
	unit within all designated special management zones.	

Action Numbe	**Proposed Actions Are Shown In Bold Print.** Description	
The Council does not have a preferred option among those listed below and is		
calling for public input on which of these is most appropriate.		
28(39)	**Regulate fish traps:**	7Y
	Option 1. No action - continue with existing regulations.	5Y:52N
	Option 2. Industry proposal to regulate fish traps.	3Y:45N
	Option 3. Modify the mesh size of fish traps.	5Y:15N
	Option 4. Limit the number of traps to 100 per permit holder.	1Y:16N
	Option 5. Limit the number of traps to 100 per permit holder	1Y:15N
	and limit the number of permit holders to _____(Council to	
	specify) for a period of _____years (Council to specify) and	
	require weekly reporting.	
	Option 6. Prohibit use of fish traps in the EEZ off Florida.	47Y:3N
	(fish trap options continued on next page)	
	Option 7. Prohibit use of fish traps in the South Atlantic EEZ.	56Y:6N
	Option 8. Phase-out fish trapping over the time period vessels	39Y:16N
	and gear currently in use in the fishery would be depreciated.	
	Option 9. Limit the use of fish traps to 10 tended traps per	36Y:15N
	vessel. It is the Council's intent that this option excludes black	
	sea bass pots; further, that tended means that at the end of each	
	trip, traps are collected and carried back into shore.	
	Option 10. Add gear, vessel and trap identification and permit	37Y:12N
	requirements for black sea bass pots.	
29(52)	**Specify allowable gear in the snapper grouper fishery.**	56Y:3N
30(52)	**Establish a procedure to deal with experimental gear.**	55Y:5N
31(53)	**Non-conforming gear be limited to the bag limit. For species**	41Y:15N
	with no bag limit, no retention would be allowed.	
Rejected Alternatives for Gear Restrictions:		
	Rejected Option 1. Only allow the use of vertical hook & line gear, not to	40Y:2N
	exceed 6 hooks per line and the lines must be attached to the vessel.	
	Alternatives to Rejected Option 1 that were considered but rejected:	
	a. A limit of 3 hooks/line.	11Y:34N
	b. Exclude black sea bass pots for catching black sea bass.	16Y:32N
	c. Allow more than 6 hooks/line while fishing for wreckfish.	5Y:36N
	d. Exclude spearfishing.	8Y:38N
	e. Exclude tended fish traps.	15Y:30N
	f. Exclude fish traps.	14Y:30N

APPENDIX 2

PROTECTION OF GROUPER SPAWNING AGGREGATIONS

BY

DR. JAMES A. BOHNSACK

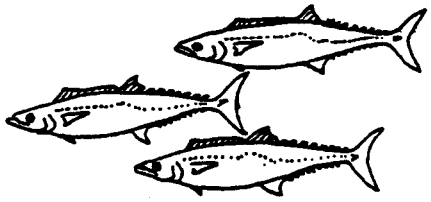
FEBRUARY 1989

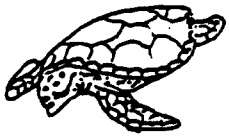
PROTECTION OF GROUPER SPAWNING AGGREGATIONS

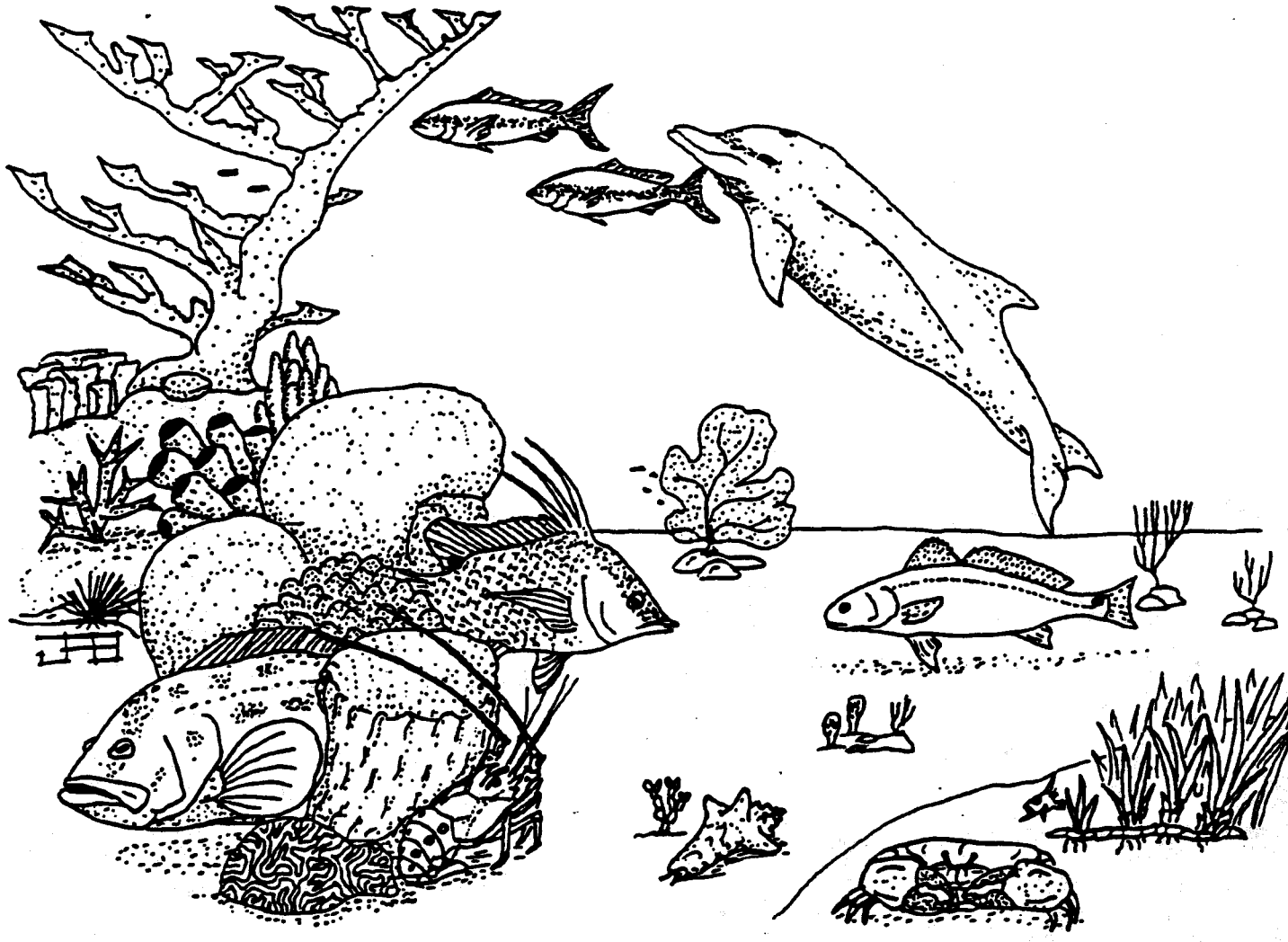
James A. Bohnsack

February 1989

MAY 29







Protection of Grouper Spawning Aggregations

by

James A. Bohnsack

February 1989

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Coastal Resource Division
Contribution No. CRD-88/89-06

Protection of Grouper Spawning Aggregations

This report, generated at the request of the Caribbean Fishery Management Council, summarizes information relevant to the management strategy of pretecting grouper spawning aggregations. During the December 1988 Caribbean council meeting, regulations were proposed to seasonally close areas where grouper spawning aggregations occur off the Virgin Islands.

Grouper are long lived, slow growing, protogynous hermaphrodites (change sex from female to male) and are widely recognized to be vulnerable to overfishing (Munro and Williams, 1985; Manooch, 1987; Polovina and Ralston, 1987). Grouper landings have declined from waters surrounding Puerto Rico, the Virgin Islands, and other Caribbean countries (Bohnsack et al., 1986; Bannerot, et al., 1987). Sadovy (pers. comm.) noted total grouper landings in Puerto Rico declined from peak levels of around 800,000 lbs in 1978 to less than 200,000 lbs in 1987.

Off Puerto Rico and the Virgin Islands, Epinephelus guttatus and E. striatus form seasonal spawning aggregations which frequently receive concentrated fishing effort (Olsen and LaPlace, 1978; Colin et al., 1987; Shapiro, 1987). Ralston (1987, pg 394) noted that groupers may be especially vulnerable to overexploitation because of their tendency to aggregate at traditional spawning sites and their protogynous reproductive system. A concern exists that this concentrated fishing activity

exacerbates overfishing problems. Spawning aggregations have shown signs of overfishing in the Virgin Islands (Olsen and LaPlace, 1978). Evidence exists that fishing mortality can reduce or annihilate known spawning aggregrations. One recognized aggregation on St. Croix has disappeared (J. Ogden, pers. comm.; Olsen and LaPlace, 1978). Catches from spawning aggregations in Belize declined from approximately 130,000 lbs per year to less than 27,000 lbs over 10 years (Carter, 1988). A suggested remedy is to protect these spawning aggregrations from all fishing activities.

The importance of aggregations to reproductive success in groupers is not known (Colin, et al., 1987). In many cases the spawn from a particular aggregation are unlikely to be returned to that site because of current patterns (Smith, 1972). For this reason Colin, et al. (1987) concluded that fishing pressure on one spawning aggregation on the western coast of Puerto Rico was unlikely to affect local recruitment success of a E. guttatus.

Recent theoretical and empirical research suggests that adult reef fish population abundance may be limited by recruitment success (i.e. the number of postsettlement survivors) (Richards and Lindeman, 1987; Doherty and Williams, 1988). Munro (1987) concluded that the importance of grouper recruitment did not differ in any significant respect to other reef fishes. Referred to as supply-side ecology, recruitment limitation is based on the fact that recruitment is highly variable relative to population size (Underwood and Fairweather, 1989). However, the chances

for successful recruitment become very low with small adult population sizes. Adequate recruitment can be expected to become a problem when spawning stock biomass becomes less than 20% of unharvested levels (Goodyear, 1988). On the basis of this information, the intense fishing of spawning aggregrations seems detrimental to recruitment success.

Several Caribbean Nations have taken actions to protect mass spawning aggregrations (Colin, 1988). In the Dominican Republic a presidential decree prohibits fishing of Serranidae during spawning season and the trading of fish with eggs. A second decree specifically prohibits fishing of Epinephelus at a site of mass spawning on its north coast. In the Cayman Islands there are three grouper aggregation areas, one at each of the three islands. In 1985 these grouper spawning areas were declared restricted marine areas with no fishing by fish traps, explosives, spearguns, seine nets or any other type of net. Only residents are permitted to enter the restricted areas and they must fish by hook and line. A substantial hook and line fishery still exists. In Bermuda two defined spawning areas for red hinds, Epinephelus guttatus are closed during its spawning season from 1 May to 15 August. Poaching is still a problem although the areas are buoyed and patrolled. Belize has established 2 marine parks that help protect spawning aggregations (Carter, 1988).

Altering catchability is a recognized management technique. Clearly, protecting spawning aggregrations would reduce catchability. Spawning aggregrations increase catchability (portion of the stock removed by one unit of fishing effort) by

increasing fish concentration in defined areas at predictable times. Some evidence shows that in addition to concentrating grouper, grouper may be less cautious and more vulnerable to fishing gear. Johannes (1981) reported that grouper tended to be more lethargic during mass spawning aggregrations and could be more easily approached by spearfishermen. Colin, et al. (1987) reported quiescent females of E. guttatus in spawning aggregations.

Another concern is based on the fact that larger fishes (males) tend to be more aggressive and less cautious in taking baits and entering traps (Thompson and Munro 1974; 1983; pg 651, Munro 1987). Reported sex ratios in spawning aggregrations ranged from 1:2.5 (male to female) to 1:5 for E. guttatus and from 1:1 to 1:1.9 for E. striatus (Colin, et al., 1987). Bannerot (1987, pg 584) noted the value of hermaphroditic strategies if non-random mating occurs and sperm is not limiting (lack of males). Spawning aggregrations may take advantage of skewed sex ratios unless high exogenous mortality is applied to older age groups (males) without rapid sex transition or behavioral adjustment (pg 575). Sperm limitation due to fishing mortality has not been demonstrated. However, a danger exists that overfishing of mass spawning aggregrations may be such a source of exogenous mortality which could alter sex ratios to such an extent that sperm becomes limiting.

Kapuscinski and Philipp (1988) noted that harvest regulations during spawning seasons help maintain the genetic diversity within stocks.

In conclusion, management actions to limit or prohibit fishing of spawning aggregrations appears justified and prudent. Grouper populations in the Virgin Islands and Puerto Rico show signs of overfishing. Spawning stocks are targeted and particularly vulnerable to exploitation by a variety of fishing gear types during mass spawning aggregrations. Particular spawning aggregrations have disappeared or show signs of overexploitation due to fishing activities. Evidence exists that reef fish stocks are recruitment limited and recruitment success becomes increasingly uncertain with reduced stock size.

Literature Cited

Bannerot, S.P., W.W. Fox, Jr., and J.E. Powers. 1987. Reproductive strategies and the management of snappers and groupers in the Gulf of Mexico and Caribbean. Pages 561-604 in Polovina, J.J. and S. Ralston, (eds.). 1987. Tropical Snappers and Groupers: Biology and Fisheries Management. Westview Press. Boulder. 659 p.

Bohnsack, J.A., D.L. Sutherland, A. Brown, D.E. Harper, and D.B. McClellan. 1986 An analysis of the Caribbean biostatistical database for 1985. Coastal Resource Division Report for the Caribbean Fishery Management Council. Contribution No. CRD-86/87-10.

Carter, J. 1988. Grouper mating ritual on a Caribbean reef. Underwater Naturalist 17: 8-11.

Colin, P. 1988. Management and Issues. Grouper Watcher 1(2): 4.

Colin, P.L., D.Y. Shapiro, and D. Weiler. 1987. Aspects of the reproduction of two groupers, E. guttatus and E. striatus in the West Indies. Bull. Mar. Sci. 40(2): 220-230.

Doherty, P.J. and D.M. Williams. 1988. The replenishment of coral reef fish populations. Oceanogr. Mar. Biol. Annu. Rev. 26: 487-551.

Goodyear, C.P. 1988. Recent trends in the red snapper fishery of the Gulf of Mexico. A report to the Gulf of Mexico Fishery Management Council by the Miami Laboratory, Southeast Fisheries Center, NOAA, U.S. Department of Commerce. CRD 87/88-16.

Johannes, R.E. 1981. Words of the Lagoon. University of Calif. Press. Berkeley and Los Angeles, Ca. 245 p.

Kapuscinski, A.R. and D.P. Philipp. 1988. Fisheries genetics: Issues and priorities for research and policy development. Fisheries 13(4): 4-10.

Manooch, C.S., III. 1987. Age and growth of snappers and groupers. pages 329-373 in Polovina and Ralston (ed.). Tropical Snappers and Groupers: Biology and Fisheries Management. Westview Press. Boulder, CO.

Munro, J.L. 1983. Caribbean coral reef fishery resources. ICLARM Studies and Reviews 7. International Center for Living Aquatic Resources Management, Manila, Philippines. 276 p.

Munro, J.L. 1987. Workshop synthesis and directions for future research. 639-659 in Polovina and Ralston (ed.). Tropical Snappers and Groupers: Biology and Fisheries Management. Westview Press. Boulder, CO.

Munro, J.L. and D.M. Williams. 1985. Assessment and management of coral reef fisheries: Biological, environmental, and socio-economic aspects. Proc. Fifth Intern. Coral Reef Congress. Tahiti. 4: 544-578.

Olsen, D.A. and J.A. LaPlace. 1978. A study of a Virgin Islands grouper fishery based on a breeding aggregation. Proc. Gulf Carib. Fish. Inst. 131: 130-144.

Polovina, J.J. and S. Ralston, (eds.). 1987. Tropical Snappers and Groupers: Biology and Fisheries Management. Westview Press. Boulder. 659 p.

Richards, W.J. and K.C. Lindeman. 1987. Recruitment dynamics of reef fishes: planktonic processes, settlement and demersal ecologies, and fishery analysis. Bull. Mar. Sci. 41(2): 392-410.

Shapiro, D.Y. 1987. Reproduction in groupers. Pages 295-328 in Polovina, J.J. and S. Ralston, (eds.). 1987. Tropical Snappers and Groupers: Biology and Fisheries Management. Westview Press. Boulder. 659 p.

Smith, C.L. 1972. A spawning aggregation of Nassau grouper, Epinephelus striatus (Bloch). Trans. Amer. Fish. Soc. 257-261.

Underwood, A.J. and P.G. Fairweather. 1989. Supply-side ecology and benthic marine assemblages. TREE 4(1): 16-20.

APPENDIX 3

INFORMATION FROM SOUTH CAROLINA ON

COMMERCIAL BANG-STICKING ON ARTIFICIAL REEFS

South Carolina
Wildlife & Marine
Resources Department

EQUAL OPPORTUNITY AGENCY

James A. Timmerman, Jr., Ph.D.
Executive Director
Paul A. Sandifer, Ph.D.
Director of
Marine Resources Division

October 31, 1989

RECEIVED
NOV 01 89
SOUTH ATLANTIC FISHERY
MANAGEMENT COUNCIL

Mr. Robert K. Mahood
Executive Director
South Atlantic Fishery Management Council
South Park Building, Suite 306
1 South Park Circle
Charleston, S.C. 29407

Dear Bob,

Enclosed is a memorandum which I received from Mel Bell concerning the commercial harvest of amberjack with bang - sticks on some of the artificial reefs located off South Carolina. I thought that you should be made aware of this development and that Gregg Waugh should also be made aware of it since he is working with the plan development team on the revision of the Snapper-Grouper Plan. The Council may want to ascertain the extent of this activity in the South Atlantic area and consider taking appropriate action if it appears to be a significant problem.

If we can be of any assistance in regards to this matter, please let me know.

Sincerely,

David

DAVID CUPKA, Assistant Director
Office of Fisheries Management

enc.(1)
cc: P.Sandifer
J.Miglarese
C.Bearden
E.Joseph
M.Bell

MEMORANDUM

TO: Charles Bearden and David Cupka

FROM: Mel Bell MB

DATE: October 24, 1989

SUBJECT: Commercial Bang-Sticking on Artificial Reefs

I wanted to make you aware of what will probably become the next potentially heated area of user conflict between recreational and commercial fishermen in association with the State's offshore artificial reefs.

Since earlier this year, I have received a number of calls from recreational anglers, primarily from Georgetown and north, who are concerned with the practice of SCUBA divers bang-sticking commercial quantities of amberjack on well known artificial reefs and shipwrecks.

This practice involves several divers working together to shoot and land as many fish as possible in the bottom time available over a given piece of structure around which the fish are easily accessible. Bang-sticking is much more effective than the use of conventional spearguns in this type of activity due to the fact that immediate death of the fish and rapid reloading of the pole spear allow large numbers of big fish to be harvested in a short period of time. Amberjack are particularly vulnerable to this type of operation due to their tendency to swim in large but loosely organized schools close to structure, as well as their habit of approaching divers to within a very close range.

The recreational fishermen who called had all observed the actual fishing activity taking place or had been at the dock or boat landing when the fish were being off-loaded. All of them were disturbed by the large number of amberjack that were removed from artificial reefs in this manner. Direct communication with the commercial fishermen themselves has confirmed that during 1988 and 1989 there were at least four boats fishing in this manner along the northern coast of the state.

One commercial fisherman reported that during one four day trip he was able to land 4,000 pounds of amberjack by bang-sticking. Another had indicated that in one visit to a wreck off Georgetown he was able to shoot 5 boxes of amberjack. As other popular established fisheries such as snapper, grouper and mackerel decline from increasing commercial and recreational pressure, and as the price of amberjack and demand for it increase, it is very likely that other fishermen who are able may move into this type of commercial endeavor.

On September 13th, during a routine examination of several offshore artificial reefs and wrecks, Division divers collected direct evidence and witnessed the immediate impact of this type of fishing activity on the BP-25 Artificial Reef off Little River Inlet. This reef, which has been closely monitored during summer months for the past three years, has always had large numbers of amberjack around it. On the initial dive during this trip only one amberjack was observed over the entire reef, and divers recovered a number of spent 38 special shell casings. During a second 30 minute dive, divers counted only four amberjack and were able to collect about 50 spent casings (many more were seen on all parts of the reef). The lack of amberjack in combination with the extraordinary number of relatively fresh casings would indicate that a large scale bang-sticking effort had recently taken place.

A visit to a near-by wreck which has also been monitored for three years revealed normal quantities (hundreds) of amberjack and no direct evidence of any bang-sticking. The observations at both of these sites would seem to indicate that this type of fishing activity can have a rather dramatic effect on resident amberjack populations on artificial reefs. The duration of this impact can only be speculated on at the moment, but it is very likely that since amberjack appear to be long-term seasonal residents of the reefs the impact could last for at least as long as it takes for next years seasonal recruitment to take place (until next April or May).

At this point it would be very hard to imagine that this activity is having a detrimental effect on the amberjack stocks off the State (as a whole amerjack are probably relatively under-utilized). The main concern we should have for now is: "are the amberjack found on the artificial reefs being most effectively exploited by allowing a few individuals to harvest large quantities of them for commercial purposes (at $.85/lb.), or would they be better utilized by allowing recreational fishermen the opportunity to catch them over the coarse of an entire fishing season?" Also, since the State's 23 artificial reefs were clearly built with the intention of enhancing recreational fishing activities and not larger scale commercial efforts, it is very hard to justify to the citizens of this State the use of these reefs for the direct commercial benefit of a few individuals (several of which are from out-of-state).

Since most of the reefs in question are outside State waters, our only method of regulating the type of fishing that takes place on the reefs is probably through modification of existing special management zone (SMZ) regulations such as those that apply to fish traps, long-lines and trawling on certain permitted reefs. A ban on the use of bang-sticks on these sites

would be one logical method of addressing the problem. Initial contact with segments of the recreational diving community suggest that this would not receive a tremendous amount of opposition, since bang-sticking is not wide-spread among this group off South Carolina.

I will continue to gather as much information on this subject as I can through various sources. At this point I do not feel the activity has received enough attention to make it a burning issue among recreational fishermen, but as word spreads and as the activity becomes more extensive I am sure that it will generate the same type of user conflict as we saw over the issue of fish traps on reefs. We will address this and other management related issues in our State Artificial Reef Plan in the near future, but it might be an area of interest now to bring before the Fisheries Management Council for some consideration and to see if it appears to be a regional problem.

cc: P. Sandifer
E. Joseph
C. Moore
G. Ulrich
D. Theiling
W. Hall
D. Stubbs
B. Low

APPENDIX 4

REGULATORY IMPACT REVIEW AND INITIAL REGULATORY FLEXIBILITY ANALYSIS

FOR AMENDMENT 4 TO THE SNAPPER GROUPER FISHERY MANAGEMENT PLAN

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Regulatory Impact Review for Amendment 4 to the Fishery Management Plan for the Snapper-Grouper Fishery of the South Atlantic Region

INTRODUCTION

The Regulatory Impact Review (RIR) is part of the process of developing and reviewing fishery management plans and amendments and is prepared by the Regional Fishery Management Councils with assistance from the National Marine Fisheries Service, as necessary. The RIR provides a comprehensive review of the level and incidence of economic impact associated with the proposed regulatory actions. The purpose of the analysis is to ensure that the regulatory agency or Council systematically considers all available alternatives so that public welfare can be enhanced in the most efficient and cost effective way.

The RIR also serves as the basis for determining whether the proposed regulations are major under Executive Order 12291. If the proposed regulations are deemed to have a significant impact on a substantial number of small entities, then an Initial Regulatory Flexibility Analysis (IRFA) must be prepared and incorporated into a joint document that meets the requirements of the Regulatory Flexibility Act. The purpose of the Regulatory Flexibility Act (RFA) is to relieve small businesses, small organizations, and small governmental entities from burdensome regulations and record-keeping requirements, to the extent possible. In as much as Executive Order 12291 encompasses the RFA requirements, the RIR usually meets the requirements of both. This is particularly true in the case of Amendment 4 because commercial, charter, and headboat operations that will be affected by the proposed regulatory actions clearly fit into the rubric of small business entities.

Analysis of Proposed Management Measures

The main text of Amendment 4 provides important background information for understanding the proposed management measures and alternatives that were considered and rejected. In describing the regulatory impacts of proposed and rejected management measures, portions of the text describing management measures are simply referenced here to avoid repetition. The RIR analysis follows the order in which management measures are presented in the amendment.

ACTIONS 1 and 2. NEW PROBLEMS AND NEW OBJECTIVES

Problems and objectives are identified in Amendment 4 and are not given further consideration in the RIR.

ACTION 3. PERMITS

Requiring permits to exceed the bag limit for snapper grouper species will provide a better framework to monitor the biological and economic status of the snapper grouper fishery in the future. A $23 fee per harvesting unit to cover the administrative costs for processing and tracking permits will be charged. Including the estimated value of time to fill out permit applications, the total private cost for permits is estimated to be $17,850 based on approximately 700 expected permitees in the snapper grouper fishery (Source: Richard Raulerson, NMFS,SERO, pers. comm.). Improved biological and economic data that are possible in a fishery where permits are required can pay dividends to those who depend on the fishery because those data allow for better protection of the resource (more accurate biological assessments, etc.), management at potentially higher sustainable levels of harvest, and better assessment of the regulatory impacts of proposed management measures. One obstacle to collecting cost and earnings information in the snapper grouper fishery has been the lack of knowledge of the universe of fishermen. With permits, representative sampling to evaluate cost and returns and production economics in the snapper grouper fishery would be improved.

Permits can play a role in improving monitoring and enforcement by making them more cost effective. Permit sanctions have become an important deterrent in fisheries enforcement. That tool is only available to enforcement authorities if permits are required. In addition, permits can be used by enforcement authorities to better define the universe of participants and thus perform representative random (or targeted) dockside inspections or at-sea boardings.

Of the thirteen proposed management directives under Action 3, directives 3 and 7 have potential regulatory impacts. Directives 3 and 7 provide a framework for income and gross sales requirements in the fishery. Lacking specific information on the percent of income active commercial, charter, or headboat participants presently derive from the fishery (lacking permits and other information to survey fishery participants), the exact impact of this proposed measure is not accurately assessable at the present.

One can assume that the proposed measure to require that 50% of earned income over one of the last three years be derived from commercial, charter, or headboat fishing will probably result in at least some present and future participants being eliminated from the fishery or will at least incur larger "costs of entry." Costs of entry are those costs associated with changing one's planned activities, such as crewing on a commercial fishing boat for a year in order to become eligible for a permit in the future, instead of making a living by some means other than fishing and with the intent of purchasing a boat and fishing sometime in the future. The latter plan would no longer be possible under the proposed restrictions on eligibility and being forced to crew on a boat can be viewed as a cost of entry.

Alternatively, corporations or partnerships can submit proof of $20,000 gross annual sales from commercial, charter, or headboat operations to be eligible for a permit. This closes the possible loophole for applicants not meeting the income requirement who could then form small corporations to circumvent the income requirement. Intuitively, the gross sales requirement appears somewhat less restrictive than the earned income requirement.

The implicit intent of income and gross sales requirements is to allow those who are more committed to commercial fishing (in terms of capital investment or earned income) to make their livelihood from the resource. Yet income requirements can exclude some part time fishermen who may represent an efficient scale of commercial operation in a fairly small yield fishery such as the snapper grouper fishery. Some commercial fishing opportunities in the snapper grouper fishery are inshore and do not appear to necessitate large scale capital investments. By excluding some part time fishermen, society may be sacrificing both employment flexibility and potentially efficient production from small operations. Small operations provide high quality product to local markets in many fisheries worldwide.

To the degree that income and gross sales requirements restrict part time participation and its potential efficiencies, the effect of these measures can create negative economic impacts. On the other hand, many people feel that income and sales requirements do not restrict true part time commercial fishermen. Those people feel that recreational fishermen who sell fish are the only parties restricted by income and gross sales requirements. This argument works from the premise that recreational fishermen should not be able to sell their catch and compete on the market with true commercial fishermen. It is often difficult to draw the line between part time commercial and recreational fishing. This is particularly true in the snapper grouper fishery where the scale of commercial operation in some areas and for some species involves fairly low investment.

Under the proposed scheme, however, recreational fishermen will be able to sell fish harvested under bag limits in states that allow this activity and with proper state licensing. Recreational fishermen must observe the commercial size limit when selling fish. The extent to which allowing recreational fishermen to sell under bag limits will reduce recreational fishermen's fish sales from their present level is not known. However, the bag limits do not apply to fish belonging to the snapper grouper complex that are not true snappers and groupers (black sea bass, porgies, grunts, etc.). Hence, sales of those species by recreational fishermen will not be impacted in states where this practice is allowed.

Although requirements to obtain a permit are expected to create some negative economic effects by eliminating some part time participants from the fishery, overall the benefits from requiring permits, in terms of better monitoring and increased regulatory compliance, are expected to outweigh the costs.

Rejected Alternative 1 for ACTION 3: No Action

Not requiring permits would avoid imposing small fees to cover the administrative costs of permits and avoid imposing some economic impacts on part time commercial fishermen who may not be able to meet the income or gross sales requirements. In addition, to the extent that part time operations represent an efficient scale for some parts of the fishery, society would not be forfeiting some of the benefits of efficient use of capital for production under the no action alternative. Yet the gains to be realized from requiring permits in terms of better biological or economic management, or increased incentives for regulatory compliance (as described above) are potentially large. Those gains probably outweigh the small costs involved with requiring permits.

Rejected Alternative 2 for ACTION 3: Determine whether a charter is recreational or commercial by the number of persons aboard.

Rejected Alternative 2 would involve only slightly different impacts in terms of potentially excluding some charter participants from obtaining a permit and hence the ability to sell fish. The option was rejected primarily to increase compatibility with Gulf of Mexico reef fish regulations.

Rejected Alternative 3 for ACTION 3: Eligibility determined from earned income during one of the last — years.

Varying the number of years for which earned income would be considered to determine eligibility (meeting the 50% income requirement) would make the income requirement either more or less restrictive for some applicants. This option involves only slightly different impacts in terms of potentially excluding some participants from obtaining a permit and hence the ability to sell fish. The option was rejected primarily to increase compatibility with Gulf of Mexico reef fish regulations.

Rejected Alternative 4 for ACTION 3: Permit requirement and fee to become effective immediately.

Rejected Alternative 4 deals with the administration of permits and does not have net benefit implications for those who use the snapper grouper resource.

Rejected Alternative 5 for ACTION 3: Specify an income level different from 50%.

Setting the criterion for eligibility at income levels less (or more) restrictive than 50% does have impact implications. Potential losses in efficiency from the 50% earned income criterion lower (higher) for income restrictions which are less than (greater than) 50%.

Rejected Alternative 6 for ACTION 3: Require a federal fisheries permit to sell snappers and groupers caught in the EEZ (federal waters)

This alternative would eliminate sales of fish caught under the bag limit.in many cases, because in states where that practice is common, many recreational fishermen would not qualify for the 50% income requirement to obtain a federal permit. Under the preferred alternative, recreational fishermen will be allowed to sell fish under the bag limit in states where this is allowed and provided they posses any state permit that is required. This alternative would impact recreational fishermen in Georgia where recreational fishermen apparently commonly sell fish , and in South Carolina and North Carolina to a lesser degree according to public comment. In addition, restaurants and other establishments that count on recreational fishermen for a large portion of their fresh fish supply would also be impacted.

ACTION 4. DATA COLLECTION

Action 4 proposes to establish a logbook system to be used for data collection. Estimated NMFS costs to administer the logbook system.total $36,850. The percentage of fishermen selected for logbooks may reduce total administrative costs proportionally. Additional costs are imposed on the fishing industry in terms of the value of time spent filling out logbooks. Those costs are estimated to be $33,750 per year. Benefits in terms of improved biological and economic data obtained by the logbook system (as referenced before) depend on the quantity and quality of data generated by the logbook system, which in turn depends on compliance by the commercial fishing industry in providing accurate data.

ACTION 5. ASSESSMENT GROUP & ANNUAL ADJUSTMENTS

Assessments and annual adjustments are described in detail in the main body of this amendment. This action will require some expenditures of public funds for meetings and staff work, however, an estimate of these costs is not available at this time. Although specific actions may have some economic impacts on fishery participants, the consequences cannot be assessed until such time as the action is implemented. In principle, this action should allow for additional flexibility in management. To the extent that flexibility is increased, positive net benefits to user groups can be expected at some future time.

ACTIONS 6 through 9. MINIMUM SIZES

Introduction: Methodology for Analyzing Proposed Minimum Sizes

Biological conservation and recovery of fish populations necessarily require reductions in current harvest rates. Over time, fish left unharvested enhance society's ability to harvest and

consume more fish and fish products in the future via growth in weight and recruitment net of natural mortality. The economic problem is to value and compare the short-term losses with the long-term gains in catch rates due to regulation.

The analyses that follow examine the effects of minimum size limits on the recreational and commercial harvesting sectors in two distinctly different ways. The purpose here is to describe the methodologies used to derive the results that follow in later sections. The first method of analysis, based on empirical size distributions of sampled fish, was used to evaluate short-term losses for nearly all species for which minimum size limits are proposed. Unfortunately, that method can only be used in a quantitative sense to evaluate effects on the commercial sector. The second method of analysis involves the use of a bioeconomic simulation model to evaluate changes in net benefits to both commercial and recreational sectors over a twenty year time period. Although the simulation model provides a more sophisticated analysis of the effects of the proposed minimum size limits, it could only be used when appropriate biological assessment data were available. Simulations were performed for five snapper grouper species along the U.S. South Atlantic coast: vermilion snapper (*Rhomboplites aurorubens*), red snapper (*Lutjanus campechanus*), red porgy (*Pagrus pagrus*), gag (*Mycteroperca microlepis*), and scamp (*M. phenax*).

The Percentage Reduction Method

The first method is used evaluates expected economic impacts on the commercial sector via a percentage reduction in expected catch approach and a series of assumptions and manipulations. The method focuses on the percentage of commercial catch of a given species that is expected to be below the proposed minimum size limit and will thus be forfeited in the short run. That percentage of forfeited catch is based on Trip Interview Program (TIP) data for 1987-1989. Whenever possible, the percentage of catch by length expected to be forfeited is based on an average of 1987-1989 catch sampled in the TIP program that was under the proposed minimum size. In most cases, percentages from hook and line gear were used because that is the predominant gear in the fishery. When the number of observations was relatively small, TIP data across gears by species were used. Where observations for a given year were relatively few compared to other years, those years were not included in the years for which the mean was calculated. In general, the technique for employing TIP data was systematic but involved some judgment calls when sample sizes appeared to be significantly different from other years in the time series.

Percentage of catch for a given species that was expected to be forfeited was converted into weight terms via standard length/weight conversions for that species. The next step involved applying the percentage of catch by weight that was expected to be foregone in the short run to an index of present catch for that species. In most cases, 1989 NMFS General Canvass Landings (pounds and value) were used. The index of present catch was examined on a state by state basis

because the relative importance of different species appear to vary considerably by state. In Florida, 1988 catch was used as an index instead of the 1989 catch because of data availability.

Decreasing the present catch index by the appropriate catch reduction percentage yields an expected decrease in poundage for a given species by state. Yet the magnitude of the revenue change from the percentage decrease should be less than the quantity decrease times existing price because prices can be expected to increase in response to the induced scarcity. Exvessel demand estimates for snappers and groupers in the Gulf and South Atlantic (Keithly and Prochaska, 1985) were used to incorporate the appropriate price response and adjust revenues to new levels.

The supply and demand equation system used to adjust prices was estimated via the seemingly unrelated regression technique. Equations are essentially derived, inverse, demand equations for snapper and grouper stock complexes. Since all variables, except the binary ones, are expressed in logarithmic form, the estimated coefficients are interpreted as "price flexibilities," which are measures of the responsiveness of prices (dependent variable) to changes in any of the associated factors (independent variables).

The directly relevant parameters for determining exvessel revenue parameters are the price flexibility coefficients, namely, -0.4614 for groupers and -0.3698 for snappers. Accordingly, a ten percent reduction in landings of grouper (snapper) means its price will increase by 4.614% (3.698%). The difference before and after the quantity and price change is the change in total revenue resulting from the proposed minimum size.

Lastly, to gauge the relative magnitude of expected revenue changes per state, economic multipliers were used to convert the revenue change into expected changes in economic activity in the given state, holding all other factors equal. Multipliers from the RIMS-II multiplier system for a 39 level sector of disaggregation (fishing and forestry) were used. Multipliers incorporate the effects of direct, indirect, and induced effects, the sum of which is thought to comprise the total change in economic activity. Multipliers pertain to output (sales), income (wages and salaries), and employment (in man-years).

Bioeconomic Simulation Model

The second model used to evaluate changes in net benefits to recreational and commercial fishermen involves a simulation of yields over time under the proposed minimum size limits and without them. The difference in yields is then put into net benefit terms via information on prices and variable harvesting costs for the commercial sector and via information on nonmarket recreational benefits for the recreational sector. The results simulate the difference between the levels of net benefits for each user group under the no action alternative as compared to net benefits under the proposed minimum size limit. The economic concept of net present value is used as the

criterion for evaluation of the dynamic tradeoffs between short-term losses and long-term gains in the value of catch rates. Federal regulations required the use of a 10% discount rate.

The effects of implementing a minimum size limit were studied by simulating the fishery over a 20 year time period. This creates a problem because the future is difficult to predict. Biological and environmental conditions, fishery regulations, and local and national economic conditions, however, all change over time and if there is no way to predict such changes the forecasts of future regulatory effects will be less reliable as the time frame is extended. Although the net present value criterion is not intended to account for uncertainty, the process of discounting tends to give the least weight to the more distant future when predictions are most uncertain.

A summary of the way in which these simulations were performed and the assumptions that were made is presented below.

Biological Simulation Model

The biological portion of the simulation analysis is a standard age-structured population model that employs a matrix with numbers of fish at age as rows and time in years as columns. During each year, the simulated fish population consisted of up to 20 age classes, with the initial numbers of fish in each age class specified as data. These data were calculated with a quasi-virtual population analysis using 1988 catches for the commercial and recreational fisheries. Time series data were not available to perform traditional virtual population analyses on a single cohort of fish.

Commercial landings (in pounds) were obtained from NMFS General Canvass Landings Unclassified snappers and groupers were assigned species designations in proportion to landings of each identified species by state, month and gear type. Pounds landed were divided by the average weight per fish from samples obtained in the TIP data to calculate numbers of fish landed. Estimates of the numbers of fish landed from each age class were derived by multiplying total landings by the length-frequency distribution from TIP samples and by an age-length key from the biological stock assessment (PDT, 1990).

Recreational landings (in numbers of fish) were obtained from unpublished data in the NMFS Headboat Survey and the NMFS Marine Recreational Fishery Statistics Survey (MRFSS). Estimates of the numbers of fish landed from each age class were derived by multiplying total landings by the length-frequency distribution from headboat samples and by an age-length key from the biological stock assessment (PDT, 1990). Separate length-frequency distributions were not available for the MRFSS within the time constraints of this analysis. Hence, it was assumed that fish caught from private and charter boats exhibited the same size distribution as fish caught from headboats. To the extent that fish caught from private and charter boats are smaller than fish caught from headboats, the simulation model overestimates the total weight of recreationally landed fish and underestimates the effects of the minimum size limits.

After specification of initial population numbers, the simulated population of fish available for capture in future years was determined by the numbers of new fish entering the population each year (recruitment) and by natural and fishing mortality coefficients. Recruitment was assumed to be a constant number of fish over time and was obtained from the quasi-virtual population analysis of 1988 data. An important objective of a minimum size limit is to increase the number of fish that live long enough to spawn and increase recruitment. The benefits from an increased spawning stock are not incorporated into the simulation model due to the absence of an empirical relationship between the size of the spawning stock and recruitment and should not be interpreted to imply that recruitment is not increased or not of value. Natural mortality coefficients were obtained from the stock assessment report (PDT, 1990) and were assumed constant over all age groups and over time. Fishing mortality coefficients for each age class were obtained from the same quasi-virtual population analysis of 1988 data that was used to calculate initial population numbers. Fishing mortality coefficients were split into commercial and recreational components according to the proportions of fish landed in each age class by the commercial and recreational sectors. Growth equations were used to determine the average weight of fish from each age group.

Catch-and-release mortality for fish smaller than the minimum size limit was incorporated into the model through appropriate adjustments to the natural mortality coefficient. Because fish cannot be identified as legal or sublegal until they have been caught, undersized fish were assumed to be caught at the same rate as without a size limit, but that they would be released and survive with a probability less than 1.0 (Waters and Huntsman, 1986). This procedure overestimates catch-and-release mortality if fishermen minimize the catch of undersized fish by using larger hooks when feasible and by avoiding areas known to have large concentrations of small fish. Catch-and-release mortality of 20% (80% survival) was assumed for all species.

Economic Portion of the Simulation Model

The annual benefits or losses received or incurred as a result of fishery regulation consists of the sum of consumers' surplus and producers' surplus and is derived from a knowledge of relevant demand and supply curves for the products and recreational activities of interest. In the present case, commercial products include snapper grouper species for consumption. Recreational activities include fishing trips for snapper grouper species from private, charter, and party boats.

Commercial Sector

The proposed minimum size limits could affect consumers and producers of commercial snapper grouper products. It is argued below that minimum size limits will have relatively small effects on consumers. The effects of minimum size limits on U.S. fishermen are approximated as changes in total revenues minus changes in variable costs of production.

The effect of minimum size limits on U.S. consumers is expected to be relatively small because most snapper grouper supplies do not originate in U.S. South Atlantic waters. Over 80% of the snappers and groupers landed in the southeastern U.S. are landed at ports along the Gulf of Mexico. In addition, Adams and Lawlor (1989) found that the ratio of imports to domestic production has increased over time because of increases in imports and decreases in domestic landings. By 1987, imports represented approximately two-thirds of total snapper supplies and nearly one-half of total grouper supplies in the southeastern U.S.

Although minimum size limits are expected to reduce domestic supplies in the short-term, the reduction would represent a relatively small fraction of total supply with a correspondingly small increase in market price required to restore equilibrium between consumption and total supply. Consumers' surplus would exhibit a relatively small decline in the short-term. In the long-term, minimum size limits are expected to produce a relatively small increase in total supplies, prices would fall and consumers would reap a relatively small gain in consumers' surplus.

The effects of minimum size limits on U.S. fishermen were measured by changes in producers' surplus and are approximated as changes in total revenues minus changes in variable costs of production. The immediate effect of minimum size limits on U.S. fishermen would be to reduce domestic landings and profits. Total revenues would decline because exvessel demand is price-elastic (Keithly and Prochaska, 1985). Production costs would decline because some variable costs are determined, in part, by catch rates. Over time, snapper grouper populations are expected to increase which would increase domestic landings and profits.

Quantification of the effects of minimum size limits on industry revenues requires predictions of future commercial landings and the corresponding ex-vessel prices. The biological simulation model predicts landings given constant recruitment and constant natural and fishing mortality coefficients. Exvessel prices for different market size classes and the size breaks between market sizes were obtained from an informal survey of commercial fish houses in different geographical regions. Prices were averaged across the different regions. In addition, prices were adjusted for changes in landings over time using the price flexibilities estimated by Keithly and Prochaska (1985).

Quantification of the effects of minimum size limits on industry costs is approximated from empirical relationships between variable costs and catch rates that were observed in survey data for the 1980-1981 fishing year. Annual variable costs from Poffenberger (1985) for vessels that primarily used snapper reels along the U.S. south Atlantic coast were updated to 1988 prices with appropriate price indices and estimated as a function of catch rates. It was expected that higher catch rates would be associated with higher unloading fees and higher gear replacement and repair costs. Higher catch rates would also be associated with higher fuel and vessel maintenance and repair costs because the more productive fishing grounds are located farther from shore. Based on

the estimated equation, variable costs per vessel would decline by 34.3 cents for every pound lost due to regulation. Labor costs were excluded from the cost equation so that the simulation model would calculate a net return to captain, crew and vessel owner.

Due to lack of data, this method of approximating changes in producers' surplus tends to overestimate both the short term costs and long term benefits of regulation. The method assumes that fishermen would not alter their general fishing practices or strategies in response to minimum size limits. This assumption is consistent with the biological simulation model where fishing mortality is held approximately constant over time. However, fishermen could respond in other ways. For example, fishermen would probably redirect their fishing effort to other fishing grounds or other species to offset regulated reductions in landings and revenues. To account for changes in producers' surplus in a more realistic fashion, the simulation model should include entry and exit into and out of the fishery. Ideally, changes in producers' surplus would be calculated as the lesser of (1) the change in net operating revenues or (2) the reduction in profits between snapper grouper fishing and the next best alternative fishery.

In each simulated year, the difference between net benefits under the size limit and net benefits without the size limit were discounted at an annual rate of 10% and then summed to calculate net present value of the proposed minimum size limit to the commercial sector.

Recreational Sector

At the present time, no model of recreational demand exists for snapper grouper fishing. Therefore, the effects of each management alternative on recreational anglers were measured by utilizing the best alternative demand model: a model for Gulf king mackerel fishing (Milon, 1989). With severe limitations, Milon's estimates are expected to provide a general indication of the magnitude of changes in recreational consumers' surplus resulting from minimum size limits for snapper grouper in the South Atlantic. Changes in consumers' surplus were calculated as the product of (1) Milon's estimated change in value per trip due to a 1% change in catch rates, (2) the percentage change in catch rates per trip due to each minimum size limit, and (3) estimates of the number of fishing trips. Minimum size limits may also change the number of paying passengers on charter and party boats, especially in areas with large concentrations of small fish. However, limited data and constraints in the amount of time available for these analyses precluded estimation of the potential changes in profits for the charter and headboat industries.

Of the various models estimated by Milon (1989), we used the pooled-site travel cost model based on average keep rates per trip and a price term with nonzero opportunity cost of time to measure the effects of minimum size limits on consumer surplus per trip. This model estimated that a 25% increase or decrease in keep rates would change consumers' surplus per trip by $2.42. Milon's pooled site model is symmetrical in that a given percentage increase or decrease in the

number of fish kept per trip leads to identical estimates of changes in value per trip, but with opposite signs. In addition, a 50% increase in fish kept would yield twice the change in consumers' surplus as a 25% increase. Therefore, each percentage change in keep rates would change consumers' surplus by approximately \$0.0968 (= \$2.42/25). This method of calculating changes in consumers' surplus for recreational anglers probably overestimates both short-term losses and long-term gains in catch rates due to minimum size limits. We expect the additional value gained per trip to decline as catch rates increase. The economic principle of diminishing marginal utility suggests that each additional fish caught per trip would increase utility, but that each increment to utility would be smaller than the previous increment. Therefore, the first five fish, for example, caught per trip would yield more utility than the second five.

Percentage changes in catch per trip were calculated from the ratios of total recreational landings to an estimate of the total number of trips, with and without the size limit. The biological simulation model predicted total recreational landings, given constant recruitment and constant natural and fishing mortality coefficients. The initial number of recreational trips was specified as data to the model. Changes in the number of trips were estimated as a function of the percentage change in harvest over time multiplied by a catch rate elasticity. Milon (1989) estimated a catch rate elasticity of 0.51, which suggests that each 10% increase in catch rates would increase the number of trips taken by approximately 5%.

Fishing trips are multispecies trips. In the analyses for most species, the catch rate for each species was multiplied by its percentage of occurrence in the total catch. Then the percentage change in the overall catch rate was multiplied by Milon's estimated change in value per 1% change in catch rate. Information about the relative contribution of each species to the overall catch rate per angler day for headboat fishermen was obtained from the stock assessment report (PDT, 1990).

The analysis of minimum size limits for red snapper differed from that for other species because of the importance of red snappers to recreational fishermen. Many party and charter boats advertise their trips as (red) snapper fishing even when true red snappers are not a major component of the catch. Therefore, the effect of a minimum size limit for red snapper was based on the percentage change in catch rates for red snapper rather than the percentage change in the overall catch rate. This difference in procedure partly explains the relatively large effects of the proposed minimum size limit on red snappers.

The initial number of trips in the analysis was approximated from information obtained from the NMFS MRFSS and the Headboat Survey. An estimate of recreational trips with private and charter boats was determined by the percentage of trips that reported snappers or groupers as primary target species multiplied by the estimated total number of recreational trips in U.S. South Atlantic waters. Due to data limitations in the MRFSS, the estimated number of snapper grouper trips did not include trips made in Monroe County, Florida. The number of angler-trips with

headboats was approximated as angler-days fished in areas where each species is a relatively important component of the headboat catch. The results of the simulations are sensitive to our estimates of the total number of recreational fishing trips for each species. The development of better methods for estimating recreational participation in the snapper grouper fishery is an important topic for future research.

Changes in recreational consumers' surplus in each simulated year were discounted at an annual rate of 10% and summed to yield net present value of minimum size limits to recreational fishermen. The inherent deficiency of data for the recreational sector and the ad hoc nature of obtaining estimates for some of the required data are acknowledged. Therefore, the analysis of the recreational sector yields rough approximations rather than definitive estimates of the effects of minimum size limits for snapper grouper species.

Background Information on Commercial and Recreational Sectors

Commercial Sector

The original Snapper Grouper Fishery Management Plan (1983) and original Source Document (1983) contain valuable economic background information on the commercial fishing sector that harvests the snapper grouper resource, as well as descriptions of different gears employed, etc. That information will not be repeated or elaborated upon here. As was mentioned before, at this time it is not possible to determine the number of commercial participants in a definitive manner. With the requirement for commercial permits contained in this amendment, the number of participants in the fishery will be obtainable in the future.

Different species clearly vary in importance between states. This variation will, in part, help to determine differences in economic impacts of proposed minimum sizes between different states. Tables 1 through 4 report pounds and value by species and state from NMFS General Canvass Landings. These tables were used to determine which species are relatively important to commercial fishermen in different states. Overall, vermilion snapper, black sea bass, and gag are the most important species in North Carolina by value in 1989. In South Carolina, gag, vermilion snapper, and red porgy are the most important in terms of value in 1989. The same species had the highest values in Georgia in 1989, with vermilion snapper being the most important. In Florida, yellowtail snapper, black grouper, and tilefish were the most valuable species in 1988. Data for 1989 were unavailable for Florida.

Recreational Sector

Overall, economic information on the recreational sector is more difficult to obtain than for the commercial sector. This probably results from better data, in general, being available on the

commercial fishing sector and traditionally more secondary economic studies have focussed on commercial fishing. For this reason, the original Snapper Grouper FMP devotes considerably more attention to background economic information describing the commercial fishing sector. In an attempt to compensate for the apparent dearth of economic information on recreational users of the snapper grouper resource, background information on the economic importance of snapper grouper recreational fishing in the South Atlantic is included in this RIR. It is hoped that this information will supplement the reader's understanding of the economic effects of the proposed minimum sizes and bag limits, particularly when, for some species, the only way of describing recreational impacts will be to describe the percentage of recreational catch that is expected to be forfeited (released for future harvest) under the proposed regulation.

Temporary reductions in catch from the proposed minimum sizes will certainly have cumulative effects on angler benefit, supporting industries, and indirect effects on the economies of states in the South Atlantic. The magnitude of some of these cumulative effects cannot be described quantitatively at this time. Where proposed size limits will affect a large proportion of recreational catch in a given state or area, a decrease in the number of snapper grouper recreational trips can also be expected. For many species, data constraints do not allow us to estimate loss of benefits via the simulation model. Yet the proposed size limits for those species may have economic effects on headboat, charter, and support industries that sell goods to private boat users.

Indirect or "ripple" economic effects should always be kept in mind when assessing economic impacts. Often, we are limited in our ability to describe direct economic effects such as net benefit changes to recreational fishermen. Descriptions of impacts to industries that supply inputs to recreational fishermen are even more difficult to depict given data constraints. The degree to which snapper grouper anglers can effectively switch to other species, particularly in the short run, is not known at this time, but will in large measure determine the degree to which indirect economic effects occur. In all probability, some of the lost revenue will return to the affected sectors of the economy in South Atlantic states as fishermen switch to mackerels, tunas, and other species.

As snapper grouper fishing quality has decreased over time, some anglers have already changed their target species. If nothing were done to protect snapper grouper species from the overfishing that is occurring, losses to the economies in South Atlantic states from decreases in recreational fishing could be larger and longer lasting than the short run losses from the proposed size limits.

The economic importance of the recreational snapper grouper fishery can be seen through several indices. A crude estimate of annual expenditures by private boat fishermen targeting snappers and groupers was made in the following manner. The proportion of 1988 South Atlantic MRFSS intercepts that indicated a snapper grouper species as the primary target was compared to

the total number of MRFSS intercepts in the South Atlantic to create an estimated percent of trips that target snapper grouper species. That fraction (roughly 4.5%) was multiplied by the MRFSS estimated total number of recreational private boat and rental trips in the South Atlantic. This produced an estimated 906,448 snapper grouper trips annually in the South Atlantic. Confidence intervals are not reported for MRFSS estimates of total recreational trips in the South Atlantic, so they could also not be constructed for this estimated number of South Atlantic recreational trips that target snapper grouper species. In addition, because of data collection constraints, this estimate does not include recreational trips in the Florida Keys.

The estimated number of recreational trips was then multiplied by an estimate of per trip expenditures by private and rental boat users. Average per trip expenditures ($16.10) were based on the 1979 socioeconomic survey estimates put into 1988 dollars to correspond with number of estimated trips in 1988 This renders an estimate of annual private boat expenditures targeting snappers and groupers in 1988 of roughly $14.6 million. This does not include large equipment expenditures such as boats, trailers, motors, fish finders but includes variable trip expenditures such as bait, fuel, tackle, etc. Trip (variable) expenditures are only a subset of total expenditures by recreational fishermen. Past purchases of large equipment items will, of course, not be affected by proposed regulatory measures, but future purchases of large items such as boats and trailers may be affected by perceptions of fishing quality and perceptions of the restrictiveness of fishing regulations.

Headboat and charter operations are of economic importance in some areas along the South Atlantic coast. Table 5 gives the number of headboats per state in the South Atlantic according to the Headboat Survey (NMFS, SEFC, Beaufort Lab).

Using a study of the economic characteristics of headboats in the Gulf of Mexico (Holland and Milon, 1989), the average headboat operation has gross sales of $62,135 per year, total expenses of $56,218, and is worth $106,684 including boat, buildings, and other investment items. Per angler fees for a full day trip average $36.

Headboat client trips are measured by angler day equivalents in the NMFS Headboat Survey. Two half-day client trips equal one angler day, etc. Table 6 gives the number of angler days in 1988 and 1989, with Georgia lumped into northeast Florida. If anglers pay roughly as much as Gulf anglers pay ($36 per trip), these angler days represent fairly large revenues to the economies in each state.

According to a marketing study of charter and headboat operations in the South Atlantic (Perdue, 1988), snapper and grouper species are the favorite targets of roughly 56% of paying headboat fishermen that were surveyed. This and other general information about headboat fishing indicates that snappers and groupers are rather important species to headboat clients.

The degree to which charter operations target and depend on snapper grouper species is not known but thought to be minor compared to headboats in general. According to Perdue's study, snappers and groupers were the favorite fish of only 8% of charter clients that were interviewed. To the extent that charter operations in the South Atlantic utilize snapper grouper species as "back-up" species when mackerels and other target species are not encountered, the proposed size restrictions may have some impacts on the charter sector. Fees paid by typical charter clients are $450 per full day charter, typically shared by 5-8 clients (Holland and Milon, 1989).

Framework for Analysis of Proposed Minimum Sizes

The proposed minimum sizes are organized into four categories: 8", 10/12", 20", and 28/36", and different species fall into each of these proposed minimum size categories. For illustrative clarity, impacts on the commercial and recreational sectors are described separately. When examining the impacts of proposed size limits for species where simulation model runs could not be made because necessary biological and economic data were lacking, alternative measures of impacts such as the percentage reduction model previously described are used alone. On the recreational side, in some cases only the percentage of recreational catch of a given species that is expected to be forfeited (harvest delayed) in the short run is described. Background information on the economic importance of recreational fishing in the South Atlantic should help to supplement the reader's understanding of the economic implications of reductions in catch for some species, at least in the short run.

Analyses that were performed using less than ideal methodologies are not intended to be a direct substitute for evaluating the correct producer and consumer benefit measures; they are simply presented as attempts to make at least some objective comparisons lacking substantial pieces of information and secondary studies.

Analysis of the Economic Impacts from Proposed Size Limits

ACTION 6. MINIMUM SIZE OF 8" TOTAL LENGTH

8" Size Limits (Lane Snapper and Black Sea Bass): Impacts on the Commercial Sector

The 8" size limit for lane snapper is not expected to have a significant effect on commercial harvesters. Lane snapper is of little consequence by weight or value in states north of Florida (Tables 1 through 4). In north Florida, lane snapper made up less than 0.1% of total snapper grouper landings or value in both 1988 and 1989. Lane snapper is only of importance in south Florida where it made up roughly 1% of total snapper grouper pounds and value in 1987 and 1988. The percentage of commercial lane snapper catch in recent years for south Florida expected

to be below the proposed minimum size is approximately zero percent by weight according to the size frequency data in TIP samples.

The 8" size limit on black sea bass is already in effect and is mentioned here as an information item. Because it is already in effect, there should, in theory, be no new impacts from this measure.

Based on the above determinations, virtually no new impacts on the commercial sector should result from the proposed minimum sizes in the 8" category.

Impacts of 8" Size Limits on the Recreational Sector.

Lane snapper is not commonly caught by recreational anglers outside of Florida. Analysis of recreational catch sampled by the MRFSS indicates that virtually no recreational catch will be impacted by the proposed 8" size limit. Zero percent of recreational catch sampled in the Headboat survey was smaller than the proposed minimum size for lane snapper. From this, it is likely that the proposed size limit for lane snapper will not impact recreational anglers.

Existing regulations for black sea bass already include an 8" size limit. Although a small portion of the sampled catch in the Recreational Survey was less than 8 inches, this catch is already prohibited and cannot be considered as a new impact.

ACTION 7. MINIMUM SIZES OF 10" AND 12" TOTAL LENGTH

Impacts of the Proposed 12" Size Limits: Commercial Sector

Referring again to Tables 1 through 4, some of the species in the 12" category are of great significance to commercial fishing. In general, vermilion snapper and red porgy are extremely important in North Carolina, South Carolina and Georgia, with vermilion ranking close to 30% of snapper grouper landings and value in those states. Yellowtail snapper and mutton snapper are rather important in Florida.

Using the percentage reduction methodology previously described, short run economic impacts resulting from the proposed 12" size limits are examined (Tables 7 through 10, upper block groupings). Short run losses of revenue in North Carolina resulting from the proposed 12" minimum sizes will be significant for vermilion snapper ($121,898) and red porgy ($58,965). In South Carolina, revenue losses for vermilion snapper are large ($222,358) with corresponding output, income and employment effects that are significant ($383,000 loss of output, $72,000 loss of income, and employment decrease of 4 job equivalents). Although red porgy is of considerable importance to commercial fishermen, revenue losses are not expected because virtually all of the commercial catch is thought to be 12 inches or longer (according to TIPS data).

Revenue losses in Georgia are not expected to be large, primarily because total revenues from snappers and groupers in the 12" category are relatively small. Although nearly 20% of Georgia's vermilion snapper catch is expected to be below the minimum size (Table 9, "Percent < MSL" column), revenue losses are modest ($13,371) because total revenue from vermilion snapper was only $96,000 in 1989. Impacts in Florida are fairly large for vermilion snapper ($146,536), and comparatively modest for yellowtail snapper ($48,910) and gray snapper ($23,044). Impacts for yellowtail snapper and gray snapper are small because the percentages of catch in Florida by weight that is expected to be forfeited in the short run are fairly small (3.4% and 7.5%, respectively). The size limit for yellowtail snapper is currently 12 inches so projected losses for yellowtail snapper cannot be viewed as a new impact of the proposed size limits. Approximately 73% of Florida's vermilion snapper catch will be below the 12" minimum size in the short run.

Net Benefit Changes Under the Simulation Model

Net benefit changes to the commercial sector over time are available for red porgy and vermilion snapper. Tables 11 through 13 present summaries of simulations for red porgy. Turning to Table 12 first, the left hand block reports pounds and exvessel revenues expected in the absence of the proposed minimum size regulations for red porgy. The right had block gives pounds and revenues with the proposed minimum size. Notice that pounds and revenues decline for the first few years then begin to exceed pounds and revenues under the no action alternative. Cost changes depict the anticipated effects of expected changes in variable costs as they relate to changes in quantities of red porgy that are landed over time.

The far left portion of Table 11 (under the Commercial heading) summarizes the regulatory impacts of the proposed red porgy minimum size in terms of changes in benefits (operating profits) to commercial fishermen resulting from the proposed minimum size. Profits decline slightly in the initial period but then begin to increase over time. By the third year, profits have completely made up for initial losses (see "ACCUM GAIN" column). By the end of the time stream, profits to the commercial sector accumulate to $91,900 more than under the no action alternative. Note that these are profit changes (compared to no action) and for several reasons, cannot be directly compared to short run revenue forfeitures in the percentage reduction model. At the bottom of Table 11, the present value of the change in operating profits stream is $31,100. This means that the value of the difference between no action and the proposed action is roughly $31,000 (taking the fact that a dollar today is inherently more valuable than a dollar at some point into the future). This positive substantial return on the "investment" (the short run sacrifice of catch under the minimum size) implies that the proposed minimum size holds significant benefits to the commercial sector over no action, even at the substantial annual discount rate of 10%.

Net benefit changes for the 12" vermilion snapper size limit for the commercial sector and 10" size limit for the recreational sector cannot be estimated directly but can be bounded. This is because the simulation model was not designed to accommodate differential size limits directly. Under the simulation, recreational and commercial fishermen are harvesting from the same stock and where the size limit is set for one sector influences benefits to the other. Commercial (and later recreational) benefit changes for proposed vermilion snapper size limits will fall somewhere between what they are estimated to be if both sectors were regulated by a 10" size limit and if both sectors were regulated under a 12" size limit.

The accumulated gain column (ACCUM GAIN) of the commercial sector of simulation results in Tables 14 through 17 provide a range of benefit changes comparing the difference between no action and the proposed (differential) size limits. Under the 10" size limit for both sectors simulation (Table 14), $40,500 in net benefits accrue to commercial fishermen over the time stream. Under the 12" size limit for both sectors simulation (Table 15), $943,500 in net benefits accrue to commercial fishermen over the time stream. If differential size limits could be built into the model, the simulation result would lie somewhere in between these estimates. At this point there is no way of predicting which end of the bounded range is closer to the net benefit that can be expected to result from proposed vermilion snapper size limits.

In both the 10 and 12" size limit simulations, some of the accrued benefit to the commercial sector comes from additional growth and higher values from larger fish (effect of price breaks). Some of the accrued benefit, however, inevitably comes from a transfer of fish from the recreational sector to the commercial sector. The magnitude of the benefit transfer stems partially from the fact that fishing mortalities are assumed constant for each age class over time. For instance, if recreational fishing mortalities are high on small vermilion snapper, then a good deal of the catch is now removed from the recreational sector by the model. If commercial fishing mortalities on larger vermilion snapper are relatively high, then relatively more catch will accrue to the commercial sector in the future.

In reality, recreational fishermen may adjust their strategies to fish where vermilion snapper are more likely to be above the size limits. This would mitigate the relative amount of benefit transferred to the commercial sector. On the other hand, in most cases, the size of recreational fishing boats and other constraints probably limit the amount of adjustment that can be made. This implies that some benefit transfer can be expected.

Impacts of the 10/12" Size Limits: Recreational Sector

Table 20 reports recreational catch by weight and number for the species in the 10/12" category in the Headboat Survey (1989) and MRFSS (1986). The right hand columns provide estimates of the percentage of the recreational catch by number that are below the proposed 12" size

limit (10 inches for vermilion snapper) based on aggregated MRFSS annual data and 1989 Headboat Survey size frequency data for states and areas where species are commonly captured by recreational anglers. These data indicate that yellowtail gray, and vermilion snappers are extremely important to private and rental boat mode recreational fishermen, while vermilion and yellowtails and red porgy are the most important to headboat anglers. Note that for some species in the category and in some states, large portions of the catch would have to be released by recreational anglers, at least in the short term. For private and rental boat fishermen, 80% of red porgy catch in South Carolina, 44% in North Carolina, 79% of gray snapper in Florida, and 50% of vermilion snapper catch in Georgia and 34% in North Carolina will have to be released in the short run. For headboat fishermen, 40% of red porgy catch, 53% of vermilion catch, and 91% of blackfin snapper catch will have to be released in the short run. These percentage reductions will undoubtedly decrease angler benefit and bring about losses to the sector of the economy that caters to recreational fishing as described before.

Net Benefit Changes Under the Simulation Model

Changes in benefits to recreational anglers catching red porgies are presented in the recreational sector portion of Table 11. Note that benefits decline at a greater rate at the beginning of the time stream and then at a steady rate of $3,700 per year for the rest of the time stream. An interpretation of the results is that recreational fishermen sacrifice red porgies initially under the 12" size limit and their losses are not compensated over the time stream because of transfers to the commercial sector and the "deductions" from the 20% release mortality that is built into the model. Again, recreational fishermen may adjust their fishing strategies and this could mitigate their losses. The model holds cohort specific fishing mortalities constant into the future and is not designed to accommodate behavioral changes. Overall, the model results indicate that benefit (consumer surplus) losses to recreational fishermen sum to $88,900 over the time stream compared to not imposing the minimum size for red porgy. In present value terms, this loss is $43,300.

The difficulty involved with using the simulation model under differential size limits (recreational/commercial) has already been discussed. For this reason, net benefit changes from the proposed 10" size limit for vermilion snapper can only be bounded at this time. Under a 10" size limit for both sectors, accumulated loss of benefits to the recreational sector sums to $10,900 compared to no action (Table 14). Under a 12" size limit for both sectors, loss of benefits to the recreational sector accumulates to $671,800 compared to no action (Table 15). If the model could directly accommodate differential size limits, then the result would fall somewhere between these two values, but there is no way to predict where in the range at this time. As noted earlier, changes in fishing strategies by recreational fishermen could mitigate these losses expected under the confines of the simulation model.

Analysis of Rejected Alternatives for the 12" Species Categories

Rejected Option 1. No Action

Not taking action would temporarily avoid the economic impacts (some positive impacts for the commercial sector) described above. Not taking action would, however, allow overfishing to continue for the species in the size category. This could potentially lead to greater economic impacts in the future if these species experience greater declines or if more stringent management measures must be implemented later on. It must be pointed out that net benefit changes described above do not take into account benefits from increasing spawning stock sizes to levels deemed safe from a biological perspective, and the way in which this may ensure that recruitment to the fishery is not jeopardized or not highly variable.

If benefits in terms of protecting the spawning stock could be described quantitatively, then this would work to mitigate losses when implementing the proposed minimum sizes is thought to involve net losses. Interpreting the results from simulations alone, however, suggests that for the recreational sector, no action is probably preferable to the proposed action. From a purely economic point of view, this conclusion may be correct, although the magnitude of losses to the recreational sector is probably overstated by the assumptions made in the simulation model. Assuming fishing mortalities per age class will remain constant over time for the recreational sector probably overstates the impacts on the recreational sector significantly. As was pointed out earlier, it is likely that anglers will change their fishing strategies after the minimum sizes are in effect.

Rejected Option 2. Minimum Sizes As Recommended by the PDT

PDT-recommended size limits would involve slightly different economic impacts but these are not significantly different from the impacts associated with the preferred alternative. In cases where PDT recommendations do not correspond to existing state regulations, enforcement costs are expected to be higher.

Rejected Option 3. 12" Fork length Size Limit For Gray Triggerfish

Data were not available to evaluate Rejected Option 3 quantitatively. During public hearings, fishermen stated that gray triggerfish appear to be experiencing some sort of population explosion and do not need protection. They stated that reductions in harvest of gray triggerfish may actually bring about reductions in benefits overall because of the damage triggerfish can do to spiny lobster and stone crab populations. Given the substantial economic impacts on the commercial and especially the recreational sector, not imposing size limits when they do not appear to be necessary may help to mitigate overall impacts on user groups. The Council will be readdressing this issue when the next stock assessment is available.

ACTION 8. MINIMUM SIZE OF 20" TOTAL LENGTH

Impacts of the Proposed 20" Size Limits: Commercial Sector

Gag represents over 20% of snapper grouper landings by weight and value in North Carolina, South Carolina, and Georgia (Tables 1-4). Scamp and red snapper are of lesser, but still considerable, importance in terms of value for the above states. In Florida, red and black groupers are the most important species in the 20" category in terms of value (Tables 1-4). Tables 7 through 10 examine the economic impacts of the proposed 20" size limit on species in the 20" group. Impacts by state are substantial but perhaps smaller than might be expected for the groupers at least. This is because the percentage of catch that cannot be retained in the short run is relatively small by weight because much of the catch by weight is of larger fish which will not be affected by the proposed 20" size limits.

Expected revenue forfeitures in the short run in the state of North Carolina total approximately $46,000 for scamp, gag, red grouper, and red snapper (Table 7). Revenue forfeitures for red snapper and scamp are expected to total to approximately $50,000 in South Carolina (Table 8). Because landings of snapper grouper species that fit into the 20" size limit bracket are fairly small, impacts in Georgia are not expected to be significant. Roughly 20% of Georgia's red snapper landings are expected to be below the minimum size in the short run, yet with only 20,000 pounds of red snapper annually, revenue losses only total to $7,119 (Table 9). Florida has the largest short run revenue losses in the 20" size limit grouping. Expected revenue losses for red grouper, red snapper, and black grouper are $76,059, $43,714, and $20,569, respectively (Table 10). Expected decreases in economic output, income, and employment (in man/year employment equivalents) for all species in the 20" grouping are $249,440, $47,220 and 2.84, respectively.

Net Benefit Changes Under the Simulation Model

Net benefit changes to the commercial sector for the 20" size limit for gag can be examined in Tables 21 and 22. Note that revenues decline slightly in the initial phase of the size limit then increase to levels significantly above revenue levels under no action (Table 22). At the same time, variable costs decrease and then increase as landings increase to higher than before the size limit was imposed (Table 22). This translates into accrued net benefits of $287,000 over the no action alternative for the 20 year time stream (Table 21). In present value terms, this increase in benefit over no action is worth $89,800, which is a substantial gain in benefit to the commercial sector considering the use of a substantial annual discount rate of ten percent.

For scamp (Tables 24 and 25), accumulated net benefit changes to the commercial sector compared to no action become positive after 15 years and accumulate to $28,600 after 20 years

(Table 24). In present value terms, the short run investment (forfeited harvest under the size limit) does not pay dividends to the commercial sector (present value of -$18,100 at the 10% annual discount rate). Again, this does not take into account benefits from the relative size of spawning stock. The likely explanation for the proposed size limit not being beneficial to the commercial sector in economic terms is that scamp are relatively slow growing fish and figuring in the effects of release mortality probably diminishes returns from additional (slow) growth over time.

Net benefits to commercial fishermen catching red snapper are quite large (Tables 27 and 29). The increase in profits compared to no action is $696,700 over the twenty year time stream, which totals to $187,900 in present value terms (Table 27). In this case, the investment pays very large dividends to commercial fishermen, and points to the likely conclusion that red snapper is severely overfished under no action. When accumulated profits are substantial as the model predicts for red snapper, this will tend to spur over time. This would work to dissipate these net returns.

Impacts of the Proposed 20" Size Limits: Recreational Sector

Table 30 examines the private boat and headboat catches of red snapper and groupers that are included in the 20" size category. Note the very large percentages of recreational catch for both headboats and private boats that is thought to be affected by the proposed 20" minimum size. Given the high percentage of catch presently below the proposed minimum size, one can expect substantial losses to recreational fishermen in the short run and some potential ripple effects on sectors of the economy that provide inputs to recreational fishermen in the South Atlantic.

Clearly, the proposed measures have greater impacts on the recreational sector than the commercial sector in terms of percentage of catch that is expected to be forfeited in the short run. This is because a greater proportion of commercial catch is made up of larger groupers and red snappers (in the 20" grouping) than in the recreational sector. These impacts could be mitigated if headboats and private recreational fishermen can target areas where a greater percentage of groupers and snappers falling into the 20" grouping were larger than the proposed minimum size. The extent to which targeting can mitigate these losses is not known at this time.

Net Benefit Changes Under the Simulation Model

Losses of benefit to recreational fishermen catching gag are considerable according to the simulation model. Over the entire time stream, recreational catch of gag remains below catches under no action (Table 23). This result is again driven by the cohort specific fishing mortalities that are built into the model. Accumulated net benefit losses to recreational fishermen total -$111,100 over the time stream, and are -$54,500 in present value terms (Table 21).

The same scenario occurs for scamp. Recreational catch decreases initially and remains below its level before the size limit was imposed over the 20 year period (Table 26). Consumer

surplus losses accumulate to -$26,800 over the twenty year stream and are -$18,300 in present value terms (Table 24).

For red snapper, after substantial initial decreases in catch, recreational landings do begin to exceed catch under the no action alternative after seven years (Table 29). Yet these accumulated losses are never compensated by increases in catch for the remainder of the time series (Table 27). For this reason, rather large losses of consumer benefit are depicted by the model. The net loss of accumulated benefit compared to no action over the 20 year period is -$1,338,800, which translates into -$1,597,500 in present value terms. This represents the largest loss to the recreational sector from a proposed size limit for a given species of all the simulation model results.

As has been pointed out before, losses described by the model under the 20" grouping could be mitigated, in real terms, by changes in recreational fishing strategies, and simulation model results do not include the benefits from increased recruitment. If, however, recreational fishermen are not able to change their fishing strategies much because of logistics, then losses from the proposed minimum sizes may be substantial in real terms.

Another reason red snapper losses are relatively large compared to estimated losses for other species has to do with the design of the simulation model. Benefit changes for red snapper are based on percentage changes in catch per trip for red snappers. Other snapper grouper species for which simulations were run are not likely to be target species and for this reason benefit changes were based on percentage changes in overall catch per trip (all species combined). The decision to handle red snapper differently has intuitive appeal because it is a high profile species. Overall, the decision to treat red snapper differently probably affects the magnitude of estimated losses to the recreational sector, but not the direction of the outcome of the results.

Analysis of Rejected Options For the 20" Size Category

Rejected Alternative 1. No Action

Not taking action would temporarily avoid the short and long run impacts described above. Some of these impacts involve increases in benefits to the commercial sector. Not taking action would, however, allow growth and recruitment overfishing to continue for the species in the 20" size category. This could potentially lead to greater economic impacts in the future if these species experience greater declines or if more stringent management measures must be implemented later on. Basing conclusions on the results from simulations alone, no action is probably preferable to the proposed action for the recreational sector but as was explained earlier, the model results to not incorporate all potential benefits from the proposed action.

Rejected Alternative 2. Size Limits As Per The PDT

PDT-recommended size limits would involve slightly different economic impacts but these are not significantly different from the impacts associated with the preferred alternative. In cases where PDT recommendations do not correspond to existing state regulations, enforcement costs are expected to be higher.

Rejected Alternative 3. 20" Fork Length Limit For Scamp

A 20" fork length limit for scamp involves virtually the same impacts that are described above because the difference between fork and total length is minimal for scamp of this size.

Rejected Alternative 4. 25" Total Length Limit For Gag and Black Grouper

The net benefit changes estimated with the simulation model for a 25" length limit for gag are reported in Table 31. For the commercial sector, losses accumulate to $407,100 over the 20 year time series. Under the preferred alternative, gains of $287,000 are expected to accumulate over the 20 year period. For the recreational sector, losses in consumer benefit add up to $514,600 with the 25" size limit as compared to losses of $111,100 with the preferred alternative of 20 inches. Losses instead of gains for the commercial sector and greater losses for the recreational sector under a 25" size limit for gag make the proposed 20" size limit preferable to the 25" rejected alternative size limit according to the results from the simulation model. The direction of these results probably stems from the slow growing nature of gag and the effects of expected release mortality over time under a larger size limit.

Because simulations could not be performed for black grouper, it is not known whether the same net benefit changes to commercial and recreational fishermen seen for gag would occur.

ACTION 9. MINIMUM SIZE OF 28" AND 36" FORK LENGTH

Impacts of the 36" Size Limit For Greater Amberjack in the Commercial Sector (Option 1)

Amberjack makes up a substantial portion of the commercial catch by weight in North Carolina, South Carolina, Georgia, and Florida. According to the percentage reduction model results, short run revenue forfeitures to the commercial sector in North and South Carolina are expected to be $7,955 and $21,080 respectively (Tables 7 and 8). These losses are not of large consequence compared to some projected losses for other species for which size limits are proposed. In Georgia and Florida, short run revenue forfeitures are $1,591 and $146,364, respectively (Tables 9 and 10). In the case of Florida, revenue losses are substantial and translate into output, income and employment losses of $251,980, $47,700 and nearly three man years, respectively (Table 10).

Impacts of the 28" Size Limit For Greater Amberjack in the Recreational Sector

Estimated short run forfeitures of amberjack catch in the private boat sector of recreational angling are 4.8% in North Carolina and 0% in Florida. For other states, MRFSS data do not report a statistically significant number of intercepts wherein amberjacks were sampled. For the headboat sector, it is estimated that 63% of the catch by number would have to be released. Greater amberjack is not thought to be an important component of the headboat catch, which probably means that in most cases, headboat anglers will not incur large benefit losses from the proposed measure.

Rejected Alternatives For Greater Amberjack Size Limits

Rejected Alternative 1. No Action

Not taking action would temporarily avoid the short run impacts described above. Not taking action would, however, allow overfishing to continue for greater amberjacks. This could potentially lead to greater economic impacts in the future if these species experience greater declines or if more stringent management measures must be implemented later on.

Rejected Alternative 2. Apply greater amberjack size limits to other amberjacks

Data are not available to analyze the additional impacts this measure would have on commercial and recreational fishing. Because other amberjacks are only infrequently encountered in the South Atlantic, this measure is not expected to have large additional impacts.

Rejected Alternative 3. 36" Size Limit For Both Commercial and Recreational Sectors

Data to examine the increased proportion of impacted catch for the headboat sector are not available at this time. The percentage of private recreational catch that would be forfeited in the short run remains 4.8% in North Carolina and increases to 19.2% in Florida. For other states, MRFSS data do not report a statistically significant number of intercepts wherein amberjacks were sampled. According to available MRFSS data, a 36" size limit would impact a greater percentage of recreational catch in Florida than under the preferred alternative.

ACTION 10. ZERO QUOTAS & BAG LIMITS AND OTHER OPTIONS

The Council has decided to wait until the next stock assessment to reexamine the status of these species and consider setting quotas for species in the deep water complex in Amendment 6. The council did, however, approve a ban on retention of Nassau grouper at this time.

Not taking action on most deepwater species at this time avoids the substantial short run impacts involved with no retention of these species (Table 32 and discussion under no retention rejected alternative). Not taking action, however, allows potential overfishing to continue for the

deep water species. This could potentially lead to greater economic impacts in the future if these species experience greater declines or if more stringent management measures must be implemented later on. It is the Council's intent, however, to develop management options as soon as the next stock assessment is available. Apparent data inadequacies precluded management of the deep water complex in Amendment 4.

Analysis of Rejected Alternatives For ACTION 10

Rejected Alternative 1. No Action on Nassau Grouper

According to the PDT, the state of the Nassau grouper population has approached endangered status. To the extent that a no retention regulation will protect the Nassau grouper population from further decreases, the no retention provision will be beneficial. Nassau grouper catches are in such a depressed state that virtually no economic impacts will result from no retention.

Rejected Option 2. Zero Quota for All Deepwater Groupers, Tilefish, and Hinds.

This measure would have large short run economic impacts in all South Atlantic states, with Florida and South Carolina feeling the largest impacts. Table 32 lists pounds and value of these deep water species landed in 1989. To analyze the impacts of this measure, total 1989 value was viewed as a net loss to each specific state and that loss of value was run through the appropriate economic multipliers in each state. Total deadweight loss of revenue in the short run would be roughly $1.9 million for all South Atlantic states and output (sales) changes would amount to a loss of $4 million, income losses would be approximately $491,000, and employment losses would be close to 50 man-year job equivalents. While these measures of economic impacts through multiplier effects are not strictly the same as net benefit changes, they do indicate that net benefit changes would be significant and negative.

This only accounts for the effects of lost value in the individual states. Boats rigged for deepwater species would experience additional losses regearing for other species or moving to other regions. The magnitude of those additional losses is not known but assumed to be substantial.

In the long run, substantial rebuilding of the deep water species stocks could provide a sizable resource for exploitation at substantial sustainable harvest levels. Information to quantitatively evaluate tradeoffs between short run costs and long run benefits is not available at this time.

Rejected Alternative 3.

This option closes a delineated area to the harvest of deep water complex species for 20 years. Enforcement costs would likely be reduced with this option. The economic impacts of this option are essentially the same as those in rejected Option 2.

Rejected Alternative 4. Allow a Small Directed For Snowy Grouper, Bycatch Allowance of Other Fish In The Complex.

This option would have the same economic impacts as the above two options minus some or all of the losses for snowy grouper revenues. If the bycatch allowance was not effective in protecting the other deep water species and bycatch was regularly discarded, then fishermen may eventually bear most of the short run losses associated with Option 1 and little of the expected long run benefits associated with recovery of the deep water species complex. This might have greater economic impacts overall and over time than Options 2 and 3.

Rejected Alternative 5. 1 Fish Bag Limit Except For Nassau Grouper As Bycatch of Directed Deepwater Vermilion/Red Porgy Fishery

This option would have virtually the same impacts as no retention. The relative economic importance of the deep water component of the vermilion and red porgy fisheries is not known at this point. This alternative would reduce some wastage of incidentally caught deep water groupers, tilefish, and red and speckled hinds that occurs in this fishery.

ACTION 11A: VERMILION SNAPPER BAG LIMIT

Analysis of MRFSS data indicates that a 10 fish vermilion snapper bag limit would reduce catch by 13%. It must be noted, however, that the 13% catch reduction estimate refers to private and rental boat recreational catch prior to the proposed 10" size limit. The 10" size limit is expected to reduce recreational catch of vermilion snapper by 34% in North Carolina and 50% in Georgia according to analysis of MRFSS intercepts (Table 20). At this time, it is impossible to isolate the separate effects of the 10 fish bag limit from the effect of the 10" size limit on private and rental boat recreational fishermen catching vermilion snapper. It is probable, however, that most of the catch reduction will result from the proposed 10" size limit. This means that, in most cases, anglers will not be able to catch enough vermilion snapper of legal length to meet the bag limit number of fish.

Vermilion snapper is known to be the staple fish of the headboat fishery outside of south Florida. Analysis of the percentage of headboat angler days that would be impacted by a 10 vermilion bag limit reveals that 3% of angler days would be impacted in the Carolinas, 78% in Georgia and north Florida, and 27% in south Florida. This does not, however, build the effects of the 10" minimum size into the analysis. The number of headboat angler days impacted with the bag

limit will be smaller because many undersized fish will have to be returned to the water by virtue of the proposed size limits. The size and bag limits combined will effectively impact a fairly large percentage of headboat catch of vermilion snapper, but it is not possible to isolate the separate effects of the bag limit at this time. Any rigorous analysis of that combined effect would have to take into account the effects of trading between anglers so as not to exceed the bag limits (diverse effects of trading with vermilion snapper bag limit, snapper aggregate bag limit, and grouper bag limit). This trading phenomenon is important because it is a likely outcome, yet it complicates analysis of expected impacts considerably.

For headboats and private boat anglers, the 10 fish vermilion bag limit may have more of a perception effect than a practical effect in some cases. Perception effects and the impacts they can have are discussed in more detail when the impacts of the snapper aggregate bag limit are discussed. Because it is impossible to isolate the effects of the size limit from the effects of the bag limit, the net benefit implications of the vermilion snapper bag limit cannot be determined at this time.

ACTION 11B: SNAPPER AGGREGATE LIMIT

The impacts of the proposed snapper aggregate bag limit are nearly impossible to predict quantitatively at this time. Efforts to examine the number of private boat recreational trips impacted by an aggregate snapper bag limit of 10 fish have not yet been successful because of the difficulty of manipulating MRFSS data in its present form. Even if those efforts had been successful, they would have yielded analyses under pre-Amendment 4 size limit regulation conditions. Whether a 10 snapper bag limit would have impacted a significant percentage of recreational trips before the size limits went into effect may not be a very realistic depiction of the real impacts of the proposed aggregate bag limit. With the fairly restrictive size limits in place, it will be considerably more difficult to catch as many as 10 true snappers to meet the bag limit.

According to MRFSS data, the two red snapper bag limit within the 10 snapper bag limit would impact roughly 27% of trips catching red snapper. That is, however, before the 20" size limit. Recall, however, that 63%, 100%, 100%, and 88% of private boat red snapper catch in North Carolina, South Carolina, Georgia, and Florida was below the proposed 20" red snapper size limit (Table 30). This makes the possibility of a trip catching more than two legal red snapper remote.

An analysis of the percentage of headboat trips catching more than 10 true snappers was undertaken (NMFS, SEFC, Beaufort Lab). According to that analysis, 33%, 33%, and 15% of headboat trips in the Carolinas, Georgia/N. Florida, and S. Florida respectively would be impacted by the proposed aggregate snapper bag limit. That analysis included vermilion snapper in the aggregate bag limit (which was the proposed action at the time the analysis was performed). Because vermilion snapper is probably the most important component of headboat catch outside of south Florida, it is more likely that far fewer headboat trips will be impacted with an aggregate

snapper limit that now excludes vermilion snapper. The proposed size limits for snappers already create the same effects of the proposed bag limit for snappers, at least for the preponderance of anglers.

In all probability, the only impact that the 10 snapper aggregate bag limit has on the recreational fishing sector will be the perception that huge, cooler-filling snapper trips are no longer legal (even if those trips are practically impossible today anyway, before the proposed size limits). That perception may be felt by the industries that serve recreational anglers such as headboat businesses and to a lesser extent, charter businesses. Some existing or potential clients may no longer wish to make trips under the perceived restrictiveness of new regulations. The ability of these businesses to mitigate the economic consequences of perceptions such as these will depend on their ability to market trips not as "meat fishing" freezer trips, but as fun, exciting, relaxing trips.

Analysis of Rejected Alternatives To ACTION 11.

Rejected Alternative 1. No Action

Not taking action involves continued high enforcement costs because of incompatibility between state and federal regulations in Florida, which already has an aggregate bag limit for snappers. To the degree that aggregate bag limits have true (conservation) impacts, then they will help to prevent overfishing of the snapper grouper resource. The conservation effects of the bag limit alone do not appear to be large given that few trips would be impacted by the bag limit even before the proposed size limits. If bag limits do more to change perceptions than conserve fish, then not having bag limits might avoid these perception problems and the economic impacts on headboat and charter operations. In the final analysis, the ability of headboat and charter operations to compensate for perception problems by marketing their service better will determine whether the preferred alternative has different economic impacts than not having bag limits (no action). Until such time as the stocks rebuild, the expected direct economic effect (not considering perception effects) of this measure is expected to be close to zero.

ACTION 12. GROUPER AGGREGATE BAG LIMIT

Efforts to examine the number of private boat trips impacted by an aggregate grouper bag limit of five have not yet been successful because of the difficulty of manipulating MRFSS data in its present form. For the headboat sector, an analysis of the percentage of headboat trips affected by an aggregate grouper bag limit of five revealed that 0% of headboat trips would be affected in the Carolinas. The same analysis for other regions could not be performed. With the added restrictiveness of the size limits on groupers, it is even more unlikely that headboat trips would be affected by the aggregate grouper bag limit.

To some degree, economic impacts from perceptions of restrictiveness of the aggregate bag limit on the headboat industry could be a factor for the grouper aggregate bag limit (as discussed under the aggregate snapper bag limit). Until such time as the grouper stocks rebuild, the expected direct economic effect (not considering perception effects) of this measure is expected to be close to zero.

Rejected Alternative For ACTION 12. No Action

Because a very small percentage of catch is expected to be impacted by the grouper aggregate bag limit, little conservation effects can be expected. This makes the conservation benefits of the aggregate bag limit nearly the same as under no action. If perception impacts are significant and not easily overcome for the headboat industry, then no action might be preferable to imposing the aggregate grouper bag limit. The magnitude of perception impacts and the probability of circumventing them as discussed above cannot be projected at this time.

ACTION 13. AMBERJACK BAG LIMIT

According to available MRFSS data, a three fish bag limit for amberjack would impact only 1% of recreational trips and yet reduce the number of fish killed by 8%. Given the small number of trips that would be impacted, the proposed bag limits of three amberjack is not expected to have large impacts on the recreational sector.

Analysis of Rejected Alternatives To ACTION 13.

Rejected Alternative 1. Amberjack Bag Limit of Six Fish

According to available MRFSS data, a six fish bag limit for amberjack will impact the same percentage of trips while reduction in fish killed will only be 5% instead of 8%. Under the mandate to reach SSR goals while attempting to minimize the impacts on user groups, the preferred option is clearly better than this alternative. In addition, this measure would be incompatible with the Gulf reef fish regulations which could be expected to increase enforcement costs.

Rejected Alternative 2. Amberjack Bag Limit of One Fish

This measure would also be incompatible with Gulf reef fish regulations and present enforcement problems. A bag limit of one fish could be expected to reduce private boat amberjack catches by 17% according to MRFSS data. This added resource protection, in addition to the size limit, was not deemed necessary in order to meet the spawning stock objective the Council has set.

ACTION 14. GRAY TRIGGERFISH BAG LIMIT

The Council decided to refrain from establishing a minimum size or bag limit at this time because there appears to be a considerable discrepancy between the state of the resource according to the assessment and accounts from fishermen that maintain the gray triggerfish is experiencing a population explosion. Action is deferred until another stock assessment can be conducted to verify the condition of the resource.

Rejected Alternative 1. for ACTION 14. Gray Triggerfish Bag Limit Of One Per Day

According to MRFSS data, a bag limit of one triggerfish would reduce triggerfish catch by private boat anglers by 51%. Headboat catch would be reduced by 16% in the Carolinas, 4% in north Florida, and 21% in south Florida.

Rejected Alternative 2. for ACTION 14. Gray Triggerfish Bag Limit Of One Per Day To Apply to Florida Only

This alternative would apparently accomplish little in terms of protecting spawning stock (see discussion in management section of this Amendment). In the headboat sector, catch in north Florida would be reduced by 4% and catch in south Florida by 21%.

Rejected Alternative 3. for ACTION 14. Include Gray Triggerfish in Snapper Aggregate Bag Limit

If gray triggerfish are as abundant as reported, then including them in the aggregate snapper bag limit would make attaining the snapper bag limit more probable for those who would wish to retain gray triggerfish. Overall, this alternative might also serve to encourage people to release gray triggerfish after catching a few in order to avoid filling their aggregate snapper bag limit with triggerfish. Given the complication factors of probable trading on headboats, there is really no way of knowing whether this alternative would have any real conservation or economic effects overall.

Rejected Alternative 4. for ACTION 14. Gray Triggerfish Bag Limit Of Three Per Day

According to available MRFSS data, a three fish bag limit for gray triggerfish would impact only 5% of recreation trips and yet reduce the number of fish killed by 30%. According to headboat data, a three fish bag limit would only impact headboat catch by 4% in the Carolinas, 0% in north Florida, and 2% in south Florida. Given the small number of trips that would be impacted, the proposed bag limits of three gray triggerfish is not expected to have large impacts on the recreational sector.

Analysis Of Other Rejected Alternatives For Bag Limits

Option 1. Three Fish Bag Limit For Spadefish

Data to analyze the impacts of this alternative are not available at this time.

ACTION 15. QUOTAS

This measure represents a decision not to set commercial quotas, so there is no economic effect. If biological objectives cannot be met with size limits, bag limits, spawning closures, and gear restrictions, then total quotas may have to be employed in the future.

Analysis Of Other Rejected Alternatives For ACTION 15: Total Quotas

Specific quota actions were not considered, thus analysis of how the effects of those actions compare to no action cannot be undertaken at this time.

ACTION 16. WRECKFISH

Directives 1-5 under Action 16 are designed to facilitate enforcement of the existing 10,000 pound trip limit in the wreckfish fishery. As such, enforcement should be more cost effective. Wreckfish fishermen will incur slightly greater costs complying with the proposed measure relating to legal landing hours because they may be forced to land fish when it is not optimal for them. These costs are probably minor and are probably compensated by the overall potential benefit trip limits afford wreckfish fishermen in the short run. The potential benefit from trip limits in the short run is that harvest under the total quota in the wreckfish fishery may be slowed down somewhat. This should mean higher exvessel prices on average to fishermen. On the other hand, trip costs may be increased by trip limits in some cases. Specifically, a fisherman owning a vessel capable of harvesting 20,000 pounds of wreckfish per trip, now has to make two trips to harvest that amount. For this reason, some individuals may not realize net benefits from the trip limits, despite slightly higher exvessel prices. Because of the projected positive effects on compliance and reduced enforcement costs, the expected outcome of this measure is positive.

Analysis Of Other Rejected Alternatives For ACTION 16

Option 1. No Action

Having trip limits that are nearly impossible to enforce penalizes honest fishermen who comply with the measure and benefits fishermen willing to cheat. Overall, enforceable trip limits are clearly better for fishermen than non-enforceable ones.

Option 2. Drop the Contingent Upon Implementation Of Limited Entry

The short run costs imposed on fishermen of having enforceable trip limits may not be necessary when alternative management for wreckfish is put in place. The decision whether to keep the landing provisions or not will have to be evaluated after a limited entry system is decided upon and implemented.

ACTION 17 and 18. ADD SPADEFISH AND LESSER AMBERJACK AND BANDED RUDDERFISH TO THE MANAGEMENT UNIT

These actions do not involve impacts on user groups at this time.

ACTION 19. HEAD AND FINS ATTACHED THROUGH LANDING

This measure requires fishermen to land fish with heads and fins still attached; fish can be eviscerated. This measure may impose some inefficiencies on harvesters who are set up to fillet fish at sea, but these impacts are probably more than compensated by decreased enforcement costs and increased enforcement efficiency.

ACTION 20. GREATER AMBERJACK SPAWNING CLOSURE

Monthly amberjack landings in April of 1989 were 19% of the annual total of 815,879 pounds. Percentages of the annual 1989 total for months around the proposed April spawning closure are 11%, 14%, and 12% for March, May, and June, respectively. March through June represents the period of greatest landings for amberjack. Amberjack prices per pound (exvessel) have historically been considerably lower during April, May, and June, than for other months (1978-1988). Price changes may have as much to do with the relative prices of likely substitutes for amberjack as with short run changes in the quantity of amberjack landed. Thus the observed relationship between amberjack landings being high for particular months when prices are low may result from markets becoming saturated, but may also result from other factors as well. Detailed statistical analysis would have to be performed to establish a cause and effect relationship between amberjack price movements and changes in quantities supplied.

Some benefits in terms of biological protection of the spawning stock may result from the proposed spawning closure. These benefits could be eroded, however, if landings prior to and after the spawning closure increase to make up the difference. Some benefits from higher prices could also occur from the spawning closure.

From a purely economic point of view, spawning closures can introduce higher production costs to fishermen by making them fish when fish are not optimally aggregated. These higher costs may or may not be compensated by increases in exvessel prices if fish are landed at other times of the year when quantities supplied are lower (or not lower). Spawning closures may increase

recruitment in the long run, making more fish available and potentially reducing harvest costs at some point in the future. Overall, the outcome in terms of whether fishermen are better off under the spawning closure depends on a number of factors that cannot be accurately accounted for at this time.

Rejected Alternative 1. For ACTION 20. No Action

Because the change in benefits to fishermen from the spawning closure cannot be determined at this time, it is impossible to determine whether no action is preferable to the spawning closure from the point of view of impacts on commercial fishermen.

Rejected Alternative 2. For ACTION 20. March, April, and May Spawning Closure

This option virtually forces fishermen to fish when amberjack are least concentrated. This would almost guarantee that fishing costs would increase considerably. Available information does not allow determination of whether prices to fishermen would compensate increased costs or not, but this appears unlikely.

ACTION 21. MUTTON SNAPPER SPAWNING CLOSURE

In May, 1989, approximately 22% of the 239,425 total annual reported pounds of mutton snapper were landed. June accounted for approximately 17% of the total. Thus the closure covers the months that comprised 39% of 1989 landings. No other months come close to the percentages of total mutton snapper catch in May and June. The objective of the proposed closure is to protect the spawning stock and thus bring about increased recruitment because fewer spawning-age mutton snapper are harvested overall, in the short run. Although this objective may be accomplished, increased fishing costs are likely to occur because fishermen will attempt to make up for lost catch by fishing when fish are less concentrated. It is not known whether exvessel prices will compensate these increased costs.

Benefits expected from the proposed measure will be eroded if commercial or recreational effort is maintained at present levels or increases, essentially removing the fish that were expected to augment spawning. Commercial effort could potentially increase during the period when the spawning closure is not in effect. Alternatively, commercial fishermen will be allowed to land and sell mutton snapper under the bag limit during the spawning closure and this may mean that catch during the spawning season is not reduced significantly. Approximately 150-200 pounds of fish per fisherman can be landed under the bag limit and this may not be a large departure from normal catch per trip because the fishery is prosecuted near shore and day trips are possible.

On the recreational side, the 10 fish aggregate snapper bag limit may work to prevent increases in effort to some degree, but the number of anglers targeting mutton snapper could increase and this would also work to defeat the intention of the spawning closure.

Rejected Alternative 1. For ACTION 21. No Action

Not taking action would sacrifice the spawning stock protection that the closure may afford. Because net benefit changes to fishermen cannot be determined at this time, there is no way to compare the biological benefits in the long run to the costs to fishermen in terms of changes in net benefits.

ACTION 22. GAG AND VERMILION SNAPPER SPAWNING CLOSURE

Because consideration of this item has been deferred, analysis of this action item will also be deferred.

ACTION 23. LITTLE RIVER SMZ

Action 23 does not have any direct impact on user groups at this time.

ACTION 24. SPECIAL RESEARCH ZONES

Action 24 does not have any impact on user groups at this time. Should research zones be proposed in the future, the impacts will be described at that time.

Rejected Alternatives for the General Category

Rejected Option 1. Require Fishermen to Conform to the More Restrictive Regulation Whether Federal Or State.

Each of the provisions discussed in this section implies State/Federal considerations which cannot be analyzed at this time. The underlying intent here, however, is to clarify these questions in order to make fisheries management and enforcement more effective.

Rejected Alternative 2. Add New South Carolina Artificial Reefs As SMZs

The Council will address this question in future amendments. For this reason, impacts have not been described here but will be examined when proposed.

Rejected Alternative 3. Commercial Trip Limits For Amberjack

Commercial trip limits of 1,500 pounds of amberjack would likely impose significant costs in terms of lost efficiencies for large to medium scale commercial operations. The potential benefits

are in terms of higher prices by slowing harvest and avoiding short run supply gluts. A more rigorous analysis of expected impacts and potential benefit tradeoffs will be undertaken if this item is reconsidered in future amendments.

Rejected Alternative 4. Fishing Year

This item has been deferred and does not appear to have sizable net benefit consequences at this time.

Rejected Alternative 5. SMZs For Research

This item does not appear to have sizable net benefit consequences at this time.

Rejected Alternative 6. Add Marbled Grouper To The Management Unit

This item does not appear to have net benefit consequences at this time.

ACTION 25. PROHIBIT THE USE OF ENTANGLEMENT NETS

Entanglement nets are not generally used in the snapper grouper fishery and are only effective under certain circumstances and for certain species. Where effective, however, entanglement nets are considered to be a very efficient gear involving low harvest costs. Some of the negative effects of entanglement gear in the snapper grouper fishery are habitat damage and potential ghost fishing. In the snapper grouper fishery, these negative attributes to using entanglement nets probably outweigh the benefits of efficient harvest but data to rigorously evaluate this benefit tradeoff is not available at this time.

Analysis Of Rejected Alternatives For ACTION 25.

Option 1. No Action

Not taking action would avoid the short run impacts associated with the prohibition of entanglement nets for those individuals who have purchased or plan to purchase entanglement gear. Entanglement gear is not widely used in the snapper grouper fishery. Not taking action would, however, also allow the negative effects of habitat damage and ghost fishing to continue.

Option 2. Allow Entanglement Net, Users Are Restricted To Recreational Bag Limits

This option would have virtually the same impacts on commercial fishing as the preferred alternative. At the same time, enforcement costs would likely be higher and the negative effects from potential ghost fishing, etc., might still be created.

ACTION 26. REGULATE LONGLINE GEAR

A. Longline Gear For Wreckfish

Wreckfish fishermen who have attempted to use longline gear to catch wreckfish report that gear loss is believed to be heavy when fishing longline gear at 300 to 400 fathoms under severe current and wind conditions inherent to the wreckfish grounds. Lost gear wastes hooked fish, may damage habitat, and may make fishing with traditional vertical gear impossible in some areas.

Given the small areas inside what is generally termed the "wreckfish grounds," (high relief areas as narrow as a few hundred yards wide and sometimes less than a mile long), gear conflicts between longliners laying miles of gear and traditional vertical gear fishermen are practically inevitable. These conflicts are not productive and are potentially dangerous under the derby fishing conditions that have arisen since the establishment of a restrictive total quota for the wreckfish fishery.

The use of longline gear in the wreckfish fishery started when fishermen began to compete for the remainder of the total quota in 1990. Bottom longlines can catch wreckfish faster than vertical gear and their use allowed some fishermen to catch proportionally more before the quota was filled. Since then, a 10,000 pound trip limit has been implemented to slow down the pace of landings so that exvessel prices are not as depressed under the derby fishery. The use of longline gear clearly attempts to circumvent the restrictive effects of the trip limit. Market driven mechanisms (individual transferable quotas) are in the process of being developed (Amendment 5) to address short run supply gluts and low prices to fishermen. The use of longlines in the wreckfish fishery attempts to foster competitive advantage for the upcoming derby fishery (before limited entry is in place).

There are large negative effects inherent with the use of longlines in the wreckfish fishery under derby fishing conditions. The costs involved with not allowing longlines are loss of competitive advantage for those willing to use the gear in spite of the fact that most of the wreckfish industry appears to acknowledge its negative effects and support the ban. The overall benefits from not allowing longline gear as described above appear to outweigh the costs.

B. Prohibition of Bottom Longlines Inside of 50 Fathoms For Any Snapper Grouper Species

The proposed prohibition will limit the use of longlines to targeting deepwater species in the snapper grouper complex. The degree to which bottom longlines are presently used inside of 50 fathoms is not well understood. Some accounts state that longlines are hardly or never used in water shallower than 50 fathoms. Other accounts contradict this. To shed some light on this question, catch of snappers and groupers attributed to bottom longlines in the South Atlantic in 1988 was separated into species groups (Table 33). The criterion for being in the upper grouping is simply

that these species are generally thought to occur in water shallower than 50 fathoms. From this simplistic analysis, 190,090 pounds of snapper and groupers making up roughly 18% of bottom longline landings in 1988 by weight and worth $336,997, may be impacted by the proposed measure. According to these findings, bottom longline use inside of 50 fathoms is not an insignificant portion of total longline landings and value. The degree to which these landings can be made up for by other gears is not known.

Imposing a prohibition for bottom longline gear inside of 50 fathoms appears to have inherently high enforcement costs, although an estimate of these enforcement costs is not available at this time. Enforcement costs could be mitigated by cooperative tips by fishermen fishing inside of 50 fathoms who observe bottom longline use. In general, it will be somewhat difficult to set or retrieve a bottom longline of any significant length without being observed under most weather conditions.

Analysis Of Rejected Alternatives For ACTION 26.

Rejected Option 1. Prohibition of Bottom Longlines Throughout The Snapper Grouper Fishery

In 1988, bottom longline catch totaled 1,039,938 pounds worth $1,555,277. This amounts to roughly 14% of total snapper grouper landings by all gears in 1988. This alternative would involve fairly large impacts on the commercial fishing sector. The degree to which this catch could be made up by other gears is not known at this time

Rejected Option 2. No Action

No action may have detrimental effects in the wreckfish fishery because many vessels may be forced to adopt the gear in order to compete in the derby fishery that has arisen since the implementation of the total quota. This will further increase the potential for wastage, habitat damage, and other detrimental effects associated with the use of longline gear in the wreckfish fishery.

No action in the bottom longline fishery excluding wreckfish would prevent impacting approximately 18% of bottom longline catch attributed to fishing shallower than 50 fathoms (Table 33). Problems of crowding and gear conflicts associated with using bottom longlines inside of 50 fathoms would not be addressed under no action.

Rejected Option 3. Limitations on the Number of Hooks That Can be Used

Depending on the number of hooks that were allowed under this rejected alternative, the impacts could range from essentially none (if the number of hooks allowed were close to the number currently in use) to the same impacts under a total prohibition (see above).

Limiting the number of hooks will not necessarily decrease potential detrimental effects of ghost fishing and habitat damage, etc, and would involve high enforcement costs.

ACTION 27. REGULATE POWERHEADS/BANG STICKS

Prohibiting powerhead and bang stick gear at South Carolina artificial reefs may impose costs on those wishing to harvest amberjacks and other snapper grouper species at artificial reef sites because these gears are probably more efficient than other gears. Since prohibiting powerhead and bang stick gear is apparently not associated with preventing overfishing of snapper grouper species at this time, the benefits obtained from prohibition or regulation are associated with reduction of user conflicts.

Analysis Of Rejected Alternatives For ACTION 27.

Option 1. Prohibit Powerheads and Bang Sticks for All Harvest At SMZs

Prohibiting powerhead and bang stick gear around all artificial reefs would impose costs on those wishing to harvest amberjacks and other snapper grouper species at artificial reef sites because powerhead and bang stick gear are probably more efficient than other gears. Because prohibiting powerhead and bang stick gear is apparently not associated with preventing overfishing of snapper grouper species at this time, the benefits obtained from prohibition or regulation are associated with reduction of user conflicts.

Option 2. No Action

Not taking action would avoid imposing the costs associated with not allowing efficient gear to be used to take amberjacks and other snapper grouper species off South Carolina artificial reefs. At the same time, not taking action allows conflicts between user groups that are apparently continuing to occur.

Option 3. Prohibit Powerheads and Bang Sticks In The South Atlantic EEZ

Powerheads and bang sticks are used for harvesting amberjacks and other snapper grouper species. Harvest by diving accounted for roughly $95,000 in value through the South Atlantic in 1988. Powerhead and bang stick gear was used for a portion of the harvest by dive gear. For North Carolina through Georgia, amberjack harvest by dive gear (primarily bang stick/powerhead) totaled only 714 pounds worth $421 in 1988. Total amberjack landings by all gears for those states in 1988 were 120,107 pounds. In Florida, 17,659 pounds of amberjack worth $5,367 were taken by dive gear in 1988. Total amberjack landings by all gears for the same year were 735,967

pounds. The degree to which divers previously using powerheads and bang sticks could harvest these equivalent landings by using other means is not known at this time.

ACTION 28. REGULATE FISH TRAPS

A. Add Gear, Vessel, and Trap Identification and Permits For Black Sea Bass Traps

The proposed regulation is not expected to have any substantial impacts on black sea bass trap fishermen. The benefits of this action are better information on the total number of traps used for black sea bass and a better idea of how many traps are used per fisherman. From an enforcement standpoint, allowing the use of black sea bass traps north of Cape Canaveral while prohibiting fish traps in the South Atlantic may make enforcement more expensive and potentially less effective.

B. Prohibit the Use of Fish Traps in the South Atlantic EEZ, Black Seabass Pots Are Allowed North of Cape Canaveral

Benefits Associated With The Proposed Prohibition

The benefits to be obtained from a prohibition on fish trapping are in several areas. In Florida, where the majority of fish trapping presently takes place, fish trapping is not allowed in state waters. This inconsistency with federal regulations complicates enforcement and likely increases its cost considerably. No state prohibitions occur in South Atlantic states outside of Florida, so further enforcement savings will not realized, at least those resulting from correcting inconsistencies between state and federal laws.

Fish traps are known to take tropical fish which are more commonly considered to be ornamental fish than food fish. Examples of these fish are angelfish, parrotfish, and tangs. These fish are viewed by skin and scuba divers and probably have substantial nonconsumptive use values associated with them. As food fish, these species command low prices generally. The value probably derived from non-consumptive use of these fish, particularly when many "users" can enjoy viewing a single fish without killing or injuring it, exceeds their consumptive value which can only be derived once. Numerous studies have established ranges of value thought to result from non-consumptive use of rare fish, mammals, and land animals. No study of the non-consumptive value of tropical fish is known to exist but the popularity of viewing tropicals among divers attests to the likelihood that non-consumptive values are probably fairly high, even if most of these fish are not particularly rare or threatened at this time. It is not known whether the current level of removals of ornamental fish by fish traps has affected or will affect the total amount of non-consumptive use

value derived from viewing these fish. Further, catch of ornamental fish is almost non-existent north of Florida.

Benefits from eliminating a highly efficient gear from a fishery where thirteen of twenty-seven species are overfished are expected to occur, at least in the short run. In the long run, it is probable that other gears will take the fish presently caught by fish traps, since the proposed regulations such as size limits and other gear limitations are not necessarily likely to prevent this. Further regulations will likely be needed if the snappers and groupers presently caught by fish trappers are to be protected from harvest.

Fish traps are thought to give a disproportionate percentage of harvest to a relatively small number of fishermen (see discussion under Action 28 in Amendment 4). Although that attests to the efficiency of fish traps and, in many cases, society benefits from efficient use of capital, under certain circumstances society can opt to trade off efficiency for other benefits, such as equity.

Ghost fishing is a problem associated with fish traps. Although most gears continue to fish for at least a brief period of time when they are lost, gill nets and fish traps are particularly prone to ghost fishing. Fish traps in Florida are not usually baited and thus can continue to fish for extended periods of time even if they are not tended. Fish traps north of Florida are baited and apparently do not function as habitat, thus reducing the potential for ghost fishing.

The proposed mandated use of biodegradable panels and jute fasteners attempts to address the ghost fishing problem. Although well-intentioned, these measures require extensive enforcement resources because traps are not brought back to the dock in Florida. It is believed that most traps fished north of Florida are brought back to the dock after each trip. It is not necessary for traps to be lost to storms or other inclement weather to make them susceptible to the waste involved in ghost fishing. Traps can be lost due to the malicious or ignorant acts of trappers or non-trappers who are competing for the same resource. The end result of ghost fishing remains the same, a waste of scarce resources. Decreasing the potential for ghost fishing can be seen as a benefit associated with the proposed prohibition of fish traps.

Considerable debate has occurred over the degree to which fish traps and fish trapping destroys fragile coral and live bottom habitats. Coral reefs take thousands of years to develop and are susceptible to damage from heavy objects placed or dragged across them. Legal proceedings in Florida have focussed on methods to value coral habitat to recover damages from shipping companies and other parties responsible for damaging coral areas in that state. At present, however, there is no reasonable benchmark that can be used from a Federal perspective to value the loss of coral habitat from fish trapping. Yet coral and live bottom habitat undoubtedly has a high non-consumptive use value associated with it. One has only to think of the popularity of underwater parks such as John Pennekamp Coral Reef State Park in Florida to recognize the importance of coral and live bottom sites to skin and SCUBA divers.

In addition to its high non-consumptive use value, coral reef habitat is indirectly important to commercial and recreational fishing. For example, groupers, lobster, and some of the snappers spend the juvenile phase of their life cycles at reefs and thus the reef is thought to contribute to the abundance of fish in Florida waters.

This information on the benefits of protecting coral reef environments is particularly germane to Florida. Yet live bottom areas (without true corals) are popular with divers north of Florida. This discussion does not attempt to enter the debate over whether, or the extent to which, fish traps are fished directly on top of coral reefs. Fish trappers contend that experienced fish trappers do not and would not set traps on corals. One reason traps are not set on coral reefs, they contend, is that fish trapping is more effective and less costly in areas adjacent to coral reefs than on the reefs themselves. In any case, the objective here is to point out the potential benefits of preventing destruction of coral and live bottom habitats if fish traps or any other practice which damages these areas. The reader can be guided by his own knowledge and judgement, or other sources as to the extent that fish trapping may impact these environments as compared with other activities.

Short And Long Run Costs Associated With Prohibiting Fish Traps In the South Atlantic

There are three types of costs or loss of benefit associated with prohibiting fish traps. The first cost involves the deadweight loss of the value remaining in the total quantity of fish trap gear which will be a forfeiture for fish trappers in most cases. The second is the loss or decrease of net returns to trap fishermen into the future. The third is the loss of consumer benefit associated with the high quality of local fresh fish available in Florida markets and to a lesser degree in states north of Florida that was produced by fish traps. This section will evaluate the extent of these costs to the degree that is possible given available data. For illustrative clarity, the discussion will focus on fish trapping in Florida and fish trapping north of Florida separately because some characteristics of fish trapping differ in those two areas.

Loss Of Value Of Fish Trap Gear

To estimate the deadweight loss of value of fish trap gear, one has to have a notion of the total number of traps in the fishery in the two areas, an idea of the value of traps if they were new, and an estimate of the average expected life of a fish trap under normal fishing conditions. An informal survey of some fish trappers in Florida and in states north of Florida was conducted. This survey did not use representative sampling. The charge was simply to get information from fish trappers who are knowledgeable about fish trapping in their area and could give reasonable estimates of the information needed. The fish trappers selected were those who spoke at public hearings and appeared to be capable and willing to give accurate information.

Depreciated Value Of Fish Traps In Florida

This analysis provides information on traps fished by full time Florida trappers. There are approximately 30 full time trappers in Florida and on average, each trapper owns 200 traps. Traps are built to last between 7 and 10 years with zinc anodes used to delay electrolysis. Expected trap loss (loss from a combination of sources such as storms, currents, theft) amounts to about 15% of the total number of traps per fisherman per year on average. This corresponds to the design life of the trap being 7-10 years because it would not make sense to build a trap to last 50 years if there is an annual 15% trap loss per fisherman.

The value of a new trap today is approximately $85, with rope, weights, and zinc fittings. Thus, the new value of the number of traps held by a fisherman is $17,000. That value, however, is not appropriate for assigning a figure for the deadweight loss to a fisherman because the traps held by fishermen are made up of a number of traps at different ages (i.e., different levels of depreciation have occurred to the traps owned by the fishermen). In the estimation that follows, it is assumed that traps last seven years and that there are an equal number of traps at each stage of depreciation. Thus, depreciation factors for each year up to seven are applied and 28.5 traps are placed in each depreciation bracket (one-seventh of the 200 traps held by a fisherman).

The number of traps in an age bracket multiplied by the depreciation factor and the purchase value of the trap yields the depreciated value of the traps in each bracket (Table 34). Summing over all age brackets yields the total depreciated value of traps held by a fisherman. This application of straight line depreciation comes directly out of a handbook on financial tools for fishermen which is a best seller among fisherman with small to medium size operations (University of Connecticut, 1984). Accelerated depreciation may be more applicable in a tax accounting sense, but straight line depreciation appears suitable for estimating remaining value in traps.

Using the above method, the estimated value remaining in traps help by the average fisherman is $9,690, and this represents the deadweight loss he faces under the prohibition because traps are designed specifically for the purpose for which they are being used and fish traps may not be used in other fisheries. Thus, in all probability, a fisherman will not be able to sell his traps at all or at least not for what they are worth because anyone purchasing the gear would not be able to use it. If there are other fisheries in which traps can be used, or other areas where traps can be used, then losses estimated here would be mitigated.

To obtain an estimate of the value remaining in traps for all full time trap fishermen, one can multiply the value of traps held by an individual by the estimated number of full time fishermen. Assuming there are 30 full time fishermen, the total deadweight loss for traps is approximately $290,700. The purchase value (new) for 6,000 traps (30 fishermen holding 200 traps each) is approximately $510,000.

Little information on part time fish trapping in Florida waters is available and an estimate of losses to part time fish trappers is not available at this time. As can be expected, deadweight losses (depreciated trap value) to an individual part time fisherman should be small relative to full time fishermen. This results from less trap gear being owned by part time fishermen and according to sources, part time fishermen do not use the same (relatively expensive) traps in some cases. Traps used by part timers may be designed to last only a few years or as short as one year. Annual trap loss rate is thought to be higher for part timers, particularly those who fish traps individually instead of in trains. This information would suggest that gear value losses to part timers may not be substantial but this cannot be confirmed at this time.

Depreciated Value Of Fish Traps In States Other Than Florida

Sources report that there are as few as 12 fish trappers of significant scale in states other than Florida. The majority of these fishermen reportedly fish out of South Carolina. Fish trapping north of Florida is prosecuted with relatively few traps (average of 25 traps per vessel) and at distances generally farther from shore (as far as 50 miles) than in Florida. Vessels are larger, averaging 40-45 feet. Trips are typically one week in duration and traps are usually brought back to the dock with the vessel. Some fishermen fish traps with hauling devices and some traps remain attached to the vessel during the entire trip. Traps are baited instead of functioning as habitat. In most cases, they are the same size as Florida traps and have the same purchase price. At least one fisherman is known to use larger, more expensive traps, but calculations here do not reflect this.

According to sources, annual trap loss is also roughly 15%. With 12 vessels fishing traps and assuming 25 traps per vessel, the total number of traps in the fishery is estimated to be 300. Because of the relatively small number of traps fishery-wide, the depreciated value of all traps in the entire fishery north of Florida is estimated in one step below (Table 35).

Making the same assumptions about an equal spread of traps at the different age brackets, the total value left in traps industry-wide, north of Florida is $14,620. This trap value estimate does not include any special hauling devices that may be used for traps fished in deep waters that may not be suitable for use in other fisheries. The total (purchase) value of traps north of Florida is $25,000. Deadweight loss of the value remaining in traps to an individual is approximately $1,218 ($14,620/12).

Loss Of Future Earnings, Florida and North Of Florida Trap Fisheries

Accounting for impacts from the proposed fish trap prohibition involves looking at a stream of future earnings for vessel captains/owners and crew members. In reality, the impact on fish trappers is the difference between what they presently earn compared to what they will earn doing their next best alternative occupation. One can expect that at least some fish trappers will continue to

fish using another gear. Yet for them, that alternative is less lucrative by definition, or they would have chosen it over fish trapping, at least in a simplistic sense. In this analysis, loss of future earnings is viewed as a deadweight loss because information on alternative earnings is not available at this time. This will provide the upper bound of losses to fish trappers. One should keep in mind, however, that in the medium to long run, fish trappers would likely have earnings from alternative occupations instead of deadweight losses.

In Florida, fish trap vessels typically have one or two crew members. For this analysis, 1.5 crew members was assumed. For trappers north of Florida, two or three crew members are used, so 2.5 was used in the analysis. A range of net returns (the difference between gross revenues and variable and fixed costs, i.e., profits before taxes) is presented for each area based on reports from fishermen. Potential variation in earnings may mean that a few trappers make more than the amounts in the ranges given, and the rest make significantly less. The purpose here is to estimate future earnings losses for the trap industry in both areas, not to figure out what a given trapper is earning. Trapping involves significant investments in gear, and vessel, and returns in the ranges are similar to earning for single proprietors in other natural resource industries involving high risks, long hours, and large investments.

Future Earnings in Florida

Net earnings to a trap fisherman probably range from $40,000 to $50,000 per year for dedicated trap fishermen. Note that the following information seriously brings into question reported pounds and value data and relative percentage of total snapper grouper catch in the South Atlantic that is attributable to fish traps. This is because estimated net returns to fish trappers in Florida, for example, are far larger than what could be generated from the total revenue attributed to fish trap catch in Florida. This is discussed in more detail in the management section of this amendment.

Assuming 30 full time vessel owner/captains making between $40,000 and $50,000 annually, total net returns for all captains/owners range from $1,200,000 to $1,500,000 annually. This represents a significant amount of benefit being generated from the trap fishery that will be lost. Although it is true that not every vessel is owner-operated, the majority are, and this assumption suffices for this exercise. If that range of total earnings to captains/vessel owners is assumed to be sustainable into the indefinite future (whether landings in the fishery are sustainable, participation levels would remain at 30, and other assumptions implicitly made here are accurate is not the point of this exercise), then the present value of returns to captains/owners fishing in the trap fishery into the indefinite future ranges from $11,999,999 to $14,999,999 when summed and discounted at 10% annually. This figure represents earnings or benefits that are viewed as forfeited or sacrificed (deadweight loss) as a result of the fish trap prohibition in Florida.

Crew members probably make between $15,000 and $17,000 annually. With 1.5 crew members on a vessel, 30 vessels, total earnings by crew members range from $675,000 to $765,000 per year. Annual total returns to crew in Florida represent a significant amount of benefit. A summation of crew earnings into the indefinite future is $6,749,999 to $7,649,999 in present value terms, again using a 10% annual discount rate. This figure represents forfeited earnings to crew members that are viewed as sacrificed (deadweight loss) as a result of the fish trap prohibition in Florida. Combining crew and captain earnings in present value terms gives a range of loss between $18,749,998 and $22,649,998, based on high and low annual returns estimates.

Future Earnings in States North of Florida

Estimates of net returns to captains/vessel owners north of Florida range from $40,000 to $55,000. Based on 12 captains/vessel owners, total annual returns range from $480,000 to $660,000, which is a significant amount of benefit derived from the trap fishery. If this stream of earnings is summed into the indefinite future and discounted at 10%, benefits to be sacrificed in present value terms range from $4,799,999 to $6,599,999 for the high and low annual earnings estimates.

Based on 2.5 crew members per vessel, and estimates of annual crew earning ranging from $15,000 to $20,000, total annual crew earnings range from $450,000 to $600,000, again, a sizable amount of benefit. Present values for earnings into the future discounted at 10% range from $4,449,999 to $5,999,999. Total future earnings in present value terms for captains/owners and crew range from $9,249,998 to $12,599,998 based on high and low earnings estimates.

Losses To Consumers

Losses to consumers cannot be estimated directly because supply and demand functions are not available and the interaction of locally caught fish in the southeast and imports as substitutes is not well understood at this time. Consumers benefit from locally supplied snappers and groupers, particularly if local supply is of higher quality than imports. The fact that local fish is marketed as such and commands higher prices in some cases suggests that consumers can distinguish local fish from imports to some degree. Substantial evidence of this is the roughly 6,800 signed individual form letters received by the South Atlantic Council expressing an appreciation for local fish available at reasonable prices that are landed by fish traps. These letters requested that fish traps not be banned because consumers felt that either prices would rise or product of the same quality would not be available if fish traps were banned.

Fish traps are generally thought to produce high quality product. Some fishermen believe that because fish apparently do not struggle while the trap is brought to the surface, in contrast to hook and line gear, fish are of higher quality for reasons attributable to levels of chemicals in the

flesh. This hypothesis has not been tested scientifically but handling is generally accepted to be a determinant of flavor of different types of meats.

In general, efficient gears can potentially create relatively larger benefits to consumers, particularly if quality is as good or better than fish caught with less efficient gear. These benefits can be passed on to consumers from relatively less expensive prices for the same (or better) quality product. The type of analysis that would need to be performed to verify this possibility, however, cannot be performed at this time.

Overall, the impact of the prohibition on consumers will be influenced by the questions of whether landings previously resulting from fish traps are made up by other gears. If these landings are not made up by other gears, then local fish will be relatively more scarce and prices of imports and local fish may increase if the quantity of imports does not increase as well. In some cases, prices of imports may increase because there is relatively little competition from local production. Consumers could be worse off under this scenario. On the other hand, if other gears bring in the quantity of fish that fish traps were catching, then consumers will only be impacted by the increase in price attributable to fish being more expensive because it is now caught by a less efficient gear, assuming these costs can be passed on to the consumer. At this time, it is impossible to determine which outcome will occur.

Comparing Costs And Benefits From Prohibiting Fish Traps

Because not all costs and benefits can be quantified at this time, a rigorous comparison of costs and benefits cannot be performed. Some of the potentially large benefits from a prohibition of traps are virtually impossible to quantify at this time. Some of the estimated lost income to fish trappers would likely show up as increased income to snapper grouper fishermen using other gears, but there is no way to account for this at present. The discussion of some of the benefits associated with banning fish traps that are described involve large uncertainties because, for instance, we do not have a clear understanding of the degree to which fish traps are actually placed on coral reefs. On the other hand, although some of the costs involved with prohibiting fish traps can be described quantitatively, we do not know whether alternative employment fishermen could find to replace fish trapping will be considerably less profitable than what they are doing now or only slightly less profitable. We also do not know whether other gears will catch the fish that fish trappers were catching so consumer impacts are uncertain at this point.

Analysis of Rejected Alternatives

Rejected Option 1 No Action

No action involves avoiding the costs described above and not obtaining the benefits in terms of preventing habitat destruction, ghost fishing and removal of ornamental fishes, etc., that are also described above.

Rejected Option 2. Industry Proposal To Regulate Fish Traps

Because the number of traps currently being used in the fishery is not known exactly, little means for evaluating the impacts of reducing the number of traps in the fishery to 15,000 exists. Based on the number of trap tags on record (51,000), a reduction to 15,000 traps is a nominal reduction of 70%. If, as was assumed in above analyses, total number of traps is closer to 6,000, then the industry proposal to limit traps to 15,000 would not involve impacts.

Measures to limit the catch of tropicals would begin to address that problem as described above. Requiring observers would address some of the enforcement problems described above. Requiring untreated jute fasteners or magnesium fasteners would address ghost fishing problems, but enforcement of this measure is difficult and expensive. Proposed measures to deny permits to trappers who receive two major violations would likely improve compliance with regulations in the fishery.

The most salient features of the industry proposal is the limitation of the number of traps per individual to 100 and the limitation on the overall size of the fish trap industry via limited entry. At face value, limits on the number of traps to 100 would have substantial impacts on fishermen because they are presently fishing about 200 traps. Whether fishermen could circumvent these impacts by fishing larger traps or fishing traps more intensively is not known at this time.

The effects of a proposed 50% income from commercial fishing to exceed the bag limit requirement are not easily discernible. Kitner's (1989) fish trap study cannot be used to directly determine what percentage of fishermen currently fishing traps might be impacted by the 50% income requirement. That study reports, however, that some 30% of respondents (with a 30% response rate to the questionnaire) indicated that they were employed outside the fishing industry in addition to their fish trap employment. Interpretation of that finding, however, is difficult.

Rejected Option 3. Modify Mesh Size

Depending on the mesh size that is allowed, modifications in mesh size could impact trap fishermen considerably because catch per effort is reduced precipitously as mesh sizes increase beyond a certain point (see Bohnsack et al. 1989). Changing mesh sizes does not address habitat and ghost fishing problems. If mesh size were required to be large enough to affect trap catch

significantly, then concerns about competition and the distribution of catch between trappers and fishermen using other gears would be addressed.

Option 4. Limit Number Of Traps To 100 per Permit Holder

Limiting the number of traps per individual to 100 would have substantial impacts on fishermen because fishermen are reportedly presently fishing roughly 200 traps. Whether fishermen could circumvent these impacts by fishing larger traps or fishing traps more intensively is not known at this time. To address gear conflict and to reduce ghost fishing and habitat damage, the limitation of 100 traps per individual would have to be accompanied by limited entry that restricts the overall size of the fishery significantly.

Option 5. Prohibit the Use of Fish Traps in the EEZ Off Florida

Banning fish trap use in EEZ waters off Florida would result in the portion of impacts in the analysis of the preferred alternative that are specific to Florida. Because habitat destruction and to some degree the competition and unequal distribution of landings are predominantly problems in Florida at this time, then some of this would be completely resolved by this rejected alternative. Ghost fishing problems would not be resolved by this alternative. Overall, because there are so few trap fishermen outside of Florida, many of the problems associated with trap fishing would be addressed with this measure. Over time, it is possible that the number of trap fishermen outside of Florida could increase. This might mean that some of the problems experienced in Florida could begin to occur north of Florida. Consistency between state and federal regulations in Florida would be accomplished with this alternative.

Option 6. Phase Out

A phase out essentially has the same impacts in the long run as the prohibition minus the loss of the depreciated value of traps. If fishermen respond rationally to this proposed mandate, then they would incur no new trap expenditures and simply fish their remaining traps under a depreciation schedule which would end with zero depreciation value of traps. It seems doubtful that fishermen would respond in that way to a phase out of this kind, but in theory, the impacts on individual fishermen would be decreased under this scenario. Loss of income impacts would be removed or decreased in the short run at least.

Option 9. 10 Tended Traps

Information to evaluate the impacts of Option 9 in detail is not available. Fishing and tending only 10 traps is clearly a very large departure from the fishing practices now employed by trap fishermen in Florida and public comment suggests that this proposal would be tantamount to a

prohibition in Florida. In states outside of Florida, some trappers use as few as 10 traps and these traps are tended. Whether other fishermen fishing traps outside of Florida (fishing 25 traps on average and bringing these traps back to the dock when returning) could modify their fishing techniques as per their proposal is not known at this time, but seems at least possible.

ACTION 29. SPECIFY ALLOWABLE GEAR

ACTION 29 does not have benefit implications at this time.

ACTION 30. EXPERIMENTAL GEAR

ACTION 30 may make experimentation with new, (and potentially more resource-kind as well as efficient) gears impossible if permits were not available for experimenting with gears that are large departures from present fishing practices. This could have impacts in both directions; it may keep potentially harmful gears from being developed, along with potentially beneficial gears. The Council has deferred consideration of this item to a future amendment.

ACTION 31. NON-CONFORMING GEAR LIMITED TO BAG LIMIT

This item may make experimentation with new, (and potentially more resource kind as well as efficient) gears impossible because the revenues from selling bag limit numbers of fish may not compensate costs of development and testing. This could have impacts in both direction; it may keep both potentially harmful and potentially beneficial gears from being developed.

Analysis of Rejected Alternatives For Gear Restrictions in General

Rejected Alternative 1. Only Hook and Line Gear Not To Exceed 6 Hooks

The impacts of rejected Alternative 1 are large. Although hook and line is the predominant gear in the snapper grouper fishery, it only accounts for 43% of landings in 1988 north of Florida and 74% in Florida (excluding wreckfish). This would mean that a substantial portion of snapper grouper catch by gears other than hook and line would have to be caught by another means which would impose potentially large costs on fishermen and consumers. Consideration of this item has been deferred to a later amendment.

SMALL BUSINESS CONSIDERATIONS

Determination of Significant Impact On A Substantial Number of Small Entities: The proposed actions will affect most of the estimated 700 small business entities involved in the snapper grouper fishery in the South Atlantic, so the "substantial number" criterion will be met. All the measures

combined should result in a temporary reduction in gross revenues by more than five percent, so there is also a "significant impact" on the small business entities. Therefore, an Initial Regulatory Flexibility Analysis (IFRA) is required. A Regulatory Impact Review (RIR) was prepared to satisfy the requirements of E.O. 12291 and the results of that analysis apply for the purposes of the IFRA since all the business firms involved are small business entities. Therefore, most of the IFRA will consist of references to the RIR. Other information required for the IFRA is contained either in the Snapper Grouper Fishery Management Plan (1983), or Amendment 4, and will be referenced as appropriate.

Explanation Of Why Action Is Being Considered: Refer to the statement of Problems in Amendment 4, Section I, D.

Objectives And Legal Basis For The Rule: Refer to Section I, C-G in Amendment 4., and Section 8.3 Fishery Management Jurisdiction, Laws and Policies in the Snapper Grouper FMP. The Magnuson Fishery Conservation And Management Act of 1976 provides the legal basis for the rule.

Identification Of Alternatives: Refer to Section III. Alternative Management Measures in Amendment 4.

Demographic Analysis: Refer to Section 8.6 Description of the Businesses, Markets, and Organizations Associated With the Fishery in the Snapper Grouper FMP.

Cost Analysis: Refer to Actions 1-31 in the RIR.

Competitive Effects Analysis: The industry that depends on the snapper grouper resource is composed entirely of small businesses(harvesters, processors, charter and headboat operations). Since no large businesses are involved, there are no disproportional small vs. large business effects.

Identification of Overlapping Regulations: The proposed amendment does not create any new overlapping regulations with any state regulations or federal laws. One outcome of the proposed amendment is that existing inconsistencies between state and federal laws will be resolved. Refer to Actions 1-31 in the RIR and Amendment 4.

PUBLIC AND PRIVATE COSTS ASSOCIATED WITH AMENDMENT 4

NMFS administration costs including Southeast Regional Office,Headquarters and NOAA General Counsel:

Southeast	$45,000
Headquarters	$15,000
NOAA	$10,000
NMFS and U.S. Coast Guard enforcement costs:	
NMFS	$160,000
U.S. Coast Guard	$1,026,000
Private costs for permits and logbooks:	
Permit fees	$16,100
Permit application time	$1,750
Logbook reporting	$33,750
NMFS costs associated with logbooks:	
Printing /mailing	$5,900
Coding/entering/editing data	$30,952
SAFMC costs associated with development of Amendment 4) (Staff, Council, public hearings, etc.)	$135,947

References

Adams, C. M. and F. J. Lawlor, III. 1989. Trends in the importation of selected fresh and frozen seafood products into the southeastern United States. Technical Paper 59, FL Sea Grant College Prog., Univ. of FL, Gainesville, FL. 70p.

Bohnsack, J.A., D.L. Sutherland, D.E. Harper, D.B. McClellan, M.W. Hulsbeck, and C.M. Holt. 1989. The effects of fish trap mesh size on reef fish catch off southeastern Florida. Mar. Fish. Rev. 51(2):36-46.

Ditton, R.B., J. R. Stoll and D.A. Gill. 1989. The social structure and economics of the charter and party boat fishing fleets in Alabama, Mississippi, Louisiana and Texas. Final report for Southeast Regional Office, NMFS, St. Petersburg, Fl. Contract No. 5617000 (RF86-1034).

Holland, R. M., and J. W. Milon. 1989. The social structure and economics of the charter and party boat fishing fleet of the gulf coast of Florida. Final report for the Southeast Regional Office, NMFS, St. Petersburg, Florida. Contract # NA87WC-H-06141.

Keithly, W. R, and F. J. Prochaska. 1985. The demand for major reef fish species in the Gulf and South Atlantic regions of the United States. Proceedings of the Tenth Annual Tropical and Subtropical Fisheries Technologies Conference of the Americas, Texas A & M Sea Grant TAMU-SG-86-102, pages 59-72.

Kitner, K. 1989. Fish trapping in the South Atlantic: Report to the South Atlantic Fishery Management Council, Charleston, South Carolina. SAFMC Technical Report No. 10, SAFMC Contribution No. 15. 18pp.

Mattson, J.S. and J, A, DeFoor, III. 1985, Natural resource damages:Restitution as a mechanism to slow destruction of Florida's natural resources. J. Land Use Env. Law 1(3):295:319.

Milon, J. W. 1989. Estimating recreational angler participation and economic impact in the Gulf of Mexico mackerel fishery. Final report for MARFIN award NA86WC-H-06116 submitted to the NMFS, SERO, 9450 Koger Blvd., St. Petersburg, FL 33702.

Perdue, R. R., 1988. Charter and Head Boat fishing as a sector of the tourism industry in North Carolina, South Carolina, and Georgia: guidelines for greater integration and improved vitality. Final report for the Southeast Regional Office, NMFS, St. Petersburg, Florida. Contract # NA86WC-H-06107.

Plan Development Team (PDT). 1990. 1990 NMFS/PDT snapper-grouper assessment. Report available from the South Atlantic Fishery Management Council, 1 Southpark Circle, Suite 306, Charleston, SC 29407.

Poffenberger, J. R. 1985. Operational and financial characteristics of reeffish vessels in the South Atlantic and Gulf of Mexico areas. N. Am. J. Fish. Man. 5:379-388.

University of Connecticut, National Sea Grant College Program. 1984. Advisory Handbook on Fishing Financial Management. Sea Grant Contract NA82AA-D-00018). 133p.

Waters, J. R. and G. R. Huntsman. 1986. Incorporating mortality from catch and release into yield-per-recruit analyses of minimum limits. N. Am. J. Fish. Man. 6:463-471.

TABLE 1. SNAPPER-GROUPER LANDINGS BY WEIGHT AND VALUE IN NORTH CAROLINA*.

	1988			1989		
	POUNDS	VALUE	PRICE/LB	POUNDS	VALUE	PRICE/LB
BLACK SEABASS	524	$709	$1.35	539	$704	$1.31
VERMILION SNAPPER	365	$703	$1.93	504	$1028	$2.04
RED PORGY	255	$242	$0.95	316	$308	$0.97
GAG	197	$361	$1.83	338	$574	$1.70
TILEFISH	132	$163	$1.23	115	$165	$1.43
SCAMP	132	$236	$1.79	117	$202	$1.73
SNOWY GROUPER	64	$85	$1.33	147	$203	$1.38
AMBERJACK	57	$12	$0.21	63	$20	$0.32
RED GROUPER	28	$43	$1.54	29	$40	$1.38
RED SNAPPER	11	$27	$2.45	40	$105	$2.63
SPECKLED HIND	9	$12	$1.33	7	$9	$1.29
SILK SNAPPER	8	$14	$1.75	10	$22	$2.20
YELLOWEDGE GROUPER	7	$11	$1.57	3	$4	$1.33
MUTTON SNAPPER	4	$7	$1.75	1	$3	$3.00
RED HIND	4	$7	$1.75	12	$17	$1.42
CUBERA SNAPPER	3	$3	$1.00	1	$1	$1.00
WARSAW GROUPER	2	$2	$1.00	1	$1	$1.00
YELLOWFIN GROUPER	1	$1	$1.00	0	$0	
BLACK GROUPER	0	$0		0	$0	
ROCK HIND	0	$0		0	$0	
GREY SNAPPER	0	$0		0	$0	
BLACKFIN SNAPPER	0	$0		0	$0	
UNCL. GROUPER	331	$432	$1.30	128	$195	$1.52
UNCL. SNAPPERS	99	$215	$2.17	31	$67	$2.16
UNCL. GRUNTS	143	$57	$.40	175	$75	$.53
OTHER PORGIES	120	$97	$.80	56	$30	$.53

*thousands of pounds and dollars
0=<500 lb
Source:NMFS General Canvass data

TABLE 2. SNAPPER-GROUPER LANDINGS BY WEIGHT AND VALUE IN SOUTH CAROLINA*.

	1988			1989		
	POUNDS.	VALUE	PRICE/LB	POUNDS.	VALUE	PRICE/LB
VERMILION SNAPPER	347	$576	$1.66	370	$723	$1.95
GAG	277	$611	$2.21	367	$758	$2.07
BLACK SEABASS	238	$244	$1.02	236	$280	$1.19
SNOWY GROUPER	122	$215	$1.76	213	$354	$1.66
SCAMP	113	$242	$2.14	179	$358	$2.00
TILEFISH	100	$143	$1.43	159	$223	$1.40
AMBERJACK	48	$25	$0.52	113	$53	$0.47
RED SNAPPER	41	$115	$2.80	82	$232	$2.83
RED PORGY	318	$364	$1.14	303	$360	$1.99
SPECKLED HIND	9	$17	$1.89	12	$22	$1.83
TRIGGERFISH	6	$6	$1.00	14	$13	$0.93
CUBERA SNAPPER	4	$5	$1.25	9	$11	$1.22
WARSAW GROUPER	3	$4	$1.33	1	$2	$2.00
YELLOWEDGE GROUPER	3	$6	$2.00	2	$4	$2.00
GREY SNAPPER	2	$3	$1.50	2	$3	$1.50
MUTTON SNAPPER	1	$2	$2.00	1	$2	$2.00
SILK SNAPPER	1	$2	$2.00	0	$0	
ROCK HIND	0	$0		0	$0	
RED GROUPER	0	$0		0	$0	
RED HIND	0	$0		0	$0	
LANE SNAPPER	0	$0		0	$0	
UNCL. GROUPER	16	$34	$2.13	38	$80	$2.11
UNCL. SNAPPERS	2	$4	$2.00	1	$2	$2.00
UNCL. GRUNTS	81	$58	$0.72	71	$45	$0.63
OTHER PORGIES	58	$44	$0.76	3	$2	$0.66

*thousands of pounds and dollars
0=<500 lb
Source:NMFS General Canvass data

TABLE 3. SNAPPER-GROUPER LANDINGS BY WEIGHT AND VALUE IN GEORGIA*.

	1988			1989		
	POUNDS	VALUE	PRICE/LB	POUNDS	VALUE	PRICE/LB
VERMILION SNAPPER	70	$109	$1.56	55	$96	$1.75
RED PORGY	60	$58	$0.97	52	$52	$1.00
GAG	31	$59	$1.90	43	$76	$1.77
SCAMP	16	$29	$1.81	21	$37	$1.76
BLACK SEABASS	15	$14	$0.93	11	$12	$1.09
AMBERJACK	15	$6	$0.40	13	$4	$0.31
SNOWY GROUPER	13	$17	$1.31	18	$22	$1.22
RED SNAPPER	12	$30	$2.50	20	$50	$2.50
SPECKLED HIND	3	$4	$1.33	4	$5	$1.25
TILEFISH	3	$3	$1.00	8	$7	$0.88
GREY SNAPPER	1	$2	$2.00	0	$1	$0.00
TRIGGERFISH	1	$1	$1.00	2	$2	$1.00
WARSAW GROUPER	1	$1	$1.00	1	$1	$1.00
CUBERA SNAPPER	0	$0		0	$0	
YELLOWTAIL SNAPPER	0	$0		0	$0	
ROCK HIND	0	$0		0	$0	
RED HIND	0	$0		0	$0	
SILK SNAPPER	0	$0		0	$0	
BLACK GROUPER	0	$0		1	$1	$1.00
RED GROUPER	0	$0		0	$0	
UNCL. GROUPER	5	$9	$1.80	8	$15	$1.87
UNCL. SNAPPERS	0	$0		0	$0	
UNCL. GRUNTS	0	$0		0	$0	
OTHER PORGIES	3	$1	$0.33	4	$3	$0.75

*thousands of pounds and dollars
0=<500 lb
Source:NMFS General Canvass data

TABLE 4. SNAPPER-GROUPER LANDINGS BY WEIGHT AND VALUE IN FLORIDA*.

	1987			1988		
	POUNDS	VALUE	PRICE/LB	POUNDS	VALUE	PRICE/LB
AMBERJACK	1116	$510	$0.47	847	$368	$0.43
BLACK GROUPER	503	$955	$1.90	330	$748	$2.27
GREY SNAPPER	439	$661	$1.51	293	$467	$1.59
MUTTON SNAPPER	365	$670	$1.84	28	$566	$1.96
TILEFISH	273	$372	$1.36	504	$669	$1.33
GAG	197	$373	$1.89	101	$223	$2.21
RED GROUPER	142	$219	$1.54	199	$349	$1.75
RED SNAPPER	130	$348	$2.68	111	$307	$2.77
SNOWY GROUPER	122	$226	$1.85	133	$242	$1.82
VERMILION SNAPPER	95	$160	$1.68	132	$223	$1.69
YELLOWTAIL SNAPPER	1020	$2076	$2.04	1066	$2237	$2.10
YELLOWEDGE GROUPER	17	$32	$1.88	8	$18	$2.25
BLACK SEABASS	32	$25	$0.78	39	$30	$0.77
SCAMP	47	$96	$2.04	41	$94	$2.29
LANE SNAPPER	43	$51	$1.19	41	$56	$1.37
TRIGGERFISH	18	$12	$0.66	26	$19	$0.73
WARSAW GROUPER	31	$38	$1.23	25	$40	$1.60
SILK SNAPPER	7.5	$11	$1.47	9	$18	$2.00
YELLOWFIN GROUPER	1	$3	$3.00	1	$2	$2.00
CUBERA SNAPPER	0	$0		0	$0	
NASSAU GROUPER	0	$0		1.5	$2	$1.33
UNCL. GROUPER	230	$443	$1.93	207	$419	$2.02
UNCL. SNAPPERS	139	NA	NA	73	$119	$1.63
UNCL. GRUNTS	159	$68	$0.42	111	$42	$0.38
OTHER PORGIES	167	$159	$0.95	192	$177	$0.92

*thousands of pounds and dollars
0=<500 lb
Source:NMFS General Canvass data

TABLE 5. Number of headboats per state in the South Atlantic.

STATE	# of headboats in 1990s
North Carolina	9
South Carolina	29
Georgia	1
Northeast Florida	24
Southeast Florida	46
TOTAL	109

TABLE 6. Number of headboat angler trips per state per year in the South Atlantic.

STATE	1988 angler days	1989 angler days
North Carolina	42,421	30,443
South Carolina	76,468	62,708
Northeast Florida	109,156	102,910
Southeast Florida	192,618	213,949
TOTAL	420,663	410,010

TABLE 7. IMPACTS OF MINIMUM SIZES IN NORTH CAROLINA.

	Pounds 89	Value 89	Price/lb	Percent < MSL	Loss lbs	New lbs	New price	New value	Loss of Revenue	change in output	change in income	change in employment
lane snapper	*	*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
red porgy	316,000	$308,000	$1.00	.05	14,220	301,780	$1.00	$299,035	$58,965	$4	$2,922	.2
grey snapper	*	*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
mutton snapper	1,000	$3,000	$3.00	.006	6	994	$3.01	$2,989	$12	$20	$4	.0
vermilion snapper	504,000	$1,028,000	$2.04	.171	86,184	417,816	$2.25	$906,102	$121,898	$209,859	$39,726	2.4
yellowtail snapper	0	$0		NA	0	0	$0.00	$0	$0	$0	$0	0
red grouper	29,000	$40,000	$1.38	.062	1,798	27,202	$1.43	$38,593	$1,407	$2,422	$458	.0
black grouper	*	*	NA	.099	NA	NA	NA	NA	NA	NA	NA	NA
gag	338,000	$574,000	$1.70	.012	3,921	334,079	$1.70	$570,378	$3,622	$6,235	$1,180	.1
scamp	117,000	$202,000	$1.73	.153	17,866	99,134	$1.93	$183,213	$18,787	$32,343	$6,123	.4
red snapper	40,000	$105,000	$2.63	.288	11,520	28,480	$3.08	$82,722	$22,278	$38,354	$7.260	.4
amberjack	63,000	$20,000	$0.32	.513	32,319	30,681	$0.38	$12,045	$7,955	$13,695	$2,592	.2
uncl. groupers	128,000	$195,000										
uncl. porgies	175,000	$75,000										
uncl. grunts	56,000	$30,000										
uncl. snappers	31,000	$67										
TOTAL	1,798,000	$2,580,067			167,834	1,240,166		$2,195,078	$184,922	$302,931	$60,266	3.6

* = <500 LB

Note: percentages of catch projected not to meet proposed minimum sizes calculated from 1987-1989 TIP data by state or region and gear. Most estimated percentages are 1987-1989 averages; years when sample sizes are significantly smaller were deleted.

TABLE 8. IMPACTS OF MINIMUM SIZES IN SOUTH CAROLINA.

	Pounds 89	Value 89	Price/lb	Percent < MSL	Loss lbs	New lbs	New price	New value	Loss of Revenue	change in output	change in income	change in employment
lane snapper	*	*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
red porgy	303,000	$360,000	$1.19	0	0	303,000	$1.18	$360,000	$0	$0	$0	0
grey snapper	2,000	$3,000	$1.50	.075	150	1,850	$1.54	$2,852	$148	$255	$48	0
mutton snapper	1,000	$2,000	$2.00	0	0	1,000	$2.00	$2,000	$0	$0	$0	0
vermilion snapper	370,000	$723,000	$1.95	.396	146,520	223,480	$2.24	$500,642	$222,358	$382,812	$72,467	4.4
yellowtail snapper	*	*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
red grouper	*	*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
black grouper	*	*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gag	367,000	$758,000	$2.07	.002	551	366,450	$2.07	$757,387	$613	$1,056	$200	.01
scamp	179,000	$358,000	$2.00	.114	20,317	158,684	$2.10	$333,987	$24,013	$41,341	$7,826	.48
red snapper	82,000	$232,000	$2.83	.165	13,530	68,470	$3.00	$205,540	$26,460	$45,553	$8,623	.52
amberjack	113,000	$53,000	$0.47	.513	57,969	55,031	$0.58	$31,920	$21,080	$36,291	$6,869	.4
uncl. grunts	81,000	$58,000	0.72									
uncl. porgies	58,000	$44,000	0.76									
uncl. groupers	16,000	$34,000	2.13									
uncl. snappers	2,000	$4,000	2.00									
TOTAL	1,574,000	$2,629,000			239,036	1,177,965		$2,194,328	$294,672	$507,308	$96,033	5.8

* = <500 LB

Note: percentages of catch projected not to meet proposed minimum sizes calculated from 1987-1989 TIP data by state or region and gear. Most estimated percentages are 1987-1989 averages; years when sample sizes are significantly smaller were deleted.

TABLE 9. IMPACTS OF MINIMUM SIZES IN GEORGIA.

	Pounds 89	Value 89	Price/lb	Percent < MSL	Loss lbs	New lbs	New price	New value	Loss of Revenue	change in output	change in income	change in employment
lane snapper	*	*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
red porgy	52,000	$52,000	$1.00	.067	10,296	41,704	$1.07	$44,758	$7,242	$12,469	$2,360	.14
grey snapper	500	1,000	$2.00	.075	40	463	$2.06	$951	49	85	16	.0
mutton snapper	*	*	NA	.006	NA	NA	NA	NA	NA	NA	NA	NA
vermilion snapper	55,000	$96,000	$1.75	.198	10,890	44,110	$1.87	$82,630	$13,371	$23,019	$4,357	.26
yellowtail snapper	*	*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
red grouper	*	*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
black grouper	1,000	$1,000	$1.00	.050	49	951	$0	$0	$1,000	$1,722	$326	.0
gag	43,000	$76,000	$1.77	.002	86	42,914	$1.77	$75,918	$82	$141	$27	.0
scamp	21,000	$37,000	$1.76	.097	2,037	18,963	$1.84	$34,906	$2,094	$3,604	$682	.0
red snapper	20,000	$50,000	$2.50	.202	4,040	15,960	$2.67	$42,881	$7,119	$12,257	$2,230	.1
amberjack	13,000	$4,000	$0.31	.513	6,669	6,331	$0.38	$2,409	$1,591	$2,739	$518	.0
TOTAL	216,500	$329,000			34,104	171,396		$284,452	$32,548	$56,035	$10,607	.64

* = <500 LB

Note: percentages of catch projected not to meet proposed minimum sizes calculated from 1987-1989 TIP data by state or region and gear. Most estimated percentages are 1987-1989 averages; years when sample sizes are significantly smaller were deleted.

TABLE 10. IMPACTS OF MINIMUM SIZES IN FLORIDA

	Pounds 88	Value 88	Price/lb	Percent < MSL	Loss lbs	New lbs	New price	New value	Loss of Revenue	change in output	change in income	change in employment
lane snapper	41,000	$56,000	$1.37	0	0	41,000	$1.37	$56,000	$0	0	$0	.0
red porgy	*	*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
grey snapper	293,000	$467,000	$1.59	.075	21,975	271,025	$1.74	$443,956	$23,044	39,673	$7,510	.45
mutton snapper	289,000	$566,000	$1.96	.0	0	289,000	$1.96	$566,000	$0	0	$0	.0
vermilion snapper	132,000	$223,000	$1.69	.73	96,360	35,640	$1.86	$76,464	$146,536	252,276	$47,756	2.88
yellowtail snapper	1,066,000	$2,238,000	$2.10	.034	36,244	1,029,756	$2.13	$2,189,090	$48,910	84,203	$15,940	.96
red grouper	199,000	$349,000	$1.75	.318	63,282	135,718	$1.82	$272,941	$76,059	130,943	$24,788	1.49
black grouper	330,000	$748,000	$2.27	.049	16,170	313,830	$2.37	$727,431	$20,569	35,412	$6,704	.4
gag	101,000	$223,000	$2.21	.017	1,717	99,283	$2.22	$220,928	$2,072	3,566	$675	.04
scamp	41,000	$94,000	$2.29	.047	1,927	39,073	$2.57	$91,525	$2,475	4,262	$807	.05
red snapper	111,000	$307,000	$2.77	.202	22,422	88,578	$3.25	$263,286	$43,714	75,257	$14,246	.86
amberjack	847,000	$368,000	$0.43	.513	434,511	412,489	$0.55	$221,636	$146,364	251,980	$47,700	2.87
uncl. groupers	207,000	$419,000										
uncl. porgies	192,000	$177,000										
uncl. grunts	111,000	$42,000										
uncl. snappers	73,000	$119,000										
TOTAL	4,033,000	$6,396,000			694,608	2,755,391		$5,129,257	$509,743	877,573	$166,124	10.00

* = <500 LB

Note: percentages of catch projected not to meet proposed minimum sizes calculated from 1987-1989 TIP data by state or region and gear. Most estimated percentages are 1987-1989 averages; years when sample sizes are significantly smaller were deleted.

Table 11. Summary of net benefit changes.

Red porgy, 12 inch MSL, release mortality = 20%
all harvesting sectors combined, at 10% discount rate

YEAR	COMMERCIAL OPERATING PROFITS	COMMERCIAL ACCUM GAIN	RECREATIONAL CONSUMER SURPLUS	RECREATIONAL ACCUM GAIN	ALL SECTORS TOTAL VALUE	ALL SECTORS ACCUM GAIN
	Net changes in thousands of dollars					
1	-$0.3	-$0.3	-$8.7	-$8.7	-$9.0	-$9.0
2	0.1	-0.2	-7.6	-16.3	-7.5	-16.5
3	1.1	0.9	-6.3	-22.6	-5.2	-21.7
4	2.7	3.5	-5.2	-27.8	-2.6	-24.3
5	4.0	7.5	-4.6	-32.4	-0.6	-24.8
6	4.8	12.3	-4.2	-36.5	0.6	-24.2
7	5.2	17.5	-4.0	-40.5	1.3	-23.0
8	5.5	23.0	-3.8	-44.3	1.7	-21.3
9	5.6	28.7	-3.8	-48.1	1.9	-19.4
10	5.7	34.4	-3.7	-51.8	2.0	-17.5
11	5.7	40.1	-3.7	-55.5	2.0	-15.4
12	5.8	45.9	-3.7	-59.2	2.1	-13.4
13	5.8	51.6	-3.7	-62.9	2.1	-11.3
14	5.8	57.4	-3.7	-66.6	2.1	-9.3
15	5.8	63.1	-3.7	-70.3	2.1	-7.2
16	5.8	68.9	-3.7	-74.0	2.1	-5.1
17	5.8	74.7	-3.7	-77.7	2.1	-3.1
18	5.8	80.4	-3.7	-81.5	2.1	-1.0
19	5.8	86.2	-3.7	-85.2	2.1	1.0
20	5.8	91.9	-3.7	-88.9	2.1	3.1

Present Worth of net change in commercial value = $31,100
Present Worth of net change in recreational value = -$43,300
Present Worth of the net change in total value = -$12,200

Table 12. Comparison of results with and without minimum size limit (MSL).

Red porgy, 12 inch MSL, release mortality = 20%
for commercial sector

	Simulation without minimum size limit			Simulation with minimum size limit		
YEAR	THOUSANDS OF POUNDS TOTAL	THOUSANDS OF EXVESSEL DOLLARS TOTAL	COST CHANGE	THOUSANDS OF POUNDS TOTAL	THOUSANDS OF EXVESSEL DOLLARS TOTAL	COST CHANGE
1	669.4	754.3	0.0	663.5	752.0	-2.0
2	669.4	754.3	0.0	665.0	752.8	-1.5
3	669.4	754.3	0.0	668.5	755.0	-0.3
4	669.4	754.3	0.0	672.9	758.1	1.2
5	669.4	754.3	0.0	675.6	760.3	2.1
6	669.4	754.3	0.0	677.2	761.7	2.6
7	669.4	754.3	0.0	678.1	762.4	3.0
8	669.4	754.3	0.0	678.6	762.9	3.1
9	669.4	754.3	0.0	678.9	763.1	3.2
10	669.4	754.3	0.0	679.0	763.2	3.3
11	669.4	754.3	0.0	679.1	763.3	3.3
12	669.4	754.3	0.0	679.1	763.3	3.3
13	669.4	754.3	0.0	679.1	763.3	3.3
14	669.4	754.3	0.0	679.1	763.3	3.3
15	669.4	754.3	0.0	679.1	763.3	3.3
16	669.4	754.3	0.0	679.1	763.3	3.3
17	669.4	754.3	0.0	679.1	763.3	3.3
18	669.4	754.3	0.0	679.1	763.3	3.3
19	669.4	754.3	0.0	679.1	763.3	3.3
20	669.4	754.3	0.0	679.1	763.3	3.3

Table 13. Comparison of results with and without minimum size limit (MSL).

Red porgy, 12 inch MSL, release mortality = 20%
for recreational sector

	Simulation without minimum size limit			Simulation with minimum size limit		
YEAR	THOUSANDS OF POUNDS TOTAL	THOUSANDS OF FISH KEPT TOTAL	CONSUMER SURPLUS CHANGE	THOUSANDS OF POUNDS TOTAL	THOUSANDS OF FISH KEPT TOTAL	CONSUMER SURPLUS CHANGE
1	384.6	259.1	0.0	370.0	236.3	-8.7
2	384.6	259.1	0.0	371.8	238.0	-7.6
3	384.6	259.1	0.0	374.1	239.5	-6.3
4	384.6	259.1	0.0	375.8	240.5	-5.2
5	384.6	259.1	0.0	376.9	241.0	-4.6
6	384.6	259.1	0.0	377.6	241.2	-4.2
7	384.6	259.1	0.0	377.9	241.3	-4.0
8	384.6	259.1	0.0	378.1	241.3	-3.8
9	384.6	259.1	0.0	378.2	241.4	-3.8
10	384.6	259.1	0.0	378.2	241.4	-3.7
11	384.6	259.1	0.0	378.2	241.4	-3.7
12	384.6	259.1	0.0	378.2	241.4	-3.7
13	384.6	259.1	0.0	378.2	241.4	-3.7
14	384.6	259.1	0.0	378.2	241.4	-3.7
15	384.6	259.1	0.0	378.2	241.4	-3.7
16	384.6	259.1	0.0	378.2	241.4	-3.7
17	384.6	259.1	0.0	378.2	241.4	-3.7
18	384.6	259.1	0.0	378.2	241.4	-3.7
19	384.6	259.1	0.0	378.2	241.4	-3.7
20	384.6	259.1	0.0	378.2	241.4	-3.7

Table 14. Summary of net benefit changes.

Vermilion snapper, 10 inch MSL–for both sectors, release mortality = 20% all harvesting sectors combined, at 10% discount rate

YEAR	COMMERCIAL OPERATING PROFITS	COMMERCIAL ACCUM GAIN	RECREATIONAL CONSUMER SURPLUS	RECREATIONAL ACCUM GAIN	ALL SECTORS TOTAL VALUE	ALL SECTORS ACCUM GAIN
	Net changes in thousands of dollars					
1	$0.0	$0.0	-$1.6	-$1.6	-$1.6	-$1.6
2	0.0	0.0	-1.3	-2.8	-1.3	-2.8
3	0.3	0.3	-0.7	-3.6	-0.4	-3.3
4	1.8	2.1	-0.5	-4.1	1.3	-2.0
5	2.2	4.3	-0.5	-4.5	1.8	-0.2
6	2.4	6.7	-0.4	-5.0	1.9	1.7
7	2.4	9.1	-0.4	-5.4	2.0	3.7
8	2.4	11.5	-0.4	-5.8	2.0	5.7
9	2.4	13.9	-0.4	-6.2	2.0	7.7
10	2.4	16.3	-0.4	-6.7	2.0	9.7
11	2.4	18.7	-0.4	-7.1	2.0	11.6
12	2.4	21.2	-0.4	-7.5	2.0	13.6
13	2.4	23.6	-0.4	-7.9	2.0	15.6
14	2.4	26.0	-0.4	-8.4	2.0	17.6
15	2.4	28.4	-0.4	-8.8	2.0	19.6
16	2.4	30.8	-0.4	-9.2	2.0	21.6
17	2.4	33.2	-0.4	-9.6	2.0	23.6
18	2.4	35.7	-0.4	-10.1	2.0	25.6
19	2.4	38.1	-0.4	-10.5	2.0	27.6
20	2.4	40.5	-0.4	-10.9	2.0	29.6

Present Worth of net change in commercial value = $14,200
Present Worth of net change in recreational value = -$5,700
Present Worth of net change in total value = $8,500

Table 15. Summary of net benefit changes.

Vermilion snapper, 12 inch MSL–for both sectors, release mortality = 20% all harvesting sectors combined, at 10% discount rate

YEAR	COMMERCIAL OPERATING PROFITS	COMMERCIAL ACCUM GAIN	RECREATIONAL CONSUMER SURPLUS	RECREATIONAL ACCUM GAIN	ALL SECTORS TOTAL VALUE	ALL SECTORS ACCUM GAIN
	Net changes in thousands of dollars					
1	-$0.7	-$0.7	-$52.3	-$52.3	-$53.0	-$53.0
2	5.6	4.9	-40.1	-92.4	-34.5	-87.5
3	36.6	41.5	-34.4	-126.8	2.2	-85.3
4	48.8	90.3	-32.7	-159.5	16.1	-69.2
5	52.2	142.5	-32.2	-191.7	20.0	-49.2
6	53.1	195.6	-32.1	-223.8	21.1	-28.1
7	53.4	249.0	-32.0	-255.8	21.3	-6.8
8	53.4	302.4	-32.0	-287.8	21.4	14.6
9	53.4	355.8	-32.0	-319.8	21.4	36.1
10	53.4	409.2	-32.0	-351.8	21.4	57.5
11	53.4	462.7	-32.0	-383.8	21.4	78.9
12	53.4	516.1	-32.0	-415.8	21.4	100.3
13	53.4	569.5	-32.0	-447.8	21.4	121.8
14	53.4	622.9	-32.0	-479.8	21.4	143.2
15	53.4	676.4	-32.0	-511.8	21.4	164.6
16	53.4	729.8	-32.0	-543.8	21.4	186.0
17	53.4	783.2	-32.0	-575.8	21.4	207.5
18	53.4	836.7	-32.0	-607.8	21.4	228.9
19	53.4	890.1	-32.0	-639.8	21.4	250.3
20	53.4	943.5	-32.0	-671.8	21.4	271.7

Present Worth of net change in commercial value = $349,300
Present Worth of net change in recreational value = -$300,000
Present Worth of net change in total value = $49,300

Table 16. Comparison of results with and without minimum size limit (MSL).

Vermilion snapper, 10 inch MSL, release mortality = 20%
for commercial sector

	Simulation without minimum size limit			Simulation with minimum size limit		
YEAR	THOUSANDS OF POUNDS TOTAL	THOUSANDS OF EXVESSEL DOLLARS TOTAL	COST CHANGE	THOUSANDS OF POUNDS TOTAL	THOUSANDS OF EXVESSEL DOLLARS TOTAL	COST CHANGE
1	1007.9	2467.6	0.0	1007.9	2467.6	0.0
2	1007.9	2467.6	0.0	1007.9	2467.6	0.0
3	1007.9	2467.6	0.0	1008.2	2468.0	0.1
4	1007.9	2467.6	0.0	1009.4	2469.9	0.5
5	1007.9	2467.6	0.0	1008.8	2470.5	0.6
6	1007.9	2467.6	0.0	1009.9	2470.6	0.7
7	1007.9	2467.6	0.0	1009.9	2470.7	0.7
8	1007.9	2467.6	0.0	1009.9	2470.7	0.7
9	1007.9	2467.6	0.0	1009.9	2470.7	0.7
10	1007.9	2467.6	0.0	1009.9	2470.7	0.7
11	1007.9	2467.6	0.0	1009.9	2470.7	0.7
12	1007.9	2467.6	0.0	1009.9	2470.7	0.7
13	1007.9	2467.6	0.0	1009.9	2470.7	0.7
14	1007.9	2467.6	0.0	1009.9	2470.7	0.7
15	1007.9	2467.6	0.0	1009.9	2470.7	0.7
16	1007.9	2467.6	0.0	1009.9	2470.7	0.7
17	1007.9	2467.6	0.0	1009.9	2470.7	0.7
18	1007.9	2467.6	0.0	1009.9	2470.7	0.7
19	1007.9	2467.6	0.0	1009.9	2470.7	0.7
20	1007.9	2467.6	0.0	1009.9	2470.7	0.7

Table 17. Comparison of results with and without minimum size limit (MSL).

Vermilion snapper, 12 inch MSL, release mortality = 20%
for commercial sector

	Simulation without minimum size limit			Simulation with minimum size limit		
YEAR	THOUSANDS OF POUNDS TOTAL	THOUSANDS OF EXVESSEL DOLLARS TOTAL	COST CHANGE	THOUSANDS OF POUNDS TOTAL	THOUSANDS OF EXVESSEL DOLLARS TOTAL	COST CHANGE
1	1007.9	2467.6	0.0	1007.1	2466.6	-0.3
2	1007.9	2467.6	0.0	1012.6	2474.8	1.6
3	1007.9	2467.6	0.0	1038.7	2514.8	10.5
4	1007.9	2467.6	0.0	1048.2	2530.2	13.8
5	1007.9	2467.6	0.0	1050.8	2534.5	14.7
6	1007.9	2467.6	0.0	1051.5	2535.7	14.9
7	1007.9	2467.6	0.0	1051.7	2536.0	15.0
8	1007.9	2467.6	0.0	1051.7	2536.0	15.0
9	1007.9	2467.6	0.0	1051.8	2536.1	15.0
10	1007.9	2467.6	0.0	1051.8	2536.1	15.0
11	1007.9	2467.6	0.0	1051.8	2536.1	15.0
12	1007.9	2467.6	0.0	1051.8	2536.1	15.0
13	1007.9	2467.6	0.0	1051.8	2536.1	15.0
14	1007.9	2467.6	0.0	1051.8	2536.1	15.0
15	1007.9	2467.6	0.0	1051.8	2536.1	15.0
16	1007.9	2467.6	0.0	1051.8	2536.1	15.0
17	1007.9	2467.6	0.0	1051.8	2536.1	15.0
18	1007.9	2467.6	0.0	1051.8	2536.1	15.0
19	1007.9	2467.6	0.0	1051.8	2536.1	15.0
20	1007.9	2467.6	0.0	1051.8	2536.1	15.0

Table 18. Comparison of results with and without minimum size limit (MSL).

Vermilion snapper, 10 inch MSL, release mortality = 20% for recreational sector

	Simulation without minimum size limit			Simulation with minimum size limit		
YEAR	THOUSANDS OF POUNDS TOTAL	THOUSANDS OF FISH KEPT TOTAL	CONSUMER SURPLUS CHANGE	THOUSANDS OF POUNDS TOTAL	THOUSANDS OF FISH KEPT TOTAL	CONSUMER SURPLUS CHANGE
1	529.8	435.8	0.0	528.4	431.4	-1.6
2	529.8	435.8	0.0	528.6	431.7	-1.3
3	529.8	435.8	0.0	529.1	432.1	-0.7
4	529.8	435.8	0.0	529.3	432.2	-0.5
5	529.8	435.8	0.0	529.4	432.2	-0.4
6	529.8	435.8	0.0	529.4	432.2	-0.4
7	529.8	435.8	0.0	529.4	432.2	-0.4
8	529.8	435.8	0.0	529.4	432.2	-0.4
9	529.8	435.8	0.0	529.4	432.2	-0.4
10	529.8	435.8	0.0	529.4	432.2	-0.4
11	529.8	435.8	0.0	529.4	432.2	-0.4
12	529.8	435.8	0.0	529.4	432.2	-0.4
13	529.8	435.8	0.0	529.4	432.2	-0.4
14	529.8	435.8	0.0	529.4	432.2	-0.4
15	529.8	435.8	0.0	529.4	432.2	-0.4
16	529.8	435.8	0.0	529.4	432.2	-0.4
17	529.8	435.8	0.0	529.4	432.2	-0.4
18	529.8	435.8	0.0	529.4	432.2	-0.4
19	529.8	435.8	0.0	529.4	432.2	-0.4
20	529.8	435.8	0.0	529.4	432.2	-0.4

Table 19. Comparison of results with and without minimum size limit (MSL).

Vermilion snapper, 12 inch MSL, release mortality = 20%
for recreational sector

	Simulation without minimum size limit			Simulation with minimum size limit		
YEAR	THOUSANDS OF POUNDS TOTAL	THOUSANDS OF FISH KEPT TOTAL	CONSUMER SURPLUS CHANGE	THOUSANDS OF POUNDS TOTAL	THOUSANDS OF FISH KEPT TOTAL	CONSUMER SURPLUS CHANGE
1	529.8	435.8	0.0	483.1	361.5	-52.3
2	529.8	435.8	0.0	493.7	369.7	-40.1
3	529.8	435.8	0.0	498.7	372.5	-34.4
4	529.8	435.8	0.0	500.2	373.2	-32.7
5	529.8	435.8	0.0	500.7	373.4	-32.2
6	529.8	435.8	0.0	500.8	373.4	-32.1
7	529.8	435.8	0.0	500.8	373.4	-32.0
8	529.8	435.8	0.0	500.8	373.4	-32.0
9	529.8	435.8	0.0	500.8	373.4	-32.0
10	529.8	435.8	0.0	500.8	373.4	-32.0
11	529.8	435.8	0.0	500.8	373.4	-32.0
12	529.8	435.8	0.0	500.8	373.4	-32.0
13	529.8	435.8	0.0	500.8	373.4	-32.0
14	529.8	435.8	0.0	500.8	373.4	-32.0
15	529.8	435.8	0.0	500.8	373.4	-32.0
16	529.8	435.8	0.0	500.8	373.4	-32.0
17	529.8	435.8	0.0	500.8	373.4	-32.0
18	529.8	435.8	0.0	500.8	373.4	-32.0
19	529.8	435.8	0.0	500.8	373.4	-32.0
20	529.8	435.8	0.0	500.8	373.4	-32.0

TABLE 20. RECREATIONAL CATCH BY WEIGHT AND NUMBER.

	MRFSS—1986		HEADBOAT 1989			% MRFSS ≤ Min Size	% HEADBOAT ≤ Min Size
	NOs	WGT(LB)*	NOs	WGT (KG)	WGT (LB)	(1989)	(1989)
10" (254mm) TL							
Vermilion Snapper	56,000	29,348	661,251	157,189	346,539	NC34%;GA50%	53%
12" (305mm) TL							
Yellowtail Snapper	278,000	381,329	160,021	99,564	219,499	FL 21%	4%
Gray Snapper	529,000	1,093,472	28,963	27,156	59,868	FL 79%	22%
Mutton Snapper			25,948	48,801	107,587	FL 0%	0%
Red Porgy	11,000	12,394	146,488	74,865	165,047	NC 44%;SC 80%	40%
Schoolmaster Snapper			989	493	1,087		50%
Queen Snapper							
Blackfin Snapper							91%
Cubera Snapper			53	208	459		0%
Dog Snapper							
Mahogany Snapper							
Silk Snapper			3,919	1,241	2,736		92%
Snappers	134,000	64,560	2,082	455	1,003		
TOTAL	1,008,000	1,581,103	1,029,714	409,972	557,286		

*Recreational weight from the MRFSS was calculated from MRFSS numbers and Headboat avg. wt.
% Recreational catch below the minimum size is from 1989 MRFSS data; Roger Pugliese & John Gauvin.
%Headboat catch below the minimum size is from Huntsman & Dixon; NMFS Beaufort Lab.
Total weight for MRFSS include amberjacks with avg. wt. from MRFSS.

Table 21. Summary of net benefit changes.

Gag, 20 inch MSL, release mortality = 20%
all harvesting sectors combined, at 10% discount rate

YEAR	COMMERCIAL		RECREATIONAL		ALL SECTORS	
	OPERATING PROFITS	ACCUM GAIN	CONSUMER SURPLUS	ACCUM GAIN	TOTAL VALUE	ACCUM GAIN
	Net changes in thousands of dollars					
1	-$2.1	-$2.1	-$9.3	-$9.3	-$11.4	-$11.4
2	-0.3	-2.4	-8.8	-18.1	-9.1	-20.5
3	2.5	0.1	-8.2	-26.3	-5.7	-26.2
4	5.4	5.5	-7.5	-33.8	-2.1	-28.3
5	8.2	13.7	-6.9	-40.7	1.3	-27.0
6	10.8	24.6	-6.3	-47.0	4.5	-22.5
7	13.2	37.7	-5.8	-52.8	7.4	-15.1
8	15.2	52.9	-5.4	-58.2	9.9	-5.3
9	17.0	69.9	-5.0	-63.2	12.0	6.7
10	18.4	88.3	-4.7	-67.8	13.8	20.5
11	19.6	107.9	-4.4	-72.2	15.2	35.7
12	19.9	127.8	-4.3	-76.5	15.6	51.3
13	19.9	147.7	-4.3	-80.9	15.6	66.9
14	19.9	167.6	-4.3	-85.2	15.6	82.4
15	19.9	187.5	-4.3	-89.5	15.6	98.0
16	19.9	207.4	-4.3	-93.8	15.6	113.6
17	19.9	227.3	-4.3	-98.2	15.6	129.2
18	19.9	247.2	-4.3	-102.5	15.6	144.7
19	19.9	267.1	-4.3	-106.8	15.6	160.3
20	19.9	287.0	-4.3	-111.1	15.6	175.9

Present Worth of net change in commercial value = $89,800
Present Worth of net change in recreational value = -$54,500
Present Worth of net change in total value = $35,300

Table 22. Comparison of results with and without minimum size limit (MSL).

Gag, 20 inch MSL, release mortality = 20%
for commercial sector

YEAR	Simulation without minimum size limit			Simulation with minimum size limit		
	THOUSANDS OF POUNDS TOTAL	THOUSANDS OF EXVESSEL DOLLARS TOTAL	COST CHANGE	THOUSANDS OF POUNDS TOTAL	THOUSANDS OF EXVESSEL DOLLARS TOTAL	COST CHANGE
1	872.9	2040.1	0.0	869.3	2036.7	-1.2
2	872.9	2040.1	0.0	871.5	2039.3	-0.5
3	872.9	2040.1	0.0	874.5	2043.1	0.5
4	872.9	2040.1	0.0	877.6	2047.1	1.6
5	872.9	2040.1	0.0	880.6	2051.0	2.6
6	872.9	2040.1	0.0	883.5	2054.5	3.6
7	872.9	2040.1	0.0	886.0	2057.8	4.5
8	872.9	2040.1	0.0	888.2	2060.6	5.2
9	872.9	2040.1	0.0	890.1	2062.9	5.9
10	872.9	2040.1	0.0	891.7	2065.0	6.4
11	872.9	2040.1	0.0	893.0	2066.6	6.9
12	872.9	2040.1	0.0	893.3	2067.0	7.0
13	872.9	2040.1	0.0	893.3	2067.0	7.0
14	872.9	2040.1	0.0	893.3	2067.0	7.0
15	872.9	2040.1	0.0	893.3	2067.0	7.0
16	872.9	2040.1	0.0	893.3	2067.0	7.0
17	872.9	2040.1	0.0	893.3	2067.0	7.0
18	872.9	2040.1	0.0	893.3	2067.0	7.0
19	872.9	2040.1	0.0	893.3	2067.0	7.0
20	872.9	2040.1	0.0	893.3	2067.0	7.0

Table 23. Comparison of results with and without minimum size limit (MSL).

Gag, 20 inch MSL, release mortality = 20%
for recreational sector

	Simulation without minimum size limit			Simulation with minimum size limit		
YEAR	THOUSANDS OF POUNDS TOTAL	THOUSANDS OF FISH KEPT TOTAL	CONSUMER SURPLUS CHANGE	THOUSANDS OF POUNDS TOTAL	THOUSANDS OF FISH KEPT TOTAL	CONSUMER SURPLUS CHANGE
1	1523.5	160.9	0.0	1451.2	133.0	-9.3
2	1523.5	160.9	0.0	1455.1	133.8	-8.8
3	1523.5	160.9	0.0	1459.9	134.4	-8.2
4	1523.5	160.9	0.0	1464.9	134.9	-7.5
5	1523.5	160.9	0.0	1469.7	135.3	-6.9
6	1523.5	160.9	0.0	1474.2	135.6	-6.3
7	1523.5	160.9	0.0	1478.2	135.8	-5.8
8	1523.5	160.9	0.0	1481.7	136.0	-5.4
9	1523.5	160.9	0.0	1484.7	136.1	-5.0
10	1523.5	160.9	0.0	1487.2	136.2	-4.7
11	1523.5	160.9	0.0	1489.3	136.3	-4.4
12	1523.5	160.9	0.0	1489.7	136.3	-4.3
13	1523.5	160.9	0.0	1489.7	136.3	-4.3
14	1523.5	160.9	0.0	1489.7	136.3	-4.3
15	1523.5	160.9	0.0	1489.7	136.3	-4.3
16	1523.5	160.9	0.0	1489.7	136.3	-4.3
17	1523.5	160.9	0.0	1489.7	136.3	-4.3
18	1523.5	160.9	0.0	1489.7	136.3	-4.3
19	1523.5	160.9	0.0	1489.7	136.3	-4.3
20	1523.5	160.9	0.0	1489.7	136.3	-4.3

Table 24. Summary of net benefit changes.

Scamp, 20 inch MSL, release mortality= 20%
all harvesting sectors combined, at 10% discount rate

YEAR	COMMERCIAL		RECREATIONAL		ALL SECTORS	
	OPERATING PROFITS	ACCUM GAIN	CONSUMER SURPLUS	ACCUM GAIN	TOTAL VALUE	ACCUM GAIN
	Net changes in thousands of dollars					
1	-$17.2	-$17.2	-$5.8	-$5.8	-$23.0	-$23.0
2	-13.6	-30.8	-4.7	-10.5	-18.3	-41.3
3	-9.0	-39.9	-3.7	-14.1	-12.7	-54.0
4	-5.3	-45.1	-2.8	-16.9	-8.1	-62.1
5	-2.2	-47.4	-2.2	-19.1	-4.4	-66.5
6	0.1	-47.3	-1.6	-20.7	-1.5	-68.0
7	1.9	-45.4	-1.2	-22.0	0.7	-67.4
8	3.2	-42.3	-0.9	-22.9	2.3	-65.2
9	4.1	-38.2	-0.7	-23.6	3.4	-61.7
10	4.9	-33.3	-0.6	-24.2	4.3	-57.5
11	5.4	-27.9	-0.5	-24.6	4.9	-52.5
12	5.7	-22.2	-0.4	-25.0	5.3	-47.2
13	6.0	-16.2	-0.3	-25.3	5.7	-41.5
14	6.2	-10.0	-0.3	-25.6	5.9	-35.6
15	6.3	-3.7	-0.2	-25.8	6.1	-29.6
16	6.4	2.7	-0.2	-26.1	6.2	-23.4
17	6.4	9.1	-0.2	-26.3	6.2	-17.2
18	6.5	15.6	-0.2	-26.5	6.3	-10.9
19	6.5	22.1	-0.2	-26.6	6.3	-4.5
20	6.5	28.6	-0.2	-26.8	6.4	1.9

Present Worth of net change in commercial value = -$18,100
Present Worth of net change in recreational value = -$18,300
Present Worth of net change in total value = -$36,500

Table 25. Comparison of results with and without minimum size limit (MSL).

Scamp, 20 inch MSL, release mortality = 20%
for commercial sector

	Simulation without minimum size limit			Simulation with minimum size limit		
YEAR	THOUSANDS OF POUNDS TOTAL	THOUSANDS OF EXVESSEL DOLLARS TOTAL	COST CHANGE	THOUSANDS OF POUNDS TOTAL	THOUSANDS OF EXVESSEL DOLLARS TOTAL	COST CHANGE
1	435.3	988.8	0.0	407.5	962.1	-9.5
2	435.3	988.8	0.0	412.3	967.4	-7.9
3	435.3	988.8	0.0	417.0	973.5	-6.2
4	435.3	988.8	0.0	420.9	978.6	-4.9
5	435.3	988.8	0.0	424.0	982.7	-3.9
6	435.3	988.8	0.0	426.4	985.9	-3.0
7	435.3	988.8	0.0	428.2	988.3	-2.4
8	435.3	988.8	0.0	429.6	990.0	-1.9
9	435.3	988.8	0.0	430.6	991.4	-1.6
10	435.3	988.8	0.0	431.4	992.3	-1.3
11	435.3	988.8	0.0	431.9	993.0	-1.2
12	435.3	988.8	0.0	432.3	993.5	-1.0
13	435.3	988.8	0.0	432.6	993.9	-0.9
14	435.3	988.8	0.0	432.7	994.1	-0.9
15	435.3	988.8	0.0	432.9	994.3	-0.8
16	435.3	988.8	0.0	433.0	994.4	-0.8
17	435.3	988.8	0.0	433.0	994.5	-0.8
18	435.3	988.8	0.0	433.1	994.5	-0.8
19	435.3	988.8	0.0	433.1	994.6	-0.7
20	435.3	988.8	0.0	433.1	994.6	-0.7

Table 26. Comparison of results with and without minimum size limit (MSL).

Scamp, 20 inch MSL, release mortality = 20%
for recreational sector

	Simulation without minimum size limit			Simulation with minimum size limit		
YEAR	THOUSANDS OF POUNDS TOTAL	THOUSANDS OF FISH KEPT TOTAL	CONSUMER SURPLUS CHANGE	THOUSANDS OF POUNDS TOTAL	THOUSANDS OF FISH KEPT TOTAL	CONSUMER SURPLUS CHANGE
1	95.9	18.6	0.0	90.0	16.2	-5.8
2	95.9	18.6	0.0	91.1	16.5	-4.7
3	95.9	18.6	0.0	91.2	16.7	-3.7
4	95.9	18.6	0.0	93.0	16.9	-2.8
5	95.9	18.6	0.0	93.7	17.0	-2.2
6	95.9	18.6	0.0	94.2	17.0	-1.6
7	95.9	18.6	0.0	94.6	17.1	-1.2
8	95.9	18.6	0.0	94.9	17.1	-0.9
9	95.9	18.6	0.0	95.1	17.1	-0.7
10	95.9	18.6	0.0	95.3	17.1	-0.6
11	95.9	18.6	0.0	95.4	17.2	-0.5
12	95.9	18.6	0.0	95.5	17.2	-0.4
13	95.9	18.6	0.0	95.6	17.2	-0.3
14	95.9	18.6	0.0	95.6	17.2	-0.3
15	95.9	18.6	0.0	95.6	17.2	-0.2
16	95.9	18.6	0.0	95.7	17.2	-0.2
17	95.9	18.6	0.0	95.7	17.2	-0.2
18	95.9	18.6	0.0	95.7	17.2	-0.2
19	95.9	18.6	0.0	95.7	17.2	-0.2
20	95.9	18.6	0.0	95.7	17.2	-0.2

Table 27. Summary of net benefit changes.

Red snapper, 20 inch MSL, release mortality = 20%
all harvesting sectors combined, at 10% discount rate

YEAR	COMMERCIAL		RECREATIONAL		ALL SECTORS	
	OPERATING PROFITS	ACCUM GAIN	CONSUMER SURPLUS	ACCUM GAIN	TOTAL VALUE	ACCUM GAIN
	Net changes in thousands of dollars					
1	-$32.8	-$32.8	-$736.1	-$736.1	-$768.8	-$768.8
2	-22.4	-55.2	-618.7	-1354.8	-641.1	-1409.9
3	-6.1	-61.3	-439.3	-1794.1	-445.4	-1855.3
4	10.0	-51.3	-282.2	-2076.3	-272.2	-2127.5
5	23.1	-28.2	-164.4	-2240.7	-141.3	-2268.8
6	32.7	4.5	-78.8	-2319.5	-46.1	-2314.9
7	39.5	43.9	-18.3	-2337.7	21.1	-2293.8
8	44.2	88.1	23.4	-2314.3	67.6	-2226.2
9	47.3	135.4	51.6	-2262.7	99.0	-2127.2
10	49.5	184.9	70.5	-2192.2	119.9	-2007.3
11	50.8	235.7	82.1	-2110.1	132.9	-1874.4
12	51.2	286.9	85.7	-2024.4	136.9	-1737.5
13	51.2	338.2	85.7	-1938.7	136.9	-1600.6
14	51.2	389.4	85.7	-1853.0	136.9	-1463.7
15	51.2	440.6	85.7	-1767.3	136.9	-1326.8
16	51.2	491.8	85.7	-1681.6	136.9	-1189.9
17	51.2	543.0	85.7	-1595.9	136.9	-1053.0
18	51.2	594.3	85.7	-1510.2	136.9	-916.1
19	51.2	645.5	85.7	-1424.5	136.9	-779.1
20	51.2	696.7	85.7	-1338.8	136.9	-642.2

Present Worth of net change in commercial value=$187,900
Present Worth of net change in recreational value= -$1,597,500
Present Worth of net change in total value= -$1,409,600

Table 28. Comparison of results with and without minimum size limit (MSL).

Red snapper, 20 inch MSL, release mortality = 20%
for commercial sector

	Simulation without minimum size limit			Simulation with minimum size limit		
YEAR	THOUSANDS OF POUNDS TOTAL	THOUSANDS OF EXVESSEL DOLLARS TOTAL	COST CHANGE	THOUSANDS OF POUNDS TOTAL	THOUSANDS OF EXVESSEL DOLLARS TOTAL	COST CHANGE
1	158.9	410.0	0.0	128.2	366.7	-10.5
2	158.9	410.0	0.0	136.0	379.8	-7.8
3	158.9	410.0	0.0	148.6	400.4	-3.5
4	158.9	410.0	0.0	160.3	420.5	0.5
5	158.9	410.0	0.0	169.4	436.7	3.6
6	158.9	410.0	0.0	176.2	448.6	5.9
7	158.9	410.0	0.0	181.1	457.1	7.6
8	158.9	410.0	0.0	184.6	463.0	8.8
9	158.9	410.0	0.0	186.9	467.0	9.6
10	158.9	410.0	0.0	188.5	469.7	10.1
11	158.9	410.0	0.0	189.5	471.3	10.5
12	158.9	410.0	0.0	189.8	471.8	10.6
13	158.9	410.0	0.0	189.8	471.8	10.6
14	158.9	410.0	0.0	189.8	471.8	10.6
15	158.9	410.0	0.0	189.8	471.8	10.6
16	158.9	410.0	0.0	189.8	471.8	10.6
17	158.9	410.0	0.0	189.8	471.8	10.6
18	158.9	410.0	0.0	189.8	471.8	10.6
19	158.9	410.0	0.0	189.8	471.8	10.6
20	158.9	410.0	0.0	189.8	471.8	10.6

Table 29. Comparison of results with and without minimum size limit (MSL).

Red snapper, 20 inch MSL, release mortality = 20%
for recreational sector

	Simulation without minimum size limit			Simulation with minimum size limit		
YEAR	THOUSANDS OF POUNDS TOTAL	THOUSANDS OF FISH KEPT TOTAL	CONSUMER SURPLUS CHANGE	THOUSANDS OF POUNDS TOTAL	THOUSANDS OF FISH KEPT TOTAL	CONSUMER SURPLUS CHANGE
1	1024.8	217.0	0.0	719.5	87.2	-736.1
2	1024.8	217.0	0.0	763.7	95.7	-618.7
3	1024.8	217.0	0.0	834.4	107.1	-439.3
4	1024.8	217.0	0.0	899.8	115.3	-282.2
5	1024.8	217.0	0.0	951.0	120.4	-164.4
6	1024.8	217.0	0.0	989.3	123.5	-78.8
7	1024.8	217.0	0.0	1016.9	125.5	-18.3
8	1024.8	217.0	0.0	1036.2	126.7	23.4
9	1024.8	217.0	0.0	1049.5	127.4	51.6
10	1024.8	217.0	0.0	1058.4	127.9	70.5
11	1024.8	217.0	0.0	1063.9	128.1	82.1
12	1024.8	217.0	0.0	1065.6	128.2	85.7
13	1024.8	217.0	0.0	1065.6	128.2	85.7
14	1024.8	217.0	0.0	1065.6	128.2	85.7
15	1024.8	217.0	0.0	1065.6	128.2	85.7
16	1024.8	217.0	0.0	1065.6	128.2	85.7
17	1024.8	217.0	0.0	1065.6	128.2	85.7
18	1024.8	217.0	0.0	1065.6	128.2	85.7
19	1024.8	217.0	0.0	1065.6	128.2	85.7
20	1024.8	217.0	0.0	1065.6	128.2	85.7

TABLE 30. RECREATIONAL CATCH BY WEIGHT AND NUMBER.

	MRFSS—1986		HEADBOAT 1989			% MRFSS ≤ Min Size (1989)	% HEADBOAT ≤ Min Size (1989)
	NOs	WGT(LB)*	NOs	WGT (KG)	WGT (LB)		
20" (508mm) TL						NC63%;SC100%	
Red Snapper	210,000	633,916	23,453	32,113	70,796	GA100%;FL88%	81%
Gag Grouper						NC54%;SC36%	25%
Red Grouper						NC73%	46%
Black Grouper							25%
Scamp Grouper							80%
Yellowfin Grouper							100%
Yellowmouth Grouper							
Groupers	156,000	672,371					
Groupers (*Epinephalus*)			8,518	16,653	36,713		
Groupers (*Mycteroperca*)			35,248	102,498	225,967		
TOTALS	366,000	1,306,287	67,219	151,264	333,476		

*Recreational weight from the MRFSS was calculated from MRFSS numbers and Headboat avg. wt.

% Recreational catch below the minimum size is from 1989 MRFSS data; Roger Pugliese & John Gauvin.
%Headboat catch below the minimum size is from Huntsman & Dixon; NMFS Beaufort Lab
Total weight for MRFSS include amberjacks with avg. wt. from MRFSS.

Table 31. Summary of net benefit changes.

Gag, 25 inch MSL–for both sectors, release mortality = 20%
all harvesting sectors combined, at 10% discount rate

YEAR	COMMERCIAL OPERATING PROFITS	COMMERCIAL ACCUM GAIN	RECREATIONAL CONSUMER SURPLUS	RECREATIONAL ACCUM GAIN	ALL SECTORS TOTAL VALUE	ALL SECTORS ACCUM GAIN
	Net changes in thousands of dollars of fish caught and kept					
1	-$86.4	-$86.4	-$40.9	-$40.9	-$127.3	-$127.3
2	-79.2	-165.6	-39.3	-80.2	-$118.5	-245.8
3	-67.0	-232.6	-36.5	-116.7	-$103.5	-349.2
4	-54.3	-286.9	-33.5	-150.2	-$87.8	-437.1
5	-42.5	-329.5	-30.8	-181.0	-$73.3	-510.5
6	-31.9	-361.4	-28.4	-209.4	-$60.3	-570.8
7	-22.6	-384.0	-26.3	-235.7	-$48.9	-619.7
8	-14.7	-398.7	-24.4	-260.1	-$39.1	-658.8
9	-8.0	-406.7	-22.9	-283.0	-$30.9	-689.7
10	-2.5	-409.2	-21.6	-304.6	-$24.1	-713.8
11	-0.1	-409.3	-21.1	-325.7	-$21.2	-734.9
12	0.2	-409.0	-21.0	-346.7	-$20.8	-755.7
13	0.2	-408.8	-21.0	-367.7	-$20.8	-776.4
14	0.2	-408.5	-21.0	-388.6	-$20.8	-797.2
15	0.2	-408.3	-21.0	-409.6	-$20.8	-817.9
16	0.2	-408.1	-21.0	-430.6	-$20.8	-838.7
17	0.2	-407.8	-21.0	-451.6	-$20.8	-859.4
18	0.2	-407.6	-21.0	-472.6	-$20.8	-880.2
19	0.2	-407.3	-21.0	-493.6	-$20.8	-900.9
20	0.2	-407.1	-21.0	-514.6	-$20.8	-921.7

Present Worth of net change in commercial value = -$298,200
Present Worth of net change in recreational value = -$247,800
Present Worth of net change in total value = $546,000

TABLE 32. ECONOMIC IMPACTS OF ZERO QUOTA FOR DEEP WATER GROUPERS BASED ON 1989 REPORTED VALUE (SOURCE:NMFS GENERAL CANVASS DATA).

NORTH CAROLINA	POUNDS	VALUE	PRICE	OUTPUT	INCOME	EMPLOYMENT
SNOWY GROUPER	147,000	$203,000	$1.38	$349,485	$66,158	3.98
TILEFISH	115,000	$165,000	$1.43	$284,064	$53,774	3.23
SPECKLED HIND	7,000	$9,000	$1.29	$15,494	$2,933	0.18
YELLOWEDGE GROUPER	3,000	$4,000	$1.33	$6,886	$1,304	0.08
WARSAW GROUPER	1,000	$1,000	$1.00	$1,722	$326	0.02
TOTAL	273,000	$382,000		$657,651	$124,494	7.49

SOUTH CAROLINA	POUNDS	VALUE	PRICE	OUTPUT	INCOME	EMPLOYMENT
SNOWY GROUPER	213,000	$354,000	$1.66	$592,135	$111,545	6.58
TILEFISH	159,000	$223,000	$1.40	$373,021	$70,267	4.12
SPECKLED HIND	12,000	$22,000	$1.83	$36,799	$6,932	0.41
YELLOWEDGE GROUPER	2,000	$4,000	$2.00	$6,690	$1,260	0.08
WARSAW GROUPER	1,000	$2,000	$2.00	$3,345	$630	0.04
TOTAL	387,000	$605,000		$1,011,990	$190,634	11.23

GEORGIA	POUNDS	VALUE	PRICE	OUTPUT	INCOME	EMPLOYMENT
SNOWY GROUPER	18,000	$22,000	$1.22	$39,613	$7,856	0.43
TILEFISH	8,000	$7,000	$0.88	$12,604	$2,499	0.14
SPECKLED HIND	4,000	$5,000	$1.25	$9,003	$1,785	0.10
YELLOWEDGE GROUPER	0	$0	$2.00	$0	$0	0
WARSAW GROUPER	1,000	$1,000	$1.00	$1,800	$357	0.01
TOTAL	31,000	$35,000		$63,021	$12,497	0.58

FLORIDA	POUNDS	VALUE	PRICE	OUTPUT	INCOME	EMPLOYMENT
SNOWY GROUPER	133,000	$242,000	$1.82	$443,515	$41,231	7.77
TILEFISH	504,000	$669,000	$1.33	$1,226,076	$113,984	21.50
SPECKLED HIND	0	$0	$0	$0	$0	0
YELLOWEDGE GROUPER	8,000	$18,000	$1.76	$32,988	$3,066	0
WARSAW GROUPER	25,000	$40,000	$1.60	$73,308	$6,815	1.28
TOTAL	670,000	$969,000		$1,775,885	$165,096	31.10

Table 33. Commercial bottom longline catch by species for the South Atlantic for 1988*.

	lb	% lb	$
Species likely to be caught inside of 50 fathoms			
Gray Snapper	125	0.0%	190
Mutton Snapper	33,831	3.3%	64,724
Gray Triggerfish (FL)	1,772	0.2%	912
Gag	66,717	6.4%	122,346
Scamp (FL)	17,386	1.7%	31,648
Red Grouper	67,566	6.5%	113,494
Yellowfin Grouper	694	0.1%	1,251
Hogfish	1,725	0.2%	2,331
Knobbed Porgy	275	0.0%	101
	190,090	18.3%	336,997
OTHERS			
Greater Amberjack	4,858	0.5%	2,585
Nassau Grouper	263	0.0%	469
Speckled Hind	6,345	0.6%	8,993
Snowy Grouper	151,160	14.5%	241,516
Warsaw Grouper	413	0.0%	537
Yellowedge Grouper	13,420	1.3%	23,833
Golden Tilefish	596,980	57.4%	835,423
Rock Hind	36	0.0%	40
Grouper & Scamp	9,007	0.9%	10,913
Red Hind	250	0.0%	360
Scup or Porgy uncl	1,160	0.1%	1,042
Red Porgy	4,754	0.5%	4,837
Snapper uncl	200	0.0%	439
Blueline Tilefish	33,275	3.2%	28,514
Tilefish uncl	1,596	0.2%	1,026
Vermilion Snapper	1,277	0.1%	2,475
Black Sea Bass	90	0.0%	124
Cubera Snapper	387	0.0%	482
Silk Snapper	342	0.0%	634
Red Snapper	2,042	0.2%	5,550
Black Grouper	21,994	2.1%	48,490
	849,848	81.7%	1,218,281
TOTALS	1,039,938		1,555,277

*Does not include wreckfish due to confidential data.

Table 34. Depreciated value of fish traps in Florida

YEAR	#TRAPS/ AGE BRACKET	DEPRECIATION FACTOR	DEPRECIATION VALUE
1	28.5	1.000	$2422.50
2	28.5	.857	$2076.40
3	28.5	.714	$1730.30
4	28.5	.571	$1384.30
5	28.5	.429	$1038.20
6	28.5	.286	$692.10
7	28.5	.143	$346.10
TOTAL	200		$9690.00

Table 35. Total depreciated value of traps north of Florida

YEAR	#TRAPS/ AGE BRACKET	DEPRECIATION FACTOR	DEPRECIATION VALUE
1	43	1.000	$3655.00
2	43	.857	$3132.80
3	43	.714	$2610.70
4	43	.571	$2088.60
5	43	.429	$1566.40
6	43	.286	$1044.30
7	43	.143	$522.10
TOTAL	301		$14,620.00