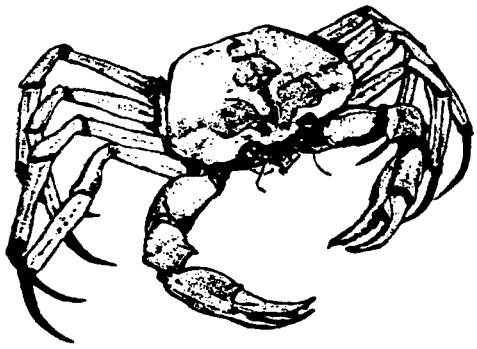
FINAL

AMENDMENT #3 TO THE FISHERY MANAGEMENT PLAN FOR THE GOLDEN CRAB FISHERY OF THE SOUTH ATLANTIC REGION

(INCLUDING ENVIRONMENTAL ASSESSMENT, REGULATORY IMPACT REVIEW, AND SOCIAL IMPACT ASSESSMENT/FISHERY IMPACT STATEMENT)



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GOLDEN CRAB AMENDMENT #3 COVER SHEET

This integrated document contains all elements of the Plan Amendment, Environmental Assessment (EA), Regulatory Impact Review (RIR), and Social Impact Assessment (SIA)/Fishery Impact Statement (FIS). Separate "Tables of Contents" are provided to assist the NMFS/NOAA/DOC reviewers in referencing corresponding sections of the document. Introductory information and/or background for the RIR and SIA/FIS are included with separate "Table of Contents" for each of these sections. The general public information begins on page 1; information for agency reviewers continues below.

National Environmental Policy Act (NEPA) regulations require certain information be presented to define the issues and provide a clear basis for choice among options by the decision maker and the public. The Council's documents must also conform to Magnuson-Stevens Act and "Other Applicable Law" requirements. National Environmental Policy Act regulations are one of the "Other Applicable Laws" referenced. The South Atlantic Council's policy is to consolidate Magnuson-Stevens Act and "Other Applicable Law" (including NEPA) requirements into one non-duplicative and non-repetitive document. This results in a document that is more easily read by the general public and saves large quantities of paper, reduces copying requirements, and saves money on postage costs. The Council concluded this is the most cost effective and efficient manner to meet the many requirements faced in preparing fishery management plans, amendments, and framework seasonal adjustments.

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NAME OF ACTION

(X) Administrative ( ) Legislative

SUMMARY

The proposed management program is to implement the actions shown on page v.

Public hearings were held February 22, 2000 at the Best Western, 211 South Krome Avenue, Florida City, Florida 33034 and February 23, 2000 at the Town & Country Inn, 2008 Savannah Highway, Charleston, South Carolina 29407. Written comments were accepted at the Council office by mail, fax, or email and must have been received by 5 P.M. on May 1, 2000. In addition, a public comment period was allowed prior to the Council taking final action during their Council meeting on June 15, 2000 at the Cheeca Lodge, Islamorada, Florida.

ENVIRONMENTAL ASSESSMENT

This integrated document contains all elements of the Plan Amendment, Environmental Assessment (EA), Regulatory Impact Review (RIR), and Social Impact Assessment (SIA)/Fishery Impact Statement (FIS). A "Table of Contents" for the EA is provided separately to aid reviewers in referencing corresponding sections of this document.

SUMMARY

The proposed management program is to implement the actions shown on page v.

REGULATORY IMPACT REVIEW

This integrated document contains all elements of the Plan Amendment, Environmental Assessment (EA), Regulatory Impact Review (RIR), and Social Impact Assessment (SIA)/Fishery Impact Statement (FIS). A "Table of Contents" for the RIR is provided separately to aid reviewers in referencing corresponding sections of the document.

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Introduction

The National Marine Fisheries Service (NMFS) requires a Regulatory Impact Review (RIR) for all regulatory actions that are of public interest. The RIR is part of the process of developing and reviewing fishery management plans, amendments, and seasonal adjustments, and is prepared by the Regional Fishery Management Councils with assistance from the National Marine Fisheries Service, as necessary. The RIR does three things: 1) it provides a comprehensive review of the level and incidence of impacts associated with a proposed or final regulatory action, 2) it provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problem, and 3) it ensures that the regulatory agency systematically and comprehensively considers all available alternatives so that public welfare can be enhanced in the most efficient and cost effective way.

The RIR also serves as the basis for determining whether any proposed regulations are a "significant regulatory action" under certain criteria provided in Executive Order 12866 and whether the proposed regulations will have a significant economic impact on a substantial number of small entities in compliance with the Regulatory Flexibility Act of 1980 (RFA) as amended by Public Law 104-121. The purpose of the Regulatory Flexibility Act is to relieve small businesses, small organizations, and small governmental entities from burdensome regulations and record-keeping requirements, to the extent possible.

This RIR analyzes the probable impacts of the proposed changes in extending the use of wire cable for mainlines through December 31, 2002, setting the escape panel measurements to 11 7/8 inches by 11 7/8 inches, removing the 5,000 pound landing requirement, requiring permits be renewed on or before six months into the next fishing year, allowing a 20% increase in vessel size, creating a subzone within the Southern Zone, allowing two new vessels into the Northern Zone, setting the MSY and Status Determination Criteria, and modifying the framework.

Problems and Objectives

The general problems and objectives as listed in the FMP are shown in Sections 1.1 and 1.2. Modifications to the list of problems and objectives are shown in Section 1.3. This plan amendment proposes to extend the use of wire cables for mainlines through December 31, 2002, set the dimensions of the escape panel or door to 11 7/8 inches by 11 7/8 inches, remove the 5,000 pound annual landings requirement for renewing the biannual permit, require permits be renewed on or before 6 months into the next fishing year, allow up to 20% increase in vessel size, create a subzone within the Southern Zone for small vessels, allow 2 new vessels into the Northern Zone, specify MSY, and Status Determination Criteria, and modify the framework. Further exposition of these issues are found in the discussions under each proposed action.

Methodology and Framework for Analysis

The basic approach adopted in this RIR is an assessment of management measures from the standpoint of determining the resulting changes in costs and benefits to society. The net effects should be stated in terms of producer and consumer surpluses. Ideally, the expected present value of net yield streams over time associated with different alternatives should be compared in evaluating the impacts. However, these estimates are not available due to data

limitations. A qualitative discussion of short-term and long-term impacts is attempted. A summary of the RIR is presented in Table 1.

Table 1. Summary of Regulatory Impact Review.

ACTION	POSITIVE IMPACTS	NEGATIVE IMPACTS	NET IMPACTS
Action 1. Extend the use of wire cable for mainlines through December 31, 2002.	Could increase benefits.	None.	Could increase benefits if wire cable proves to be more cost effective.
Rejected Option 1. No Action. Allow the use of cable for trap mainlines through December 31, 2000.	None.	Could result in loss of benefits to fishermen interested in this gear option.	Could decrease benefits.
Action 2. Escape panel or door on traps must measure at least 11&7/8 inches by 11&7/8 inches.	None except to ensure that fishermen are in compliance with gear regulations.	None.	None except to ensure that fishermen are in compliance with regulations.
Rejected Option 1. No Action. Require that the escape door or panel on one of the vertical sides be at least 12 inches by 12 inches.	None.	Cost to fishermen so that gear conforms to new dimensions.	Cost to fishermen so that gear conforms to new dimensions.

Table 1. Summary of Regulatory Impact Review (cont.).

ACTION	POSITIVE IMPACTS	NEGATIVE IMPACTS	NET IMPACTS
Action 3. 3A. Remove the 5,000 pound harvest requirement for renewing the biannual permit. In addition, permit holders in the Southern Zone not meeting the 5,000 pound requirement by October 2000 are to be granted permits as long as they met the previous 5,000 pound requirement applied October 1998. **3B. Permits are to be renewed on or before six months into the next fishing year.**	Could increase revenue in the fishery.	None.	Could increase revenue in the fishery.
Rejected Option 1. No Action. Maintain the annual 5,000 pound harvest requirement for renewing the permit.	None.	Would exclude vessels from the fishery.	Would result in loss of benefits to the industry.
Rejected Option 2. Alternative renewal dates: (a) Permits are to be renewed prior to the start of the next fishing year; (b) Permits are to be renewed prior to the end of the next fishing year; and (c) Apply one of the above time restrictions to permit renewal and add the requirement that renewal must be accompanied by a previous year's catch of a minimum of 5,000 pounds	None except to aid enforcement.	Could exclude vessels from the fishery that don't meet the 5,000 pound requirement.	Could result in loss of benefits to the industry from vessels that are excluded.

Table 1. Summary of Regulatory Impact Review (cont.).

ACTION	POSITIVE IMPACTS	NEGATIVE IMPACTS	NET IMPACTS
Action 4. Allow up to a 20% increase in vessel size from the vessel size on the original permit.	Likely positive.	None.	Likely positive.
Rejected Option 1. No Action. Vessel size remains at the specification on the original permit with the provision for some increase with multiple permits.	None.	None, except to reduce revenue to those vessels that are constrained by current size limits.	Likely negative.
Rejected Option 2. Eliminate limit on vessel size.	Allow other vessels to operate in the fishery.	Could result in excess capacity.	May not result in sustainable positive benefits.
Rejected Option 3: Establish maximum vessel size by zone.	Allow other vessels to operate in the fishery.	Not able to determine if there will be negative impacts.	Not able to determine if there will be long-term positive benefits.

Table 1. Summary of Regulatory Impact Review (cont.).

ACTION	POSITIVE IMPACTS	NEGATIVE IMPACTS	NET IMPACTS
Action 5. Create a sub-zone within the Southern Zone using the following area and conditions: (a) Area bounded by 81° 22' to 81° 56' and 24° 15' to 24° 07'; (b) Small vessels (less than or equal to 65 feet documented length) agree to fish for golden crabs only within this sub-zone. Larger vessels agree not to fish golden crabs within this sub-zone with the understanding that they will be allowed to fish within the Northern Zone without losing ability to return to the Southern Zone. It is the Council's intent that the larger vessels are free to travel between and fish in the Northern and Southern Zones; they can transit but not fish in the Middle Zone. At the end of three years, these permit holders would specify which zone they elect to fish in on a permanent basis; (c) It is the Council's intent that the sub-zone created within the Southern Zone would exist for a minimum period of 3 years. At the end of 2-3 years the Council will review these measures to determine if the exclusive fishing sub-zone should be repealed; and (d) Review production data from the area on an annual basis.	Increase benefits to small vessels.	None.	Could increase net benefits if measure resolves user conflict.
Rejected Option 1: No Action: Leave open the entire zone to all vessels of all sizes.	None.	Would not resolve user conflict.	Likely negative.
Rejected Option 2. Other sub-zone options.	Could resolve user conflict.	None.	Could increase net benefits if measure resolves user conflict.
Rejected Option 3: Require use of a vessel monitoring system or a trap monitoring system.	Could resolve user conflict.	Some cost for monitoring system.	May increase benefits.

Table 1. Summary of Regulatory Impact Review (cont.).

ACTION	POSITIVE IMPACTS	NEGATIVE IMPACTS	NET IMPACTS
Action 6. Allow two new vessels to be permitted to fish only in the Northern Zone using the next two participants on the original list (used by the Council during the October 1995 Council meeting) that want to enter the fishery.	Would increase benefits.	None.	Expected to increase net benefits.
Rejected Option 1: No Action.	None.	Could constrain benefits.	May not optimize long-term benefits.
Rejected Option 2: Institute an auction or lottery system to add vessels to the Northern Zone.	Would increase benefits.	None, except may not equitably distribute benefits in the fishery.	Could maximize benefits.
Action 7. Specify MSY and Status Determination Criteria.	None by itself.	None by itself.	Actions resulting from this measure could increase or decrease benefits.
Rejected Option 1: No Action. Do not specify MSY and Status Determination Criteria.	None by itself.	None by itself.	Would not allow the Council to take action to ensure sustained economic benefits in he fishery.
Action 8. Modify the framework to allow modifications to the sub-zone. Modifications include but are not limited to changing the size, timeframe, seasonality, repealing, and eligibility requirements.	None.	None.	None.
Rejected Option 1: No Action.	None.	None.	None.

This Plan Amendment is not significant under Executive Order 12866. See Section 4.9 for details of impacts on small businesses.

SOCIAL IMPACT ASSESSMENT/FISHERY IMPACT STATEMENT

This integrated document contains all elements of the Plan Amendment, Environmental Assessment (EA), Regulatory Impact Review (RIR), and Social Impact Assessment (SIA)/Fishery Impact Statement (FIS). A "Table of Contents" for the SIA/FIS is provided separately to aid reviewers in referencing corresponding sections of the document.

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Introduction

Mandates to conduct Social Impact Assessments (SIA) come from both the National Environmental Policy Act (NEPA) and the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). NEPA requires Federal agencies to consider the interactions of natural and human environments by using a "systematic, interdisciplinary approach which will ensure the integrated use of the natural and social sciences...in planning and decision-making" [NEPA Section 102 (2)(a)]. Under the Council on Environmental Quality's (U.S. CEQ, 1986) *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act* a clarification of the terms "human environment" explained the interpretation to include the relationship of people with their natural and physical environment (40 CFR 1508.14). Moreover, agencies need to address the aesthetic, historic, cultural, economic, social, or health effects which may be direct, indirect, or cumulative (Interorganizational Committee on Guidelines and Principles for Social Impact Assessment, 1994).

Under the MSFCMA, fishery management plans (FMPs) must "...achieve and maintain, on a continuing basis, the optimum yield from each fishery" [MSFCMA Section 2 (b)(4)]. When considering "a system for limiting access to the fishery in order to achieve optimum yield" the Secretary of Commerce and Regional Fishery Management Councils are to consider both the social and economic impacts of the system, and other factors [MSFCMA Section 303(b)(6)]. Recent amendments to the MSFCMA require that FMPs address the impacts of any management measures on the participants in the affected fishery and those participants in other fisheries that may be affected directly or indirectly through the inclusion of a fishery impact statement [MSFCMA Section 303 (a) (9)]. Most recently, with the addition of National Standard 8, FMPs must now consider the impacts upon fishing communities to assure their sustained participation and minimize adverse economic impacts upon those communities [MSFCMA Section 301 (a) (8)]. Consideration of social impacts is a growing concern as fisheries experience increased participation and/or declines in stocks. With an increasing need for management action, the consequences of such changes need to be examined in order to mitigate the negative impacts experienced by the populations concerned.

Problems and Methods

Social impacts are generally the consequences to human populations that follow from some type of public or private action. Those consequences may include alterations to "the ways in which people live, work or play, relate to one another, organize to meet their needs and generally cope as members of a society...." (Interorganizational Committee on Guidelines and Principles for Social Impact Assessment, 1994:1). In addition, cultural impacts which may involve changes in values and beliefs which affect people's way of identifying themselves within their occupation, communities, and society in general are included under this interpretation. Social impact analyses help determine the consequences of policy action in advance by comparing the status quo with the projected impacts. Therefore, it is extremely important that as much information as possible concerning a fishery and its participants be gathered for an assessment. Although public hearings and scoping meetings do provide input from those concerned with a particular action, they do not constitute a full overview of the fishery.

Without access to relevant information for conducting social impact analyses it is important to identify any foreseeable adverse effects on the human environment. With quantitative data often lacking, qualitative data can be used to provide a rough estimate of some impacts. In addition, when there is a body of empirical findings available from the social science literature, it needs to be summarized and referenced in the analysis.

In attempting to assess the social impacts of the proposed measures it must be noted that data used for this analysis did not represent a comprehensive overview of the fishery therefore the analyses do not include all social impacts. However, based on information available to the Council the proposed actions will provide positive social benefits to the golden crab industry/fishermen (Table 2). What information was available primarily pertains to the commercial harvesting sector of the golden crab fishery. Thus social impacts on the processing sector, the consumer, fishing communities, and society as a whole are not fully addressed due to data limitations. The fishery impact statement/social impact assessment consists of the description of the social and economic status of the fishery and the social impacts under each action item and option. There is presently little information to define or determine impacts upon fishing communities.

Table 2. Summary of Social Impacts.

Action	Social Impacts
Action 1. Extend the use of wire cable for mainlines through December 31, 2002.	Extension of the use of cables will have a positive impact by allowing fishers to fully experiment with alternative gear in a new fishery.
Action 2. Escape panel or door on traps must measure at least 11 7/8 inches by 11 7/8 inches.	Less burden will be put on the fishers by having the regulations fit the reality of gear characteristics, thus furthering positive relations between fishers, managers, and law enforcement.
Action 3. 3A. Remove the 5,000 pound harvest requirement for renewing the biannual permit. In addition, permit holders in the Southern Zone not meeting the 5,000 pound requirement by October 2000 are to be granted permits as long as they met the previous 5,000 pound requirement applied October 1998. 3B. Permits are to be renewed on or before six months into the next fishing year.	Because the fishery has been operating at less than optimal levels due to fishing conflicts in the past two years, removing this harvest requirement will allow for more equitable participation in the fishery.
Action 4. Allow up to a 20% increase in vessel size from the vessel size on the original permit.	Allowing an increase in vessel size will have a positive impact in two ways: likely increase in human safety by working a larger vessel and by increasing personal freedom of the fishers.

Table 2. Summary of Social Impacts continued.

Action	Social Impacts
Action 5. Create a sub-zone within the Southern Zone using the following area and conditions : (a) Area bounded by 81°22' to 81° 56' and 24° 15' to 24° 07'; (b) Small vessels (less than or equal to 65 feet documented length) agree to fish for golden crabs only within this sub-zone. Larger vessels agree not to fish golden crabs within this sub-zone with the understanding that they will be allowed to fish within the Northern Zone without losing ability to return to Southern Zone. It is the Council's intent that the larger vessels are free to travel between and fish in the Northern and Southern Zones; they can transit but not fish in the Middle Zone. At the end of three years, these permit holders would specify which zone they elect to fish in on a permanent basis; (c) It is the Council's intent that the sub-zone created within the Southern Zone would exist for a period of 3 years. At the end of 2-3 years the Council will review these measures to determine if the exclusive fishing zone should be repealed; and (d) Review production data from the area on an annual basis.	This action would mostly eliminate the conflict now existing in the fishery, thus bringing social benefits to all concerned. However, the larger vessel owners may experience less benefit as they are excluded from a portion of the Southern Zone. They may realize benefits from fishing the Northern Zone.
Action 6. Allow two new vessels to be permitted to fish only in the Northern Zone using the next two participants on the original list (used by the Council during the October 1995 Council meeting) that want to enter the fishery.	This action will help the fishery develop its potential by increasing the possible area that may be fished by the fishery's participants. This will benefit the larger boats that may be excluded from a portion of the southern zone if Action 5 is approved.
Action 7. Specify MSY and Status Determination Criteria.	Determination of MSY or the stock's status will, at this point in time, have no predictable social impacts because the golden crab fishery is too new to sufficiently measure its potential.
Action 8. Modify the framework to allow modifications to the sub-zone. Modifications include but are not limited to changing the size, timeframe, seasonality, repealing, and eligibility requirement.	Would have a positive social impact in that the Council will be more efficient and effective in responding to the needs of fishery participants.

Social Impact Assessment Data Needs

To provide better assessments, socio-economic data need to be collected on a regular basis for fishermen, processors, consumers, and fishing communities. Collecting social and economic information through logbooks may be one manner of providing this information on a regular basis for fishermen. Information on fishing communities in the South Atlantic is virtually non-existent and research needs to be conducted to identify fishing communities within the South Atlantic and the contribution of fishing and fisheries to those communities. The following list of data needs is provided as a guideline:

1. Demographic information may include but is not necessarily limited to: population; age; gender; ethnic/race; education; language; marital status; children, (age and gender); residence; household size; household income, (fishing/non-fishing); occupational skills; and association with vessels and firms (role and status).
2. Social Structure information may include but is not necessarily limited to: historical participation; description of work patterns; kinship unit, size, and structure; organization and affiliation; patterns of communication and cooperation; competition and conflict; spousal and household processes; and communication and integration.
3. Emic culture information may include but is not necessarily limited to: occupational motivation and satisfaction; attitudes and perceptions concerning management; constituent views of their personal future of fishing; psycho-social well-being; and cultural traditions related to fishing (identity and meaning).
4. Fishing community information might include but is not necessarily limited to: identifying communities; dependence upon fishery resources; identifying businesses related to that dependence; and number of employees within these businesses.

This list of data needs is not exhaustive or all inclusive. Issues within the golden crab fishery such as territoriality and conflict demand more specific information concerning the social environment, especially if disputes evolve over fishing territories when short-term effort expansion occurs.

The Gulf of Mexico Fishery Management Council's Socio-Economic Panel recommended that further research be initiated and funded by National Marine Fisheries Service as soon as possible to aid in the identification and definition of fishing communities in the Southeast. The panel also recommended the scope of this problem be addressed at a national level, such that impacts upon fishing communities can be analyzed across regions as well as within. A key area for expanded research is ethnographic and survey research to identify, not only communities, but those who provide supporting services to the economy and culture of fishing communities. Especially important in the Southeast is the need to provide a realistic portrayal of recreational fishing, diving, tourism, and coastal development and their importance to a fishing community.

The South Atlantic, Mid-Atlantic, and New England Fishery Management Councils, the ASMFC, NMFS, U.S. Fish and Wildlife Service, and all the Atlantic coastal States are currently developing a coastwide fisheries statistics program (Atlantic Coastal Cooperative Statistics Program or ACCSP). A minimum set of reporting requirements based on a trip-level for fishermen and dealers has been developed and is the minimum standard for data collection on the Atlantic coast. Two socio-economic pilot studies are underway in the Georgia blue crab fishery and the Northeast/Mid-Atlantic summer flounder fishery. In addition, the South Atlantic Council and the NMFS are evaluating use of logbooks in the snapper grouper and mackerel fisheries to collect detailed economic data at the trip level. Nothing in the ACCSP program would prohibit a state/agency from requiring more detailed information on a trip basis if so desired. As the ACCSP provisions are adopted, they will be incorporated into the reporting requirements for the golden crab fishery.

1.0 PURPOSE AND NEED

Since the original fishery management plan was completed in 1995, issues and problems have arisen in the golden crab fishery that have caused a decline in production and an increase in conflict among the participants in this fishery. Broadly seen, these issues include questions related to gear restrictions, permitting processes, limits on vessel size, crew safety, and zoning/participation conflicts.

1.1 Issues/Problems

Problems as listed in the original fishery management plan are as follows (SAFMC, 1995):

1. The status of the golden crab resources is unknown but given the life history characteristics (slow growing and long-lived), excessive fishing mortality will jeopardize the biological integrity of the golden crab resource of the south Atlantic.
2. Management is limited by lack of current and accurate biological, statistical, social, and economic information. Data necessary to document growth and/or recruitment overfishing, and to calculate spawning stock ratios (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. Potential conflicts: Due to limited fishing grounds and competitive fishing conditions as a large number of vessels compete for the available golden crab resources, gear and area conflicts have occurred among commercial users of the golden crab resource, and between commercial users employing different gears (traps, trawls, longlines and entanglement nets) when traditional management measures are utilized.
4. Habitat degradation, which may be caused by some types of fishing gear, will adversely affect golden crab stocks and associated habitat/species.
5. Excess capacity: the size and capacity of the golden crab fleet will exceed that needed for prudent harvest levels that the Council is likely to allow in the foreseeable future. Additional vessels in the future would exacerbate this situation since the derby nature of an open access fishery encourages fishermen to add harvest capacity even when gains in production are marginal or when economies of scale are not necessarily realized.
6. Inefficiency: measures to control harvest (total allowable catch, gear restrictions, trip limits) and other future measures that would likely be needed under continued open access, increase fishing costs and decrease potential consumer and producer benefits from the fishery.
7. Low conservation and compliance incentives: under open access, incentives to promote conservation and voluntary compliance with regulations are low because the benefits from doing so may be appropriated by other fishermen or new entrants.
8. High regulatory costs: management and enforcement costs will be unnecessarily high and would be expected to increase under open access as the number of vessels increases and stricter management measures are needed to control excess fishing effort.

9. Low marketing incentives: efforts by dealers to augment consumer acceptance of golden crab will be thwarted by short-run oversupply and lack of product continuity. The likelihood of additional harvest restrictions under open access increases uncertainty and instability and discourages long-run planning and investment by dealers.

1.2 Management Objectives

Objectives as listed in the original fishery management plan are as follows (SAFMC, 1995):

1. Prevent overfishing of golden crab by preventing the fishing mortality rate from exceeding the fishing mortality rate that would produce maximum sustainable yield (F_{MSY}).
2. Collect necessary data to develop, monitor, and assess biological, economic, and social impacts of management measures designed to prevent overfishing, 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 commercial fishing activities.
6. Promote public comprehension of, voluntary compliance with, and enforcement of the management measures.
7. Develop a mechanism to vest fishermen in the golden crab fishery, and create incentives for conservation and regulatory compliance whereby fishermen can realize potential long-run benefits from efforts to conserve and manage the golden crab resource.
8. Provide a management regime which promotes stability and facilitates long-range planning and investment by harvesters and dealers while avoiding, where possible, the necessity for more stringent management measures and increasing management costs over time.
9. Develop a mechanism that allows the marketplace to drive harvest strategies and product forms in order to maintain product continuity and increase total producer and consumer benefits from the fishery.
10. Promote management regimes that minimize gear and area conflicts among fishermen.
11. Minimize the tendency for over-capitalization in the harvesting and processing/distribution sectors.
12. Provide a reasonable opportunity for fishermen to make adequate returns from commercial fishing by controlling entry so that returns are not regularly dissipated by open access, while also providing avenues for fishermen not initially included in the controlled access program to enter the program.

1.3 Issues/Problems Requiring Plan Amendment

Problems 1 (unknown stock status) and 2 (lack of data) continue to be issues in the fishery. Data for golden crab are very limited and available resources within the NMFS do not allow sufficient data collection. In addition, the NMFS is interpreting the Magnuson-Stevens Act to require an estimate of Maximum Sustainable Yield (MSY) and biomass-based overfishing components for every species in every management plan. While NMFS recognizes the data do not exist to provide the necessary stock assessment and scientific information to allow the Council to develop such estimates, it is their legal and policy determination that such values must be specified. The Council/NMFS Annual Operations Plan lists the data/analytical needs for golden crab.

Problem 3 (conflicts) is the primary emphasis of this amendment. Fishermen in the southern zone have suffered gear damage from other golden crab fishermen. To further illustrate this problem, the following description of gear loss is drawn from the minutes of the Joint Golden Crab Committee and AP meeting of June 18, 1998:

> Concerns of gear loss may be best illustrated by paraphrasing the comments of Mr. Tim Daniels, a small boat operator in the southern zone. Mr. Daniels and his partner were unfortunate to have had 70-80% of their traps (valued at approximately $100,000) "destroyed" or lost through gear conflicts with a large vessel from outside the South Atlantic region. The nature of the conflict was in the action of the larger vessel setting its traps over the traplines of other fishermen, including Mr. Daniels. In his statement he claimed he would not return to set traps until the Council has taken some action to protect his investment. Mr. Daniels also added that he knew of some fishermen that would not fish for golden crab again because of the losses they withstood from gear damage. He ended by saying, "You won't have a fishery to worry about if something isn't done."

Problem 4 (habitat degradation) continues to be a concern particularly with use of cable mainlines. Essential fish habitat for golden crab is described in Section 3.8.

Problems 5 (excess capacity), 6 (inefficiency), 7 (low conservation and compliance incentives), 8 (high regulatory costs), and 9 (low marketing incentives) have been resolved with implementation of the FMP which established a controlled access program. **The Council approved deleting Problems 5 through 9 and adding the following new problem:**

New Problem 5. Lack of adequate harvesting capacity in the northern zone. This results in lack of product which impacts marketing and development of a viable fishery and prevents maximization of economic and social benefits.

Objectives 1 through 6 remain applicable. Objectives 7, 8, 9, 11, and 12 have been addressed through implementation of the Golden Crab FMP. **The Council approved deleting Objectives 7, 8, 9, 11, and 12; objective 10 is to be renumbered as Objective 7.** This amendment provides a mechanism to minimize gear and area conflicts among fishermen (Objective 7).

1.4 History of Management

The golden crab resource and fishery in the South Atlantic Region were unprotected prior to implementation of the FMP. The Council approved a **control date** that was published in the Federal Register on April 7, 1995. The Council completed the **Golden Crab FMP** (SAFMC, 1995) and submitted the plan for formal Secretarial Review on December 15, 1995. Regulations implementing the FMP were published in the Federal Register on August 27, 1996 [61 Federal Register 43952]; various regulations became effective August 27, September 26, and October 28, 1996 and September, 1997.

The Golden Crab FMP relies on a system of traditional fishery management plus controlled access. Traditional fisheries management includes measures to provide biological protection to the resource (escape gaps in traps and no retention of female crabs); gear regulation (define allowable gear, degradable panel, tending requirements, gear identification, and maximum trap size by zone); provides for law enforcement (depth limitations and prohibit possession of whole fish or fillets of snapper grouper species); determine the number of participants (vessel and dealer/processor permits); collect the necessary data (vessel/fishermen and dealer/processor reporting); and a framework procedure to adjust the management program (framework adjustments and adjustments to activities authorized by the Secretary of Commerce). Use of these traditional management techniques in other fishery management plans has not solved all fisheries management problems. At best, the fishery resource, in this case golden crab, is biologically protected. Ignored or even exacerbated are underlying social and economic problems resulting from conflicts, high regulatory costs, and low marketing incentives. To solve these social and economic problems, managers have increasingly turned to various forms of controlled access or effort limitation. The Council chose to limit the number of vessels in the golden crab fishery. Combining the more traditional fisheries management measures with controlled access best allowed the Council to solve problems in the golden crab fishery.

Framework Seasonal Adjustment #1 (SAFMC, 1997) revised the vessel size limitations applicable when a vessel permit is transferred to another vessel and extended through December 31, 2000, the authorization to use wire cable for a mainline attached to a golden crab trap. The framework document was sent to NMFS on September 26, 1997 and the proposed rule was published on June 26, 1998. The final rule was published in the Federal Register on October 28, 1998 with regulations effective upon publication.

Amendment 1 (SAFMC, 1998a) was a part of the Council's Comprehensive Amendment addressing Essential Fish Habitat in FMPs of the South Atlantic Region. Essential fish habitat for golden crab includes the U.S. Continental Shelf from Chesapeake Bay south through the Florida Straits (and into the Gulf of Mexico). In addition, the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse golden crab larvae. The detailed description of seven essential fish habitat types (a flat foraminferan ooze habitat; distinct

mounds, primarily of dead coral; ripple habitat; dunes; black pebble habitat; low outcrop; and soft-bioturbated habitat) for golden crab is provided in Wenner et al. (1987). Refer to Section 3.0 in the Habitat Plan (SAFMC, 1998c) for a more detailed description of habitat utilized by the managed species. Also, it should be noted that the Gulf Stream occurs within the EEZ. There is insufficient knowledge of the biology of golden crabs to identify spawning and nursery areas and to identify HAPCs. As information becomes available, the Council will evaluate such data and identify HAPCs as appropriate through the framework. In addition, Amendment 1established a framework procedure to address habitat issues; this framework was added to the framework of all approved FMPs including the Golden Crab FMP.

Amendment 1 was submitted to the NMFS on October 9, 1998. The Notice of Availability was published in the Federal Register on March 5, 1999 and the Comprehensive Habitat Amendment was approved on June 3, 1999. The proposed rule was published on July 9, 1999 and a supplement to the proposed rule was published on November 2, 1999. The final rule was published in the Federal Register on June 14, 2000 with regulations becoming effective July 14, 2000.

Amendment 2 (SAFMC, 1998b) was a part of the Council's Comprehensive Amendment addressing Sustainable Fishery Act definitions and other required provisions in FMPs of the South Atlantic Region. The amendment was partially approved on May 19, 1999. The final rule was published in the Federal Register on November 2, 1999 with regulations becoming effective December 2, 1999. The description of fisheries and communities was approved and bycatch reporting was approved. The remaining items for golden crab were disapproved because "the stock status determination criteria are incomplete and, thus, do not totally fulfill the new requirements of the Magnuson-Stevens Act and the national standard guidelines".

Lastly, this current effort at managing the Golden crab fishery is distinguished by the practice of co-management, which has been defined by McGoodwin (1990, pp. 189-190) as "a shift away from autocratic and paternalistic modes of management to modes that rely on the joint efforts of traditional fisheries specialists and fishing peoples. The options for managing the fishery that are put forth in this document have been developed by the golden crab fishermen and refined in consultation with the SAFMC. It is hoped that such efforts will increase the legitimacy of the future regulations and make the rationale for such regulations more understandable to all involved.

2.0 ALTERNATIVES

National Environmental Policy Act (NEPA) regulations indicate that Section 2.0 should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision maker and the public. The Council's documents must also conform to the Magnuson-Stevens Act and "Other Applicable Law" requirements. National Environmental Policy Act regulations are one of the "Other Applicable Laws" referenced. The South Atlantic Council decided to consolidate Magnuson-Stevens Act and "Other Applicable Law" (including NEPA) requirements into one non-duplicative and non-repetitive document. The Council's approach is to present the bulk of the evaluation of alternatives and discussion about the effects on the environment in Section 4.0 Environmental Consequences of Fisheries Activities. Section 2.0 Alternatives, is presented as a summary of Section 4.0. The Council concluded this meets the intent of NEPA regulatory requirements.

Management measures (proposed actions) are intended to address the management objectives and issues discussed above. Each management measure has a number of alternatives that have been considered by the Council. The following table summarizes the alternatives and how they address the problems/issues identified by the Council.

The proposed actions address gear/area conflict among fishermen, the lack of sufficient harvesting capacity in the Northern Zone, and habitat impacts from cable mainlines and safety. The lack of knowledge and lack of sufficient data remain problems. The Council has specified data needs in the Golden Crab FMP (SAFMC, 1995) and the annual NMFS/Council Operations Plan. The Council remains concerned about the lack of data and is currently exploring any remaining alternatives to obtain the necessary social, economic, and biological information necessary to meet the Magnuson-Stevens Act requirements.

Table 3. Summary of Environmental Consequences.

ACTION	Gear/Area Conflict	Insufficient Capacity	Habitat Impacts	Safety
Action 1. Extend the use of wire cable for mainlines through December 31, 2002.	N/A	N/A	Would result in some impact.	Improves safety for smaller vessels.
Rejected Option 1. No Action. Allow the use of cable for trap mainlines through December 31, 2000.	N/A	N/A	Prevents impacts from cable.	Would reduce safety on smaller vessels.
Action 2. Escape panel or door on traps must measure at least 11&7/8" by 11&7/8".	N/A	N/A	N/A	N/A
Rejected Option 1. No Action. Require that the escape door or panel on one of the vertical sides be at least 12" by 12".	N/A	N/A	N/A	N/A

Table 3. Summary of Environmental Consequences (cont.).

ACTION	Gear/Area Conflict	Insufficient Capacity	Habitat Impacts	Safety
Action 3. 3A. Remove the 5,000 pound harvest requirement for renewing the biannual permit. In addition, permit holders in the Southern Zone not meeting the 5,000 pound requirement by October 2000 are to be granted permits as long as they met the previous 5,000 pound requirement applied October 1998. **3B. Permits are to be renewed on or before six months into the next fishing year.**	N/A	Would increase the number of vessels.	N/A	Could increase safety because fishermen would not have to fish in bad weather in order to meet the 5,000 pound requirement.
Rejected Option 1. No Action. Maintain the annual 5,000 pound harvest requirement for renewing the permit.	N/A	Could reduce the number of vessels.	N/A	Could decrease vessel safety.
Rejected Option 2. Alternative renewal dates: (a) Permits are to be renewed prior to the start of the next fishing year; (b) Permits are to be renewed prior to the end of the next fishing year; and (c) Apply one of the above time restrictions to permit renewal and add the requirement that renewal must be accompanied by a previous year's catch of a minimum of 5,000 pounds	N/A	Could result in some decrease if permits are not renewed by deadlines.	N/A	Could result in some decrease in safety if the 5,000 pound requirement is kept.

Table 3. Summary of Environmental Consequences (cont.).

ACTION	Gear/Area Conflict	Insufficient Capacity	Habitat Impacts	Safety
Action 4. Allow up to a 20% increase in vessel size from the vessel size on the original permit.	N/A	Could increase capacity.	N/A	Would increase.
Rejected Option 1. No Action. Vessel size remains at the specification on the original permit with the provision for some increase with multiple permits.	N/A	Could limit the number of vessels in the Northern Zone.	N/A	Would decrease.
Rejected Option 2. Eliminate limit on vessel size.	N/A	Could increase capacity.	N/A	Would increase.
Rejected Option 3: Establish maximum vessel size by zone.	N/A	Could increase capacity.	N/A	Would increase depending on size established.

Table 3. Summary of Environmental Consequences (cont.).

ACTION	Gear/Area Conflict	Insufficient Capacity	Habitat Impacts	Safety
Action 5. Create a sub-zone within the Southern Zone using the following area and conditions: (a) Area bounded by 81°22' to 81° 56' and 24° 15' to 24° 07'; (b) Small vessels (less than or equal to 65 feet documented length) agree to fish for golden crabs only within this sub-zone. Larger vessels agree not to fish golden crabs within this sub-zone with the understanding that they will be allowed to fish within the Northern Zone without losing ability to return to Southern Zone. It is the Council's intent that the larger vessels are free to travel between and fish in the Northern and Southern Zones; they can transit but not fish in the Middle Zone. At the end of three years, these permit holders would specify which zone they elect to fish in on a permanent basis; (c) It is the Council's intent that the sub-zone created within the Southern Zone would exist for a minimum period of 3 years. At the end of 2-3 years the Council will review these measures to determine if the exclusive fishing sub-zone should be repealed; and (d) Review production data from the area on an annual basis.	Optimal solution to gear/area conflict.	Would increase.	N/A	Would increase safety.
Rejected Option 1: No Action: Leave open the entire zone to all vessels of all sizes.	Would not be addressed.	Would not be addressed.	N/A	Would decrease safety.
Rejected Option 2. Other sub-zone options.	Would address conflict.	Would not be addressed.	N/A	Would increase safety.
Rejected Option 3: Require use of a vessel monitoring system or a trap monitoring system.	Could decrease the amount of conflict.	Would not be addressed.	N/A	Some increase in safety.

Table 3. Summary of Environmental Consequences (cont.).

ACTION	Gear/Area Conflict	Insufficient Capacity	Habitat Impacts	Safety
Action 6. Allow two new vessels to be permitted to fish only in the Northern Zone using the next two participants on the original list (used by the Council during the October 1995 Council meeting) that want to enter the fishery.	Would help address conflict.	Would increase the number of vessels.	To the extent there is interaction with habitat, there could be some increase in habitat impacts.	N/A
Rejected Option 1: No Action.	Would not address conflict.	Would not increase capacity.	None.	N/A
Rejected Option 2: Institute an auction or lottery system to add vessels to the Northern Zone.	N/A	Would increase capacity.	Could be some increase.	N/A
Action 7: Specify MSY and Status Determination Criteria.	N/A	N/A	N/A	N/A
Rejected Option 1: No Action. Do not specify MSY and Status Determination Criteria.	N/A	N/A	N/A	N/A
Action 8: Modify the framework to allow modifications to the sub-zone. Modifications include but are not limited to changing the size, timeframe, seasonality, repealing, and eligibility requirements.	None.	None.	None.	None.
Rejected Option 1: No Action.	None.	None.	None.	None.

3.0 AFFECTED ENVIRONMENT

The affected environment, including a description of the golden crab fishery in the South Atlantic Region, is presented in detail in the original Golden Crab FMP (SAFMC, 1995) and the 1999 SAFE Report (SAFMC, 1999). A description of Council concerns and recommendations on protecting golden crab habitat are also included in Amendment 1 (SAFMC, 1998a). A description of essential fish habitat for golden crabs is presented in Section 3.8.

3.1 Description of the Species and Distribution

[Note: The following text is directly from the Golden Crab Fishery Management Plan (SAFMC, 1995) and was originally taken from Erdman (1990); any references, tables, and/or figures are contained in the cited document.]

"The golden crab, Chaceon fenneri, is a large gold or buff colored species inhabiting the continental slope of Bermuda (Luckhurst, 1986; Manning and Holthuis, 1986) and the southeastern United States from off Chesapeake Bay (Schroeder, 1959), south through the Straits of Florida and into the eastern Gulf of Mexico (Manning and Holthuis, 1984, 1986; Otwell et al., 1984; Wenner et al., 1987).

Prior to its description, previous records referred to this species as either the red crab C. quinquedens or the similar gold colored C. affinis, which is endemic to the northeast Atlantic Ocean (National Marine Fisheries Service, 1986; Manning and Holthuis, 1984). Its recognition as a new species was a direct result of exploratory fishing in the eastern Gulf of Mexico in hopes of establishing a new deep-sea crab fishery in this area (Otwell et al., 1984).

Reported depth distributions of C. fenneri range from 205 m off the Dry Tortugas (Manning and Holthuis, 1984) to 1007 m off Bermuda (Manning and Holthuis, 1986). Size of males examined range from 34 to 139 mm carapace length (CL) and females range from 39 to 118 mm CL. Ovigerous females have been reported during September, October and November, and range in size from 91 to 118 mm CL (Manning and Holthuis, 1984, 1986)."

3.2 Optimum Yield

[Note: Taken from the Golden Crab FMP (SAFMC, 1995). See Action 7 for the Council's new MSY.]

Optimum yield (OY) is all golden crab that are harvested legally under the provisions of the golden crab fishery management plan which is equivalent to that level of golden crab harvested that would minimize user conflict among vessels, minimize the cost of fishing, produce a stable level of landings that would maximize returns to the fishermen, provide for a stable supply, and minimize management costs.

Information on golden crab is very limited which prevents use of a more quantitative definition of optimum yield at this time. MSY cannot be specified at this time based on the extremely limited data available throughout the South Atlantic Council's area of jurisdiction. The Council reviewed alternative specifications of OY but concluded, based on the limited data available, a simple statement of OY as the harvest resulting from the specified management regulations was the most appropriate alternative to allow the fishery to develop while protecting the biological integrity of the resource. As more data become available, the framework procedure will be used to modify the OY statement. The specified management measures protect the biological integrity of the golden crab resource by requiring escape gaps, biodegradable panels,

return of all females, and specifying a limit on fishing effort. Therefore, the Council concluded: (1) current data deficiencies make the MSY concept as a basis for specifying OY of limited value at this time, (2) the specification of OY based on the specified management regulations is based on the best available information, and (3) the specified OY is measurable.

3.3 Maximum Sustainable Yield

[Note: Taken directly from the Golden Crab FMP (SAFMC, 1995); any references, tables, and/or figures are contained in the cited document. See Action 7 for the Council's new MSY.]

"Information to calculate maximum sustainable yield (MSY) is extremely limited. Ideally, one would like to have catch and effort data for 10 years, information on size and age of the catch, fishery independent data, and information relating spawning to recruitment. If these types of data were available for golden crab, surplus production models, spawner/recruit models, and catch-at-age models (e.g., virtual population analysis) could be used to conduct a stock assessment. Faced with such a severe lack of data, the Council had no choice but to use a more simple approach relating the fishing mortality rate to the rate that would produce the maximum sustainable yield.

This is not necessarily all bad as described by Hilborn and Walters (1992: 4):

"A management authority can go about the difficult business of making choices among quantitative alternatives in three ways. First, it may simply mimic choices made under similar circumstances by other authorities under the assumption that previous decision making has already involved careful evaluation of alternatives. Second, it may make an initial choice that 'looks reasonable' on intuitive grounds, then plan to systematically vary the choice while monitoring biological and economic responses, so as to eventually find the best choice by an empirical process of trial and error. Third, it may engage in formal stock assessment, the construction of quantitative models to make the best predictions possible about alternative choices based on whatever data are available to date, and then base its choices on the models while expecting to refine or modify the choices later as more data become available. A combination of the second and third approaches, using a mixture of quantitative modeling and empirical management experimentation, has come to be called 'adaptive management' (Walters and Hilborn 1976, Walters 1986)."

The following discussion concerning MSY based on natural mortality is from an examination of reference points (RPs) for fishery management with application to straddling and highly migratory resources (FAO, 1993). The FAO document was prepared to offer technical input on practical options for management of these resources. Straddling resources includes species which occur within the jurisdiction of multiple countries and for which management should be coordinated. As such, the theory and approach is useful for golden crab which are known to occur in the U.S., Bahamas, and Cuba. In addition, the information presented below is generic to any species as it relates basic principles of population dynamics.

"New fisheries usually develop in the absence of adequate assessment information, and management has to proceed on the basis of information available at that point in time. It is important that the rate of fishing during the early stages does not exceed the rate of learning (e.g. Hilborn and Sibert 1988). A more cautious approach may result in underexploitation, but this

will not necessarily lead to a loss of potential yield (see later sections on Risk). In the 1960-70s, many new fisheries developed in different parts of the world, for which the only data on stock status was one or several estimates of biomass from exploratory fishing campaigns or fishery surveys. In an attempt to provide some basis for fleet and fishery development, a simple empirical formula for the MSY was proposed by Gulland (1973) in terms of the virgin biomass B_0 and the natural mortality rate M, notably MSY = 0.5 M B_0. (A reformulation of the second yield equation in Annex I), and follows the symmetrical Schaefer yield model in assuming that MSY will occur at half the virgin stock size B_0, and that at MSY, the fishing mortality and natural mortality rates will be equal. Later, a more cautious approach was used, and Gulland generalized the equation to MSY = x.M.B_0 with the value of x being related to the stock characteristics. Garcia et al. (1989) proposed several estimators for MSY when historical data series are not available.

There is in fact little empirical evidence that F_{MSY} = M for a majority of stocks. Beddington and Cooke (1983) suggested that x is generally smaller than 0.5, while for tropical penaeids Garcia and Lereste (1981) suggested that values x = 0.32 to 0.44 are appropriate. From a limited set of 11 stocks, Caddy and Csirke (1983) found values were bounded by x = 0.33 to at least x = 4, the lowest values being shown by short-lived shrimp and a sardine populations, and the highest by two northern demersal finfish; apical predators with low natural mortality rates. From an analysis of a series of small pelagic stocks, Patterson (1992) found that only low exploitation rates (no more than 40%) corresponding to not more than x = 0.33 are sustainable. The point of mentioning these very approximate benchmarks is that for many straddling stocks off developing coastal countries, setting 'Precautionary' RPs might still have to draw upon such procedures."

Because of the lack of both fishery-dependent and fishery-independent data from the golden crab fishery, it has not been possible to develop a MSY estimate for the golden crab fishery in the south Atlantic. A preliminary analysis was prepared with the assistance of Dr. John Merriner, NMFS SEFSC Beaufort Lab.

Preliminary MSY Analysis

Mortality estimates are available from work on the red crab off southwest Africa (Melville-Smith, 1988): Natural mortality (M) range = 0.05, 0.10, and 0.15 (see Section 3.1.6 Mortality Rates).

The biomass (B_0) of golden crab in the south Atlantic is unknown. An estimate of adult golden crab biomass for the eastern Gulf of Mexico is available (Lindberg et al., 1989). Based on research from the eastern Gulf of Mexico, adult biomass was estimated to be 13.6 million pounds (see Section 3.1.7 Abundance).

The quantity of habitat suitable to golden crab in the south Atlantic is unknown. For purposes of the preliminary MSY analysis, habitat in the south Atlantic was assumed to be equal to and two times the quantity of habitat in the eastern Gulf of Mexico.

Finally, the sex ratio was assumed to be either 1M:1F or 2M:1F. This recognizes results of research which show a higher proportion of females in the south Atlantic.

Using these estimates, maximum sustainable yield can be calculated (Table 2) using the formula:

$$MSY = 0.5\ M\ B_0$$

Table 2. Maximum sustainable yield based on estimated abundance of golden crab in the Gulf of Mexico.

Natural Mortality (M)	Total Biomass Pounds	SATL Habitat = GM MSY Sex ratio 1M:1F	SATL Habitat = GM MSY Sex ratio 2M:1F	SATL Habitat twice GM MSY Sex ratio 1M:1F	SATL Habitat twice GM MSY Sex ratio 2M:1F
0.05	13,600,000	170,000	227,800	340,000	455,600
0.10	13,600,000	340,000	455,600	680,000	911,200
0.15	13,600,000	510,000	683,400	1,020,000	1,366,800

Based on the preliminary analysis, maximum sustainable yield was estimated to range between 170,000 and 1,366,800 pounds. This information was included in the September 1995 draft fishery management plan which was reviewed by the public, attendees at public hearings, the Council's Golden Crab Advisory Panel, the Council's Scientific and Statistical Committee, and the South Atlantic Council.

SC DNR Analysis

In addition to the preliminary analysis, the Council requested Dr. Elizabeth Wenner, Mr. Glenn Ulrich, and Dr. Charles Barans from the South Carolina Department of Natural Resources examine their data from the South Atlantic Bight and provide an estimate of MSY for golden crab in the south Atlantic. The analysis provided was reviewed by the Council's Scientific and Statistical Committee, the Golden Crab Advisory Panel, and the Council. This information was also distributed to members of the public prior to the final public hearing during the October 1995 Council meeting. The complete analysis as outlined in a letter from Dr. Elizabeth L. Wenner, Mr. Glenn F. Ulrich, and Dr. Charles Barans, which was FAXED on October 11, 1995 is as follows:

"The following information is provided for use of the South Atlantic Fishery Management Council in determining standing stock estimates and MSY for Chaceon fenneri (golden crab). Since neither the true density of crabs nor their habitat distributions are known for the entire South Atlantic Bight from Cape Hatteras to Cape Canaveral or beyond, standing stock can be estimated in several ways to obtain a range of values that might be considered conservative or liberal. We are providing estimates based on an expansion of in situ crab densities from a relatively small geographic and bathymetric area to develop our first estimate. A second approach is based on trap catches and effective fishing area (EFA) within the most productive areas surveyed in 1985-86.

In the first estimate, the surface area of ocean bottom of golden crab (Chaceon fenneri) distribution was estimated from a NOAA, National Ocean Survey series of detailed bathymetric maps (transverse mercator projections) with depths contoured at 50 m intervals. Using each of the map sheets necessary between Cape Canaveral (28°30'N) and Cape Fear (34°00'N), the depth contours for 350 m and 550 m were located and visually approximated as straight lines (1 cm = 2.5 km). These depth contours were chosen because they contain most of the trapping effort, greatest catches of golden crab, and visual observations from a submersible. Flat surface area from the chart was calculated for the resulting triangular and trapezoidal figures

representing areas between the 350-550 m depths. Areas (km^2) were summed throughout the region. Using this method, a total bottom area estimated from flat map surface was 19,517.7 km^2.

From submersible observations, a density of 1.9 crabs/ha (190 crabs/km^2 averaged over several habitat types) was found by Wenner and Barans (1990) for depths of 300-600 m. Expanding to the area from Cape Canaveral-Cape Fear, an estimated number of 3.7 million crabs is obtained. This estimate is dependent on the assumption that unbiased visual observations of crabs were made from a submersible and that these density estimates are applicable to the entire area under consideration.

Based on a sex ratio of 22M:1F (3039 males, 135 females from traps; Wenner et al. 1987) for depths of 300-600 m, the standing stock of males is 3,541,124 and that of females 166,876. Assuming an average weight of 927 g (2.04 lbs) per male crab in depths of 274-549 m (Wenner et al. 1987), the total biomass of males is 7,223,893 lbs.

Using Gulland's formula, MSY = 0.5 M B_0, where MSY is maximum sustainable yield in kg, M is the instantaneous rate of natural mortality based on a range of values determined for C. maritae (Melville-Smith In press), and B_0 is the estimated total biomass of males, the following estimates of MSY from the first method are derived:

M	*B_0 (in millions)*	*MSY (millions of lbs.)*
0.05	*7.2*	*0.18*
0.10	*7.2*	*0.36*
0.15	*7.2*	*0.54*

In the second population estimate, EFA of traps (3625m^2) was calculated using the observed crab density in some of the more productive habitats from first year submersible work (0.8 crabs/1000 m^2) in conjunction with mean crab catch (2.9 crabs/trap, from 274-549 m) collected concurrently in the same areas. This assumes that EFA is the same for all geographic and depth areas where it has been applied.

The linear distance from due east of Charleston, SC to Cape Canaveral, FL along the 150 fathom (275 m) contour is 518.6 km and the average width of each 50 fathom stratum in the area where our sampling occurred was 3.7 km. An assumption that this is the average width of these depth strata for more productive areas throughout the region was made.

Depths 274 - 366 m: Area = 518.6 km x 3.7 km = 1918.8 km^2.
Depths 367 - 457 m: Area = 518.6 km x 7.4 km = 3837.6 km^2.

Total golden crabs taken in year 1 & 2 for each depth zone were divided by total number of traps set to yield the following:

274 - 366 m: 162 crabs in 59 traps = 2.7 crabs/trap.
367 - 549 m: 4147 crabs in 446 traps = 9.3 crabs/trap.

For depths 274-366, a density estimate and standing stock estimate was obtained as follows:

$\frac{2.7 \text{ crabs/trap}}{.003625 \text{ km}^2\text{/trap}} = 744.8 \text{ crabs/km}^2.$

$744.8 \text{ crabs/km}^2 \times 1918.8 \text{ km}^2 = 1,429,122 \text{ crabs}$

$1,429,122 \text{ crabs} \times 0.956(\% \text{ males}) = 1,366,241 \text{ male crabs}$

$1,366,241 \times 0.927 \text{ kg/crab} = B_0 \text{ of } 1,266,505 \text{ kg or } 2,786,311 \text{ lbs.}$

M	B_0 lbs.	MSY lbs.
0.05	2,786,311	69,658
0.10	2,786,311	139,316
0.15	2,786,311	208,973

For depths of 367-549 m, a density estimate and standing stock estimate was obtained as follows:

$\frac{9.3 \text{ crabs/trap}}{.003625 \text{ km}^2\text{/trap}} = 2565.5 \text{ crabs/km}^2.$

$2565.5 \text{ crabs/km}^2 \times 3837.6 \text{ km}^2 = 9,845,363 \text{ crabs}$

$9,845,363 \text{ crabs} \times 0.956 (\% \text{ males}) = 9,412,167 \text{ male crabs}$

$9,412,167 \times 0.927 \text{ kg/crab} = B_0 \text{ of } 8,725,079 \text{ kg or } 19,195,174 \text{ lbs.}$

M	B_0 lbs.	MSY lbs.
0.05	19,195,174	479,879
0.10	19,195,174	959,759
0.15	19,195,174	1,439,638

Total MSY estimates for Method 2:

M	274-366 m	367-549 m	Total lbs.
0.05	69,658	479,879	549,537
0.10	139,316	959,759	1,099,075
0.15	208,973	1,439,638	1,648,611

In addition to the population estimates presented here, substantial areas on the Blake Plateau may support significant numbers of crabs although a very limited number of trap sets in these areas indicates that the density is lower than in the shallower strata. In the 400-500 fathom area between 30 and 31°N, 87 traps caught 63 crabs; a mean of 0.7 crabs/trap. Additionally, in these sets males made up only about 40% of the catch.

Golden crabs also occur in the 100-150 fathom stratum and may be abundant in certain areas or at certain times. Drew Kendall of GAMAREX has reported good catch rates in these depths during some of their survey efforts. This data should be examined to determine if it can be utilized to expand the population estimates to these depths.

We hope that you will find this information useful in management proposals for golden crab. Differences in estimates of MSY between methods reflect choices of crab densities and habitat area variables for calculations. Should you need any clarification or additional information about these estimates, please give us a call."

Table 2. Summary of MSY estimates.

Preliminary Estimate	*MSY*	=	*170,000*	*to*	*1,366,800 pounds*
*SCDNR Method #1**	*MSY*	=	*180,000*	*to*	*540,000 pounds*
*SCDNR Method #2**	*MSY*	=	*550,000*	*to*	*1,650,000 pounds*

**For the area Cape Hatteras, NC to Cape Canaveral, FL only.*

The Council's Scientific and Statistical Committee reviewed the preliminary estimate and the two SC DNR estimates of MSY and were requested to address the following questions (Memorandum to SSC from Gregg Waugh dated 10/12/95):

1. What is the best available estimate of MSY for the Cape Canaveral, Florida to Cape Fear, North Carolina area?

2. What is the best available estimate of MSY for the Cape Canaveral, Florida area south? This is the area where virtually 100% of the 600,000 pounds caught thus far in 1995 have originated.

3. What are your recommendations about including a numerical estimate of MSY in the document at this time? What about a numerical estimate for the Cape Canaveral to Cape Fear area only and no numerical estimate for the entire fishery?

The SSC discussed the MSY methodology, the source of the distribution and abundance data, the need for adaptive management, and the concern that golden crabs could be easily overfished. There was concern expressed that there was not sufficient data to calculate MSY. SSC members stated that they are not speaking negatively of the information collected and complimented the researchers on their work; however, members concluded there was insufficient information upon which to calculate MSY at this time. The following motions was approved: "The SSC recommends that the Council not present current estimates of MSY in the document because we question the scientific soundness of these estimates." Their intent is that data be collected and an estimate of MSY be calculated as soon as sufficient information becomes available.

The Council's Golden Crab Advisory Panel reviewed the information concerning MSY and concluded there was not sufficient information available to estimate MSY at this time.

The NMFS SEFSC reviewed the preliminary estimate of MSY contained in the September 1995 public hearing document and concluded: "It should be emphasized that this MSY is a very rough estimate which needs to be monitored and modified as more information on the fishery becomes available." "MSY estimates on pages 40-41 (Note: referring to the September 1995 draft FMP document) are based on published data from the Gulf of Mexico and range from 0.17 to 1.37 million pounds depending upon the assumed sex ratio, comparative stock sizes, and

assumed mortality rates. There is no scientific basis for the choice of 'best point estimate of 1.4 million pounds,' (also see page 90, Option 4) (Note: referring to the September 1995 document). There is no explanation as to how this choice was arrived at. SCMRRI scientists are evaluating their research data in an attempt to provide B_0 and MSY estimates for a large portion of the U.S. South Atlantic area. Upon review of their data and the process for data expansion by Council staff, SSC, SEFSC, etc. those values may replace the estimate in Table 2, page 41 (Note: referring to the September 1995 document). It is encouraged that population estimates for the Atlantic coast area be used in the MSY calculations. Please note that sex ratios for the South Atlantic collections were quite high for males, 15:1, p.33) (Note: referring to the September 1995 document)."

The South Atlantic Council reviewed the MSY estimates, the methodology, review comments by the NMFS SEFSC, SSC, and Golden Crab AP and concluded, based upon the best available information, not to specify a total MSY for the golden crab resource within the Council's area of jurisdiction. The Council did however conclude there is sufficient information to use in making a very preliminary estimate of potential yield for the area Cape Canaveral, Florida through Cape Fear, North Carolina. The real shortcoming of the available data is the lack of any estimate for the area south of Cape Canaveral, Florida where the majority of the fishery takes place. Therefore, no estimate of MSY is specified at this time. The data collection measures specified in the management plan will generate data useful for calculating MSY. In fact, the Council requested, and NMFS has implemented, a voluntary logbook program beginning in November 1995 to start the data collection process. As soon as sufficient information becomes available to calculate MSY, the framework procedure will be used to incorporate the MSY figures into the management plan."

[Note: The following is taken directly from Appendix F in the Golden Crab SAFE Report (SAFMC, 1999) and originally from Harper and Scott (1998); any references, tables, and/or figures are contained in the cited document.]

"Preliminary Production Model Analysis

Catch and estimated effort data for the period 1986-present were fit with a non-equilibrium production model (Prager 1993) to estimate stock status relative to MSY levels. Golden crab quarterly catch in pounds for the South Atlantic region were obtained from the Accumulated Landings System for the period 1986 through October 1996. After October 1996, golden crab catch was derived from the Golden Crab Trip Report Logbook. Quarterly effort levels were estimated by dividing quarterly catch by observed CPUE (lbs per trap haul). CPUE data for 1986 were available in Erdman (1990). CPUE for the most recent period (1996-1998) were from the Golden Crab logbook reports described earlier. The production model was fit to both quarterly and annual data. However, only 3 paired annual observations of catch and effort were available, making the annual model fit of questionable value. Results of the annual and quarterly model fits depended on assumptions made about the initial biomass level. Quarterly catch and estimated effort data are provided in Table 4. For this preliminary analysis, the fishing year was defined to begin in February; thus, the first quarter of the fishing year ended in April and the last quarter ended in January. For this analysis, a total of 49 quarters of catch (February 1986 - April 1998) and 14 quarters of effort were available.

The data were first fit assuming that stock biomass was at model carrying capacity (K=2Bmsy) in January 1986. A total of 501 bootstrap fits of the model to the 14 paired catch and effort observations (Table 4) were used to estimate uncertainty in the model parameters of interest. As the model was fit to quarterly data, estimates of annual parameters, such as MSY, can be obtained by multiplying the parameters of concern by 4. From this model, current biomass is estimated to be at about that level which could produce MSY and the median estimate of annual MSY is on the order of 847,000 lbs per year (approximate 80% CI, ~650,000 - 920,000 lbs per year). The results of this fit are shown in Table 5. Recent (quarterly) fishing mortality rates were estimated to range from about 0.5 to 2 times that needed to achieve quarterly MSY. The estimated time-trajectory of relative (quarterly) biomass and relative (quarterly) fishing mortality rate are shown in Figure 5.

An alternative model was fit to the data in which initial biomass was not fixed at K, but estimated. As above, a total of 501 bootstrap fits of this model to the 14 paired catch and effort observations (Table 4) were used to characterize the uncertainty in parameter estimates. From this model, initial biomass (January 1986) was estimated to be more than twice carrying capacity, current biomass was estimated to be about 50% above that level which could produce MSY and recent fishing mortality rates ranged from about 0.25 to about 1.0 Fmsy. From this model, the estimate of annual MSY is less precisely estimated although the median estimate is on the order of 1,070,000 lbs per year (approximate 80% CI, ~707,000 - >60,000,000 lbs per year). The results of this fit are shown in Table 6. The estimated time-trajectory of relative (quarterly) biomass and relative (quarterly) fishing mortality rate are shown in Figure 6."

New Maximum Sustainable Yield Discussion

[Note: The following is taken directly from Harper, Eyo, and Scott (2000); any references, tables, and/or figures are contained in the cited document.]

"Updated Production Model Analysis

Catch and estimated effort data for the period 1986-present were refit with a non-equilibrium production model (Prager 1993) as described in Harper and Scott (1998). Golden crab quarterly catch in pounds for the South Atlantic region were obtained from the Accumulated Landings System for the period 1986 through October 1996. After 1996, golden crab catch was derived from the Golden Crab Trip Report Logbooks. Quarterly effort levels were estimated by dividing quarterly catch by observed CPUE (lbs per trap haul). CPUE data for 1986 were available in Erdman (1990). CPUE for the most recent period (1996-1999) were from the Golden Crab Logbook Reports described earlier. The production model was fit to both quarterly and annual data (annual data were compiled from the quarterly values in Table 4). However, only 5 paired annual observations of catch and effort were available, making the annual model fits more dependent upon assumptions. Results of both the quarterly and annual model fits depend upon assumptions made about the initial (1986) biomass level and for this update, we assumed that golden crab biomass was at carrying capacity at the beginning of 1986, rather than assuming the biomass was far from K. Quarterly catch and estimated effort data are provided in Table 4. For this analysis, as in Harper and Scott (1998), the first quarter of the fishing year ended in April and the last quarter ended in April of the following calendar year, resulting in a total of 56 quarters of catch (February of 1986 – January 2000) and 21 quarters of available effort information.

A total of 501 bootstrap fits of the model to the 21 paired catch and effort observations (Table 4) were used to estimate uncertainty in the model parameters of interest. As the model was fit to quarterly data, estimates of annual parameters, such as MSY or effort expected to result in MSY (f_{MSY}), can be obtained by multiplying the parameters of concern by 4. From this model, current biomass is estimated to be slightly below B_{MSY} after having increased from lower levels in the recent past while current fishing mortality is at about F_{MSY} (Figure 6). Under this model, the approximate 80% confidence range for quarterly MSY resulting from this fit to the fishery data is about 144,000 to 186,000 lbs per quarter with a median estimate of 171,000 lbs per quarter for the fishery as it has historically operated (Table 5). This yield would be expected from a quarterly effort level of about 4,800 trap hauls (~4,400 – 5,500, approximate 80% CI) within the fishing grounds the fishery has historically exploited. These quarterly estimates translate into an annual median estimate for MSY of approximately 684,000 lbs and an annual median estimate for f_{MSY} of approximately 19,000 trap hauls per year within the areas and in the manner historically fished.

Fitting the model to the 5 annual catch and effort observations data results in more uncertain estimates of stock status, although the results are similar. In this case (Figure 7) current biomass is estimated to be slightly above B_{MSY}, after having increased from a low in 1998 while fishing mortality is slightly below F_{MSY}. Under this model, the approximate 80% confidence range for annual MSY resulting from this fit to the fishery data is about 212,000 to 799,000 lbs per year with a median estimate of 673,000 lbs per year for the fishery as it has historically operated (Table 6). This yield would be expected from an annual effort level of about 22,100 trap hauls (~16,000 – 31,000, approximate 80% CI) within the fishing grounds and in the manner the fishery has historically operated. As indicated above, the quarterly estimates translated into annual estimates are more precisely determined and fall well within the confidence ranges for estimates of parameters based on annual data.

Current status and estimated uncertainty in status resulting from the production model fits relative to example limit and target control rules as outlined in Restrepo et.al. (1999) are shown in Figure 8 for the quarterly model fit and in Figure 9 for the annual model fit to the data."

The Council's specified MSY is included as Action 7.

3.4 Probable Future Condition

[Note: Taken directly from the Golden Crab FMP (SAFMC, 1995); any references, tables, and/or figures are contained in the cited document.]

"Golden crabs are a long-lived, slow growing, deep water (cold environment) species. Their reproductive biology is likely to result in periodic recruitment and their abundance in the South Atlantic Council's area is unknown. These life history characteristics suggest conservative management to prevent overfishing.

The rapid development already exhibited by this fishery is expected to accelerate in the immediate future. Southeastern fishermen continue to seek diversification opportunities to alleviate problems experienced in fisheries for traditional species, such as user group conflicts, declining resources and over-capitalization. The net ban in the State of Florida, extensive closures in New England, and large reductions in crab fisheries in the northwest could result in significant influxes of effort into the golden crab fishery. The number of vessels thought to be actively fishing increased from two vessels in January 1995 to about 37 vessels fishing as of August 1, 1995. However, data from the State of Florida and discussions with fishermen, indicate up to 80 individuals have documented landings as of April 7, 1995. An additional 33 individuals would qualify by September 1, 1995 based on data from Florida and discussions with fishermen.

Without management the golden crab resource will become rapidly overfished. This is not a species that can withstand the high fishing mortality from a fleet as large as is likely to enter the fishery."

The number of golden crab permits on November 3, 2000 were: (a) Northern Zone – 0; (b) Middle Zone – 3; and (c) Southern Zone – 4 (Source: Robert Sadler, email 11/3/00 to Gregg Waugh).

3.5 Definition of Overfishing

[Note: Taken directly from Golden Crab FMP)(SAFMC, 1995); any references, tables, and/or figures are contained in the cited document.]

"Overfishing is defined as any rate of fishing mortality in excess of F_{msy} for golden crab in the South Atlantic Council's management area."

"Data are not available to estimate fishing mortality rate at this time. Permitting and reporting requirements under this plan will allow monitoring of the catch which is necessary to calculate fishing mortality rates and evaluate overfishing. Catch and effort records and biological sampling will also be required to ensure overfishing is prevented. The framework established under this plan will allow the Council to modify the management program once fishing mortality rates are estimated. It is anticipated that a preliminary estimate of fishing mortality can be made within 3-4 years whereas a more precise estimate usually requires data over a 10-year period.

Fishermen and dealers indicated they would be more than willing to provide data voluntarily. The South Atlantic Council requested (September 1995) NMFS to immediately begin a voluntary logbook program so that valuable data and time are not lost. This program was implemented during November 1995.

The Council chose this overfishing definition because it is the one most likely to be estimated in the least amount of time after data collection begins. This definition has been used in other crab fisheries (red king crab and tanner crab) in the northwest. This definition provides a

specific, measurable definition of overfishing and as soon as sufficient biological information are collected, the National Marine Fisheries Service will conduct a stock assessment and calculate the fishing mortality rate relative to F_{msy}.

There is a possibility that the Gulf of Mexico and South Atlantic golden crab populations may be linked at least in the Florida Keys. This could occur either by adult movement from the Gulf of Mexico to the South Atlantic in the Florida Keys, or transport of larvae from the Gulf of Mexico to the South Atlantic. Little more can be said concerning this potential linkage except this possibility exists. Although the lack of information on sustainable yield raises the possibility of overfishing, similar uncertainty exists for many other Atlantic coast fisheries. In this context, the golden crab fishery is similar to many other southeastern fisheries. The important difference here is that the Council is concerned about overfishing and intends to minimize this possibility.

The Council is proposing a number of biological and managerial measures to minimize the possibility of overfishing. Specifically, the catch is limited to male crabs that have attained sexual maturity. The use of escape gaps will ensure few small crabs (females and juvenile males) are taken. Also, the number of vessels that will participate in this fishery has been limited with most vessels being allowed in the southern zone where the golden crab is only one of several resources that are exploited seasonally. In essence, the golden crab fishery appears to be an off-season species for fishermen in the Florida Keys who fish primarily for stone crab, spiny lobster, king mackerel, and snappers and groupers. Conversely, the number of vessels in the middle zone is limited because alternative fishery resources in this zone are severely limited. Fishing in the northern zone (the largest area) requires a larger vessel due to distance from shore and fishing conditions. The available data indicates the potential yield is relatively low in the northern zone. On the other hand, fishermen believe the available yield is higher. Fishermen will be encouraged to switch to this area from more southern zones both to reduce fishing pressure in the southern zones and to obtain additional information in the northern zone.

The Council has proposed a management program which is designed specifically to obtain information about the fishery, minimize user conflicts, and minimize the possibility of overfishing the resource. Additionally, a framework procedure includes the ability to implement quotas (including zero quotas), trip limits, limits on number of gear, season/area closures including spawning closures, specifying and altering the MSY and total allowable catch (TAC) once sufficient data are available, and implementing and modifying a minimum size. It is the intent of the Council that once sufficient information becomes available to estimate MSY, TAC be limited by the upper end of an acceptable biological catch (ABC) and that no limit should be placed on the lower limit of ABC. Analyses of available data will be conducted on an annual basis and detailed catch and effort data will be obtained by vessel logbooks. These measures, in addition to the measures proposed for immediate implementation, should minimize the possibility of overfishing.

Because of the longevity of the golden crab and minimal fishing pressure prior to 1995, the fishery should experience "the fishing-up effect" as described by Ricker (1975: pages 260-264) in his classic work. This effect is portrayed in Ricker's Figure 10.5 included below. The basic features of the fishing up effect is a temporary large increase in catch followed by a sustainable, but much lower level of landings. This is caused by fishing up the accumulated stock of older individuals followed by the fishery becoming dependent upon younger individuals that are recruited annually into the fishery. Fishing not only substantially changes the age structure of the

population, but also promotes compensatory growth by thinning out the population. This phenomenon, particularly the temporary nature of the large increase in landings, is poorly understood by fishermen, but is a fundamental characteristic of a population responding to fishing. It is the intent of the Council to monitor landings closely during this transitional "fishing-up" phase and establish an appropriate MSY as soon as sufficient data become available. The framework procedure, in addition to the measures proposed for immediate implementation, will be used to minimize the possibility of overfishing."

New Assessment Information

[Note: The following is taken directly from Harper, Eyo, and Scott (2000); any references, tables, and/or figures are contained in the cited document.]

"Reported Logbook Golden Crab Catches

Table 1 provides a monthly summary of the information for the 695 Golden Crab Trip Report Logbook forms which reported fishing activity. For the Middle Zone (area between 25° N. latitude and 28° N. latitude), estimated monthly golden crab catches from 538 trips completed during the entire period, November 1995 through March 2000, were 2.17 million pounds. Over the entire time period Middle Zone monthly catches averaged 41,011 pounds and ranged from 8,140 pounds for December 1998 to 84,872 pounds for May 1997 (Figure 1). Logbook report forms representing 157 trips with golden crab landings made in the Southern Zone (area south of 25°) between February 1997 and January 2000 were submitted. Southern Zone estimated golden crab catches for these reported trips were 692,327 and averaged 19,231 pounds per month over the thirty-six reported months.

Catch-per-unit-effort

The number of trap hauls reported for the 695 trips in the golden crab logbook database was 82,456 (Table 1, Figure 2). During the logbook time period the average number of traps hauled per month was 1,136 in the Middle Zone and 618 in the Southern Zone. Harper (1996) reported that golden crab catch-per-unit-effort as measured by mean catch (pounds) per trap haul was highest during the period November 1995 through March 1996. With additional trips over a longer time period available for calculations, CPUE trends appear to be exhibiting variable seasonal patterns with peak CPUE occurring in winter-spring (December through May) and lower CPUE values calculated during summer-fall (June through November). In general CPUE trends declined slightly in both the Middle and Southern zones between 1995 and 1998 (Figure 3). However, the 1999 CPUE data indicated an increasing trend, especially in the Middle Zone. Although variable, the Southern Zone 1999 CPUE rates were significantly higher than previously reported levels, with peak CPUE of 62.9 pounds per trap haul occurring during August 1999.

TIP Sampling

TIP sampling of the golden crab fishery began during May 1995. A total of 63 trips have been sampled and 10,616 golden crabs have been measured through March 2000. For the purposes of this report, all golden crabs carapace width (CW) measurements were pooled by month regardless of area fished. This pooling of data is justified based upon research indicating that there was little difference in body size and weight characteristics between Atlantic and Gulf of Mexico collected golden crab samples (Trigg el.al., 1997). Table 3 presents the monthly number of crabs measured and carapace width statistics. The overall mean carapace width of sampled golden crabs was 146.4 mm (N=10,616, std.=12.6) and ranged from 138.1 mm (N=132,

std.=12.3) during May 1998; to 157.7 mm (N=161, std.=8.3) during January 1997 (Figure 5)."
[Note: Minimum in range should be 136.1 mm (N=75, std.=11.4) during March 2000 (Table 3).]

Based upon the updated stock assessment report (Harper, Eyo, and Scott, 2000), golden crab are not overfished nor is overfishing occurring. The Council's Scientific and Statistical Committee reviewed the new MSY analyses and expressed concern, not about methodology, but the limited data and whether or not it was applicable to use the production data from a limited area to generate MSY for the entire area or even in terms of the limited area. The Council's Advisory Panel also reviewed the new MSY analyses and expressed concern about the limited data and area sampled. Advisory Panel members noted the similarities of red crab (similar longevity, slow growth rates, deep water, etc.) to golden crab and the different amount of bottom habitat available (about 14 times more bottom with golden crabs versus red crab). Based on their knowledge and experience, the Advisory Panel recommended that if a number was necessary, a range of 4 to 18 million pounds be used.

The Council's new overfishing definition is included as Action 7.

3.6 Economic Status of the Fishery

This section draws upon economic information contained in the FMP (SAFMC, 1995), the 1997 Seasonal Framework Adjustment (SAFMC, 1997), the 1999 Golden Crab Stock Assessment and Evaluation Report (SAFMC, 1999), the Economic Trends Report (Antozzi, 2000), and the 2000 Updated NMFS Assessment (Harper, Eyo, and Scott, 2000). This section describes economic aspects of the commercial fishery for golden crab in the south Atlantic region (there is no recreational fishery for golden crab).

The Golden Crab Fishery Management Plan went into effect on August 27, 1996 and established three golden crab fishing zones. The Northern Zone is defined as the EEZ north of 28 degrees N. latitude. The Middle Zone is contained within the EEZ between 25 degrees North and 28 degrees North latitude. The Southern Zone extends South from 25 degrees North latitude within the South Atlantic Council's EEZ. Federal permits are issued for a specific zone and fishing is allowed only in the zone for which the permit is issued.

In the South Atlantic region 35 vessels were granted permits to operate in this fishery (Table 9): 27 permits were issued for the Southern Zone; 6 permits were issued for the Middle Zone; and 2 permits were granted to vessels for the Northern Zone. Other management regulations imposed through the Golden Crab FMP include: dealer and vessel permitting and reporting; limitations on the size of vessels; prescribing allowable gear (including escape gaps and escape panels); and prohibiting possession of female crabs.

Official reports of golden crab landings date back to 1986 although fishermen indicated they had landed golden crab in the early 1980s. The fishery mainly occurs at depths in excess of 700 feet. Some fishermen reported they have fished for golden crab at depths up to 1,800 feet. Vessel size ranges from 34 feet to 180 feet in length. Approximately 58% of the vessels have fiberglass hulls, 32% have steel hulls and 11% have wooden hulls. These vessels are six to 27 years old. Crew size ranges from two for the smaller vessels to seven for the larger vessels. The smaller vessels operate in south Florida where the continental shelf is narrow. This makes it possible for fishermen to reach deep waters within six to ten miles offshore. Most of the vessels that fish off south Florida are also involved in the mackerel, stone crab, or lobster fisheries.

Data provided by the industry indicate that average catch per trip ranged from 150 pounds for small vessels to 8,800 pounds for large vessels in 1995. The average trip length ranged from one to seven days. The minimum gross revenue per day needed to break-even was $150 for the smallest vessel and $8,000 for the largest vessel. Also, vessel variable costs per trip ranged from $100 to $10,000. Most of the information concerning vessel fixed costs included refitting and gear costs in computing vessel fixed costs per year. Thus, this information is not representative of actual vessel fixed costs. Crew share as a percentage of gross revenue ranges from 12.5% to 60%. Between January and July 1995, the average exvessel price per pound ranged from 99 cents to $1.20. Based on these figures, the average gross revenue per trip was $8,800 for the largest vessel and $150 for the smallest vessel.

The Golden Crab logbook data from 1995 to March 2000 are summarized in Table 4. The number of trap hauls reported for the 695 reported trips was 82,456, and the average number of trap hauls per month was 1,136 in the Middle Zone and 618 in the Southern Zone (Harper, Eyo, and Scott, 2000). There is some evidence that golden crab catch per unit effort (CPUE) measured as pounds per trap haul varies by season with peak CPUE during the period December to May (Harper, Eyo, and Scott, 2000).

Table 4. Number of Trips and Landings of Golden Crab in the South Atlantic Region (Source: Harper and Scott, 1998; Harper, Eyo, and Scott, 2000).

Time Period	Zone	Number of Trips	Total Landings	Average monthly Catch
November 1995 – March 2000	Middle Zone	538	2,173,597	41,011
February 1997 - March 2000	Southern Zone	167	692,327	18,219

Monthly golden crab landings show a cyclical pattern with the greatest landings between March and July (Figure 1) when the Florida Keys' lobster fishermen enter the fishery. During the period June 1996 to May 1997 the total landings amounted to 897,000 at a total ex-vessel value of $781,000. These landings were down 46% from the previous year's harvest (June 1996 to May 1996).

Of the 35 vessels that were issued permits only about 11 have fished for golden crabs since qualifying (Appendix G of the SAFE report; SAFMC, 1999). In 1997, Antozzi (1997) reported that only five or six vessels were dedicated to harvesting this species full-time. One vessel docked in St. Petersburg, one in Ft. Lauderdale, two in Marathon Key, and one or two in the lower Keys. Seasonally about a dozen vessels fish for golden crab during the closed lobster season, March to July.

An update for 1998 indicated that only 1 vessel was operating in this fishery full time, and there was no production in the Gulf of Mexico (Antozzi, 1998). In addition, the expected boost in landings that occurred in previous summers was not observed during the summer of 1998. This is due to the fact that spiny lobster fishermen who participate in this fishery from March to July chose to pursue other fisheries or did not fish during this season.

The 2000 update (Antozzi, 2000) indicated there were 10 active permits with 7 in the Southern Zone, 3 in the Middle Zone, and none in the Northern Zone. The number of golden

crab permits active on November 3, 2000 were: (a) Northern Zone – 0; (b) Middle Zone – 3; and (c) Southern Zone 4 (Source: Robert Sadler, email 11/3/00 to Gregg Waugh).

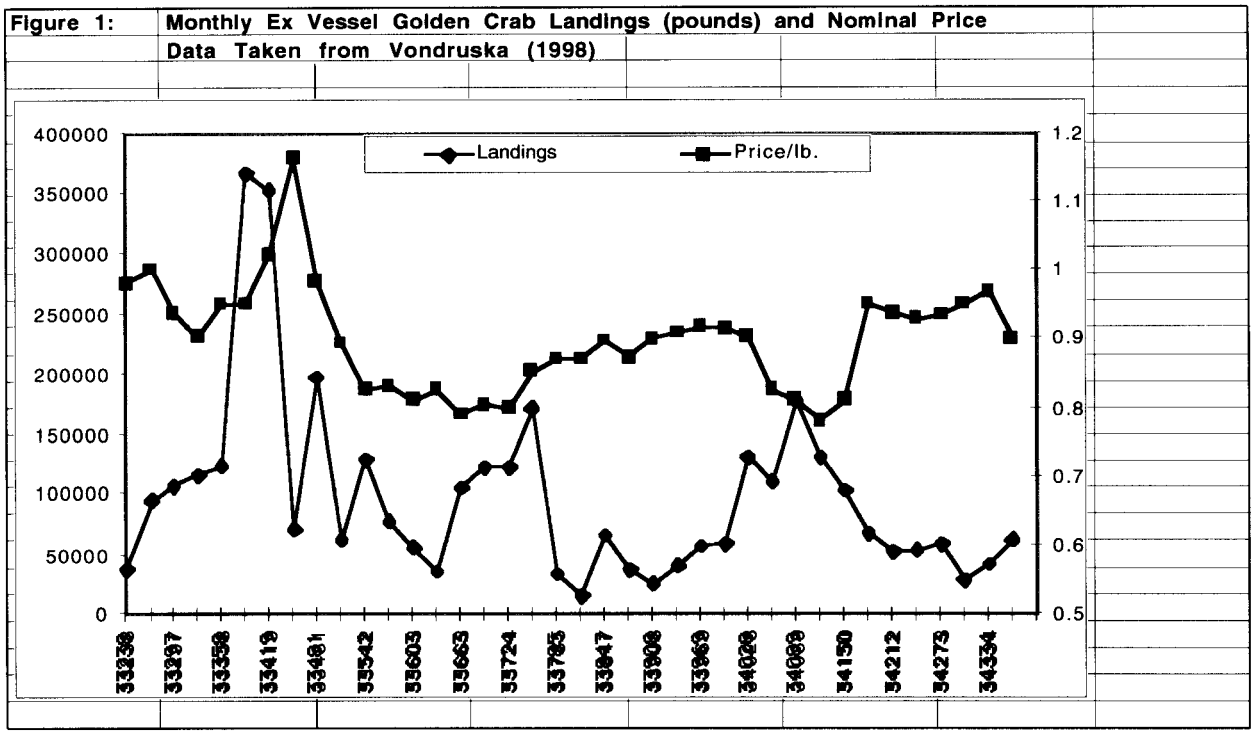

Figure 1. Monthly Ex-Vessel Golden Crab Landings (pounds) and Nominal Price (dollars) taken from Vondruska (1998). [Note: The above graph begins in January 1995 and ends in February 1998.]

Another important issue may be ex-vessel prices, which is a significant determinant of entry and exit behavior in any fishery. For golden crab, nominal ex-vessel price declined from $0.90 and $1.04 per pound in 1995 to $0.83 in 1997. This decline in 1997 is particularly noticeable considering that harvest was at higher levels in 1995 (Figure 1). Dockside prices reported in early 1998 were between 75 and 80 cents per pound. This price decrease is likely due to the increased supply of other large crabs, especially snow crab. Antozzi (2000) reported the total value of the South Atlantic and Gulf golden crab fishery was $763,000 in 1999; the average ex-vessel price for 1999 was $1.03 per pound live weight.

Golden crab is viewed in the marketplace as a substitute for snow crab clusters. Most of the product is processed into clusters, which is not as favored as other large crab species such as snow crabs. The golden crab market is strongly influenced by the wholesale market for snow crabs (Antozzi, 1998). A large proportion of the Alaskan catch of snow crab goes to Japan, and the drop in the yen in 1997 reduced the export demand for this product. The excess supply entered the U.S. market and lowered domestic snow crab prices, which may be partly responsible

for depressed golden crab prices. The increase in production from Russia and Canada also magnified this problem.

Antozzi (1997) concluded that the market for golden crab is also inhibited from expanding due to a supply constraint. He attributes this lack of production to the difficulty and cost of operating in this fishery, which requires a sizable investment in specialized gear including on-board holding facilities that keep crabs alive. This fishery takes place in deep water so trips can be lengthy under adverse sea conditions. Some industry members have stated that vessels larger than 50 feet are needed to cope with rough sea conditions offshore and to provide the stability needed for trap deployment and retrieval.

The future outlook for the golden crab market will be strongly influenced by the market supply of other large crabs, and the health of export markets. The outlook on this market would improve if this product could be viewed as more than just a substitute for snow crabs. Steady production and other product forms such as picked meat were suggested as ways to overcome this problem. However, Antozzi (1998) was of the opinion that this fall off in golden crab price may not reverse unless the Japanese economy improves.

3.7 Social Status of the Fishery

The following section is drawn from the 1995 Golden Crab FMP (SAFMC, 1995). Unfortunately, more current socio-cultural data is lacking for this fishery. At the end of this section a summary of the recent changes in the golden crab fishery of the South Atlantic is offered.

Fishing for golden crab in the South Atlantic region has been an occasional enterprise since the mid-1980s among fishermen in southeast Florida and South Carolina. Fishermen from south Florida supplemented their income by making trips to experiment with trapping golden crab by modifying fish traps used in the snapper grouper fishery. South Carolina fishermen converted longline boats and worked the deep waters of their coast traveling as far as 100 miles offshore. Because of the depth fished, strong currents, and difficulties in handling golden crab there have been obstacles to developing both the fishery and a market for this product.

In the late 1980s fishermen from south Florida developed a golden crab trap and a method of handling golden crab that seemed to provide a stable harvest. In addition, a local market developed which provided incentive for expansion of the fishery (Lindberg and Wenner, 1990). There was also interest expressed by vessels from Alaska and New England, however this never developed into a sizeable portion of the fishery.

Another major impetus to growing interest in the golden crab fishery was the regulatory action by the Council to ban the use of fish traps in 1991. The State of Florida soon followed with similar legislation. Some of the fishermen displaced by the new legislation have now substituted golden crab as their primary fishery.

The fishery has grown little in comparison to when the FMP was approved. At that time, information from fishermen suggested there were two boats fishing for golden crab in southeastern Florida. These individuals had been able to create a small, local market for their crab but wished to ensure a sustainable market over time. To do that, they encouraged others to enter this fishery in order to expand the market through increasing supply and hopefully creating more

demand for the product. There was some evidence of an expanding market due to a decline in the supply of snow crab from Alaska. Since that time, fishermen and those involved in the intermediate sector, have concluded that the golden crab is carving out its own niche in the market.

With growing interest in the fishery, the Council decided to proceed with development of a fishery management plan. Council staff continued to receive inquiries concerning this fishery with more than 30 phone calls by the end of July (1995). Because this fishery was relatively new, in that there had not been a sustainable fishery in the past, there was little socio-cultural or economic data concerning the participants. During the public hearing process, fishermen who volunteered information concerning their participation in the fishery allowed Council staff to develop a rudimentary profile of the fishery. During public hearings held in Charleston, SC; Cocoa Beach, FL; Ft. Lauderdale, FL; and Marathon, FL twenty-four individuals provided information pertaining to their fishing operations for golden crab. The following description was based upon the information they provided. The number of fishermen providing information for some characteristics will vary because individuals may not have commented on that particular aspect of their fishing operation. This description does not constitute a comprehensive overview of the golden crab fishery and should be considered an imprecise yet informative portrayal of the fishery.

The following is taken directly from Golden Crab FMP (SAFMC, 1995); any references, tables, and/or figures are contained in the cited document.

"During the public hearing process, 24 individuals indicated they had fished for golden crab in the South Atlantic (see Table 5). On average they were middle-aged and had long tenures as commercial fishermen. However, few had spent many years fishing for golden crab and only four individuals had more than five years experience in the fishery. This relative lack of experience within the fishery is evident as Table 5 indicates with an average of two years fishing experience for golden crab among those who contributed that information.

Over three quarters of those included in this profile were married and had children as shown in Table 6. Although fishing is largely a male occupation, the household unit often provides important support activity to the fishing operation by providing a ready supply of labor, procuring supplies, or other important tasks. The role of the family in the golden crab fishing operation is not fully known; it can only be assumed that the same type of support is provided by the families of golden crab fishermen. Over half of these fishermen had at least some college or attained a college degree with regard to their education level; none had attained less than a high school diploma. If these individuals are typical, then golden crab fishermen may have a slightly higher education level on average than some of their counterparts in other fisheries of the south Atlantic. The majority of individuals in this profile were captain/owners or captains. There were three crew and two owners included with one crew member and one owner providing only socio-demographic information.

Table 5. Age and tenure of fishermen among golden crab fishermen who provided information during public hearings held from August 7 through August 17, 1995.

Variable	*Minimum*	*Maximum*	*Average*	*N*
Age	*30*	*72*	*43*	*24*
Years as a fisherman	*5*	*45*	*24*	*24*
Years fishing golden crab	*0*	*10*	*2*	*24*

Table 6. Socio-demographic characteristics for golden crab fishermen who provided information during public hearings held from August 7 through August 17, 1995.

Variable	*Frequency*	*Percent*	*N*
Marital status			*n=23*
Married	*17*	*74%*	
Not married	*6*	*26%*	
Dependents			*n=24*
Has children	*18*	*75%*	
Does not have children	*6*	*25%*	
Education			*n=23*
Grade school	-	-	
Some high school	-	-	
High school graduate	*9*	*39%*	
Vocational/tech school graduate	*2*	*9%*	
Some college	*8*	*35%*	
College graduate and more	*4*	*17%*	
Status			*n=24*
Captain/owner	*13*	*54%*	
Captain	*6*	*25%*	
Crew	*3*	*13%*	
Owner	*2*	*8%*	

One feature within the fishery that has become apparent from public scoping and hearings is the dissimilar size of vessels seeking to fish golden crab (see Table 7a). The south Florida fishery has been primarily a small boat fishery with vessels ranging in size from 34 ft to 85 ft and fishing depths from 700 to 1,000 feet. With the expansion of the fishery, the participation of larger vessels has become evident as mentioned above.

Table 7a. Vessel characteristics for golden crab fishermen who provided information during public hearings held from August 7 through August 17, 1995.

Variable	*Minimum*	*Maximum*	*Average*	*N*
Boat Length (feet)	*34*	*180*	*67*	*20*
Number of crew	*1*	*7*	*4*	*20*
Maximum # of traps/vessel	*20*	*1000*	*210*	*18*
Number of traps/string	*10*	*60*	*32*	*20*

At the public hearings in 1995, there were two vessels noted, one 120 feet long and the other 180 feet long, that were geared and indicated they would most likely fish north of Cape Canaveral, Florida or at least north of Ft. Pierce, Florida. These larger vessels were to make longer trips, fish deeper water, and pull more traps. Other industry representatives indicated during the public scoping meeting and public hearings that they have or intend to outfit boats to fish for golden crab in both areas which led to early estimates of the maximum number of vessels in the fishery as possibly reaching forty (40), at that time. More recent information from the Florida trip ticket data indicated that the number of vessels is closer to thirty (30). It is still unclear as to how many vessels are actually fishing for golden crab and estimates of individuals who have landed golden crab by the April 7, 1995 control date have reached 65. Some of these individuals indicated they will fish golden crab part-time and may combine their fishing effort with others on one vessel. They intend to trap golden crab when other fisheries, like lobster, mackerel, or snapper grouper either close or offer less of an opportunity than golden crab for making ends meet. So, at this time it is difficult to determine the exact number of vessels that are actively participating in the golden crab fishery on a part-time basis.

Information from fishermen and testimony from public hearings and scoping suggests many part-time fishermen who will or have entered the golden crab fishery in the Keys and southern Florida are highliners from the lobster and stone crab fisheries. These individuals are very adept at trap fishing and will most likely contribute substantially to the landings in those areas. This movement to another fishery is part of the traditional, multi-species fishing that is practiced by the majority of fishermen in this region. Their yearly round of fishing activity encompasses several fisheries and at times different gear types. This type of behavior tends to mask the importance of a particular species on the entire fishing operation. While fishing for golden crab may not be critical to the overall fishing operation, it may supplement income when slack times occur in other fisheries which normally mean reduced income at that time of the year. The importance of this additional income to the overall household income is unknown, but could become crucial if established over time. Many of these fishermen may have once participated in fish trapping prior to the ban implemented by the Council in 1991. Their search for other fisheries to fill a void left after the fish trap ban may have led to the golden crab fishery. With increasing regulation on other fisheries, effort limitations in some, increased competition in others, and outright bans on traditional fishing practices, the number of choices for a multi-species fishery strategy is becoming smaller and smaller for fishermen. Although golden crab is not as economically significant as other fisheries, it may contribute an important part to this multi-

species approach for some fishermen. For others, it will provide full-time employment and a considerable investment in time and money.

The issues of a large vessel and a small vessel fishery and a part-time/full-time fishery are important distinctions to be considered when developing management options. There will be significant variation in crew size and gear size depending upon vessel length and its multi-species approach as seen in Table 7a.

Of the fifteen individuals who indicated the state in which their vessel was registered (Table 7b), all but three were registered in Florida. One vessel was registered in Alaska, one in Pennsylvania, and one in Virginia. The majority of vessels were constructed of fiberglass. All large boats, over 85 feet in length, were constructed of steel. Two individuals indicated their vessels were constructed of wood. No vessel in this sample was less than five years old; in fact, over 80% of the vessels included here are ten years old or older.

Table 7b. Vessel characteristics for golden crab fishermen who provided information during public hearings held from August 7 through August 17, 1995.

Variable	*Frequency*	*Percent*	*N*
State which vessel was registered			*15*
Florida	*12*	*79%*	
Alaska	*1*	*7%*	
Pennsylvania	*1*	*7%*	
Virginia	*1*	*7%*	
Vessel construction type			*19*
Steel	*6*	*32%*	
Wood	*2*	*10%*	
Fiberglass	*11*	*58%*	
Year vessel built			*18*
1975 & before	*4*	*22%*	
1976 - 1980	*4*	*22%*	
1981- 1985	*7*	*39%*	
1986 - 1990	*3*	*17%*	

Of those individuals who provided information concerning their traps, almost half used wire traps only (Table 8). Thirty-two percent or six individuals used a combination of trap types including wire, wood, plastic, and webbing. Four fishermen claimed they used the webbing type only. Rope was the preferred material for the mainline with 75% of fishermen indicating they used it solely. One individual used cable only, and four fishermen used a combination of rope and cable for their mainline.

A noticeable majority of fishermen indicated they did use escape gaps and had degradable panels on their golden crab traps. Four individuals said they did not use either, and one individual said some traps had both escape gaps and degradable panels.

Table 8. Trap characteristics for golden crab fishermen who provided information during public hearings held from August 7 through August 17, 1995.

Variable	*Frequency*	*Percent*	*N*
Trap Construction			*19*
Wire only	*9*	*47%*	
Wood only	*0*	-	
Plastic only	*0*	-	
Webbing only	*4*	*21%*	
Combination	*6*	*32%*	
Material for Mainline			*20*
Cable only	*1*	*5%*	
Rope only	*15*	*75%*	
Both	*4*	*20%*	
Biodegradable panel			*18*
Yes	*13*	*72%*	
No	*4*	*22%*	
Some	*1*	*6%*	
Escape gaps			*19*
Yes	*14*	*74%*	
No	*4*	*21%*	
Some	*1*	*5%*	
Buoys on mainline			*20*
Yes	*14*	*70%*	
No	*5*	*25%*	
Some	*1*	*5%*	

Most fishermen verified they do use buoys on their mainline, while five said they did not. One individual used buoys on some of his mainlines. The use of buoys is a function of the type of gear being used and the strength of the current. Gear that is too light can move when strong currents push buoys along making them impractical. With heavier gear, buoys are unlikely to move as easily and can be used to identify gear location. When buoys are not used, mainlines must be grappled from the bottom using loran or other locational electronics.

Little information is available concerning catch per unit of effort. However, some information does exist on one fishing operation (Lindberg and Wenner, 1990). Over a two year period approximately 75,000 lb were taken from a six square mile area with an average of about 1,000 lb per week. The vessel was fishing at depths of 118 to 125 fathoms. Catches were sustained at 100 lb per trap per week but were reduced to approximately 50-60 lb once another fishermen began to set traps near the harvesting area. It is not clear why there was such a drop in CPUE given the effort increase of only one fisherman, however, it may indicate a much larger area needed per harvester if density or abundance for this crab is low.

One of the interesting characteristics of this fishery that became apparent during public comment was the informal use of territoriality among fishermen in south Florida and the Keys. Testimony by participants in the golden crab fishery indicated fishermen have informally agreed to divide territory among themselves to avoid setting gear on top of one another. At the heart of this issue was the use of cable mainline verses rope, yet it may have important implications for controlling harvesting effort within zones. Another important aspect of this conflict that surfaced during testimony was that a number of Hispanic fishermen use cable as mainline, rather than rope. Information from fishermen in the Keys suggested that lower initial costs with cable and the lack of storage room for rope may be the primary reasons for using cable as mainline.

At this time it is not known how many fishermen participate in these informal agreements or the effectiveness of these territorial arrangements. Fishermen seem to have resolved some of the conflicts regarding gear placement, but whether this territoriality will endure and be applicable to other issues related to the fishery remains to be seen. With little information on crab density or the impact of harvesting over time on abundance, the concept of territoriality and its efficacy need to be examined. If fishermen are willing to enter into territorial use rights agreements on their own, the Council may want to consider some type of co-management of this fishery in the future. Co-management can greatly reduce the costs of enforcement and administration of fishery management if successfully implemented. The small number of golden crab fishermen and their willingness to participate in management decisions makes this fishery a good candidate for co-management."

Changes in the Fishery since 1995

The previous summary of the social aspects of the golden crab fishery dates to 1995. Since that time, no further research has been conducted concerning the social or cultural attributes of the participants in the fishery. This lack of data is unfortunate, as the low number of participants would allow a researcher complete or almost complete coverage of the existing fishery. It is suggested that a full sociocultural survey, including ethnographic observations, be conducted as soon as possible in order to fix a reliable baseline with which to measure future changes and possible social impacts due to revised regulations.

Regarding the number of participants in the fishery, it is apparent from permit records that there are far fewer fishermen pursuing golden crab then there were in 1995. At that time there was speculation that the fishery would see increased participation from Alaskan crabbers; this has not occurred, and only one Alaskan boat briefly fished in the area. Overall, there are 10 vessels that hold permits to fish for golden crab. This is a decrease from 35 vessels in 1996. As of November 3, 2000, there were 3 vessels in the Middle Zone and 4 vessels in the Southern Zone (Source: Robert Sadler, email 11/3/00 to Gregg Waugh).

According to conversations in 1999 with fishermen at both informal meetings and public hearings, participation has decreased because of the threat of gear loss and continued conflict over fishing areas. Most of the smaller boat owners in the Florida Keys made it clear at a meeting in Marathon in August, 1999, that they would not fish at all until some commitment had been made to protect their financial interest in the fishery. This attitude is traceable to the actions of one boat captain who repeatedly ignored the local fishing agreements in existence, and continued to set his crab traps over other fishermen's trap lines. This conflict has cost participation in the fishery and has led directly to the creation of Amendment 3.

The decline in participation is most dramatically felt in the northern zone, where no one currently holds a permit to fish. While initially only two vessels were permitted in 1996, fishermen feel that the northern zone has been and continues to be underutilized and some action should be taken to encourage more fishing in that area.

Finally, it should be noted that what has occurred in the golden crab fishery is an excellent example of co-management. When users of a resource – in this case the golden crab fishery – are given a role in deciding how to manage that resource, the legitimacy of the regulations is increased and thus compliance is enhanced. The golden crab fishermen have indicated what they feel is necessary for successful use of the resource, and by this proposed amendment, the Council has responded.

3.8 Ecosystem Considerations

[Note: Taken directly from the Golden Crab SAFE Report (SAFMC, 1999); any references, tables, Appendices, and/or figures are contained in the cited document. This material is being included in Amendment 3 to meet the SFA requirements to address "ecosystem management". Specific guidance has yet to be provided by NMFS.]

"Introduction

As a result of the Sustainable Fisheries Act Amendment to the Magnuson-Stevens Fishery Conservation and Management Act in 1996 the Councils and the NMFS have been mandated to use an ecosystem approach in managing the Nation's Fisheries. The Council has taken the first step with the submission of the Habitat Plan identifying and describing in detail essential fish habitat (EFH) for species managed throughout the South Atlantic and with the submission of the Comprehensive Habitat Amendment amending all existing FMP's to include descriptions of EFH and EFH-habitat areas of particular concern (EFH-HAPCs). By including an Ecosystems Considerations section in the required SAFE reports, existing data regarding the effects of a fishery on the ecosystem will be provided to the Council on a species by species basis while emphasizing the need for a new level of information. This section will also provide the Assessment Group with a forum in which to express their ecosystem concerns for a specific fishery. In addition to receiving information from the Assessment Group, anecdotal information concerning ecosystem issues has also been gathered through discussions with the Wreckfish Advisory Panel and other people familiar with the fishery and has been included in this section.

While incorporating ecosystem concerns into stock assessment reports is a new approach for this Council, this approach has been taken by the North Pacific Fishery Management Council for several years. A copy of their ecosystems chapter has been included as Appendix E and is an example of the way the ecosystem approach can be used in annual SAFE reports. Another supporting document detailing new ideas and approaches to holistic management is the report to Congress from the Ecosystem Principles Advisory Panel of the NMFS (Appendix F), appointed by the National Academy of Sciences. Congress charged NMFS with establishing this panel to assess the extent that ecosystem principles are used in fisheries management and research and to recommend how such principles can be used to improve our Nation's management of living marine resources.

Ecosystem considerations presented in the interim final rule to implement the essential fish habitat (EFH) provisions of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act).

Overview of EFH FMP Amendment Guidelines

The themes of sustainability and risk-averse management are prevalent throughout the Magnuson-Stevens Act, both in the management of fishing practices (e.g., reduction of bycatch and overfishing and consideration of ecological factors in determining optimum yield [OY]) and in the protection of habitats (i.e., prevention of direct and indirect losses of habitats, including EFH). Management of fishing practices and habitat protection are both necessary to ensure long-term productivity of our Nation s fisheries. Mitigation of EFH losses and degradation will supplement the traditional management of marine fisheries. Councils and managers will be able to address a broader range of impacts that may be contributing to the reduction of fisheries resources. Habitats that have been severely altered or impacted may be unable to support populations adequately to maintain sustainable fisheries. Councils should recognize that fishery resources are dependent on healthy ecosystems; and that actions that alter the ecological structure and/or functions within the system can disturb the health or integrity of an ecosystem. Excess disturbance, including over-harvesting of key components (e.g., managed species) can alter ecosystems and reduce their productive capacity. Even though traditional fishery management and FMPs have been mostly based on yields of single-species or multi-species stocks, these regulations encourage a broader, ecosystem approach to meet the EFH requirements of the Magnuson-Stevens Act. Councils should strive to understand the ecological roles (e.g., prey, competitors, trophic links within food webs, nutrient transfer between ecosystems, etc.) played by managed species within their ecosystems. They should protect, conserve, and enhance adequate quantities of EFH to support a fish population that is capable of fulfilling all of those other contributions that the managed species makes to maintaining a healthy ecosystem as well as supporting a sustainable fishery. Councils must identify in FMPs the habitats used by all life history stages of each managed species in their fishery management units (FMUs). Habitats that are necessary to the species for spawning, breeding, feeding, or growth to maturity will be described and identified as EFH. These habitats must be described in narratives (text and tables) and identified geographically (in text and maps) in the FMP. Mapping of EFH maximizes the ease with which the information can be shared with the public, affected parties, and Federal and state agencies to facilitate conservation and consultation. EFH that is judged to be particularly important to the long-term productivity of populations of one or more managed species, or to be particularly vulnerable to degradation, should be identified as "habitat areas of particular concern" (HAPC) to help provide additional focus for conservation efforts. After describing and identifying EFH, Councils must assess the potential adverse effects of all fishing-equipment types on EFH and must include management measures that minimize adverse effects, to the extent practicable, in FMPs. Councils are also directed to examine non-fishing sources of adverse impacts that may affect the quantity or quality of EFH and to consider actions to reduce or eliminate the effects.

(ii) EFH determination.

(E) Ecological relationships among species and between the species and their habitat require, where possible, that an ecosystem approach be used in determining the EFH of a managed species or species assemblage. The extent of the EFH should be based on the judgment of the Secretary and the appropriate Council(s) regarding the quantity and quality of habitat that is necessary to maintain a sustainable fishery and the managed species' contribution to a healthy ecosystem.

(11) Review and revision of EFH components of FMPs.

This information should be reviewed as part of the annual Stock Assessment and Fishery Evaluation (SAFE) report prepared pursuant to § 600.315(e).

Essential Fish Habitat and Essential Fish Habitat -Habitat Areas of Particular Concern

Essential fish habitat is defined in the Act as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The definition for EFH may include habitat for an individual species or an assemblage of species, whichever is appropriate within each FMP.

For the purpose of interpreting the definition of essential fish habitat: "waters" includes aquatic areas and their associated physical, chemical, and biological properties that are utilized by fish. When appropriate this may include areas used historically. Water quality, including but not limited to nutrient levels, oxygen concentration and turbidity levels is also considered to be a component of this definition. Examples of "waters" that may be considered EFH, include open waters, wetlands, estuarine habitats, riverine habitats, and wetlands hydologically connected to productive water bodies.

"Necessary", relative to the definition of essential fish habitat, means the habitat required to support a sustainable fishery and a healthy ecosystem. While "spawning, breeding, feeding, or growth to maturity" covers a species full life cycle.

In the context of this definition the term "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities. These communities could encompass mangroves, tidal marshes, mussel beds, cobble with attached fauna, mud and clay burrows, coral reefs and submerged aquatic vegetation. Migratory routes such as rivers and passes serving as passageways to and from anadromous fish spawning grounds should also be considered EFH. Included in the interpretation of "substrate" are artificial reefs and shipwrecks (if providing EFH), and partially or entirely submerged structures such as jetties.

The Habitat Plan presents the habitat requirements (by life stage where information exists) for species managed by the Council. Available information on environmental and habitat variables that control or limit distribution, abundance, reproduction, growth, survival, and productivity of the managed species is included.

Essential Fish Habitat for Golden Crab

Essential fish habitat for golden crab includes the U.S. Continental Shelf from Chesapeake Bay south through the Florida Straits (and into the Gulf of Mexico). In addition, the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse golden crab larvae. The detailed description of seven essential fish habitat types (a flat foraminferan ooze habitat; distinct mounds, primarily of dead coral; ripple habitat; dunes; black pebble habitat; low outcrop; and soft-bioturbated habitat) for golden crab is provided in Wenner et al. (1987).

Essential Fish Habitat-Habitat Areas of Particular Concern for Golden Crab

There is insufficient knowledge of the biology of golden crabs to identify spawning and nursery areas and to identify HAPCs at this time. As information becomes available, the Council will evaluate such data and identify HAPCs as appropriate through the framework.

Description of Habitat

Description of the Species and Distribution

The golden crab, Chaceon fenneri, is a large gold or buff colored species inhabiting the continental slope of Bermuda (Luckhurst, 1986; Manning and Holthuis, 1986) and the southeastern United States from off Chesapeake Bay (Schroeder, 1959), south through the Straits of Florida and into the eastern Gulf of Mexico (Manning and Holthuis, 1984, 1986; Otwell et al., 1984; Wenner et al., 1987, Erdman 1990).

Reported depth distributions of C. fenneri range from 205 m off the Dry Tortugas (Manning and Holthuis, 1984) to 1007 m off Bermuda (Manning and Holthuis, 1986). Size of males examined range from 34 to 139 mm carapace length (CL) and females range from 39 to 118 mm CL. Ovigerous females have been reported during September, October and November, and range in size from 91 to 118 mm CL (Manning and Holthuis, 1984, 1986)."

Larval Distribution & Recruitment

The following text is taken directly from Lockhart et al. (1990):

"The distribution patterns of Chaceon fenneri and possibly C. quinquedens in the eastern Gulf of Mexico suggest a causal role for the Loop Current System (Maul 1977) in basic life history adaptations. Female distribution within these species' geographic ranges and the timing of larval release supports this hypothesis. Ours was the first study to discover female golden crabs in any significant numbers and was also the first to find a major population of female red crabs in the Gulf of Mexico. Both of these concentrations of females were seemingly shifted counter-current to the Loop Current circulation. We hypothesize that this counter-current shift is linked to larval release and transport, and serves to maximize recruitment into the parent population by minimizing risk of larval flushing.

Similar counter-current shifts of other female decapods have been reported or hypothesized. In the Gulf of Mexico, spawning female blue crabs (Callinectes sapidus) have been hypothesized to undergo a late summer spawning migration in the northeastern Gulf of Mexico that is counter to the Loop Current system (Oesterling and Adams 1979). Female western rock lobsters (Panulirus cygnus) are hypothesized to undergo migration to favor recruitment back into the parent population (Phillips et al. 1979). Kelly et al. (1982) proposed that only those red crab larvae (Chaceon quinquedens) released up-current in the species' range will recruit back into the

parent population. Melville-Smith (1987a, 1987b, 1987c) in a tagging study of red crabs (C. maritae) off the coast of southwest Africa, showed that the only segment of the population exhibiting significant directional movement were adult females: 32% of recaptures had moved greater than 100 km and the greatest distance traveled was 380 km over 5 yr. This directional movement was later shown to be counter to the prevailing surface currents (Melville-Smith 1990). Thus, within decapods in general, and the genus in particular, adult females are capable of, and appear to undergo, long-distance directional movement in their lifetimes.

A similar migration of adult female golden crabs, counter-current to Loop Current circulation in the Gulf of Mexico, would produce the geographic population structure observed off the southeastern United States. Females would be most common farthest up-current whereas males would be most common intermediate in the species geographic range. Wenner et al. (1987) reported a 15:1 (M:F) sex ratio in the South Atlantic Bight and in this study, we had an overall sex ratio of 1:4 — both consistent with hypothesized net female movements to accommodate larval retention and offset the risk of larval flushing.

In fact, given this, two female strategies could maximize recruitment in a prevailing current. The first is for females to position themselves far enough up current so that entrainment would return larvae to the parent population (Sastry 1983). The second is to avoid larval entrainment altogether and thus avoid flushing of the larvae out of the system. Female Chaceon fenneri, and perhaps C. quinquedens, appear to use both strategies but rely mainly on the latter.

Female golden crabs release larvae offshore in depths usually shallower than 500 m. If larvae were released directly into the Loop Current-Gulf Stream System, they would be entrained for their entire developmental period. Given a developmental time of 33-40 d at 18°C (K. Stuck, Gulf Coast Research Laboratories, Ocean Springs, Mississippi, pers. comm.) and current speeds of 10-20 cm/sec (Sturges and Evans 1983), transport of the larvae would be 285 km to 690 km downstream. Thus, larvae released on the Atlantic side of Florida are in danger of being flushed out of the species' range before recruiting to the benthic stock. Likewise, larvae released directly into the current in the southeastern Gulf of Mexico would be flushed from the Gulf.

Female golden crabs release larvae from February to March (Erdman and Blake 1988; Erdman et al. 1989) and the greatest concentration of female golden crabs to date found in this study was in the northeastern Gulf of Mexico off central Florida. Only during this period and in this region (Maul 1977), can female golden crabs avoid complete entrainment and possible flushing of larvae out of the system. Partial entrainment of larvae might still occur, but its duration should be much reduced, and the risk of larval flushing minimal. This hypothesis predicts that most larvae should be found near the concentrations of females we found in the northeastern Gulf of Mexico with decreasing settlement further downstream. The abundance of juveniles should show a similar pattern.

One need not invoke similar counter-current movements for male geryonid crabs. In particular, males moving perpendicular to adult females (i.e. males moving up and down the continental slope) would have a greater encounter rate with females than males moving along the slope with females. Given low female reproductive frequency (Erdman et al. 1989), intense male-female competition (Lindberg and Lockhart 1988), and probability of multiple broods (Hinsch 1988) from a single protracted copulation (H. M. Perry, pers. obs.), the male strategy should be to intercept relatively rare receptive females all along the species' range, not to aggregate with

presumably inseminated females. This hypothesis would predict a relatively uniform abundance of males along their geographic range. In addition, the incidence of inseminated females should be high farthest upstream with an ever decreasing percentage down-stream. Our study supports the former hypothesis but we cannot address the latter.

The distributional patterns of geryonid crabs we observed are consistent with those reported from elsewhere. Furthermore, these patterns lead us to suggest that the Loop Current System has had a causal role in life history adaptations of Chaceon fenneri and perhaps C. quinquedens. In general, females are expected to release larvae during a time and in a region where risk of larval flushing is minimal (Sinclair 1988), whereas males are expected to compete intensely for rare, receptive mates."

The coastal physical oceanography in the Florida Keys was described by Yeung (1991) in a study of lobster recruitment:

"The strong, northward-flowing Florida Current is the part of the Gulf Stream system confined within the Straits of Florida. It continues from the Loop Current in the Gulf of Mexico, and proceeds beyond Cape Hatteras as the North Atlantic Gulf Stream.

The mean axis of the Florida Current is approximately 80 km offshore of Key West and 25 km off Miami (Lee et al. 1991). Mean annual cross-stream surface current speed in the Straits of Florida is approximately 100 cm/s (U.S. Naval Oceanographic Office 1965).

Brooks and Niller (1975) observed a persistent countercurrent near Key West extending from surface to the bottom, and from nearshore to approximately 20 km seaward. They believed that it was part of the cyclonic recalculation of the Florida Current between the Lower and Middle Keys.

The presence of a cold, cyclonic gyre was confirmed by physical oceanographic data collected in the SEFCAR cruises. It was named the Pourtales Gyre since it occurs over the Pourtales Terrace -- that area of the continental shelf off the Lower and Middle Keys (Lee et al. 1991). When the Florida Current moves offshore, the Pourtales Gyre forms over the Pourtales Terrace, and can last for a period of 1-4 weeks.

The Pourtales Gyre could entrain and retain locally spawned planktonic larvae for a short period. The combination of the cyclonic circulation and enhanced surface Ekman transport could also advect foreign arrivals into, and concentrate them at, the coastal boundary (Lee et al. 1991).

Vertical distribution of the larvae within the 3-dimensional circulation will subject them to complicated hydrographic gradients, which might influence their development time, and hence their dispersal potential (Kelly, Sulkin, and van Heukelem 1982; Sulkin and McKeen 1989). Thus, variability in the circulation features and water mass properties can lead to variability in larval transport and recruitment."

The Pourtales Gyre may provide a mechanism for entrainment of golden crab larvae spawned on the Florida east coast, and also as a mechanism to entrain and advect larvae from the Gulf and Caribbean (e.g., Cuba). This possibility is supported by the conclusion of Yeung (1991) suggesting that larvae of a foreign origin supply recruits to the Florida spiny lobster population:

"The foreign supply of pre-recruits arriving with the Florida Current might easily meet the same fate as the locally spawned larvae, that is, passing on with the Florida Current. The Pourtales Gyre may play a significant role in recruitment by providing a physical mechanism to entrain and advect larvae into the coastal boundary.

The Pourtales Gyre, even if linked with the Dry Tortugas gyre or the Florida Bay circulation, may not be able to provide a pathway much more than 2 months in period. For locally spawned Panulirus larvae to be retained for their entire development would require several circuits -- not impossible, but unlikely"

The timing of the Pourtales Gyre provides a mechanism for local recruitment of Scyllarus larvae (Yeung, 1991) and may also provide a similar mechanism for golden crab larvae. Golden crab larvae from the Gulf of Mexico, Cuba, and possibly other areas of the Caribbean, probably provide larvae to the South Atlantic population. The proportion of local recruitment is unknown but could be significant.

Feeding

Feeding habits are very poorly known. Golden crabs are often categorized as scavengers that feed opportunistically on dead carcasses deposited on the bottom from overlying waters (Hines, 1990).

Movement

Wenner et al. (1987) found in the South Atlantic Bight that: " Size-related distribution of G. fenneri with depth, similar to that reported for red crab, may occur in the South Atlantic Bight. We found the largest crabs in the shallowest (274-366 m) and deepest (733-823 m) strata. A clear trend of size-related up-slope migrations such as Wigley et al. (1975) reported for G. quinquedens is not apparent, however, because of trap bias for capture of larger crabs of both sexes. Otwell et al. (1984) also noted no pattern in size of golden crab by depth for either sex. Tagging studies of red crab off southern New England provided no evidence for migration patterns and indicated instead that tagged crabs seldom moved more than 20 km from their site of release (Lux et al., 1982)."

Lindberg and Lockhart (1993) found in the Gulf of Mexico: " The golden crab Chaceon fenneri in the eastern Gulf of Mexico exhibits a typical bathymetric pattern of partial sex zonation and an inverse size-depth relationship, as first reported for red crabs (C. quinquedens: Wigley et al., 1975; C. maritae: Beyers and Wilke, 1980). Sex segregation, with females shallower than most males, was more evident in our results than in those of Wenner et al. (1987) from the South Atlantic Bight, primarily because our trap catch had a higher proportion of females (25.9% compared to 5.2%)."

Abundance

Golden crab abundance studies are limited. Data from the South Atlantic Bight (Wenner et al., 1987) estimated abundance from visual assessment was 1.9 crabs per hectare while traps caught between 2 and 10 kg per trap. Wenner and Barans (1990) estimated the golden crab population in small areas of 26-29 square km between 300-500 m off Charleston to be 5,000-6,000 adult crabs. In the eastern Gulf of Mexico adult standing stock was estimated to be 7.8 million golden crabs and the biomass was estimated to be 6.16 million kg (13.6 million pounds) (Lindberg et al., 1989). Experimental trapping off Georgia yielded an average catch of 7 kg per trap (Kendall, 1990).

Habitats Identified in the Habitat Plan Which Constitute the Ecosystem Used by Managed Species including Golden Crab

A. Marine/Offshore Essential Fish Habitat

Marine offshore habitats include live/hard bottom, coral and coral reefs, artificial/manmade reefs, pelagic Sargassum and water column habitat. Section 3.2 presents individual detailed descriptions including species use of these habitats.

Live/Hard Bottom Habitat

Major fisheries habitats on the Continental Shelf along the southeastern United States from Cape Hatteras to Cape Canaveral (South Atlantic Bight) can be stratified into five general categories: coastal, open shelf, live/hard bottom, shelf edge, and lower shelf based on type of bottom and water temperature. Each of these habitats harbors a distinct association of demersal fishes (Struhsaker 1969) and invertebrates. The description of this essential fish habitat presented in Section 3.2.1.2, segregates the region into two sections: a) Cape Hatteras to Cape Canaveral; and b) Cape Canaveral to the Dry Tortugas. These regions represent temperate, wide-shelf systems and tropical, narrow-shelf systems, respectively. The zoogeographic break between these regions typically occurs between Cape Canaveral and Jupiter Inlet.

Covered by a vast plain of sand and mud underlain at depths of less than a meter by carbonate sandstone is relatively unattractive to fish. Live/hard bottom, usually found near outcropping shelves of sedimentary rock in the zone from 15 to 35 fathoms and at the shelf break, a zone from about 35 to 100 fathoms where the Continental Shelf adjoins the deep ocean basin and is often characterized by steep cliffs and ledges. The live bottom areas constitute essential habitat for warm-temperate and tropical species of snappers, groupers, and associated fishes including 113 species of reef fish representing 43 families of predominately tropical and subtropical fishes off the coasts of North Carolina and South Carolina.

The distribution of live/hard bottom habitat in the south Atlantic region is presented in the hardbottom maps in Section 3.2. These geographic coverage's are a compilation of the four state bottom mapping effort in the South East Monitoring and Assessment Program (SEAMAP). The Florida Marine Research Institute developed uniform ArcView coverage's of hard bottom habitat (including coral, coral reefs, live/hard bottom, and artificial reefs) as a 1998 SEAMAP program and provided it to the Council for inclusion into the south Atlantic essential fish habitat distribution data base and GIS system.

Coral and Coral Reefs

Coral reef communities or solitary specimens exist throughout the south Atlantic region from nearshore environments to continental slopes and canyons, including the intermediate shelf zones. Habitats supporting corals and coral-associated species are discussed below in groupings based on their physical and ecological characteristics. Dependent upon many variables, corals may dominate a habitat, be a significant component, or be individuals within a community characterized by other fauna. Geologically and ecologically, the range of coral assemblages and habitat types is equally diverse. The coral reefs of shallow warm waters are typically, though not always, built upon coralline rock and support a wide array of hermatypic and ahermatypic corals, finfish, invertebrates, plants, and microorganisms. Hard bottoms and hard banks, found on a wider bathymetric and geographic scale, often possess high species diversity but may lack

hermatypic corals, the supporting coralline structure, or some of the associated biota. In deeper waters, large elongate mounds called deepwater banks, hundreds of meters in length, often support a rich fauna compared to adjacent areas. Lastly are communities including solitary corals. This category often lacks a topographic relief as its substrate, but instead may use a sandy bottom, for example. Coral habitats (i.e., habitats to which coral is a significant contributor) are divided into five categories - solitary corals, hard bottoms, deepwater banks, patch reefs, and outer bank reefs. The order of presentation approximates the ranking of habitat complexity based upon species diversity (e.g., zonation, topographic relief, and other factors). Although attempts have been made to generalize the discussion into definable types, it must be noted that the continuum of habitats includes many more than these five distinct varieties.

The ecological value, function and distribution of this essential fish habitat is described in Section 3.2.1.2. The distribution of live/hard bottom habitat in the south Atlantic region is presented in the hardbottom maps in Section 3.2.

Water Column

Specific habitats in the water column can best be defined in terms of gradients and discontinuities in temperature, salinity, density, nutrients, light, etc. These "structural" components of the water column environment are not static, but change both in time and space. Therefore, there are numerous potentially distinct water column habitats for a broad array of managed species and life-stages within species.

The discussion of the ecological function of water column habitat and importance to managed species is presented in Section 3.2.3.2.

Detailed Golden Crab Habitat Description

Based on exploratory trapping, golden crab maximum abundance occurs between 367 and 549 meters in the South Atlantic Bight. Information on sediment composition suggest that golden crab abundance is influenced by sediment type with highest catches on substrates containing a mixture of silt-clay and foraminiferan shell. Wenner et al. (1987) further notes: "Other studies have described an association of G. quinquedens with soft substrates. Wigley et al. (1975) noted that bottom sediments throughout the area surveyed for red crab from offshore Maryland to Corsair Canyon (Georges Bank) consisted of a soft, olive-green, silt-clay mixture. If golden crabs preferentially inhabit soft substrates, then their zone of maximum abundance may be limited within the South Atlantic Bight. Surveys by Bullis and Rathjen (1959) indicated that green mud occurred consistently at 270-450 m between St. Augustine and Cape Canaveral, FL (30°N and 28°N). This same depth range from Savannah, GA to St. Augustine was generally characterized by Bullis and Rathjen (1959) as extremely irregular bottom with some smooth limestone or "slab" rock present. Our study indicates, however, that the bottom due east between Savannah and St. Catherines Island, GA at 270-540 m consists of mud and biogenic ooze. Further north from Cape Fear, NC to Savannah, bottom topography between 270 and 450 m is highly variable with rocky outcrops, sand and mud ooze present (Low and Ulrich, 1983)."

In a subsequent study using a submersible, Wenner and Barans (1990) found the greatest abundance in rock outcrops:

Observations on density and a characterization of essential habitat for golden crab, Chaceon fenneri, were made from a submersible along 85 transects in depths of 389-567 m approximately 122 km southeast of Charleston, South Carolina. Additional observations on habitat were made on 16 transects that crossed isobaths between 293-517 m.

Seven essential habitat types can be identified for golden crab from observations:

- *A flat foraminiferon ooze habitat (405-567 m) was the most frequently encountered habitat. This habitat type is characterized by pteropod-foraminiferan debris mixed with larger shell fragments, a sediment surface mostly covered with a black phosphorite precipitate;*

- *Distinct mounds, primarily of dead coral at depths of 503 to 555 meters and constituted 20% of the bottom surveyed on dives to count crabs. Coral mounds rose approximately 15 to 23 meters in height above the surrounding sea floor and included several that were thinly veneered with a fine sediment and dead coral fragments, as well as a number that were thickly encrusted with live branching ahermatypic corals (Lophelia prolifera and Enallopsammia profunda). Fan-shaped sponges, pennatulids and crinoids were oriented into the northerly 1.4-1.9 km- h^{-1} current. The decapod crustaceans Bathynectes longispina, Heterocarpus ensifer and Eumunida pita, the black-bellied rosefish, Helicolenus dactylopterus, and the wreckfish, Polyprion americanus, were frequently sighted along transects in the coral mound habitat.*

- *Ripple habitat (320-539 m); dunes (389-472 m); black pebble habitat (446-564 m); low outcrop (466-512 m); and soft-bioturbated habitat (293-475 m). A total of 109 C. fenneri were sighted within the 583,480 m^2 of bottom surveyed. Density (mean no. per 1,000 m^2) was significantly different among habitats, with highest values (0.7 per 1,000 m^2) noted among low rock outcrops. Lowest densities were observed in the dune habitat (<0.1 per 1,000 m^2), while densities for other habitats were similar (0.15-0.22 per 1,000 m^2)."*

A similar submersible study in the eastern Gulf of Mexico (Lindberg and Lockhart, 1993) found similar results with higher abundance on hard bottom: "Within the bathymetric range of golden crabs, crab abundance may be related more to habitat type than to depth. The greatest density (36.5 crabs/ha) occurred on or near hard-bottom canyon features."

Golden crab occupy offshore oceanic waters along the Atlantic and Gulf of Mexico coasts as adults. Offshore areas used by adults are probably the least affected by habitat alterations and water quality degradation. Currently, the primary threat comes from oil and gas development and production, offshore dumping of dredged material, disposal of chemical and other wastes, and the discharge of contaminants by river systems.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

This section covers five major areas of concern in the golden crab fishery: (1) gear regulations; (2) vessel permitting and size regulations; (3) refinements to golden crab area zoning; (4) adding vessels in the Northern Zone; and (5) modifications to the framework. Each issue addressing these concerns will be stated as a proposed management action, and its alternative actions will follow. Following each action is a summary of the expected biological, economic, and social impacts from each action.

Based on public hearing input, the Council has finalized their management actions. All other options considered are included under the heading "Rejected Options". The Council considers these choices to be final under the Magnuson-Stevens Act. The public will have an additional opportunity to comment on the federal register notice on the amendment and on the proposed rule. Should the Council need to change an action, the amendment would come back to the Council for additional consideration.

4.2 Management Options

4.2.1 Action 1. Extend the use of wire cable for mainlines through December 31, 2002.

Use of cable for main lines was extended for one year in Framework Action #1 dated September 1997 and was to expire on January 31, 1999. This period of use was to be evaluatory and transitional in nature (Framework Seasonal Adjustment #1; SAFMC, 1997). During comments on the proposed rule the Council requested cable be allowed through December 31, 2000. The final rule was published on November 28, 1998 and extended through December 31, 2000, the authorization to use wire cable for a mainline attached to a golden crab trap.

Biological Impacts

Habitat damage from use of cable for the mainline is a concern. Use of rope for mainline can also potentially result in habitat damage. However, coral and live bottom habitat is limited in the deep water mud areas fished and the Council took action in the FMP to minimize any habitat damage by requiring that traps be fished in depths greater than 700 feet.

Fishermen have stated cable is not currently being used in the Middle Zone. There has been no fishing in the Northern Zone. In the Southern Zone only one fishermen has reported using cable in the past. During public hearings in 1995, fishermen indicated that one individual used cable mainlines and four individuals used rope and cable in the Southern Zone. Habitat damage from the anticipated level of use would appear to be limited. However, if numerous fishermen begin using cable mainlines, the biological impact will be considered further.

Economic Impacts

The preferred option is to extend the use of wire cable for mainlines for two years on a trial basis. Currently, there are no vessels using wire cable, however there was some interest expressed by current participants to explore this possibility. If this proves to be more cost effective then there would be economic benefits from this action.

Social Impacts

When the 1995 FMP for golden crab was written, the majority of fishermen used rope for mainline and buoy lines. Reduced costs associated with gearing up seems to be the main reason for using cable mainlines. Cable is used in other fisheries by certain fishermen and is easily adapted to their golden crab fishing operation. Rope may also present a storage problem, especially with smaller boats that do not have adequate room for storage space. Without the proper storage facilities, rope coiled on the deck presents a safety risk that some fishermen are not willing to take.

Because the fishery in the Southern Zone has not been fully operable since late 1998 and 1999, it would make sense to extend the authorization to use cable mainlines for a longer time, thus testing the viability of such gear. In the past, some fishermen requested that cable not be allowed stating its absence would reduce the opportunity for conflict. Cable when laid over rope can result in lost traps as it cuts the line while the rope mainline is being hauled up. Now that new area fishing regulations are being considered for the Southern Zone, cable versus rope may not pose the same problem as it once did.

Conclusion

The Council concluded the proposed action is necessary to allow for a full evaluation of the use of cable in the golden crab fishery. The Council's Advisory Panel unanimously supported this action. In addition, public hearing comments supported this action. The Council considered extending use of cable for buoy lines but declined to do so based on safety issues raised by the Coast Guard.

Rejected Options for Action 1:

Rejected Option 1. No Action. Allow the use of cable for trap mainlines until December 31, 2000.

Biological Impacts

To the extent there are habitat impacts, such impacts would cease after December 31, 2000.

Economic Impacts

When the measure to consider the use of cable for trap mainline was approved and extended it only affected one vessel in the golden crab fishery. The Advisory Panel indicated that this vessel is not currently operating in the fishery. If the use of wire mainlines expired on December 31, 2000 there would no additional cost to the current vessels operating in this fishery. However, there would be foregone benefits since some vessel owners are interested in exploring the use of wire cable.

Social Impacts

The social impacts follow closely along the economic impact discussed above. However, by not allowing the trap fishermen to fully explore the practice of using cable mainlines, potential benefits may not be realized.

Conclusion

The Council rejected this option because it would not allow a thorough evaluation of the use of cable in the golden crab fishery and because it would negatively impact fishermen who wish to use cable.

4.2.2 Action 2. Escape panel or door on traps must measure at least 11 7/8 inches by 11 7/8 inches.

The current specification is 12 inches by 12 inches. Traps are constructed of 2 inch mesh and fishermen cut openings 6 meshes by 6 meshes which would appear to meet the 12 inch by 12 inch requirement. However, the inside opening measures slightly below 12 inches which would make the traps illegal. Fishermen could cut 7 meshes by 7 meshes but this would weaken the trap. The Council's original intent would be met with the revised measurement of 11 and 7/8 inches.

Biological Impacts

None because this size would continue to allow golden crabs to escape.

Economic Impacts

The purpose of the escape panel or door is to allow golden crabs to escape from traps and reduce mortality from lost traps continuing to fish (ghost fishing). This measure will not change how the fishery presently operates, since this is in reality the dimensions of the escape panel when the 2 inch mesh is cut in 6x6 meshes. Thus, there should be no change in economic benefits.

Social Impacts

The main reason to adjust the size of the escape panel opening is to better reflect the size of currently manufactured mesh in net sizes. By allowing the size to reflect this reality, less burden is put upon the fisherman. There is a positive social benefit realized by making a regulation fit the reality of the fishery, thereby lessening tensions between the fishermen and law enforcement officers.

Conclusion

The Council's Advisory Panel unanimously supported this action. In addition, public hearing comments supported this action. The Council concluded the 11 and 7/8 inches by 11 and 7/8 inches requirement meets the intent of the original specification contained in the Golden Crab FMP.

Rejected Options for Action 2:

Rejected Option 1. No Action. Require that the escape door or panel on one of the vertical sides be at least 12 inches by 12 inches.

Biological Impacts

None because this size would continue to allow golden crabs to escape.

Economic Impacts

The no action option requires that the escape door or panel on one of the vertical sides be at least 12 inches by 12 inches. Currently, in this fishery the escape panels are close to these measurements, and there would be additional cost to modify the gear to meet these minimum requirements.

Social Impacts

If fishermen are required to refit their traps based on a technicality that has no clear biological benefit (1/8 x 1/8 inch difference in the escape door panel) a point of legitimacy for Council action will be lost. On such small differences, if an action can be taken that will benefit the fishermen, one should proceed in that fashion, and accrue positive social impacts, even if it is hard to measure quantitatively.

Conclusion

The Council rejected this option because the proposed action reflects actual mesh sizes and better clarifies the Council's intent.

4.2.3. Action 3A. Remove the 5,000 Pound Harvest Requirement for Renewing the Biannual Permit. In addition, permit holders in the Southern Zone not meeting the 5,000 pound requirement by October 2000 are to be granted permits as long as they met the previous 5,000 pound requirement applied October 1998.

Action 3B. Permits are to be renewed on or before six months into the next fishing year.

Biological Impacts

Biological impacts are expected to be minimal but will include the effect of continued or increasing harvest occurring because more boats will continue from year to year because they will no longer be excluded based on the 5,000 pound harvesting requirement.

Economic Impacts

This would allow vessels that cannot meet the current 5,000 pound annual landings qualification criterion to operate in this fishery. As expressed by members on the Advisory Panel, it is sometimes difficult for small vessels to meet this requirement every year. Also, for some vessels golden crab may be a fall back fishery during seasons when catches of other more valuable species are low. Thus, this action would allow some vessels to operate profitably during low harvest periods in other fisheries. Making this modification will allow more vessels to stay in the fishery which is necessary to ensure sufficient product to supply and maintain the markets.

Social Impacts

Removing the 5,000 pound annual landings qualification will better serve those fishermen who, due to lack of clear regulations and conflict within the golden crab fishery, have not fished regularly in the past two years. Worried about losing their gear due to area conflicts in the Southern Zone, they have waited for Council action before setting their traps again. By removing

the landings qualification, fishermen who are dedicated to the golden crab industry will have a chance to fish and build the industry. Excluding these fishermen would pose a setback to the golden crab fishery as a whole.

The additional qualification to allow those meeting the previous 5,000 pound requirement on October 1998 to continue fishing will preserve the Council's original intent of repealing the landings requirement and still allow for fishery participants to continue fishing. This action will have positive social impacts by not excluding Southern Zone fishermen who have been the most affected by conflicts.

Conclusion

The Council originally used the 5,000 pound requirement in to reduce the number of permits, particularly in the Southern Zone. The number of permits, transfers, and landings are shown below in Table 9. There are now no vessels in the Northern Zone and the Council is adding two new vessels (see Action 6) in the Northern Zone and allowing larger vessels in the Southern Zone to fish in both the Northern and Southern Zones (see Action 5). In addition, the number of vessels in the Southern Zone has decreased from 27 in 1996 to 7 active permits as of October 1999; two vessels are still eligible to renew from 1998. There are currently (as of November 1, 2000) 4 active permits in the Southern Zone with one additional vessel still eligible to renew.

The Council concluded the 5,000 pound requirement for permit renewal is no longer necessary. In fact, the requirement is having a negative impact on the number of participants in the fishery. Unless a certain level of effort (landings) is maintained, the market structure that has been developed will be negatively impacted. The Council's Advisory Panel unanimously supported this action. In addition, public hearing comments supported this action.

The Council concluded the Southern Zone permit holders that would be excluded based on the 5,000 pound requirement applied in October 2000 (currently estimated to be 3-4 vessels) should be granted permits in order to maintain sufficient fishing effort in the Southern Zone. Also, the sub-zone under Action 5 is being developed to provide protection for permit holders that have not been able to fish since October 1998 and these permit holders will likely be excluded before the 5,000 pound waiver would become effective. Therefore, these permits should be reissued in order to meet the objectives of the FMP and this amendment.

Requiring permits to be renewed on or before six months into the next fishing year should provide fishermen adequate time to renew while fixing a period in time when the universe of qualified vessels would be known. The Council concluded this action is necessary to effectively manage the golden crab fishery and achieve the stated objectives.

Rejected Options for Action 3:

Rejected Option 1. No Action. Maintain the annual 5,000 pound harvest requirement for renewing the permit.

Biological Impacts

Biological impacts could include an increase in stocks because there would be fewer boats fishing as a result of the harvest requirement.

Economic Impacts

This would exclude vessels that cannot meet the qualification criterion from participating in the fishery, for example vessels that operate part-time in the golden crab fishery. Of the 35 vessels that were granted permits only 11 have reported landings since the fishery became a limited entry fishery. In 1998 thirteen vessels met this requirement to renew their permits: 0 in the Northern Zone; 3 in the Middle Zone; and 7 in the Southern Zone (Table 9). As of November 1, 2000, 7 vessels met this requirement: (a) Northern Zone – 0; (b) Middle Zone – 3; and (c) Southern Zone – 4. Reducing the number of vessels in the fishery would have negative impacts on the golden crab market structure.

Table 9. Number of Golden Crab Permits and Transfers, and Landings in the South Atlantic Region (Source: Ed Burgess, NMFS SERO Permits Office, pers. comm.; Harper and Scott, 1998; Harper, Eyo, and Scott, 2000; Robert Sadler, NMFS SERO, email 11/3/00).

FISHING ZONE	INITIAL ISSUANCE	AUTO RENEWAL	NOT RENEWED (REPORTING NON-COMPLIANCE)	VESSELS MEETING CATCH REQUIREMENT TO RENEW	VESSELS RENEWED	VESSELS RENEWED
	(1996)	(1997)	(1997)	(1998)	(1998)	(2000)
NORTHERN ZONE	2	1	1	0	0	0
MIDDLE ZONE	6	4	2	3	3	3
SOUTHERN ZONE	27	23	4	10	7	4
TOTAL VESSELS	35	28	7	13	10	7

NUMBER OF GOLDEN CRAB PERMIT TRANSFERS	
YEAR	NUMBER
1997	2
1998	2
1999	0
2000	1 (2 for 1)

GOLDEN CRAB LANDINGS					
FISHING ZONE	1995*	1996	1997	1998	1999
NORTHERN ZONE	0	0	0	0	0
MIDDLE ZONE	61,660	523,160	661,896	354,416	443,765
SOUTHERN ZONE	0	0	372,551	156,836	158,662
TOTAL LANDINGS	61,660	523,160	1,034,447	511,252	602,427

*November & December only.

Social Impacts

The number of vessels currently participating in the golden crab fishery has declined markedly in the past two years due to various reasons, with conflict over fishing grounds being the most outstanding cause. If the fishery is to reach its potential and the necessary infrastructure is to be created and maintained, more fishermen are needed in the fishery. By qualifying which vessels are to be permitted, without considering which ones could and could not fish in the past two years, may leave many out of the fishery. This will have a negative social impact upon the smaller, part-time operators in the Southern Zone, and perhaps on those wishing to renew in the Middle or Northern Zones.

Conclusion

The Council rejected this option because it would continue to reduce the number of permitted vessels in the Southern Zone resulting in negative impacts on the fishery as a whole. In addition, this action would not meet the objectives of the fishery management plan.

Rejected Option 2. Alternative renewal dates: (a) Permits are to be renewed prior to the start of the next fishing year; (b) Permits are to be renewed prior to the end of the next fishing year; and (c) Apply one of the above time restrictions to permit renewal and add the requirement that renewal must be accompanied by a previous year's catch of a minimum of 5,000 pounds.

Biological Impacts

None.

Economic Impacts

Since the length of time that the vessel can operate in the fishery is not affected by the date of renewal, there should be no economic impact from Options 2(a) and 2(b). However, renewing permits before the start of the fishing year could facilitate enforcement of fishing regulations. Any one of the other time restrictions may or may not impact enforcement and data collection. Sub-option (c) would have negative economic impacts on vessels that cannot meet the 5,000 pound permit renewal qualification (see discussion under Rejected Option 1).

Social Impacts

The positive impact from sub-option (a) is that enforcement would be enhanced, thus facilitating the smooth operation of the fishery. Sub-option (b) would delay the permitting until the end of the fishing year and thus would hinder both enforcement and data collection necessary for monitoring development of the fishery. This impact would therefore be negative. Sub-option (c) would have a negative impact on the fishery in that it would ban from fishing those participants who have borne the negative consequences of previous conflicts in the fishery.

Conclusion

The Council rejected these options because the proposed action better addresses the issue of capacity and permit renewal.

4.2.4. Action 4. Allow up to a 20% increase in vessel size from the vessel size on the original permit.

The Council's intent with this action is to allow permit holders to increase their vessel size by 20% over the current provisions resulting from implementation of Framework Adjustment #1 which allow for an increase in vessel size with multiple permits. Length refers to the vessel's documented length.

Biological Impacts

If larger vessels were able to fish more (stay at sea longer or fish more days given weather limitations) than the vessels currently in the fishery, there could be some increase in catch.

Economic Impacts

This action would allow permit holders to purchase larger vessels. If current vessel size limits participants in the fishery from operating in certain areas due to safety concerns or ease of operating gear, then this measure would likely result in increased economic benefits to the fishery. Industry members have stated that this measure will not increase total harvesting capacity beyond what the resource can sustain.

Social Impacts

Allowing the permit holders to increase their vessel size by 20% gives more freedom to permit holders to direct their fishing behavior. A 20% increase in the vessel size will improve safety in the work environment and may make working traps a bit easier. Having more freedom to self-direct behavior and increase the quality of the work environment are important factors in determining professional satisfaction, and so this action is seen to have positive social benefits for the fishermen.

Conclusion

The Council's Advisory Panel unanimously supported this action. In addition, public hearing comments supported this action. The Council concluded this increase is necessary to address vessel safety concerns raised by participants in the Southern Zone. This action should improve safety in the work environment and may make working traps easier and safer.

Rejected Options for Action 4:

Rejected Option 1. No Action. Vessel size remains at the specification on the original permit with the provision for some increase with multiple permits.

Biological Impacts

None.

Economic Impacts

This would restrict vessels from fishing certain areas if vessel size is a limiting factor. Some industry members stated that vessels larger than 50 feet are needed to cope with rough conditions at sea to consistently harvest golden crabs (Antozzi, 1998). Of the 39 vessels initially granted permits in this fishery, 15 were below 50 feet in length (SAFMC, 1997).

Social Impacts

Not having the choice of buying a new vessel or being able to continue pursuing a fishery puts an unfair burden upon the permit holder. It may decrease safety and comfort during fishing trips. It may also exacerbate any conflict between the owners of differently sized vessels by prohibiting any resolution of the gap between "large boats and small boats".

Conclusion

The Council rejected this option because it would not address vessel safety concerns raised by participants in the Southern Zone and it is not in the best interest of the continued viability of the fishery.

Rejected Option 2. Eliminate limit on vessel size.

Biological Impacts

If larger vessels were able to fish more (stay at sea longer or fish more days given weather limitations) than the vessels currently in the fishery, there would be some increase in catch.

Economic Impacts

If existing vessel size limits prevent vessels from fishing in certain areas due to safety concerns, then this measure would likely result in increased economic benefits to the fishery. However, this measure could result in increased harvesting capacity and increased competition with the small vessels.

Social Impacts

By eliminating restrictions on permitted vessel sizes, competition and conflict may increase. At this time the owners of smaller vessels feel that large vessels present unfair competition even in a limited access fishery such as golden crab. If vessel size is clearly limited however by zone, this may decrease conflicts and assure a more equitable opportunity for exploiting the resource.

Conclusion

The Council rejected this option because it would allow too large an increase in vessel size within the Southern Zone.

Rejected Option 3. Establish maximum vessel size by zone.

Biological Impacts

If larger vessels were able to fish more (stay at sea longer or fish more days given weather limitations) than the vessels currently in the fishery, there would be some increase in catch.

Economic Impacts

Without specific size limits it is difficult to determine the economic impact of this option.

Social Impacts

This option may either increase or decrease conflict in the fishery. Large vessels would be prohibited from fishing in smaller boat zones, but the small boats could go in both their own zone and into larger boat zones. This option seems to distribute rights inequitably, and so would negatively impact large boat owners, while perhaps benefiting small boat owners.

Conclusion

The Council rejected this option in favor of the proposed action because there is no need for a limit on vessel size in the Northern Zone and the 20% increase addresses the vessel safety concerns raised by participants in the Southern Zone.

4.2.5. Action 5. Create a sub-zone within the Southern Zone using the following area and conditions:

A. Area (Figure 2): 81° 22' to 81° 56'
24° 15' to 24° 07'

B. Small vessels (less than or equal to 65 feet documented length) agree to fish for golden crabs only within this sub-zone. Larger vessels agree not to fish golden crabs within this sub-zone with the understanding that they will be allowed to fish within the Northern Zone without losing ability to return to Southern Zone. It is the Council's intent that the larger vessels are free to travel between and fish in the Northern and Southern Zones (Figure 3); they can transit but not fish in the Middle Zone. At the end of three years, these permit holders would specify which zone they elect to fish in on a permanent basis.

C. It is the Council's intent that the sub-zone created within the Southern Zone would exist for a minimum period of 3 years. At the end of 2-3 years, the Council will review these measures to determine if the exclusive fishing sub-zone should be repealed.

D. Review production data from the area on an annual basis.

This area and these conditions were agreed to by all Southern Zone permit holders during a September 27, 1999 meeting. It is the Council's intent that the sub-zone system would exist for a minimum period of 3 years; however, the Council intends to review the situation at the end of year two, which would include evaluating production data from the area, to ensure the area is being actively fished. For enforcement purposes, the Council requests that the zones vessels are allowed to fish within be indicated on their permit along with the vessel size.

Biological Impacts

None.

Economic Impacts

One of the major issues in this fishery is the conflict between large vessels and the small vessels fishing in the Southern Zone. This conflict has resulted in loss of gear and loss in revenue due to the fact that some vessels were unable to operate and retrieve gear in the Southern Zone. If these measures resolve this conflict then there would be an increase in economic benefits to small vessels fishing in this sub-zone.

Social Impacts

There are clear social benefits to this option. Because the option would nearly eliminate conflict between large and small boats, it would address the problems that have kept the small boats from fishing in late 1998 and 1999. The option is also one that has been developed by the fishermen themselves, and so would further the practice of co-management, thereby benefiting the facilitation of the policy-making process and enhancing compliance. However, a negative social impact may be experienced by the larger boat owners who see their exclusion from any fishing zone to be to their detriment and impacting their fishing success.

Conclusion

The Council's Advisory Panel and other industry participants developed this action. In addition, public hearing comments supported this action. The Council concluded establishment of this sub-zone was the most effective and efficient mechanism to solve the conflict issue and prevent future gear damage and losses in the Southern Zone. Allowing vessels in the Southern Zone to fish in the Northern Zone (Action 4) provides the larger vessels in the Southern Zone an opportunity to explore a new area while the smaller vessel owners in the Southern Zone determine whether or not they can fish the Southern Zone in an economically sustainable fashion. This action provides for efficient use of the harvesting capacity present in the fishery while addressing the conflict problem. The 65 foot specification is a break-point for using larger traps and hydraulic gear. Ultimately, the Council wants vessels to select either the Northern Zone or Southern Zone. If no vessels choose to fish in the Northern Zone, the Council can determine, in the future, how to encourage vessels to fish in the Northern Zone.

The sub-zone goes into effect on the effective date published in the final rule. With regard to the 2-3 years specified in Action 5, it is the Council's intent that the evaluation period for the sub-zone begins when the zone is legally in effect and the traps within the area removed such that the smaller vessel fishermen can fish within the sub-zone.

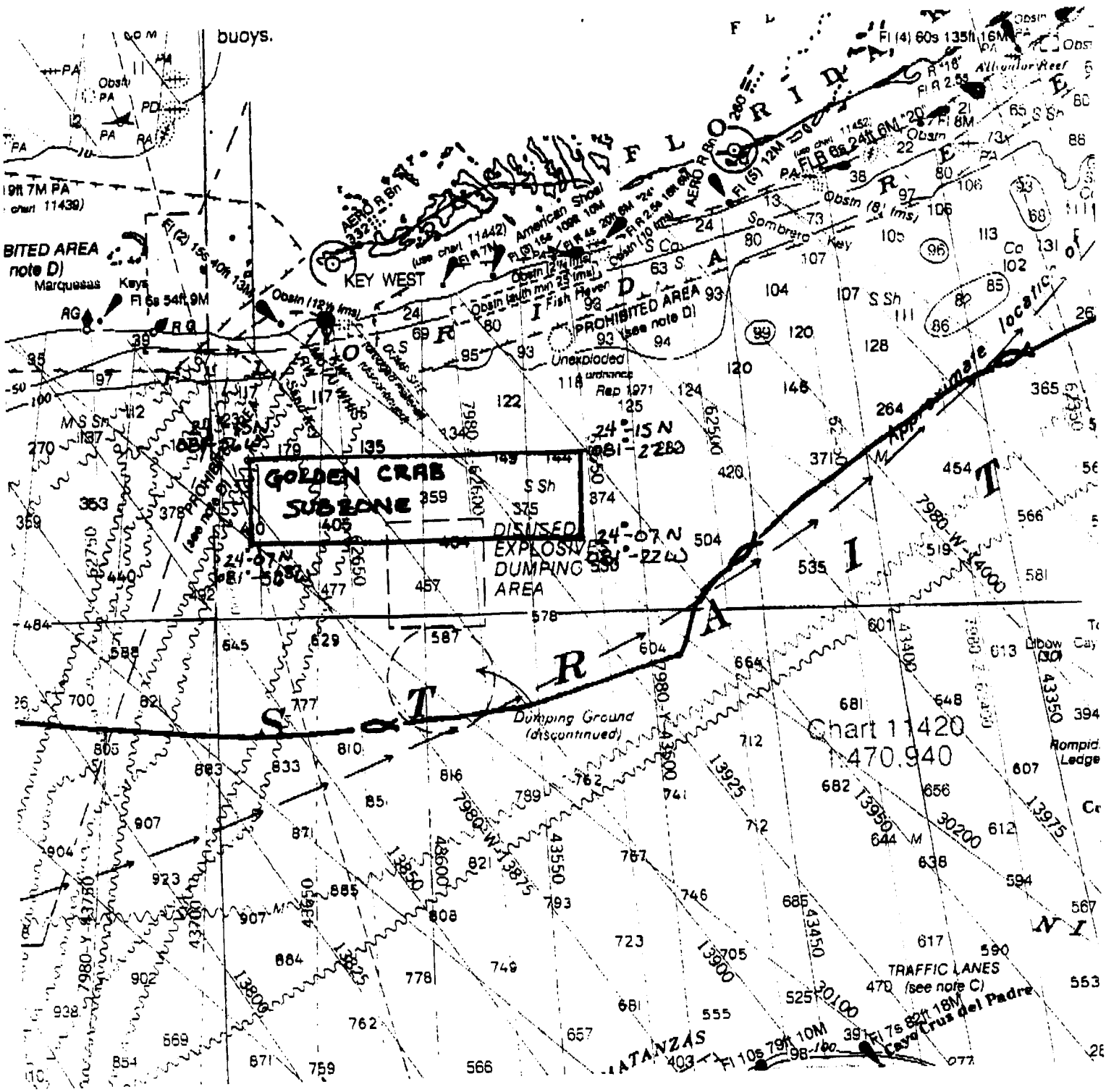

Figure 2. Chart of the proposed sub-zone.

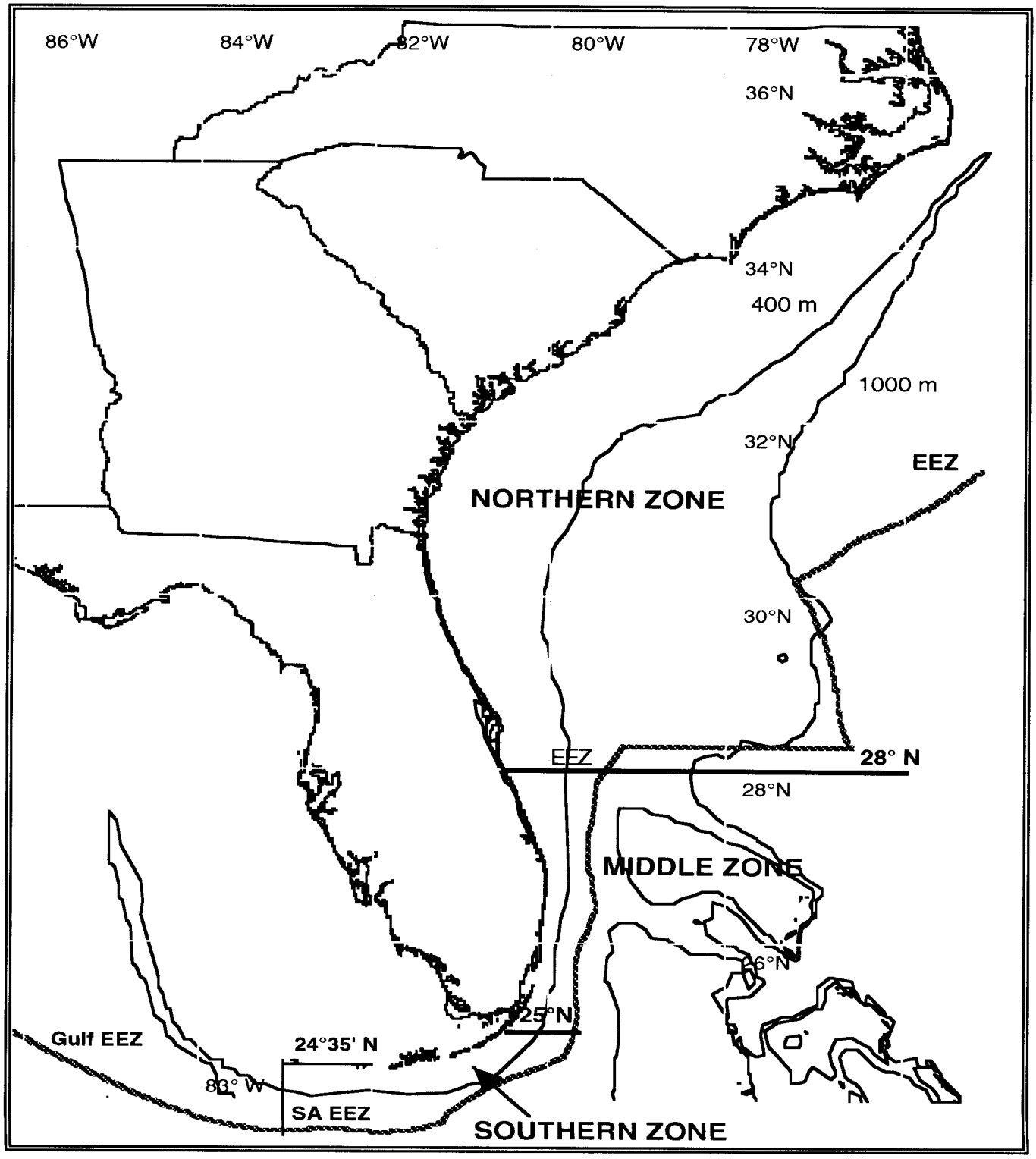

Figure 3. Map of the South Atlantic Council's area of jurisdiction with the proposed zones.

Rejected Options for Action 5:

Rejected Option 1. No action. Leave open the entire Southern Zone to all vessels of all sizes.

Biological Impacts

None.

Economic Impacts

The gear conflict in the Southern Zone has resulted in loss of gear and loss in revenue due to the fact that some vessels are unable and unwilling to deploy and fish gear in the Southern Zone. In particular, one vessel has posed a problem to other vessels that have operated cooperatively throughout this zone. This conflict needs to be resolved in order for economic benefits to be optimized. The continued loss of this production could result in the loss of the one processor handling golden crabs in the Florida Keys.

Social Impacts

Leaving open the entire Southern Zone to all vessels would negate all efforts of fishermen to regulate and extricate themselves from the current and perceived conflict that now exists in the Southern Zone. The negative impacts would be: 1) fishermen's eroding trust in the Council and in the management process; 2) many small boat fishermen would not fish for golden crab, resulting in a loss of income for these fishermen and product for the established markets; and 3) the golden crab fishery would not develop in the way it has been proposed it develop. Linked to these impacts, the reduced overall catch would negatively impact those fish dealers that hope to expand their operations to include golden crab on a regular and dependable basis.

Conclusion

The Council rejected this option because it would not solve the conflict problem.

Rejected Option 2. Other sub-zone options.

A. Create a sub-zone and divide it into six different mini-zones. Boat size and previous history of landings from the logbook database would limit which boats participate. Fishermen would report their fishing locations to a third party, such as NMFS. When one mini-zone is taken, fishermen may decide which of the remaining mini-zones they will use and report it to NMFS. When done fishing or when a boat moves its traps, the same reporting procedure must be followed.

Variations:

1. The sub-zone would hold its integrity for a full twelve months.
2. The sub-zone would hold its integrity for a limited time, such as May through August.
3. The fishermen do not report to NMFS or any other third party. Reporting of fishing areas would be dealt with internally among the boats permitted to work in the mini-zone.

B. Create a sub-zone but do not subdivide it. The fishermen will report their fishing activities amongst themselves as they have done in the past, thus avoiding conflict. Boat size and previous history of landings will limit which boats participate.
Variations:

1. The sub-zone would hold its integrity for a full-twelve months.
2. The sub-zone would hold its integrity for a limited time, such as May through August.

Biological Impacts

None.

Economic Impacts

Under Scenario A., there would be some additional administration cost to NMFS from managing this area. At this time it is not possible to determine whether this is likely to optimize economic benefits.

Under Scenario B., there will be no additional administration cost since fishermen will be coordinating usage in this sub-zone. At this time it is not possible to determine whether this is likely to optimize economic benefits.

Social Impacts

Scenario A. This is a much more complicated version of the Preferred Action. It is based upon a traditional system of dividing the fishing territory among smaller vessel owners. The main drawbacks to the option are that it is more complicated and restrictive than the other option, thus creating more possibility of misunderstandings. It relies upon constant reporting of location of traps and assumes that all fishermen will be diligent in removing traps from one mini-zone at regular intervals. It may further foment conflict among the participants if one boat has larger catches in one particular area, and may increase conflict between small and large boat owners. Some of the conflicts may be mitigated by employing one or more of the variations above, for example, limiting the territory to a particular time of use would allow large boats in to fish the area, and lessen resource distribution inequity.

Scenario B. This is a reasonable action in that it allows fishermen of the sub-zone to create their own solutions to the problem of fishing conflict. However, this action does not address how disagreements over which boats will qualify for fishing in this sub-zone will be settled nor does it address issues of enforcement.

Conclusion

The Council rejected these options in favor of the proposed action because the proposed action is simpler and more easily enforced.

Rejected Option 3. Require use of a Vessel Monitoring System and/or a Trap Monitoring System.

Create a system where each boat and/or trap line is equipped with a monitoring device and their position can be monitored by a third party such as NMFS.

Biological Impacts

None.

Economic Impacts

There would be some costs incurred for the vessel monitoring system, and administrative costs for NMFS or another party to monitor the vessel location and coordinate fishing activities. At this time it is not possible to determine whether this is likely to optimize economic benefits. This option may reduce some of the economic losses from gear conflict. In addition, there would be some costs incurred for the electronic device to locate the traps.

Social Impacts

As mentioned under Economic Impacts, there will be a monetary cost attached to this proposal. Aside from the financial impact imposed on the fishermen and NMFS, fishermen are reluctant to accept such a system which they see as overly intrusive. Furthermore, a VMS would not solve the problems of gear conflict, as the system would be monitoring the boats and not the traps, however, a trap monitoring system would address the gear conflict.

This would be a near-perfect solution to the problem of gear conflict for all the boats, except for the cost that would be incurred initially and subsequently when the system needs to be maintained. Fishermen, in previous discussions, were wary of this proposed action both for the possible incurred costs and the actual feasibility of the idea.

Conclusion

The Council rejected this option in favor of the proposed action because the proposed action is simpler and less costly to the industry.

4.2.6. Action 6. Allow two new vessels to be permitted to fish only in the Northern Zone using the next two participants on the original list (used by the Council during the October 1995 Council meeting) that want to enter the fishery.

The list used in October 1995 was prioritized based on pounds landed without reference to a specific zone. It is the Council's intent that those originally receiving permits would be deleted from the list and the process would begin with the two individuals having the highest level of landings. The two permits would be offered to these two individuals and if they accepted, the permits would be awarded. If either of them decline, then the next individual would be eligible and so on until the two permits are awarded. If the entire list is used without awarding the two permits, the Council will explore methods to add vessels via an amendment to the plan.

It is the Council's intent that vessel size not be limited in the Northern Zone. Transfers are permitted but if a vessel transfers back to the Southern Zone, they must meet the vessel size limit.

Biological Impacts

There are no vessels permitted to fish in the Northern Zone. Information on the population of golden crab in this area is limited and if fishing were ongoing, data could be collected for eventual use in defining maximum sustainable yield. The proposed level of effort in the Northern Zone should not result in overfishing in the Northern Zone.

Economic Impacts

This situation could increase economic benefits in this fishery, if the Northern Zone can sustain higher harvest levels. Granting of permits to the next two participants on the list who are interested in fishing this zone may have a higher probability of maximizing economic benefits.

Social Impacts

If the golden crab fishery is to develop and survive in the marketplace, then there must be a steady supply of crab. Because no boats are fishing currently in the Northern Zone it would be beneficial to direct interested fishermen to that zone.

As to which is better, a lottery (Rejected Option 2) or using the existing list in order to choose who fishes in which zone (Action 6), there appear to be no negative or positive effects from either action.

Conclusion

The Council concluded additional vessels are necessary for optimum yield to be achieved and decided not to limit vessel size due to vessel safety and economic efficiency concerns. The Council's Advisory Panel unanimously supported this action. In addition, public hearing comments supported this action. This level of harvest will not result in overfishing and will provide data to eventually calculate a more accurate MSY. The Council is allowing only two new vessels and vessel transfers from the Southern Zone initially to be conservative. If the data indicate that additional vessels can be supported in the Northern Zone, the Council will amend the plan to add more vessels.

The Council considered the NMFS' suggestion to establish a cap on pounds harvested in the Northern Zone or a cap on effort (number of trap hauls or traps per vessel) in the Northern Zone but concluded the data available was too limited to establish such limits. In addition, the Council concluded the conservation measures in place provide sufficient biological protection for the golden crab resource. The Council's action to allow two new vessels in the Northern Zone plus the vessels that may transfer from the Southern Zone will not provide such a large catch in a short time such that negative impacts to the resource would result. Limiting the pounds or trap hauls or traps would provide a disincentive to vessels fishing in the Northern Zone. The Council will monitor landings and if actions becomes necessary, the framework will be used to implement appropriate limits.

Rejected Options for Action 6:

Rejected Option 1. No Action.

Biological Impacts

Without data from the Northern Zone, MSY estimates will continue to be imprecise and some assumption will have to be made about potential yield.

Economic Impacts

This situation may not optimize economic benefits if vessels wanting to fish the Northern Zone are prohibited and the fishery can sustain higher landings.

Social Impacts

If the situation remains as it is now, conflict will increase in the Southern Zone.

Conclusion

The Council rejected this option in favor of the proposed action because the proposed action provides the necessary data collection to better manage the fishery which will allow the achievement of optimum yield.

Rejected Option 2. Institute an auction or lottery system to add vessels to the Northern Zone.

Biological Impacts

There are currently no vessels permitted to fish in the Northern Zone. Information on the population of golden crab in this area is limited and if fishing were ongoing, data could be collected for use in refining the estimate of maximum sustainable yield. The proposed level of effort in the Northern Zone would need to be limited to prevent overfishing.

Economic Impacts

An auction would result in the granting of fishing rights for the Northern Zone to vessels that have the greatest interest or the highest expected value for this zone. This method may be the most economically efficient way to manage this zone, however it may not result in an equitable distribution of economic benefits.

The lottery system chosen to add new permits to this fishery should give all vessels equal probability of participation in the Northern Zone, however vessels chosen at random may not be equipped to fish in the northern zone, and or the owners may have no interest in fishing this zone.

Social Impacts

If rights are not granted equitably, this action will promote further conflict within the fishery.

Conclusion

The Council rejected the lottery or auction options in favor of the proposed action because the proposed action is more equitable and addresses vessels that initially expressed interest in the fishery but did not qualify for entry.

4.2.7. Action 7. Specify MSY and Status Determination Criteria.

In the South Atlantic Council's area of jurisdiction, Maximum Sustainable Yield (MSY) for golden crab is estimated to range between 4 and 12 million pounds.

A Maximum Fishing Mortality Threshold (MFMT) – In the South Atlantic Council's area of jurisdiction, overfishing for golden crab is defined as a fishing mortality rate (F) in excess of the fishing mortality rate that produces maximum sustainable yield (F_{MSY}).

A Minimum Stock Size Threshold (MSST) – In the South Atlantic Council's area of jurisdiction, the minimum stock size threshold for golden crab is defined as a ratio of current biomass ($B_{current}$) to biomass at MSY or (1 - M)*B_{MSY}, where 1 - M should never be less than 0.5. Golden crab would be overfished if current biomass ($B_{current}$) was less than MSST and would be recovered when current biomass was equal or greater than the biomass at MSY.

The Sustainable Fisheries Act requires Councils to manage fishery resources based on MSY as a limit to optimum yield (OY) and maximum fishing mortality threshold (MFMT) as a limit to fishing mortality rate. Stocks should also be maintained above the minimum stock size threshold (MSST). "The Technical Guidance Document" and "The Checklist for FMP Amendments" were developed by NMFS to assist in meeting the new requirements. Following the checklist, golden crab are "Data-poor: Reliable estimates of MSY-related quantities are unavailable, as are reliable estimates of either current stock size or certain critical life history or fishery parameters. Control rules typically involve parameters such as M, historical average catch, etc. Stock assessments are minimal, and measurements of uncertainty may be qualitative rather than quantitative."

In the SFA Comprehensive Amendment (SAFMC, 1998b) the Council indicated MSY was unknown, did not change OY (see Section 3.2), did not change the overfishing level (see Section 3.5), and concluded that no rebuilding timeframe was necessary at the time. The Council's SFA Comprehensive Amendment was partially approved on May 19, 1999. Portions of the amendment addressing the MSY and Status Determination Criteria (SDC) were rejected but the current measures remain in place.

In the 1999 Report to Congress on the Status of Fisheries of the United States (NMFS, 1999), NMFS concluded that golden crab are not overfished based on the fishing mortality rate; they indicated that the biomass-based overfishing component is undefined; that the biomass-based overfished level is unknown; and that golden crab are not approaching an overfished condition.

Data for golden crab are very limited and available resources within the NMFS do not allow sufficient data collection. In addition, the NMFS is interpreting the Magnuson-Stevens Act to require an estimate of Maximum Sustainable Yield (MSY) and biomass-based overfishing components for every species in every management plan. While NMFS recognizes the data do not exist to provide the necessary stock assessment and scientific information to allow the Council to develop such estimates, it is their legal and policy determination that such values must be specified. The Council/NMFS Annual Operations Plan lists the data/analytical needs for golden crab.

The Council also considered the following range of options:

A. MSY Options:

1. MSY = 650,000 — 920,000 pounds
2. MSY = 707,000 — >60,000,000 pounds
3. MSY = 170,000 — 1,366,800 pounds
4. MSY = 180,000 — 540,000 pounds
5. MSY = 550,000 — 1,650,000 pounds

B. MFMT Options:

1. Fmsy
2. F30%SPR

C. MSST Options:

1. MSST = the larger of 0.5Bmsy or (1-M)Bmsy
2. MSST = 1,000,000 pounds

Biological Impacts

None.

Economic Impacts

Specification of MSY and the status determination criteria by themselves will not have an impact on the fishery. However, management measures taken to prevent the fishery from exceeding these overfishing thresholds will have an impact on economic benefits.

Social Impacts

Specifying a MSY based on the limited data could result in an unrealistically low MSY which could prevent expansion of harvest. Such a cap would increase stress on fishermen and result in negative social impacts.

Conclusion

Much of the management of golden crab is based on the closely related red crab. The original fishery management plan contains the detailed information about red crab. In discussing an appropriate MSY for golden crab, the Council again considered information available on the red crab. The MSY estimate suggested for red crab in the northeast in 1977 was 5.5 million pounds (Serchuck, 1977). The estimated MSY "may have been revised downward in recent years to about 4 million pounds (Source: Letter from Vaughn Anthony, NMFS NEFSC dated January 12, 1994). The Council's Advisory Panel indicated that the amount of area yielding golden crab was about 14 times that yielding red crab. They suggested a MSY of 4 to 18 million pounds which was scaled up from the red crab estimate based on their knowledge of the area yielding golden crab. The Council approved a range of 4 to 12 million pounds, reduced from the upper limit of 18 million pounds suggested by the Advisory Panel in order to be more risk averse while still allowing full development of a sustainable and viable fishery.

The updated assessment provided by NMFS included an annual MSY estimate of 673,000 pounds (212,00 – 799,000 pounds; 80% CI) and an estimate of 171,000 pounds (144,000 – 186,000 pounds; 80% CI) based on quarterly catches. The Council discussed these estimates but rejected them because they were based on catches from only a small portion of the

fishery. The Council's Scientific and Statistical Committee expressed concern about the limited data and applicability of production-based estimates from just a portion of the fishery. In addition, the Council concluded using one of these estimates would have resulted in a limit on landings that would have prevented proper development of the fishery and achievement of OY and the fishery management goals.

The Council's Advisory Panel indicated that such a low estimate of MSY would prevent further development of the fishery. Based on their experience, the Advisory Panel indicated that a 100 foot vessel would require 1 million pounds to operate economically, a 120' to 130' vessel would require 1.5 million pounds, and a 180' vessel would require 3 million pounds.

The Council is not relying on MSY to manage the fishery. The Council's biological measures (no harvest of females, escape gaps, escape panels, etc.) provide adequate protection to prevent overfishing at this time. The Council is specifying the above levels to meet the NMFS/NOAA policy/legal interpretation of the Magnuson-Steven Act. The Council will monitor the fishery and if reductions are necessary, the framework process will be used.

Rejected Options for Action 7:

Rejected Option 1. No Action. Do not specify MSY and Status Determination Criteria.

Biological Impacts

None.

Economic Impacts

Specification of MSY and the status determination criteria by themselves will not have an impact on the fishery.

Social Impacts

None.

Conclusion

The Council rejected no action because NOAA GC has interpreted this as being illegal and without these specifications, the amendment would be rejected.

4.2.8. Action 8. Modify the framework to allow modifications to the sub-zone. Modifications include but are not limited to changing the size, timeframe, seasonality, repealing, and eligibility requirements.

It is the Council's intent that all other existing framework provisions could apply within the proposed sub-zone. Timeframe refers to the length of time the sub-zone is in place and eligibility requirements refer to the vessel size break (currently specified as 65 feet).

Biological Impacts

None.

Economic Impacts

None.

Social Impacts

Would have a positive social impact in that the Council will be more efficient and effective in responding to the needs of fishing participants.

Conclusion

This would allow the Council to modify the sub-zone through the framework process rather than a plan amendment. This should allow changes to be effective more quickly and further the co-management aspects of this fishery.

Rejected Options for Action 8:

Rejected Option 1. No Action.

Biological Impacts

None.

Economic Impacts

None.

Social Impacts

Would have a negative social impact in that the Council would not be efficient and effective in responding to the needs of fishing participants.

Conclusion

The Council rejected no action because this would not allow the Council to address issues regarding the sub-zone through the framework process.

4.3 Research Needs

Needs for further research include the biological research needs listed in the 1995 FMP (SAFMC, 1995), and should be amended to include economic and social research needs as shown in the annual NMFS/Council Operations Plan, SAFE Report, and this amendment.

Golden Crab Research Needs: Golden Crab FMP (SAFMC, 1995)

The following research needs (Items 1-8 taken from Lindberg and Wenner, 1990) are listed in no particular priority order:

1. Recruitment processes and life history strategy.
2. What are the settlement patterns of juveniles with respect to depth? What are the subsequent development and mortality rates, and how do they vary across depths?
3. Growth rates. Accurate, detailed molt staging should be incorporated into future sampling regimes, while controlled laboratory experiments to test effects of ecological variables are particularly desirable.
4. Reproductive cycle. Age at first reproduction is poorly known. Comparative studies and experimentation are needed to resolve questions of this basic life history trait.
5. Seasonal movements, encounter rates among potential mates and competitors, movement by mated pairs, and takeover attempts all need to be documented to test golden crab mating strategies.
6. Habitat preferences. Basic ecological questions concerning physiological ecology, refuges and foraging habits, trophic dynamics and community relationships remain largely unanswered.
7. Home ranging versus nomadism needs to be examined.
8. Questions of basis physiology of deep-dwelling organisms, biogeography and systematics, or parasitology and symbiosis.

Additional fishery management related items include:

9. Estimate potential yield.
10. Document economic and social information of fishermen and dealers.
11. Document information on market structure, development, and consumer acceptance of product.
12. Determine whether there is any substitutability with other crustaceans.
13. Identification of existing bottom habitat suitable for golden crabs in the South Atlantic Council's area would be useful.
14. Biodegradable panel research - determine the rate at which specified material degrades and evaluate materials/methods to meet objective of degrading within 14-30 days.
15. Bioprofile sampling - data on size, molt and reproductive status, etc.
16. Gear impacts and refugia.

4.4 Unavoidable Adverse Effects

The proposed actions discussed in Section 4.2 are not expected to result in any substantial unavoidable adverse effects (See Summary of Regulatory Impact Review and the discussion under each action item for more details). In fact, it is expected that these actions would likely result in increased economic benefits:

ACTION 1. Extend the use of wire cable for mainlines through December 31, 2002. Currently, there are no vessels using wire cable, however there was some interest expressed by current participants to explore this possibility. If this proves to be more cost effective then there would be economic benefits from this action.

ACTION 2. Escape Panel or Door on traps must measures at least 11 7/8 inches by 11 7/8 inches. This measure will not change how the fishery presently operates, thus, there should be no change in economic benefits.

ACTION 3. Remove the 5,000 Pound Harvest Requirement for Renewing the Biannual Permit. In addition, permit holders in the Southern Zone not meeting the 5,000 pound requirement by October 2000 are to be granted permits as long as they met the previous 5,000 pound requirement applied October 1998. Permits are to be renewed on or before six months into the next fishing year. This would allow vessels that cannot meet the current 5,000 pound annual landings qualification criterion to operate in this fishery, and is likely to increase short-term economic benefits.

ACTION 4. Allow up to a 20% increase in vessel size from the vessel size on the original permit. If current vessel size limits the fishery from fishing in certain areas due to safety concerns, then this measure would likely result in increased economic benefits to the fishery.

ACTION 5. Create a sub-zone within the Southern Zone using the following area and conditions:

(a) Area (Figure 2): 81°22' to 81° 56'
24° 15' to 24° 07'

(b) Small vessels (less than or equal to 65 feet documented length) agree to fish for golden crabs only within this sub-zone. Larger vessels agree not to fish golden crabs within this sub-zone with the understanding that they will be allowed to fish within the Northern Zone without losing ability to return to Southern Zone. It is the Council's intent that the larger vessels are free to travel between and fish in the Northern and Southern Zones (Figure 3); they can transit but not fish in the Middle Zone. At the end of three years, these permit holders would specify which zone they elect to fish in on a permanent basis.

(c) It is the Council's intent that the sub-zone created within the Southern Zone would exist for a minimum period of 3 years. At the end of 2-3 years the Council will review these measures to determine if the exclusive fishing sub-zone should be repealed.

(d) Review production data from the area on an annual basis.

If these measures resolve the conflict in the Southern Zone then there would an increase in net economic benefits in this fishery.

ACTION 6. Allow two new vessels to be permitted to fish only in the Northern Zone using the next two participants on the original list (used by the Council during the October 1995 Council meeting) that want to enter the fishery. This situation could increase economic benefits in this fishery if the Northern Zone can sustain viable harvest levels.

ACTION 7. Specify MSY and the status determination criteria, which by themselves will not have an impact on the fishery. However, management measures taken to prevent the fishery from exceeding these overfishing thresholds will affect economic benefits.

ACTION 8. Modify the framework to allow modifications to the sub-zone. Modifications include but are not limited to changing the size, timeframe, seasonality, repealing, and eligibility requirements. This action will not have an impact on the fishery.

4.5 Relationship of Short-term Uses and Long-term Productivity

Short-term uses will be positively impacted. The Council concluded that the proposed actions would result in net benefits to society.

4.6 Irreversible and Irretrievable Commitments of Resources

There are no irreversible or irretrievable commitments of resources associated with the proposed actions.

4.7 Effects of the Fishery on the Environment

4.7.1 Damage to Ocean and Coastal Habitats

The proposed actions, and their alternatives, are not expected to have any adverse effect on the ocean and coastal habitats. Identification of sensitive bottom habitat (*Oculina*, *Lophelia*, and *Emallopsamia* coral) will aid fishermen in avoiding damage to these areas.

The fishery, as presently prosecuted, does not substantially impact the bottom habitat that is essential to golden crab under Council management. The Council will continue to monitor the fishery and if it becomes apparent that a particular gear or fishing practice results in habitat damage, action will be proposed through the framework procedures to mitigate or minimize damage.

4.7.2 Public Health and Safety

SEC. 301. NATIONAL STANDARDS FOR FISHERY 16 U.S.C. 1851CONSERVATION AND MANAGEMENT 104-297:
(10) Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

Due to issues of conflict between fishermen and concerns over the minimum vessel size necessary to safely carry out the capture of golden crab, the Council is compelled to address such issues in order to promote the safety of human life at sea.

The proposed actions, and their alternatives, are not expected to have any substantial adverse impact on public health or safety. In fact, the measures addressing conflict, use of cable, and increasing vessel size will increase public health and safety.

4.7.3 Endangered Species and Marine Mammals

The Council has determined that the proposed management measures in Amendment 3 will not adversely affect federally-listed endangered or threatened species, or their critical habitat, under NMFS purview. Current participants do not buoy their traps which eliminates any potential interaction similar to that which occurs with American lobster buoy lines.

4.7.4 Cumulative Effects

The proposed actions, and their alternatives, are not expected to result in cumulative adverse effects that could have a substantial effect on the golden crab resource or any related stocks, including sea turtles or marine mammals.

4.8 Public and Private Costs

Preparation, implementation, enforcement, and monitoring of this and any federal action involves expenditure of public and private resources which can be expressed as costs associated with the regulation. Estimated costs are shown below:

Council costs of document preparation, meetings, public hearings, and information dissemination	$50,000
NMFS administrative costs of document preparation, meetings, and review	$10,000
NMFS law enforcement costs	$0
Total	$60,000

4.9 Effects on Small Businesses – Threshold Analysis

Introduction

The Regulatory Flexibility Act requires a determination as to whether or not a proposed rule has a significant impact on a substantial number of small entities. If the rule does have this impact then an Initial Regulatory Flexibility Analysis (IRFA) has to be completed for public comment. The IRFA becomes final after the public comments have been addressed. If the proposed rule does not meet the criteria for "substantial number" and "significant impact" then a certification to this effect must be prepared.

This proposed rule, if promulgated, will :

ACTION 1. Extend the use of wire cable for mainlines through December 31, 2002. Currently, there are no vessels using wire cable, however there was some interest expressed by current participants to explore this possibility. If this proves to be more cost effective or to increase safety, then there would be economic benefits from this action.

ACTION 2. Escape Panel or Door on traps must measures at least 11 7/8 inches by 11 7/8 inches. This measure will not change how the fishery presently operates, thus, there should be no change in economic benefits.

ACTION 3. Remove the 5,000 Pound Harvest Requirement for Renewing the Biannual Permit. In addition, permit holders in the Southern Zone not meeting the 5,000 pound requirement by October 2000 are to be granted permits as long as they met the previous 5,000 pound requirement applied October 1998. Permits are to be renewed on or before six months into the next fishing year. This would allow vessels that cannot meet the current 5,000 pound annual landings qualification criterion to operate in this fishery, and is likely to increase short-term economic benefits.

ACTION 4. Allow up to a 20% increase in vessel size from the vessel size on the original permit. If current vessel size limits the fishery from fishing in certain areas due to safety concerns, this measure would likely result in increased economic benefits to the fishery.

ACTION 5. Create a sub-zone within the southern zone using the following area and conditions:

(a) Area (Figure 2): 81°22' to 81° 56'
24° 15' to 24° 07'

(b) Small vessels (less than or equal to 65 feet documented length) agree to fish for golden crabs only within this sub-zone. Larger vessels agree not to fish golden crabs within this sub-zone with the understanding that they will be allowed to fish within the Northern Zone without losing ability to return to Southern Zone. It is the Council's intent that the larger vessels are free to travel between and fish in the Northern and Southern Zones (Figure 3); they can transit but not fish in the Middle Zone. At the end of three years, these permit holders would specify which zone they elect to fish in on a permanent basis.

(c) It is the Council's intent that the sub-zone created within the southern zone would exist for a minimum period of 3 years. At the end of 2-3 years the Council will review these measures to determine if the exclusive fishing sub-zone should be repealed.
(d) Review production data from the area on an annual basis.

If these measures resolve the conflict in the Southern Zone then there would an increase in net economic benefits in this fishery.

ACTION 6. Allow two new vessels to be permitted to fish only in the Northern Zone using the next two participants on the original list (used by the Council during the October 1995 Council meeting) that want to enter the fishery. This situation could increase economic benefits in this fishery, if the Northern Zone can sustain viable harvest levels.

ACTION 7. Specify MSY and the status determination criteria, which by themselves will not have an impact on the fishery.

ACTION 8. Modify the framework to allow modifications to the sub-zone. Modifications include but are not limited to changing the size, timeframe, seasonality, repealing, and eligibility requirements. This action will not have an impact on the fishery.

There is no recreational component in this fishery and the RFA concerns the commercial sector only. All of the commercial entities harvesting golden crab in the South Atlantic region affected by the rule will qualify as small business entities because their gross revenues are less than $3.0 million annually. Hence, it is clear that the criterion of a substantial number of the small business entities comprising the golden crab harvesting industry being affected by the proposed rule will be met. The outcome of "significant impact" is less clear but can be triggered by any of the five conditions or criteria discussed below.

The regulations are likely to result in a change in annual gross revenues by more than 5 percent. The discussions under economic impacts in Section 4 detail the effects on commercial entities for each proposed action to the extent possible given available data. For the commercial sector, it is expected that the proposed actions would either have no impact on revenue or could result in increased earnings.

Annual compliance costs (annualized capital, operating, reporting, etc.) increase total costs of production for small entities by more than 5 percent. The eight proposed actions are not expected to cause any increase in production costs.

Compliance costs as a percent of sales for small entities are at least 10 percent higher than compliance costs as a percent of sales for large entities. All the firms expected to be impacted by the rule are small entities and hence there is no differential impact.

Capital costs of compliance represents a significant portion of capital available to small entities considering internal cash flow and external financing capabilities. The proposed actions do not require any existing fishing entity to acquire new equipment or to completely refit existing equipment for compliance purposes.

The requirements of the regulation are likely to result in a number of the small entities affected being forced to cease business operations. This number is not precisely defined by SBA but a "rule of thumb" to trigger this criterion would be two percent of the small entities affected. The analyses under economic impacts for each proposed action do not indicate that any entity will be forced out of business. On the contrary, the proposed actions would allow all of the current permit holders to remain in the fishery.

Considering all the criteria discussed above, the conclusion is that small businesses will not be significantly affected by the proposed rule. Hence, the determination is made that the proposed rule will have no significant impact on a substantial number of small business entities and an Initial Regulatory Flexibility Analysis (IRFA) is not required.

The full details of the economic analyses conducted for the proposed actions are contained in the RIR under the heading "Economic Impacts" in Section 4. Some of the relevant results are summarized for the purposes of the IRFA.

Description of the reasons why action by the agency is being considered: Refer to Section 1.0, Purpose and Need. and section 4.0 This plan amendment addresses: (1) Extending the use of wire cable for mainlines through December 31, 2002, to allow participants the option of using this new method on an experimental basis; (2) Setting the dimensions of Escape Panel or Door on traps at a minimum of 11 7/8 inches by 11 7/8 inches, which will not change how the fishery presently operates; (3) Removing the 5,000 pound harvest requirement for renewing the biannual permit to allow currently permitted vessels to remain in the fishery and specify a timeframe for permit renewal; (4) Allowing up to a 20% increase in vessel size from the vessel size on the original permit, to remove constraints from those vessels that are constrained from fishing in certain areas due to safety concerns; (5) Creation of a sub-zone for exclusive use by small boat fishermen in order to resolve a gear conflict in the Southern Zone; (6) Increasing fishing participation in the Northern Zone by: (a) Allowing vessels permitted in the Southern Zone to fish in the Northern Zone without losing the ability to fish in their original zone; (b) Establishing qualifications for new permits as the next two vessels/individuals on the original list that want to enter the fishery to allow new fishing effort in the Northern Zone; and (7) Specifying MSY and the status determination criteria, to ensure compliance with the Magnuson Act.

Statement of the objectives of, and legal basis for the proposed rule: The following objectives are a part of these actions: (1) To stabilize yield at MSY and maintain population levels sufficient to ensure adequate recruitment; (2) To provide a flexible management system; and (3) To optimize the social and economic benefits of the golden crab fishery. The Magnuson-Stevens Fishery Conservation and Management Act (Public Law 94-265) as amended through October 11, 1996 provides the legal basis for the rule.

Description and estimate of the number of small entities to which the proposed rule will apply: The proposed rule will apply to all commercial entities that comprise the golden crab fishery. There are seven vessels with golden crab permits as of November 1, 2000(Table 9). Data on mean capital investment in vessel and equipment are not available.

Description of the projected reporting, record keeping and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for the preparation of the report or records: The proposed rule will not require any additional reporting or record keeping on the part of commercial entities. Compliance will be monitored through existing systems established by the National Marine Fisheries Service and the U.S. Coast Guard. The professional skills necessary to meet these requirements will not change relative to the level that all fishermen are familiar with and have previously used.

Identification of all relevant Federal rules which may duplicate, overlap or conflict with the proposed rule: No duplicative, overlapping or conflicting Federal rules have been identified.

Description of significant alternatives to the proposed rule and discussion of how the alternatives attempt to minimize economic impacts on small entities: In Section 4, the proposed actions include a number of options under the heading: "Rejected Options for Actions 1 - 8". Each of these options include an economic impact assessment. Refer to Section 4.2: "Management Options" for details of the economic impact assessment on small entities for each option. The status quo or "no action" option was also considered for each proposed action. Relative to the proposed actions, all the other possible options would either result in reduced economic benefits or have no economic impact on the fishery.

5.0 LIST OF PREPARERS

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SAFMC Scientific and Statistical Committee
Florida Fish & Wildlife Conservation Commission
Georgia Department of Natural Resources
South Carolina Department of Natural Resources
North Carolina Department of Environment, Health, and Natural Resources
National Marine Fisheries Service
- Southeast Region
- Southeast Center

United States Coast Guard
Monroe County Commercial Fishermen, Inc.

7.0 APPLICABLE LAW

7.1 VESSEL SAFETY CONSIDERATIONS

PL. 99-659 amended the Magnuson-Stevens 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 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 plan 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 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 plan 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.

A number of the measures proposed in this amendment will improve vessel safety.

7.2 ENDANGERED SPECIES ACT OF 1973

The proposed actions have no anticipated adverse impact on threatened or endangered species or on marine mammals. Current participants do not buoy their traps which eliminates any potential interaction similar to that which occurs with American lobster trap buoy lines. A Section 7 consultation was conducted with the NMFS Southeast Regional Office.

A biological assessment was prepared which concluded that neither the fishery nor the proposed management plan for the golden crab fishery will adversely affect the recovery of endangered or threatened species, or their critical habitat. Listed and protected species under the Endangered Species Act (ESA) and governed by the jurisdiction of NMFS include:

Whales:

(1) The northern right whale- *Eubalaena glacialis* (ENDANGERED)
(2) The humpback whale- *Magaptera novaeangliae* (ENDANGERED)
(3) The fin whale- *Balaenoptera physalus* (ENDANGERED)
(4) The sei whale- *Balaenoptera borealis* (ENDANGERED)
(5) The sperm whale- *Physeter macrocephalus* (ENDANGERED)
(6) The blue whale- *Balaenoptera musculus* (ENDANGERED)

Sea Turtles:

(1) The Kemp's ridley turtle- *Lepidochelys kempii* (ENDANGERED)
(2) The leatherback turtle- *Dermochelys coriacea*(ENDANGERED)
(3) The hawksbill turtle- *Eretmochelys imbricata*(ENDANGERED)
(4) The green turtle- *Chelonia mydas* (THREATENED/ENDANGERED)

(5) The loggerhead turtle- *Caretta caretta* (THREATENED)

Other:
(1) The manatee- *Trichechus manatus* (ENDANGERED)

7.3 MARINE MAMMALS PROTECTION ACT AMENDMENTS OF 1988

The Council has determined that the golden crab amendment and its implementing rule will not have a significant adverse impact on marine mammals.

7.4 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 does not propose any additional data collection programs

7.5 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 fishery management plan.

7.6 NATIONAL ENVIRONMENTAL POLICY ACT — FINDINGS OF NO SIGNIFICANT IMPACT (FONSI)

The discussion of the need for these proposed framework actions and alternatives, and their environmental impacts are contained in Sections 1.0 and 2.0 of this plan/environmental impact statement. A description of the affected environment is contained in Section 3.0.

The proposed amendment is not a major action having significant impact on the quality of the marine or human environment of the South Atlantic.

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.

7.6.1 Finding of No Significant Environmental Impact (FONSI)

Section 4.0 describes the Council's management measures in detail.

Section 1508.27 of the CEQ Regulations list 10 points to be considered in determining whether or not impacts are significant. Impacts of these actions are relative to the individuals that will be required to forego catches in the short-term and to the individuals, and society, in the long-term, because higher and more stable catches will be maintained. The analyses presented below are based on the detailed information contained in Section 4.0 Environmental Consequences including the Regulatory Impact Review and Regulatory Flexibility Determination.

7.6.1.1 Beneficial and Adverse Impacts

There are beneficial and adverse impacts from the proposed actions. The impacts are described for each action in Section 4.0 (See the RIR, SIA and Section 4.9 Effects on Small Businesses) and summarized in Section 2.0.

The beneficial and adverse impacts as analyzed in Section 4.0 are not significant.

7.6.1.2 Public Health or Safety

The proposed actions are not expected to have any significant adverse impact on public health or safety. In fact, a number of the measures will improve public health and safety.

7.6.1.3 Unique Characteristics

The proposed actions are not expected to have any significant adverse impact on unique characteristics of the area such as proximity to historic or cultural resources, park lands, wetlands, or ecologically critical areas. Section 3.2 of the FMP contains information on habitat. The Council's positions on a number of habitat related issues are presented in that section. The Council evaluated the effects of the fishery on the environment (Section 4.7) and concluded that the fishery, as presently prosecuted, does not significantly impact the bottom habitat that is essential to the species under Council management.

7.6.1.4 Controversial Effects

The proposed actions are not expected to have any significant controversial issues. The Council has provided for input by the public through committee and Council meetings that are open to the public, through meetings with the Golden Crab Advisory Panel, and by holding public hearings.

7.6.1.5 Uncertainty or Unique/Unknown Risks

The proposed actions are not expected to have any significant effects on the human environment that are highly uncertain or involve unique or unknown risks.

7.6.1.6 Precedent/Principle Setting

The proposed actions are not expected to have any significant effects by establishing precedent and do not include actions which would represent a decision in principle about a future consideration.

7.6.1.7 Relationship/Cumulative Impact

The proposed actions are not expected to have any significant cumulative impacts that could have a substantial effect on the golden crab resource or any related stocks, including sea turtles. (See RIR and SIA, and Section 4.9 Effects on Small Businesses.)

7.6.1.8 Historical/Cultural Impacts

The proposed actions are not expected to have any significant effects on historical sites listed in the National Register of Historic Places and will not result in any significant impacts on significant scientific, cultural, or historical resources.

7.6.1.9 Endangered/Threatened Impacts

The proposed actions are not expected to adversely affect any endangered or threatened species or marine mammal population. (See Sections 7.2 and 7.3.) A Section 7 consultation was conducted with the NMFS Southeast Regional Office for the original FMP. A biological assessment was prepared which concluded that neither the fishery nor the proposed management plan for the golden crab fishery will adversely affect the recovery of endangered or threatened species or marine mammals.

7.6.1.10 Interaction With Existing Laws for Habitat Protection

The proposed actions are not expected to have any significant interaction which might threaten a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

Additional points analyzed by the Council are presented below:

7.6.1.11 Effects of the Fishery on the Environment

Section 3.2 of the original FMP contains information on habitat concerns. The Council's positions on a number of habitat related issues are presented in Section 3.2.6. The Council evaluated the effects of the fishery on the environment (Section 4.7) and concluded that the fishery, as presently prosecuted, does not significantly impact the bottom habitat that is essential to the species under Council management.

7.6.1.12 Bycatch

The golden crab fishery has virtually no bycatch.

[Note: The following is taken directly from Harper, Eyo, and Scott (2000); any references, tables, and/or figures are contained in the cited document.]

"Incidental catch

Incidental catch information was estimated by fishers and reported on the Golden Crab Trip Logbook forms. The most frequently reported incidental catch species was the giant isopod, Bathynomus giganteus. A total of 29,547 estimated pounds of giant isopod were caught between November 1995 and March 2000 (Table 2). The overall mean catch per trap haul was 0.36 pounds and ranged from 0.09 pounds during January 1999 to 0.89 pounds during October 1998. In general, reported incidental catch of other species was very low. In addition to the giant

isopod, nine other categories of species or higher taxa representing a total incidental catch of 41.6 pounds over the period November 1995 through December 1998 were reported on the logbook forms. These categories and estimated catch were: rockfish – 13.3 pounds, hake – 6.0 pounds, red crab – 6.0 pounds, queen snapper – 4.3 pounds, jonah crab – 3.8 pounds, whiting – 3.0 pounds, squid – 2.2 pounds, shrimp – 2.0 pounds, and scorpion fish – 1.0 pounds.

The measures in this fishery management plan will not impact bycatch and do not have bycatch considerations.

7.6.1.13 Effort Directed at or From Other Fisheries

The measures in this amendment will not result in effort being shifted into other fisheries.

7.6.1.14 Essential Fish Habitat

The area affected by the proposed action in the golden crab fishery includes areas that have been identified as EFH for golden crab and a number of other species under Council management. The proposed actions in the context of the fishery as a whole will not have an adverse impact on EFH; therefore an EFH consultation is not required.

Conclusion:

For the reasons discussed above, the proposed actions to amend management measures within the Golden Crab fishery are consistent with existing national environmental policies and objectives set forth in Sections 101(a) and 101(b) of the National Environmental Policy Act and will not have a significant impact on the quality of the human environment. As described in Section 5.03.c of NOAA Administrative Order 216-6, a Finding of No Significant Impact is supported and appropriate for the proposed actions. Therefore, preparation of an environmental impact statement for the proposed actions is not required by Section 102(2)(C) of the National Environmental Policy Act or its implementing regulations.

Approved: _____ _____

Assistant Administrator for Fisheries Date

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9.0 APPENDIXES

Appendix A. Summary of Marathon Golden Crab Informal Meeting, Marathon, FL, Banana Bay Resort, 6:30 P.M. on August 17, 2000.

Attendees:

Bill Whipple	Tommy Coppedge
John Sanchez	Tim Daniels
Gary Graves	Ray Brulend
Kathi Kitner	

This meeting began with Tim Daniels giving a brief history of the recent conflict in the Southern Zone Golden Crab fishery. He stressed that this history has been told many times, and now is the time to do something, once and for all.

The area to be zoned was then discussed. While the demarcation was clear to some fishermen in the room, it was unclear to others, and remains so. More or less it is a stretch of about thirty miles east to West, beginning approximately at 81.57 west. The area needs to be determined clearly.

There was then considerable discussion among all present in regard to matters of enforcement, with the point being made by Bill Whipple that it would be difficult to count on the Coast Guard to patrol the area, or even respond to calls reporting violations by other fishermen.

This point led Tim Daniels to suggest that the sub-zone would work better for enforcement reasons, in that violators would only need to violate the space, not be caught with their gear in the area.

Bill Whipple suggested that rather than permitting bottom usage, it would be better to go with enforcing Section 622.46 that prohibits gear conflict altogether.

Tim Daniels responds by insisting that he needs to fish in that area, and he needs to be protected there.

Bill Whipple asks if making a sub-zone will actually prohibit others, and if it does, is it a desirable outcome to have zoned areas? Will this be a problem in the future in this and/or other fisheries?

Tim Daniels states that the sub-zone is essentially a leased area.

Bill Whipple questions the exclusionary nature of what is being proposed.

Tim Daniels responds that the sub-zone may as well be called a "small boat zone." The six permit holders who have small boats would then divide the area into their own zones, and use NMFS to perhaps monitor their activities and trap locations.

Tim Daniels states that if no one else is in the zone, a small boat could fish the whole thing. He then modifies this to say that a boat could on fish one mini-zone of the sub-zone at a time. However, no large boats would be allowed in the sub-zone. He expressed concern that a large boat could come in and fish out the area before any small boat would have a chance to fish.

There was then discussion on how to deal with the large boats that are permitted for the Southern Zone. This issue was shelved for further discussion in the future.

IN SUMMARY: The main issues and concerns that came out of this meeting are the following:

1) Should the sub-zone be "active" for a full twelve months of the year, or for lesser time periods?

2) Should large boats ever be allowed to fish the area of the sub-zone?

3) How should the time spent in a mini-zone be limited?

4) How, if at all, should fishermen report their trap locations to avoid setting on top of one another?

5) Statement needed to make sure that fishermen pull their traps out of the water when not actively fishing them.

6) How should all of the above be enforced and by whom?

Appendix B. Summary of Miami Golden Crab Informal Meeting.

Summary of the Golden Crab Informal Meeting, Miami, Florida, Airport Best Western Hotel, 7:30 P.M. on August 18, 2000.

This is a summarized transcription of the tape made at the meeting that evening.

Attendees:

Richard Nielsen, Jr. (RN Jr.)
John Sanchez (JS)
Dick Nielsen, Sr. (DN, Sr.)
Bill Whipple (BW)
Terry Nielsen (TN)
Vishwanie Maharaj (VM)
Kathi Kitner (KK)
Kerry O'Malley (KO)

Summary of Comments:
John Sanchez starts by giving the attendees a briefing about the meeting that occurred the night before in Marathon, as requested by Richard Nielsen. He says that the reason that the meeting was held in Marathon was because it is spiny lobster season and the majority of the Southern Zone fishermen live in that area. For general convenience the meeting was held informally in the Keys.

The attendees were: Gary Graves, Tim Daniels, Bill Whipple, Tommy Coppedge, Raymond Bruland, John Sanchez, and Kathi Kitner.

JS: Asked what mechanisms could be developed to stop the problem of outsiders coming into the area, which has caused tremendous problems of gears loss (by setting on top of another's traps). The Southern Zone fishermen wanted to develop a mechanism, a formal dialogue, whereby you as a Golden Crab fisherman, would have to notify somebody such as NMFS where you are fishing. This would mean that any newcomer or regular would have to first call and state their intent to fish and then NMFS would tell them that they could fish a given area or not, if someone has already set there.

How do they delineate areas? There is a problem now in the small boat component in the fishery in that they are limited as to where they can go to fish. They can't go 150 miles offshore to try to experiment with this fishery. They found this 30 mile strip which is productive and easily accessible for them in the day trips they have been doing, and so saying, Perhaps let's make this a small boat area, divide it up into quadrants, or parcels, 5 miles wide was one figure given. And

then no one person can fish in more than one area, and that broke down nicely, as 5 goes into 30 six times, which is the number of small boats in the Southern Zone.

When a boat is done fishing an area, then whatever agreed upon authority must be notified again that you are leaving.

Then there was more discussion, keeping in mind Mr. Whipple, who has a large boat, just how a small boat area relates to big boats, in that what is his remaining fishing area?

Would the rest of the zone also be parcelled up? Would big boats also have to designate to a third party where they are fishing, having notification requirements and things like that.

For example, Mr. Whipple, if he has X amount of area, let's say 100 square miles, well, there are three big boat owners, and will each be able to pick their three 10 mile quadrants, and work it that way? Will there be an exclusivity factor? None of that was discussed. So in my mind the concept is good but it needs to be fine-tuned. And I will state it for the record: One of the concerns of Gary Nichols (who John Sanchez spoke to earlier that day), was that while the idea of phoning in what area you will fish in is fine, you can't just call in and pick an area and then tie it up, and not produce. So hypothetically, if you don't produce X amount of crabs in a month, then you need to get out of there and let someone else into that area.

KK: The only other thing that came up was the concern of the big boats being locked out of that area for the entire year. That was a concern. If the small boats are only fishing from let's say, June through August, then that excludes other boats for the rest of the year.

JS: Just thinking out loud. Bill's been there. He has had landings in that area. There has to be a mechanism...maybe get away from the big boat/small boat language, and say that landings would qualify someone to fish the area, but have to stick with same regs as others.

KK: Bill still has gear out there now, right?

BW: Right. Yes.

RN, Jr.: Bill, how do you feel about it? You have probably landed more crabs out of that spot than all the other boats combined. I know those other boats went out there and got landings to qualify, and have not done a lot since then. You should be included in the area. If you had a 150' vessel I would say no, but you have a 72'vessel. So that's bigger than a 55' vessel, but it is not a ship.

See, what you have going on here is: you got guys, and all the guys at that meeting, MIGHT fish this area, and for them to come in, and say, I want this to be our area, I don't think is right. I mean there are all kinds of options.

1) For nine months of the year, leave it open to Bill or whoever. And Bill should be included in the other three months.

2) I have a problem with gear sitting out there for nine months out of the year. And it's been happening. That's how Tim got cleaned out. His gear was out there.

BW: Some of it has been there for two years, without anybody hauling it.

RN, Jr.: And that messes you up as a fisherman, a fulltime fisherman that depends on Golden Crabs for your livelihood, to go out there and fish that area. And there's no reason to take this area and make it off limits to...Bill Whipple. Well, we are talking about Bill Whipple here, so let's just identify him as such. There is no need to exclude him out of there. History of landings in that area should be included. Just because a guy has a 50 boat doesn't mean you should automatically include him in that area. I think you should have a history in that area.

Flexibility is a key. You have to leave it flexible.

Put a 3, 4, 5 thousand pound quota that you have to land, and I don't know if NMFS would like that, but put some kind of qualifier. Looking down the road, someone is going to put gear out there, and then they won't want to move. So you have to land a certain poundage per month to stay.

In summary, *Richard believes that Bill Whipple should not be excluded from the "special zone" just because his boat is slightly larger than the others. He also feels that the Marathon boats are using Golden Crab as a backup insurance against slim years in spiny lobster and stone crabs. He sees them as part-timers and so should not be able to tie up an area of bottom that measures 30x? miles for 12 months out of the year. He opposes calling it a small boat zone, and would rather make participation contingent on a history of landings in that specific area.*

JS: He believes that a compromise can be attained, as it is a small group of reasonable people.

BW: Expresses concern about law enforcement of the issue, plus the legal meaning of closing out sections of the ocean. Also brings up concerns that what is left, after taking away the "special zone" is about 140 miles, and of that, about 40 is pure silt bottom, which is unfishable. Another part is part of a fishery conservation zone. That leaves about 40 miles that is fishable. He asks if that is fair to exclude a larger boat from so much of the zone?

JS: You could say that if you have no landings, you can't even come to the table to discuss it. We are getting too far from the original problem of how do you avoid people getting covered up?

BW: and the original skipper that caused all the mess is gone now, and is back in Alaska.

Also a big boat depends on a lot of mobility.

And right now I am the only one there. Soon, I think, there will be another boat with a permit. And perhaps a third. If there were a lot of boats, okay, reporting would be necessary. But with two or three boats, those people should just cooperate, because if they can't, a reporting system wouldn't help anyway.

RN, Jr.: Well, this is a question to those four fishermen who would be assigned to fish in the area. Once you are assigned to that area, do you have to go that route? What I am saying is that with the small number of boats assigned to that area, you ought to be able to work it out without going to NMFS with it.

The problem has been from an outside person coming in, that's the problem. So if you eliminate the problem by assigning that area to a few boats, then let them work out how to fish the area.

KO: But if a person is qualified based on a landings history, that won't keep this guy out.

RN, Jr.: Right, but I still say that they should back off on specifics, keep it flexible, let everyone work on it for a year. You don't need your numbers sent into the NMFS. You don't need that because you have already eliminated the problem (by creating a zone) so why go through all the rest of it?

BW: Again, I am not sure you could make it fly (the zoning) as far as the lawyers are concerned. The question of "assignability" is very touchy.

RN, Jr.: Bill, it is no different than what we did before with the areas (the Northern, Middle and Southern Zones). It would be another sub-zone. The concept itself has already flown.

JS: So the gist of what you are saying is that there is no demand on NMFS to keep track of anything for you. Which also means that they don't have to commit to anything you want either. The positive thing is thinking that maybe this can be addressed without the lawyers getting involved and all crazy.

It is down the road when these permits might get bought and sold, and the outsider comes in, is it going to fly that he can't go in the zone because he doesn't have landings, yet he bought a permit. Those are legal questions.

RN, Jr.: If it were me, I would opt for the least amount of constraints. And just by assigning this area to these fishermen, the problem is solved. If a year down the road it comes up that it can't be worked out, then you can take the next step (assigning a grid, etc.). But Tim has stated over and over again that the problem is not the people fishing there.

BW: Says he is skeptical about just having something in the regulations does not guarantee that someone won't abuse it, or that the regs will be enforced at all, or even prosecuted. So there is no guarantee that he isn't going to have the problem again with somebody else.

RN, Jr.: Well, true. If he fished without a permit and that was supposed to stop him, and it didn't. You can make all the rules in the world, and if a guy is going to fish illegally, nothing you can do to stop him.

JS: Seems we need more discussion, and have all the players here. Need to really think this through. Keep it informal.

DN, Sr.: When you say all the players, there are seven licenses down there, right? Who are they? And also, what size vessels do they have?

(General discussion of who is in fishery in Southern Zone, but not decided...no one knows for sure)

John Sanchez says it seems a better idea to hold off on the options paper until we have another meeting where all the players/stakeholders can come together and hammer out an agreement.