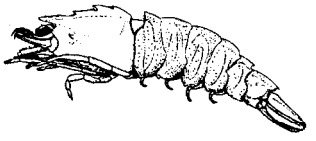
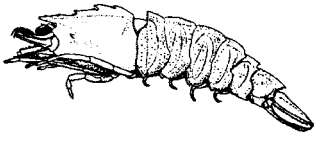
FINAL
AMENDMENT 5
TO THE
FISHERY MANAGEMENT PLAN
FOR THE
SHRIMP FISHERY
OF THE
SOUTH ATLANTIC REGION
(ROCK SHRIMP)
INCLUDING A
FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT, INITIAL REGULATORY FLEXIBILITY ANALYSIS, REGULATORY IMPACT REVIEW, AND SOCIAL IMPACT ASSESSMENT/FISHERY IMPACT STATEMENT





JANUARY 2002

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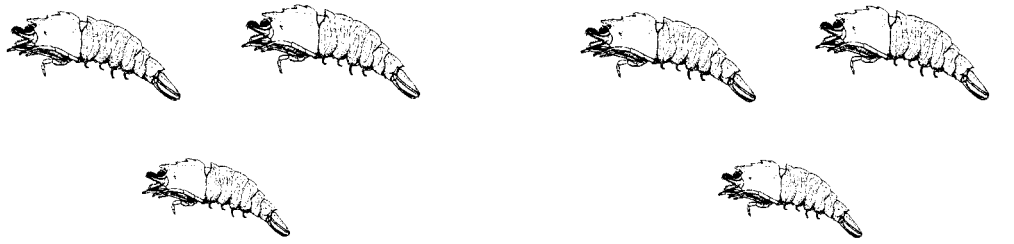

prepared by the
South Atlantic Fishery Management Council

JANUARY 2002

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SOUTH ATLANTIC SHRIMP AMENDMENT 5 (COVER SHEET)

This integrated document contains all elements of the Plan Amendment, Final Supplemental Environmental Impact Statement (FSEIS), Initial Regulatory Flexibility Analysis (IRFA), Regulatory Impact Review (RIR), and Social Impact Assessment (SIA)/Fishery Impact Statement (FIS). Separate tables of contents are provided to assist readers and the NMFS/NOAA/DOC reviewers in referencing corresponding sections of the Amendment. Introductory information and/or background for the FSEIS, IRFA, RIR and SIA/FIS are included with a separate table of contents for each of these sections.

Responsible Agencies

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Name of Action:

(X) Administrative ( ) Legislative

SUMMARY

The proposed management actions contained in this amendment pertain to the rock shrimp fishery in the south Atlantic region and involves the following actions:

(1) Establish a limited access program for the rock shrimp fishery prosecuted within the South Atlantic Council's area of jurisdiction south of the Georgia/South Carolina state line, and limit initial eligibility to the owner of a vessel that: (a) has held a valid rock shrimp permit prior to December 31, 2000; and (b) can demonstrate at least 15,000 pounds of rock shrimp landings in any one calendar year from 1996 through 2000. This owner will be eligible to receive a fully transferable permit. A limited access permit would be required for harvest and possession of rock shrimp in the South Atlantic Council's area of jurisdiction south of the Georgia/South Carolina state line;

(2) Require captains operating vessels that are required to have permits to fish for rock shrimp in the South Atlantic Council's area of jurisdiction to have a vessel operator's permit issued by the National Marine Fisheries Service to participate in this fishery. The duration of the permit is to be specified by the National Marine Fisheries Service;

(3) Require that the minimum mesh size for a tail bag of a rock shrimp trawl, above the 2 inch rings, be at least 40 meshes of 1 and 7/8 inch stretched mesh at the cod end. This mesh size regulation only applies to the limited access rock shrimp fishery in the South Atlantic Council's area of jurisdiction; and

(4) Require any vessel fishing with a limited access rock shrimp permit in the South Atlantic Council's area of jurisdiction will be required to use an approved vessel monitoring system (VMS), which should not exceed $1,200 for equipment and installation. Annual communication costs should not exceed $500, except annual communication costs may go up to $800 if NMFS determines that additional communication is necessary.

During development of Amendment 1 to the SAFMC Shrimp Plan (Rock Shrimp Management), public scoping meetings were held on September 23, 1992 in Cocoa Beach, Florida; on September 24, 1992 in Jacksonville Beach, Florida; on February 9, 1994 in St. Augustine, Florida; on April 20, 1994 in Brunswick, Georgia; and on June 23, 1994 in Marathon, Florida. A control date for the rock shrimp fishery was established on the publication date in the Federal Register, April 4, 1994 (FR Doc.94-8005). The topics discussed included the need for a limited access program, operator permits, and gear restrictions in the rock shrimp fishery. At the time Amendment 1 was approved these issues were deferred for later consideration.

The Rock Shrimp Advisory Panel met on August 1st and 2nd, 2000 in Charleston, South Carolina and recommended that the South Atlantic Fishery Management Council develop a limited access program for the rock shrimp fishery. Through subsequent meetings the Council developed measures for Shrimp Amendment 5 and voted on the proposed and other possible options to go out to public hearings at their meeting on March 8-9, 2001 Jekyll Island, Georgia.

Public hearings on Shrimp Amendment 5 were held at the following locations:

Thursday, May 3, 2001
NC Department of Environment & Natural Resources
127 Cardinal Drive; Wilmington, NC 28405

Monday, May 7, 2001
Radisson Beach Resort
2600 N. A1A; Fort Pierce, FL 34949

Tuesday, May 8, 2000
Florida Fish & Wildlife Conservation Commission,
Florida Marine Research Institute
100 Eighth Avenue, SE; St. Petersburg, FL 53701-5095

Wednesday, May 9, 2001
Lafayette Plaza Hotel
301 Government Street; Mobile, AL 36602

Tuesday, May 15, 2001
Town & Country Inn
2008 Savannah Highway; Charleston, SC 29407

Thursday, May 24, 2001
University of Georgia, Marine Extension Service
715 Bay Street; Brunswick, GA 31520

Tuesday, May 29, 2001
Radisson Hampton
700 Settlers Landing Road; Hampton, VA 23669

Tuesday, June 19, 2001
Radisson Ponce de Leon
4000 US Highway 1; St. Augustine, FL 32095

The deadline for receiving written public hearing comments at the Council Office was May 29, 2001. This deadline was set so that all public hearing comments could be reviewed at the June 2001 South Atlantic Council meeting by the Council and the Rock Shrimp Advisory Panel.

Public hearings were videotaped and each Council member received: (1) video; (2) transcribed minutes from each hearing; and (3) copies of all letters received at hearings and/or the Council office.

The Council reviewed informal review and public hearing comments at the June 2001 meeting and revised the document to address these comments. The Council reviewed and approved the Final Amendment 5 document at the December 2001 meeting.

FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

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

SUMMARY

The National Environmental Policy Act (NEPA) requires Federal agencies to consider the interactions of natural and human environments. Issues and concerns to be addressed in the Final Supplemental Environmental Impact Statement (FSEIS) are: What are the benefits to the industry, the resource, essential habitat, and the nation by establishing a limited access program for rock shrimp under the proposed measures? (Action 1); What should be done to protect the population of juvenile rock shrimp? (gear restrictions); and What additional measures are needed to protect EFH and EFH-HAPCs? (Vessel monitoring systems).

Notice of Intent to Prepare a SEIS Published on: May 24, 2001.

DSEIS to NMFS on: May 14, 2001
DSEIS to EPA on: July 27, 2001
Public Comments on DSEIS requested by: September 4, 2001

The only DSEIS comment on Shrimp Amendment 5 was submitted by the Environmental Protection Agency (EPA), is contained in Appendix H. The issues raised by EPA are: excessive harvest of small shrimp; improved compliance with existing conservation measures; and improved protection of HAPCs. Overall, EPA agreed with the proposed Amendment 5 and rated the DEIS as a "LO" (i.e., Lack of Objections) since the proposed Amendment 5 management of rock shrimp appears appropriate overall. The following is a summary of their recommendations which have been addressed in the Final SEIS (FSEIS):

- Limit the fishing capacity for the rock shrimp fishery (EPA did not favor the no action option for Action 1). The Council's proposed action will limit the number of vessels in the rock shrimp fishery.
- Require operator permits for all vessels in the rock shrimp fishery (Action 2). The Council's proposed action will require the captain of a rock shrimp permitted vessel to have an operator's permit issued by the National Marine Fisheries Service.
- Set a minimum mesh size for the rock shrimp trawl gear, and defer to the Council/NMFS on the exact specifications (Action 3). Data relating the presented mesh sizes to the escapement of small shrimp should be added to the document. The Council examined all available data, however, at this time no mesh selectivity studies have been conducted on the rock shrimp fishery to provide this information. Members of the South Atlantic Rock Shrimp Advisory Panel had observed marked differences in the rock shrimp catch composition of two vessels towing nets with different mesh sizes at the same location. One vessel towing nets with a cod end mesh size of 1 and 7/8 inch stretched mesh managed to avoid a large proportion of the smaller, unmarketable shrimp (50/60 count per pound) as opposed to another vessel fishing side-by-side and using nets where the cod end mesh size was 1 and 5/8 inch stretched mesh (June 20- 21, 2001 Joint Controlled Access Committee/Rock Shrimp Advisory Panel meeting, Jekyll Island, Georgia). The Council's proposed action will establish a minimum mesh size of 1 and 7/8 inch stretched mesh at the cod end.
- Data on the effects of the various mesh sizes on finfish and juvenile shrimp bycatch should be added to the document. The Council examined all available data, however, at this time no such studies have been conducted. Available information on the bycatch of a few rock shrimp trips are contained in Section 3 of this document. The National Marine Fisheries Service will implement a comprehensive observer program to characterize bycatch in the rock shrimp fishery. These data will be added to future amendments of the South Atlantic Shrimp Plan.
- All rock shrimp vessels should be equipped with a vessel monitoring system to discourage incursions in special habitat and closed areas (Action 4). The Council's proposed action will require a VMS to be used on all vessels with limited access rock shrimp permits.

- The Council should consider a yield below OY/MSY for this fishery. The Council's current OY is set equal to MSY which is appropriate for an annual crop like rock shrimp when recruitment is dependent on environmental conditions rather than female biomass. That is, a relatively small number of mature shrimp can provide sufficient recruits. The Council will address modifications to the current overfishing definitions and OY for the rock shrimp fishery in Amendment 6 to the Shrimp Plan during 2002.

- A list of acronyms and definitions as well as a glossary should be added to the FSEIS. Appendix I contains a glossary of technical terms used in this document.

The Council determined that the limited access program would only apply to the area south of the Georgia/South Carolina line in the south Atlantic (Action 1) since the rock shrimp fisheries north of this area are ecologically distinct and occur sporadically. Action 2 (operator permits) would apply to all areas in the South Atlantic Council's area of jurisdiction. Action 3 (mesh size restrictions) would only apply to the rock shrimp limited access fishery. Vessel monitoring systems would be required on all vessels that held limited access rock shrimp permits (Action 4). Since the Council specified the geographic area for each management action (Action 1 to Action 4), Action 5 in the DSEIS was no longer necessary and is not included in the FSEIS.

EPA rated the DSEIS as a LO (lack of objections) on the condition that the Council address the above comments which the Council has done.

FSEIS to NMFS on: 1/25/02
FSEIS to EPA on:
Public Comments on FSEIS requested by:

REGULATORY IMPACT REVIEW

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

INTRODUCTION

The Regulatory Impact Review (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 regulatory impact review provides a comprehensive review of the level and incidence of economic impact associated with the proposed regulatory actions.

Executive Order 12866 requires that a Regulatory Impact Analysis be prepared for all regulatory actions that are of public interest. To meet this mandate NMFS requires that the Council prepare a Regulatory Impact Review (RIR) for proposed actions. The RIR does three things: 1) it provides a comprehensive review of the level and incidence of impacts associated with a proposed or final regulatory action, 2) it provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problem, and 3) it ensures that the regulatory agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost effective way.

The RIR also serves as the basis for determining whether any proposed actions are a "significant regulatory action" under certain criteria provided in Executive Order 12866. This RIR analyzes the probable impacts on society from the proposed actions in this amendment to the Fishery Management Plan for the Shrimp Fishery of the south Atlantic Region (FMP).

In addition, information from the RIR is used to assess the impacts of the proposed actions on small entities. Because of the nature of these proposed actions, an initial regulatory flexibility analysis (IRFA) is prepared in Section 4H to provide full disclosure of their impacts on small entities.

PROBLEMS AND OBJECTIVES

Problems and objectives addressed by this amendment and the purpose and need for the present amendment are found in Section 1.0 of this document. Essentially the plan amendment addresses the issues of (1) establishing a limited access program for the rock shrimp fishery south of the Georgia/South Carolina state line in the South Atlantic Council's area of jurisdiction to reduce current capacity and slow the rate of growth of future capacity in a fishery where there is an overcapacity problem and thus increase future net economic benefits to the industry. Overcapacity could threaten the economic viability of the current rock shrimp industry; (2) reducing the harvest of small rock shrimp; and (3) implementing operator permits and requiring vessel monitoring systems to ensure better compliance with fishery management regulations and improve protection of essential fish habitat-HAPCs.

METHODOLOGY AND FRAMEWORK FOR ANALYSIS

The discussions for the proposed actions are incorporated in the text under economic impacts in Section 4. This RIR assesses management measures from the standpoint of determining the changes in costs and benefits to society. The net effects should be stated in terms of changes in producer surplus or net profits to the harvest sector, and consumer surplus to the final users of the resource.

The harvest sector refers to harvesters, processors and dealers of rock shrimp. Final users of the resource are taken to refer to the individuals that derive benefits from consuming rock shrimp. Ideally, all these changes in costs and benefits need to be accounted for in assessing the net economic benefits to society from the management of the rock shrimp fishery. However, lack of data (particularly on standardized effort units, effort, operating costs, count sizes and associated dockside prices) does not allow for this type of analysis. The RIR attempts to determine these changes to the extent possible given the current data limitations. In many cases these impacts can only be presented in a qualitative manner.

Summary of Expected Changes in Net Benefits (Summary of Regulatory Impact Review-RIR)

Table 1. Summary of Expected Changes in Net Benefits.

PROPOSED ACTION/ OTHER POSSIBLE OPTIONS	POSITIVE IMPACTS	NEGATIVE IMPACTS	NET IMPACTS
Proposed Action 1. Establish a limited access program for the rock shrimp fishery prosecuted within the South Atlantic Council's area of jurisdiction south of the Georgia/South Carolina state line, and limit initial eligibility to the owner of a vessel that: (a) has held a valid rock shrimp permit prior to December 31, 2000; and (b) can demonstrate at least 15,000 pounds of rock shrimp landings in any one calendar year from 1996 through 2000. This owner will be eligible to receive a fully transferable permit. A limited access permit would be required for harvest and possession of rock shrimp in the South Atlantic Council's area of jurisdiction south of the Georgia/South Carolina state line.	This option would eliminate latent permits from the fishery and reduce some of the overcapacity in the industry. The initial reduction in overcapacity though would not be as high as under rejected option 2.	It is expected that this option would exclude at least 111 vessels that fished during the period 1996 through 2000. The loss of gross revenue in the first year to vessels that would not qualify for a limited access permit is expected to be $151,491. It is expected that in future years vessels will adjust to other revenue generating activities in order to mitigate some of these losses. In addition, there would be future loss of revenue for vessels that entered the fishery in 2001. The short-term negative impacts are not as high as rejected option 2 but higher than the other two rejected options.	This measure would reduce some of the overcapacity and reduce the rate of increase of harvesting capacity in the future. This measure together with Action 1E would stabilize economic returns to the industry. It is likely that this measure would increase net economic returns to the industry but not to the same extent as rejected option 2. However, it is expected to result in higher net economic benefits than rejected options 1 and 3.
Rejected Option 1. No Action. Do not develop a limited access program for the rock shrimp fishery in the South Atlantic Fishery Management Council's area of jurisdiction.	This option would not exclude vessels from the fishery that expected to fish in future years.	This option could result in an exacerbation of the current overcapacity situation in this fishery.	Compared to the proposed action, this measure would result in a higher rate of growth of harvesting capacity and capitalization in the rock shrimp harvesting sector, which would reduce future net economic benefits to the industry.

Table 1 (contd.) Summary of Expected Changes in Net Benefits.

PROPOSED ACTION/ OTHER POSSIBLE OPTIONS	POSITIVE IMPACTS	NEGATIVE IMPACTS	NET IMPACTS
Rejected Option 2. Establish a limited access program for the rock shrimp fishery prosecuted within the South Atlantic Council's area of jurisdiction, and limit initial eligibility to the owner of a vessel that: (a) has held a valid rock shrimp permit prior to December 31, 1999; and (b) can demonstrate landings of at least 15,000 pounds of rock shrimp in any one year from 1996 through 1999. These vessel owners will be eligible for fully transferable permits.	This option would yield increased benefits to the vessels that qualify for a limited access permit from increased future revenue. It would eliminate some of the latent permits from the fishery and reduce some of the overcapacity in the fishery.	This option could result in short-term loss of revenue to the 127 vessels that had documented landings from 1996 to 2000 that did not meet the landings criterion. It is expected that this short-term loss to vessels that would not qualify for a limited access permit would not exceed $527,448 in the first year. Also, vessels that had entered the fishery in 2001 would not be able to continue fishing in the future.	This measure would reduce some of the overcapacity and reduce the rate of increase of harvesting capacity in the future, to a greater extent than the proposed action.
Rejected Option 3. Establish a limited access program for the rock shrimp fishery prosecuted within the South Atlantic Council's area of jurisdiction. A vessel owner who can demonstrate rock shrimp landings prior to the control date of April 4, 1994 will be eligible to receive a fully transferable permit. The owner of a vessel that entered the fishery after the control date with documented rock shrimp landings from 1996 to the end of 1999 will only be eligible for a non-transferable permit.	Compared to the proposed action this option would allow more vessels to qualify for a permit. However, the majority of these vessels would only be eligible to receive a non-transferable permit.	Vessels entering the fishery in 2000 and 2001, and vessels that only fished in 1995 would be excluded from the fishery.	In the long-term this option could reduce the fleet size to it lowest level compared to the other options, since vessels that entered the fishery during more recent years would only be eligible to receive non-transferable permits.

Table 1 (contd.) Summary of Expected Changes in Net Benefits.

PROPOSED ACTION/ OTHER POSSIBLE OPTIONS	POSITIVE IMPACTS	NEGATIVE IMPACTS	NET IMPACTS
Proposed Action 2. Require captains operating vessels that are required to have permits to fish for rock shrimp in the South Atlantic Council's area of jurisdiction to have a vessel operator's permit issued by the National Marine Fisheries Service to participate in this fishery. The duration of the permit is to be specified by the National Marine Fisheries Service.	This option would improve compliance with fishery management regulations, and reduce costs to society. There is expected to be a reduction in enforcement costs.	There would be a small fee for issuing and renewing an operator's permit, which is expected to be about $50. The cost of administering this program is expected to be about $10,000 annually.	Likely to increase benefits to society because compliance would increase and enforcement costs would likely be reduced.
Rejected Option 1. No Action. Do not require an operator's permit.	There would be no positive impact due to lower compliance with fishery management regulations.	This option would not improve compliance with fishery management regulations, and could even result in higher enforcement costs.	This option would not increase net benefits due to lower compliance and possibly higher enforcement costs.
Rejected Option 2. Require an operator's permit in the rock shrimp fishery only when the operator is not the permit holder.	This option would improve compliance with fishery management regulations, and reduce costs to society. However, it would not be as effective as the preferred option.	There would be a small fee for an operator's permit of about $50. The cost of administering this program is expected to be about $10,000 annually.	This option is likely to increase benefits to society from increased compliance and lower enforcement costs, although not to the same extent as the proposed action.
Proposed Action 3. Require that the minimum mesh size for a tail bag of a rock shrimp trawl, above the 2 inch rings, be at least 40 meshes of 1 and 7/8 inch stretched mesh at the cod end. This mesh size regulation only applies to the limited access rock shrimp fishery in the South Atlantic Council's area of jurisdiction.	This option could increase yield and gross revenue from escapement of rock shrimp to larger size classes, which are worth more per pound.	There would be a cost to vessel owners who need to modify their gear; expected to be between $150-$320 per vessel. Also, there would be a loss of revenue from the escapement of smaller shrimp that are of marketable size.	Net benefits would likely increase. The magnitude of this increase would depend on the level of increased yield, total cost of replacing gear, and the price differential between the respective rock shrimp size categories.

Table 1 (contd.) Summary of Expected Changes in Net Benefits.

PROPOSED ACTION/ OTHER POSSIBLE OPTIONS	POSITIVE IMPACTS	NEGATIVE IMPACTS	NET IMPACTS
Rejected Option 1. No Action. Do not specify a minimum mesh size.	This option would avoid the cost of modifying gear and loss of marketable rock shrimp.	This option would not allow for increased yield and gross revenue from the escapement of unmarketable juvenile rock shrimp.	The level of forgone revenue would depend on the increase in yield from the "optimal" mesh size and the price differentials between the respective rock shrimp size categories.
Rejected Option 2. Require that the minimum mesh size for a tail bag of a rock shrimp trawl, above the 2 inch rings, be at least 40 meshes of 1 and 3/4 inch stretched mesh at the cod end. This mesh size regulation only applies to the limited access rock shrimp fishery in the South Atlantic Council's area of jurisdiction.	This option could increase yield and gross revenue from recruitment of rock shrimp to larger size classes, which are worth more per pound.	There would be a cost to vessel owners who need to modify their gear; expected to be between $150-$320 per vessel. The loss of revenue from the escapement of smaller marketable shrimp would be less than the proposed action.	Net benefits would depend on the level of increased yield, total cost of replacing gear, and the price differential between the respective rock shrimp size categories.
Rejected Option 3. Require that the minimum mesh size for a tail bag of a rock shrimp trawl, above the 2 inch rings, be at least 40 meshes of 2 inch stretched mesh at the cod end. This mesh size regulation only applies to the limited access rock shrimp fishery in the South Atlantic Council's area of jurisdiction.	This option could increase yield and gross revenue from recruitment of rock shrimp to larger size classes, which are worth more per pound.	There would be a cost to vessel owners who need to modify their gear; expected to be between $150-$320 per vessel. The loss of revenue from the escapement of smaller marketable shrimp is expected to be higher than the proposed action and rejected option 2.	Net benefits would depend on the level of increased yield, total cost of replacing gear, and the price differential between the respective rock shrimp size categories.

Table 1 (contd.) Summary of Expected Changes in Net Benefits.

PROPOSED ACTION/ OTHER POSSIBLE OPTIONS	POSITIVE IMPACTS	NEGATIVE IMPACTS	NET IMPACTS
Proposed Action 4. Any vessel fishing with a limited access rock shrimp permit in the South Atlantic Council's area of jurisdiction will be required to use an approved vessel monitoring system (VMS), which shall not exceed $1,200 for equipment and installation. Annual communication costs should not exceed $500, except annual communication costs may go up to $800 if NMFS determines that additional communication is necessary.	This option is expected to increase economic benefits in the future from better compliance with fishery management regulations on closed areas and a reduction in enforcement costs. In addition, protection of the remaining 20 acres of *Oculina* coral has a high existence value.	The initial cost could be as high as $1,200 for purchase of an appropriate vessel monitoring system. In addition, there would be an increase in annual costs to operate, repair, and maintain this system. Communication costs are expected to be no more than $800 annually.	This option is likely to increase net benefits to society through improved enforcement and reduced costs. In addition, protection of the remaining 20 acres of *Oculina* coral has a high existence value.
Rejected Option 1. No Action. Do not require use of an approved vessel monitoring system (VMS).	Vessel owners would not incur the cost for purchase and operation of a VMS.	This option would not improve compliance with fishery management regulations, would not reduce enforcement costs, and would not protect the remaining 20 acres of *Oculina* coral.	This option is unlikely to increase net benefits to society due to non-compliance, higher enforcement costs, and loss of the remaining 20 acres of *Oculina* coral.
Rejected Option 2. Any vessel fishing with a limited access rock shrimp permit in the South Atlantic Council's area of jurisdiction will be required to use a vessel monitoring system (VMS).	This option would be expected to increase economic benefits in the future from better compliance with fishery management regulations on closed areas, and a reduction in enforcement costs. In addition, protection of the remaining 20 acres of *Oculina* coral has a high existence value.	There would be an initial cost for purchase of a vessel monitoring system. In addition, there would be an increase in annual costs to operate, repair, and maintain this system.	This option is likely to increase net benefits to society through improved enforcement and reduced costs. In addition protection of the remaining 20 acres of *Oculina* coral has a high existence value..

PROPOSED ACTION/ OTHER POSSIBLE OPTIONS	POSITIVE IMPACTS	NEGATIVE IMPACTS	NET IMPACTS
Rejected Option 3. Any vessel with a south Atlantic limited access rock shrimp permit where the owner/operator had a resource violation during the past three years will be required to use a vessel monitoring system.	This option is expected to increase economic benefits in the future from better compliance with fishery management regulations on closed areas. However, may not be as effective as Proposed Action 4 or Rejected Option 2 as not all rock shrimp vessels would be required to use VMS.	There would be a cost to those individuals who had previous resource violations. These costs would include the initial outlay for purchase of a vessel monitoring system, and there would be an increase in annual costs to operate, repair, and maintain this system.	This option is likely to increase net benefits to society through improved enforcement and reduced costs. In addition protection of the remaining 20 acres of *Oculina* coral has a high existence value. However, benefits are likely to be lower than the Council's preferred option and Rejected Option 2.

The limited access program will improve economic efficiency in this fishery, since initially there will be a reduction in the number of vessels allowed to participate in the fishery (Action 1). The requirement for operator permits (Action 2) and VMS (Action 4) will add to annual operating costs but it is expected that net benefits to society will increase from improved compliance with fishery management regulations, reduced enforcement costs, and protection of the remaining 20 acres of *Oculina* coral. It is assumed that there will be increased economic yield from the proposed minimum mesh size regulation (Action 3) and thus net economic benefits to society in the long-term are expected to exceed the short-term cost of regulations in this Amendment.

In addition, aggregate effects from the proposed actions are not likely to exceed $100 million, and thus this proposed rule is not significant under E.O. 12866. Refer to Section 4.0 for detailed analysis of these economic effects and impacts on small businesses (IRFA).

It is strongly recommended that a comprehensive cost and earnings study of vessels in the rock shrimp fishery be conducted. This will provide data for use in a bioeconomic model of the dynamics of this fishery so that fishing behavior and effort levels can be predicted. This information could then be used to generate profitability of these vessels under various resource and regulatory conditions. In addition, these analytical models could then be used to quantify net benefits and determine benefit-cost ratios for the proposed actions and alternatives.

SOCIAL IMPACT ASSESSMENT

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

INTRODUCTION

Mandates to conduct Social Impact Assessments (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 (A)]. Under the U.S. Council on Environmental Quality's *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 301 (a) (1)]. More 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 [MSFCMA Section 303 (1) (9)]. 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 determine 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 analysis it is impossible 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 this specific fishery, the social impacts of limiting entry for the rock shrimp industry are hard to determine at this time due to the lack of current social, cultural and community data about the industry itself. The most recent available socioeconomic dataset of the fishery's participants is from 1994, and describes some basic demographic characteristics about the permit holders and their vessels in that particular year (See Section 3). This particular survey has not been redesigned nor re-administered to anyone in the industry and so does not reflect the greater number of permit holders in the fishery since 1996, nor any other changes that may have occurred. To compensate for this lack of current data, the Council's staff requested that attendees at the public hearings voluntarily respond to a brief list of questions in the public hearing input document designed to gather some basic information covering demographics, fishing practices, and simple economics about the fishery. It was hoped that this form of rapid assessment would update some of the social and demographic characteristics of the fishery's participants. Unfortunately, only 6 public hearing documents were completed out of a potential pool of approximately 70 to 80 persons. Furthermore, the polls were not filled out completely in any of the cases, and so the data were not particularly useful.

Minutes from the public hearings were transcribed and using the content analysis program Atlas.ti, they were analyzed for comments that would help to understand the potential social impacts of each proposed action. While this was of some help, such an analytical exercise is best performed at the scoping stage of developing a fishery management plan. Scoping is a more encompassing process that attempts to identify/explore all the various groups that will be affected by the proposed regulations. When properly done, scoping should identify as many possible alternatives to the proposed action(s), any conflicts, or other problems or benefits related to the issue (Council on Environmental Quality, 1981). Public hearing testimony, on the other hand, is inherently biased because only the views of those choosing to attend the hearings are represented.

Finally, after the June 2001 Council meeting, a list of all current permit holders was obtained and random, informal telephone conversations with approximately 25 of 333 permit holders were carried out. These conversations helped to clarify questions regarding historical participation in the fishery, what the social impacts of limited access might be, speculation in permits, perceptions of cumulative impacts of regulations, and issues of fairness and equity in the shrimp fishery. Telephone calls were made to permit holders in all the south Atlantic States and in Pennsylvania, Virginia, Rhode Island, Massachusetts, New Jersey and Washington state.

Other data sources used in determining social impacts were the U.S. Census Bureau and the U.S. Bureau of Labor Statistics.

Table 2. Summary of the Social Impact Statement/Fishery Impact Assessment.

PROPOSED ACTIONS/OTHER POSSIBLE OPTIONS	SOCIAL IMPACT
Proposed Action 1. Establish a limited access program for the rock shrimp fishery prosecuted within the South Atlantic Council's area of jurisdiction south of the Georgia/South Carolina state line, and limit initial eligibility to the owner of a vessel that: (a) has held a valid rock shrimp permit prior to December 31, 2000; and (b) can demonstrate at least 15,000 pounds of rock shrimp landings in any one calendar year from 1996 through 2000. This owner will be eligible to receive a fully transferable permit. A limited access permit would be required for harvest and possession of rock shrimp in the South Atlantic Council's area of jurisdiction south of the Georgia/South Carolina state line.	The social impacts will vary depending on whether or not the fishermen are included or excluded from the fishery. If included, there will be a positive benefit from increased individual catch and market stability. If not included, there will be a potential economic loss to small scale shrimpers, but this loss is hard to predict since fishing for rock shrimp is often erratic and the vessels participate in other fisheries.
Rejected Option 1. No Action. Do not develop a limited access program for the rock shrimp fishery in the South Atlantic Fishery Management Council's area of jurisdiction.	This option would not address concerns of the industry regarding protection of the resource both biologically and economically. It would not address potential social losses due to overcapacity for those fishermen who have large sums invested in rock shrimping.
Rejected Option 2. Establish a limited access program for the rock shrimp fishery prosecuted within the South Atlantic Council's area of jurisdiction, and limit initial eligibility to the owner of a vessel that: (a) has held a valid rock shrimp permit prior to December 31, 1999; and (b) can demonstrate landings of at least 15,000 pounds of rock shrimp in any one year from 1996 through 1999. These vessel owners will be eligible for fully transferable permits.	This is a more restrictive option than the proposed action in that it would limit permits in the entire south Atlantic region and would not allow for entrants from the year 2000 and 2001. While the social impacts would be similar to Proposed Action 1, they would be slightly more widespread within the fishery.
Rejected Option 3. Establish a limited access program for the rock shrimp fishery prosecuted within the South Atlantic Council's area of jurisdiction. A vessel owner who can demonstrate rock shrimp landings prior to the control date of April 4, 1994 will be eligible to receive a fully transferable permit. The owner of a vessel that entered the fishery after the control date with documented rock shrimp landings from 1996 to the end of 1999 will only be eligible for a non-transferable permit.	This rejected option would unfairly penalize those fishermen who have expended the most recent effort in the fishery. It may also lead to atrophy in the industry itself, as older fishermen are favored over more recent entrants. It also poses problems for determining eligibility, as there was no uniform documentation of landings prior to 1994.

Table 2 (contd.) Summary of Social Impacts

PROPOSED ACTIONS/OTHER POSSIBLE OPTIONS	SOCIAL IMPACT
Proposed Action 2. Require captains operating vessels that are required to have permits to fish for rock shrimp in the South Atlantic Council's area of jurisdiction to have a vessel operator's permit issued by the National Marine Fisheries Service to participate in this fishery. The duration of the permit is to be specified by the National Marine Fisheries Service.	Compliance with regulations should be enhanced. There will be improved data collection for conducting social impact analyses.
Rejected Option 1. No Action. Do not require an operator's permit.	This option would not address the issue of compliance and accountability, nor would it help build a better database for the fishery.
Rejected Option 2. Require an operator's permit in the rock shrimp fishery only when the operator is not the permit holder.	This option would not allow for as much accountability as the proposed action.
Proposed Action 3. Require that the minimum mesh size for a tail bag of a rock shrimp trawl, above the 2 inch rings, be at least 40 meshes of 1 and 7/8 inch stretched mesh at the cod end. This mesh size regulation only applies to the limited access rock shrimp fishery in the South Atlantic Council's area of jurisdiction.	This action will have a positive social impact by reducing conflict among some fishermen over what may been sometimes seen as poor fishing practices. There may be some short-term impacts to some shrimpers due to costs of refitting and loss of benefits from catching smaller shrimp.
Rejected Option 1. No Action. Do not specify a minimum mesh size.	This option would not address social conflict in the fishery related to disapproved fishery practices.
Rejected Option 2. Require that the minimum mesh size for a tail bag of a rock shrimp trawl, above the 2 inch rings, be at least 40 meshes of 1 and 3/4 inch stretched mesh at the cod end. This mesh size regulation only applies to the limited access rock shrimp fishery in the South Atlantic Council's area of jurisdiction.	There may be some impacts from costs of refitting and also from the diminished catch of smaller shrimp. These impacts would be in the short-term however. This action would have a positive impact by reducing conflict among some fishermen over what may be sometimes seen as poor fishing practices.
Rejected Option 3. Require that the minimum mesh size for a tail bag of a rock shrimp trawl, above the 2 inch rings, be at least 40 meshes of 2 inch stretched mesh at the cod end. This mesh size regulation only applies to the limited access rock shrimp fishery in the South Atlantic Council's area of jurisdiction.	There will be a negative impact in that there will be a loss in the amount of shrimp retained in the nets. This decrease may lead to loss in revenues which could lead to social impacts, such as reduction in crew size.

Table 2 (contd.) Summary of Social Impacts

PROPOSED ACTIONS/OTHER POSSIBLE OPTIONS	SOCIAL IMPACT
Proposed Action 4. Any vessel fishing with a limited access rock shrimp permit in the South Atlantic Council's area of jurisdiction will be required to use an approved vessel monitoring system (VMS), which shall not exceed $1,200 for equipment and installation. Annual communication costs should not exceed $500, except annual communication costs may go up to $800 if NMFS determines that additional communication is necessary.	There will be a positive impact from improved enforcement, and this will lessen suspicions and tensions between fishermen, as it will make all participants in the fishery subject to the same regulations and sanctions. There will be one other important benefit to society at large from this proposed action. The use of VMS in this fishery will help to assure the continued existence of the *Oculina* corals, which are unique and threatened by numerous anthropogenic activities. One such activity is illegal trawling through these coral banks. As there are approximately 20 square acres of this coral left in the world, more vigorous enforcement of the borders of the *Oculina* HAPC through means such as VMS will have a positive impact on the entire ecosystem.
Rejected Option 1. No Action. Do not require the use of an approved vessel monitoring system (VMS).	There may be continued problems with enforcement of no-fishing areas without the use of VMS. Not requiring VMS for monitoring of vessels may have the negative impact on society at large by depriving society of their existence and other unspecified values.
Rejected Option 2. Any vessel fishing with a limited access rock shrimp permit in the South Atlantic Council's area of jurisdiction will be required to use a vessel monitoring system (VMS).	This differs from the proposed action only in that it states no ceiling on materials and installation costs. This action may inflict greater social impacts as there are no built in cost controls.
Rejected Option 3. Any vessel with a south Atlantic limited access rock shrimp permit where the owner/operator had a resource violation during the past three years will be required to use a vessel monitoring system.	This option would target only those with previous resource violations and thus may create a social stigma. Will not reduce tensions and conflicts among fishermen. The *Oculina* HAPC would still be vulnerable to future incursions, having a negative impact on society at large.

Social Impact Assessment Data Needs

Given the lack of sufficient data to conduct a complete social impact assessment, the following data needs are suggested to help improve analysis of future actions addressing rock shrimp. The following categories include the types of data that need to be collected on the commercial harvesting sector.

Demographic information on commercial harvesters may include but not necessarily be limited to: Population, age, gender, ethnic/race, education, language, marital status, children (age & gender), residence, household size, household income (harvester/non harvester), occupational skills, and association with vessels and firms (role & status).

Social structure information on commercial harvesters may include but not necessarily be limited to: Historical participation, description of work patterns, description of gear and materials needed for harvesting and their use, organization and affiliation, patterns of communication and cooperation, competition and conflict, and communication and integration.

Emic culture information may include but not necessarily be limited to: Occupational motivation and satisfaction, attitudes and perceptions concerning management, constituent views of their personal future of harvesting, and psycho-social well-being.

This list of data needs is not exhaustive or all-inclusive. Upcoming issues within the south Atlantic will undoubtedly focus upon allocation and the need for reliable and valid information concerning the social environment will become even more necessary for managing fisheries. A further recommendation might be for the NMFS to review and implement the "Southeast Social and Cultural Data and Analysis Plan" as this would address many of the current data needs. There will be a study carried out under the auspices of NMFS and the SAFMC to document the fishing communities in the south Atlantic; that data will not be available until the late fall of 2002.

The Atlantic Coastal Cooperative Statistics Program (ACCSP) Program Design contains detailed social and economic data needs and draft survey instruments. Social and economic data collection projects should at least collect the minimum data elements.

1.0 PURPOSE AND NEED

A. Introduction

The rock shrimp fishery prosecuted within the South Atlantic Council's area of jurisdiction came under management on October 9, 1996 when Amendment 1 to the Fishery Management Plan for the Shrimp Fishery of the south Atlantic Region went into effect (SAFMC, 1996a). Amendment 1 established closed areas (effective 10/9/96) and set requirements for rock shrimp dealer permits and vessel permits (effective 11/1/96). Under Amendment 1 there was a proposed action to require vessel operator permits but the National Marine Fisheries Service rejected this measure because in their opinion there were "no data collection, or other benefits from this permit requirement sufficient to justify the associated costs and paperwork burden." Further that "adequate penalties, including fines and vessel permit sanctions are available to deter violations.." The Council disagreed strongly then and still does disagree. The continued violations of the *Oculina* HAPC support the Council's position.

During development of Shrimp Amendment 1, the rock shrimp industry and the Council addressed the topics of a limited access program and gear restrictions to increase overall yield in the rock shrimp fishery. Scoping meetings were held to obtain public input on these matters, however, the Council did not go forward with these management actions at that time (refer to history of management for a detailed discussion).

A control date of April 4, 1994 for the commercial fishery for rock shrimp in the EEZ off Florida from Duval through St. Lucie Counties was published in the Federal Register on April 4, 1994. Individuals entering the fishery after this date would not be assured of future participation in the fishery if a management regime was implemented that limited the number of participants in the fishery. The control date was intended to discourage new entries into this fishery based on economic speculation while the Council considered whether and how participation or effort in the rock shrimp fishery should be controlled.

The Rock Shrimp Advisory Panel (AP) met on August 1 and 2, 2000 in Charleston, South Carolina and focused their discussions on operator permits, a limited access program for the rock shrimp fishery, the size distribution of the rock shrimp harvest, and the increased discards of juvenile rock shrimp. The Rock Shrimp AP was concerned about the "speculative interest" in this fishery, which they defined as latent permit holders and vessels that fished infrequently and had a low level of landings (probably to maintain a landings record in order to qualify for a limited access permit). In any one year there are at least 400 rock shrimp permits issued. During the year with the highest landings to date, 1996, 153 vessels had documented landings of rock shrimp (Table 13). The AP also expressed concern about the number of new vessels that entered the fishery in 2000 and other large operators who were interested in entering this fishery in the near future.

The National Marine Fisheries Service began a program to measure vessel capacity in federally managed fisheries during 1999. This capacity measurement exercise is part of an international agreement with the Food and Agriculture Organization (FAO) that directs all FAO members to assess capacity levels in their domestic fisheries. The first step in this process was to put together qualitative estimates of capacity in U.S. fisheries. In the preliminary qualitative analysis for federally managed fisheries, the rock shrimp fishery in the south Atlantic was classified as one of the fisheries where there are indications of overcapacity (NMFS, 2001a). This conclusion is based on the Council's current optimum yield estimate of 6.83 million pounds (NMFS, 2001a).

The initial criteria for developing the rock shrimp limited access program was set by the Rock Shrimp AP so that the "core group" of participants would remain in the fishery. Advisory Panel members are of the opinion that the rock shrimp industry could sustain at most 150 vessels. In their opinion, additional vessels could result in serious resource depletion and economic hardship to the fishermen currently in the industry.

In addition to this basic framework for limited access, the Rock Shrimp AP also proposed that the Council set up a requirement for operator permits for rock shrimp vessels in the South Atlantic Council's area of jurisdiction, as they had in Amendment 1 (SAFMC, 1996a). Subsequently, the South Atlantic Council met on three occasions and further developed recommendations on these measures.

A joint meeting of the Rock Shrimp Advisory Panel and the Council to finalize options for the public hearing draft of Shrimp Amendment 5 was held during the Council's March 5-9, 2001 meeting. Amendment 5 includes proposed qualification criteria for the rock shrimp limited access program, conditions governing permit application/renewal, whether catch histories could be transferred from one vessel to another, and other measures for the limited access permitting system once it is in place.

The industry expressed the need for operator permits since many owners are not on board their vessels when fishing for rock shrimp. This measure would allow the industry to be more selective in hiring captains and ultimately increase compliance with fishery management regulations. Continued violations of the *Oculina* HAPC indicate that current enforcement tools are insufficient to protect habitat like *Oculina*. The Council proposed that affordable and effective vessel monitoring systems would further improve compliance with regulations, particularly in the case of restrictions on fishing areas enacted to protect essential fish habitat and habitat areas of particular concern.

Some of the Rock Shrimp AP members indicated that the average size of shrimp has declined significantly in recent years. However, if these small shrimp make up the bulk of the landings, and there is a market for them, they will be caught and purchased by the processors. Another matter addressed during these meetings was the increased proportion of juvenile rock shrimp in the catch that are discarded. Also, there were reports from the Rock Shrimp AP of dead, discarded shrimp being caught multiple times by other vessels. The Rock Shrimp AP suggested that these problems could be resolved by the limited access program and by setting a standard cod end minimum mesh size.

Members of the South Atlantic Rock Shrimp Advisory Panel had observed marked differences in the rock shrimp catch composition of two vessels towing nets with different mesh sizes at the same location. One vessel towing nets with a cod end mesh size of 1 and 7/8 inch stretched mesh managed to avoid a large proportion of the smaller, unmarketable shrimp (50/60 count per pound) as opposed to another vessel fishing side-by-side and using nets where the cod end mesh size was 1 and 5/8 inch stretched mesh (June 20- 21, 2001 Joint Controlled Access Committee/Rock Shrimp Advisory Panel meeting, Jekyll Island, Georgia).

The Council discussed a seasonal closure for rock shrimp when Amendment 1 to the shrimp plan was developed, however, this issue was not addressed in this amendment (refer to Appendices B and C in Amendment 1 to the South Atlantic Shrimp Fishery Management Plan; SAFMC, 1996a).

Public hearings on Amendment 5 to the SAFMC Shrimp Fishery Management Plan were held during the period May 3, 2001 to June 19, 2001 throughout the south Atlantic region, and two hearings were held in the Gulf of Mexico. Input from these public hearings

was considered by the Rock Shrimp AP and Council during the June 2001 SAFMC Council meeting in Jekyll Island, Georgia. The Council modified management measures based on this public input at the June Council meeting.

New information was presented to the Council during the December 2001 meeting concerning the *Oculina* Bank and impacts from rock shrimp trawls (Appendix J). Dr. Chris Koenig presented the final report on the *Oculina* Banks for the Council to use in evaluating whether or not the experimental closed area should continue. The report documents the continued damage attributable to bottom trawls which could be rock shrimp trawls and/or calico scallop trawls. In addition, Lt. Commander Dave Cinalli briefed the Council on the recent apprehension of a permitted rock shrimp vessel approximately one mile within the *Oculina* HAPC. Three additional vessels were reported to have been fishing within the *Oculina* HAPC area. These facts and the *Oculina* Report support the conclusion that rock shrimp trawling is having a significant, negative impact on *Oculina*.

During the December meeting, the Council discussed whether to submit the Rock Shrimp document for formal review and implementation after the December 3-7, 2001 meeting or approve options for a second DSEIS review. The Council voted to approve Shrimp Amendment 5 (Rock Shrimp) for formal review and implementation without adding MSY, OY, and overfishing actions. The Council will address these SFA parameters in Shrimp Amendment 6 which the Council has given a high priority for work during 2002. This should result in having the much needed rock shrimp measures implemented in the first quarter of 2002. The rock shrimp industry is very adamant that the limited entry program be implemented as soon as possible and they oppose any delay due to the negative socioeconomic impacts from continued open access. The requirement for vessel monitoring systems (VMS) would greatly assist enforcement to protect the *Oculina* Bank HAPC. There has been an increase in fishing within this closed area given the lack of adequate enforcement resources. This will continue into the foreseeable future. Any delay could result in further damage to critical *Oculina* habitat. Dr. Koenig's work indicates that "To our knowledge, only about 8 hectares (20 acres) of fully intact *Oculina* thicket habitat remain in the OHAPC and probably in the world." *Oculina* has been designated as:

(A) Essential Fish Habitat for species in the snapper grouper management unit; for spiny lobster; and for coral, coral reefs, and live/hard bottom.

(B) Essential Fish Habitat-Habitat Area of Particular concern for species in the snapper grouper management unit; and for coral, coral reefs, and live/hard bottom.

In addition, the public is losing confidence in the ability of the Council and NMFS to manage fisheries in a timely manner. The South Atlantic Council has been unable to get any regulations implemented since Snapper Grouper Amendment 12 which was approved by the Council in November 1999, sent to NMFS on March 15, 2000, and implemented on August 29, 2000. A delay in submitting Shrimp Amendment 5 would further erode the public's confidence in the Council's and NMFS' ability to effectively manage fisheries in the south Atlantic.

On the other hand, the Council risks having the amendment rejected because it does not include the MSY, OY, and overfishing actions. The Secretary would be weighing implementing a much needed limited entry program and a VMS requirement that would provide additional habitat protection versus delaying these measures so that actions could be added that will not affect the spawning stock and future health of the rock shrimp

resource, but would meet the SFA requirements in this amendment as opposed to Shrimp Amendment 6.

The South Atlantic Council addressed the "new" Sustainable Fisheries Act (SFA) requirements established in 1996 through the Comprehensive Amendment dated October 1998. Regulations implementing these measures were effective December 2, 1999. The Council concluded that:

1. The rock shrimp Maximum Sustainable Yield (MSY) of 6.8 million pounds did not need to be changed.
2. Optimum Yield (OY) is equal to MSY which for the rock shrimp fishery in the south Atlantic EEZ is defined as the amount of harvest that can be taken by U.S. fishermen without reducing the spawning stock below the level necessary to ensure adequate recruitment. The Council did not change OY.
3. Overfishing – The South Atlantic rock shrimp resource is overfished when the annual landings exceed the value which is two standard deviations above mean landings 1986-1994. This level, based on the more accurate state data, is 6,829,449 pounds. The Council did not change the overfishing definition.

Shrimp Amendment 5 addresses the rock shrimp fishery and was approved for public hearings and informal NMFS review during the March 2001 Council meeting. Amendment 5 proposes to establish a license limitation program for the rock shrimp fishery, requires limited entry permits, requires an operator's permit, establishes a minimum mesh size for trawls, and requires use of a vessel monitoring system. At the time the Council finalized Amendment 5 for public hearings and informal NMFS review, no new information addressing MSY, OY, and overfishing was available. The Council did not include options addressing any of these measures given the total lack of any new data.

The public hearing document was sent to NMFS on May 3, 2001. Public comments were requested by May 29, 2001 and comments from NMFS SERO, SEFSC, Washington, and NOAA GC were requested no later than during the June 18-22, 2001 Council meeting. Public hearings were scheduled and the Council requested the DSEIS be filed and they would consider DSEIS comments at the September 17-21, 2001 Council meeting. The Notice of Intent to prepare the DSEIS was published in the Federal Register on May 24, 2001 with comments due by June 25, 2001. No comments were received. The DSEIS was published on July 12, 2001 with comments due by September 4, 2001. The only DSEIS comments received were from the EPA. These comments were not substantive and have been addressed in the revised Amendment 5 document. The EPA rated the DSEIS as a "LO" (i.e., Lack of Objections) since the proposed Amendment 5 management of rock shrimp appears appropriate overall.

On June 19, 2001 the Council received the NMFS informal comments including information from the NMFS SEFSC on MSY, OY, and overfishing. The Council asked NMFS and NOAA GC if they needed to include options for these parameters in Amendment 5 and have additional hearings and another DSEIS review given that these issues were not included in the public hearing draft of Amendment 5. Or, could they include these options in the next shrimp amendment given that this would significantly delay implementation of the needed rock shrimp management measures. NOAA GC and NMFS advised the Council that these measures could be addressed in the next shrimp amendment.

In October, the NMFS SERO raised some concerns about the MSY, OY, and overfishing definitions meeting the "new" SFA requirements given the new intense scrutiny

documents are receiving during the review process and the fact that the golden crab MSY was recently rejected. A conference call with NMFS SERO, NOAA GC, and Council staff was held and we were informed that the situation had changed and that the best possible situation would be to add measures that would meet the "new" SFA requirements to Shrimp Amendment 5. We pointed out that this would require at least one additional public hearing and would require an additional DSEIS review. NOAA GC offered to check on the requirement for an additional DSEIS review. Subsequently we were informed that yes indeed an additional DSEIS review would be required, however, one additional public hearing at the December 2001 meeting would suffice for additional hearings.

The Council decided to go forward with Amendment 5 at this time to protect the remaining 20 acres of fully intact *Oculina* thicket habitat remaining in the world and to minimize the continued negative socioeconomic impacts from new entrants to the fishery under open access. The Council's current OY is set equal to MSY which is appropriate for an annual crop like rock shrimp when recruitment is dependent on environmental conditions rather than female biomass. That is, a relatively small number of mature shrimp can provide sufficient recruits for the subsequent year's production. The Council is fully committed to working on Amendment 6 during 2002 to address the SFA parameters. In the interim, the existing MSY, OY, and overfishing parameters specified provide sufficient protection while new parameters that meet the "new" SFA requirements are implemented via Amendment 6.

The Council provided a public comment period on rock shrimp during the December meeting and received one comment from Dr. Douglas Rader representing over 300,000 members of The Environmental Defense Fund. Dr. Rader's letter stated that "We strongly support moving expeditiously forward on finalizing and implementing Amendment 5 to the Shrimp FMP, implementing VMS coverage in the rock shrimp fleet, and other improvements. Any deficiencies in addressing issues related to MSY/OY and others should be handled through subsequent amendments or framework actions."

B. Issues/Problems and Management Objectives Addressed in this Plan Amendment

Issues/Problems

The following issues/problems will be added to the list of issues/problems in the Shrimp Fishery Management Plan:

1. Overcapacity. There is overcapacity in the rock shrimp fishery:

   - In any one year at least 400 rock shrimp permits are issued. There is a lot of latent effort, however during the period 1996 through 2000 at least 279 vessels have landed rock shrimp caught on the east coast. During the year with the highest level of landings, 1996, 153 vessels participated in the fishery and landed 21 million pounds of rock shrimp.
   - Based on an OY estimate of 6.8 million pounds, the National Marine Fisheries Service has indicated that there are preliminary indications of over-capacity in this fishery (NMFS, 2001a).

   Any gains from current regulatory measures under open access are likely to attract new entrants and provide incentives for those already in the fishery to increase

harvest capacity, even when gains in production are marginal. An increase in capacity would reduce net benefits in this industry and could force producers to harvest shrimp in marginal areas. In addition, a substantial increase in capacity could also result in non- compliance with fishery regulations in closed areas. This is of particular concern since this non-compliant behavior could threaten the remaining 20 acres of *Oculina* coral in the world.

2. Low Conservation and Compliance Incentives. Under open access there is little incentive on the part of fishermen to promote conservation and to voluntarily comply with regulations. This is because the benefits from doing so may accrue to other fishermen or to new entrants. A situation could arise where production in open fishing areas is insufficient to meet the threshold revenue needs of participants if there is a large increase of effort in the fishery. Such a scenario could result in increased transgressions into closed areas that are relatively more productive. A controlled access management system would provide a mechanism for those who participate in conservation measures to share in the resulting benefits. In addition, limited access permit holders tend to face higher costs if convicted of violating fishery regulations. As mentioned above, non-compliance with closed areas is threatening the remaining 20 acres of *Oculina* coral in the world.

3. Excessive Harvest of Small Unmarketable Rock Shrimp. There were several reports from fishermen that the proportion of juvenile rock shrimp in the catch has increased over time, and in some cases discarded, small shrimp were subsequently caught by other vessels. This situation could be further exacerbated if fishermen are forced to operate in marginal areas as a result of an excessive increase in effort due to the open access nature of the current fishery.

Management Objectives

The following objectives will be added to the list of objectives in the Shrimp Fishery Management Plan:

1. Manage the resource to provide for higher sustainable net benefits by taking the first step in reducing the current overcapacity in this fishery.

2. Remove latent permits from the fishery and restrict future entrants so as not to exacerbate the overcapacity problem in the future. There is concern that latent permits could become active if conditions change in other fisheries. This increased effort could threaten the long-term economic viability of the current rock shrimp industry.

3. Protect the interest of traditional user groups in this fishery. These are defined as fishermen who are dependent on rock shrimp for a large portion of their fishing income and vessels that harvest smaller quantities on a regular basis in order to supplement income from other fisheries such as the penaeid shrimp fishery. Traditional users also tend to be more familiar with management regulations pertaining to their fishery as opposed to new entrants who enter a fishery and participate infrequently.

4. Decrease fishing mortality on unmarketable small/juvenile rock shrimp with the goal of increasing future yield in the rock shrimp industry from reduced discards of small shrimp. This can be achieved by setting a minimum mesh size restriction and by the Council's proposed limited access program.

5. Improve enforcement of current fishery management regulations, particularly with regard to illegal fishing in the *Oculina* Bank HAPC, by requiring vessel monitoring systems. It is expected that compliance with these regulations should improve under a limited access program.

6. Protect the interests of vessel owners who are not operators and increase compliance with management regulations by the requirement for operator permits.

The Council deliberated on the input from the Rock Shrimp Advisory Panel, the public hearing testimony on the measures in the Public Hearing Draft of Shrimp Amendment 5, comments on the DSEIS, and the guidance under the Magnuson Act and other applicable laws in recommending management measures contained in this document. In particular the Council gave careful consideration to Section 303(b)(6) of the Magnuson-Stevens Act, which provides guidance in developing limited access programs as follows:

"Any fishery management plan which is prepared by any Council, or by the Secretary, with respect to any fishery, may --establish a limited access system for the fishery in order to achieve optimum yield if, in developing such system, the Council and the Secretary take into account--

(A) present participation in the fishery,
(B) historical fishing practices in, and dependence on, the fishery,
(C) the economics of the fishery,
(D) the capability of fishing vessels used in the fishery to engage in other fisheries,
(E) the cultural and social framework relevant to the fishery and any affected fishing communities, and
(F) any other relevant considerations;"

C. Issues/Problems and Management Objectives Addressed in the Shrimp Fishery Management Plan

Issues/Problems

Problems identified in the Shrimp Fishery Management Plan as modified by Amendments 1 and 2 are as follows [Note: Amendments 3 and 4 did not change the list of problems.]:

1. Unregulated commercial fishing in the EEZ on over-wintering white shrimp following severe winter cold kills may reduce subsequent recruitment and fall shrimp production.
2. Shrimp trawls have a significant bycatch of non-target finfish and invertebrates, most of which are discarded dead. This may reduce ecosystem diversity, adversely impact other fauna, and significantly reduce yield in other fisheries directed at these

discarded species. In addition, shrimp trawls have a bycatch of endangered, threatened, and/or protected species (e.g., leatherback turtles) that are too large to be excluded by TEDs. Repeat captures of endangered turtles by shrimp trawls in areas of high turtle and shrimp concentration may be contributing to increased sea turtle mortalities.

3. Lack of consistent/compatible regulations addressing bycatch in federal waters may result in unenforceable state regulations and preclude effective reduction of weakfish and Spanish mackerel throughout the range of the species.
4. There will be a compliance problem with fishermen participating in a transboundary penaeid shrimp fishery if reduction strategies are not standardized.
5. Shrimp mariculture operations may inadvertently release exotic species and/or diseases or parasites into local waters. The impact of such releases on domestic shrimp stocks is unknown, but potentially serious.
6. Habitat alteration (including beach renourishment and dredge and fill projects) and pollution in coastal areas may reduce shrimp production.
7. Incomplete and inadequate data for the south Atlantic rock shrimp fishery.

Management Objectives

Objectives identified in the Shrimp Fishery Management Plan as modified by Amendments 1 and 2 are as follows [Note: Amendments 3 and 4 did not change the list of problems.]:

1. Eliminate fishing mortality on over-wintering white shrimp following severe winter cold kills.
2. Reduce the bycatch of non-target finfish, invertebrates, and threatened, protected, and endangered species.
3. Coordinate development of measures reducing bycatch with south Atlantic states to enhance enforceability of both state and federal regulations.
4. Enhance compliance of trawl fishermen participating in a transboundary penaeid shrimp fishery through standardization of bycatch reduction strategies.
5. Encourage states with mariculture facilities to carefully monitor these operations, and require safeguards to prevent exotic species from escaping and/or diseases from entering the environment.
6. Reduce or eliminate loss and/or alteration of the habitat on which shrimp depend or degradation of water quality through pollution that would reduce shrimp production.
7. Provide a mechanism to manage rock shrimp under the fishery management plan for the shrimp fishery in the south Atlantic region.
8. Minimize impacts of the rock shrimp fishery on coral, coral reefs, and live/hard bottom habitat in the south Atlantic region.
9. Implement permit and reporting requirements needed to ensure necessary data are provided by the rock shrimp industry.

D. History of Management

The Fishery Management Plan for the Shrimp Fishery of the south Atlantic Region (SAFMC, 1993) was prepared by the South Atlantic Fishery Management Council primarily to provide south Atlantic states with the ability to request concurrent closure of the EEZ adjacent to their closed state waters following severe winter cold weather and to eliminate fishing mortality on over-wintering white shrimp following severe winter cold kills. The plan provided an exemption for the royal red and rock shrimp fisheries in the event of a closure of the EEZ to the harvest of white shrimp. In addition it also established a buffer zone extending seaward from shore 25 nautical miles, inside of which no trawling would be allowed with a net having less than 4 inch stretch mesh during an EEZ closure. Vessels trawling inside this buffer zone could not have a shrimp net aboard (i.e., a net with less than 4 inch stretch mesh) in the closed portion of the EEZ. Transit of the closed EEZ with less than 4 inch stretch mesh aboard while in possession of *Penaeus* species will be allowed provided that the nets are in an un-fishable condition which is defined as stowed below deck. The exemption, the provision for transit through the EEZ and limiting the buffer zone to 25 miles were all measures implemented to allow the rock shrimp fishery to be prosecuted with minimal disruption during a closure of federal waters for protection of white shrimp. Rock shrimp, although acknowledged as being part of the south Atlantic shrimp fishery, were not included in the management unit because no regulations were being proposed for the species at that time. The Fishery Management Plan for the Shrimp Fishery of the south Atlantic Region (SAFMC, 1993) was approved in December 1993. The Shrimp Plan contained a Final Environmental Impact Statement.

The primary measure discussed in previous deliberations on rock shrimp involved delaying harvest to increase yield and possibly market price by landing larger rock shrimp (see Appendix B in Shrimp Amendment 1; SAFMC, 1996a). Shrimp Advisory Panel members also reviewed the issue (September 28, 1992) and recommended the Council consider implementation of a delayed harvest if economic benefits to the rock shrimp fishery could be documented.

The Council, in response to industry comments, held scoping meetings in 1992 to solicit input from the public on the management of rock shrimp. Rock shrimp fishermen and the Council were concerned over the decline in rock shrimp landings. With the use and modification of peeling technology to economically process smaller rock shrimp, the industry proceeded to harvest larger amounts of previously unmarketable rock shrimp.

A preliminary analysis, conducted by Council staff in 1993, looked at the possibility of increasing total value of landed rock shrimp if they were allowed to attain a larger and possibly more valuable market size. No information was available at the time on the potential increase in value from landing larger shrimp. A preliminary analysis of what determines dockside prices in the rock shrimp fishery (Adams, 1993) was initiated at the request of the Council and our Scientific and Statistical Committee.

The Council reinitiated discussions on rock shrimp in 1994 and held public scoping meetings in St. Augustine, Florida on February 9, 1994 and in Brunswick, Georgia on April 20, 1994 to solicit input on development of regulations for the rock shrimp fishery. The Council, pursuant to action taken at the St. Augustine meeting, approved a control date of April 4, 1994 for the rock shrimp fishery prosecuted in federal waters off Florida from Duval County through St. Lucie County (see Appendix H in Shrimp Amendment 1; SAFMC, 1996a).

The preliminary analysis of what determines dockside prices in the fishery was reviewed by the Council along with an update to the original yield-per-recruit analysis. The updated yield-per-recruit analysis and newly available price information were used to further explore changes in yield and exvessel prices of landed rock shrimp for various seasonal closures (see Appendix B in Shrimp Amendment 1; SAFMC, 1996a). The results indicated that at that time there would be a marginal gain in yield and value by delaying the opening of the season. Part of the reason for this is due to the probable density dependency of growth and mortality. Also, the differential market prices of the various size categories considered in the analysis contributed to this conclusion.

The Council, on June 23, 1994, held an additional public scoping meeting in Marathon, Florida prior to reviewing a decision document for rock shrimp. The Council subsequently voted to develop Amendment #1 to the shrimp fishery management plan to manage the rock shrimp fishery off Cape Canaveral, Florida through area and possibly gear restrictions, license limitation, and co-management of the fishery with the industry.

In 1994, increased demand and unusually high market prices for many shrimp products, resulting from a reduced rate of increase in imports of maricultured shrimp, provided fishermen with an incentive to harvest all marketable sizes of rock shrimp, expanding fishing areas even further south. The season started much earlier in 1994, lasted much longer, and allowed fishermen to increase their overall harvest and hence total revenue.

Subsequently, the increased effort and extension of the fishery offshore and significantly farther south of Cape Canaveral, increased the probability of the fishery impacting protected hard/live bottom habitat. This included *Oculina* coral and the *Oculina* Bank Habitat Area of Particular Concern (HAPC). The *Oculina* Bank HAPC was established through the original Coral Plan (GMFMC and SAFMC, 1982). The area encompassed by the *Oculina* Bank HAPC was designated an experimental closed area under Amendment 6 to the snapper grouper fishery management plan (SAFMC, 1994a) in which fishing or anchoring to fish for species in the snapper grouper management unit was prohibited. There was concern the trawls used in the rock shrimp fishery would cause significant damage to these fragile habitats. Therefore, the Council proposed to implement regulations to manage the fishery by requiring appropriate measures to monitor the fishery and prevent gear damage to habitat. Measures addressing area closures, gear restrictions, license limitation, and co-management of the fishery with the industry were taken to public hearing in St. Augustine and Cocoa Beach, Florida in September 1994.

At its October 1994 meeting, the Council voted to defer license limitation, co-management, and development of a framework procedure to allow introduction of gear regulations to a separate amendment; take no action on mesh size regulations contingent on the development of a framework procedure; and include no trawling for rock shrimp south of 28° 30' N. latitude as the preferred option for an area closure. Prohibiting trawling for rock shrimp south of 28° 30' N. latitude would have enhanced existing federal regulations for coral and snapper grouper by providing more protection to *Oculina* coral and the *Oculina* Bank HAPC. The area that would have been protected south of the line contains the majority of the known distribution of *Oculina* coral.

The Council was scheduled to review Amendment 1 at the February 1995 Council meeting and hold a final public hearing. Prior to the hearing held in St. Augustine, Florida fishermen commented that the information on the fishery was incorrect and incomplete. Council staff attended an informal meeting with rock shrimp fishermen, dealers, and

processors to explain data sources, Council rationale, etc. The meeting was held on Monday, February 6, 1995. At that meeting staff listened to the concerns of the industry and requested help from the newly formed Rock Shrimp Producers Association to improve our understanding of the industry with specific focus on landings and harvest areas. The two items presented in the draft Amendment were challenged by industry as not truly representative of the fishery. At both the informal meeting on February 6, 1995 and the public hearing held on Tuesday, February 7, 1995 industry representatives suggested that landings information was incomplete due to late data or non-reporting. Industry representatives indicated that some landings were reaching the processors before being documented, and that may have explained some of the inconsistencies.

Landings from certain harvest areas were also challenged by representatives of the Rock Shrimp Producers Association. This indicated that harvesting of rock shrimp had moved further south than official statistics indicated. Generally, the industry suggested that overall landings were larger and more pounds had been harvested in certain harvest areas. This new information showed the closure proposed by the Council would have a greater impact upon the rock shrimp fishery than had been previously assumed.

Given the concerns expressed by industry, the Council deferred final action to provide an additional opportunity for industry to supply information on total harvest and areas fished. At the same time the Council asked that industry consider the issues of under-reporting and habitat protection, and work closely with staff to bring new options to the next Council meeting.

With new information provided by the industry through the public hearing process and with updated information from the State of Florida, a more accurate picture of total landings and area of harvest was achieved. The presentation of known distribution of live/hard bottom habitat associated with the rock shrimp fishing area was also refined.

An Ad Hoc Rock Shrimp Advisory Panel was established by the Council and convened to discuss and propose options to address the two primary issues of reporting and habitat protection. The Ad Hoc Advisory Panel presented the following measures for consideration by the South Atlantic Council:

1. Create a no transit zone for all vessels around the *Oculina* Bank HAPC that is strictly enforced.
2. Build an education program for the protection of the *Oculina* coral.
   A. Clearly highlight the zone on charts.
   B. Create leaflets to be distributed by docks and the rock shrimp network to all fisherman.
   C. Work together with state and local agencies like the Alabama Extension and Research Center, to disseminate information.
3. Keep logbooks on all vessels as a requirement. Reporting of landings would be made by receiving docks.
   A. Use a more extensive reporting classification to fully understand the fisheries instead of the current system which divides the area into only three areas.
4. Mandatory permitting for captains.
   A. First offense would result in six months suspension.
   B. Second offense would result in permanent suspension.
5. Locate a buoy system on the west side of the *Oculina* Bank HAPC.

It was the Council's intent that possession of calico scallops and rock shrimp within these areas is also prohibited. This enhanced enforceability of the prohibition on harvest and use of bottom-tending gear in these areas.

Within the two Satellite *Oculina* Bank HAPCs, the following regulations apply:

1. Fishing with a bottom longline, bottom trawl, dredge, pot, or trap is prohibited.
2. A fishing vessel may not anchor, use an anchor and chain, or use a grapple and chain.

The Council's Comprehensive Habitat Amendment (including Shrimp Amendment 3) was sent to NMFS for formal review and implementation on October 9, 1998. The final rule was published on June 14, 2000 and regulations became effective on July 14, 2000.

Shrimp Amendment 4 (SAFMC, 1998c), which addressed the Sustainable Fisheries Act requirements of the Magnuson-Stevens Act, as amended in 1996, contained an Environmental Assessment and the following rock shrimp items:

Consistency with SFA Section 102 definitions:
Maximum Sustainable Yield (MSY), Optimum Yield (OY), and Overfishing:
ACTION 1. No action to change the Rock Shrimp MSY from 6.8 million pounds.

ACTION 2. No action to change the Rock Shrimp OY from "OY is MSY which for the rock shrimp fishery in the south Atlantic EEZ is defined as the amount of harvest that can be taken by U.S. fishermen without reducing the spawning stock below the level necessary to ensure adequate reproduction."

ACTION 3. No action to change the Rock Shrimp Overfishing from "The south Atlantic rock shrimp resource is overfished when the annual landings exceed the value which is two standard deviations above mean landings 1986-1994. This level, based on the more accurate state data, is 6,829,449 million pounds.

ACTIONS 4 & 5. No action to address the rebuilding time frame or overfishing evaluation because rock shrimp are not overfished.

Other Required Provisions in the Comprehensive SFA Amendment
Bycatch – bycatch management measures and bycatch reporting requirements:

Rock shrimp – During development of the BRD management measure the Council reviewed information from a small number of observer trips aboard rock shrimp vessels that indicated bycatch was minimal in this fishery. This information was corroborated by industry members serving on the Council's Rock Shrimp Advisory Panel. Also, the Council was provided information indicating BRDs are being used in rock shrimp trawls voluntarily by the industry. The Council has requested NMFS conduct additional observer trips aboard rock shrimp vessels to verify that the bycatch in the fishery is minimal during all months in which the fishery is pursued. If the Council receives information that there is more than minimal bycatch and that BRDs are not being used, the Council will move to extend the BRD requirement to the rock shrimp fishery. The Council recently received a report from a hook and line fisherman that bycatch in the rock shrimp fishery could have impacts on the

snapper/grouper fishery. While fishing off the east coast of Florida this fisherman observed discards of several snapper and grouper species from a vessel trawling for rock shrimp.

In addition, trawling for rock shrimp is prohibited in areas where coral resources may be impacted, thus bycatch of coral is minimized and coral habitat is protected.

ACTION 2A. No action to amend the bycatch management measures in the Shrimp FMP.

ACTION 2B. Amend the Shrimp FMP to include reporting requirements as specified in the Atlantic Coastal Cooperative Statistics Program (ACCSP). SAFMC staff will work with NOAA General Counsel to determine the appropriate procedure to remove all the varied data reporting requirements in individual FMPs and reference one comprehensive data reporting document.

Fishing Communities – Identify and define fishing communities:
ACTION 4. Amend the Shrimp FMP to include available information on fishing communities (refer to the detailed discussion in the SFA Comprehensive Amendment).

The Council's Comprehensive SFA Amendment (including Shrimp Amendment 4) was sent to NMFS for formal review and implementation on October 7, 1998. The final rule was published on November 2, 1999 and regulations became effective on December 2, 1999.

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

National Environmental Policy Act (NEPA) regulations require that Section 2.0 present the environmental impacts of the proposed actions 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 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 detailed evaluation of alternatives and discussion about the effects on the environment in Section 4.0 Environmental Consequences. In Section 2.0, the Council summarizes the impacts of the proposed actions and range of alternatives and uses matrices to provide the reader with a summary of the environmental impacts of the proposed actions as they relate to the range of alternatives considered. The Council concluded this meets the interest 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 reasonable alternatives that have been considered by the Council. The following tables summarize the proposed action and the range of alternatives and how they address the problems/issues identified by the Council. Management alternatives are presented in the rows and issues/problems in the columns. The alternatives for the implementation, administration, and operation of Action 1, Actions 1A to 1H, are not included in this section to avoid confusion and clutter of information in Section 2. Refer to Section 4 for the evaluation and discussion of the implementation, administration, and operation of the limited access program proposed in Action 1. Also, for detailed analysis of impacts for each alternative see Section 4.0 Environmental Consequences.

The following problems/issues pertaining to the rock shrimp fishery have been identified and addressed by this amendment. The abbreviated summary title is used in the impact table (Table 3) to identify which problems/issues are addressed by which proposed management alternative.

Socio-Economic Problem/Issue	Summary Title
Reduced social and economic benefits	Benefits
Overcapacity	Capacity
Improved compliance with existing conservation measures.	Compliance
Improved protection of HAPCs.	Compliance

Biological Problem/Issue	Summary Title
Excess harvest of small shrimp	Harvest
Improved compliance with existing conservation measures.	Compliance
Improved protection of HAPCs.	Habitat
Reduction in bycatch	Bycatch

Table 3. Summary of Environmental Consequences (Effects of Alternatives on the Issues/Problems).

Alternatives	Issues/Problems	
	Biological: Bycatch/Habitat	**Social and Economic: Benefits, Capacity**
Proposed Action 1. Establish a limited access program for the rock shrimp fishery prosecuted within the South Atlantic Council's area of jurisdiction South of the Georgia/South Carolina state line, and limit initial eligibility to the owner of a vessel that: (a) has held a valid rock shrimp permit prior to December 31, 2000; and (b) can demonstrate at least 15,000 pounds of rock shrimp landings in any one calendar year from 1996 through 2000. This owner will be eligible to receive a fully transferable permit. A limited access permit will be required for harvest and possession of rock shrimp in the South Atlantic Council's area of jurisdiction South of the Georgia/South Carolina state line.	This proposed action could reduce the level of bycatch under the assumption that the level of effort in the fishery is reduced. In addition, this action is expected to increase compliance with fishery management regulations and thus enhance protection of Essential Fish Habitat (EFH).	Initially this measure would reduce over capacity, and slow the growth rate of capacity in comparison to the status quo.
Rejected Option 1. No Action. Do not develop a limited access program for the rock shrimp fishery in the South Atlantic Fishery Management Council's area of jurisdiction.	This option could result in increased bycatch if the fishery expands under the "open access" situation. Would not improve compliance with fishery management regulations and improve protection of Essential Fish Habitat.	Compared to the other alternatives, no action could result in a higher growth rate in capacity and exacerbate the current overcapacity problem in this fishery.

Table 3. Summary of Environmental Consequences Continued

Alternatives	Issues/Problems	
	Biological: Bycatch/Habitat	**Social and Economic: Benefits, Capacity**
Rejected Option 2. Establish a limited access program for the rock shrimp fishery prosecuted within the South Atlantic Council's area of jurisdiction, and limit initial eligibility to the owner of a vessel that: (a) has held a valid rock shrimp permit prior to December 31, 1999; and (b) can demonstrate landings of at least 15,000 pounds of rock shrimp in any one year from 1996 through 1999. These vessel owners will be eligible for fully transferable permits.	This proposed action could reduce the level of bycatch under the assumption that the level of effort in the fishery is reduced. In addition, this action is expected to increase compliance with fishery management regulations and thus enhance protection of Essential Fish Habitat (EFH).	Initially this measure would reduce over capacity, and slow the growth rate of capacity in comparison to the status quo.
Rejected Option 3. Establish a limited access program for the rock shrimp fishery prosecuted within the South Atlantic Council's area of jurisdiction. A vessel owner who can demonstrate rock shrimp landings prior to the control date of April 4, 1994 will be eligible to receive a fully transferable permit. The owner of a vessel that entered the fishery after the control date with documented rock shrimp landings from 1996 to the end of 1999 will only be eligible for a non-transferable permit.	This option could reduce the level of bycatch under the assumption that the level of effort in the fishery is reduced. Also, this option is expected to increase compliance with fishery management regulations and thus enhance protection of Essential Fish Habitat.	Initially this option would result in higher capacity that the preferred option and rejected option 2. In the long term this option could reduce the fleet size to it lowest level compared to the other options, since vessels that entered the fishery during more recent years would only be eligible to receive non-transferable permits.

Table 3. Summary of Environmental Consequences Continued

Alternatives	Issues/Problems	
	Biological: Habitat	**Social and Economic: Benefits, Capacity**
Proposed Action 2. Require captains operating vessels that are required to have permits to fish for rock shrimp in the South Atlantic Council's area of jurisdiction to have a vessel operator's permit issued by the National Marine Fisheries Service to participate in this fishery. The duration of the permit is to be specified by the National Marine Fisheries Service.	This proposed action is expected to increase compliance with fishery management regulations and thus enhance protection of Essential Fish Habitat.	This proposed action is likely to increase benefits to society.
Rejected Option 1. No Action. Do not require an operator's permit.	This option would not increase compliance with fishery management regulations and thus enhance protection of Essential Fish Habitat.	This option would not increase net benefits.
Rejected Option 2. Require an operator's permit in the rock shrimp fishery only when the operator is not the permit holder.	This option would increase compliance with fishery management regulations and thus enhance protection of Essential Fish Habitat.	This option is likely to increase benefits to society.

Table 3. Summary of Environmental Consequences Continued

Alternatives	Issues/Problems	
	Biological: Harvest	**Social and Economic: Benefits, Capacity**
Proposed Action 3. Require that the minimum mesh size for a tail bag of a rock shrimp trawl, above the 2 inch rings, be at least 40 meshes of 1 and 7/8 inch stretched mesh at the cod end. This mesh size regulation only applies to the limited access rock shrimp fishery in the South Atlantic Council's area of jurisdiction.	This proposed action could increase yield from the fishery and provide additional protection for juvenile shrimp.	Net benefits from this action would depend on the level of increased yield, total cost of replacing gear, and the price differential between the respective size categories. From testimony provided by the Rock Shrimp Advisory Panel it appears that this mesh size is likely to increase benefits to society.
Rejected Option 1. No Action. Do not specify a minimum mesh size.	This option would not increase yield from the fishery and provide additional protection for juvenile shrimp.	Forgone revenue would depend on increase in yield from the "optimal" mesh size and the price differentials between the respective size categories.
Rejected Option 2. Require that the minimum mesh size for a tail bag of a rock shrimp trawl, above the 2 inch rings, be at least 40 meshes of 1 and 3/4 inch stretched mesh at the cod end. This mesh size regulation only applies to the limited access rock shrimp fishery in the South Atlantic Council's area of jurisdiction.	This option could increase yield from the fishery and provide additional protection for juvenile shrimp.	Net benefits from this option would depend on the level of increased yield, total cost of replacing gear, and the price differential between the respective size categories.
Rejected Option 3. Require that the minimum mesh size for a tail bag of a rock shrimp trawl, above the 2 inch rings, be at least 40 meshes of 2 inch stretched mesh at the cod end. This mesh size regulation only applies to the limited access rock shrimp fishery in the South Atlantic Council's area of jurisdiction.	This option could increase yield from the fishery and provide additional protection for juvenile shrimp.	Net benefits from this option would depend on the level of increased yield, total cost of replacing gear, and the price differential between the respective size categories.

Table 3 (contd.). Summary of Environmental Consequences

Alternatives	Issues/Problems	
	Biological: Harvest, Habitat	**Social and Economic:**
Proposed Action 4. Any vessel fishing with a limited access rock shrimp permit in the South Atlantic Council's area of jurisdiction will be required to use an approved vessel monitoring system (VMS), which shall not exceed $1,200 for equipment and installation. Annual communication costs should not exceed $500, except annual communication costs may go up to $800 if NMFS determines that additional communication is necessary.	This proposed action will improve protection for *Oculina* coral and EFH/EFH-HAPC. This is critical considering the fact that there are 20 acres of intact *Oculina* coral left in the world.	This proposed action will increase net benefits to society.
Rejected Option 1. No Action. Do not require the use of an approved vessel monitoring system (VMS).	This option would not provide additional EFH/EFH-HAPC protection.	This option is unlikely to increase net benefits to society.
Rejected Option 2. Any vessel fishing with a limited access rock shrimp permit in the South Atlantic Council's area of jurisdiction will be required to use a vessel monitoring system (VMS).	This option would improve protection for *Oculina* coral and EFH/EFH-HAPC.	This option is likely to increase net benefits to society.
Rejected Option 3. Any vessel with a South Atlantic limited access rock shrimp permit where the owner/operator had a resource violation during the past three years will be required to use a vessel monitoring system.	This option would improve protection for *Oculina* coral and EFH/EFH-HAPC.	This option is likely to increase net benefits to society.

Additional management measures that were eliminated from further detailed consideration prior to the public hearings are included in Appendix B. Appendix C and Appendix D also contain additional options considered by the Council.

3.0 AFFECTED ENVIRONMENT

The affected environment, including a description of the shrimp fisheries in the south Atlantic region, is presented in detail in the original shrimp plan (SAFMC, 1993) and the profile of the shrimp fishery in the south Atlantic (SAFMC, 1981). A description of council concerns and recommendations on protecting shrimp habitat is also included in the original FMP.

Keiser (1976) described the distribution of rock shrimp in coastal waters of the southeastern United States. Whitaker (1982) presented a summary of information on rock shrimp off South Carolina. The only comprehensive research to date on rock shrimp off the east coast of Florida was by Kennedy et al. (1977). The following section incorporates some of the more significant findings presented by Kennedy et al. (1977) regarding the biology of rock shrimp on the east coast of Florida. The 1999 Shrimp Stock Assessment and Fishery Evaluation report contains a summary of data and research results on the south Atlantic shrimp fishery (SAFMC, 1999). The Council is in the process of developing a major revision/update to the EIS for the shrimp fishery. It is scheduled to be completed in 2003.

A. Description of the Species and Distribution

Rock shrimp are distributed worldwide in tropical and temperate waters. In the southeastern United States, the rock shrimp fishery is based entirely on the rock shrimp (*Sicyonia brevirostris*). Rock shrimp occur in deeper waters than the associated three *Penaeus* shrimp species and constitute a small part of the overall southeast shrimp fishery.

Morphology

Rock shrimp (Figure 1) are very different in appearance from the three species of *Penaeus*. Rock shrimp can be easily separated from *Penaeus* species by their thick, rigid, stony exoskeleton.

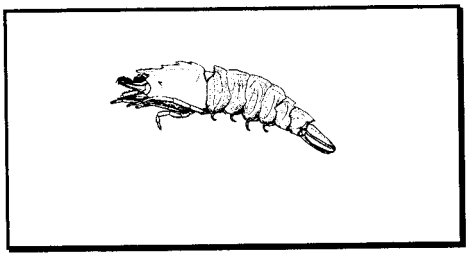


Figure 1. Rock shrimp *Sicyonia brevirostris*.

Distribution

Rock shrimp are found in the Gulf of Mexico, Cuba, the Bahamas, and the Atlantic Coast of the U.S. up to Virginia (SAFMC, 1993) (Figure 2). The center of abundance and the concentrated commercial fishery for rock shrimp in the south Atlantic region occurs off northeast Florida south to Jupiter Inlet (SAFMC, 1996a). Small quantities of rock shrimp are also found off North Carolina and South Carolina, and are occasionally landed in these states. During the public hearing phase for Shrimp Amendment 5 fishermen stated that historically there was production off Georgia, and in some recent years there were landings records from the statistical zone off the Georgia coast (these data are confidential and cannot be reported in this document). However, the level of this production is not comparable to the fishery prosecuted in the EEZ off Florida.

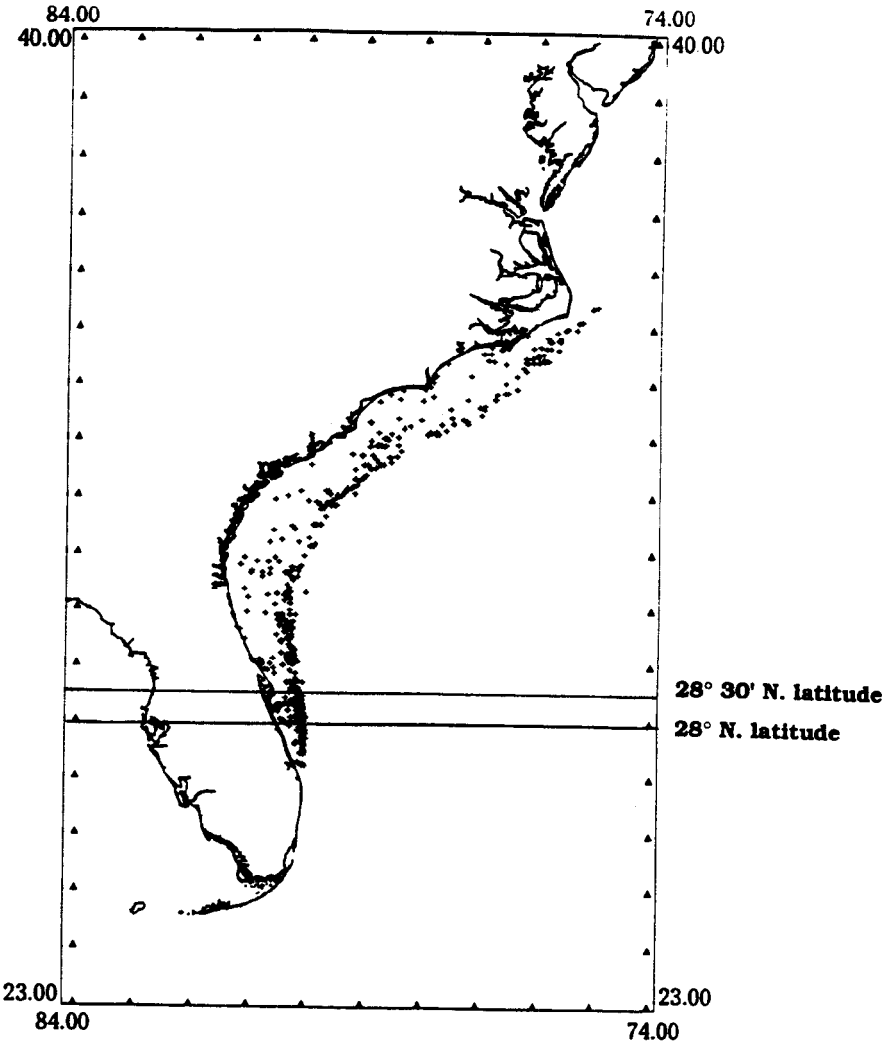


Figure 2. Rock shrimp distribution in the south Atlantic region as indicated from historical research efforts (1956-1991) using finfish and shrimp trawls (Source: NMFS, 1994).

Rock shrimp live mainly on sand bottom from a few meters to 183 m (600 ft), and occasionally deeper (SAFMC, 1993). The largest concentrations are found between 25 and 65 m (82 and 213 ft).

Biological Characteristics

Maturation

Rock shrimp are dioecious (separate sexes). Female rock shrimp attain sexual maturity at about 17 mm carapace length (CL), and all males are mature by 24 mm CL. Seasonal temperature initiates maturation.

Fecundity and Total Reproductive Capacity

Rock shrimp have ovaries that extend from the anterior end of the cephalothorax to the posterior end of the abdomen. Rock shrimp, as with most shrimp species, are highly fecund. Fecundity most probably, as with penaeids, increases with size. Kennedy et al. (1977) approximated the contribution of mature female rock shrimp by size class to total reproduction (Figure 3).

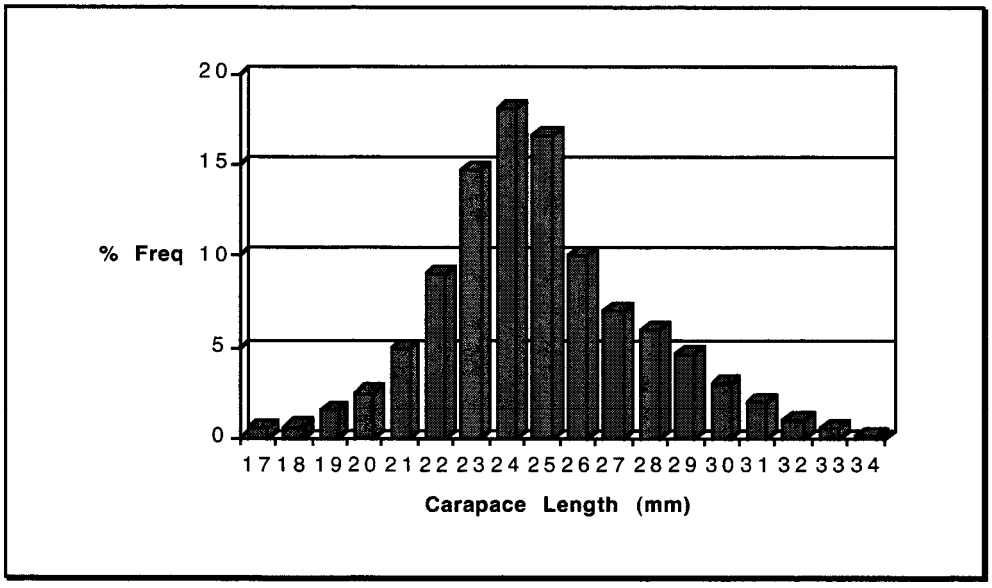


Figure 3. Contribution of mature female rock shrimp by size class to total reproduction (Source: Kennedy et al., 1977).

Mating

In rock shrimp, copulation is believed to take place between hard shelled individuals. During copulation the male anchors the spermatophore to the female's thelycum by the petasma and other structures and a glutinous material. Fertilization is believed to take place as ova and spermatozoa are simultaneously expulsed from the female.

Spawning

Spawning season for rock shrimp is variable with peak spawning beginning between November and January and lasting 3 months. Individual females may spawn three or more times in one season. Peak spawning activity seems to occur monthly and coincides with the full moon (Kennedy et al., 1977).

Ovarian Development

Five ovarian stages, one more than found in penaeid shrimp, have been identified for rock shrimp (Kennedy et al., 1977): 1) Undeveloped; 2) Developing; 3) Nearly Ripe; 4) Ripe; and 5) Advanced Ripe.

Larval and Postlarval Phases

Kennedy et al. (1977) found rock shrimp larvae to be present year round with no trend relative to depth, temperature, salinity, and length, or moon phase. The development from egg to postlarvae takes approximately one month. Subsequently the development from postlarvae to the smallest mode of recruits takes two to three months. The major transport mechanism affecting planktonic larval rock shrimp is the shelf current systems near Cape Canaveral, Florida (Bumpus, 1973). These currents keep larvae on the Florida Shelf and may transport them inshore in spring.

Length-Weight Relationships

Length-weight relationships for rock shrimp were estimated in 1977 (Kennedy *et* al., 1977) and are as follows:

for female rock shrimp:

$W = 1.818\ CL - 30.475$	above 23 mm CL
$W = 3.398 \times 10^{-4}\ CL^{3.364}$	below 23 mm CL

for male rock shrimp:

$W = 1.886\ CL - 30.922$	above 23 mm CL
$W = 4.104 \times 10^{-4}\ CL^{3.303}$	below 23 mm CL

Total length of males and females increases at the same rate until 20 mm CL. The rate of increase in total length for females after reaching 20 mm CL slows down most likely in response to maturity and spawning (Kennedy et al., 1977).

Length-count (count= number of shrimp per pound) relationships have been developed for rock shrimp and are presented in Figure 4.

Growth Patterns, Mortality, and Recruitment

Rates of growth in rock shrimp are variable and depend on factors such as season, water temperature, shrimp density, size, and sex. Rock shrimp grow about a count a month. Growth is 2 - 3 mm CL per month in juveniles and 0.5 - 0.6 mm CL per month in adults (Kennedy et al., 1977).

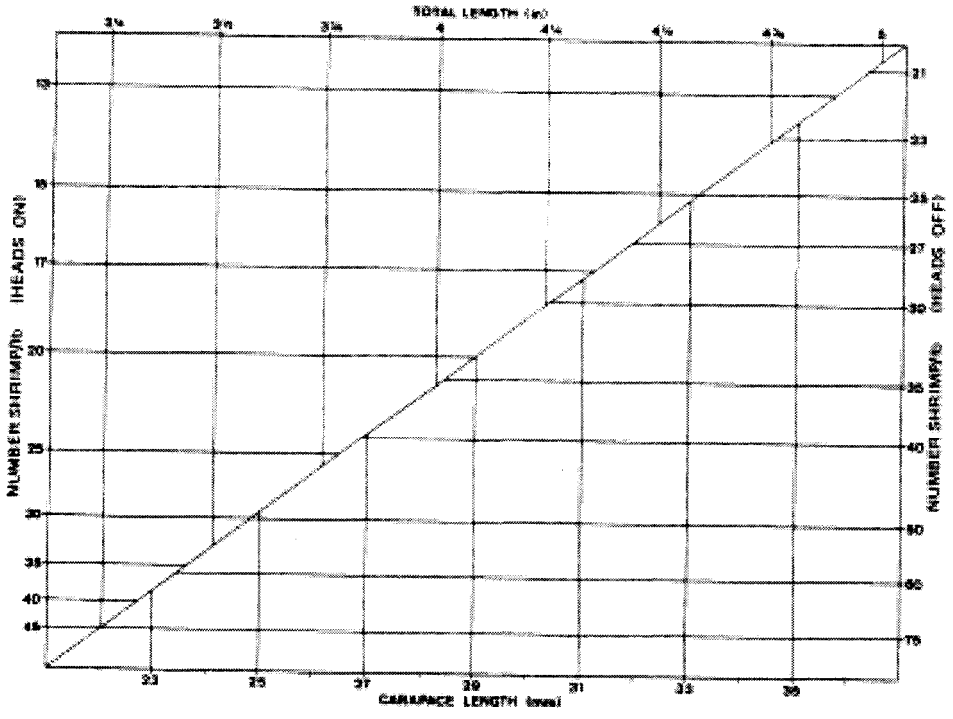


Figure 4. Relationship of rock shrimp length to count size, heads on and heads off (Kennedy et al., 1977).

Density is thought to also affect growth of rock shrimp. In 1993, the industry indicated that rock shrimp were abundant but never grew significantly over 36/40 count which was the predominant size class harvested during July and August of that year. During years of low densities, the average size appears to be generally larger.

Since rock shrimp live between 20 and 22 months, natural mortality rates are very high, and with fishing, virtually the entire year class will be dead at the end of the season. The intense fishing effort which exists in this fishery harvests exclusively the incoming year class. Three year classes were present in sampling conducted between 1973 and 1974 by Kennedy et al. (1977). Fishing mortality, in combination with high natural mortality and possibly poor environmental conditions, may be high enough to prevent any significant escapement of adults to constitute a harvestable segment of the population. The better than average rock shrimp production in the 1994 and 1996 seasons possibly resulted from better environmental conditions more conducive to rock shrimp reproduction and spawning.

Recruitment to the area offshore of Cape Canaveral occurs between April and August with two or more influxes of recruits entering within one season (Kennedy et al., 1977).

Estimation of Survival Rates Used in Rock Shrimp Analysis

A yield-per-recruit analysis was conducted by SAFMC staff based on estimated survival rates developed from growth information contained in Kennedy et al. (1977). Researchers observed three generations of shrimp during part or all of their life cycle: G1 (January 1973 through November 1973), G2 (April 1973 through November 1974), and G3 (April 1974 through December 1974). Survival rates were estimated for two of the three generations. The observed change in carapace length (CL) was used as an estimate of growth rate and was rapid from May through August 1973 and May through September 1974. Mean carapace lengths (measured to nearest 0.5 mm) for G2 males and females beginning in May 1973 and G3 males and females beginning in May 1974 were approximated from Figure 20, page 30 of Kennedy et al. (1977). Growth was estimated directly from mean carapace length for each month from May to October. Mean carapace length was converted to mean weight in grams from length-weight equations for males and females presented in Kennedy et al. (1977).

B. Abundance

Population size is thought to be regulated by environmental conditions and available bottom habitat. While fishing certainly reduces the population size over the course of the season, it is unknown what impact fishing has on subsequent year class strength. Year class and adult abundance follows a yearly cycle, peaking in the fall and exponentially declining until a new year class appears in the spring. Estimates of population size are not available but since effort in the fishery is high, the fishery may be considered to be fished at near maximum levels. Annual landings are probably a good indication of relative abundance. Annual variation in catch is presumed to be due to a combination of prevailing environmental conditions, fishing effort, price, and relative abundance of shrimp (SAFMC, 1996a).

C. Ecological Relationships

Food, Substrate, and Predation

Along the Florida Atlantic coast, the predominant substrate inside of 200 m depth is fine to medium sand with small patches of silt and clay (Milliman, 1972). Juvenile and adult rock shrimp are bottom feeders. Stomach contents analyses indicated that rock shrimp primarily feed on small bivalve mollusks and decapod crustaceans (Cobb et al., 1973). Based on stomach contents of rock shrimp analyzed, Kennedy et al. (1977) found the relative abundance of particular crustaceans and mollusks corresponding to their availability in the surrounding benthic habitat (SAFMC, 1996a).

Description of Rock Shrimp Habitat

A description of shrimp habitat and recommendations to protect habitat were contained in the shrimp management plan (SAFMC, 1993). The bottom habitat on which rock shrimp thrive is thought to be limited. Kennedy et al. (1977) determined that the deep water limit of rock shrimp was most likely due to the decrease of suitable bottom habitat rather than to other physical parameters including salinity and temperature. Cobb et al. (1973) found the inshore distribution of rock shrimp to be associated with terrigenous and

biogenic sand substrates and only sporadically on mud. Rock shrimp also utilize hard bottom and coral or more specifically *Oculina* coral habitat areas. This was confirmed with research trawls capturing large amounts of rock shrimp in and around the *Oculina* Bank HAPC prior to its designation (Appendix G). Also, a common technique used by fishermen searching for rock shrimp was described during public hearings for Amendment 1. This technique involves first locating coral or hard bottom and then trawling around it on the associated sand/shell bottom.

Other than Kennedy et al. (1977), no characterization of rock shrimp habitat or bycatch in the rock shrimp fishery has been conducted. In order to address issues raised by NMFS during informal review, a list of species associated with the benthic habitat inhabited by rock shrimp was compiled from research trawling efforts (1955-1991) that captured harvestable levels of rock shrimp. This list of species caught in association with rock shrimp discussed under the Section on bycatch in the fishery is included in Appendix A. In addition, Kennedy et al. (1977), during research efforts sampling the major distribution area of rock shrimp off the east coast of Florida, compiled a list of crustacean and molluscan taxa associated with rock shrimp benthic habitat (SAFMC, 1996a).

Description of *Oculina* Coral Habitat

Oculina coral (*Oculina varicosa*) is distributed along the south Atlantic shelf with concentrations occurring off the central east coast of Florida (SAFMC, 1996a). According to Reed (1980) the majority of massive *Oculina* growth occurs between 27° 30' N. latitude and 28° 30' N. latitude. *Oculina*, a slow growing coral species, constitutes essential habitat for a complex of species, including those managed under the snapper grouper fishery management plan (SAFMC, 1983). The average growth rate for *Oculina varicosa* at a depth of 80 m was estimated to be very slow, 16 mm/year (Reed, 1981). Bullis and Rathjen (1959) identified rugged coral formations in depths from 27 to 180 m between St. Augustine and Cape Canaveral, Florida. The highest growth rate for *Oculina* is on the top or on the current facing mound. *Oculina* Banks thrive in areas of strong currents (up to 60 cm/second) which are thought to contribute to the growth of the coral (Reed, 1992). Reed also described *Oculina varicosa* as follows:

> *Oculina varicosa forms spherical, dendroid, bushy colonies that are 10 cm to 1.5 m in diameter and height. Individual corals may coalesce forming linear colonies 3-4 m in length or massive thickets of contiguous colonies on the slopes and tops of the banks (Reed, 1980). The deep-water form lacks zooxanthellae, whereas in shallow water Oculina varicosa is usually golden brown with the algal symbiont and colonies average <30 cm in diameter with thicker branches. Deep-water banks of the coral, however, are only known from 27°32' N and 79°59' W to 28°59' N and 80°07'W....*

Deepwater coral communities support a very rich and diverse community composed of large numbers of species of mollusks, amphipods, and echinoderms with *Oculina* constituting the dominant species. The diversity of this system is equivalent to that of many tropical reef systems (Reed 1992). The geomorphological nature of the deepwater *Oculina* Banks is characterized by high current regimes which trap fine sand, mud, and coral debris forming the basis for the diverse invertebrate community (Reed 1992). To protect this fragile limited coral habitat, a 92 square mile *Oculina* Bank Habitat Area of Particular Concern (HAPC) was established under the Federal Fishery Management Plan for Coral

and Coral Reefs (GMFMC and SAFMC, 1982; SAFMC, 1996a; Appendix G). The *Oculina* Bank HAPC was expanded and two Satellite HAPC's established under the Council's Comprehensive Habitat Amendment/Amendment 4 to the Coral FMP (SAFMC, 1998a). Snapper/Grouper Amendment 6 (SAFMC, 1994a) created an Experimental Closed Area within the *Oculina* HAPC.

Existing regulations protecting the *Oculina* HAPC are as follows:

Regulations in the Coral Fishery Management Plan

A Final Rule for Coral Amendment 4 (in the Comprehensive EFH Amendment) was published in the Federal Register on June 14, 2000. This rule increased the size of the *Oculina* Bank Habitat Area of Particular Concern (HAPC) and incorporates two adjacent areas within the *Oculina* Bank HAPC and reads as follows:

Expand the *Oculina* Bank Habitat Area of Particular Concern (HAPC) to an area bounded to the west by 80°W. longitude, to the north by 28°30' N. latitude, to the south by 27°30' N. latitude, and to the east by the 100 fathom (600 feet) depth contour.

Establish the following two Satellite *Oculina* HAPCs: (1) Satellite *Oculina* HAPC #1 is bounded on the north by 28°30'N. Latitude, on the south by 28°29'N. Latitude, on the east by 80°W. Longitude, and on the west by 80°3'W. Longitude, and (2) Satellite *Oculina* HAPC #2 is bounded on the north by 28°17'N. Latitude, on the south by 28°16'N. Latitude, on the east by 80°W. Longitude, and on the west by 80°3'W. Longitude.

Within these areas, fishing with bottom longline, bottom trawl, dredge, pot, or trap is prohibited. Also, fishing vessels may not anchor, use an anchor, use a grapple and chain in these areas. Furthermore, vessels may not fish for rock shrimp or possess rock shrimp in or from the area on board a fishing vessel.

This rule also implemented the Council's framework procedures for all plans that allows for timely modification of definitions of Essential Fish Habitat (EFH) and establishment or modification of EFH Habitat Areas of Particular Concern and Coral HAPCs.

Regulations in the Snapper Grouper Fishery Management Plan

Amendment 6 to the Snapper/Grouper Plan established an experimental closed area bounded on the north by 27°53'N. Latitude, on the south by 27°30'N. Latitude, on the east by 79°56' W. Longitude, and on the west by 80°00'W. Longitude.

All restrictions within the HAPC apply. In addition, no person may fish for snapper-grouper species in the area or retain snapper-grouper in or from the area. Any snapper-grouper taken incidentally by hook-and-line gear must be released immediately by cutting the line without removing the fish from the water.

In addition, *Oculina* coral serve as an important habitat to many species of finfish. A list of finfish species collected in and around *Oculina* reef habitats, is presented in Table 4 (Reed, 1982). Some species may be possible bycatch if trawling occurs on or around the *Oculina* banks.

New information was presented to the Council during the December 2001 meeting concerning the *Oculina* Bank and impacts from rock shrimp trawls (Appendix J). Dr. Chris Koenig presented the final report on the *Oculina* Banks for the Council to use in evaluating whether or not the experimental closed area should continue. The report documents the continued damage attributable to bottom trawl which could be rock shrimp trawls and/or

calico scallop trawls. Dr. Koenig's work indicates that "To our knowledge, only about 8 hectares (20 acres) of fully intact *Oculina* thicket habitat remain in the OHAPC and probably in the world."

Table 4. Species List of Fish Observed or Collected on *Oculina* Reefs off Central Eastern Florida (Source: Reed, 1982).

Species	Common Name
MURAENIDE	Morays
Gynothorax nigromarginatus	
Muraena milaris	
CLUPEIDAE	Herrings
Sardinella anchovia	Spanish sardine
BATRACHOIDIDAE	Toadfishes
Opsanus pardus	
HOLOCENTRIDAE	Squirrelfishes
Corniger spinousu	
Holcentrus ascensionis	
SERRANIDAE	Seabasses
Centropristis ocyurus	Bank seabass
Centropristis philadelphia	Rock seabass
Centropristis striata	Black seabass
Epinephelus adscensionis	Rock hind
Epinephelus drummondhayi	Speckled hind
Epinephelus itajara	Goliath Grouper
Epinephelus morio	Red grouper
Epinephelus nigritus	Warsaw grouper
Epinephelus niveatus	Snowy grouper
Hemanthias vivanus	Red barber
Holoanthias martinicensis	
Liopropoma eukrines	Wrasse basslet
Mycteroperca bonaci	Black grouper
Mycteroperca nicrolepis	Gag grouper
Mycteroperca phenax	Scamp grouper
Plectranthis garrupellus	
Serranus phoebe	Tattler
Serranus sublingarius	Belted sandfish
GRAMMISRIDAE	Soapfishes
Rypticus maculatus	
Rypictus saponaceus	
PRIANCANTHIDAE	Bigeyes
Priacanthus arenatus	
Priacantus alta	
APOGONIAE	Cardinalfishes
Apogon pseudomaculatus	
CARANGIDAE	Jacks
Caranx hippos	Jack crevalle
Decapterus dumerili	Round scad
Seriola dumerili	Greater amberjack
Seriola rivoliana	Almaco jack
Caranx crysos	Blue runner
LUTJANIDAE	Snappers
Lutjanus campechanus	Red snapper
Lutjanus griseus	Gray snapper
Lutjanus synagris	Lane snapper
Rhomboplites aurorubens	Vermilion snapper

Table 4. Species list of fish observed or collected on *Oculina* reefs off central eastern Florida (cont.).

Species	Common Name
POMADASYIDAE	Grunts
Haemulon aurolineatum	Tomtate
SPARIDAE	
Archosargus probatocephalus	Sheephead
Pagrus pagrus	Red porgy
SCIAENIDAE	Drums
Equetus acuminatus	
Equetus lanceolatus	
Equetus umbrosus	
Equetus n. sp.	
CHAETODONTIDAE	Butterflyfishes
Chaetodon aya	
Chaetodon ocellatus	
Chaetodon sedentarius	
POMACANTHIDAE	Angelfishes
Chromis bermudensis	
Chromis scotti	
Eupomacentrus variabilis	
LABRIDAE	Wrasses
Bodianus pulchellus	
Halichoeres bivittatus	
Halichoeres caudalis	
Halichoeres bathyphilus	
GOBIIDAE	Gobies
Lythrypnus nesiotes	
Lythrypnus spilus	
SCOMBRIDAE	Mackerels and Tunas
Acanthocymbium solandri	Wahoo
Euthynnus alletteratus	Little tunny
Scomberomorus cavalla	King mackerel
Scomberomorus maculatus	Spanish mackerel
SCORPAENIDAE	Scorpionfishes
Neomerinthe hemingwayi	
Scorpaena brasiliensis	
Scorpaena dispar	
MOLIIDAE	Molas
Mola mola	Ocean sunfish
MOBULIDAE	Mantas
Manta birostris	Atlantic manta
CARCHARINIDAE	Requiem sharks
Galeocerdo cuvieri	Tiger shark
SPHYRNIDAE	Hammerhead sharks
Sphyrna lewini	Scalloped hammerhead

D. Maximum Sustainable Yield

Because rock shrimp live only 20-22 months landings fluctuate considerably from year to year depending primarily on environmental factors. Maximum sustainable yield (MSY) is not a particularly useful concept. Although there is a good historical time series of catch data, the associated effort data are not considered adequate to calculate MSY. Nevertheless, two standard deviations above the mean total landings may be considered to be a reasonable proxy for MSY. The harvest of rock shrimp in the region has fluctuated while fleet size and fishing power increased tremendously from 1986 to 1994. During the period 1990-1994 the harvest of rock shrimp increased. If the increase in rock shrimp landings is due to increased effort, market development and product acceptance, and the expansion of the fishery south of Cape Canaveral, the rock shrimp resource may be fully exploited.

For management purposes, MSY can be considered to be two standard deviations above the mean total shrimp landings for the Southeast Region for the period 1986 to 1994. The MSY proxy for rock shrimp, based on the state data from 1986 to 1994 is 6,829,449 pounds heads on (SAFMC, 1996a). The Council will evaluate new data and consider respecificiation of this SFA parameter during 2002 through Amendment 6 to the Shrimp Plan.

E. Probable Future Condition

The status of rock shrimp stocks in the south Atlantic are not considered overfished at this time. Because of high fecundity, rock shrimp are capable of rebounding from a very low population size in one year to a high population size in the next. Fluctuations in abundance resulting from changes in environmental conditions will continue to occur.

F. Optimum Yield

Optimum Yield (OY) is MSY which for the rock shrimp fishery in the South Atlantic Council's EEZ is defined as the amount of harvest that can be taken by U.S. fishermen without reducing the spawning stock below the level necessary to ensure adequate reproduction. This is appropriate for an annual crop like rock shrimp when recruitment is dependent on environmental conditions rather than female biomass. That is, a relatively small number of mature shrimp can provide sufficient recruits for the subsequent year's production. The Council will evaluate new data and consider respecificiation of this SFA parameter during 2002 through Amendment 6 to the Shrimp Plan.

G. Definition of Overfishing

The south Atlantic rock shrimp resource is overfished when the annual landings exceed the value which is two standard deviations above mean landings 1986-1994 (mean=3,451,132 lb., s.d=1,689,159). This level, based on the more accurate state data, is 6,829,449 pounds heads on (SAFMC, 1996a). The Council will evaluate new data and consider respecificiation of this SFA parameter during 2002 through Amendment 6 to the Shrimp Plan.

H. Description of Fishing Activities

Given the distance from shore, depth of water, and gear necessary to harvest rock shrimp, there is no recreational fishery. The rock shrimp commercial fishery has existed off the east coast of Florida for approximately thirty years. The relatively historically recent beginning for this shrimp fishery, compared to other southeast shrimp fisheries can be attributed to the lack of a viable market for the crustacean once considered "trash." Rock shrimp found a niche in the local fresh market and restaurant trade during the early 1970's, and became a regional delicacy. During those early years rock shrimping was primarily a local fishery with boats principally from the east coast of Florida, Georgia, North Carolina, and South Carolina. The fishery grew in the mid 1990s and today rock shrimp are marketed world wide. Expanding markets created growth within the industry which in turn has changed the composition of the rock shrimp fishery including the harvesting and the intermediate sectors (SAFMC, 1996a).

In the south Atlantic region there is essentially one user group exploiting the rock shrimp resource, commercial trawlers. Rock shrimp (*Sicyonia brevirostris*) harvested by commercial vessels is the only one of six species of *Sicyonia* reported for the south Atlantic coast which attains a commercial size (Keiser, 1976). When the rock shrimp industry began, few vessels participated on a full-time basis with some vessels making a few trips a year when the white and brown shrimping ended, or as a bycatch of the penaeid shrimp fishery (Dennis, 1992). During the period 1986 to 1994 there was an increase in effort in terms of the number of vessels participating (SAFMC, 1996a).

During development of Shrimp Amendment 1 sources indicated that there was an increase in the number of participants with more boats from the Gulf of Mexico region entering the fishery. This increase in participants and the new markets for rock shrimp mentioned earlier are reflected in the increased landings in the period 1991 to 1994 (SAFMC, 1996a).

The rock shrimp fishery historically was prosecuted along Florida's east coast from Cape Canaveral to as far north as Jacksonville. Historically, this fishery extended into south Georgia (statements at Public hearings for Shrimp Amendment 5). The increase in participants and market opportunities for smaller rock shrimp brought about a subsequent change in harvesting patterns as vessels began fishing as far south as St. Lucie County. This shift in effort to the south reflected new participation in the fishery as the majority of those harvesting these new areas were from the Gulf region. A control data for this fishery of April 4, 1994 was set to put the industry on notice that the Council could at some future date develop a limited access program for this fishery (SAFMC, 1996a).

Amendment 1 to the Shrimp Plan established a requirement for vessel permits and dealer permits, and prohibited trawling for rock shrimp in an area off of Florida. These measures were published in the Federal Register on September 9, 1996 (Appendix F).

As part of the public hearing process for Shrimp Amendment 1, industry representatives provided information concerning socio-demographic characteristics, landings data, vessel economics, and harvest areas. These data were provided by fifty individuals in the rock shrimp industry. Of those fifty individuals, 44 were harvesters and 6 were dealers or processors. At that time data from the Florida trip ticket program indicated that at least 53 vessels landed rock shrimp in Florida during 1994. While this data set did not come from a random sample of the rock shrimp fishery, it was the best information available and is retained in this document in the following sections. In addition, individual states and the National Marine Fisheries Service provided recent data on rock shrimp permits, landings, and value.

Harvest Area Information

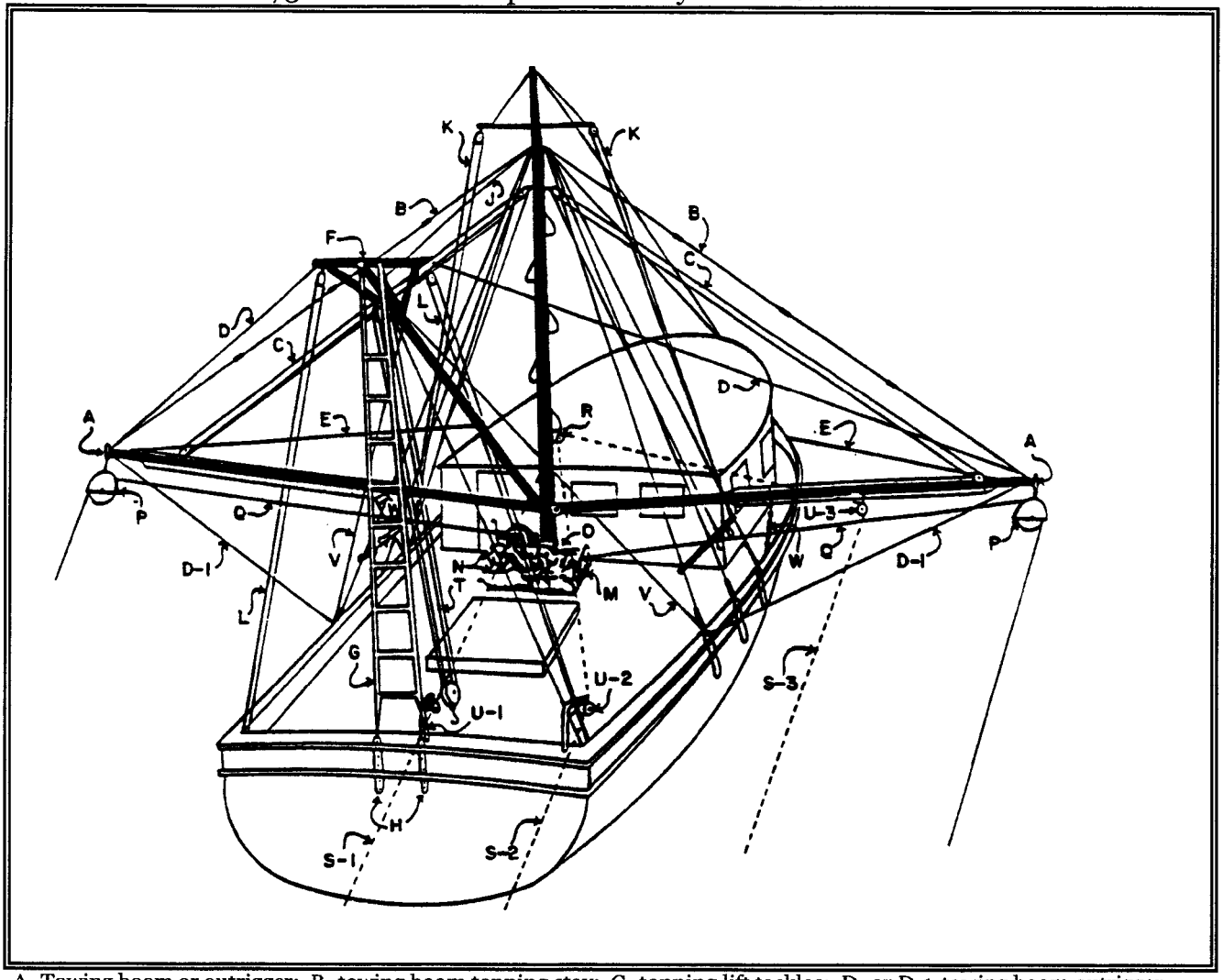
The commercial rock shrimp fishery historically occurred from St. Augustine, Florida to Cape Canaveral, Florida (Hertzal Shoals), and more than 50% of the harvest came from the Cape Canaveral area. This fishery expanded further south due to increased participation in particular from the Gulf of Mexico. At the time Shrimp Amendment 1 was developed, the directed fishery was concentrated between Fernandina Beach and south of Cape Canaveral to Melbourne. Furthermore, there were reports that vessels were found fishing as far south as St. Lucie County (SAFMC, 1996a). During that period, vessels from home ports in the Gulf states harvested more rock shrimp in these southern areas, while vessels from the south Atlantic harvested more in the northern areas (SAFMC, 1996a). Limited sporadic harvest has also occurred off Georgia, North Carolina, and South Carolina

During development of Shrimp Amendment 1, the Rock Shrimp Producers Association submitted information to the Council indicating that the harvest area extended between just north of New Smyrna Beach to Stuart between 120 ft (20 fathoms) and 156 feet (26 fathoms) and between 200 and 240 feet (33.3 and 40 fathoms)(SAFMC, 1996a). The fishable grounds are hard sand to shell hash bottoms, which run north and south with a width as narrow as one mile. There was an effort shift to the south of Cape Canaveral which exposed the known concentrations of *Oculina* coral and the *Oculina* Bank HAPC to bottom trawls. Trawling was prohibited in the HAPC (a 4x23 nm strip bounded by latitude 27° 30' N. and 27° 53' N. and longitude 79° 56' W. 80° 00' W.) in 1982 as one of the measures under the Coral Fishery Management Plan (GMFMC and SAFMC, 1982). In addition, Amendment 1 to the Snapper Grouper Fishery Management Plan prohibited the retention of snapper grouper species caught by roller rig trawls and their use on live/hard bottom habitat north of 28° 35' N. latitude (SAFMC, 1988). Furthermore Amendment 1 to the Shrimp Plan (SAFMC, 1996a) prohibited trawling in the area east of 80° 00' W. longitude between 27° 30' N. latitude and 28° 30' N. latitude shoreward of the 100-fathom (183-m) contour (Appendix G).

Trawl Vessels

There are two types of vessels in the rock shrimp fishery: ice or fresh boats and freezer boats. Most newer rock shrimp trawlers are 75-80 feet in length and are rigged to tow two to four nets simultaneously. The double-rigged shrimp trawler has two outrigger booms from whose ends the cable from the winch drum is run through a block to the two

nets (Figure 5). Testimony at Amendment 1 hearings indicated that a standard freezer trawler was around 73 feet and would pull four forty-foot nets.



A- Towing boom or outrigger; B- towing boom topping stay; C- topping lift tackles; D- or D-1-towing boom outrigger back stay; E- towing boom outrigger bow stay; F- modified boom; G- boom back stays- ratline structure; H- boom back stay plate on transom; J- boom topping lift stay; K- single block tackle; L- single block tackle; M- trawl winch; N- heads, two on trawl winch; O- center drum for trynet warp; R- leading block for try net; S-1, S-2, S-3- trynet lead block; T- main fish tackle tail block; U-1, U-2, U-3- trynet lead block; any one may be used to accord with selection of S-1, S-2, or S-3; V- boom shrouds; W- chain stoppers for outriggers.

Figure 5. Rigged shrimp vessel similar to ones used in the rock shrimp fishery (SAFMC, 1993).

Essentially the only gear used in the rock shrimp fishery is the trawl which consists of: (1) a cone-shaped bag in which the shrimp are gathered into the tail or cod end; (2) wings on each side of the net for herding shrimp into the bag; (3) trawl doors at the extreme end of each wing for holding the wings apart and holding the mouth of the net open; and (4) two lines attached to the trawl doors and fastened to the vessel. A ground line extends from door to door on the bottom of the wings and mouth of the net while a float line is similarly extended at the top of the wings and mouth of the net. A flat net is more often used when fishing for rock shrimp since they burrow into the bottom to escape the trawl.

This net has a wider horizontal spread than other designs and is believed more effective (SAFMC, 1996a).

Some vessels use twin trawls, which are essentially two trawls on a single set of doors, joined together at the head and foot ropes to a neutral door connected to a third bridle leg. Thus, instead of towing two seventy-foot nets the vessel tows four forty-foot nets. This rig has some advantages in ease of handling and increased efficiency. At the time Amendment 1 was developed industry advisors indicated that the cod end mesh size commonly used in the industry was between 1 7/8 and 2 inches stretched mesh measured on the diagonal (SAFMC, 1996a).

The tow length varies depending on many factors including the concentration of shrimp. Large boats fishing offshore waters make much longer drags lasting several hours. Testimony at public hearings for Shrimp Amendment 1 indicated that vessels may drag up to 30 to 35 miles over a number of tows in one night fishing for rock shrimp (SAFMC, 1996a).

Fleet Characteristics

From the 1994 poll conducted during development of Shrimp Amendment 1, the majority of vessels were from south Atlantic states primarily Florida (Table 5). However, 40% of the vessels included in this profile reported they were from Gulf states. There was no information provided by vessels from North Carolina in this 1994 report.

Information for the rock shrimp industry indicated that in the past the majority of boats in the rock shrimp fishery were wooden ice boats. Almost half of the harvesters providing information for the 1994 report had steel hulled vessels and 84% were freezer boats. There were only seven ice boats (Table 5). Of the vessels included in the 1994 report, over 75% were at least ten years old; over half were 15 years or older (Table 5).

Table 5. Fleet Characteristics for a Comparative Subsample of the 1994 Rock Shrimp Fishery (SAFMC, 1996a).

Variable	Frequency	Percent	N
State which vessel was registered			n=43
Florida	19	44%	
Alabama	14	33%	
South Carolina	3	7%	
Georgia	4	9%	
Texas	3	7%	
Vessel construction type			n=43
Steel	21	49%	
Wood	13	30%	
Fiberglass	9	21%	
Type of vessel			n=43
Freezer	36	84%	
Ice	7	16%	
Year vessel built			n=43
1975 & before	8	19%	
1976 - 1980	22	51%	
1981- 1985	7	16%	
1986 - 1990	1	2%	
1991 -1994	5	12%	

During 1994 harvesters from the south Atlantic on average were older and had been rock shrimping much longer than harvesters from the Gulf states (Table 6). Harvesters from both regions had long tenures as fishermen with each average close to the overall mean of twenty-five years. Gulf vessels tended to be longer, had more crew, and pulled larger nets on average. Moreover, these vessels made fewer and longer trips than those from the south Atlantic. Average catch was higher for Gulf vessels, as was the dollar amount needed to break even per/day while fishing (Table 6; SAFMC, 1996a).

Table 6. A Comparative Subsample of Rock Shrimp Harvester Characteristics by Region (Ice Boats and Freezer Boats Combined) (SAFMC, 1996a).

Variable	Average for Gulf Region	n	Average for South Atlantic Region	n	Average Combined Gulf/SA*	n
Age	43	14	47	26	46	40
Years as a fisherman	24	14	26	26	25	40
Years as a rock shrimper	5	14	15	26	11	40
Boat Length (ft)	81	17	75	26	78	43
Number of crew (ft)	5	17	3	26	4	43
Size nets (ft)	55	17	45	26	50	43
Net mesh size (in)	1 7/8	17	1 7/8	26	1 7/8	43
Bag mesh size (in)(mode)	1 3/4	17	1 3/4	24	1 3/4	41
Trip length (days)	21	16	14	22	17	38
Number of trips	5	16	9	21	7	37
Amount to break even/day	$1050/day	7	$922/day	13	$967/day	20
Average catch (lb)	46,633	14	20,892	20	31,491	34
Exvessel Price	$1.20	14	$1.22	17	$1.21	31

* Combined Gulf/SA is the total for both regions divided by the number for both regions.

More recent data on fleet characteristics were summarized from the NMFS Southeast permits database (Tables 7, 8a, 8b, 8c, 8d, and 8e). These data represent information on all vessels with rock shrimp permits, which can amount to over 400 in any complete year (Table 8a). These trends may not be representative of active vessels in this fishery since, at most, 153 vessels harvested rock shrimp annually from 1996 through 2000 (Table 9). south Atlantic rock shrimp permits were purchased by vessels from a wide geographic range spanning Massachusetts to Texas, however, most permitted vessels are located in Florida and Alabama. The number of permits issued to vessels in Louisiana appears to be on a declining trend (Table 7).

Table 7. Rock Shrimp Permitted Vessels by Home Port State. Source: NMFS Permits Office.

Year	AL	FL	GA	LA	MA	MS	NC	NH	NJ	NY	RI	SC	TX	VA	Total
1996	37	101	11	16		4	15		3	1		12	4	16	220
1997	85	180	15	28	2	5	26	1	7	3	1	15	18	22	408
1998	85	201	14	24	3	3	38		7	3	1	11	17	24	431
1999	87	199	17	13	5	2	33		8	2		11	16	22	415
2000	95	187	18	10	2	2	31		7	1	2	13	14	19	401

Since 1996 the length composition of the permitted rock shrimp fleet appears to be fairly stable with about 70% of all vessels in the 60 to 79 foot range (Tables 8a and 8b). As stated previously these data may not reflect the actual size distribution of the active fleet.

Table 8a. Number of Rock Shrimp Permitted Vessels in each Length Category. Source: NMFS Permits Office.

Category	1996	1997	1998	1999	2000
Less than 30 ft	2	5	9	18	13
30-39 ft	1	12	23	24	20
40-49 ft	6	9	15	16	16
50-59 ft	9	17	17	15	15
60-69 ft	87	150	144	132	129
70-79 ft	93	170	178	163	155
80-89 ft	19	40	40	42	45
90 – 137 ft	3	5	5	5	8
Grand Total	220	408	431	415	401

*The data on overall length was provided to the Permits Office from information contained in the Coast Guard's Certificate of Documentation (Pers. Comm. Janet Miller, NMFS Permits Office). The Coast Guard requires information on overall vessel length not keel length and vessels owners have to provide either a builders certificate or a manufacturer's letter with this information.

Table 8b. Proportion of Rock Shrimp Permitted Vessels in each Length Category.

Category	1996	1997	1998	1999	2000
Less than 30 ft	0.9%	1.2%	2.1%	4.3%	3.2%
30-39 ft	0.5%	2.9%	5.3%	5.8%	5.0%
40-49 ft	2.7%	2.2%	3.5%	3.9%	4.0%
50-59 ft	4.1%	4.2%	3.9%	3.6%	3.7%
60-69 ft	39.5%	36.8%	33.4%	31.8%	32.2%
70-79 ft	42.3%	41.7%	41.3%	39.3%	38.7%
80-89 ft	8.6%	9.8%	9.3%	10.1%	11.2%
90 - 137 ft	1.4%	1.2%	1.2%	1.2%	2.0%

Table 8c. Proportion of Rock Shrimp Permitted Vessels in each Horsepower Category.

Horse Power Category	1996	1997	1998	1999	2000
100-399	4%	7%	7%	8%	6%
400-499	44%	42%	40%	40%	38%
500-599	22%	21%	21%	21%	22%
600-699	15%	17%	17%	16%	16%
700-799	7%	8%	8%	9%	8%
Greater than 800	8%	8%	7%	8%	9%

Engine horsepower of the majority of permitted vessels range anywhere from 400 to 700 (Table 8c). Also, the proportion of permitted vessels in each horsepower category did not change substantially during the period 1996 to the end of 2000 (Table 8c).

Table 8d. Proportion of Active Rock Shrimp Vessels in each Length Category.

Category	1996	1997	1998	1999	2000
Less than 60 ft	4.4%	3.2%	4.1%	3.1%	2.7%
60-69 ft	38.1%	41.5%	42.5%	34.4%	31.5%
70-79 ft	47.8%	42.6%	41.1%	43.0%	43.2%
More than 80 ft	9.7%	12.7%	10.9%	19.5%	22.5%
Vessels not in permits file*	19	14	3	7	9

*These vessels reported landings on the states' trip tickets, however, the Vessel ID numbers were not in the rock shrimp permits database. A total of 47 vessels could not be located in the rock shrimp permits database. Length data for most of these vessels was obtained from the Coast Guard vessel documentation database.

Table 8e. Proportion of Active Rock Shrimp Vessels in each Horsepower Category.

Category	1996	1997	1998	1999	2000
0-400 HP	50.8%	54.0%	55.7%	40.5%	38.3%
401-500 HP	21.1%	22.5%	17.1%	22.3%	18.7%
501-600 HP	15.6%	9.0%	14.3%	17.4%	18.7%
601-700 HP	7.0%	9.0%	8.6%	11.6%	14.0%
More than 700 HP	5.6%	5.5%	4.2%	8.2%	10.2%

Most of the active vessels are above 60 feet in length and during the period 1996 to 2000 there was an increase in the size composition of active vessels in the fleet (Table 8d). In 1996 around 10% of vessels in the fishery were larger than 80 ft, and by 2000 this proportion increased to 22.5% (Table 8d). This trend was also reflected in engine horse power (Table 8e). From 1996 through to the end of 2000 there was a decline in the proportion of vessels with engine horse power less than 500, and a concurrent increase in the proportion of vessels in horse power categories greater than 500 (Table 8e).

Economic Description of the Fishery

This section contains more recent data on the dynamics of permit purchase and renewal, and description of the active fleet. In addition, trends in landings, price, and value are included.

The value of rock shrimp landings peaked in 1996 at $15.37 million coinciding with the highest level of recorded landings for this fishery (Table 9). Real price converted to 1999 dollars seem to be on an increasing trend from 1997 to 1999 even though landings increased year after year during this period. These price increases are incentives for new vessels to enter the fishery with the anticipation of high future expected profits. There was some speculation that increased availability of rock shrimp in 1992-1994 and the higher price paid, especially in 1994, encouraged large freezer boats (>70 ft) to enter and dominate the fishery thereby increasing fishing capacity (SAFMC, 1996a).

In 2000 landings of rock shrimp amounted to 7.9 million pounds, more than double the 1999 landings and consequently unit price declined (Table 9). At this time the trip ticket data for 2000 from the State of Florida has not been verified, however all landings received by the state were available for this analysis.

Table 9. Rock Shrimp Permits Issued During the Period 1996 to 2000, Landings and Value from the Atlantic East Coast 1996-2000 (Source: NMFS, SEFSC and NMFS Permits Office).*

Year	1995	1996	1997	1998	1999	2000
No. of permitted vessels		220	408	431	415	401
No. of dealer permits			65	79	83	75
No. of active vessels	102	153	108	77	135	120
Pounds (heads on)	4,801,565	21,347,989	2,410,821	2,701,545	3,462,200	7,909,599
Average Price/lb.	$0.98	$0.67	$1.01	$1.36	$1.79	$1.48
Average Real Price/lb. (1999 dollars)	$1.07	$0.72	$1.05	$1.39	$1.79	$1.44
Average Value (1999 dollars)	$5,137,675	$15,370,552	$2,531,362	$3,755,148	$6,197,338	$11,389,823
Average Value per Active Vessel (1999 dollars)	$50,369	$100,461	$23,439	$48,768	$45,906	$94,915

*Please note that permits were first issued in September of 1996.
*Rock shrimp landings only represent quantity and value of rock shrimp caught in the south Atlantic EEZ, some of which could have been sold to dealers in the Gulf.
*Rock shrimp caught in the Gulf that are sold to processors on the east coast of Florida are not included in this table.

The data on landings and value from previous years indicated a lot of fluctuation with somewhat of an increasing trend from 1992 to 1994. These figures represent landings of rock shrimp compiled from the individual state landings in the south Atlantic region. It is not known with any certainty if these figures are good estimates of rock shrimp caught in the South Atlantic Council's area of jurisdiction, since there were no reporting requirements or vessel permits at that time. In addition, the Florida trip ticket program evolved considerably during this period (SAFMC, 1996a).

Overall over 540 vessels were issued permits in the rock shrimp fishery from 1996 to the end of 2000. Some of these vessels have held permits for five out of the five years (Table 10). Over 400 vessel permits were issued or renewed each calendar year from 1997 through 2000 (Table 9). Permits were not required until November 1, 1996. Thus, the increase in the number of permits issued in 1997 may not signify a substantial increase in demand for entrance into this fishery. However, the high level of landings in 1996 could have persuaded

a number of new vessel owners to purchase rock shrimp permits in 1997 and subsequent years.

Table 10. Number of Vessels that Held Rock Shrimp Permits from 1996 to the End of 2000. Source: NMFS Permits Office

Number of years vessel held rock shrimp permit	Number of Vessels
1 year only	51
2 years only	96
3 years only	96
4 years only	141
All 5 years	156
Grand Total	540

In 1998, 377 vessels renewed their permits and 54 vessels were new to the fishery (Table 11). Only three of the vessels that did not renew in 1998 renewed in later years (Table 11). In 1999, 370 vessels renewed their permits from the previous years, and 45 vessels were new. In 2000, 368 renewed their permits from previous years and about 33 were new vessels. Reports from industry sources indicate that there were new entrants in the fishery during 2001. Given the number of active vessels in any one year, it appears that there is a considerable level of latent capacity in this fishery.

Table 11. Rock Shrimp Permit Activity in Each Calendar Year. Source: NMFS Permits Office.

Item	1996	1997	1998	1999	2000
Vessels renewing permits from previous years		220	377	370	368
New vessels issued permits	220	188	54	45	33
Total	220	408	431	415	401

During the period 1984 to 1994 landings of rock shrimp increased substantially (SAFMC, 1996a). Much of this increase may be attributed to increased effort within the fishery. However, there does seem to be a cyclical pattern to the abundance of rock shrimp that is driven primarily by environmental factors. Since 1994 annual landings of rock shrimp varied considerably from year to year (Table 9). During 1996, the south Atlantic fishery had as many as 153 active vessels. This is the highest on record.

Information on participation in and economic dependence on other fisheries would result in a better understanding of the impacts from management regulations on these rock shrimp vessels. Vessels in the rock shrimp fishery also operate in the Gulf of Mexico and south Atlantic penaeid shrimp fisheries, where landings in 2000 amounted to 285 million pounds (ex-vessel value of $646 million) and 30 million pounds (ex-vessel value of $75 million) respectively. The size of the penaeid shrimp fleet in the Gulf and south Atlantic was estimated to be around 15,000 fishing craft (Mike Travis, pers. comm. 2001).

Information from Amendment 1 to the Shrimp Plan indicated that at that time the contribution of each species to total shrimp landings in the south Atlantic varied in a

The following rock shrimp items were approved under this comprehensive amendment [Note: Detailed information is presented in the Council's Habitat Plan (SAFMC, 1998b)]:

Actions addressing Essential Fish Habitat:

ACTION 1. Identify Essential Fish Habitat for Penaeid and Rock Shrimp.

For Rock shrimp, essential fish habitat consists of offshore terrigenous and biogenic sand bottom habitats from 18 to 182 meters in depth with highest concentrations occurring between 34 and 55 meters. This applies to all areas from North Carolina through the Florida Keys. Essential fish habitat includes the shelf current systems near Cape Canaveral, Florida which provide major transport mechanisms affecting planktonic larval rock shrimp. These currents keep larvae on the Florida shelf and may transport them inshore in spring. In addition, the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse rock shrimp larvae.

ACTION 3. Implement a Voluntary Vessel Monitoring System (VMS) as soon as possible in the Rock Shrimp Fishery.

It was proposed that the voluntary pilot program should run for six months using a "GPS Cell Phone" based system or some other unit that provides the necessary coverage/output. Units were to be placed on 2-4 vessels chosen by the rock shrimp industry. Information collected would be confidential and provided to NMFS and the individual/business involved. This data were to be used for data collection and enforcement. Council staff and members would have access to such data under existing guidelines concerning access to confidential data. Immediately after 6 months of use, the system would be evaluated by NMFS, the Rock Shrimp Advisory Panel, and the Council. A determination would be made, as part of the evaluation, concerning the future use of transponders in the rock shrimp fishery.

This program was not implemented by the National Marine Fisheries Service because there was no approved vessel monitoring system.

Changes to the Coral FMP affecting Rock Shrimp:

ACTION 3A. Expand the *Oculina* Bank Habitat Area of Particular Concern (HAPC) to an area bounded to the west by 80°W. longitude, to the north by 28°30'N. latitude, to the south by 27°30'N. latitude, and to the east by the 100 fathom (600 feet) depth contour

This action expanded the *Oculina* Bank HAPC area to include the area currently closed to rock shrimp harvest. The Calico Scallop FMP proposes to close this area to calico scallop harvest. The expanded *Oculina* Bank HAPC is 60 nautical miles long by about 5 nautical miles wide although the width tracks the 100 fathom (600 foot) depth contour rather than a longitude line. Within the expanded *Oculina* Bank HAPC area the following regulations apply:

1. Fishing with a bottom longline, bottom trawl, dredge, pot, or trap is prohibited.
2. A fishing vessel may not anchor, use an anchor and chain, or use a grapple and chain.

ACTION 3B. Establish the following two Satellite *Oculina* HAPCs: (1) Satellite *Oculina* HAPC #1 is bounded on the north by 28°30'N. latitude, on the south by 28°29'N. latitude, on the east by 80°W. longitude, and on the west by 80°3'W. longitude; and (2) Satellite *Oculina* HAPC #2 is bounded on the north by 28°17'N. latitude, on the south by 28°16'N. latitude, on the east by 80°W. longitude, and on the west by 80°3'W. longitude.

It was the Council's intent that possession of calico scallops and rock shrimp within these areas is also prohibited. This enhanced enforceability of the prohibition on harvest and use of bottom-tending gear in these areas.

Within the two Satellite *Oculina* Bank HAPCs, the following regulations apply:

1. Fishing with a bottom longline, bottom trawl, dredge, pot, or trap is prohibited.
2. A fishing vessel may not anchor, use an anchor and chain, or use a grapple and chain.

The Council's Comprehensive Habitat Amendment (including Shrimp Amendment 3) was sent to NMFS for formal review and implementation on October 9, 1998. The final rule was published on June 14, 2000 and regulations became effective on July 14, 2000.

Shrimp Amendment 4 (SAFMC, 1998c), which addressed the Sustainable Fisheries Act requirements of the Magnuson-Stevens Act, as amended in 1996, contained an Environmental Assessment and the following rock shrimp items:

Consistency with SFA Section 102 definitions:
Maximum Sustainable Yield (MSY), Optimum Yield (OY), and Overfishing:
ACTION 1. No action to change the Rock Shrimp MSY from 6.8 million pounds.

ACTION 2. No action to change the Rock Shrimp OY from "OY is MSY which for the rock shrimp fishery in the south Atlantic EEZ is defined as the amount of harvest that can be taken by U.S. fishermen without reducing the spawning stock below the level necessary to ensure adequate reproduction."

ACTION 3. No action to change the Rock Shrimp Overfishing from "The south Atlantic rock shrimp resource is overfished when the annual landings exceed the value which is two standard deviations above mean landings 1986-1994. This level, based on the more accurate state data, is 6,829,449 million pounds.

ACTIONS 4 & 5. No action to address the rebuilding time frame or overfishing evaluation because rock shrimp are not overfished.

Other Required Provisions in the Comprehensive SFA Amendment
Bycatch – bycatch management measures and bycatch reporting requirements:

Rock shrimp – During development of the BRD management measure the Council reviewed information from a small number of observer trips aboard rock shrimp vessels that indicated bycatch was minimal in this fishery. This information was corroborated by industry members serving on the Council's Rock Shrimp Advisory Panel. Also, the Council was provided information indicating BRDs are being used in rock shrimp trawls voluntarily by the industry. The Council has requested NMFS conduct additional observer trips aboard rock shrimp vessels to verify that the bycatch in the fishery is minimal during all months in which the fishery is pursued. If the Council receives information that there is more than minimal bycatch and that BRDs are not being used, the Council will move to extend the BRD requirement to the rock shrimp fishery. The Council recently received a report from a hook and line fisherman that bycatch in the rock shrimp fishery could have impacts on the

relatively consistent pattern among the four southeastern states. In North Carolina, brown shrimp was the principal species and rock shrimp constituted a minor component of any year's catch. In South Carolina and Georgia, landings were dominated by white shrimp. Rock shrimp landings during 1986 to 1994 were either nonexistent or minimal for South Carolina and constituted a low percentage of total shrimp catch for Georgia vessels.

In northeast Florida, landings of rock shrimp became an increasing component of shrimp landings during the 1990s (SAFMC, 1996a). The proportion of rock shrimp landings to total shrimp landings for the east coast of Florida was close to 50% during the period 1997 to 1999 (NMFS, 2001b). The actual percentages cannot be reported because that could reveal the level of rock shrimp landings in the other states, which are confidential data, because there were less than 3 dealers or vessels reporting rock shrimp landings.

Vessels harvesting rock shrimp in the South Atlantic Council's area of jurisdiction land most of the product in the states of Florida, Alabama, and Georgia. Small quantities are landed in South Carolina and North Carolina. Vessel level records are available if the state has a trip ticket reporting system, and the actual data elements reported varies by state. Data on individual vessel landings were obtained from the Florida trip ticket program, the Georgia trip ticket program, and the Gulf shrimp database program (Alabama vessels). Caveats associated with each state's database are listed below:

South Carolina – Not able to identify specific vessels in this fishery. However, there only appears to be one or two trips per year and a low level of rock shrimp landings.

North Carolina – The State of North Carolina could not release the names of participants and other vessel information. Landings did not exceed 10,000 pounds during the period 1996-2000. In addition, the number of vessels reporting rock shrimp landings in North Carolina ranged from 3-24 during this period. It was assumed that all rock shrimp landed in North Carolina were caught in the south Atlantic EEZ.

Georgia – In Georgia there is only a small number of dealers who distribute rock shrimp and thus this state's landings data was aggregated with the other state's data bases to maintain confidentiality. In the Georgia database there were records where area fished was unknown, however it was assumed that all shrimp were caught in the South Atlantic Council's area of jurisdiction.

Florida – In the Florida trip ticket database there was a large number of records with no data for area fished in 1995 (Table 12).

Table 12. Landings in the Florida Trip Ticket Database where Area Caught was not Identified. Data for 1997 and 1998 were Combined to Protect Confidential Records. Source: Florida Marine Research Institute.

Item	1995	1996	1997 and 1998 combined
Total Landings (lb.)	860,313	336,634	59,555
Number of Vessels	98	19	5

Also, in the Florida trip ticket database some records of landings in the south Atlantic region cannot be linked to a vessel (Table 13). The State of Florida requires the Saltwater Products License (SPL) number on trip tickets. These licenses can be issued to the vessel or to individuals (usually crew members). Landings reported on some records with no vessel identification information are linked to individual SPLs.

Table 13. Data on Rock Shrimp Harvested in the South Atlantic EEZ for Vessels Landing in Florida, Alabama, and Georgia*. Source: Florida Marine Research Institute, Georgia DNR, and NMFS SEFSC.

	1995	1996	1997	1998	1999	2000
Landings (pounds)	4,801,565	21,347,989	2,410,821	2,701,545	3,462,200	7,909,599
Number of Vessels	102	153	108	77	135	120
Vessels Fishing in Previous Years (1995-1999)		75	80	56	92	95
New Vessels Entering the Fishery		78	28	21	43	25
Landings (lb.) that Cannot be Linked to a Vessel (FL trip Ticket Data)	216,683	34,307	13,847	11,985	101,373	97,926
Number SPL Licenses not Linked to a Vessel (Individual Licenses)**	9(2)	8(5)	7(7)	5(3)	12(6)	6

* South Carolina and North Carolina data are not included.

** Some of the SPL data not associated with a specific vessel are probably individual licenses. Numbers in parentheses indicate the number of licenses that were identified as individual licenses.

Prior to 1997 data on the number of active vessels in the fishery may not be accurate since vessel permits were not required before November 1996. In addition, many states did not have detailed reporting requirements that captured vessel identification information. This should be a consideration in assessing information in Tables 12 and 13.

It appears that anywhere from 21 to 43 new vessels enter the rock shrimp fishery each year (Table 13). In 2000 there were 25 active vessels that had not participated in the fishery before.

From 1995 to the end of 2000, 295 vessels participated in this fishery. A large number (123) were in the fishery for one year during this time period. From the period 1996 to 2000, a total of 279 vessels were active, with 130 in the fishery for one year (Table 14).

Table 14. Number of Vessels that Caught Rock Shrimp During the Time Periods 1995-2000 and 1996 to 2000. Source: Florida Marine Research Institute, Georgia DNR, and NMFS SEFSC.

Number of Years	1995-2000	1996-2000
1 year only	123	130
2 years only	69	59
3 years only	36	38
4 years only	29	30
5 years only	19	22
6 years only	19	
Total Number of Active Vessels	295	279

Rock Shrimp Vessel Economics and Heterogeneity of the Harvesting Sector

The diversity in the rock shrimp fishery can be described primarily by firm size, level of dependence on rock shrimp, and vessel length and horse power (indicators of vessel capacity). There is a certain degree of diversity in the rock shrimp fishery in terms of firm size, and the structure of the industry. For example an examination of the permits file would reveal that there are a number of firms that own multiple vessels in the industry. Information from public hearings and the Rock Shrimp Advisory Panel indicate that some firms own processing plants, and a number of these firms are also affiliated with marketing and distribution interests. At the other end of the spectrum is the individual vessel firm where the owner is the operator. At this time is not possible to trace ownership of all vessels back to the firm, so the profitability analysis focuses on the vessel as the firm and for purposes of the Regulatory Flexibility Analysis it is assumed that all firms are small entities.

The frequency distribution of landings by vessels in the rock shrimp fishery are depicted for each year between 1995 and 2000 (Table 15). From this data summary it is evident that there are many vessels with a low level of landings and a core group of vessels that account for the bulk of landings in this fishery (Table 15). During the period 1998 to 2000 anywhere from 19 to 46 vessels landed 50,000 pounds or more rock shrimp in any one year (Table 15).

Table 15. Frequency Distribution of Landings By Permitted Vessels. Source: Florida Marine Research Institute, Georgia DNR, and NMFS SEFSC.

Landings Category (pounds)	1995	1996	1997	1998	1999	2000
1-999	4	10	21	11	18	15
1,000-4,999	16	10	15	13	23	12
5,000-14,999	18	14	16	9	27	15
15,000-24,999	9	12	18	6	15	9
25,000-35,999	6	14	13	13	14	8
36,000-49,999	8	11	13	6	14	15
More than 49,999	41	82	12	19	24	46
Total	102	153	108	77	135	120

One of the characteristics that can be used to separate the fishery in terms of heterogeneity is vessel length. This fishery is dominated by vessels in the 60 ft and larger length classes (Table 8d). For most of these entities there is a substantial capital investment in vessel and gear up into the hundreds of thousands of dollars in magnitude. Some of these vessels depend on the rock shrimp resource for a large part of their revenue while others depend on the fishery for a small part of their fishing income and are not in the fishery every year.

During the 1994 season, two types of vessels trawled for rock shrimp. The predominant vessel type was the freezer boat that ranged from 56 to 75 feet in length. A few ice boats (up to 56 feet in length) also participated in the fishery. The freezer boats made trips that lasted up to 20 days and the ice boats operated on 5-7 day trips.

In 1994, reports from fishermen at public hearings indicated that the larger freezer boats needed to make a minimum gross revenue of $1,200 a day in order to break even. Ice boats required a gross revenue of $800 a day to break even. Forty percent of the gross revenue went to the crew. The remaining 60 percent went to the boat owner to cover fixed costs, operating costs, etc. Average total catch per trip was approximately 36,000 pounds for freezer boats and 15,000 pounds for ice boats (heads-on). Freezer boats received an average of $1.25 per pound as exvessel price, while ice boats received an average of $1.00 per pound in 1994. No information was available on fixed and operating costs. Based on total revenue and minimum revenue needed to operate, fixed and operating costs per trip were estimated at $12,000 to $14,400 and $3,360 for freezer and ice boats respectively during 1994. At this time this represents the best available data on vessel costs and revenue in the rock shrimp fishery. However, it is expected that current costs and revenue could vary from these figures as operating practices, market prices and other factors change.

There are more recent data on operating costs from studies on the penaeid shrimp fisheries in the Gulf and south Atlantic. These cost estimates could be applicable to vessels in the rock shrimp fishery. Rock shrimp vessels traditionally participate in the penaeid shrimp fishery, and both penaeid shrimp and rock shrimp could be targeted on different days during the same multi-day trip. In particular, it is expected that costs and average rates of return for penaeid shrimp vessels 60 feet and larger should be similar to operating costs in the rock shrimp fishery.

One study on the Gulf shrimp fishery revealed that vessels in the 60 foot and larger size range showed the smallest revenue over cash cost (6.2%). In addition, large vessels had the least flexibility in substituting and adjusting inputs in response to poor conditions in the fishery. They require skilled crew to operate the vessel and are not able to reduce labor costs as readily as vessels in the smaller size categories. Also, these vessels had the largest number of years with revenue losses. Furthermore, households are more dependent on income from these vessels as compared to vessels less than 45 feet in length (Funk, 1998).

A recent study on the penaeid shrimp fishery off South Carolina indicated that many vessels are operating on break-even levels of activity (Henry et al., 2001). The South Carolina penaeid shrimp fishery was classified into three size categories based on differences in operating costs, profit margins, and ability of the vessel owner to make input substitutions (Henry *et* al., 2001):

1. Below 60 feet which would include the ice boats and smaller vessels that usually have one or two crew members.
2. 60-89 feet – vessels that are likely to be only freezer vessels. Different operating costs, less flexibility in making changes to another fishery or the ability to fish in inshore areas. The ability to travel longer distances and remain at sea for longer periods.
3. 90 feet and greater– these vessels have higher operating costs than category 2.

These authors surmised that if poor catches continue during the next five years then 20% of the large vessels (>60 ft.) could be forced to exit the industry. Price declines from short-term market gluts could also have the same effect. The annual total operating costs of vessels in the 60-100 ft range was $166,067 in 1999. On average the number of days fished was 198 per year (average per day cost of $837). The largest operating costs were crew and captain shares. The study also indicated that about 25% of all vessel owners have revenues above $150,000, and the average rate of return on investment was 3% on vessels larger than 60 feet (Henry et al., 2001). It is unknown to what extent these study results are reflective of the rock shrimp fishery.

Vessel profitability would also depend on the cost of inputs, in particular rising fuel cost is expected to have a more serious effect on vessel level profitability than previously. In fact fuel costs are now on par with crew share and repairs for larger shrimp vessels (NMFS, 2001b). The market outlook is not favorable for future shrimp price increases as slower economic growth is expected in the three largest markets: Japan, the United States, and Europe (NMFS, 2001b).

The Wholesale Sector - Dealer Permits

The number of dealers issued permits varied between 65 and 83 during the period 1997 to 2000 (Table 16). As expected, most dealers are located in the State of Florida, however there is a wide geographic distribution (Table 16). These rock shrimp dealers also hold permits in other fisheries such as snapper/grouper.

Table 16. Number of Rock Shrimp Dealers by State where Business is Located. Source: NMFS Permits Office.

STATE	1997	1998	1999	2000
AL	4	4	4	3
FL	32	43	43	38
GA	5	6	5	5
LA	6	6	5	4
MA	2	2	2	3
MD		2	2	2
MS	2			
NC	5	6	5	5
NY			4	4
RI	1	1	1	
SC	4	5	5	5
TX	4	4	6	5
WA			1	1
Grand Total	65	79	83	75

Socio-demographic profile

In 1994, as shown in Table 17, of those harvesters indicating marital status all but three were married and all but three had children. Well over half were high school graduates, and 19% had continued their education beyond high school. Of those harvesters included in this report, thirty (73%) were captain owners, ten were captains, and one was a crew member.

As the public hearing document produced no useable data, the socio-demographic data from 1994 is the most recent and representative information available (Table 17). In hopes of supplementing that information, a number of informal telephone conversations were carried out with those that currently hold south Atlantic rock shrimp permits. There were 333 vessel permits, but most likely quite a few less actual boat owners, as there were as many as 23 boats in one instance counted registered to one company.

Table 17. Demographic Characteristics of a Comparative Subsample of Rock Shrimp Harvesters for 1994. Source: Data Provided at Public Hearings for Shrimp Amendment 1 (SAFMC, 1996a).

Variable	Frequency	Percent	N
Marital Status			n=40
Married	37	93%	
Not married	3	7%	
Dependents			n=40
Has children	37	93%	
Does not have children	3	7%	
Education			n=40
Grade School	2	5%	
Some high school	9	23%	
High school graduate	21	53%	
Vocational/tech school graduate	1	2%	
Some college	6	15%	
College graduate and more	1	2%	
Status			n=41
Captain/owner	30	73%	
Captain	10	24%	
Crew	1	2%	

The conversations with approximately 25 rock shrimp permit holders pointed to four distinct types within the larger group (see Permit Holders – Typology below). First, there were those permit-holders (Type 1) that held a permit because they believed that it might be of some future use to them or their children. Their boats were not outfitted for shrimping/trawling, and they lived and ported their vessel great distances from the rock shrimp grounds. They expressed little expectation of ever using the permit. They knew only a minimal amount about the proposed management plan, and were not surprised to learn that they would most likely lose their eligibility to hold the permit in the future. For example, one permit holder explained he had sold the boat already once, but in the course of payment the new owner was incarcerated and so the boat was returned to him. He had refit it and was now selling it to another fisherman. The permit holder did not express any feelings about losing the permit, as he did not intend to use it.

The second "natural history" category (a "natural history" category being formed from the deductive method as opposed to inductive methods) of permit holders (Type 2) were those that were current participants in the penaeid shrimp fishery and had shrimped for rock shrimp in the past twenty or so years, but either had not landed a sufficient amount of rock shrimp or did not have landings in the qualifying years to be eligible for a limited entry permit. This group contains some of the historical participants (that is, those that have begun fishing for rock shrimp in the years previous to the qualifying years) in the rock shrimp fishery. For example, one woman explained that her husband has been shrimping for 30 years and has rock shrimped off and on when "he has had to." She explained that he preferred not to rock shrimp because it required going farther offshore, required extra crew, and one had to catch more rock shrimp than other types to make any profit. This year her husband has gone to the Gulf of Mexico because the catches are so far depressed in the Atlantic in 2001. She claimed that they could document landings before the qualifying years as she had saved receipts from earlier sales. She cleans houses for extra income for the household.

The third group (Type 3), roughly identified would be eligible for a limited entry permit, but based on recent entry into the fishery (during the period 1996-2000), and having sufficient landings. In some cases, these might be participants that are fairly young (20 years of age approximately) and who are interested in carrying on a family tradition of shrimping. Some in this group are older but are just recently able to afford to own a boat on their own.

The fourth and final group (Type 4) in this typology is composed of both older and younger fishermen and women. The have historical participation in the fishery, they have fished in the fishery in recent years, they have sufficient landings and they will be eligible for a permit. They expressed concern for those that will be excluded from the fishery, but also claim that they are pleased that the fishery will be managed, in their perception, more efficiently and fairly.

No dealers or processors of rock shrimp were interviewed, although a dealer/processor survey should be incorporated into future fishery management plans.

PERMIT HOLDERS – TYPOLOGY

	Ever Rock Shrimped?	Historical Participation?	Landings >15K	Eligible for Limited Entry?
TYPE 1	No	No	No	No
TYPE 2	Yes	Yes	No	No
TYPE 3	Yes	No	Yes	Yes
TYPE 4	Yes	Yes	Yes	Yes

Conversations also revealed a number of perceived negative social impacts should the limited entry program be implemented. The impact most often discussed was what might be referred to as a loss of opportunity to balance their fishing business. While permit holders may not have been active in harvesting rock shrimp since 1996, they held the permit as "insurance." Some fishermen saw rock shrimp as part of an "annual round" of fishing, where they usually fish for white shrimp in the spring, "brownies" in the summer, and rock shrimp and pink shrimp in the fall. It was explained that the inactive permit-holders most often participated in other shrimp fisheries, but when "times got really bad" they felt that they could fall back on rock shrimp fishing. This type of fall-back would allow them to meet minimal fishing and household necessities, such as making a boat or house banknote payment.

The 1999 SAFMC SAFE Report for the Shrimp Fishery of the south Atlantic (SAFMC, 1999) notes that fisherman migration is an additional adaptation to the seasonal nature of the shrimp fishery. Rather than switch over to other fisheries available to them locally, some shrimpers choose to temporarily migrate to other states or regions with greater abundance of shrimp. At times, especially for larger vessels, these migrations last for extended periods of time and take them far up the Atlantic coast or far south to the Gulf of Mexico (Johnson and Orbach, 1990). Smaller vessels migrate as well, though their search for shrimp frequently takes them only to states adjacent to their home states. This migration of boats needs to be accounted for because the rock shrimp fishery draws boats from the Gulf when fishing is good in the Atlantic, and from the Atlantic to the Gulf when catches are better there.

The practice of keeping one's opportunities open is a common business strategy, and not only in fisheries. It is not "speculation" per say, as speculation is most often defined in a somewhat negative manner, as assuming a risk in hopes of a gain, or buying something in the hopes of selling it at a high profit. While some of this behavior is present among some permit-holders, it is not widespread. There would need to be a large and sustained disaster in many other fisheries for rock shrimp to attract all permit holders to fish for rock shrimp; conversely, there would need to be a large and a sustained success in the rock shrimp industry (high prices, high catches) for the same event to occur.

Community Profiles

Because of the lack of in-depth social or ethnographic data for this fishery, various problems arise when trying to determine impacts from the proposed actions in this amendment. Chief among these problems is the difficulty in determining the geographic area or community where the impacts may be felt. One approach would be to analyze which vessels would be eligible for continuing participation in the limited entry rock shrimp fishery, and then determine where –in which ports - the majority of their landings have occurred. Where those landings occur – the communities – could then be analyzed for potential social impacts. The number and location of landings for vessels that were active but will not qualify for the limited entry program could then be compared to vessels that will qualify and have landings in the same area. If those communities or geographic regions are the same, the gains in landings for some vessels might cancel the losses for others. However, this type of analysis leaves out consideration of impacts that might occur in the vessel owner's community of residence, such as a loss of income to the vessel generating a need for other household members to seek employment in order to meet household needs that were previously met by rock shrimp catches, however sporadic those catches may have been.

There are problems with the data for conducting this type of analysis: there are missing vessel identification numbers and mismatches in the datasets that cannot be resolved. Of the vessels that will qualify (N=168), 42, or 25% could not be found in the landings dataset that covered the years 1998 – 2000. This is most likely due to the fact that the missing vessels had qualifying landings in the years previous to 1998.

There are problems of classification also, as with the problem of determining what the term "homeport" or hailing port means. Does this location portray where the vessel actually spends most of it's time when not fishing (in between regular trips), or spends time when not fishing during the season, or at some other time? A listed homeport may not be where the vessel is usually kept, or where the vessel usually unloads its catch. Because of the difficulty in assessing the meaning of "homeport," in spite of the fact that with better data it could be an important variable in the determination of impacts, it will not be used as a variable in the following analysis.

Trying to determine impacts on the community listed for the vessel's owner does not alleviate the problem either; the vessel owner may not live in a fishing community per say; in the south Atlantic traditional fishing community social organization and settlement patterns have been drastically changed since the 1960s when tremendous population shifts to the coasts have occurred (Florida's coastal population alone nearly doubled from 1960 to 1980; US Census Bureau, 1995). Residential patterns for commercial fishermen tend less to cluster together in the present than they may have in the past. Nor are residential patterns for the vessel's crew known. It is not now possible to measure the effects the management measures will have on the crew (and their families, etc.) of the vessel when there is essentially no specific data on crew socio-demographics. Again, this is problematic when one cannot tell if the crew lives on the vessel, in the immediate vicinity of the vessel, or if they live elsewhere.

It is nearly impossible due to data limitations to determine with certainty what the level of impacts on these geographically dispersed cities and communities might be. People in communities ranging from Virginia to Texas and Washington state held rock shrimp permits. However, the majority of these permits were latent – they had never been used

and thus one could predict that the loss of that permit will not generate a significant impact to that entity.

The size of the communities is also problematic for the analysis. In a city the size of Miami, the loss of one permit to one vessel would generate a miniscule community impact. However, in the smaller communities that still depend a great deal on fishing for both economic and cultural welfare, the impact from one or two vessels keeping or losing permits/income could indeed be greater. Even within large cities that little resemble what might be called traditional fishing communities, there are sub-communities of fishermen, rather like neighborhoods, that may feel the impacts of regulatory measures even though the larger city structure may obscure or even cushion the importance of those impacts.

It is not possible to carry out complete community profiles of all the potentially impacted communities in the south Atlantic. There is no data to accomplish this task at this time; however, future research is planned so that such analyses will be possible. The following description addresses only the three regions of Florida predicted to experience the most impacts – positive and negative – from the proposed measures in this amendment.

Community Profiles

The descriptions of the following geographic regions, counties, or communities are partial, reflecting the current lack of community data in the south Atlantic.

Duval County: Jacksonville, Jacksonville Beach, Atlantic Beach, and Mayport

Duval county itself continues to grow at a relatively fast rate. Its 1990 population was 672,971, but increased to 778,879 in 2000, an increase of 15.7%. The ethnic composition of this northeastern Florida coastal county is mostly white, with almost 66% of Duval county self-identifying as white, 28.5% as African American, and four % as Hispanic/Latino in the 2000 Census. The county's per capita median income in 1990 was $28,513. The owner-occupied housing rate was 63% and 37% for rentals.

Atlantic Beach, one of the residential communities in Duval County, and blended into Jacksonville, had a 2000 total population of 13,368. The median age of the city's residents is 39.3 years. Eighty-two percent of the population is self-identifies as white, 12.7% as African American and 4.2% as Hispanic/Latino. The median age of the population is 39.3 years. Housing is divided between 61.1% owner-occupied units, and 33.9% rental units. The city was incorporated in 1925.

The community of Jacksonville Beach is located close to Atlantic Beach, and has a 2000 population of 20.990. The population self-identifies as 90.9% white, 4.8% African American, and 3.0% Hispanic/Latino. The median age of the population is 38.4 years. Owner-occupied housing units make up 59.7% of the units, and the remaining 40.3% are rentals.

Mayport Village is not considered an official city in Census Bureau records, as it was incorporated into the Jacksonville/Duval county government in 1967. However it is a well-known port, and traces its European beginnings to 1564 and the settlement by the French Huguenots. Later the Spanish exerted their influence, and then in the mid-1800s the Village attracted Southern European and Minorcan immigrants because of its reputation as a fishing village. Mayport Village houses both NOAA field offices and the Mayport Naval Station. There is a dock there that serves the car ferry that crosses the Saint John's River. It is also home to various commercial (Table 18a) and recreational fishing interests.

According to the Waterfronts Florida Community Website (www.dca.state.fl.us/ffcm/FCMP/waterfronts/community/mayport.htm), the village is on the verge of revitalization.

Table18a. Commercial Landings from Mayport, Florida. Source: NMFS.

Year	Millions of Pounds	Millions of Dollars
2000	4.5	9.9
1999	3.9	7.7
1998	3.5	7.3
1997	3.9	6.1
1995	4.3	8.0
1994	6.4	13.5
1993	4.8	6.2

Brevard County: Port Canaveral/Cape Canaveral, and Cocoa/Cocoa Beach

The community of Port Canaveral and Cape Canaveral, including Cocoa Beach and the city of Cocoa, exhibit a great volume of landings of rock shrimp in the south Atlantic. Historically, the coastal communities of central Florida developed in the late 1800s along with Henry Flagler's railway line. They were small rural entities whose economies revolved around the growing, packing and shipping of pineapples (and later citrus), cattle ranching and commercial fishing. Major pulses of growth came with both World Wars, and then later with the coming of NASA activities, which spurred development in the late 1950s and early 1960s. Commercial fishing remained an important component of these communities' livelihoods, and only in the past 20-30 years has it diminished significantly. However, in its place has come a great increase the number of private recreational fishermen and women, and also a growth in the number of for-hire vessels.

Brevard county itself continues to grow at a relatively fast rate. Its 1990 population was 398,978, but increased to 476,230 in 2000, an increase of 19.4%. The ethnic composition of these central Florida coastal communities is primarily white, with almost 90% of Brevard county self-identifying as white in the 2000 Census. The county has an estimated 1997 (latest available data) poverty rate for people of all ages of 11.3 percent and this is relatively low for the state of Florida. The county's personal median income is $36,353 for the same year.

Cocoa Beach, one of the residential communities for Port Canaveral, had a 2000 total population of 12,482, with 96.6 percent of persons self-identifying as white. The median age for this community is 56.6 years. Owner-occupied units make up 72.7 percent of the housing, while renter-occupied units comprise 27.3 percent of the pool.

The community of Cape Canaveral is the closest residential community to the commercial shipping, fishing and recreational boating port of Port Canaveral. According to the 2000 Census, the city had a total population of 8,829, with the median age being 46.2. The largest ethnic category for Cape Canaveral is white, comprising 94.7 percent. Perhaps reflective of the industries that dominate the area, housing tenure is almost equally divided between renter-occupied units and owner-occupied units (49.9 versus 50.1 percent, respectively).

The commercial fishing interests in the area are overshadowed by large corporate conglomerations such as Disney Cruise Lines (Port Canaveral recently passed Miami as the number one cruise passenger port in the world), the NASA Space Program, and the numerous charter and private recreational fishing interests that dock or launch their boats from the Port. While the commercial fishing component is therefore a smaller entity in the Port, it none-the-less has its own section of the harbor which is prominently identified on the new signage at the entrance of the port.

A brief descriptive history of the port from the Canaveral Port Authority is quoted below (http://www.portcanaveral.org, August, 2001):

"Port Canaveral has developed from a small oil and shrimp port into the busiest cruise port in the Western Hemisphere. It also has developed into an international hub for cargo from humble beginnings when a cargo vessel loaded with newsprint and a petroleum tanker made the first calls on Port Canaveral in 1955. Three years later, Tropicana tanker vessels began transporting refrigerated single-strength orange juice to New York out of Port Canaveral.

Bulk cement was first shipped through the port in the mid-1960s. Petroleum, which continues to be one of Port Canaveral's major imports, accounted for 93 percent of the Port's cargo by 1966, while cement imports represented six percent. The remaining one percent of cargo included newsprint, military and miscellaneous cargo. During 1966, Port Canaveral's cargo tonnage reached the one-millionth mark for the first time.

As cargo tonnage continued to increase, so did the varieties of cargo shipped through Port Canaveral. In the 1970s, scrap steel processed locally for export was added to the port's list of cargo, as well as fresh citrus cargo exports to Northern Europe and Japan. During the 1980s, citrus concentrate became a key import in addition to deciduous concentrates from Argentina and Chile.

Solar salt (evaporated sea water) used for premium water conditioning and in agricultural markets, also became a new commodity at Port Canaveral in 1982. Morton Salt Company opened a solar salt processing plant at Port Canaveral in 1990, and today more than a quarter of a million tons of salt is shipped through the Port annually.

In the early 1990s, single strength orange juice came back after a 30-year hiatus. Other primary cargoes at Port Canaveral, such as lumber, cement and newsprint also have increased steadily since the 1980s. The seafood industry also continues to thrive at Port Canaveral."

This port has historically (since 1996) the highest level of landings of rock shrimp in the south Atlantic. There are currently 3 seafood processor/dealers located in the port; individual landings are not known for these businesses but total landings are shown in Table 18b. There were approximately 7 such seafood wholesale businesses in 1993, but that number declined to five in 1998. These figures indicate that change in the industry is occurring but without further research it is not possible to understand the causes or incidence of change.

Table 18b. Commercial Landings from Cape Canaveral, Florida. Source: NMFS.

Year	Millions of Pounds	Millions of Dollars
2000	10.9	15.3
1999	8.9	11.9
1998	8.9	10.6
1997	10.3	15.6
1996	21.2	17.7
1995	10.1	16.9
1994	19.5	30.6
1993	13.4	17.2
1992	10.8	10.4
1991	7.8	9.9
1990	8.8	13.2

Monroe County: Key West and Marathon

Monroe county, unlike Brevard and Duval counties, has grown much slower in the past decade, with the population growing from 78,024 in 1990 to 79,589 in 2000, a increase of only two percent. The ethnic composition of this south Florida coastal county is mostly white, with 90.7% of the county's residents self-identifying as white in the 2000 Census. Hispanic/Latinos make up 15.8%, and African Americans 4.8%. The county's median age is 42.6 years. The county has an estimated 1997 (latest available data) poverty rate for people of all ages of 11.3 percent and this is relatively low for the state of Florida. The county's personal median income is $36,353 for the same year.

Key West has a 2000 population of 25,478, The median age for this community is 39.3 years. According to the official Key West website (http://www.keywestcity.com/), the city's primary economic activity is tourism, and 1.3 million visitors were received in 1996. Commercial landings are shown in Table 18c.

A description of the city is offered at the city's website:

"Key West lies near the end of the chain of islands known as the Florida Keys, and is the southern-most city in the continental United States. The island-community is located about 90 miles north of Cuba and 150 miles southwest of Miami at a latitude of 24 degrees, 33 minutes, 5 seconds North and at a longitude of 81 degrees, 48 minutes, 14 seconds West. The island has an area of 4.2 square miles, while the City-incorporating the northern part of neighboring Stock Island-has an area of 5.79 square miles. The City initially developed because of its proximity to the Florida Straits, the abutting Florida Reef, strong offshore ocean currents (the Gulf Stream), and the area's unpredictable winds, combined with a large natural deep-water harbor and deep channels into the harbor. The Florida Straits are the northern-most sea passage from the Gulf of Mexico to the Atlantic Ocean. For three centuries this passage formed part of the great nautical trade route that carried ships from Caribbean and South American ports to their European homelands. The location of Key West serves as a gateway both to the Caribbean and between the Atlantic Ocean and the Gulf of Mexico was recognized by the military at an early date. Another important regional factor in the development of the City has been its proximity to Cuba, 90 miles to the south.'

The cost of living is high in Key West, which could be why so few vessels or owners report Key West as their residence or homeport. In 1996 the American Association of Realtors ranked Key West as the fourth most expensive real estate market in the United States. The community of Marathon has a 2000 population of 10,255. The median age for in Marathon is 43.8 years.

Table 18c. Commercial Landings from Key West, Florida. Source:NMFS.

Year	Millions of Pounds	Millions of Dollars
2000	16.9	50.6
1999	19.8	51.9
1998	18.9	44.8
1997	18.8	54.9
1996	23.7	62.8
1995	23.4	66.7
1994	21.5	53.0
1993	20.3	35.2
1992	9.4	17.4
1991	14.1	35.1
1990	11.4	21.7

Seasons

Rock shrimp landings vary seasonally, governed primarily by the life cycle of the species. The peak rock shrimping season generally runs from July through October. Historically, the fishery did not begin until August or September (SAFMC, 1996a). At public hearings for Amendment 1 testimony indicated that on average by September 1, the majority of rock shrimp catch was of marketable size (SAFMC, 1996a).

Recent data supplied by the NMFS indicate that currently the main rock shrimp season occurs from August through October. However, fishing occurs year round (Figure 6).

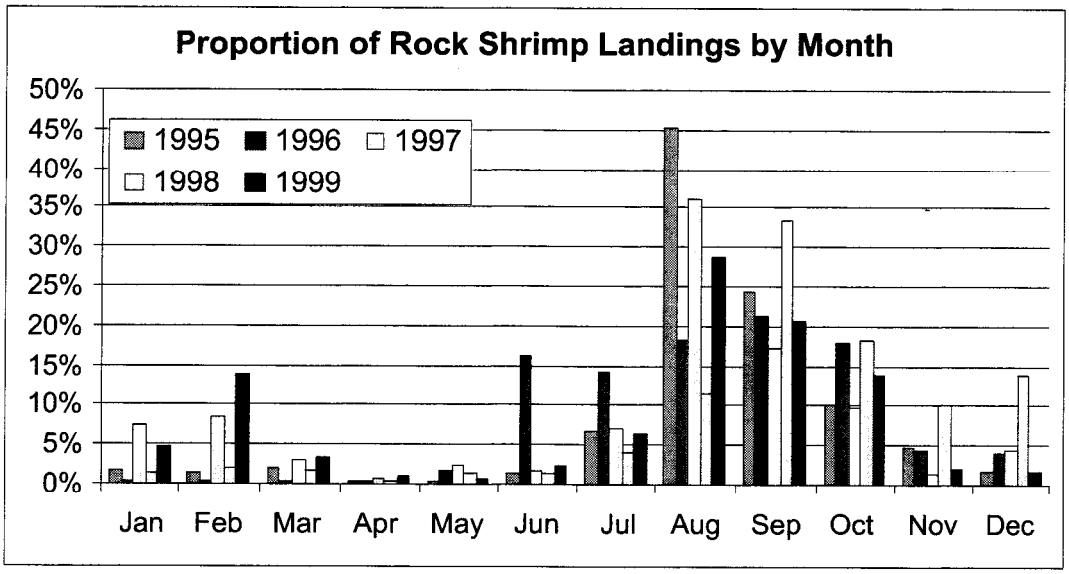


Figure 6. Seasonal Pattern of Rock Shrimp Landings in the South Atlantic Region. Source: NMFS General Canvass Database.

During the time when Amendment 1 was developed rock shrimping was a fall back or a filler to the white and brown shrimp fisheries. To a degree, the amount of effort and the period vessels fish is dependent on the success of the white and brown shrimp fisheries. Many vessels participated at varying levels in those fisheries and a number of the larger freezer trawlers were dependent on the rock shrimp fishery for a large portion of their annual revenue (SAFMC, 1996a). Apart from penaeid shrimp species, to a lesser extent other species are targeted throughout the year. Whether these species are targeted during the same time as rock shrimp is not clear(SAFMC, 1996a).

Participation in Other Fisheries

Participants in the commercial rock shrimp fishery are involved in other fisheries. Larger vessels often participate in other trawl fisheries mainly for white, brown, and pink shrimp. Many of the larger shrimp vessels in the region are mobile and can participate in the offshore shrimp fisheries throughout the south Atlantic states and the Gulf of Mexico. However, they are restricted from the inshore/bay shrimp fisheries. Other information on harvest areas during the Shrimp Amendment 1 public hearing process indicated that many rock shrimp vessels do fish other regions throughout the year. Many vessels fish during the open Gulf shrimp season in the summer months just prior to the rock shrimp season. Also the peak in the pink shrimp fishing on Florida's west coast occurs just after the rock shrimp season.

More recent information on participation in other fisheries from three sources are presented below. The rock shrimp permits database contains information on other federal permits that were issued to rock shrimp vessels. It appears that the majority of these vessels only hold rock shrimp permits (Table 19). This does not imply that they are dependent on one fishery. Most rock shrimp vessels participate in the penaeid shrimp fisheries in the Gulf and south Atlantic, which do not require federal permits. Some of the fisheries that multiple

permit holders can participate in include: snapper/grouper, king mackerel, Spanish mackerel, shark, Gulf reef fish, and swordfish.

Table 19. Number of Federal Permits Owned by Rock Shrimp Permit Holders. Source: NMFS Permits Office

Number of Permits	1996	1997	1998	1999	2000
1(Rock Shrimp)	167	293	292	286	275
2	35	51	54	55	60
3	3	17	20	20	26
4	8	18	20	12	10
5	5	10	9	16	11
6	1	5	14	10	9
7		9	10	7	2
8		3	4	3	1
9			4	1	1
10	1	2	2	5	4
11			1		1
12			1		1
Grand Total	220	408	431	415	401

When completing permit application forms applicants are requested to include information on the most important fisheries in which the vessel participates. However, the shrimp fishery is not classified into penaeid shrimp or rock shrimp. From the permits data file rock shrimp permitted vessels do participate in other fisheries. The most common is the shrimp fishery:

Permitted vessels that do not participate in the shrimp fishery –10%
Permitted vessels that only participate in the shrimp fishery-59%
Permitted vessels that participate in the shrimp fishery and other fisheries-31%

Permitted vessels that participate in other fisheries apart from the shrimp fishery declared that they are involved in the spiny lobster, reef fish, king mackerel, and shark fisheries most often.

Vessels in the rock shrimp fishery participate in other fisheries in the Gulf of Mexico and the south Atlantic region. In order to obtain complete information on a vessel's revenue profile and economic dependence on rock shrimp, there would have to be a systematic search of all databases in the Gulf and south Atlantic to obtain information on the respective vessel's landings and ex-vessel revenue in all fisheries. This would only be possible if all states had a trip ticket system or other reporting mechanism in place that captured this information.

Data from the Florida trip ticket program provides some information on the dependence of these vessels on rock shrimp, however this is only reflective of the landings in the State of Florida. For most of these vessels additional revenue comes from other shrimp as opposed to other fisheries apart from shrimp. At most rock shrimp vessels obtain 20% of their Florida revenue from other species apart from shrimp. At least 25% of vessels landing in Florida obtain anywhere from 80-100% of their Florida fishing revenue from

rock shrimp, and 62% of all vessels landing rock shrimp in Florida obtain at least 40% of fishing income from rock shrimp (Table 20).

Table 20. The Proportion of Vessels landing rock shrimp in Florida in each Revenue Category (% of Vessel Revenue from Rock Shrimp Landings in Florida) During 2000. Source: Florida Marine Research Institute (FMRI).

Rock Shrimp Revenue Category	% of Vessels in each rock shrimp revenue category
0-19%	18.5%
20%-39%	19.3%
40%-59%	16.5%
60%-79%	20.2%
80%-100%	25.5%

Discards and Bycatch

The discarded bycatch of fish and crustaceans in the rock shrimp trawl fishery is highly variable by season and area. Comments received from industry representatives at scoping meetings and public hearings for Amendment 1 to the Shrimp Plan have indicated that the catches have very little bycatch north of Cape Canaveral and in deeper water. As vessels began fishing earlier in the year, in June and July versus August or September, discards of unmarketable juvenile rock shrimp increased dramatically. Industry representatives also indicated that beyond 20 fathoms (120 ft), 90% of the catch is rock shrimp; therefore, it can be assumed that the remaining is bycatch (SAFMC, 1996a).

In order to document species associated with rock shrimp benthic habitats, NMFS SEFSC Pascagoula Laboratory compiled lists of species associated with rock shrimp catches in research trawling efforts for finfish and shrimp conducted between 1956 and 1991 (Appendix A). At a minimum, these lists will provide potential bycatch associated with rock shrimp trawling. In order to identify possible key species caught in association with harvestable levels of rock shrimp, only trawl records when rock shrimp catches met or exceeded 40 pounds per hour per 40 foot of head rope were used based on input from public hearings and discussions with people in the industry.

One rock shrimp bycatch characterization observer trip was completed between January 26 and February 4, 1995. The results are detailed in Table 21. Further characterization trips are being coordinated through the NMFS Southeast Fisheries Science Center.

The Council will revisit bycatch in the rock shrimp fishery once adequate characterization is completed and further analyses are accomplished by NMFS to determine the extent of bycatch, if any, in the rock shrimp fishery.

Table 21. Results of Initial Rock Shrimp Bycatch Characterization Trip. Source: GSAFDF (1995).

	Number of individuals/per hour/per net	kilograms/per hour/per net
Biomass	NA	38.2
Total finfish	1,164	33.6
Shrimp		
Rock Shrimp	283	5.0
Penaeids	49	1.8
Other Invertebrates		
Swimming crabs	20.6	1.0
Mantis shrimp	56	1.5
Squid	1.2	0.2
Drums		
croaker	2.4	0.3
spot	23.5	2.3
weakfish	not taken	
sea trout	not taken	
whiting	not taken	
Mackerels	not taken	
Other Fishes		
Lizardfish (*Synodus sp.*)		
Eel (*Lepophidium sp.*	25.0	3.3
Jenny (*Eucinostomus sp.*)	3.0	0.2
Goatfish (*Mullus sp.*)	6.3	0.5
Sea Bass (*Diplectrum sp.*)	7.5	0.6
Sea Bass (*Centropristis sp.*)	11.3	0.7
Grunt (*Haemulon sp.*)	1.2	0.1
Pinfish (*Lagodon sp.*)	4.0	0.4
Searobin (*P. ophryas*)	0.7	0.03
Searobin (*P. longirostris*)	43.0	0.8
Searobin (*Bellator sp.*)	87.0	1.0
Scorpionfish (*S. calcaratta*)	30.0	0.7
Flatfishes		
P. lethostigma	0.7	0.2
A. quadrocellata	0.5	0.1
S. gunteri	44.6	1.1
B. robinsi	11.3	0.3
Etropus sp.	33.0	0.4
E. crossotus	17.3	0.4
Cyclopsetta sp.	3.1	0.4
Citharichthys macrops	5.2	0.2
Symphurus plagiusa	3.6	0.1
Filefish (*Monocanthus sp.*)	3.1	0.1
Puffer (*Sphoeroides sp.*)	2.4	0.2

(estimates based on 53.1 tow hours with a mean tow time of 3.8 hours)

Turtle Interactions and TEDS

While the proposed actions for the rock shrimp fishery contained in this amendment will not have any impact on threatened or endangered species, the southeastern shrimp fishery itself does have a significant interaction with sea turtles, all species of which are listed as either threatened or endangered under the ESA of 1973, 16 U.S.C., 1531 et seq. Incidental capture by trawlers fishing for white, brown, and pink shrimp has been documented for loggerhead, Kemp's ridley, green, leatherback, and hawksbill turtles in coastal waters of the southeastern United States and Gulf of Mexico. No capture of sea turtles have been documented for the rock shrimp fishery and NMFS SERO (Dr. Andrew Kemmerer, pers. comm. 1994) has indicated that no action was necessary addressing threatened or endangered species in the rock shrimp fishery under Amendment 1. Some rock shrimpers testifying at public hearings for Shrimp Amendment 1 indicated that the mandatory turtle excluder devices being pulled are helpful in eliminating unwanted bycatch other than turtles (SAFMC, 1996a).

Regulations promulgated by NMFS under the Endangered Species Act, required shrimp trawlers in Federal or state waters off the southeastern Atlantic coastal states to comply with Federal sea turtle conservation requirements. The final rule as published in the Federal Register is presented in Appendix VIII of the original FMP (SAFMC, 1993).

NMFS estimated that prior to 1987, commercial shrimp trawlers killed more than 11,000 sea turtles annually in waters off the south Atlantic and Gulf of Mexico states. A more recent review and analysis of existing information by the National Academy of Sciences in 1990, found that the NMFS estimates were conservative, and that the number of turtles killed by shrimp trawlers could be as high as 44,000 each year which makes it the largest human-caused source of turtle mortality in U.S. waters.

A biological opinion on implementation of the 1987 Sea Turtle Conservation Regulations (52 FR 24244, June 29, 1987) was submitted on September 30, 1987. The 1987 opinion addressed the potential adverse effects to listed species of implementation of the rule, and concluded that the regulations would have a positive impact on sea turtles by substantially reducing mortalities.

NMFS issued regulations under the ESA on June 29, 1987 [52 FR 24244] to reduce the incidental capture of sea turtles by shrimp trawlers. Trawlers 25 feet or longer were required to use TEDs in offshore waters, and were required to limit tow times to 90 minutes or use TEDs in inshore waters (landward of the COLREGS line). Trawlers less than 25 feet in length were required to use 90 minute tow times or TEDs in inshore and offshore waters. These conservation measures were required in the waters off the southeastern Atlantic United States (North Carolina through Florida) from May 1 through August 31, except for the Canaveral area where the regulations were in place year round.

Because of extensive strandings of turtles during periods when TEDs were not required, NMFS issued regulations on September 4, 1991 [56 FR 43713], extending the sea turtle conservation regulations from September 1, 1991, through April 30, 1992 in the Atlantic area.

On April 9, 1992, Endangered Species Act (ESA) Section 7 consultation was initiated by the South Atlantic Fishery Management Council. This consultation was to address the potential adverse effects to listed species of both the proposed management action (adoption of a shrimp fishery management plan for the south Atlantic) and the shrimp fishery itself.

A biological opinion regarding implementation of the Shrimp Fishery Management Plan for the south Atlantic region and Amendment 6 to the Gulf of Mexico Shrimp Fishery Management Plan was issued on August 19, 1992 which is contained in Appendix IX of the original FMP (SAFMC, 1993). NMFS concluded that shrimp trawling in the southeastern United States was in compliance with the 1992 Revised Sea Turtle Conservation Regulations and the proposed management actions under the south Atlantic shrimp FMP were not likely to jeopardize the continued existence of threatened or endangered species under NMFS jurisdiction.

On September 8, 1992 (57 FR 40861) NMFS issued a final rule effective September 1, 1992 that extended the sea turtle regulations in the Atlantic area to year-round rather than May 1 through August 31. Effective November 1, 1992 in all areas where tow times were used in place of TEDs, tow times were reduced from 90 to 75 minutes. The interim rules also eliminated the exemption for the rock shrimp fishery in the Atlantic and provided for exemptions for vertical barred beam trawls, roller trawls, wing nets, skimmer trawls, pusher-head trawls, and bait shrimpers.

As of December 1, 1992 shrimp trawlers were required to comply with sea turtle conservation measures throughout the year in all areas. Effective January 1, 1993 shrimp trawlers under 25 feet in offshore waters could no longer use limited tow times as an alternative to using TEDs. Also effective January 1, 1993, was the requirement that shrimp trawlers in inshore waters must use TEDs unless they are equipped with a single net with a headrope length less than 35 feet and a footrope length less than 44 feet. In that case, then they can use limited tow times until December 1, 1994. Final ESA regulations for the shrimp fishery were published on December 4, 1992 (FR Doc. 92-29370)

A Section 7 consultation was reinitiated on November 14, 1994 and a Biological Opinion regarding the present prosecution of the southeast shrimp trawl fishery was issued on November 14, 1994 (SAFMC, 1996a). This Opinion found the fishery as presently prosecuted is likely to jeopardize the continued existence of threatened or endangered species under NMFS jurisdiction. Subsequently, the opinion directed NMFS to implement permits in the entire shrimp fishery within four months and detailed specific tasks to increase enforcement of existing regulations, and to accomplish research needed to identify and implement management measures to eliminate the jeopardy situation. An Emergency Response Plan developed in response to the biological opinion was issued by NMFS and specifies monitoring and regulatory action required if allowable take levels of threatened and endangered sea turtles are exceeded.

4.0 ENVIRONMENTAL CONSEQUENCES

A. Introduction

This section presents management measures and alternatives considered by the Council and the environmental consequences of management. The Final Supplemental Environmental Impact Statement (FSEIS), the Regulatory Impact Review (RIR), the Initial Regulatory Flexibility Analysis (IRFA), and Social Impact Assessment/Fishery Impact Statement (SIA/FIS) are incorporated into the discussion under each of the proposed action items.

Each action is followed by four sub-headings: Biological Impacts, Economic Impacts, Social Impacts, and Conclusion. These are self explanatory with the first three presenting the impacts of each measure considered. The Council's rationale is presented under the heading Conclusion. The Council's preferred action is listed below the Action number and other options considered by the Council are indicated under the heading "Rejected Options."

Alternatives that were eliminated from detailed consideration and/or for which no action is being proposed are included in Appendix B. There were two actions in the public hearing draft of Shrimp Amendment 5 that were dropped from the current document because they were not relevant given the Council's recommendation on proposed measures at the June 2001 Council meeting (Appendix C). Additional alternatives that were suggested during the public hearing process are listed in Appendix D. This information is included to provide a complete NEPA record of all alternatives considered by the Council during development of Amendment 5.

B. Proposed Actions

ACTION 1. Establish a limited access program for the rock shrimp fishery prosecuted within the South Atlantic Council's area of jurisdiction south of the Georgia/South Carolina state line, and limit initial eligibility to the owner of a vessel that: (a) has held a valid rock shrimp permit prior to December 31, 2000; and (b) can demonstrate at least 15,000 pounds of rock shrimp landings in any one calendar year from 1996 through 2000. This owner will be eligible to receive a fully transferable permit. A limited access permit will be required for harvest and possession of rock shrimp in the South Atlantic Council's area of jurisdiction south of the Georgia/South Carolina state line.

The Council's intent is that each qualifying vessel will need to have a limited access permit in order to harvest or possess rock shrimp in the limited access area within the South Atlantic Council's area of jurisdiction. Vessels that do not have a limited access rock shrimp permit would still need a rock shrimp open access permit (currently required) to possess, harvest, or land rock shrimp north of the Georgia/South Carolina state line.

Several owners can qualify from one vessel if that vessel is sold to multiple owners during the qualifying period, and under each separate ownership the vessel meets the qualifying landings criteria. Each of these permit applicants must own a vessel to be issued a limited access permit.

Verification of Landings

1. To be eligible for a limited access permit, vessels must meet the qualification criteria proposed. Vessel owners must have proof that their qualifying rock shrimp landings were harvested from the South Atlantic Council's area of jurisdiction. Landings taken from the Gulf of Mexico are not to be included. Landings will be determined through records kept at the state level. The Council's preferred action would require verification of landings data from January 1, 1996 to December 31, 2000. Under current regulations, fishermen and dealers must submit trip tickets or dealer reports to the individual states by the 10th day of the subsequent month. The Council will not consider any landings data submitted to the states after January 31, 2001.

2. For annual landings qualifying criteria, only landings that were recorded during the period when fishermen held a valid rock shrimp permit will be counted. Qualifying landings must occur during a calendar year, not just any consecutive 12-month period.

3. Only landings that were harvested, landed, and sold in compliance with all state and federal regulations may be used to determine eligibility.

4. The Council will allow the purchase/transfer of catch history from a qualifying vessel to be used to meet the poundage requirement for a limited access permit (Action 1B).

Conditions of permit application/issuance/renewal, transfer of catch history, transferability of limited access permits, inactive permits, and reissuance of permits that did not meet the renewal criteria are addressed in Actions 1A through 1H.

Biological Impacts

This measure would reduce the level of bycatch in the future if it results in reduced effort in the fishery. In addition, it is expected that there will be improved compliance with current fishery management regulations as the penalties are generally higher in a limited access fishery for federal fishery violations. This is especially important given the precarious state of *Oculina* coral as indicated in the report from Chris Koenig (Appendix J).

Rock shrimp are caught in small quantities sporadically off North and South Carolina. There was no evidence linking these populations with the "core" fishery off Florida and these states were excluded from the limited access area. Georgia was included because in certain years prevailing oceanographic current patterns would link the populations off Florida and Georgia. Thus, fishing effort in Georgia could affect the availability off Florida (the core fishery).

Economic Impacts

This option would allow at least 168 vessels to qualify for a limited access permit (Table 22). In addition, if a vessel was sold to multiple owners during the qualifying period, and under each ownership the landings threshold criterion was met, each owner would qualify for a limited access permit (not factored in the estimate of the number of qualifying vessels). Furthermore, there are landings in the Florida trip ticket records that could not be linked to a vessel. If these landings are associated with a vessel that met the qualification criteria, and the submission of this data was conducted in accordance with Florida law, then this would further increase the actual number of vessels that would qualify for a limited access rock shrimp permit.

Table 22. Number of Vessels that would Qualify for a Rock Shrimp Limited Access Permit Based on Various Threshold Level of Landings from 1996-2000. Number of Vessels with Documented Landings and Total Number of Permitted Vessels that would not Qualify.

Threshold level of landings (pounds)	Number of qualifying vessels	Vessels with landings (1996 to 2000) not qualifying *	Permitted vessels not qualifying**
1	279		261
1,000	243	36	297
5,000	208	71	332
10,000	183	96	357
15,000	168	111	372
25,000	146	133	394
30,000	137	142	403
36,000	131	148	409
40,000	124	155	416
50,000	110	169	430
100,000	78	201	462
200,000	45	234	495
300,000	25	254	515
400,000	12	267	528

* These figures do not include vessels with landings in 2001.
** Includes vessels that were issued permits from 1996 to Dec. 2000.

Table 23. Proportion of Active Qualifying Vessels, Active Non-Qualifiers, and Latent Permit Holders in each Vessel Length Category.

Category	Vessels that Qualify	Active Vessels – Non-Qualifiers	Vessels with no documented landings
Less than 60 ft	3%	8%	17%
60-69 ft	32%	47%	30%
70-79 ft	47%	35%	39%
More than 80 ft	18%	10%	14%

There are differences in length composition among the groups of vessels that would qualify for a limited access permit and those that would not qualify (Table 23). The main differences occur in the less than 60 feet category which contains a substantially higher

proportion of vessels that would not qualify for a permit (17% of the vessels with no documented rock shrimp landings and 8% of active vessels that would not qualify) compared to vessels that would meet the qualification criteria (3%). In addition, a slightly greater percentage of vessels that qualify for a permit are in the larger vessel length categories (greater than 70 feet) compared to the two groups of non-qualifiers (Table 23).

Table 24. Proportion of Active Qualifying Vessels, Active Non-Qualifiers, and Latent Permit Holders in each Vessel Horse Power Category.

Category	Vessels that Qualify	Active Vessels – Non-Qualifiers	Vessels with no documented landings
0-400 HP	41%	57%	45%
401-500 HP	22%	14%	18%
501-600 HP	20%	14%	18%
601-700 HP	9%	10%	8%
More than 700 HP	9%	7%	12%

Similar to the length composition data, there are differences in horsepower composition between the group of vessels that would qualify for a limited access permit and those that would not qualify (Table 24). The main difference occurs in the less than 400 HP category with a higher proportion of active vessels that would not qualify for a permit compared to the other two groups (Table 24).

Table 25. For Vessels that would not Qualify for a Permit: Number of Active Vessels, Landings, and Ex-vessel Revenue.

Item	1996	1997	1998	1999	2000	Total 1996-2000	Average 1996-2000
Number of Inactive Permit Holders		300	354	280	281		304
Number of Active Vessels not Qualifying for a Permit	31	29	22	37	30	111	30
Landings from Active Vessels (pounds)	148,152	63,892	53,483	180,125	126,305	571,957	114,392
Ex-vessel Revenue (1999 dollars)	$106,670	$67,087	$74,342	$322,424	$186,932	$757,455	$151,491
Average revenue per active vessel in a given year	$3,441	$2,313	$3,379	$8,714	$6,231	$1,365	$5,050

In any one year during the period 1996 to 2000 anywhere from 22 to 37 vessels that caught rock shrimp would not qualify for a permit (Table 25). Once this measure is implemented, it is expected that the average annual loss of revenue for these non-qualifying vessels would not exceed $151,491 (1999 dollars) in the first year (Table 25). This estimate was calculated based on the assumption that these vessels would have harvested 114,392 pounds of rock shrimp on average annually. Also, it is assumed that the remaining vessels in the fishery (the ones that qualify for a limited access permit) will capture these landings. Thus, overall gross revenue to the industry is not expected to decline in the future. Net revenue is expected to increase since there would be a reduction in the level of overcapacity in the industry.

The figures on average loss of revenue per active non-qualifying vessel can be interpreted in two ways. One method estimates the average loss of revenue at $5,050, and was calculated under the assumption that on average only 30 of the non-qualifying vessels would fish in any given year (Table 25).

The other method of calculating the average expected loss per vessel was based on the 111 non-qualifying vessels that landed rock shrimp during the period 1996-2000 (Table 22). However, the majority of the 111 non-qualifying vessels are inactive in any one year (i.e. their landings and revenues are zero). Over the five year period (1996-2000) these 111 vessels generated 571,957 pounds of landings, earning $757,455 in revenue (Table 25). The second estimate of $1,365 per vessel per year is the average expected loss per vessel for all 111 non-qualifiers. Furthermore, the loss in short-term profit would be less than $1,365 per vessel annually when production costs are deducted from this gross revenue figure. Due to the lack of appropriate cost estimates, net revenue losses cannot be calculated.

It is expected that these active vessels would switch to other fisheries in order to make up the lost revenue or absorb this loss into their normal operations in the long-term. Also, some of these non-qualifiers, in particular vessels from North Carolina and South Carolina, could recoup some of their future lost revenue from the intermittent rock shrimp fisheries in the area north of the South Carolina/Georgia state line which will remain an open access area under this proposed action. There have been sporadic small levels of rock shrimp harvest in these states (this data is confidential and cannot be presented separate from the overall landings in the south Atlantic region). Thus, vessels that do not qualify for a limited access permit could fish for rock shrimp off North and South Carolina.

In addition, this measure would exclude vessels that entered the fishery after December 31, 2000. At this time estimates cannot be calculated for 2001 because the data are not complete. The short-term loss in ex-vessel gross revenue to vessels not qualifying for a permit is expected to be higher than $151,491 since it is likely that some of the vessels entering the fishery in 2001 would have some expectation of fishing in the future. The short-term reduction in expected revenue as a result of this regulation would be less than that for the Councils Rejected Option 2, which proposed a cutoff date of December 31, 1999. However, the short-term loss in revenue would be higher than Rejected Option 3 which would allow 311 permits to be issued (130 transferable permits and 181 non transferable permits).

Table 26. Distribution of landings for Active Vessels that would not qualify for a Limited Access Permit.

Landings Category (lb.)	1996	1997	1998	1999	2000	Average	Percentage
0-999	8	17	8	10	10	11	33%
1,000-4,999	10	6	10	13	9	10	31%
5,000-9,999	8	6	4	8	7	7	21%
10,000 and higher	5			6	4	5	15%
Minimum (lb.)	15	2	10	14	5	2	
Maximum (lb.)	13,656	12,518	10,157	13,959	12,577	13,959	

In terms of the distribution of impacts among the vessels that would not qualify, on average 64% of these vessels are expected to experience a short-term decrease in landings of less than 5,000 pounds (5,000 X $1.44 = $7,200), while 15% are expected to experience a decrease in landings of at least 10,000 pounds (Table 26). For the calculation of actual reduction in vessel profit, information on the total trip costs may not be used since the vessel can target penaeid shrimp and other species on the same trip. Allocating these costs to only rock shrimp is difficult as it is unclear what other species were targeted and how the trip length was apportioned between these various species.

Furthermore, this measure would eliminate latent permits. There have been 540 permit holders since the permitting process began in September 1996, and of these 261 have never fished for rock shrimp (Table 22). There is very little information on these permit holders and it is unclear what their future intentions are with respect to fishing for rock shrimp. Table 11 indicates that out of all permit holders, over 300 renewed their permits from previous years. Except for 1997, there were between 33 and 54 new permit holders each year (Table 11).

There are no published studies on the cost and earnings of rock shrimp vessels. In addition, there is little information to document the overall revenue of these rock shrimp vessels from other fisheries. Thus, the overall impact of this measure on vessel profitability cannot be calculated.

There are preliminary indications of overcapacity in the rock shrimp fishery and the penaeid shrimp fishery (NMFS, 2001a). Currently, there is an estimated 15,000 fishing craft in the shrimp fisheries in both the Gulf and south Atlantic (Mike Travis, pers. comm. 2001). The number actually fishing in the south Atlantic is unknown. Under open access management a certain proportion of these vessels could potentially enter the rock shrimp fishery if conditions erode in the penaeid shrimp fishery. This situation would result in further increases in capacity and capitalization in the rock shrimp harvesting sector which would reduce economic benefits to the industry and could force many of the vessels that traditionally fish for rock shrimp to exit the industry.

Two recent studies on the penaeid shrimp fisheries in the Southeast indicated that many vessels in the 60 feet and larger size category are operating on the margin (Funk, 1998; and Henry et al., 2001). The majority of vessels in the rock shrimp fleet are large vessels (>60 feet) that operate in the penaeid shrimp fishery, and it is expected that the average profitability observed in these studies would apply to the rock shrimp fishery. These vessels are limited in their alternative fishing opportunities since they cannot participate in the inshore shrimp fishery and would have to be refitted for other types of fishing further offshore. In addition, they require skilled crew and may not have the same

flexibility to reduce inputs to cut costs. These are some of the adjustments that smaller vessels can make in order to remain economically viable in the fishing industry. Thus, vessels in this fishery are expected to be more vulnerable to the effects of overcapacity and substantial reductions in revenue (Funk, 1998; and Henry et al., 2001).

In certain years rock shrimp harvest makes up at least 50% of the shrimp landings on the East Coast of Florida and therefore is extremely important to the processors and wholesalers on this coast. Vessels that operate primarily on the East coast of Florida and not in the Gulf, and have no intentions of fishing in the Gulf, will be more affected financially by increases in capacity to the extent that they have even fewer options for earning additional revenue.

On the other hand, under the limited access program this future economic option would be forgone for vessels not able to qualify for a limited access permit. The Council had to weigh this potential economic opportunity against the current overcapacity in the rock shrimp fishery that could potentially expand in the future under "open access" management. In the extreme situation where a large number of vessels in the rock shrimp industry are not able to operate profitably, illegal fishing in closed areas could increase. This non-compliant behavior would also depend on the probability of detection and the penalty for the violation.

Compared to open access management, this measure would reduce some of the existing overcapacity, slow the growth of capacity in the future, and thus increase future net benefits to the industry. With the elimination of vessels from the fishery, it is possible that this harvesting effort could shift to other fisheries such as the penaeid shrimp fishery or the calico scallop fishery. The likelihood of this would depend on the abundance and availability of these species during the peak months for rock shrimp.

One of the benefits of a limited access program is that it allows participants to plan for the long-term. Fishermen who qualify for the limited access program are more likely to take advantage of future gains since these long-term benefits are not dissipated by new entrants to the fishery.

In comparison to the other options, this measure would have lower short-term negative economic effects than Rejected Option 2 (a cutoff date of December 31, 1999), and higher short-term loss of revenue than Rejected Option 3 (transferable permits to vessels that fished prior to the control date of 1994 and non-transferable permits to vessels that operated in the fishery during 1996 to 1999).

Given the level of available information, it is not possible to calculate a benefit-cost ratio for this measure and compare it to the rejected options. It is only possible to speculate on a ranking of these options based on the net economic returns in the short/medium term. All of the options considered would result in higher net economic returns compared to the status quo since initially there would be a reduction in overcapacity. In terms of net economic returns to the industry, Rejected Option 2 is expected to produce the highest net economic returns since it would allow fewer vessels to qualify for a limited access permit. Apart from the status quo, Rejected Option 3 is expected to result in the lowest net economic returns to the rock shrimp industry. In fact Rejected Option 3 may not improve upon the status quo in the short and medium term. These conclusions are based on the fact that there is overcapacity in this fishery and the assumption that the relative composition of the fleet in terms of operating efficiency would not differ depending on the option chosen for limited access. That is, the relative proportion of efficient versus inefficient producers would be the same no matter which option was chosen for the limited access program.

Social Impacts

The social impacts of limiting entry in the rock shrimp industry are hard to determine at this time due to the lack of social, cultural, and community data about the industry itself. The last available sociocultural survey of the rock shrimp fishery participants was conducted in 1994 and described some basic demographic characteristics about a small percentage of the permit holders and their vessels in that particular year (See Section 3).

According to NMFS data there were 401 permits issued for harvesting rock shrimp in the year 2000 (Table 9). By limiting entry in this fishery to approximately 168 current permit-holders a large number of permit holders, both active and latent, will be eliminated from the rock shrimp fishery (Table 22). Reducing latent permits and speculative interest in the fishery is one of the management objectives of this Amendment, and this action will achieve that objective.

Current (2001) rock shrimp permit holders reside in a geographical range from Washington state to Rhode Island, and many of the coastal states in between. The number of permits issued to fishermen in each sate varies from year to year as permits are renewed or allowed to lapse.

Action 1 will have disparate impacts on permit holders. The qualifying criteria will essentially reduce the number of potential active participants by 42%. Those participants that will qualify for a limited entry transferable permit are expected to experience positive impacts from this regulatory measure. These fishermen, processors, and dealers will be assured that the rock shrimp fishery will not experience great increases in the number of vessels competing for the same resource. This will increase stability in harvest and the market for rock shrimp (e.g., higher, more stable prices) thereby benefiting those that hold limited entry permits.

Because so little is known about permit holders that are not active in the fishery, and thus do not qualify, it is hard to determine if the above-mentioned benefits may not accrue to active fishermen even without limited entry. It is important to note that the highest number of active participants in the fishery in any one year was 153 in 1996 (Table 9), just slightly less than the number being proposed by this action.

The best available data at this time (landings data primarily from Florida that has been matched with permits data for the fishery) points to three geographical areas that will potentially experience impacts (positive or negative) generated from the proposed measures. Three sets of data, although incomplete, were analyzed to obtain this determination: communities where there are vessel owners that will be ineligible and eligible for limited entry rock shrimp permits, communities listed as the homeports of vessels both eligible and not eligible for the proposed permits, and landings locations/communities where it is predicted, due to past high levels of landings (1998-2000), there will be losses or gains experienced. Except for the area of the Florida Keys/Monroe County, all three datasets pointed to Duval County (Jacksonville, Jacksonville Beach, Atlantic Beach, and Mayport) and Brevard County (Cape Canaveral, Cocoa Beach, and Port Canaveral) as potentially experiencing the most impacts. In the case of Monroe County, neither the owner residence or homeport datasets pointed to Monroe County as an important community area to experience impacts. These communities are listed below in three broad groupings:

1) Communities that will be impacted from a loss of permits in the owner's resident community.

	Number of Vessel Owners – ALL ACTIVE	
	Do Not Qualify	Do Qualify
REGION 1: Duval		
Jacksonville	8	6
Jacksonville Beach	1	1
Atlantic Beach	6	9
Mayport	2	1
REGION 2: Brevard		
Cape Canaveral	1	3
Cocoa/Cocoa Beach	0	7
Port Canaveral	0	0
REGION 3: Monroe		
Key West	5	1
Marathon	0	0

2) Communities that will be impacted from a loss of permits in the boat's homeport community.

	Number of Vessels Homeported – ALL ACTIVE	
	Do Not Qualify	Do Qualify
REGION 1: Duval		
Jacksonville	6	7
Jacksonville Beach	0	0
Atlantic Beach	2	0
Mayport	10	13
REGION 2: Brevard		
Cape Canaveral	3	6
Cocoa/Cocoa Beach	0	1
Port Canaveral	3	12
REGION 3: Monroe		
Key West	4	1
Marathon	1	0

3) Communities that will be impacted by a potential change in landings of rock shrimp.

	Episodes of Landings (Trips) by Vessels, 1998 - 2000	
	Active, Qualified	Active, Not Qualified
Duval County, FL	53	43
Brevard County, FL	210	84
Monroe County, FL	199	247

Boats from the south Atlantic often travel to the Gulf of Mexico to shrimp for both rock shrimp and other shrimp species. It is not known how limiting entry into the south Atlantic rock shrimp fishery will impact the Gulf shrimp fishery. It could be that in years when south Atlantic boats would have fished for rock shrimp in the Atlantic, they will now migrate to the Gulf, increasing pressure on the Gulf stocks and reducing catches overall for the boats there.

The majority of fishermen that have fished for rock shrimp in the past have targeted – and continue to target – white, pink, and brown shrimp. For them, rock shrimp was a supplementary fishery. Fishermen that are no longer eligible to fish for rock shrimp off of Georgia and Florida's east coast will find it difficult to enter other fisheries in the south Atlantic to make up any loss of income. Most fishermen who were not going to be eligible for the limited entry permit explained that they have lost access to other fisheries they had previously participated in as "fall-backs." The two fisheries most often mentioned were the snapper-grouper and king mackerel fisheries (it is unclear how and to what extent they participated in these fisheries).

It was hypothesized that many permit holders that do not meet the qualification threshold may have been holding permits as a back-up option to their current preferred fishery. Interviews with fishermen in this and other fisheries have revealed that one strategy used by fishermen currently is to hold as many permits as they can qualify for at a time in order to be prepared if future regulatory actions threaten to exclude them from one or another fishery. This does not mean they will participate in all the fisheries in which they are permitted, but they believe that this keeps their future options open. However, they can not know if future regulations will require a minimal amount of landings in order to qualify for future participation, or what that amount might be. They are not "speculating" in permits, but simply acting rationally to protect their interests. In the case of rock shrimp, this has actually worked against their interests by artificially inflating the number of potential participants in the fishery.

Conclusion

In formulating this proposed action the Council considered the Rock Shrimp Advisory Panel recommendations; public hearing input; and the biological, economic, and social impacts of this measure and the alternatives. In addition they took into account the guidance under the Magnuson-Stevens Act. Section 303(b)(6) of the Magnuson-Stevens Act specifies that: "Any fishery management plan which is prepared by any Council, or by the Secretary, with respect to any fishery, may --establish a limited access system for the fishery in order to achieve optimum yield if, in developing such system, the Council and the Secretary take into account--

(A) present participation in the fishery,
(B) historical fishing practices in, and dependence on, the fishery,
(C) the economics of the fishery,
(D) the capability of fishing vessels used in the fishery to engage in other fisheries,
(E) the cultural and social framework relevant to the fishery and any affected fishing communities, and
(F) any other relevant considerations;"

This is a small fishery prosecuted within a restricted geographic area that can only accommodate a limited number of vessels on a sustainable basis. The economic dependence of these vessels on rock shrimp was given careful consideration. The Council was of the opinion that if additional vessels entered this fishery many traditional operators could face severe economic losses which could force them to leave the fishery. Many of these vessels traditionally operate in the penaeid shrimp fishery (white, brown, and pink shrimp). The Council weighed the fact that vessels heavily dependent on rock shrimp would not be able to easily transfer all of their revenue earning activities to other fisheries since the penaeid shrimp fishery is already showing signs of over-capacity (NMFS, 2001a).

The Council considered historical participation in the fishery and chose to include fishermen that met the minimum harvest criteria during the period 1996 through 2000. This action will allow vessels that were dependent on the rock shrimp fishery in the last five years (the period permits were required) to remain in the fishery. Vessels that may have entered the fishery in 2001 purely on a speculative basis to obtain a limited access permit would not qualify under these criteria. The Council considered more restrictive options (tougher criteria) but adopted the proposed action in part to "grandfather" active fishermen into the system thereby reducing the short-term economic and social impacts.

Advisory Panel Recommendations

The Rock Shrimp Advisory Panel (AP) proposed the qualifying years as 1996 through 2000 and the threshold criteria of 15,000 pounds in any one year. Vessel permits were first issued in 1996 and the AP was of the opinion that anyone with a serious interest in this fishery would have purchased a permit and fished, during this period, particularly in 1996 which was the year with the highest recorded landings to date. The cutoff date of 1999 was initially chosen by the AP, since many "large" vessels had entered the fishery after 1999, and there were other "large" operators who purchased rock shrimp permits with the intent of entering this fishery in the future if conditions eroded in the fisheries in which they currently participate. The AP suggested using the average landings per trip as a threshold for total annual landings for any vessel to qualify. The AP recommended a threshold of 15,000 pounds because this was the industry average harvest per trip in 1994 for ice boats.

In their opinion this would represent the minimum annual level of landings for a vessel that had an interest in regularly participating in this fishery. The AP were of the opinion that the landings threshold was necessary since there were a number of vessels that entered the fishery in 2000 once they learned that the Council was considering a limited access program. These vessels made one or two tows to obtain a landings record with the intent of qualifying for a limited access permit.

Public Hearing Input

Review of the public hearing comments indicated that there was mixed support for a limited access program in this fishery. Two of the main objections were the fact that vessels that entered the fishery in 2000 would not be allowed to continue to operate in this fishery (proposed in the public hearing draft of the amendment). In addition, there was concern about historical participants who did not fish during the period 1996 to 1999 not being able to enter the fishery in the future. The Council and Advisory Panel took these facts under consideration and extended the qualifying date to December 31, 2000. The preferred option that was taken out to public hearings had a cutoff date of December 31, 1999 (Rejected Option 2).

Historical Participation

The Council considered historical participation in the fishery. Data from the Florida trip ticket program indicated that there were at least 79 vessels that fished prior to the qualifying years that fished during the qualifying period and would be eligible to receive a limited access permit. In addition, the Council gave preference to vessels that fished prior to 1996 in qualifying for the pool of limited access permits not reissued to a vessel (Action 1H). These vessels would not be required to meet the minimum landings criterion but would only have to show proof of landings (e.g., state trip tickets, sales receipts, or tax returns prior to 1996).

Geographic Location of the Limited Access Program

The Council considered the case where for some vessel owners rock shrimp is only a bycatch (in the penaeid shrimp fishery) or caught in small quantities due to limited geographical availability and modified the limited access area to exclude North and South Carolina. Some fishermen traditionally harvest rock shrimp in North Carolina and South Carolina in small quantities but these landings are not sufficient to meet the threshold qualifying criteria for the limited access program. Rock shrimp show up sporadically and are not in abundance off these states and generally are not targeted. There were accounts at the public hearings of rock shrimp as a bycatch in the hopper (brown shrimp) fishery off South Carolina. It is assumed that fishing for rock shrimp off of North and South Carolina would not affect the "core fishery" off Florida, as there is no evidence that these populations are related.

Georgia was included because in certain years prevailing oceanographic current patterns would link the population off of Florida to Georgia. Thus, fishing effort in Georgia could affect the availability off Florida (the core fishery). Restricting the limited access area to Georgia and Florida provides a fair and equitable balance and does not discriminate between residents of different states (National Standard 4 of the Magnuson-Stevens Act).

Rationale for Limited Access

The Council's action to limit access protects both the resource and the fishery. The Council determined the potential economic hardship of allowing overcapacity to increase outweighed reducing the options for new participants to enter this fishery.

The Council took this precautionary approach now instead of waiting until the problem intensified. If the number of vessels were allowed to grow there could be increased economic hardship and it would be more difficult to reduce the level of effort in the fishery. This measure will cap the number of vessels and is expected to slow the rate of growth of effort in this fishery (compared to the status quo), increase compliance with fishery management regulations, and move towards a more sustainable, healthy fishery. However, the Council will monitor this fishery to determine if future actions are necessary to reduce capacity. At some future date it may be necessary to consider other measures to prevent "capital stuffing" (increase in net sizes, vessel length, horse power, and other characteristics that increase vessel capacity) or even actions that could reduce the number of vessels in the rock shrimp fishery, if overcapacity results in undesirable resource and/or economic conditions.

This proposed action would address management objectives 1, 2, and 3 but not to the same extent as Rejected Option 2, particularly with respect to the removal of "speculative interest." However, this option would have less of a negative impact on the current participants in the fishery compared to Rejected Option 2.

Rejected Options for Action 1:

Rejected Option 1. No Action. Do not develop a limited access program for the rock shrimp fishery in the South Atlantic Fishery Management Council's area of jurisdiction.

Biological Impacts

In the absence of a limited access program with more vessels participating in the fishery, and by inference more effort directed at this fishery, it would be expected that catches of juvenile rock shrimp and the discard problem would increase. In addition, this scenario would also increase the level of bycatch in this fishery. Furthermore, there is the risk of increased non-compliance with closed area restrictions (refer to the Economic impacts section for a more detailed discussion of this issue). An increase in the level of illegal trawling within the *Oculina* Bank is of critical concern given the precarious state of *Oculina* coral as indicated in the report from Dr. Chris Koenig (Appendix J).

Economic Impacts

No action would result in further increases in capacity and capitalization in the rock shrimp harvesting sector which would reduce future economic benefits to the industry. Compared to the other options, this open access situation could result in the highest growth rate in capacity and further exacerbate the current overcapacity problem. This conclusion is drawn from the fact that there are many large vessels (>60 feet) in the penaeid shrimp fishery that are currently operating at the margin. These vessels are limited in their alternative fishing opportunities since they cannot participate in the inshore shrimp fishery and would have to be refitted for other types of fishing offshore. In addition, they require skilled crew and have less flexibility in reducing inputs to cut costs (Funk, 1998; and Henry et al., 2001). These are some of the adjustments that smaller vessels can make in order to remain economically viable in the fishing industry.

In the extreme situation, where a large number of vessels in the rock shrimp industry are not able to operate profitably, illegal fishing in closed areas could increase. This non-compliant behavior would also depend on the probability of detection and the penalty for the violation.

Social Impacts

Testimony from those on the Rock Shrimp Advisory Panel pointed to the fact that those who form the "core" of the active rock shrimp fishery are in favor of limiting access to this fishery. These fishermen are concerned about the future viability of the resource and feel that there are far too many outstanding permits that threaten to, if employed, damage the resource and make their own businesses unviable. If all of the currently inactive permit-holders do not begin to fish, then there would be little impact on any group in the fishery. There is little chance that all permit-holders would join the fishery even in years of bountiful harvests, as it is economically unfeasible and unattractive for them to do so. However, if participation does increase over the target number of approximately 150 boats, all participants may experience lowered catches, creating hardship and social stress and conflict in the fishery.

Conclusion

Under this option, overcapitalization and overcapacity would continue to increase in this fishery at the fastest rate. In addition, any gains from current regulatory measures under open access would likely attract new entrants to the fishery and provide incentives for those already in the fishery to increase harvest capacity. The Rock Shrimp Advisory Panel did not support this option. In addition, the Council was concerned that under open access management of the "core" rock shrimp fishery there could be increases in the number of incursions in the *Oculina* Bank closed area. As stated previously this behavior could jeopardize the remaining 20 acres of intact *Oculina* coral left in the world. Increased incursions into closed areas are more likely under open access management because of economic hardship caused by overcapacity, or due to the fact that new entrants who occasionally participate in a fishery tend to be less familiar with the area and also with the current management regulations governing that fishery. The Council determined that this option would not address the rock shrimp management objectives 1, 2, and 3. Therefore, the Council rejected this option.

Rejected Option 2. Establish a limited access program for the rock shrimp fishery prosecuted within the South Atlantic Council's area of jurisdiction, and limit initial eligibility to the owner of a vessel that: (a) has held a valid rock shrimp permit prior to December 31, 1999; and (b) can demonstrate landings of at least 15,000 pounds of rock shrimp in any one year from 1996 through 1999. These vessel owners will be eligible for fully transferable permits.

Biological Impacts

This measure would reduce the level of bycatch in the future if it results in reduced effort in the fishery. In addition, it is expected that there will be improved compliance with current fishery management regulations as the penalties are generally higher in a limited access fishery for federal fishery violations. This is especially important given the precarious state of *Oculina* coral as indicated in the report from Chris Koenig (Appendix J).

Economic Impacts

Updated information from the Florida Department of Environmental Protection, and the States of Georgia and Alabama indicates that a minimum of 153 vessels would qualify for permits in the rock shrimp fishery under this option (Table 27). Vessels qualifying for this limited access permit would benefit from less competition and any future increases in productivity, which would lead to increased gross revenue for these vessels. However, 102 vessels that fished sometime in the four year period (1996 to 1999) that did not meet the 15,000 pound threshold criterion could experience short-term losses in revenue, since they would no longer be able to participate in this fishery (Table 27). In addition, new vessels entering the fishery in 2000 and 2001 would also experience short- term losses in revenue. During 2000, 25 new rock shrimp vessels entered the fishery (Table 13). Thus, under this option a total of 127 vessels that landed rock shrimp during the period 1996-2000 would not qualify for a limited access permit.

Table 27. Number of Vessels that would Qualify for a Rock Shrimp Limited Access Permit Based on Various Threshold Level of Landings from 1996-1999. Number of Vessels with Documented Landings and Total Number of Permitted Vessels that would not Qualify.

Threshold level of landings (pounds)	Number of qualifying vessels	Vessels with landings (1996 to 1999) not qualifying *	Permitted vessels not qualifying**
1	255		285
1,000	223	32	317
5,000	190	65	350
10,000	166	89	374
15,000	153	102	387
25,000	134	121	406
30,000	124	131	416
36,000	115	140	425
40,000	109	146	431
50,000	96	159	444
100,000	63	192	477
200,000	41	214	499
300,000	24	231	516
400,000	12	243	528

* These figures do not include vessels with landings in 2000 and 2001.
** Includes vessels that were issued permits from 1996 to Dec. 2000.

In any one year during the period 1996 to 2000 anywhere from 23 to 46 vessels that caught rock shrimp would not qualify for a permit (Table 28). If this option were to be implemented, the aggregate harvest of these vessels give some indication of the short-term decline in expected landings. The expected annual loss for vessels that would not qualify under this option is at least $527,448 (1999 dollars). In addition, this measure would exclude vessels that entered the fishery after 2000. Thus, the short-term loss of revenue to vessels that would not qualify under this option is expected to exceed $527,448. Under this option the short-term loss of revenue would be for the first year and not for subsequent years, where it is expected that some vessels would adjust to other income earning activities.

Table 28. For Vessels that would not Qualify for a Permit: Number of Active Vessels, Landings, and Ex-vessel Revenue.

	1996	1997	1998	1999	2000	Total 1996-2000	Average 1996-2000
Number of Inactive Permit Holders		300	354	280	281		
Number of Active Vessels not Qualifying for a Permit	33	30	23	46	46	127	36
Total Landings from Active Vessels (lb.)	149,345	68,034	58,186	216,321	1,402,169	1,894,055	378,811
Ex-vessel Revenue (1999 dollars)	$107,529	$71,436	$80,879	$387,215	$1,990,183	$2,637,242	$527,448
Average revenue per vessel	$3,258	$2,381	$3,516	$8,418	$43,265		$14,816

The average expected loss in gross revenue per vessel for the 127 vessels that would not qualify for a limited access permit is $20,765. This was calculated using the total revenue earned by non-qualifiers for the period 1996 to the end of 2000 ($2,637,242). Another approach would be to this calculation is to assume that on average in any given year, 36 non-qualifying vessels would participate in the fishery. The average expected loss of revenue for these vessels would amount to $14,816 (Table 28).

This option would reduce some of the overcapacity, and thus increase future net benefits to the industry. With the elimination of vessels from the fishery, it is possible that this harvesting effort could shift to other fisheries such as the penaeid shrimp fishery or the calico scallop fishery.

Social Impacts

This option is more restrictive than the preferred option as it would exclude boats that began rock shrimping in the year 2000. If adopted, this action would exclude 15 boats that have participated heavily in the fishery. It is unknown what the loss of the fishery would mean to these boats. The other impacts from this measure are the same as in the Council's proposed action.

Conclusion

One of the benefits of a limited access program is that it allows participants to plan for the long-term. Fishermen who qualify for the limited access program are more likely to realize future gains from management actions since these long-term benefits are not dissipated by new entrants to the fishery.

The Rock Shrimp Advisory Panel initially proposed the qualifying years as 1996 through 1999 and the threshold criteria of 15,000 pounds in any one year. Vessel permits were first issued in 1996 and the AP were of the opinion that anyone with a serious interest in this fishery would have purchased a permit and fished particularly in 1996, which was the year with the highest recorded landings to date. The cutoff date of 1999 was chosen since many "large" vessels had entered the fishery after 1999 purely on speculation. This rejected option was the Council's preferred option that was taken out to public hearings.

During the public hearing process, a number of vessel owners who entered the fishery in 2000 expressed the concern that this option would cause severe economic hardship. A number of these new entrants were heavily dependent on the rock shrimp fishery and entered the fishery with the intent of becoming part of the core group in the future.

The Council determined that this option best addresses management objectives 1 (reduce overcapacity), 2 (remove latent permits), and 3 (protect the interest of traditional user groups). The Council and Rock Shrimp AP weighed the large short-term negative economic and social impacts from the exclusion of vessels that entered the fishery in 2000 versus the benefit of better addressing these three management objectives. Both the Council and AP changed their earlier recommendation to include vessels meeting the threshold criteria in 2000 in the limited access program, and the Council rejected this option.

Rejected Option 3. Establish a limited access program for the rock shrimp fishery prosecuted within the South Atlantic Council's area of jurisdiction. A vessel owner who can demonstrate rock shrimp landings prior to the control date of April 4, 1994 will be eligible to receive a fully transferable permit. The owner of a vessel that entered the fishery after the control date with documented rock shrimp landings from 1996 to the end of 1999 will only be eligible for a non-transferable permit.

This option stipulates both transferable and non transferable permits defined as follows:

Transferable Permit - Can be purchased or traded to a new owner.

Non-Transferable Permit - Cannot be transferred or sold to a new owner.

Biological Impacts

This measure would reduce the level of bycatch in the future if it results in reduced effort in the fishery. In addition, there could be some improvement in compliance with current fishery management regulations as the penalties are generally higher in a limited access fishery for federal fishery violations. This is especially important given the precarious state of *Oculina* coral as indicated in the report from Chris Koenig (Appendix J). However, this measure may not provide the same level of protection as the Councils proposed action and Rejected Option 2 since a large number of vessels would qualify for a limited access permit. In fact, this option may only provide a marginal improvement over Rejected Option 1 (no action).

Economic Impacts

Anyone who can demonstrate some level of rock shrimp landings prior to the control date of April 4, 1994 would be eligible to receive a fully transferable permit. It would be difficult to prove whether or not vessels were in the fishery before the control date since federal permitting and record keeping requirements were not put in place before 1996.

Data on rock shrimp landings from the Florida trip ticket program prior to 1995 were provided to calculate the impacts of management options that address fishing in these early years (Table 29). This data set may not account for all of the vessels that participated in this fishery before 1995 since:

1. Reporting area fished was not a requirement,
2. Vessel ID and other vessel information were not required, and
3. Vessels were not required to have permits.

Table 29. Number of Vessels Active in the Rock Shrimp Fishery: Preliminary Data from the Florida Trip Ticket Program. Source: FMRI.

1990	1991	1992	1993	1994	1995	Total Number of Unique Vessels 1990-1994	Total Number of Unique Vessels 1990-1995
40	32	44	46	53	100	130	173

Under this option at least 130 unique vessels would be eligible to receive transferable limited access permits. Of these 130 potential qualifiers, 74 have documented landings during the period 1996 to 1999, and perhaps the rest are no longer in the industry. Thus, at least 74 vessels would receive limited access permits. There were 255 vessels with documented landings from 1996 to 1999. Since 74 of these vessels would receive transferable permits, it is expected that 181 vessels would be eligible to receive non-transferable permits.

This option is perhaps less restrictive in terms of initial participation when compared to the preferred option. In total 311 (130 transferable and 181 non-transferable permits) could be issued. However, for the long-term, this option could prove more restrictive to the industry, since vessels that entered the fishery more recently would only be granted non-transferable permits. Vessels that entered the fishery in 2000 and 2001, and vessels that only fished in 1995, would be excluded from the limited access fishery.

Social Impacts

This action would limit eligibility to historical participants in the fishery and exclude those that have begun recently in the fishery. Many of the historical participants are nearing the age of retirement, and while they might transfer their permit to another fisherman, it may effectively reduce the number of younger participants in the fishery.

This rejected option would unfairly penalize those fishermen who have expended the most recent effort in the fishery. It may also lead to atrophy in the industry itself, as older fishermen are favored over more recent entrants. It also poses problems for determining eligibility, as there was no uniform documentation of landings prior to 1994.

Social impacts from this option would be from two actions: designation of transferable vs. non-transferable permits and the exclusion of those entering the fishery after 1999. Creation of a two-tier system of eligibility in this fishery may lead to conflict and confusion among the fishery's participants. This type of permitting structure was implemented in the region's snapper grouper fishery; however no follow-up studies have been conducted to document how this system has impacted the fishery. Furthermore, this option does not limit sufficiently the number of participants in the fishery and thus does not fulfill the goals of this amendment.

Conclusion

Rock shrimp permit holders who can demonstrate landings prior to the control date of April 4, 1994 would qualify for a fully transferable limited access permit. Those permit holders who can only demonstrate landings after the control date would qualify for a non-transferable limited access permit. This option would initially be less restrictive than the preferred option and was not supported by the Rock Shrimp Advisory Panel because it is likely that there would be too many vessels in the fishery. The Council rejected this option because of the uncertainty of the number of vessels that would qualify to participate in the fishery under this option, and the likelihood that this option would not address the management objectives to the same extent as the proposed management action.

ACTIONS 1A THROUGH 1H ADDRESS IMPLEMENTATION, ADMINISTRATION, AND OPERATION OF THE LIMITED ACCESS PROGRAM PROPOSED IN ACTION 1 OF THIS AMENDMENT.

ACTION 1A. Application for limited access permits must be made within 120 days after publication of the final rule in the Federal Register. The initial assignment of permits will be to qualified vessel owner(s) even if they no longer own the qualifying vessel. Each vessel in the limited access fishery will require a separate limited access permit. Permits will be required 180 days after the publication date of the final rule.

It is expected that the implementation date of the final rule would be the publication date in the Federal Register. Thus, permits would be required 180 days after publication of the final rule. In the public hearing draft of Shrimp Amendment 5, this action stipulated that permits would be required 150 days after the publication date of the final rule, which was modified to 180 days by the Council upon recommendation from the National Marine Fisheries Service.

Biological Impacts

There would be no biological impact from this measure since it would not have a direct effect on the rock shrimp resource, associated bycatch, or habitat because it addresses details of permit issuance.

Economic Impacts

There would be no economic impacts since this 120 day time period allows for potential qualifiers to become aware that a limited access program has been established, and have sufficient time to apply for the limited access permit.

Social Impacts

A period of 120 days to be aware of new regulations should be sufficient time to allow potential entrants to comply with the new program. Giving an additional 60 days to have the permit in place also allows sufficient time. Social impacts from this proposed option should be negligible.

Conclusion

The Council concluded that 180 days provides a reasonable time period for permit holders to become aware of and apply for the limited access permits and for the National Marine Fisheries Service to process these applications. Initially the Council considered a

150 day time frame for this measure, however based on the NMFS recommendation it was modified to 180 days, which would decrease the possibility of NMFS having to implement an additional regulation in the future to process late applicants who are qualified vessel owners.

Assigning permits to the vessel owners will track previous limited access programs established by the South Atlantic Council. Only one permit will be issued to each vessel as requested by the Rock Shrimp Advisory Panel, which is also consistent with standard NMFS permitting procedure. However, more than one owner can qualify on the landings of a single vessel as discussed under Action 1.

Rejected Options for Action 1A:

Rejected Option 1. Application for limited access permits must be made within 90 days after publication of the final rule in the Federal Register. The initial assignment of permits will be to vessel owner(s), and each vessel in the limited access fishery will require a separate limited access permit. Permits will be required 150 days after the publication date of the final rule.

Biological Impacts

There would be no biological impact from this measure since it would not have a direct effect on the rock shrimp resource, associated bycatch, or habitat because it addresses details of permit issuance.

Economic Impacts

There would be no economic impact unless the 90 day time period was too short for potential qualifiers to become aware of the proposed regulation and apply for a limited access permit.

Social Impacts

A period of 90 days to be aware of new regulations would not be sufficient time to allow potential entrants to comply with the new program. Social impacts from this proposed option would be negligible.

Conclusion

The Council was of the opinion that 90 days was not sufficient time for potential qualifiers to become aware of this regulation and apply for a limited access permit. This measure would have increased the possibility that NMFS would have to implement an additional regulation in the future to process late applicants who are qualified vessel owners. Therefore, the Council rejected this option.

Rejected Option 2. Once the final rule is published in the Federal Register, delay implementation of the limited access permitting system until January of the following year. Qualifying permit holders would then have 150 days to apply for a limited access permit.

This option would change the effective date of implementation of the limited access permits established under the other options.

Biological Impacts

There would be no biological impact from this measure since it would not have a direct effect on the rock shrimp resource, associated bycatch, or habitat because it addresses details of permit issuance.

Economic Impacts

This would allow at least 150 days for the public to become aware of the limited access program and take steps to apply for a permit. Compared to the preferred option, it would allow more time for the non-qualifiers to become aware of the new regulation and reduce the level of non-compliance. Also, it would allow the vessels that do not qualify for a limited access permit to complete the fishing year. This additional time would allow these vessels to transition into other revenue generating ventures to compensate for future forgone rock shrimp income. However, it would delay implementation of the rock shrimp limited access program.

Social Impacts

Delaying implementation of the proposed rule until the following year would lessen the impacts upon those in the fishery who do not qualify for the limited entry program. It would allow more of a transition period, which would not have a negative impact on the resource or the fishermen.

Conclusion

This option would allow more time for implementation than the proposed action. This option was not supported by the Rock Shrimp Advisory Panel. Also, without knowing when the amendment would be completed and the final rule published in the Federal Register, there was too much uncertainty as to when the limited access program would go into effect. Therefore, the Council rejected this option.

Rejected Option 3. Application for limited access permits must be made within 6 months after publication of the final rule in the Federal Register. The initial assignment of permits will be to vessel owner(s), and each vessel in the limited access fishery will require a separate limited access permit. Permits will be required 6 months after the publication date of the final rule.

Biological Impacts

There would be no biological impact from this measure since it would not have a direct effect on the rock shrimp resource, associated bycatch, or habitat because it addresses details of permit issuance.

Economic Impacts

This would allow at least 6 months for the public to become aware of the limited access program and take steps to apply for a permit. It allows more time for the qualifiers to become aware of the new regulation and apply for their limited access permit.

Social Impacts

Six months to be aware of new regulations should be sufficient time to allow potential entrants to comply with the new program. Giving this amount of time might allow for some transition period for those already in the fishery but not eligible for the limited entry program. Social impacts from this proposed option should be negligible.

Conclusion

This option is less restrictive than the proposed action, however it would require more time for the program to be implemented which was not supported by the Rock Shrimp Advisory Panel. Therefore, the Council rejected this option.

ACTION 1B. The transfer of rock shrimp catch history from one vessel owner to another will be allowed if a permitted vessel that qualified for a rock shrimp limited access permit is sold or transferred to a new owner prior to publication of the final rule in the Federal Register. Transferred catch histories will only be recognized in total (no partial catch histories will be allowed) and will only be recognized with sale or transfer of the permitted vessel.

If a vessel meets the eligibility criteria to qualify for a transferable limited access permit, and the vessel is sold or transferred, it is the intent of the Council that the original owner retains credit for the landings. The limited access permit will be issued to the original vessel owner unless there is some legal agreement where the catch history is transferred with the vessel to the new owner. If a vessel and a vessel's catch history have been sold or transferred, the individual(s) with documentation supporting their ownership of such catch history will be considered the owner and such landings will be included in qualifying under the Council's proposed action. In addition, the qualifying level of landings will have to come from one calendar year during the qualifying period.

The Council will only consider transferring catch history with the sale/transfer of the qualifying vessel. In the case where a vessel sank prior to either a vessel sale or transfer to a new owner, the catch history could not be sold or transferred to a new owner. However, the original owner could use these landings records to qualify for a limited access permit once he/she owns a vessel that can be attached to the permit.

Biological Impacts

There would be no biological impact from this measure since it would not have a direct effect on the rock shrimp resource, associated bycatch, or habitat because it addresses administrative details concerning the transfer of catch history.

Economic Impacts

If a qualifying vessel owner does not intend to continue operating in this industry, then he/she can transfer the catch history along with the vessel prior to implementation of this program. This legal transaction would reduce the delay in transfer or sale of a rock shrimp vessel, since the new owner could be guaranteed a limited access permit provided the previous owner met all of the qualifying criteria. In addition, this measure would benefit new owners of vessels who would not qualify under the criteria described in Action 1, by providing the opportunity to participate in the limited access fishery. There is likely to be a cost associated with the transfer of catch history, which could be included in the price paid for the vessel. Since this is a voluntary market transaction it is likely that the expected benefits from participation in this fishery at an earlier date and not purchasing a limited access permit on the open market would exceed the costs of purchasing the catch history or else the transaction would not occur.

Social Impacts

Allowing the transferring of catch history with a vessel will help to provide continuity and vitality in the fishery. Fishermen desiring to enter the fishery will have a way in which to do so, and young fishermen will not be negatively impacted. If monetary value is attached to the catch history or the limited entry permit, it may have the effect of over-limiting entry into the fishery. As seen in other fisheries, the demand for permits has driven up their prices and often effectively bars crew and young fishermen from entering or moving up in the fishery. While this may just be seen as an effect of the market economy in this country, it has a negative, long-term social impact on the fishery.

Conclusion

The Council is proposing this procedure based on experience learned during implementation of the Snapper Grouper Limited Access Program. If a qualifying vessel owner does not intend to continue operating in this industry, then he/she can transfer the catch history along with the vessel prior to the implementation of this program. This would reduce the delay in transfer or sale of a rock shrimp vessel if the previous owner met all of the qualifying criteria. It would also allow new participants to enter the fishery. The Rock Shrimp Advisory Panel supported this option.

Rejected Options for Action 1B:

Rejected Option 1. The transfer of catch history from one vessel owner to another will be allowed without the stipulation that the vessel be sold to the new owner of the catch history. Transferred catch histories will only be recognized in total (no partial catch histories will be allowed).

If a vessel meets the chosen eligibility criteria to qualify for a transferable limited access permit, the owner of the qualifying vessel can transfer the catch history through a legal agreement with another owner irrespective of whether the vessel is sold to that person/entity. If a vessel's catch history has been sold or transferred, the individual(s) with documentation supporting their ownership of such catch history would be considered the owner and such landings would be included in qualifying under the Council's proposed action. The original owner of the vessel with the catch history would no longer be able to use these landings to qualify for a limited access permit.

Biological Impacts

There would be no biological impact from this measure since it would not have a direct effect on the rock shrimp resource, associated bycatch, or habitat because it addresses administrative details concerning the transfer of catch history.

Economic Impacts

This is a more flexible system than the proposed measure since it would allow the owner to sell the catch history during the transition period, even if she/he did not want to sell the vessel. The owner may no longer be interested in fishing for rock shrimp but would keep the vessel and use it in any other fishery or sell it to another owner. The owner of the catch history now has the option of purchasing the original vessel to which the catch history was attached or can use another vessel in this fishery.

Social Impacts

The social impacts for this option mirror the economic impacts. This is a more flexible system and works more in favor of the fishery's participants.

Conclusion

This option was not supported by the Rock Shrimp Advisory Panel or the Council. The main reason being there would be an additional administrative burden on the agency to ensure that limited access permits would not be issued to two vessel owners: the owner of the vessel that met the qualification criteria and the owner who purchased the catch history. The decision to allow the transfer of catch history was made in order to protect the interests of vessel owners who purchased a qualifying vessel prior to implementation of the limited access program with the intention of participating in the limited access fishery. Therefore, the Council rejected this option.

Rejected Option 2. Only allow transfer of the rock shrimp qualifying catch histories to legal beneficiaries in the event of death, permanent disability or serious medical condition of the original owner.

Biological Impacts

There would be no biological impact from this measure since it would not have a direct effect on the rock shrimp resource, associated bycatch, or habitat because it addresses administrative details concerning the transfer of catch history.

Economic Impacts

This is the most restrictive of the options under transfer of catch history. Unless they are legal beneficiaries, new vessel owners wanting to enter the rock shrimp fishery would have to wait until the limited access program is in place and then purchase a limited access permit. This delay in entering the fishery would be a cost to the new participant in terms of forgone revenue.

Social Impacts

This very restrictive option would not benefit as many current participants in the fishery as the other options, and thus would have the most negative social impacts.

Conclusion

This option is more restrictive than the proposed action and was not supported by the Rock Shrimp Advisory Panel. Therefore, the Council rejected this option.

ACTION 1C. An Application Oversight Board will be established to assist the NMFS Regional Administrator in handling disputes over eligibility for limited access permits. The board will not evaluate "hardship" applications. There will be a 240-day time limit after the publication date of the final rule in which an individual must appeal to the board.

The board will ensure the criteria for a limited access permit were applied to an owner's application in a proper manner. The board will be made up of the state directors (or designees) from each state in the South Atlantic Council's area of jurisdiction. Each member will provide his/her individual recommendation on each appeal to the NMFS Regional Administrator for final administrative decision. NOAA General Counsel will have an advisory role to board members, and NMFS and Council staff will provide assistance.

The National Marine Fisheries Service recommended that a deadline be set for submission of appeals to avoid a lengthy time period for appeals and to allow the universe of vessels to be known in a timely fashion. The recommendation of 240 days would provide adequate time for the potential qualifier to be notified and prepare the application for the Appeals Board.

Biological Impacts

There would be no biological impact from this measure since it would not have a direct effect on the rock shrimp resource, associated bycatch, or habitat because it addresses administrative details concerning the appeals process.

Economic Impacts

There would be no economic impact from this measure by itself. Economic impacts would depend on the specific action taken by the Appeals Board.

Social Impacts

Not considering hardship will leave at a disadvantage those that truly should qualify for a permit but due to unforeseen circumstances do not under the proposed measures.

Conclusion

Determination of a hardship case is difficult; "where do you draw the line" and it can be considered arbitrary and capricious, which may not meet the mandates of the Magnuson-Stevens Fishery Conservation and Management Act. This structure and procedure tracks that used for the Snapper Grouper Limited Access Program where both the Council and NMFS have considerable experience. This option was supported by the Rock Shrimp Advisory Panel since it would provide enough time for vessel owners from Texas through the Atlantic to become aware of whether their permit application was rejected and have the necessary time to apply to the appeals Board if necessary. The purpose of this oversight board is to ensure that the criteria that the Council sets out are applied correctly by the Regional Administrator.

Rejected Options for Action 1C:

Rejected Option 1. An Application Oversight Board will be established to assist the NMFS Regional Administrator in handling disputes over eligibility for limited access permits. The board will evaluate "hardship" applications.

Biological Impacts

There would be no biological impact from this measure since it would not have a direct effect on the rock shrimp resource, associated bycatch, or habitat because it addresses administrative details concerning the appeals process.

Economic Impacts

There would be no economic impact from this measure by itself. Economic impacts would depend on the specific action taken by the Appeals Board.

Social Impacts

This option would have less negative impacts than the proposed action by having the ability to evaluate hardship cases.

Conclusion

Allowing hardship applications would add considerable complexity to the process and likely result in legal challenges by those individuals that did not receive a favorable response to their hardship appeal. This option was not supported by the Rock Shrimp Advisory Panel. Also, NOAA GC has recommended the Council not address hardship cases. The Board's decisions in evaluating hardship applications could be considered arbitrary and capricious since it would be using subjective criteria to determine whether a limited access permit should be granted to the appellate. Therefore, the Council rejected this option.

Rejected Option 2. There would not be an appeals process.

Biological Impacts

There would be no biological impact from this measure since it would not have a direct effect on the rock shrimp resource, associated bycatch, or habitat because it addresses administrative details concerning the appeals process.

Economic Impacts

There would be no economic impact from this measure directly. However, there could be negative economic effects for those vessels that meet the qualification criteria but are not granted limited access permits due to data errors in the system.

Social Impacts

Having no appeals process would have the negative social impact of not allowing for the correction of human error in the system.

Conclusion

This option would not provide any opportunity for permit holders to appeal a decision on evaluation of their rock shrimp landings records in applying for a limited access permit. This option is more restrictive than the proposed action and was not supported by the Rock Shrimp Advisory Panel. Therefore, the Council rejected this option.

ACTION 1D. Limited access rock shrimp permits can be legally transferred or sold to another person/entity or to a same owner replacement vessel.

The intent of this measure is to allow the owner to sell/transfer the vessel, then he/she should determine the disposition of the permit. Either transfer it to a new owner who purchased the vessel, or retain and sell to someone else.

To another person or entity. There will be a one to one transfer, and the vessel's catch history will be transferred along with the permit to the new owner (such catch histories may be used in the future to qualify for IFQs should Congress allow this as a fishery management option in the future and the Council deems this to be appropriate).

To a replacement vessel. In the case where the owner met the permit qualifying criteria with a vessel that is not currently in the fishery, the limited access permit holder should have a grace period of 24 months after the date the limited access program is put in place to become active in the fishery.

An additional vessel owned by a current rock shrimp permit holder cannot be used in the fishery unless a permit is obtained for this vessel or it is a replacement vessel.

The National Marine Fisheries Service will set up a system to track permit transfers and fees to cover the administrative costs of processing transfers. NMFS shall also collect data on the value of the permit sale/transfer.

Biological Impacts

There would be no biological impact from this measure since it would not have a direct effect on the rock shrimp resource, associated bycatch, or habitat because it deals with administrative details of permit transfers.

Economic Impacts

This measure will allow the permit holder to receive financial compensation for the limited access permit in the event that he/she chooses to utilize the vessel in another fishery. This flexibility will allow the vessel owner to choose the option that provides the highest economic benefits to him/her. There will be a cost to the new entrant into the fishery. The Rock Shrimp Advisory Panel was of the opinion that the resale value of the permit could be in the range of upwards of $10,000. This value would depend on the number of permits on the market and expected profits in this fishery.

The ability to transfer permits is not expected to result in decreased effort in this fishery. As owners opt to leave the fishery it is expected they will be replaced by new entrants. There may be no change in capacity or capacity may increase initially if the new vessels are more efficient than their predecessors. However, capacity is expected to increase at a decreasing rate (in the absence of a limited access program) since the permit cost would reduce the level of revenue available to increase vessel harvesting efficiency or capacity in the short-term.

Social Impacts

If an owner sells his boat but retains the permit, he or she may lose value on the vessel sale since the permit would have added worth to the boat. However, in a limited entry system, permits themselves gain value because of their relative scarcity. If the rock shrimp fishery continues to be a viable fishery, those that want to enter it would have to buy a permit. The cost of the permit then becomes a negative impact on new potential participants in the fishery. Various permits in different regions range in price from $2,500

to $25,000, although the mean is closer to $7,500 (according to various trade journals, such as *National Fisherman.*) This cost may be a barrier to younger fishermen desiring to enter the fishery.

If the permit needs to be transferred to a replacement vessel, then this proposal simplifies the process. The same is true with permit transference to a legal beneficiary. These two instances will have positive social impacts on the owners and beneficiaries of owners.

Conclusion

The industry wanted a transferable rock shrimp permit that could be sold without the stipulation that the vessel had to be sold/transferred along with the permit. This option was supported by the Rock Shrimp Advisory Panel and was proposed based on what the Council learned from implementation of the Snapper Grouper Limited Access Program. Transferability also provides an opportunity for other fishermen to participate in the fishery and would not necessarily expand capacity. The Council could revisit this measure in the future if there are serious problems arising from overcapacity in this fishery.

Rejected Options for Action 1D:

Rejected Option 1. Limited access rock shrimp permits can only be transferred to a new owner with sale or transfer of the vessel to such owner.

Biological Impacts

There would be no biological impact from this measure since it would not have a direct effect on the rock shrimp resource, associated bycatch, or habitat because it deals with administrative details of permit transfers.

Economic Impacts

This option is more restrictive than the preferred option as the permit holder can only sell his/her permit with the vessel. If a permit is transferred to a new owner under this stipulation, there would be no immediate change in capacity in the fishery. In time, the new owner could increase vessel capacity if the conditions in the fishery provide sufficiently high returns. If the owner wanted to leave the rock shrimp industry and utilize the vessel in another fishery, there would be a reduction in the number of vessels in the rock shrimp industry, since that owner could not sell the permit without the attached vessel.

Social Impacts

This option is restrictive and would have the negative impact of not allowing the fishery participants to be reflective of their needs and realities. For example, if a fisherman wants to upgrade his 55' vessel to one that is 65', he could not do so without losing his permit. This option would reduce the viability and flexibility of the industry and result in negative social impacts.

Conclusion

This option is more restrictive than the proposed action and would limit the choices available to qualified participants. It was not supported by the Rock Shrimp Advisory Panel. Therefore, the Council rejected this option.

ACTION 1E. If a limited access rock shrimp permit is "not active" during a 48 month period (four calendar years) it will not be renewed and criteria will be applied to put the permit back in the limited access rock shrimp fishery.

Limited access permitted vessels would have to show documented landings of at least 15,000 pounds of rock shrimp in one out of four calendar years in order to retain this permit. The Council's intent was four calendar years and not a consecutive 48 month period. The Council's proposed definition of an inactive permit is one where the vessel it is attached to has less than 15,000 pounds of rock shrimp landings in a calendar year (Action 1F).

This provision will include vessel owners who are in the process of upgrading their vessel when the limited access system is in place. They will have four calendar years to put the vessel back into the fishery. In the event of death or permanent disability of a permit holder, the beneficiary will have a four year period to either sell the permit or harvest rock shrimp in the south Atlantic EEZ.

Biological Impacts

There would be no biological impact from this measure since it would not have a direct effect on the rock shrimp resource, associated bycatch, or habitat because it deals with the administrative details of permit renewals.

Economic Impacts

It is expected fishermen who are dependent on rock shrimp would participate in this fishery at least once in a four year period. This "use it or lose it clause" prevents the situation where permit holders only retain permits so that their asset value increases. This latter situation could result in lower net benefits to society depending on the future value of the permit versus current harvest value of rock shrimp. Compared to the no action alternative this measure is likely to ensure a more steady supply to the market.

Social Impacts

Members of the AP and other industry representatives indicated they wanted to avoid maintaining the situation as it currently exists in this fishery: many permit holders but fewer people actually fishing, that is, latent permits. They would prefer to have this fishery remain viable and have benefits accrue to those that are serious about their participation. This action is based on a premise similar to that of limiting entry into the fishery. This action specifies that if a permit is not being used, then the permit should be available to someone else who will exercise its use.

A period of 48 months was determined to be a sufficient amount of time to commission and build a new boat, or to fish in other areas (primarily the Gulf of Mexico) without losing one's permit. This gives limited entry permit holders a greater degree of flexibility to manage their businesses as they wish. Furthermore, this option mitigates to a degree the impacts on those who were not able to qualify for the permits when the action is put in place. It would allow historical participants and small producers a chance to re-enter the fishery.

Conclusion

The Council concluded this option provides the necessary level of flexibility for normal operations within the fishery and would ensure a more stable supply of rock shrimp for consumers compared to the no action option. This option was supported by the Rock Shrimp Advisory Panel as it would not force vessels to fish in the rock shrimp fishery if there were better opportunities in other fisheries simply to maintain the limited access permit. Furthermore, they recommended that four years is a long enough time period for vessels that are "serious" participants to operate in the fishery. It would provide sufficient time for vessel owners to replace lost or retired permitted vessels, and to participate in other fisheries that are more financially rewarding. This would also provide enough time for an estate to be settled and transfer of the owner's assets to a beneficiary.

The public hearing draft of Shrimp Amendment 5 had an option where this "use it or lose it clause" would be invoked when the permit was inactive for a 36 month period. The Council modified this option after public input and the Advisory Panel's later recommendation of 48 months.

Rejected Options for Action 1E:

Rejected Option 1. Do not take action if limited access permits are not active.

Biological Impacts

There would be no biological impact from this measure since it would not have a direct effect on the rock shrimp resource, associated bycatch, or habitat because it simply deals with the issue of whether or not a limited access permit would be renewed.

Economic Impacts

This situation would allow permit holders to retain permits so that their asset value increases. The net benefits to society depends on the future value of the permit versus current harvest value of rock shrimp and the level of capacity in the fishery.

Social Impacts

If there is no "penalty" for holding a permit and not fishing it, then the possibility arises that the fishery will be faced with the same situation it now faces: many permits but relatively little activity. Letting a person "sit on" a permit indefinitely would have a negative impact on others that may hope to enter the fishery but cannot find any permits available to them. Taking no action would not address the management objective of eliminating speculation in the industry.

Conclusion

The Council concluded this option would allow inactive permits to continue in the fishery, which could have a negative effect on the supply of rock shrimp to the market. In addition, this option would hinder the entrance of new participants into the fishery who may have more of an interest in fishing for rock shrimp. This option was not supported by the Rock Shrimp Advisory Panel. Therefore, the Council rejected this option.

Rejected Option 2. If a rock shrimp limited access permit is not active for a 24 month period it will not be renewed and criteria will be applied to put the permit back in the limited access rock shrimp fishery.

Biological Impacts

There would be no biological impact from this measure since it would not have a direct effect on the rock shrimp resource, associated bycatch, or habitat because it deals with the administrative details of permit renewals.

Economic Impacts

Compared to the proposed measure, this 24-month use it or lose it clause would place more of a burden on vessel owners to harvest rock shrimp during non-optimal periods when other fisheries may provide higher revenue, especially since the threshold annual landings is set at 15,000 pounds (definition of an inactive permit-Action 1F). However, permit holders are more likely to lose their permit and future revenues from the rock shrimp fishery under this option, which could result in a favorable economic situation for another vessel owner who would be reissued the permit. This latter situation could result in lower net benefits to society depending on the future value of the permit versus current harvest value of rock shrimp. Compared to the no action alternative, this measure would likely result in a more steady supply to the market.

Social Impacts

Comments at public hearings and from the AP pointed to the fact that most vessels now being built usually take two to three years to complete. If one had to use a permit within two years, one could never commission a new vessel to be built to replace a lost or disabled vessel. Other problems discussed would be cases where a fisherman fished in the Gulf of Mexico when the fishing was good there, and then appeared inactive in the south Atlantic. These fishermen would lose their permits while actively fishing in the Gulf, but not in the south Atlantic. This action could result in permit loss for too many participants, and thus have negative social impacts on the fishery.

Conclusion

The Council concluded this option would allow too short a time period for the rock shrimp permit holders to replace or repair vessels. Also, it is more likely to force fishermen to operate at sub-optimal periods in the rock shrimp fishery. At the public hearings, members of the rock shrimp industry indicated that two years would not provide enough time for cases where there are emergencies in the fishery. For example, if a vessel sinks, a two year time period would not be sufficient for it to be replaced by a new vessel. In addition, there are years when other fisheries that the vessel participates in would be more profitable, and this would force vessels to move into the rock shrimp fishery. This option was not supported by the Rock Shrimp Advisory Panel. Therefore, the Council rejected this option.

ACTION 1F. A rock shrimp limited access permit is defined as inactive when the vessel it is attached to has less than 15,000 pounds of documented rock shrimp harvest from the EEZ within the South Atlantic Council's area of jurisdiction in a calendar year.

Landings taken from the limited access area and outside of the limited access area but within the South Atlantic Council's area of jurisdiction (EEZ) can be used to meet this annual landings condition.

Biological Impacts

There would be no biological impact from this measure since it would not have a direct effect on the rock shrimp resource, associated bycatch, or habitat because it deals with administrative details of permit activity.

Economic Impacts

There would be no economic impacts from this option since it only provides a definition for an inactive permit. Economic impacts are tied to Action 1E, the "use it or lose it clause."

Social Impacts

An owner/operator would suffer no repercussions from this action if he or she were not inactive for a time period of four years. As discussed above for Action 1E, this action is also tied to the same qualifying criteria as Action 1 which limits entry into the fishery. As such, it adds procedural consistency to the FMP. If an owner/operator does not have enough landings in four years, he or she will lose that permit. That would have a negative impact on the owner, but it would positively impact another person who would like to have a permit to fish in the fishery.

Conclusion

The option is tied to Action 1E, the "use it or lose it" condition in this fishery. A vessel would need at least 15,000 pounds of rock shrimp landings taken from anywhere within the South Atlantic Council's area of jurisdiction (EEZ)to be considered active in a calendar year. This is the level of landings that was set for the threshold qualifying criteria for the limited access permit (Action 1) and is more restrictive than the rejected options for Action 1F. However, the Council did not want to set the threshold at too low a level in order to ensure that "serious participants" remained in the fishery. This measure was recommended by the Rock Shrimp Advisory Panel.

Rejected Options for Action 1F:

Rejected Option 1. An inactive rock shrimp limited access permit is one that is not attached to a vessel.

Biological Impacts

There would be no biological impact from this measure since it would not have a direct effect on the rock shrimp resource, associated bycatch, or habitat because it deals with administrative details of permit activity.

Economic Impacts

There would be no economic impacts from this option since it only provides a definition for an inactive permit. Economic impacts are tied to Action 1E, the "use it or lose it clause."

Social Impacts

If all permits had to be attached to a vessel, then it would be difficult to sell one's boat, retain the permit, and for example, build another boat. This would go against the intent of Actions 1E and 1F. It would have negative social impacts on those fishermen that are attempting to upgrade or replace their vessel.

Conclusion

This option would define a permit as inactive if it was not attached to a vessel. Thus, a permitted vessel with no landings would be considered "active" in any given calendar year. In combination with Action 1E this could result in latent permits in the fishery and was not supported by the Council or Advisory Panel. If there are a large number of latent permits or permits associated with a low level of landings there could be negative effects on the market supply. Therefore, the Council rejected this option.

Rejected Option 2. A limited access rock shrimp permit is considered inactive when the vessel it is attached to has no documented rock shrimp landings from the EEZ within the South Atlantic Council's area of jurisdiction in a calendar year.

Biological Impacts

There would be no biological impact from this measure since it would not have a direct effect on the rock shrimp resource, associated bycatch, or habitat because it deals with administrative details of permit activity.

Economic Impacts

There would be no economic impacts from this option since it only provides a definition for an inactive permit. Economic impacts are tied to Action 1E, the "use it or lose it clause."

Social Impacts

This option is far too restrictive and would negatively impact many fishermen who have good reasons for not having landed rock shrimp in one calendar year. As discussed above, an owner might wish to have a new vessel built, and the building time frame is at least two years. Another possibility is that an owner may only want to fish for penaeid shrimp for a year while the harvest is good. Simply put, this option would restrict people's options and not allow them to run their business in the best way they know. Therefore, resulting in negative social impacts.

Conclusion

A vessel would need any level of rock shrimp landings taken from anywhere within the South Atlantic Council's area of jurisdiction to be considered active in a calendar year. This would provide more flexibility to fishermen who had permits in this fishery in that they would not have to sustain a high level of landings in one of four years (Action 1E). However, the Council and AP were not in favor of this option as it would still allow participants who are not "serious" about the rock shrimp industry to remain in the fishery

and not allow the opportunity to pass on to other fishermen who may have more of an interest in participating in this industry. Therefore, the Council rejected this option.

ACTION 1G. Rock shrimp limited access permits must be renewed no later than one year after the permit's expiration date. If the limited access permit is not renewed within this time frame then it will not be reissued to that vessel.

Biological Impacts

There would be no biological impact from this measure since it would not have a direct effect on the rock shrimp resource, associated bycatch, or habitat because it deals with administrative details of permit renewal.

Economic Impacts

This time frame set for permit renewal would have no economic impact on the rock shrimp industry since it provides an adequate length of time for a vessel owner to renew his/her permit after it expires.

Social Impacts

This is a reasonable length of time to renew a permit. There should be no social impacts from this action.

Conclusion

This provides sufficient time for a notice to be mailed out to participants and for them to renew their permits. This would also provide sufficient time for the owner to recognize that the permit has expired and take the necessary steps to renew that permit. It should also cover situations where the permit holders are unable to renew permits due to a serious medical condition or personal hardship. The National Marine Fisheries Service recommended this option since this would track the time frame for permit renewals in other Southeast fisheries such as the snapper/grouper fishery.

Rejected Options for Action 1G:

Rejected Option 1. Rock shrimp limited access permits must be renewed within 60 days of the permit's expiration date. If the permit is not renewed within this time frame then it will not be reissued to that vessel.

Biological Impacts

There would be no biological impact from this measure since it would not have a direct effect on the rock shrimp resource, associated bycatch, or habitat because it deals with administrative details of permit renewal.

Economic Impacts

Compared to the Council's proposed action, this 60-day time frame is too short for permit renewal. There are situations where permit holders are at sea for long periods and would be unable to renew their permits. Under this scenario vessel owners would lose their limited access rock shrimp permit which would result in forgone gross revenue. Thus, this option for permit renewal would have a negative economic impact on some vessels in the rock shrimp industry.

Social Impacts

This option does not afford enough time for permit renewal as it does not take into account those fishermen who may migrate up and down the east coast of the United States and into the Gulf of Mexico. Such trips might last for months, during which time it may be difficult to renew one's permit. This option would have the negative social impact of restricting people's options and flushing from the limited entry program those that may be some of the most robust participants.

Conclusion

This option would not provide sufficient time for a notice to be mailed out to participants and for them to renew their permits, and does not track the time frame for permit renewals in other Southeast fisheries such as the snapper/grouper fishery. Therefore, the Council rejected this option.

Rejected Option 2. Rock shrimp limited access permits must be renewed no later than six months after the permit's expiration date. If the permit is not renewed within this time frame it will not be reissued to that vessel.

Biological Impacts

There would be no biological impact from this measure since it would not have a direct effect on the rock shrimp resource, associated bycatch, or habitat because it deals with administrative details of permit renewal.

Economic Impacts

This 6-month time frame may be sufficient for permit renewal. However, the Council's proposed action provides an additional 6 months for permit renewal and is less restrictive than this rejected option. Compared to Rejected Option 1, this option provides a longer time frame for permit renewal, yet there could be situations where some vessel owners would miss this deadline and lose their limited access rock shrimp permit. Thus, this option would have a negative economic impact on some vessels in the rock shrimp industry but not to the same extent as Rejected Option 1.

Social Impacts

This option will have fewer social impacts than Rejected Option 1, as six months is a more reasonable time frame for permit renewal. However, since this industry does experience a great deal of fisherman migration, it may have a negative social impact on those who range long distances to fish and have difficulty renewing permits in a shorter time frame .

Conclusion

This option would not provide sufficient time for a notice to be mailed out to participants and for them to renew their permits, and does not track the time frame for permit renewals in other Southeast fisheries such as the snapper/grouper fishery. Therefore, the Council rejected this option.

ACTION 1H. Rock shrimp limited access permits that did not meet the renewal criteria will be issued to vessel owners randomly selected from a universe comprised of vessel owners with documented landings prior to the qualifying years. Application by vessel owners for random (universe) selection must be filed within one year after publication of the final rule in the Federal Register.

Landings records prior to 1996 could be verified with state trip ticket records. In cases where the states did not have a trip ticket reporting system, verification of individual landings records would have to correspond to the state's dealer reports. If the reports were not verified, then they could not be used to qualify for this universe. The Council's intent is that this would be a one time establishment of the pool or universe.

Biological Impacts

There would be no biological impact from this measure since it would not have a direct effect on the rock shrimp resource, associated bycatch, or habitat because it deals with the administrative details of reissuing permits.

Economic Impacts

This option would provide economic benefits to historical participants who had not qualified for a limited access permit and who were interested in participating in the rock shrimp fishery. Even if recipients had no intention of harvesting rock shrimp, they could sell the permit to other vessel owners and realize some monetary gain. In terms of overall benefits to the industry and to society, this option and others that involved reissuing permits would not increase net benefits if the industry is overcapitalized or there is overcapacity.

Social Impacts

By making available some number of permits to those historical participants, this action serves to mitigate some of the negative social impacts from Action 1. However, it is unknown how many permits might become available from this method of distribution and if it will actually prove to be a true source of permits for the fishery. It is unknown if this method will be in balance or not, with there being a possibility of having more permits than applicants, or vice versa. Overall, it will have a positive social impact on the historical participants in the rock shrimp fishery.

Conclusion

This option would favor those vessel owners that had landings prior to the years used to qualify and was supported by the Rock Shrimp Advisory Panel. Proof of documented landings would have to be verified with the respective state's databases and/or data at the National Marine Fisheries Service. Certain vessel owners who had historically built the fishery and helped establish markets for the product but who did not fish during the qualifying period would have an opportunity for economic gain. This special consideration of the welfare of historical participants meets one of the stipulations under Section 303(b)(6) of the Magnuson–Stevens Act and was deemed "fair" by the Advisory Panel and Council. This action would fulfill, to some extent, the "fair and equitable" provision under National Standard 4 of the Magnuson-Sevens Act (Section 301(a)(4)).

Rejected Options for Action 1H:

Rejected Option 1. Rock shrimp limited access permits that did not meet the renewal criteria will be issued to vessel owners randomly selected from a universe comprised of vessel owners with documented landings outside of the qualifying years. Application by vessel owners for random (universe) selection must be filed within one year after publication of the final rule in the Federal Register.

Biological Impacts

There would be no biological impact from this measure since it would not have a direct effect on the rock shrimp resource, associated bycatch, or habitat because it deals with the administrative details of reissuing permits.

Economic Impacts

This option would provide economic benefits to historical participants who had not qualified for a limited access permit and who were interested in participating in the rock shrimp fishery. Benefits would also accrue to more recent entrants, since the qualifying years did not include 2001, as these new entrants would have an opportunity of being selected to receive a limited access permit. Even new recipients who have no intention of participating could sell the permit to another vessel owner and realize some monetary gain. In terms of overall economic benefits to the industry and to society, this option and others that involve reissuing permits would not increase net benefits if the industry is overcapitalized and or there is overcapacity.

Social Impacts

This option differs from the preferred option only in that fishermen who began to fish in 2001 would also be eligible to receive a permit. As this option is less restrictive than the proposed action, it would have less potential social impacts, but may discriminate in a small way against historical participants by increasing the pool of applicants.

Conclusion

This option would favor those vessel owners that had landings outside of the years used to qualify, including 2001. This option was not supported by the Rock Shrimp Advisory Panel since they indicated the group that should receive preference would be historical participants. Therefore, the Council rejected this option.

Rejected Option 2. Rock shrimp limited access permits that did not meet the renewal criteria will be issued to apprentices or qualified crew on rock shrimp vessels.

Biological Impacts

There would be no biological impact from this measure since it would not have a direct effect on the rock shrimp resource, associated bycatch, or habitat because it deals with the administrative details of reissuing permits.

Economic Impacts

This option would benefit crew and apprentices and provide more availability of crew to this industry. Given the incentives, it would be expected that the productivity of labor should increase. The level of benefits to the crew would depend on whether they are able to purchase vessels and, if so, the gains to be realized in the industry at that time. If

crew cannot raise the capital needed to purchase a vessel for rock shrimping, the benefits would be the value of the permit when sold.

In terms of overall economic benefits to the industry and to society, this option and others that involve reissuing permits would not increase net benefits if the industry is overcapitalized and or there is overcapacity.

Social Impacts

Issuing the permits to apprentices and crew allows for qualified fishermen who desire to enter the fishery to move up in the fishery and keep the fishery vigorous. However, it would still discriminate against historical participants. A better option would be to have crew and apprentices somehow qualify for a different pool of permits, perhaps setting aside 10 percent of the renewal permits for crew, etc.

Conclusion

This option would favor qualified crew and individuals involved in an apprenticeship program. The Rock Shrimp Advisory Panel did not support this option because they were of the opinion that historical participants should receive some advantage under this limited access program. The case for historical participants was presented at the rock shrimp public hearings. Therefore, the Council rejected this option.

Rejected Option 3. Rock shrimp limited access permits that did not meet the renewal criteria will be issued to vessel owners randomly selected from a universe of applicants. Application by vessel owners for random (universe) selection must be filed within one year after publication of the final rule in the Federal Register.

Biological Impacts

There would be no biological impact from this measure since it would not have a direct effect on the rock shrimp resource, associated bycatch, or habitat because it deals with the administrative details of reissuing permits.

Economic Impacts

Anyone who had an interest in entering the rock shrimp industry would be eligible to receive a permit under this option. In terms of overall economic benefits to the industry and to society, this option and others that involve reissuing permits would not increase benefits if the industry is overcapitalized and or there is overcapacity.

Social Impacts

Opening up the pool of permits to anyone who did not qualify under the original criteria is the least restrictive option of all. However, in that it is so liberal, it will not address historical participants and others who have had a stake in the fishery. This would create problems of fairness and equity in the fishery, and not respond to the mandate of the MSFCMA.

Conclusion

This option would not favor any particular group, and was not supported by the Council, since they wanted to give preference to historical participants. Therefore, the Council rejected this option.

Rejected Option 4. Rock shrimp limited access permits that did not meet the renewal criteria will be issued to vessel owners randomly selected from a universe comprised of vessel owners who did not meet the initial eligibility criteria but who can provide evidence of some level of landings. Application by vessel owners for random (universe) selection must be filed within one year after implementation of the final rule.

Biological Impacts

There would be no biological impact from this measure since it would not have a direct effect on the rock shrimp resource, associated bycatch, or habitat because it deals with the administrative details of reissuing permits.

Economic Impacts

This means of issuing permits would provide economic benefits to those individuals that had participated in the fishery and who did not meet the initial qualifying criteria. In terms of overall economic benefits to the industry and to society, this option would not increase benefits if the industry is overcapitalized or there is excess harvesting capacity.

Social Impacts

Opening up the pool of permits to anyone who did not qualify under the original criteria but had some landings is less restrictive than the proposed action. It would address the historical participants in the fishery, but would also allow recent participants (2001) to qualify.

Conclusion

This option would favor those vessel owners that had some level of landings but did not meet the initial requirements used to qualify. This option was not supported by the Rock Shrimp Advisory Panel, since it did not give preference to historical participants. Therefore, the Council rejected this option.

ACTION 2. Require captains operating vessels that are required to have permits to fish for rock shrimp in the South Atlantic Council's area of jurisdiction to have a vessel operator's permit issued by the National Marine Fisheries Service to participate in this fishery. The duration of the permit is to be specified by the National Marine Fisheries Service.

Require that the operator of a commercial vessel obtain an operator's permit issued by the National Marine Fisheries Service to harvest or possess rock shrimp in or from the south Atlantic EEZ. On each federally permitted rock shrimp commercial vessel, there must be on board at least one operator who has been issued a federal operator's permit for the rock shrimp fishery. The federally permitted operator will be held accountable for violations of fishing regulations and also may be subject to a permit sanction. If an operator's permit has been sanctioned for violations in any fishery, during the permit sanction period the individual operator may not work in any capacity aboard a federally permitted fishing vessel. The Council's intent is to require all captains of rock shrimp vessels to have an operator's permit if fishing for rock shrimp regardless of whether they are operating in the limited access area or further north in the South Atlantic Council's area of jurisdiction.

It was suggested by the National Marine Fisheries Service that these operator permits should have a three year duration. No performance or competency testing will be

required to obtain a permit. However, the permit may be revoked for violation of federal rock shrimp regulations as authorized by 15 C.F.R. 904. In that case the sanction period would depend on the penalty schedule.

The federal permit program will have the following requirements:

1. Any operator of a vessel fishing for rock shrimp must have an operator's permit issued by the NMFS Regional Administrator.
2. An operator is defined as the master or other individual on board a vessel who is in charge of that vessel (see 50 CFR 620.2).
3. The operator is required to submit an application, supplied by the Regional Administrator, for an Operator's Permit. The permit will be issued for a period of up to three years.
4. The applicant would provide his/her name, mailing address, telephone number, date of birth, and physical characteristics (height, weight, hair, and eye color) on the application. In addition to this information, the applicant must provide two passport size, color photos.
5. The permit is not transferable.
6. Permit holders would be required to carry their permit aboard the fishing vessel during fishing and off-loading operations and must have it available for inspection upon request by an authorized officer.
7. The Regional Administrator may charge an administrative fee for the operator permit consistent with NOAA guidelines.

The National Marine Fisheries Service has implemented such a program successfully in the NMFS Northeast Region. This ID card is expected to display the operator's personal information (name, date of birth, address, weight, height, and hair color), an unobstructed view of the passport size photo, and be sealed in a transparent pouch showing a hologram and/or secure image to deter counterfeiting.

Biological Impacts

There would be no direct biological impact from this measure, however increased compliance with fisheries management regulations could result in improvements in protection of Essential Fish Habitat (EFH) such as *Oculina* coral.

Economic Impacts

The cost to the agency for setting up this ID card system for operator permits could run up to $10,000 (data provided by the National Marine Fisheries Service). There would also be the cost of issuing and reissuing these permits when they expire. The cost of ID issuance is expected to be similar to that currently charged for most permit categories ($50). Changes or updates to the operator's personal information during the effective period will be accommodated via issuance of a new ID card that would require another fee payment. NMFS recommends that ID cards be issued for a period of three years and thus operators would have to incur the $50 cost every three years.

The proposed action would ensure that vessel operators would be held accountable for federal fishery violations. If there is a permit sanction, that individual may not work in any capacity aboard a federally permitted fishing vessel during the sanction period. Thus, this measure should deter fishery violations. For vessel owners who are not operators this would enhance accountability of the vessel operators they employ and reduce their costs for

fishery violations. For owner/operators this measure would ensure that if convicted of a fishery management violation they could not work as an operator aboard another fishing vessel. Thus, the Council's preferred option is likely to effect higher compliance than the other options considered and rejected.

A reduction in the incidence of fishery management violations is likely to increase net benefits in the long-term from a reduction in enforcement costs, a reduction in the cost of the penalties (as a result of voluntary compliance), and gains from increased compliance with fishery management regulations.

Social Impacts

Members of the industry, mostly boat owners, expressed almost complete agreement with this measure. Currently, if an owner hires a captain who subsequently violates a fishery regulation, the owner is held liable. With this action, the owner would be afforded some protection and the operator could be sanctioned.

While this measure may cause a degree of psychological discomfort at first for the operators of rock shrimp vessels, it will not have any long-term impacts beyond that similar to requiring a driver's license to operate an automobile.

As mentioned under economic impacts, it is likely that compliance with various fishery regulations will be enhanced, as the penalty for noncompliance affects the operator.

One additional positive social impact is that having a database of operators will allow better future calculations of social impacts in the fishery. The public hearing comments also supported this management action.

Conclusion

The rock shrimp industry requested that operator permits be used in this fishery during development of Shrimp Amendment 1 and have a vested interest in having these operator licenses as a requirement. Requiring a vessel operator's permit will provide accountability of operators in complying with regulations and provide a mechanism to remove violators from the fishery. During development of Shrimp Amendment 5 there was further support from the Rock Shrimp Advisory Panel (AP). The AP continually emphasized the need for operator permits in this fishery since many owners do not operate their vessels, and these vessel owners are liable for fishery management violations even if they are not on board the vessel.

The Council reviewed the NMFS decision not to implement operator permits under Shrimp Amendment 1 and concluded the continued violation of the *Oculina* HAPC support use of operator permits. In light of the events of September 11, 2001, the level of fisheries enforcement will likely remain low in the foreseeable future. Improvements to law enforcement and compliance such as operator permits will provide more protection to EFH (e.g. *Oculina* coral).

The Council is proposing this measure as an additional incentive for vessel captains to fish legally and in a manner in which habitat damage is avoided, if they wish to ensure their continued participation in the fishery. This action best addresses rock shrimp management objective 6 (to protect the interest of vessel owners who are not operators with the requirement for operator permits) and management objective 5 (improve enforcement of fishery management regulations). In the long run NMFS will have to deal with the issue of operator permits across all fisheries.

Rejected Options for Action 2:

Rejected Option 1. No Action. Do not require an operator's permit.

Biological Impacts

This option would not increase compliance with current management regulations. Thus, there would be a higher risk of further damage to EFH and EFH-HAPCs compared to the Council's proposed action to require operator's permits.

Economic Impacts

The no action option would not provide an incentive for vessel operators to comply with fishery management regulations, in particular, regulations that restrict fishing in critical habitat areas. On the other hand there would be no administrative cost of setting up the program or fees for operator permits. However, this measure could reduce benefits in the long-term.

Social Impacts

Taking no action on this issue would not address the issues of accountability or enforcement of regulations in the fishery, nor would it help build a better scientific database for future impact assessment and evaluation.

Conclusion

Taking no action would impede facilitating self compliance in the industry. Without the threat of sanctions, including the loss of fishing time or ability to participate in the fishery, some captains will not comply with federal fishing regulations. The no action option is not supported by the Rock Shrimp Advisory Panel. This action would not address rock shrimp management objective 6 (to protect the interest of vessel owners who are not operators with the requirement for operator permits) and management objective 5 (improve compliance with fishery management regulations). Therefore, the Council rejected this option.

Rejected Option 2. Require an operator's permit in the rock shrimp fishery only when the operator is not the permit holder.

This option would include provisions to hold vessel operators who are not owners accountable for federal fishery violations.

Biological Impacts

There would be no direct biological impact from this measure, however increased compliance with fisheries management regulations could result in improvements in Essential Fish Habitat (EFH) such as *Oculina* coral.

Economic Impacts

For vessel owners who are not the vessel operator this would enhance the accountability of vessel operators they employ and reduce the cost of fishery violations. Increased compliance with fishery management is likely to increase net benefits in the long-term. However, this measure will engender less compliance with regulations compared to the preferred option. The latter would ensure that if an owner/operator's vessel permit is sanctioned for a fishery violation that owner cannot obtain an operator's permit and work on another fishing vessel.

Social Impacts

This would not provide for better accountability in the fishery and the process is complicated if law enforcement must determine who is the owner and who is the operator. It would have a benefit to the permit holder who is the operator who would have the burden of additional paperwork lessened.

Conclusion

This option would leave a loophole in that vessel owner/operators whose limited access permits are sanctioned for a fishery violation would be able to work aboard another fishing vessel as an operator. Thus, there was no support from the Rock Shrimp Advisory Panel. This action would address rock shrimp management objective 6 (to protect the interest of vessel owners who are not operators), but would not be as effective as the preferred option in addressing management objective 5 (improve enforcement of fishery management regulations). Therefore, the Council rejected this option.

ACTION 3. Require that the minimum mesh size for a tail bag of a rock shrimp trawl, above the 2 inch rings, be at least 40 meshes of 1 and 7/8 inch stretched mesh at the cod end. This mesh size regulation only applies to the limited access rock shrimp fishery in the South Atlantic Council's area of jurisdiction.

Information from the Rock Shrimp Advisory Panel, and testimony at the public hearings, indicated that there were fishermen who use smaller mesh sizes and instances where smaller mesh liners are used. The Council's intent is that 1 and 7/8 inch stretched mesh (measured on the diagonal) will be the effective mesh size and use of smaller mesh bag liners would not be allowed. The limited access area is the area south of the Georgia/South Carolina line in the South Atlantic Council's area of jurisdiction.

Biological Impacts

The intent of this measure is to reduce bycatch of juvenile shrimp, standardize gear used in the fishery, and increase future yield. However, one major problem is the lack of information on net selectivity for rock shrimp. In addition, no studies are available on the mortality associated with capture and passing through the net. This may be of some concern because of the intense fishing effort concentrated on what the industry describes as a narrow band of suitable rock shrimp habitat and trawling grounds. With the imposition of a minimum mesh size, shrimpers could still cull small shrimp during the spring. At the time Amendment 1 to the shrimp fishery management plan was developed, the rock shrimp fishery utilized between 1 and 7/8" and 2" mesh nets (SAFMC, 1996a). Recent input from the AP indicated that mesh size varies within the industry, and some fishermen utilize smaller mesh bag liners. The Rock Shrimp AP were of the opinion that this mesh size is expected to reduce the catch of smaller shrimp in the 50/60 and 60/70 count (number of shrimp per pound) categories, which are largely unmarketable.

Economic Impacts

With the expected decrease in the bycatch of small, unmarketable shrimp and possible increase in overall yield from allowing recruitment to larger size classes, there could be some increases in revenue. For those vessel owners who had to alter their nets to meet this requirement, there could also be a loss of marketable size shrimp due to

escapement and a corresponding loss of revenue. Even if there is an expected increase in future yield, the net benefits to the industry would depend on the price differential between the different size classes of shrimp. The replacement cost of a 150 mesh by 1 and 7/8 inch cod end could vary from $75 to $80 per unit (these figures were provided by the owner of a gear supply store in Georgia). Vessels are rigged to tow two or four nets, thus the overall replacement costs could either be $150-$160 per vessel or $300-$320 per vessel.

The Advisory Panel offered an opinion that this mesh size would be more effective at allowing the escapement of small, unmarketable shrimp than the 1 and 3/4 inch mesh size. However, the 2 inch mesh size would allow escapement of a much higher proportion of marketable shrimp compared to this proposed mesh size.

The replacement cost for the cod end would be recovered in the future as overall yields increase from allowing recruitment to larger size classes. Also, the time saved due to not having to cull a lot of small, unmarketable shrimp from hauls could translate to more tows per trip. This could possibly increase harvest of larger sized shrimp per trip. Under the assumption that the net replacement cost would be recouped from higher returns, and the AP's recommendation that 1 and 7/8 inches is the optimal mesh size for this fishery, the benefits from this measure would exceed the costs.

Social Impacts

Because the current primary mesh size is 1 and 7/8 inch stretched mesh, there will be little if any social impacts from this action. There may be some short-term impacts to some shrimpers due to costs of refitting and the loss of the benefit of catching smaller shrimp. No one at the public hearings or in telephone conversations was in favor of catching very small shrimp; the opinions expressed were in favor of implementing a minimum mesh size. This action will have the additional positive social impact of reducing conflict between those who catch smaller shrimp and those who see this as a poor fishing practice.

Conclusion

At the Rock Shrimp Advisory Panel Meeting held on August 1 and 2, 2000, some of the panel members indicated that the average size of shrimp declined significantly in recent years. However, if these small shrimp make up the bulk of the landings, and there is a high enough demand for this product, then dealers will purchase these shrimp and market the final product. It appeared that the price was high enough to justify this practice in the past.

Also, there were reports from the Advisory Panel of dead, discarded juvenile shrimp caught multiple times by other vessels. Subsequently, the industry realized that to sustain higher profits in the future measures were needed to reduce bycatch of juvenile shrimp and increase the catch of larger shrimp. The recommendation from the Advisory Panel was to allow the escapement of very small shrimp by using 1 and 7/8 inch stretched mesh in trawls. Shrimp escaping them could be caught in one to two months time at a larger size and command higher prices. They recommended this option to the Council at the March 2001 joint AP/Council meeting. In addition there was support for this measure during the public hearing process.

Information from the South Atlantic Rock Shrimp Advisory Panel indicated that there was a marked difference in the rock shrimp catch composition of two vessels towing nets with different mesh sizes in the same location. The vessel using 1 and 7/8 inch stretched mesh managed to avoid a large proportion of the smaller, unmarketable shrimp (50/60 count) as opposed to the other vessel using nets where the cod end mesh size was 1 and 5/8 inch stretched mesh.

This action will reduce discards and reduce the bycatch of unmarketable, small rock shrimp, and would address rock shrimp management objective 4 (decrease fishing mortality on umarketable small/juvenile rock shrimp).

Rejected Options for Action 3:

Rejected Option 1. No Action. Do not specify a minimum mesh size.

Biological Impacts

The discards and bycatch of smaller rock shrimp would continue.

Economic Impacts

There would be no cost to vessels owners from modifying their nets to meet this requirement. However, this option would not result in increased yield and returns to the fishery.

Social Impacts

This proposed measure would fail to heed the request of the industry and also fail to codify and set a standard for appropriate gear. There is concern in the industry that too many very small shrimp are being caught and that this might endanger the size of catches later in the season. There are also some fishermen that target small rock shrimp by putting a bag liner inside the cod end of the bag. This practice is seen by many shrimpers to be detrimental to the stock of shrimp. Taking no action will not address any conflict derived from fishermen catching smaller shrimp and those opposed to this practice.

Conclusion

This option would not address the problem of discards and bycatch of smaller rock shrimp. The no action option was not supported by the Rock Shrimp Advisory Panel since it would not address rock shrimp management objective 4 (decrease fishing mortality on small rock shrimp). Therefore, the Council rejected this option.

Rejected Option 2. Require that the minimum mesh size for a tail bag of a rock shrimp trawl, above the 2 inch rings, be at least 40 meshes of 1 and 3/4 inch stretched mesh at the cod end. This mesh size regulation only applies to the limited access rock shrimp fishery in the South Atlantic Council's area of jurisdiction.

Biological Impacts

This measure could result in increased catch of juvenile rock shrimp as compared to the Council's proposed action.

Economic Impacts

There would be a cost for gear replacement for nets constructed of smaller mesh sizes which could either be $150-$160 per vessel or $300-$320 per vessel. However, this option may not increase future yield in the fishery to the same extent as the preferred option but would reduce losses from escapement of small marketable shrimp in the short-term.

Social Impacts

While there is not a great size difference between 1 and 7/8 mesh and 1 and 3/4 inch mesh, there may be some impacts from costs of refitting and also from the diminished catch

of smaller shrimp. These impacts would occur in the short-term however. This action would have a positive impact by reducing conflict among some fishermen over what may be sometimes seen as poor fishing practices.

Conclusion

This option would allow use of a smaller mesh size and was not supported by the Rock Shrimp Advisory Panel, since it would not address rock shrimp management objective 4 (decrease fishing mortality on small rock shrimp) to the same extent as the proposed action. Therefore, the Council rejected this option.

Rejected Option 3. Require that the minimum mesh size for a tail bag of a rock shrimp trawl, above the 2 inch rings, be at least 40 meshes of 2 inch stretched mesh at the cod end. This mesh size regulation only applies to the limited access rock shrimp fishery in the South Atlantic Council's area of jurisdiction.

Biological Impacts

This option would provide for more escapement of smaller rock shrimp.

Economic Impacts

The Rock Shrimp Advisory Panel was of the opinion that this would allow too large a proportion of the rock shrimp catch to escape including sizes that are readily marketable. There would be a cost for gear replacement for nets constructed of smaller mesh sizes which could either be $150-$160 per vessel or $300-$320 per vessel. Compared to the preferred option, this measure would entail a greater loss of revenue from escapement of marketable shrimp. At the time Amendment 1 to the Shrimp Plan was developed it was estimated that a 2 inch minimum mesh size could result in a small increase in future yields given the industry standard mesh sizes at that time. However, information from the AP indicated that use of this mesh size would result in high losses of marketable shrimp. As a result, the net benefits of this option would be less than the proposed action.

Social Impacts

If the mesh size increases to 2 inches, there will be a loss in the amount of smaller shrimp that may be harvested. While this may bode well for the escapement of the smaller rock shrimp, it may have a negative social impact on the industry by reducing revenues from the sale of smaller grades of shrimp. Reduced revenue may lead to other social impacts such as decreasing crew size.

Conclusion

This option would require use of a larger mesh size than proposed by the Advisory Panel. Even though it would address management objective 4 in terms of reducing the mortality of juvenile shrimp it may be at too high a cost for the industry, and was not supported by the Rock Shrimp Advisory Panel. Therefore, the Council rejected this option.

ACTION 4. Any vessel fishing with a limited access rock shrimp permit in the South Atlantic Council's area of jurisdiction will be required to use an approved vessel monitoring system (VMS), which shall not exceed $1,200 for equipment and installation. Annual communication costs should not exceed $500, except annual communication costs may go up to $800 if NMFS determines that additional communication is necessary.

The Public Hearing Draft of Shrimp Amendment 5 contained an estimate of $2,500 for purchase and installation of the VMS system. The Council modified this to $1,200 based on new information on the cost of VMS systems that would meet the requirements of an approved system.

For a person aboard a fishing vessel with a limited access rock shrimp permit to fish for rock shrimp in the EEZ in South Atlantic Council's area of jurisdiction, possess rock shrimp in or from the South Atlantic Council's EEZ, off-load rock shrimp from the South Atlantic Council's EEZ, or sell rock shrimp in or from the South Atlantic Council's EEZ, an approved vessel monitoring system must be on board the vessel, be in operational condition, and be turned on.

It is the Council's intent that for trips on which the vessel enters the *Oculina* Bank, no rock shrimp may be possessed on board the vessel. Further, when such vessels are fishing within the limited access rock shrimp area, the VMS unit should be turned on 100% of the time.

The cost of the system and installation on the vessel would be paid for by the individual/business involved up to a maximum of $1,200 for equipment and installation. Information collected will be maintained as confidential information. The data will be provided to NMFS and the individual/business involved. This information will be used for data collection and enforcement. Council staff and members will be provided access to such data under existing guidelines concerning access to confidential data. The coverage level is to be 100%.

It is the Council's intent to allow the Secretary of Commerce as much flexibility as possible in establishing the operational characteristics of the VMS unit to be implemented in the rock shrimp fishery under the total cost considerations specified in the amendment. Additional details about specific units are to be resolved by NMFS and a list of approved units will be published in the Federal Register.

Biological Impacts

To the extent enforcement is increased and trawling in the *Oculina* Bank HAPC is eliminated, there will be corresponding benefits in terms of protecting *Oculina* coral, habitat, and juvenile rock shrimp. This could lead to increased biological productivity. There is an urgent need to implement this measure for increased protection of the *Oculina* coral habitat. A recently completed research survey of the area concluded that there are only 20 areas of *Oculina* left intact in the world (Appendix J).

Economic Impacts

The initial cost to vessel owners could range up to $1,200 for purchase and installation of an appropriate vessel monitoring system. There would be a maximum cost of $800 per year in communications cost, and additional operating and repair costs. Under the proposed limited access program (Action 1) at least 168 vessels would qualify for a limited access rock shrimp permit (Table 22) and will be required to use VMS. There would be a one time cost of up to $201,600 ($1,200 x 168). This cost would occur every seven years assuming the VMS units on these vessels are replaced once every seven years. In addition, there would be communication costs of between $84,000 (168 x 500) and $134,000 (168 x 800) annually. No information is available on maintenance costs.

This measure will increase the probability of detection of fisheries violations and improve enforcement of regulations to protect habitat. Thus, it is expected that economic benefits in this fishery and other fisheries would increase in the future from a reduction in cost due to reduced damage to essential fish habitat. Given the fact that there are only 20 acres of *Oculina* coral habitat left intact in the world, the nonuse benefits of this resource is expected to be high. Another benefit accrues in the form of more and better information to owners with respect to the activity of their vessels and captain/crew. This information should allow the owner to make better hiring decisions (who are the "good" captains) and better decisions about where/when to fish in the future. It is expected that the incremental benefits from this measure should exceed the cost to the industry from implementation of this vessel monitoring program.

Social Impacts

The characteristic independence of fishermen may be threatened by this action. However, VMS is in use in other fisheries in the United States and seemingly with little negative social impact. There will be a positive impact from improved enforcement, and this will lessen suspicions and tensions between fishermen, as it will make all participants in the fishery subject to the same regulations and sanctions. As one fisherman stated, he will no longer have to worry about others breaking the law for financial gain while he remains honest but poor. There will also be an indirect but important benefit to society at large by attempting to assure the existence of the last beds of *Oculina* corals. The use of VMS in this fishery will help to assure the continued existence of the *Oculina* corals, which are unique and threatened by numerous anthropogenic activities. One such activity is illegal trawling through these coral banks. As there are approximately 20 acres of this coral left in the

world, more vigorous enforcement of the borders of the *Oculina* HAPC through means such as VMS will have a positive impact on the entire ecosystem including the people.

Conclusion

The Council concluded use of an approved vessel monitoring system is necessary to protect essential fish habitat and essential fish habitat areas of particular concern, especially *Oculina* coral. Use of rock shrimp trawls can result in damage to bottom habitat as emphasized in the recent report presented to the Council on the habitat damage within the *Oculina* Bank from illegal trawling (Appendix J). Having rock shrimp vessels carrying an approved VMS unit will improve compliance and allow the industry to demonstrate they are not fishing in any closed areas.

Public hearing attendees did raise the issue of the confidentiality of the VMS data and the additional operational and fixed cost from the use of VMS systems. These data will be treated in the same way as all confidential data that the National Marine Fisheries Service collects and analyzes. Only personnel who are allowed to review confidential information will be given access to this data, and data deemed confidential cannot be released to the public.

This proposed action best addresses management objective 5 (improve enforcement of fishery management regulations) particularly with regard to illegal fishing in the *Oculina* Bank HAPC. Currently, there is a low probability of detection of fishing in the *Oculina* Bank HAPC given the distance from shore and the frequency of Coast Guard patrols in this area.

The U.S. Coast Guard and the NMFS Division of Law Enforcement are faced with increased and more complex fishery management regulations to enforce. At the same time these agencies have to cope with dwindling assets and law enforcement personnel, as budgets do not keep pace with these requirements.

This technology will significantly improve the detection of fishery violations in this closed area. The Council deliberated extensively on this issue, as well as the cost to the industry and other concerns expressed by fishermen opposed to the use of VMS. The Council concluded that improvement in enforceability of "closed area" regulations would outweigh these concerns and voted to recommend this action.

Rejected Options for Action 4:

Rejected Option 1. No Action. Do not require use of an approved vessel monitoring system (VMS).

Biological Impacts

There would be no potential for increased biological productivity through increased enforcement and protection of essential fish habitat. There is an urgent need to implement a VMS requirement in this fishery for increased protection of the *Oculina* coral habitat. A recently completed research survey of the area concluded that there are only 20 areas of *Oculina* left intact in the world (Appendix J).

Economic Impacts

Vessel owners would not incur costs for purchasing and maintaining vessel monitoring systems in this fishery. However, this situation would not increase compliance with fishery management regulations in closed areas, and would forgo any economic benefits that could result from additional protection of essential fish habitat and habitat

areas of particular concern. This measure would not reduce the costs of enforcement of closed areas.

Social Impacts

There are striking problems in the rock shrimp fishery related to actual and perceived fishing by trawlers in closed areas off the east coast of Florida. This has led to distrust both among rock shrimp fishermen and participants in other fisheries prosecuted in federal waters. Taking no action to rectify some of this distrust will have negative impacts among the rock shrimp fishery and other fisheries in the area. Not requiring the use of VMS to more effectively and efficiently enforce the boundaries of the *Oculina* HAPC would have a negative social impact on society at large, as there is a real risk the remaining 20 acres of *Oculina* coral could be eliminated, thus depriving society of their existence and possible other values.

Conclusion

The no action option could result in damage to bottom habitat in the *Oculina* Bank area. This option would not address management objective 5 (improve enforcement of fishery management regulations particularly with regard to illegal fishing in the *Oculina* Bank HAPC). This option could lead to the destruction and loss of the last 20 acres of *Oculina* coral. Therefore, the Council rejected this option.

Rejected Option 2. Any vessel fishing with a limited access rock shrimp permit in the South Atlantic Council's area of jurisdiction will be required to use a vessel monitoring system (VMS).

This option would apply only to vessels with limited access permits fishing for rock shrimp in the South Atlantic Council's area of jurisdiction. This differs from the proposed action in that no limit is set on the cost of a VMS system. In addition, there are no specific criteria of performance that the system must meet as required in the Council's proposed action.

Biological Impacts

To the extent enforcement is increased and trawling in the *Oculina* Bank HAPC is eliminated, there will be corresponding benefits in terms of protecting *Oculina* coral, habitat, and juvenile rock shrimp. This could lead to increased biological productivity. There is an urgent need to implement a VMS requirement in this fishery for increased protection of the *Oculina* coral habitat. A recently completed research survey of the area concluded that there are only 20 areas of *Oculina* left intact in the world (Appendix J).

Economic Impacts

The initial cost to vessel owners would depend on the system purchased. There would also be an increase in variable costs to operate, repair, and maintain this system. It is expected that there would be increased economic benefits in the future from better compliance with fishery management regulations on closed areas. However, the system purchased may not provide the same level of protection as the proposed measure if the VMS unit purchased did not meet the minimum standards outlined for the proposed measure. Thus the benefits from this option may be lower than the Council's preferred option.

Social Impacts

The characteristic independence of fishermen may be threatened by this action, especially with no cap on the potential costs of the system. However, VMS is in use in other fisheries in the United States with seemingly little negative impact. There will be a positive social impact from improved enforcement, and this will lessen suspicions and tensions between fishermen in this and other fisheries prosecuted near closed areas.

Conclusion

The Council concluded use of an approved vessel monitoring system is necessary to protect essential fish habitat especially *Oculina* coral. Use of rock shrimp trawls can result in damage to bottom habitat. Having rock shrimp vessels carrying a VMS unit will allow the industry to demonstrate they are not fishing in any closed areas. The Council's preferred action provides more details about the VMS unit and limits the costs to fishermen. Rejected Option 2 would address management objective 5 (improve enforcement of fishery management regulations particularly with regard to illegal fishing in the *Oculina* Bank HAPC) but may not provide the same level of protection as the proposed measure if the VMS unit purchased did not meet the minimum standards outlined for the proposed measure. Therefore, the Council rejected this option.

Rejected Option 3. Any vessel with a south Atlantic limited access rock shrimp permit where the owner/operator had a resource violation during the past three years will be required to use a vessel monitoring system.

This option would apply only to vessels with limited access permits fishing for rock shrimp in the South Atlantic Council's area of jurisdiction.

Biological Impacts

To the extent enforcement is increased and trawling in the *Oculina* Bank HAPC is eliminated, there will be corresponding benefits in terms of protecting *Oculina* coral, habitat, and juvenile rock shrimp. This could lead to increased biological productivity. There is an urgent need to implement a VMS requirement in this fishery for increased protection of the *Oculina* coral habitat. A recently completed research survey of the area concluded that there are only 20 areas of *Oculina* left intact in the world (Appendix J).

Economic Impacts

This would only apply to select vessels based on their past history. There would be an initial cost for purchase of an appropriate vessel monitoring system and would depend on the VMS unit required. There would also be an increase in variable costs to operate, repair, and maintain this system. Vessel owners who had no previous violations would not have to incur these costs. There would be increased economic benefits in the future from better compliance with fishery management regulations on closed areas. However, these benefits would be lower than the Council's proposed measure as only a portion of the fleet would be monitored while fishing in close proximity to closed areas.

Social Impacts

This option could be seen as an additional penalty for a violation that the owner/operator has presumably paid for in the past. Thus, this proposed measure is a social action that could be construed as unfair. By only requiring those who have had a past

resource violation to use a vessel monitoring system, this measure would not address the issues of distrust and conflict in the fishery, nor would it increase compliance to the same extent as the Council's proposed action. Furthermore, a history of past violations or compliance is not a reliable predictor for future behaviors, hence the *Oculina* HAPC would still be vulnerable to future incursions, having a negative impact on society at large.

Conclusion

The Council concluded use of an approved vessel monitoring system is necessary to protect essential fish habitat. This option would address management objective 5 (improve enforcement of fishery management regulations particularly with regard to illegal fishing in the *Oculina* Bank HAPC), but would not provide the same level of compliance as the Council's preferred option. Therefore, the Council rejected this option.

C. Unavoidable Adverse Effects

This amendment would apply to the rock shrimp fishery prosecuted within the South Atlantic Council's area of jurisdiction. The following summarizes the short-term losses, which will be mitigated by long-term gains (refer to Section 4B for a detailed discussion of these impacts and 4H for the impact on small businesses):

ACTION 1. Establish a limited access program for the rock shrimp fishery prosecuted within the South Atlantic Council's area of jurisdiction south of the Georgia/South Carolina state line. There will be a decrease in the number of vessels fishing for rock shrimp. The short-term loss of revenue to vessels that would not qualify for a limited access permit is estimated to be $151,491 for the first year. It is expected that vessels would mitigate these losses in the future by switching to other revenue earning activities. This measure would reduce overcapacity in this fishery and slow the growth of capacity in the future, thereby increasing overall economic benefits to the rock shrimp industry.

ACTION 2. Require captains operating vessels to fish for rock shrimp in the South Atlantic Council's area of jurisdiction to have a vessel operator's permit. The expected cost is $50 for issue and renewal of an operator permit which would expire in three years. This measure would improve compliance with fishery management regulations.

ACTION 3. Require that the minimum mesh size for a tail bag of a rock shrimp trawl, above the 2 inch rings, be at least 40 meshes of 1 and 7/8 inch stretched mesh at the cod end. There would be a cost to replace nets for some fishermen who are currently using a smaller mesh size. The cost of replacing this gear could vary anywhere from $150 to $320 per vessel. However, this measure could potentially increase yield in the fishery and future benefits to the industry.

ACTION 4. Any vessel fishing with a limited access rock shrimp permit in the South Atlantic Council's area of jurisdiction will be required to use an approved vessel monitoring system (VMS). There would be a one time cost of up to $201,600 for VMS units which is expected to occur every seven years. In addition, there would be communication costs of between $84,000 and $134,000 annually and annual maintenance costs of these units. These cost figures are aggregate estimates for all vessels that qualify for a limited access

permit. This measure would improve compliance with fishery management regulations to protect essential fish habitat and is likely to increase net benefits in the long-term.

D. Relationship of Short-term Uses and Long-term Productivity

The limited access program would change the way in which fishermen think about the rock shrimp resource. It will provide an incentive for long-term planning and voluntary compliance will increase. This fundamental change in behavior, combined with the other measures proposed, will help to improve the fishery for rock shrimp. In the short-term, those vessels not qualifying for a limited access rock shrimp permit will lose on average $151,491 in the first year. Vessels that entered the fishery after December 31, 2000 will not be eligible to receive a limited access permit under the Council's preferred option.

The requirement for operator's permits and VMS will increase the cost to the industry, however these measures will improve compliance with fishery management regulations. The mesh size stipulation will increase costs for some vessel owners, however, this measure would also increase yield in the rock shrimp fishery. The Council weighed the short-term impacts upon the fishery against the long-term productivity and stability of this fishery and concluded that the proposed actions would result in net benefits to society.

E. Irreversible and Irretrievable Commitments of Resources

There are no irreversible or irretrievable commitments of resources.

F. Effects of the Fishery on the Environment

Damage to Ocean and Coastal Habitats

The proposed actions are expected to have a positive effect on ocean and coastal habitats. Limiting the number of vessels, specifying a minimum mesh size, and requiring a vessel monitoring system will limit trawl damage to essential fish habitat and reduce bycatch.

Public Health and Safety

The proposed actions, and their alternatives, are not expected to have any substantial adverse impact on public health or safety. Requiring use of VMS will increase vessel safety.

Endangered Species and Marine Mammals

The proposed actions, and their alternatives, are not expected to adversely affect any endangered or threatened species or marine mammal populations. A Section 7 consultation was reinitiated for the southeastern shrimp fishery and the updated Endangered Species Act Biological Opinion is included in Appendix F of Shrimp Amendment 1 (SAFMC, 1996a). Additional information on endangered and threaten species is contained in Section 3.0, Subsection H under Turtle Interactions and TEDs; in Section 7.0, Subsection C; and in Appendix E (Biological Evaluation).

Cumulative Effects

The proposed actions, and their alternatives, are not expected to result in cumulative adverse effects that could have a substantial impact on the rock shrimp resource or any related stocks, including sea turtles. In fact, the proposed measures may improve status of stocks and will reduce fishery related habitat damage.

G. 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.

Costs associated with this specific action include:

Council costs of document preparation, meetings, public hearings, and information dissemination	$100,000
NMFS administrative costs of document preparation, meetings and review	$25,000
NMFS law enforcement costs	
Permit Costs NMFS Administrative Costs	$10,000
TOTAL	$135,000+

H. Initial Regulatory Flexibility Analysis- Effects on Small Businesses

The Regulatory Flexibility Act requires an assessment of the economic impacts of proposed actions on small entities. It provides for certifying that a proposed rule would not have a significant economic impact on a substantial number of small entities if the factual basis for the certification is provided. If a certification cannot be made, an initial regulatory flexibility analysis (IRFA) must be prepared. The IRFA, using information from the analysis of the economic impacts of the various alternatives contained in the document should demonstrate that::

- Reasonable alternatives from among which to select a proposal are identified.
- The proposal selected reflects a wise choice from among reasonable alternatives.
- Managers have fair warning whether their proposal will generate loud complaint.
- The proposal competes well against other social goals, regardless of legislative mandates, in light of other administration priorities.
- The proposal will move rapidly through the regulatory process at OMB and SBA's Office of Advocacy.
- The proposal is likely to withstand legal challenge.

The definition of a "small entity" is taken from Part 121 of Title 13, Code of Federal Regulation (CFR), which classifies businesses by SIC code as small or large. The established size standards are as follows:

- Any fish harvesting business is a small entity if it is independently owned and operated and not dominant in its field of operation and if it has annual gross receipts not in excess of $3.0 million.

All of the commercial entities harvesting rock shrimp affected by the proposed management actions 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 rock shrimp harvesting industry being affected by the proposed rule will be met. Evaluation of whether a proposed rule will result in a "significant impact" is less clear. Recent guidelines provided by the National Marine Fisheries Service recommends that the criteria of profitability and disproportionality be used in this determination (NMFS, 2000):

1. Disproportionality. A comparison must be made of the effect of the proposed rule on small and large entities.
2. Profitability. The analysis should focus on the short and medium-term effect on profits of small entities.

Disproportionality

The industry is composed entirely of small businesses (harvesters and fish houses). Since no large businesses are involved, there are no disproportional small versus large business effects. However, among the small entities in this fishery there is a degree of heterogeneity in terms of size of firms (size is defined as the number of harvesting platforms owned) and by the size of individual vessels. There is a need to identify the different tiers within the industry to determine if there are differential impacts on one class of small entities as opposed to another. From the analyses presented in Section 4B there are differences in size (vessel length and horsepower) among the vessels that would be affected by these regulations (Table 23 and 24).

Profitability

For purposes of the Regulatory Flexibility Act, this measure would impact small business entities. The impacts of the preferred option for Action 1 would at least affect 111 active vessels, which could experience some short-term loss in revenue. The average loss in gross revenue per vessel is expected to be no greater than $1,365 annually in the short-term. However, it is expected that some of these vessels will mitigate this loss by participating in other fisheries. In addition, vessels that entered the fishery in 2001 would experience higher losses in average revenue. Refer to Section 4B for the details of these analyses. At this time it is not possible to calculate the impact on vessel profitability of this preferred option since information is not available regarding the economic dependence of these vessels on the rock shrimp fishery.

In the extreme case there is the possibility that this measure could result in a few vessels being forced of out business if they cannot make up the forgone revenue in other fisheries. This situation would be more likely for Rejected Option 2, which proposed a cutoff date of 1999 and would exclude all vessels that entered the fishery in 2000. The Council had to weigh this risk against the likelihood that the no action alternative could result in increased overcapacity in the future which could force some of the "core" firms, that are more dependent on rock shrimp, out of business in the future. Rejected Option 3 may not reduce the level of capacity in this fishery in the near term and also could result in negative economic effects on the "core" rock shrimp industry.

Actions 1A to 1H would only apply to those vessels that meet the criteria for a limited access permit and remain in the fishery after the limited access program is implemented. If the preferred option in Action 1 is chosen this could potentially affect 168 vessels. It is

expected that proposed Actions 1A to 1H would only have a minimal effect on the short-term revenue of vessels that qualify and apply for a limited access permit.

The requirement for operator permits (Action 2) would increase the costs to vessel owners only if the owner is the operator. This cost is expected to be around $50, and permits should be valid for three years. This action is unlikely to substantially reduce firm level profitability.

Action 3 could increase cost to some vessel owners whose gear do not meet the minimum mesh size regulation. The gear replacement cost is expected to vary between $75 and $80 per net ($150 to $320 per vessel).

Action 4 would impose a one time cost for a vessel monitoring system that is likely no greater than $1,200 per vessel. In addition, there would be some level of maintenance costs, and no more than $800 per vessel per year in annual communication costs. Thus, this measure will decrease short-term profitability. It is expected that future gains in the fishery would offset these short-term costs to small entities.

Given the fact that there could be some impact on the short-term profits of commercial rock shrimp vessels that do not qualify for a limited access permit, increased costs for vessels that participate in the rock shrimp limited access fishery from the requirements for operator permits, vessel monitoring systems and the stipulation on the cod end minimum mesh size, this proposed rule is likely to have a significant impact on a substantial number of small business entities. Therefore, an Initial Regulatory Flexibility Analysis (IRFA) is required.

The full details of the economic analyses conducted for the proposed rule are contained in the RIR under the heading "Economic Impacts" in Section 4B. 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. This plan amendment addresses the following requirements: (1) The need for limited access permits for those vessels that meet the qualification criteria and make up the "core" rock shrimp fishery. The industry representatives (Rock Shrimp Advisory Panel) recommended that the Council consider a limited access program to avoid a situation where the current overcapacity problem is exacerbated and thus increase the risk of the firms that are dependent on rock shrimp going out of business. There are also a number of terms and conditions that govern this limited access fishery that are contained in Actions 1A to 1H;

(2) There is a need to improve compliance with the current management regulations in this fishery. Action 2 (requirement for operator permits) and Action 4 (requirement for the use of VMS) seek to address this objective. The Rock Shrimp Advisory Panel requested operator's permits to protect their interests since many owners do not operate their own vessels, and this measure would allow them to hire captains who are likely to be more compliant with fishery regulations. Vessel owners are also liable for any fishery violations even if they are not on board the vessel during the period when the infraction occurs. There have been a number of instances of illegal fishing in an important closed fishing area, the *Oculina* Bank HAPC, by vessels in this rock shrimp fishery. Given the dwindling law enforcement resources for patrolling these areas, which are several miles offshore, the Council recommended that vessels in this fishery be required to use approved vessel monitoring systems (VMS) since they regularly operate in close proximity to the *Oculina* Bank. There is an urgent need to implement this measure for increased protection of the

Oculina coral habitat. A recently completed research survey of the area concluded that there are only 20 areas of *Oculina* left intact in the world (Appendix J). To the extent enforcement is increased and trawling in the *Oculina* Bank HAPC is eliminated, there will be corresponding benefits in terms of protecting *Oculina* coral, habitat, and juvenile rock shrimp. Another benefit accrues in the form of more and better information to owners with respect to the activity of their vessels and captain/crew. This information should allow the owner to make better hiring decisions (who are the "good" captains) and better decisions about where/when to fish in the future.

Action 1 would also increase compliance with management regulations since firms that qualify for the limited access program would benefit from future resource improvements, and the penalties are higher for fishery violations in a limited access fishery compared to an open access fishery; and

(3) The industry expressed the need to reduce the level of harvest of juvenile rock shrimp caught and discarded and recommended that a minimum mesh size regulation would be one way to achieve this goal. The Council adopted the recommendation from the industry of the "optimal" gear modification to address this issue which is expected to lead to increased future benefits to the industry.

Statement of the objectives of, and legal basis for, the proposed rule: The following objectives are a part of these actions: (1) To reduce overcapacity in this fishery; (2) To improve compliance with fishery management regulations including those regulations that protect essential fish habitat and habitat areas of particular concern; and (3) To reduce the harvest and subsequent discarding of juvenile rock shrimp. 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 of the rock shrimp permit holders, which can vary from year to year (Table 9). In any given year there is at least 400 permits issued for rock shrimp. Since the permitting process began in 1996 at least 540 different vessels have been permitted in this fishery. Not all of these vessels have participated in the fishery. From 1996 to 2000 at least 279 different vessels have been active for at least one year.

The measures in this proposed rule could have an impact on all of these vessels or a subset. The fishery has been divided into 4 different groups: 1) vessels that will qualify for limited entry (168); 2) vessels that have been active (through 2000) but will not qualify (111); 3) permitted vessels that have never been active in this fishery; and 4) vessels that first entered the fishery in 2001 that will not qualify for a limited access permit.

The rule is likely to negatively affect 111 vessels that had landings during the period 1996 to 2000 and an unknown number of vessels that fished in 2001. In addition, costs for all vessels in the rock shrimp fishery will be affected by the requirement for operator permits. Vessels that qualify for the limited access permit would face higher costs for the purchase and operation of the VMS system. In addition, some of these limited access permit holders would face higher costs for gear modifications. This actual number of vessels that currently use smaller mesh trawl gear is unknown. The rule will affect all latent permit holders since they will be excluded from the fishery.

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 require a vessel monitoring system to enforce closed areas to rock shrimp vessels. Compliance will be monitored through a vessel monitoring system to be established by the National Marine Fisheries Service and the U.S. Coast Guard. 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 4B, for each proposed action there is a section on the rejected options. The economic impacts are calculated and/or described for each alternative and included in that assessment is an analysis of the economic impact on small entities. Additional alternatives are included in Appendices B, C, and D. The following discussion provides the rationale for the Council's choice of each proposed action in comparison to the alternatives considered for that action item:

1. **Preferred Action 1** would result in lesser impacts ($151,491 vs $527,448) than Rejected Option 2. The Rock Shrimp Advisory Panel also supported this action. Given the possibility of continued entry of new vessels into the fishery and an exacerbation of the current overcapacity problem, the no action option is unacceptable. Rejected Option 3 would only enable those who entered the fishery after April 4, 1994 to obtain non-transferable permits. This option is too restrictive on recent participants and was not supported by industry representatives. Also, it is likely that this option would not reduce the initial level of overcapacity in the fishery. Based on the objectives of the FMP and the issues being addressed, preferred Action 1 is superior over the rejected alternatives.

2. **Preferred Action 2** would result in higher costs than the no action option (Rejected Option 1) since it would require an operator's permit estimated to cost $50 that would be valid for three years. The Rock Shrimp Advisory Panel recommended operator's permits to assist in reducing the cost of penalties to the industry from federal fishery management violations. It is expected that this procedure will improve compliance with fisheries management regulations. Even though Rejected Option 2 (only requires an operator's permit for captains who do not own the vessel they operate) would result in a lower cost to the industry, the Council wanted to eliminate the possibility that a vessel owner who had a vessel permit sanction for a federal fishery violation would obtain an operator's permit and work on board another rock shrimp vessel. Thus Action 2 was the best option over the rejected alternatives.

3. **Preferred Action 3** would result in gear replacement costs for those vessels that utilize trawl nets with a smaller mesh size. Compared to the no action option, this

measure would impose a cost on the industry. However, the Advisory Panel was of the opinion that the replacement cost for the cod end would be recovered in the future as overall yields increase from allowing recruitment of small shrimp that escape to larger size classes. Also, the time saved due to not having to cull a lot of small, unmarketable shrimp from hauls could translate to more tows per trip. In comparison to Rejected Options 3 and 4, the Advisory Panel offered an opinion that the recommended mesh size would be more effective at allowing the escapement of small, unmarketable shrimp than the 1 and 3/4 inch mesh size. However, the 2 inch mesh size would allow escapement of a much higher proportion of marketable shrimp compared to this proposed mesh size. Under the assumption that the net replacement cost would be recouped from higher returns, and the AP's recommendation that 1 and 7/8 inches is the optimal mesh size for this fishery, this proposed action is superior to the alternatives considered.

4. **Preferred Action 4** would likely result in higher costs than Rejected Option 3 (only vessels with a past fishery violation would be required to use VMS as opposed to all vessels for the Council's preferred action). The Council concluded use of an approved vessel monitoring system is necessary to protect essential fish habitat and essential fish habitat areas of particular concern. Use of rock shrimp trawls can result in damage to bottom habitat as emphasized in the recent report presented to the Council on the habitat damage within the *Oculina* Bank from illegal trawling (Appendix J). The latest report indicates that there are only 20 acres of *Oculina* coral left intact in this area and in the world. Having rock shrimp vessels carrying an approved VMS unit will improve compliance and allow the industry to demonstrate they are not fishing in any closed areas. Currently, there is a low probability of detection of fishing in the *Oculina* Bank HAPC given the distance from shore and the frequency of Coast Guard patrols in this area. This technology will significantly improve the detection of fishery violations in this closed area. Thus, this option is superior to the no action option and Rejected Option 3. Rejected Option 3 would only provide coverage for some vessels in the industry and would not be as effective as the preferred alternative in improving compliance. In comparison to Rejected Option 2, the Council decided that the VMS system requirements should be specified to ensure that the system utilized would provide good surveillance of vessel activities. In this respect the preferred alternative is better than Rejected Option 2. Also, the Council's preferred action sets a cap on industry cost for purchase of the VMS unit and annual communication cost. From the above discussion the Council's proposed action was superior to the alternatives considered.

I. Research Needs

The following research needs are listed in no particular priority order:

1. Recruitment processes and life history strategy for rock shrimp.

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 laboratory experiments to test effects of ecological variables are particularly desirable.

4. Reproductive cycle.

5. Seasonal movements.

6. Habitat preferences. Basic ecological questions concerning physiological ecology, refuges and foraging habits, trophic dynamics, and community relationships remain largely unanswered.

7. Basic physiology of rock shrimp, biogeography, and systematics.

8. Estimate potential yield.

9. Document economic and social information of fishermen, dealers and processors.

10. Identification of the extent of existing bottom habitat suitable for rock shrimp in the South Atlantic Council's area of jurisdiction.

11. Bycatch characterization of the rock shrimp fishery.

12. Additional fishery management related items include: a study on cost and earnings in this fishery, where information can be gathered to determine:
    - The firm size and structure.
    - Costs and Revenue from all fisheries that the vessel prosecutes.
    - Information to determine how effort would shift into other fisheries and what criteria are most important in determining this shift.
    - The profit levels at which vessels are likely to exit the industry.

5.0 LIST OF PREPARERS

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The following individuals and agencies helped during development of this document by providing assistance with state and federal landings data:

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Rick Minkler, NMFS SEFSC Pascagoula Laboratory provided a compilation of historical research identifying rock shrimp distribution and bycatch.

John Reed, Harbor Branch Institute provided published and unpublished data for preparation of coral and hard bottom distribution maps presented in this document.

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6.0 LIST OF AGENCIES AND ORGANIZATIONS

Responsible Agency:

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List of Agencies, Organizations, and Persons Consulted:

SAFMC Law Enforcement Advisory Panel
SAFMC Rock Shrimp Advisory Panel
SAFMC Habitat Advisory Panel
SAFMC Scientific and Statistical Committee
North Carolina Coastal Zone Management Program
South Carolina Coastal Zone Management Program
Georgia Coastal Zone Management Program
Florida Coastal Zone Management Program
Florida Fish and Wildlife Conservation Commission
Florida Marine Fisheries Institute
Georgia Department of Natural Resources
South Carolina Department of Natural Resources
North Carolina Department of Environment, Health, and Natural Resources
National Marine Fisheries Service
- Washington Office
- Office of Ecology and Conservation
- Southeast Region
- Southeast Fisheries Science Center

United States Coast Guard
United States Environmental Protection Agency, Region IV
Center for Marine Conservation
National Fisheries Institute
Florida Sea Grant

7.0 APPLICABLE LAW

A. Vessel Safety

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 amendment to the Shrimp Fishery Management Plan. Therefore, no management adjustments for fishery access will be provided.

There are no fishery conditions, management measures, or regulations contained in this amendment which would result in the loss of harvesting opportunity because of crew and vessel safety effects of adverse weather or ocean conditions. No concerns have been raised by people engaged in the fishery or the Coast Guard that the proposed management measures directly or indirectly pose a hazard to crew or vessel safety under adverse weather or ocean conditions. Therefore, there are no procedures for making management adjustments in this amendment due to vessel safety problems because no person will be precluded from a fair or equitable harvesting opportunity by the management measures set forth. There are no procedures proposed to monitor, evaluate, and report on the effects of management measures on vessel or crew safety under adverse weather or ocean conditions.

Implementation of management measures which incorporate use of vessel transponders will enhance vessel safety in the fishery. The Coast Guard will have almost immediate information on exact location of a vessel in distress, thereby reducing search and rescue time.

B. Coastal Zone Consistency

Section 307(c)(1) of the Federal Coastal Zone Management Act of 1972 requires that all federal activities which directly affect the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable. While it is the goal of the Council to have complementary management measures with those of the states, federal and state administrative procedures vary and regulatory changes are unlikely to be fully instituted at the same time. Based upon the assessment of this amendment's impacts in previous sections, the Council concluded this amendment is an improvement to the federal management for rock shrimp.

This amendment is consistent with the Coastal Zone Management Plan of the States of Florida, Georgia, South Carolina, and North Carolina to the maximum extent possible.

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

C. Endangered Species and Marine Mammal Acts

The proposed actions are not expected to have any anticipated adverse impact on any endangered or threatened species or marine mammal population. A Section 7 consultation was conducted for the original fishery management plan and it was determined the fishery management plan was not likely to jeopardize the continued existence of threatened or endangered animals or result in the destruction or adverse modification of habitat that may be critical to those species. A Section 7 consultation for the shrimp fishery was reinitiated on November 15, 1994 by the NMFS Southeast Regional Office. An updated biological assessment which determines if the southeastern shrimp fishery is having a negative impact on threatened or endangered species or marine mammals, was prepared and is included in Appendix F in Shrimp Amendment 1 (SAFMC, 1996a). Compliance with the prohibition of rock shrimp trawling east of 80° W. longitude between 28° 30' N. latitude and 27° 30' N. latitude in depths less than 100 fathoms eliminated even the chance rock shrimp trawlers will encounter or impact endangered or threatened species or marine mammals in the closed area.

The Sustainable Fisheries Act of 1996 established certain requirements and standards the Councils and Secretary must meet in managing fisheries under the Magnuson-Stevens Act. Implementing the provisions in this amendment will not have any negative impacts on the listed and endangered species under the Endangered Species Act (ESA) and Marine Mammals Protection Act (MMPA).

Whales:	Date Listed
(1) Northern right whale- Eubalaena glacialis (ENDANGERED) (Critical Habitat Designated)	12/2/70
(2) Humpback whale- *Magaptera novaeangliae* (ENDANGERED)	12/2/70
(3) Fin whale- *Balaenoptera physalus* (ENDANGERED)	12/2/70
(4) Sei whale- *Balaenoptera borealis* (ENDANGERED)	12/2/70
(5) Sperm whale- *Physeter macrocephalus* (ENDANGERED)	12/2/70
(6) Blue whale- *Balaenoptera musculus* (ENDANGERED)	12/2/70

Sea Turtles:	Date Listed
(1) Kemp's ridley turtle- *Lepidochelys kempii* (ENDANGERED)	12/2/70
(2) Leatherback turtle- *Dermochelys coriacea* (ENDANGERED)	6/2/70
(3) Hawksbill turtle- *Eretmochelys imbricata* (ENDANGERED)	6/2/70
(4) Green turtle- *Chelonia mydas* (THREATENED/ENDANGERED)	7/28/78
(5) Loggerhead turtle- *Caretta caretta* (THREATENED)	7/28/78

Fish:	Date Listed
(1) Shortnose sturgeon- *Acipenser brevirostrum* (ENDANGERED)	3/11/67

Seagrasses:	Date Listed
(1) Johnson's seagrass- *Halophilia johnsonii* (THREATENED) (Critical Habitat Designated)	9/14/98

Species Proposed for Listing

None.

Designated Critical Habitat
Right Whale: Between 31°15' N. Latitude (approximately the mouth of the Altamaha River, Georgia) and 30°15' N. Latitude (approximately Jacksonville Beach, Florida) from the coast out to 15 nautical miles offshore; the coastal waters between 30°15' N. Latitude and 28°00' N. (approximately Sebastain Inlet, Florida) from the coast out to 5 miles.

Proposed Critical Habitat
None.

Candidate Species- Fish
Dusky shark- *Carachahinus obscrurus*
Sand Tiger Shark- *Odontaspis taurus*
Night Tiger- *Carachahinus signatus*
Atlantic sturgeon- *Acipenser oxyrhynchus oxyrhynchus*
Mangrove rivulus- *Rivulus mamoratus*
Opposum pipefish- *Microphis barchyurus lineatus*
Key silverside- *Menidia conchorum*
Goliath grouper- *Epinephelus itajara*
Speckled hind- *Epinephelus drummondhayi*
Warsaw grouper- *Epinephelus nigritus*
Nassau grouper- *Epinephelus striatus*

Other Species Under U.S. Fish and Wildlife Service Jurisdiction:	Date Listed
(1) West Indian manatee- *Trichechus manatus* (ENDANGERED)	3/67
(Critical Habitat Designated)	1976
(2) American crocodile - *Crocodulus acutus* (ENDANGERED)	9/75
(Critical Habitat Designated)	12/79

D. Paperwork Reduction Act

The purpose of the Paperwork Reduction Act is to control paperwork requirements imposed on the public by the federal government. The authority to manage information collection and record keeping requirements is vested with the Director of the Office of Management and Budget. This authority encompasses establishment of guidelines and policies, approval of information collection requests, and reduction of paperwork burdens and duplications.

The Council is proposing measures under this amendment that will establish a license limitation program, require operator permits, set a minimum mesh size for nets, and require the use of VMS. These measures also require that NMFS collect value information of permit transfers once the license limitation program is implemented. These measures were proposed and continue to be strongly supported by industry.

E. Federalism

No federalism issues have been identified relative to the actions proposed in this amendment and associated regulations. The affected states have been closely involved in developing the proposed management measures and the principal state officials responsible for fisheries management in their respective states have not expressed federalism related opposition to adoption of this amendment.

F. National Environmental Policy Act

The discussion of the need for this amendment, proposed actions and alternatives, and their environmental impacts are contained in Sections 1.0 and 2.0 of this Amendment/Final Supplemental Environmental Impact Statement. A description of the affected environment is contained in Section 3.0.

The proposed amendment is a major action having significant impact on the quality of the marine or human environment of the south Atlantic. The proposed actions will have positive impacts by limiting the number of vessels in the fishery and enhancing protection of coral resources and essential bottom habitat from the requirements for operator permits and VMS.

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

The proposed regulations will further protect the limited deepwater *Oculina* coral resources by restricting the number of permits in the fishery and requiring the use of VMS, which will limit the impact of potentially damaging bottom tending trawl gear used by the fishery. Implementation of these regulations will better achieve the objectives of this amendment, the Coral fisheries management plan, and the fishery management plan for Snapper Grouper, by lessening the negative environmental impacts from the rock shrimp fishery on protected and essential bottom habitat. Overall, the benefits to the nation resulting from implementation of this amendment are greater than management costs.

The Council's preferred action is to establish a limited access program for rock shrimp. Additional actions in this amendment require a vessel monitoring system, require an operator's permit, and establishes minimum trawl mesh size. Section 4.0 describes the Council's management measures in detail.

Section 1508.27 of the CEQ Regulations list 13 points to be considered in determining whether or not impacts are significant. 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.

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 and summarized in Section 2.0. Impacts associated with the proposed limited access program, the requirement for operator permits and VMS, and the stipulation of a minimum mesh size were described under Section 4B. The requirement for VMS and operator permits would enhance protection of the *Oculina* Bank HAPC, and these benefits are not quantifiable. Beneficial impacts of a reduction in excess capacity, reduced harvest of juvenile shrimp, improved compliance with fishery management regulations, and increased protection of *Oculina* coral are unquantifiable. The

benefits and adverse impacts discussed in Section 4.0 are significant under the Regulatory Flexibility Act but not under E.O. 12866.

Public Health or Safety

The proposed actions are not expected to have any significant adverse impact on public health or safety.

Unique Characteristics

The proposed actions are expected to have a positive impact on unique characteristics of the area such as proximity to historic or cultural resources, park lands, wetlands or ecologically critical areas. The fishery, as presently prosecuted, does occasionally significantly impact the live bottom habitat that is essential to the reef species under Council management. Regulations within the existing *Oculina* Bank HAPC will be strengthened with the VMS and operator's permit requirements reducing the possible interaction of the bottom tending gear and the fragile *Oculina* coral resource.

Controversial Effects

The proposed actions are not expected to have significant controversial effects. The Council has provided for extensive input by the public through committee and council meetings, by holding scoping meetings, conducting public hearings, and by providing the opportunity for interested persons to provide written comments. During development of this amendment the Council has incorporated suggestions from the public, and this final document addresses all comments and suggestions received.

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. Benefits from management cannot be quantified but the direction and relative magnitude are known and are positive. If the proposed actions were not implemented there would be a high level of uncertainty as to the future status of the species being managed.

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.

Relationship/Cumulative Impact

The proposed actions are not expected to have any significant cumulative negative impacts that could have a substantial effect on the rock shrimp resource or any related stocks, including sea turtles. In fact, the proposed measures will improve the status of impacted deepwater coral resources and reduce habitat damage inflicted by bottom tending trawls.

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.

Endangered/Threatened Impacts

The proposed actions are not expected to have any significant effects on any endangered or threatened species or marine mammal population. A Section 7 consultation for the shrimp fishery was reinitiated on November 15, 1994 by the NMFS Southeast Regional Office. An updated biological assessment which determines if the southeastern shrimp fishery is having a negative impact on threatened or endangered species or marine mammals, was prepared and is included in Appendix F of Shrimp Amendment 1 (SAFMC, 1996a).

Interaction With Existing Laws for Habitat Protection

The proposed actions are expected to have a positive interaction with existing Federal requirements imposed for the protection of the environment. The management action will enhance existing federal regulations protecting all stony corals, including *Oculina*, and live/hard bottom habitat.

The Council has also adopted a number of positions that protect the habitat supporting managed shrimp resources. These positions are contained in the South Atlantic Coral Amendment 2 (SAFMC, 1994b) and the SFA Comprehensive Habitat Amendment (SAFMC, 1998a). The proposed measures will minimize habitat damage east of 80° W. longitude between 28° 30' N. latitude and 27° 30' N. latitude in depths less than 100 fathoms. Additional habitat protection will be provided in the existing *Oculina* HAPC and experimental closed area.

Effects of the Fishery on the Environment

Section 3.0 Affected Environment discusses rock shrimp habitat and coral habitat impacted by bottom tending trawls used in the rock shrimp fishery. Section 4.0 Environmental Consequences, Subsection F presents information on the impacts of the proposed action and alternatives on the environment. The Council evaluated the effects of the fishery on the environment and concluded that the fishery, as prosecuted does impact *Oculina* coral and live/hard bottom habitat including the *Oculina* Bank HAPC. The implementation of the management measures proposed under this amendment will aid in reducing to the maximum extent practicable the impact of the fishery on the protected coral and live bottom resources.

Bycatch

Section 3.0 Affected Environment, Subsection H, discusses species associated with rock shrimp habitat as well as *Oculina* coral habitat. Table 4 in Section 3.0, presents a list of finfish species associated with *Oculina* coral habitat and more specifically with the *Oculina* Bank HAPC.

No directed research has been conducted to quantify bycatch associated with the Atlantic coast rock shrimp fishery. As a proxy for such information, data on catch associated with high concentrations of rock shrimp caught in historic finfish and shrimp research trawling conducted between 1956 and 1991 in the South Atlantic bight was observed. Appendix A identifies catch associated with high or harvestable catches of rock shrimp.

The Council has requested NMFS conduct a characterization of bycatch in the rock shrimp fishery. NMFS intends to devote 100 vessel observer days in the rock shrimp fishery. In addition, the Council is proposing to implement a minimum mesh size to address bycatch.

Effort Directed at or From Other Fisheries

The limited access proposal could result in the exclusion of vessels that have recently entered the fishery and those that cannot meet the landings threshold criteria. There is a possibility that these vessels would increase effort targeted at the penaeid shrimp fishery. In particular vessels that entered the fishery after 2000. However, this measure would reduce the likelihood of increased effort in the rock shrimp fishery from vessels participating in other fisheries when regulations in those fisheries restrict participation.

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9.0 PUBLIC HEARINGS AND SCOPING MEETINGS - LOCATIONS AND DATES

During development of Amendment 1 to the SAFMC Shrimp Plan (Rock Shrimp Management), public scoping meetings were held on September 23, 1992 in Cocoa Beach, Florida; on September 24, 1992 in Jacksonville Beach, Florida; on February 9, 1994 in St. Augustine, Florida; on April 20, 1994 in Brunswick, Georgia; and on June 23, 1994 in Marathon, Florida. A control date for the rock shrimp fishery was established as the publication date in the Federal Register, April 4, 1994 (FR Doc.94-8005). The topics discussed included the need for a limited access program, operator permits, and gear restrictions in the rock shrimp fishery. At the time Amendment 1 was approved these issues were deferred for later consideration.

The Rock Shrimp Advisory Panel met on August 1st and 2nd, 2000 in Charleston, South Carolina and recommended that the South Atlantic Fishery Management Council develop a limited access program for the rock shrimp fishery. Through subsequent meetings the Council developed measures for Shrimp Amendment 5 and voted on the proposed actions and options to go out to public hearings at their meeting on March 8-9, 2001 Jekyll Island, Georgia.

Public hearings on Shrimp Amendment 5 were held at the following locations:

May 3, 2001
NC Department of Environment & Natural Resources
127 Cardinal Drive; Wilmington, NC 28405

Monday, May 7, 2001
Radisson Beach Resort
2600 N. A1A; Fort Pierce, FL 34949

Tuesday, May 8, 2001
Florida Fish & Wildlife Conservation Commission, Florida Marine Research Institute
100 Eighth Avenue, SE; St. Petersburg, FL 53701-5095

Wednesday, May 9, 2001
Lafayette Plaza Hotel
301 Government Street; Mobile, AL 36602

Tuesday, May 15, 2001
Town & Country Inn
2008 Savannah Highway; Charleston, SC 29407

Monday, May 24, 2001
University of Georgia, Marine Extension Service
715 Bay Street; Brunswick, GA 31520

Tuesday, May 29, 2001
Radisson Hampton
700 Settlers Landing Road; Hampton, VA 23669

Tuesday, June 19, 2001
Radisson Ponce de Leon
4000 US Highway 1; St. Augustine, FL 32095

10.0 APPENDICES

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Appendix A. Species list and frequency of capture of bycatch associated with research trawl catches of harvestable levels of rock shrimp.
(Stations catching at least 20 pounds rock shrimp per hour)
(Total Stations = 57) (Reports for species caught in two or more stations)

NMFS Biocode	Freq	%Freq	Number	Weight	Av.Wt.
228011901	57	100.0	56796	33810	0.6
132010302	47	82.5	1825	7620	4.2
229080100	45	78.9	2261	13570	6.0
170024805	44	77.2	2516	6610	2.6
195050200	39	68.2	803	1170	1.5
330231102	36	63.2	3452	8380	2.4
228010703	34	59.6	1308	1590	1.2
170400000	34	59.6	1344	2680	2.0
183050700	32	56.1	2854	2140	0.7
228010701	30	52.6	1976	1600	0.8
225010103	30	52.6	681	680	1.0
170201902	29	50.9	2469	12940	5.2
189040204	28	49.1	3967	4940	1.2
170024806	28	49.1	686	1010	1.5
170570518	26	45.6	241	210	0.9
170570800	24	42.1	513	190	0.4
170201701	24	42.1	3437	17970	5.2
183011003	23	40.4	715	1550	2.2
183012203	22	38.6	286	570	2.0
229110809	22	38.6	1104	980	0.9
183040802	21	36.8	151	100	0.7
143060200	21	36.8	53	60	1.1
170560700	20	35.1	83	50	0.6
229110803	20	35.1	1309	870	0.7
229260100	19	33.3	141	290	2.1
347020200	19	33.3	196	120	0.6
170024804	18	31.6	278	410	1.5
229260201	18	31.6	125	250	2.0
183012403	17	29.8	67	650	9.7
148010105	17	29.8	930	740	0.8
229110602	16	28.1	826	520	0.6
229050000	15	26.3	154	60	0.4
170570503	15	26.3	132	130	1.0
183011000	14	24.6	444	590	1.3
170340501	14	24.6	24	10	0.4
170211601	14	24.6	562	840	1.5
170220203	14	24.6	164	170	1.0
229260102	14	24.6	47	100	2.1
170570525	13	22.8	124	120	1.0
110040205	13	22.8	39	230	5.9
183010605	12	21.1	310	120	0.4

Appendix A

NMFS Biocode	Freq	%Freq	Number	Weight	Av.Wt.
183010403	12	21.1	36	210	5.8
170400303	12	21.1	164	580	3.5
170560703	11	19.3	42	70	1.7
170560704	11	19.3	151	160	1.1
183012105	11	19.3	57	260	4.6
183050702	11	19.3	95	50	0.5
170020903	10	17.5	66	460	7.0
183040800	9	15.8	77	50	0.6
193010801	9	15.8	25	20	0.8
229110000	8	14.0	761	360	0.5
183010606	8	14	161	129	0.7
132010101	8	14	62	120	1.9
170111202	8	14	101	100	1.0
613000000	8	14	0	2150	1.0
308100201	8	14	10	470	47.0
170201604	7	12.3	56	230	4.1
183010304	7	12.3	72	190	2.6
170570500	7	12.3	64	110	1.7
170511104	7	12.3	27	10	0.4
183012404	6	10.5	24	100	4.2
195050203	6	10.5	67	40	0.6
189080600	5	8.8	21	30	1.4
229110800	5	8.8	177	900	5.1
183040803	5	8.8	35	30	0.9
183012200	5	8.8	71	40.0	0.6
170570803	5	8.8	15	-	-
17091003	5	8.8	153	170	1.1
132010300	5	8.8	15	-	-
143060205	5	8.8	67	170	2.5
350020100	5	8.8	8	10	1.3
691000000	4	7.0	608	500	0.8
619000000	4	7.0	7	-	-
170024208	4	7.0	15	10	0.7
170152001	4	7.0	3	30	10
170201806	4	7.0	0	1600	10
170151107	4	7.0	4	300	75
183010300	4	7.0	63	40	0.6
183010600	4	7.0	147	120	0.8
170511101	4	7.0	18	20	1.1
229110810	4	7.0	123	100	0.8
189030502	4	7.0	4	-	-
225010100	4	7.0	23	10	0.4
195050401	3	5.3	40	30	0.8
195050400	3	5.3	16	-	-
189070102	3	5.3	7	-	-
229260000	3	5.3	19	40	2.1
229110203	3	5.3	22	30	1.4

NMFS Biocode	Freq	%Freq	Number	Weight	Av.Wt.
229110201	3	5.3	4	-	-
170220605	3	5.3	3	-	-
170213404	3	5.3	16	10	0.6
170210660	3	5.3	7	50	7.1
170570505	3	5.3	5	-	-
170570514	3	5.3	-	-	-
170110800	3	5.3	4	20	5.0
170080101	3	5.3	8	10	1.3
170201801	3	5.3	1	-	-
170200907	3	5.3	25	280	11.6
170020900	3	5.3	2	-	-
148010100	3	5.3	4	-	-
694000000	3	5.3	29	120	4.1
121052004	2	3.5	0	60	4.1
689000000	2	3.5	310	350	1.1
308070100	2	3.5	2	-	-
308010528	2	3.5	16	160	10
143150402	2	3.5	3	-	-
143150400	2	3.5	3	-	-
141020101	2	3.5	4	-	-
165030102	2	3.5	17	90	5.3
151061500	2	3.5	2	-	-
151060600	2	3.5	3	-	-
170201100	2	3.5	95	220	2.3
170200903	2	3.5	6	160	26.7
170113802	2	3.5	0	-	26.7
170111201	2	3.5	6	-	-
170570512	2	3.5	3	-	-
183050707	2	3.5	8	-	-
183040000	2	3.5	7	-	-
170282901	2	3.5	22	20	0.9
229110101	2	3.5	29	70	2.4
229110600	2	3.5	21	30	1.4
229010300	2	3.5	2	20	10
307800201	2	3.5	2	-	-
307780400	2	3.5	2	-	-
189070200	2	3.5	4	10	2.5
189090203	2	3.5	4	10	2.5
228010705	2	3.5	7	-	-
228011800	2	3.5	27	-	-

Appendix B. Other Options Considered Early On in Development of Shrimp Amendment 5.

The Council reviewed a number of other options that were not brought to the public hearing process. The Council concluded the actions and alternatives included in the amendment represent a reasonable range of options for consideration. Additional options eliminated from detailed discussion are as follows:

ACTION 1. A license limitation program for the Rock Shrimp Fishery prosecuted within the South Atlantic Council's area of jurisdiction

Other Possible Option 4. Initial eligibility is limited to boat owners/vessels that: (a) have held a valid rock shrimp permit prior to December 31, 1999; and (b) can demonstrate landings in any one year from 1996 to 1999. These vessels are eligible to receive fully transferable permits.

This option is less restrictive than the Council's preferred option, since it would allow all vessels that landed rock shrimp during the period 1996-1999 to qualify for a limited access permit without having to meet the minimum threshold level of landings. The Council and Advisory Panel concluded that this option would not sufficiently address the overcapacity problem in this fishery and thus eliminated it from further consideration.

Other Possible Option 5. Initial eligibility is limited to boat owners/vessels that can demonstrate landings prior to Dec 31, 1999. Fully transferable permits will be granted to owners/vessels that can demonstrate landings of at least 15,000 to 36,000 lb. in any one year from 1996 to 1999. Vessels not meeting these landings criteria but who can demonstrate landings in any of these three years will be granted non-transferable permits.

Less restrictive than the preferred option since vessel owners who can demonstrate landings below the threshold during the four year period spanning 1996-1999 would be granted non-transferable permits. The Council and Advisory Panel concluded that this option would not sufficiently address the overcapacity problem in this fishery and thus eliminated it from further consideration.

Other Possible Option 6. Fully transferable permits will be granted to permit holders who can demonstrate landings in any year between 1996 and 1999. Vessels not meeting these criteria but who can demonstrate landings prior to 1996 will be granted non-transferable permits.

This option is less restrictive than the preferred option and other possible option 5, since all active permitted vessels during 1996 to 1999 will qualify for a permit. In addition, vessels that have not participated in this fishery during 1996 to 1999 would be granted non-transferable permits if owners could document landings in this fishery prior to 1996. The Council and Advisory Panel concluded that this option would not sufficiently address the overcapacity problem in this fishery and thus eliminated it from further consideration.

Other Possible Option 7. Initial eligibility is limited to boat owners/vessels that can demonstrate landings prior to the control date of April 4, 1994. These vessel owners will be granted fully transferable permits.

Anyone who could demonstrate some level of rock shrimp landings prior to the control date of April 4, 1994 would be granted a fully transferable permit. This option may exclude many of the vessels currently operating in the rock shrimp fishery, and grant limited access permits to vessel owners no longer in the rock shrimp industry.

ACTION 1B. TRANSFER OF CATCH HISTORY.

Other Possible Option 3. Do not allow transfer of the rock shrimp qualifying catch histories to another owner.

This option would not allow the transfer of catch history to another owner/vessel prior to implementation of the limited access program.

Issues Discussed and Eliminated from Detailed Consideration

The Council discussed whether to consider actions specific to the corporate ownership of a vessel that qualified for a limited access permit. Topics discussed included whether the fishing permit was an asset of the corporation, the disposition of corporate assets should the corporation dissolve or cease to exist, and what would happen if a fisherman who owned a vessel that qualified for a limited access permit wanted to form a corporation. The Council ultimately chose not to propose any actions specific to corporate ownership, since the various states' laws resolved many of their concerns regarding corporate assets and dissolution. Additionally, since the proposed actions on the transferability of the limited access permits did not encompass a 2-for-1 permit scheme akin to the limited access scheme used in the Snapper Grouper Fishery Management Plan, the concerns on an individual forming a corporation did not seem to be a problem that the Council needed to address.

At the June 2001 SAFMC Council meeting the Council deliberated on a motion to include historical participants in the limited access program. Specifically, this proposal would allow an additional 50 non-transferable limited access permits for participants who had fished prior to the qualifying years but who had not fished during the qualification period. This proposed measure would benefit historical participants who must be accorded some consideration in the development of any limited access program (Section 303(c) of the Magnuson-Stevens Act). However, the Council decided that this measure could potentially allow too many vessels in the fishery, which could exacerbate the overcapacity problem in the future.

Leasing Limited access Permits

At this time the Council did not see the need for any particular action to address leasing of limited access permits. The same rules that currently apply to leasing of the open access rock shrimp permits would continue under a limited access program.

Appendix C. Options in the Public Hearing Draft of Shrimp Amendment 5 not Relevant for Further Consideration.

The action and other possible options listed below were contained in the Public Hearing Draft of Shrimp Amendment 5 and removed from further consideration after the public comment period. These measures were no longer relevant given the Council's recommendations at the June 2001 SAFMC Council meeting in St. Augustine, Florida.

ACTION 5. Require that Management Actions 1 to 4 apply to all vessels fishing for rock shrimp in the EEZ in the South Atlantic Council's area of jurisdiction.

Other Possible Options for Action 5:

Other Possible Option 1. No Action

Other Possible Option 2. Require that Management Actions 1 to 4 apply to only those vessels fishing for rock shrimp in the EEZ off of Florida in the South Atlantic Council's area of jurisdiction.

The Council specified which area each proposed management action would apply to, and Action 5 was removed from the draft amendment since it was no longer relevant.

ACTION 1E. A non-transferable permit can only be transferred to a replacement vessel owned by the initial permit holder provided the replacement vessel is equal to or less than the size (length and gross tonnage) of the replaced vessel.

Other Possible Options for ACTION 1E:

Other Possible Option 1. A non-transferable permit can be transferred to a replacement vessel owned by the initial permit holder with no restrictions on vessel size (length and gross tonnage).

This measure is linked to Other Possible Option 3 for Action 1, which has a provision for non-transferable permits. Since this option was not chosen as the Council's proposed management action, Action 1E was no longer relevant and was removed from the draft amendment.

Appendix D. New Options Suggested at Public Hearings for Shrimp Amendment 5.

At the public hearings during the period May and June 2001 the following were suggested as alternatives to the proposed measures in the Public Hearing Draft of Shrimp Amendment 5. They were considered and rejected by the Council.
The Council concluded the actions and alternatives included in the amendment represent a reasonable range of options for consideration. Additional options eliminated from detailed discussion are as follows:

Alternatives for Action 1- Limited access Program

1. Establish a moratorium on issuing new rock shrimp permits for the fishery prosecuted in the US south Atlantic EEZ after December 31, 2000. This option is less restrictive than the Council's preferred option, since it would allow all vessels that landed rock shrimp prior to December 31, 2000 to qualify for a limited access permit. The Council and Advisory Panel concluded that this option would not sufficiently address the overcapacity problem in this fishery and thus it was not considered.

2. Establish a license limitation program for the rock shrimp fishery prosecuted within the South Atlantic Council's area of jurisdiction and limit initial eligibility to boat owners/vessels that: (a) have held a valid rock shrimp permit prior to December 31, 2000; and (b) can demonstrate landings in any one year from 1996 to 1999. These vessels will be eligible to receive fully transferable permits. The Council and Advisory Panel concluded that this option would not sufficiently address the overcapacity problem in this fishery and thus it was not considered.

3. Allow both limited access and the current open access permits in the rock shrimp fishery. A Limited access permit would only be required if annual landings exceeded 10,000 lb. Vessel owners that met the Council's qualifying criteria would be eligible to receive the limited access permits and they would be subject to the terms and conditions set by ACTIONS 1A TO 1I. The Council and Advisory Panel concluded that this option would not sufficiently address the overcapacity problem in this fishery and thus it was not considered.

4. Establish a minimum count size for rock shrimp that can be legally sold and not go forward with ACTION 1 (LIMITED ACCESS) AND ACTION 3 (MINIMUM MESH SIZE). The Council and Advisory Panel concluded that this option would not address the overcapacity problem in this fishery. Also, it would not sufficiently address the problem of excessive harvest of juvenile rock shrimp. Therefore, it was not considered by the Council.

5. Instead of ACTION 1 (LIMITED ACCESS) set a fee for rock shrimp permits of $2,500 annually. Permits would have to be purchased prior to June 1 of each fishing year. This option could not be considered by the Council because the Secretary can only set license fees at the level to cover the cost of administering the permit system (Section 304(d)(1) of the MSFMCA).

6. Establish some limit on the size of the trawl gear. The Council and Advisory Panel concluded that this option would not sufficiently address the overcapacity problem in this fishery and thus it was not considered.

Alternatives for Action 1F- The "Use it or lose it clause"

1. If a permit is not active for a 48 month period, then it should not be renewed and criteria set up to put the permit back in the rock shrimp fishery. The Council adopted this measure

2. If a permit is not active for a 60 month period, then it should not be renewed and criteria set up to put the permit back in the rock shrimp fishery.

Appendix E. Biological Evaluation for Actions Proposed to Conserve and Manage Rock Shrimp in the South Atlantic Region.

I. Description of the Proposed Actions in the Fishery Management Plan for the Rock Shrimp of the U.S. waters (EEZ) of the South Atlantic.

Problems and issues identified by the Councils and addressed by this fishery management plan are as follows:

1. Excess Capacity. There is excess capacity in the rock shrimp fishery. Any gains from current regulatory measures under open access are likely to attract new entrants to the fishery and provide incentive for those already in the fishery to increase harvest capacity even when gains in production are marginal or when economies of scale are not necessarily realized.
2. Excessive Harvest of Small Rock Shrimp.
3. Low Conservation and Compliance Incentives. Under open access there is little incentive on the part of fishermen to promote conservation and to voluntarily comply with regulations. This is because the benefits from doing so may accrue to other fishermen or to new entrants. A controlled access management system would provide a mechanism for those who participate in conservation measures to share in the resulting benefits.

Objectives addressed by this fishery management plan are as follows:

1. Remove "speculative interest" from the fishery and ensure that optimum yield would not be exceeded. Speculative interest refers to permit holders who are not currently involved in the fishery and those who rarely fish for rock shrimp.
2. Sustain economic benefits in the fishery. There is concern that latent permits could become active if conditions change in other fisheries. This increased effort could threaten the long-term economic viability of the rock shrimp industry.
3. Protect the interest of traditional user groups in this fishery. These are defined as highliners who are dependent on rock shrimp for a large portion of their fishing income and vessels that harvest smaller quantities in order to supplement income from other fisheries such as the penaeid shrimp fishery.
4. Protect the resource to provide for long-term sustainable benefits by reducing excess harvesting capacity in the fishery.
5. Decrease fishing mortality on small rock shrimp with the goal of sustaining current economic benefits and perhaps increasing future yield in the rock shrimp industry.
6. Improve enforcement of current fishery management regulations, particularly with regard to illegal fishing in the *Oculina* Bank HAPC, by requiring vessel monitoring systems.
7. Protect the interests of vessel owners who are not operators with the requirement for operator permits.

The Council is proposing the following actions:

ACTION 1. Establish a limited access program for the rock shrimp fishery prosecuted within the South Atlantic Council's area of jurisdiction south of the Georgia/South Carolina state line, and limit initial eligibility to the owner of a vessel that: (a) has held a valid rock shrimp permit prior to December 31, 2000; and (b) can demonstrate at least 15,000 pounds of rock shrimp landings in any one calendar year from 1996 through 2000. This owner will be eligible to receive a fully transferable permit. A limited access permit will be required for harvest and possession of rock shrimp in the South Atlantic Council's area of jurisdiction South of the Georgia/South Carolina state line

ACTION 2. Require captains operating vessels that are required to have permits to fish for rock shrimp in the South Atlantic Council's area of jurisdiction to have a vessel operator's permit issued by the National Marine Fisheries Service to participate in this fishery. The duration of the permit is to be specified by the National Marine Fisheries Service.

ACTION 3. Require that the minimum mesh size for a tail bag of a rock shrimp trawl, above the 2 inch rings, be at least 40 meshes of 1 and 7/8 inch stretched mesh at the cod end. This mesh size regulation only applies to the limited access rock shrimp fishery in the South Atlantic Council's area of jurisdiction.

ACTION 4. Require any vessel fishing with a limited access rock shrimp permit in the South Atlantic Council's area of jurisdiction to use an approved vessel monitoring system (VMS), which shall not exceed $1,200 for equipment and installation. Annual communication costs should not exceed $500, except annual communication costs may go up to $800 if NMFS determines that additional communication is necessary.

II. Threatened and Endangered Species found in the Management Units for Rock Shrimp (U.S. waters (EEZ) of the South Atlantic).

Endangered Species and Marine Mammal Acts:

The Sustainable Fisheries Act of 1996 established certain requirements and standards the Councils and the Secretary must meet in managing fisheries under the Magnuson-Stevens Act. Implementing the provisions in this fishery management plan will not have any negative impacts on the listed and protected species under the Endangered Species Act (ESA) and Marine Mammals Protection Act (MMPA) including:

Whales:	Date Listed
(1) Northern right whale- *Eubalaena glacialis* (ENDANGERED) (Critical Habitat Designated)	12/2/70
(2) Humpback whale- *Magaptera novaeangliae* (ENDANGERED)	12/2/70
(3) Fin whale- *Balaenoptera physalus* (ENDANGERED)	12/2/70
(4) Sei whale- *Balaenoptera borealis* (ENDANGERED)	12/2/70
(5) Sperm whale- *Physeter macrocephalus* (ENDANGERED)	12/2/70
(6) Blue whale- *Balaenoptera musculus* (ENDANGERED)	12/2/70

Sea Turtles:	Date Listed
(1) Kemp's ridley turtle- *Lepidochelys kempii* (ENDANGERED)	12/2/70
(2) Leatherback turtle- *Dermochelys coriacea* (ENDANGERED)	6/2/70
(3) Hawksbill turtle- *Eretmochelys imbricata* (ENDANGERED)	6/2/70
(4) Green turtle- *Chelonia mydas* (THREATENED/ENDANGERED)	7/28/78
(5) Loggerhead turtle- *Caretta caretta* (THREATENED)	7/28/78

Fish:	Date Listed
(1) Shortnose sturgeon- *Acipenser brevirostrum* (ENDANGERED)	3/11/67

Seagrasses:	Date Listed
(1) Johnson's seagrass- *Halophilia johnsonii* (THREATENED) (Critical Habitat Designated)	9/14/98

Species Proposed for Listing
None.

Designated Critical Habitat
Right Whale: Between 31°15' N. latitude (approximately the mouth of the Altamaha River, Georgia) and 30°15' N. latitude (approximately Jacksonville Beach, Florida) from the coast out to 15 nautical miles offshore; the coastal waters between 30°15' N. latitude and 28°00' N. latitude (approximately Sebastain Inlet, Florida) from the coast out to 5 miles.

Proposed Critical Habitat
None.

Candidate Species- Fish
Dusky shark- *Carachahinus obscrurus*
Sand Tiger Shark- *Odontaspis taurus*
Night Tiger- *Carachahinus signatus*
Atlantic sturgeon- *Acipenser oxyrhynchus oxyrhynchus*
Mangrove rivulus- *Rivulus mamoratus*
Opposum pipefish- *Microphis barchyurus lineatus*
Key silverside- *Menidia conchorum*
Goliath Grouper- *Epinephelus itajara*
Speckled hind- *Epinephelus drummondhayi*
Warsaw grouper- *Epinephelus nigritus*
Nassau grouper- *Epinephelus striatus*

Other Species Under U.S. Fish and Wildlife Service Jurisdiction:	Date Listed
(1) West Indian manatee- *Trichechus manatus* (ENDANGERED)	3/67
(Critical Habitat Designated)	1976
(2) American crocodile - *Crocodulus acutus* (ENDANGERED)	9/75
(Critical Habitat Designated)	12/79

III. Biological Information

Detailed biological information for the threatened and endangered species occurring in the range of the management unit of the FMP are included in the Biological Opinion prepared for the shrimp fishery.

IV. How will Proposed Actions effect Threatened or Endangered Species or Critical Habitat and A Determination of Effect.

The Council has determined that the actions proposed in Amendment 5 to the Fishery Management Plan for the Shrimp Fishery of the south Atlantic Region will have "No Effect" on associated threatened and endangered species because the likely interactions have been addressed in the Biological Opinion for the Shrimp Fishery.

The Council will work closely with NMFS to ensure that the regulations to implement measures contained in the Biological Opinion are effective in reducing the turtle mortality. If monitoring indicates that additional regulations are necessary for the rock shrimp fishery, the Councils will implement such regulations through an amendment to the FMP.

V. Supporting Documentation

Documentation supporting the determination of "No Effect" is included in the Biological Opinion for the Shrimp Fishery. In addition, Section 3.0 of this document describes the affected environment including the stocks, fisheries, and essential fish habitat they depend on.

Appendix F. Final Rule for Amendment 1 to the Fishery Management Plan for the Shrimp Fishery in the South Atlantic Region.

[Federal Register: September 9, 1996 (Volume 61, Number 175)]
[Rules and Regulations]
[Page 47446-47449]
From the Federal Register Online via GPO Access [wais.access.gpo.gov]
[DOCID:fr09se96-18]

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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 622

[Docket No. 960409106-6207-02; I.D. 031196A]
RIN 0648-AG26

Fisheries of the Caribbean, Gulf of Mexico, and south Atlantic;
Shrimp Fishery Off the Southern Atlantic States; Amendment 1

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Final rule.

SUMMARY: NMFS issues this final rule to implement Amendment 1 to the Fishery Management Plan for the Shrimp Fishery of the south Atlantic Region (FMP). This rule prohibits trawling for rock shrimp in an area off the Florida east coast; requires permits for dealers and vessels in the rock shrimp fishery off the southern Atlantic states; requires dealers to report information needed to monitor the fishery; and requires that the initial sale, trade, barter, or transfer of rock shrimp harvested from the exclusive economic zone (EEZ) off the southern Atlantic states occur only between permitted dealers and permitted vessels. In addition, NMFS informs the public of the approval by the Office of Management and Budget (OMB) of the collection-of-information requirements contained in this rule. The intended effect is to protect critical habitat and conserve and manage the rock shrimp fishery.

EFFECTIVE DATES: October 9, 1996; except that the amendments to Secs. 622.4, 622.5, and 622.45 are effective November 1, 1996.

ADDRESSES: Requests for copies of the final regulatory flexibility analysis (FRFA) should be sent to Peter J. Eldridge, Southeast Regional Office,

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NMFS, 9721 Executive Center Drive N., St. Petersburg, FL 33702.
Comments regarding the collection-of-information requirements contained in this rule should be sent to Edward E. Burgess, Southeast Regional Office, NMFS, 9721 Executive Center Drive N., St. Petersburg, FL 33702, and to the Office of Information and Regulatory Affairs, OMB, Washington, DC 20503 (Attention: NOAA Desk Officer).

FOR FURTHER INFORMATION CONTACT: Peter J. Eldridge, 813-570-5305.

SUPPLEMENTARY INFORMATION: The FMP was prepared by the South Atlantic Fishery Management Council (Council) under the authority of the Magnuson Stevens Fishery Conservation and Management Act

(Magnuson Act). The background and rationale for the measures in Amendment 1, and the rationale for NMFS's disapproval, based on a preliminary evaluation of Amendment 1, of a measure that would have required vessel operator permits, were contained in the preamble to the proposed rule (61 FR 17866, April 23, 1996) and are not repeated here.

Comments and Responses

Comment: One fisherman commented that the area being closed to trawling is too large. He believes the outer or offshore edge of the closed area should be moved shoreward from the proposed 100-fathom (183-m) depth contour to the offshore edge of the *Oculina* Bank Habitat Area of Particular Concern (HAPC). He states that this will allow fishermen to continue their harvest of pink and rock shrimp in this area. In addition, he recommends delaying implementation of Amendment 1 until after the 1996 rock shrimp season (July through October). Response: Amendment 1 specifically addresses the need to minimize impacts of the rock shrimp fishery on essential bottom habitat. Amendment 1 will extend protection of the valuable *Oculina* coral species and its existing habitat to the north and east of the existing HAPC. Amendment 1 recognizes and analyzes the adverse economic impacts of displacing fishermen from the area in which trawling would be prohibited. The Council concluded that the potential long-term economic benefits of the closed area would outweigh the short-term adverse effects. NMFS concurs with that conclusion. Thus, NMFS does not support moving the outer boundary of the proposed no-trawling area shoreward to the edge of the HAPC. Also, because of documented damage to *Oculina* habitat from trawling, to the detriment of the important species dependent on that habitat, it is not wise or prudent to delay implementation of approved Amendment 1.

Changes from the Proposed Rule

Since the proposed rule was published, NMFS has consolidated most of its fishery regulations for the Southeast Region into one set of regulations at 50 CFR part 622 (published on July 3, 1996, 61 FR 34930). Accordingly, the implementing regulations for Amendment 1 in this final rule are amendments to part 622 in lieu of amendments to the south Atlantic shrimp regulations, previously contained in part 659. Part 622 contains general provisions common to all federally managed fisheries (e.g., permit application procedures, vessel and gear identification requirements, and prohibitions). Therefore, such general provisions that appeared in the proposed rule are not included in this final rule. Minor changes in language have been made to conform to the standards in part 622. The proposed rule would have required the owner or operator of a permitted vessel or a permitted dealer to notify the Director, Southeast Region, NMFS (RD) within 15 days after any change in the information previously submitted on the permit application. To conform with the standard in other fisheries permitted by the RD, as it exists in part 622, the time frame for that notification is changed to 30 days.

Effective Dates

To allow time to publicize the requirements for vessel and dealer permits, distribute applications for such permits, receive and process applications, and issue permits, NMFS makes the provisions of this final rule that require permits, or that are dependent on the possession of a permit, effective November 1, 1996.

Classification

The RD determined that Amendment 1 is necessary for the conservation and management of the shrimp fishery off the southern Atlantic states and that it is consistent with the Magnuson Act and other applicable law, with the exception of the measure that was previously disapproved. See the proposed rule for a discussion of the disapproved measure.

This action has been determined to be not significant for purposes of E.O. 12866.

NMFS prepared a final regulatory flexibility analysis (FRFA) that indicates this final rule is necessary to minimize the impacts of rock shrimp trawling on important coral and coral reef resources and on live- and hard-bottom habitats within and adjacent to the HAPC off the east coast of Florida. Minimizing habitat damage will enhance survival of juvenile rock shrimp and snapper-grouper species dependent upon this habitat. Also this rule will allow NMFS to collect fishery and biological information necessary to improve the management program and to ensure attainment of optimum yield over the long-term. The one public comment received on the proposed rule indicated that the area closed to shrimp trawling is too large and should be reduced to minimize lost pink and rock shrimp harvest. The Council had already assessed this option in the initial regulatory flexibility analysis (IRFA) and related analyses of management options supporting its preferred measures in Amendment 1; it concluded that a smaller closed area would not

offer sufficient habitat protection (see comments and responses above). Accordingly, this comment did not result in changes to the conclusions of the IRFA.

The FRFA indicates that this rule will result in significant economic impacts on between 65 and 108 vessels and 12 dealers; all of these vessels and dealers are considered small entities for purposes of the Regulatory Flexibility Act. The magnitude of the impacts per small entity were difficult to quantify because rock shrimp landings vary considerably from year to year and rock shrimp exhibit considerable geographic movement and could move from areas closed to trawling to open areas and, thus, be harvested. The principal adverse impacts will result from prohibiting shrimp trawling in the closed area. Assuming that the affected vessels cannot redirect their fishing effort to other areas, and assuming continuation of recent harvest rates, affected vessels may lose approximately $41,000 each the first year. It is likely, however, that most vessels will be able to shift their effort to other areas or to other fisheries and these losses are not projected for the long-term. The extent to which vessels are able to shift to open areas or to other fisheries will determine how well they can minimize reduced rock shrimp catches and revenues; this extent cannot be estimated at this time. It is possible that some vessels may not demonstrate reduced net revenues if, by switching to other fishing areas, they can harvest larger sized shrimp that bring a significantly higher price per pound.

This final rule contains new collection-of-information requirements including: Vessel permit applications; dealer permit applications; dealer

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reports regarding rock shrimp receipts; and vessel identification requirements. These requirements will affect vessel owners or operators who choose to participate in the rock shrimp fishery and dealers who intend to purchase rock shrimp from permitted vessels. The professional skills necessary for complying with these information collection requirements are the same as required by the vessel owners/operators and dealers permitted in other federally managed fisheries of the south Atlantic area; these skills include the ability to understand, fill out, and submit to NMFS necessary application forms for vessel or dealer permits and for reporting landings and ex-vessel prices.

In trying to minimize significant economic impacts on small entities, the Council and NMFS considered numerous management alternatives in selecting the preferred management measures regarding addition of rock shrimp to the FMP management unit, habitat and shrimp resource protection, and permitting and reporting requirements. In general, some of the management options considered and rejected would have had less of a short-term impact on rock shrimp fishermen but the long-term damage to essential habitat and resource productivity would have been greater. Regarding the management unit measure, the FRFA indicates that a management unit with a smaller geographic range would not provide management authority for future, timely regulatory actions necessary to protect shrimp and habitat resources beyond the *Oculina* HAPC. Regarding the extent of the area closed to shrimp trawling, the area chosen was proposed by the industry as representing an acceptable balance between protecting critical shrimp and habitat resources and minimizing adverse, regulatory impacts. Rock shrimp fishing in the area to be closed has occurred only in recent years and the catch has consisted mainly of very small rock shrimp, which are intercepted before they reach traditional fishing grounds. The trawling closure area may result in higher fishery yields and revenues over the long-term, in part because small shrimp, otherwise harvested, will be allowed to reach a larger size and command a higher market price per pound. Regarding permitting and reporting and recordkeeping requirements, the Council deliberately chose an approach that would minimize burdens on reporting entities while still providing the information on actual landings and harvest locations necessary for management. While permits are required for vessels and dealers, only the dealers are required to submit reports on landings. The Council decided that this approach would minimize burdens on the individual fisherman (e.g., no mandatory log book system required). Also, the Council encouraged NMFS to use information from state fisheries agencies, particularly from Florida where most landings occur, to minimize additional reporting burdens on dealers. Refer to the FRFA for further details (see ADDRESSES). Notwithstanding any other provision of law, no person is required to respond to nor shall a person be subject to a penalty for failure to comply with a collection of information subject to the requirements of the Paperwork Reduction Act (PRA) unless that collection of information displays a currently valid OMB control number.

This rule contains new collection-of-information requirements subject to the PRA for vessels and dealers in the rock shrimp fishery--namely, vessel permit applications, dealer permit applications, dealer reports regarding rock shrimp receipts, and vessel identification requirements. The existing vessel identification requirements contained in 50 CFR 622.6(a)(1)(i) and (a)(2) are made applicable to a vessel in the rock shrimp fishery by requiring such vessel to obtain a permit--each vessel for which a permit has been issued under 50 CFR 622.4 is required to comply with those requirements. These collections of information have been approved by OMB under OMB control numbers 0648-0205, 0648-0205, 0648-0013, and 0648-0306, respectively. The public reporting burdens for these collections are estimated to average 20, 5, 15, and 45 minutes per response, respectively, including the time for reviewing instructions, searching existing data

sources, gathering and maintaining the data needed, and completing and reviewing the collections of information. Send comments regarding any of these reporting burden estimates, or any other aspect of the collections of information, including suggestions for reducing the burdens, to NMFS and OMB (see ADDRESSES).

List of Subjects in 50 CFR Part 622

Fisheries, Fishing, Puerto Rico, Reporting and recordkeeping requirements, Virgin Islands.

Dated: September 3, 1996.
N. Foster,
Deputy Assistant Administrator for Fisheries, National Marine Fisheries Service.

For the reasons set out in the preamble, 50 CFR Part 622 is amended as follows:

PART 622--FISHERIES OF THE CARIBBEAN, GULF AND SOUTH ATLANTIC

1. The authority citation for part 622 continues to read as follows:

Authority: 16 U.S.C. 1801 et seq.

2. In Sec. 622.2, the definition of ``Dealer'' is added, in alphabetical order, to read as follows:

Sec. 622.2 Definitions and acronyms.

* * * * *

Dealer, in addition to the definition specified in Sec. 600.15 of this chapter, means the person who first receives rock shrimp harvested from the EEZ upon transfer ashore.

* * * * *

3. In Sec. 622.4, effective November 1, 1996, paragraph (a)(2)(viii) is added and the first sentence of paragraph (a)(4) is revised to read as follows:

Sec. 622.4 Permits and fees.

(a) * * *

(2) * * *

(viii) South Atlantic rock shrimp. For a person aboard a vessel to fish for rock shrimp in the south Atlantic EEZ or possess rock shrimp in or from the south Atlantic EEZ, a commercial vessel permit for rock shrimp must be issued to the vessel and must be on board.

* * * * *

(4) * * * For a dealer to receive Gulf reef fish, golden crab harvested from the south Atlantic EEZ, south Atlantic snapper-grouper, rock shrimp harvested from the south Atlantic EEZ, or wreckfish, a dealer permit for Gulf reef fish, golden crab, south Atlantic snapper-grouper, rock shrimp, or wreckfish, respectively, must be issued to the dealer. * * *

* * * * *

4. In Sec. 622.5, effective November 1, 1996, paragraph (c)(7) is added to read as follows:

Sec. 622.5 Recordkeeping and reporting.

(c) * * *

(7) South Atlantic rock shrimp. (i) A dealer who has been issued a permit for rock shrimp, as required under Sec. 622.4(a)(4), and who is selected by the SRD must provide information on receipts of rock shrimp and prices paid on forms available from the SRD. The required information must be submitted to the SRD at monthly intervals postmarked not later than 5 days after the end of each month. Reporting frequencies and reporting deadlines may be modified upon notification by the SRD.

(ii) On demand, a dealer who has been issued a dealer permit for rock

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shrimp, as required under Sec. 622.4(a)(4), must make available to an authorized officer all records of offloadings, purchases, or sales of rock shrimp.

* * * * *

5. In Sec. 622.35, paragraph (g) is added to read as follows:

Sec. 622.35 south Atlantic EEZ seasonal and/or area closures.

* * * * *

(g) Rock shrimp closed area. No person may trawl for rock shrimp in the area east of 80 deg.00' W. long. between 27 deg.30' N. lat. and 28 deg.30' N. lat. shoreward of the 100-fathom (183-m) contour, as shown on the latest edition of NOAA chart 11460; and no person may possess rock shrimp in or from this area on board a fishing vessel.

6. In Sec. 622.45, effective November 1, 1996, paragraph (g) is added to read as follows:

Sec. 622.45 Restrictions on sale/purchase.

* * * * *

(g) South Atlantic rock shrimp. (1) Rock shrimp harvested in the south Atlantic EEZ on board a vessel that does not have a valid commercial permit for rock shrimp, as required under Sec. 622.4(a)(2)(viii), may not be transferred, received, sold, or purchased.

(2) Rock shrimp harvested on board a vessel that has a valid commercial permit for rock shrimp may be transferred or sold only to a dealer who has a valid permit for rock shrimp, as required under Sec. 622.4(a)(4).

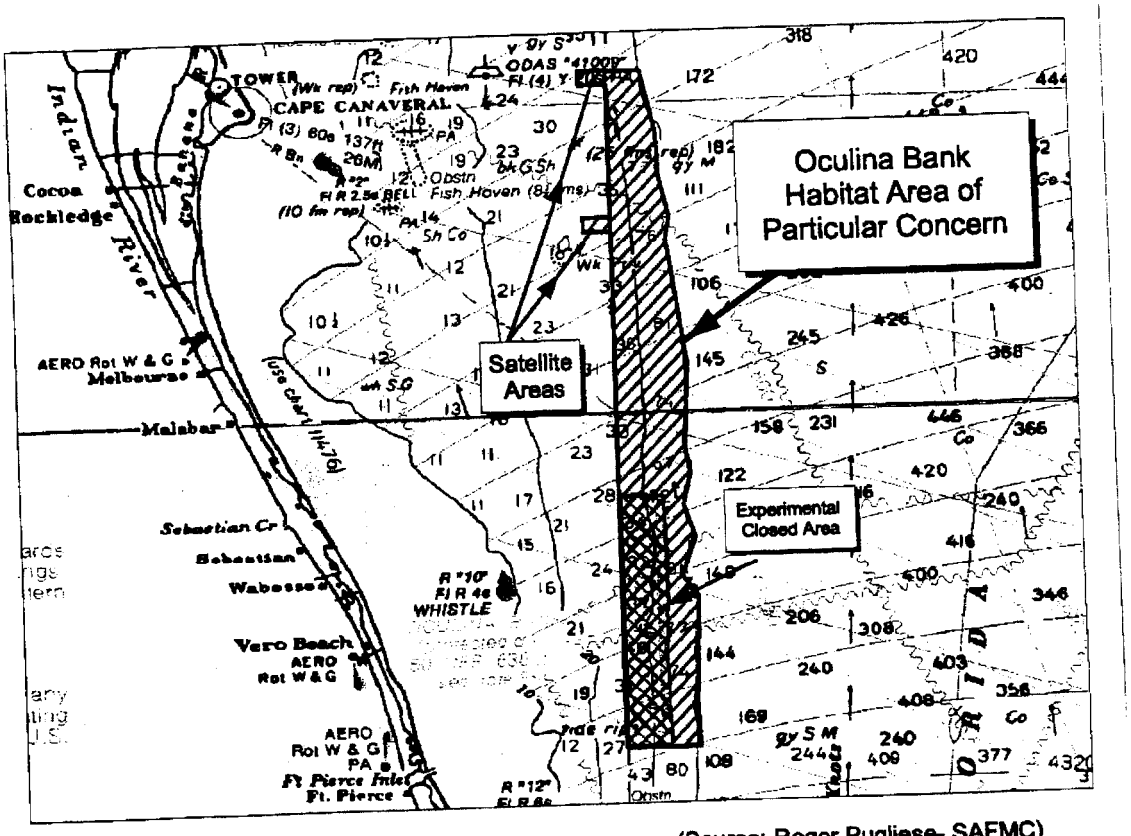
(3) Rock shrimp harvested in the south Atlantic EEZ may be received or purchased by a dealer who has a valid permit for rock shrimp, as required under Sec. 622.4(a)(4), only from a vessel that has a valid commercial permit for rock shrimp.

[FR Doc. 96-22958 Filed 9-6-96; 8:45 am]
BILLING CODE 3510-22-F

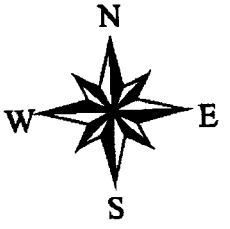
Appendix G. *Oculina* Bank Habitat Area of Particular Concern.

Appendix G

Appendix G. Oculina Bank Habitat Area of Particular Concern.



(Source: Roger Pugliese- SAFMC)
Note: Not for Navigation



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Appendix H. EPA Review of DSEIS for "Amendment 5 to the Fishery Management Plan for the Shrimp Fishery of the south Atlantic Region.

Appendix H

Appendix H. EPA Review of DSEIS for "Amendment 5 to the Fishery Management Plan for the Shrimp Fishery of the south Atlantic Region.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

2001 SEP -4 PM 11: 29

9/5/01

August 30, 2001

Dr. Joseph E. Powers
National Marine Fisheries Service
Southeast Regional Office
9721 Executive Center Drive North
St. Petersburg, FL 33702

SUBJECT: EPA Review of DSEIS for "Amendment 5 to the Fishery Management Plan for Shrimp Fishery of the South Atlantic Region (Rock Shrimp)"; CEQ Number 010257

Dear Dr. Powers:

Pursuant to Section 102(2)(C) of the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, the U.S. Environmental Protection Agency (EPA) has reviewed the subject National Marine Fisheries Service (NMFS) Draft Supplemental Environmental Impact Statement (DSEIS) prepared by the South Atlantic Fishery Management Council (Council) for Amendment 5 to the rock shrimp (*Sicyonia brevirostris*) Fishery Management Plan (shrimp FMP).

EPA overall agrees with the proposed Amendment 5 but offers the following comments on the DSEIS for consideration in the development of the Final SEIS (FSEIS):

- **NEPA Process**

Background Information - EPA appreciates that the DSEIS provides a good summary of the past four amendments to the shrimp FMP. We feel that such background information is beneficial to the average public reviewer and provides the history of the proposed new actions by the NMFS and Council in Amendment 5. Inclusion of such background information has been requested in past EPA reviews of FMP EISs.

Public Comment Due Date - While we can appreciate that the present document is a multi-purpose document as opposed to only an EIS, the due dates for public comments should be clear. Page xi states that comments are due by May 29, 2001. These comments apparently refer to public hearing comments and should not be confused with the public comment due date for the DSEIS. EIS due dates are based on the *Federal Register* notice date and a 45-day minimum review period for Draft EISs (including SEISs) and 30-day minimum review period for Final EISs. Comments for the present DSEIS are due by September 4, 2001. Future NMFS EISs should clarify comment due dates.

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List of Acronyms & Glossary - We suggest the addition of a list of acronyms that defines fisheries abbreviations such as OY, MSY, EFH, HAPC, EEZ, etc. A glossary would also be useful to the public reviewer to define fisheries terms such as fecundity, penaeid shrimp, recruitment, essential fish habitat, etc.

- **Purpose & Need** - In most of the past FMP EISs reviewed by EPA, the need for Fisheries management was due to stock overfishing. The present Amendment 5 to the shrimp FMP appears to have another purpose since page 11 (Amendment 4) states that "rock shrimp are not overfished." Amendment 5 appears to address socio-economic and biological issues discussed on page 12. The biological issues, which are of more concern to EPA pursuant to its mandates, are 1) excessive harvest of small shrimp, 2) improved compliance with existing conservation measures, and 3) improved protection of HAPCs [Habitat Areas of Particular Concern]. These issues were expressed in five proposed actions with alternatives (options) for Amendment 5. Management also appears to be aimed at maintaining an optimum yield (OY), which for this fishery equals (pg. 11) the Maximum Sustainable Yield (MSY).

- **Alternatives** - We offer the following comments on the five proposed actions and their options as discussed on Tables 1-3:

o *Proposed Action 1 (Limited Entry)* - EPA agrees with limiting the fishing capacity for the rock shrimp fishery in order to help regulate the fishing pressure. This action would eliminate 102 vessels that "had documented landings from 1996 to 1999 that did not meet the landings criterion" (at least 15,000 pounds). Therefore, the fishery would essentially be fished by established traditional vessels/operators and would not be influenced by "speculative interest" fishing which can temporarily fluctuate stock size and market prices. The permits of these remaining vessels, however, would remain fully transferable so that some new entrants could still conceivably enter the fishery.

We note (pg. 1) that the Rock Shrimp Advisory Panel (AP) believes that no more than 150 vessels should constitute the commercial fishery in order to maintain OY. We also note (pg. 2) that some discarded dead juveniles can be caught again several times by competing vessels. This could clog nets and thereby increase the likelihood of additional catches of live juveniles (which may also become dead discards) as well as other bycatch. Additionally, the trawl paths of too many competing vessels could damage the natural habitat of rock shrimp and consequently affect their stock numbers. Based on the DSEIS, the viability of the year class for this species is apparently particularly related to environmental conditions.

* *Option 1 of Action 1 (No Action)* - This option would be the least restrictive since it would not exclude future vessels into the fishery.

* *Option 2 of Action 1* - This option is less restrictive than proposed Action 1.

* *Option 3 of Action 1* - This option is less restrictive than both Action 1 and Option 2.

EPA Recommendation - EPA agrees with the concept of a limited entry program to maintain OY or a lower managed yield. However, we assume that the number of vessels allowed is based on recent data and conditions will continue to be monitored and adjusted as needed. Action 1 and its options differ in their degree of limiting vessels into the fishery. The proposed Action 1 appears reasonable to EPA while Option 1 (no action) is not favored. EPA will defer the specifics of selecting Action 1 versus Options 2 or 3 to the NMFS/Council, based on specific fishery data that measure catch effort and fishing capacity effects and maintenance of a sustainable yield.

Related to proposed Action 1, we also recommend the following:

* *Sport Fishery* - The FSEIS should indicate if there is a sport fishery for rock shrimp which might reduce stocks without regulation. However, given the relatively deep preferred habitat of rock shrimp (82-213 ft and up to 600 ft), it is likely that no sport fishery exists.

* *OY* - Page 11 states that "OY is MSY which for the rock shrimp fishery in the south Atlantic EEZ is defined as the amount of harvest that can be taken by U.S. fishermen without reducing the spawning stock below the level necessary to ensure adequate reproduction." Although an OY/MSY management goal seems appropriate from a reproductive capacity perspective and is commonly used in fishery management, it may or may not be the optimal management goal from an ecological perspective. That is, if fishing pressure through continual trawling excessively affects shrimp habitat which in turn affects recruitment and survival, a yield that is somewhat below the OY/MSY may be better overall. Although the Magnuson-Stevens Act already considers environmental aspects, we suggest that the NMFS/Council further consider the relevance of a yield somewhat below the OY for this fishery. If appropriate for this fishery, this factor should be incorporated into the limited entry proposed action in terms of the number of fishing vessels allowed.

o *Proposed Action 2 (Operating Permits)* - EPA agrees with the concept of operating permits in order to improve compliance with the FMP and maintenance of the fishery.

* *Option 1 of Action 2 (No Action)* - This option would not require operating permits.

* *Option 2 of Action 2 (Limited Operating Permits)* - This option would be less restrictive since it only requires operating permits when an operator is not the owner of the vessel.

EPA Recommendation - EPA favors Action 2 over Option 2 since it is inclusive of all vessels in the fishery under the Council's jurisdiction. EPA does not favor Option 1 since it requires no operating permits.

o *Proposed Action 3 (Mesh Size)* - EPA agrees with controlling the minimum stretched mesh size in order to allow adequate recruitment and help prevent overfishing. The proposed Action 3 dictates a 1 7/8-inch mesh.

* *Option 1 of Action 3 (No Action)* - This option requires no change in mesh size and therefore offers economic advantage of no gear modification.

* *Option 2 of Action 3 (Smaller Mesh Size)* - This option dictates a 1 3/4-inch mesh.

* *Option 3 of Action 3 (Larger Mesh Size)* - This option dictates a 2-inch mesh size.

EPA Recommendation - EPA favors proposed Action 3 as a fishery management technique. EPA will defer the specifics of selecting the appropriate mesh size to the NMFS/Council, since this selection should be based on specific fishery data measuring fecundity, size of first maturity, recruitment, growth rate, managed yield, etc. We note from the DSEIS that this species grows rapidly, reproduces some three times a year, and becomes mature at 24 mm carapace length (CL) for females and 17 mm CL for males.

Related to proposed Action 3, we also recommend the following:

* *Size of First Maturity* - Pages 20-21 discuss the reproductive capacity of rock shrimp based on CL. The FSEIS should relate this length (24 mm CL for females and 17 mm CL for males) to the presented 1 3/4-, 1 7/8-, and 2-inch minimum stretched mesh in terms of fishery effects. FSEIS discussion of the selected mesh size should include how it would affect the reproducing population and, in turn, sustainable recruitment and viability of the shrimp fishery as a whole.

* *Bycatch* - The effects of the selected mesh size on bycatch, including juvenile rock shrimp (which likely would become dead discards), should also be discussed in the FSEIS.

o *Proposed Action 4 (Monitoring System)* - EPA agrees with the implementation of a monitoring system onboard fishing vessels to improve compliance with closed areas and special habitats such as the Oculina coral HAPC. The proposed Action 4 limits such a system to no more than $2,500 for initial costs to the vessel owner/operator.

* *Option 1 of Action 4 (No Action)* - This option would not require a vessel monitoring system.

* *Option 2 of Action 4 (Monitoring System Without Cost Limitations)* - This option would not require a $2,500 cost cap on the system.

* *Option 3 of Action 4 (Monitoring System Limited to Previous Violations)* - This option only requires a monitoring system if the owner/operator has had a previous violation in the last three years.

EPA Recommendation - EPA favors proposed Action 4 from a special habitat and closed fishing area compliance standpoint. We believe all rock shrimp vessels (as opposed to only those with recent violations) should be equipped with a monitoring system to discourage violations. The $2,500 cost cap for the system seems less important since cost would be somewhat self-regulating (predictably, if the minimum cost is left unregulated, only a minimum amount would be spent on such a system anyway), unless this maximum to the vessel owner/operator suggests that any additional costs will be provided by other sources such as NMFS to minimize societal impacts (the FSEIS should clarify). Accordingly, we favor Action 4, although Option 2 is also reasonable.

o *Proposed Action 5 (Amendment 5 Applicability)* - This action proposes that the above four proposed actions would apply to all rock shrimp fishing vessels that fish within south Atlantic EEZ waters under the Council's jurisdiction.

* *Option 1 of Action 5 (No Action)* - This option would not change the status quo.

* *Option 2 of Action 5 (Florida Applicability)* - This option proposes that the above four actions would apply only to those rock shrimp fishing vessels that fish within EEZ waters off of Florida under the Council's jurisdiction.

EPA Recommendation - EPA favors application of Amendment 5 to all rock shrimp fishing vessels within EEZ waters under the Council's jurisdiction for management consistency and to facilitate compliance. However, if rock shrimp in areas outside Florida Exclusive Economic Zone (EEZ) waters are ecologically distinct (e.g., sub-species) or are fished with different gear and/or fishing effort, then EPA would favor separate FMP conditions for these areas as determined by the NMFS/Council and based on recent data. The FSEIS should clarify if populations outside Florida EEZ waters are considered distinct and would have different management requirements.

▸ Summary

Overall, EPA generally believes the proposed Amendment 5 would benefit the fishery and generally agrees with the proposed management actions and/or an action option. Of the presented actions and options, EPA favors proposed Action 1 limiting vessel entry (or Options 2 or 3 depending on the assessed fishing pressure on the rock shrimp fishery), Action 2 requiring operating permits, Action 3 restricting mesh size (or Options 2 or 3 depending on the effects of mesh size relative to rock shrimp reproductive capacity), Action 4 requiring a monitoring system with a price cap of $2,500 for initial costs (or Option 2 which does not stipulate a price cap), and Action 5 applying Amendment 5 to all areas of rock shrimp fishing areas in the south Atlantic EEZ under the Council's jurisdiction (or Option 2 if rock shrimp populations outside Florida are distinct and would have different management requirements).

Although a typical management technique for FMPs, we request that the OY/MSY management goal be reviewed by the NMFS/Council to ensure that this goal is the also optimal

ecologically, and if not, to manage at a lower yield. Factors to consider are trawl effects relative to rock shrimp habitat destruction and associated possible reductions in recruitment and stock size due to OY/MSY fishing pressure. We also request that the FSEIS provide additional information such relating CL of mature females and males to the selected mesh size relative to sustainable recruitment, and if rock shrimp outside Florida waters are considered distinct populations and would require different fisheries management.

▸ EPA DSEIS Rating

If our above comments are appropriately addressed, EPA rates this DSEIS as an "LO" (i.e., Lack of Objections) since the proposed Amendment 5 management of rock shrimp appears appropriate overall. Our comments should be addressed in the FSEIS.

EPA was pleased to review the DSEIS. Should you have questions regarding these comments, feel free to contact Chris Hoberg of my staff at 404/562-9619.

Sincerely,

Heinz J. Mueller, Chief
Office of Environmental Assessment
Environmental Accountability Division

Appendix I. Glossary of Terms in Amendment 5 to the South Atlantic Shrimp Fishery Management Plan.

Biomass: The total weight or volume of a species in a given area.

B_{MSY}: The biomass of fish expected to exist under equilibrium conditions when fishing at F_{MSY}

B_{OY}: The biomass of fish expected to exist under equilibrium conditions when fishing at F_{OY}

Bycatch: The harvest of fish or shellfish other than the species for which the fishing gear was set. Bycatch is often called incidental catch. Some bycatch is kept for sale.

Catch-per-Unit Effort (CPUE): The total number or weight of fish harvested by a defined unit of fishing effort.

Cohort: A group of fish/shellfish spawned during a given period.

Essential Fish Habitat (EFH): Those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity.

Essential Fish Habitat-Habitat Areas of Particular Concern (EHF-HAPC): Those waters and substrate that are critical to fish for spawning, breeding, feeding or growth to maturity.

Exclusive Economic Zone (EEZ): All waters from the seaward boundary of coastal states out to 200 nautical miles.

F_{CURR}: The current instantaneous rate of fishing mortality

F_{MSY}: The rate of fishing mortality expected to achieve MSY under equilibrium conditions and a corresponding biomass of B_{MSY}

F_{OY}: The rate of fishing mortality expected to achieve OY under equilibrium conditions and a corresponding biomass of B_{OY}

Fecundity: A measurement of the egg-producing ability of an organism. Fecundity may change with the age and size of the organism.

Fishing Effort: The amount of time and fishing power used to harvest fish. Fishing power includes gear size, boat size, and horsepower.

Fishing Mortality (F): Instantaneous rate of fishing mortality calculated in yield-per-recruit analysis is that portion of total mortality attributable to fishing. It is equal to total mortality (Z) minus natural mortality (M). F is the measure of "fishing pressure" for stock assessment and management considerations in this FMP.

Growth Overfishing: The harvesting of a fish stock to the point that the harvest is less than the maximum possible (by weight). Growth overfishing, by itself, does not affect the ability of a fish population to replace itself.

Maximum Sustainable Yield (MSY): The largest long term average yield (catch) that can be taken from a stock (or stock complex) under prevailing ecological and environmental conditions.

Natural Mortality: A measurement of the rate of removal of fish from a population from natural causes.

Optimum Yield (OY): The amount of fish that will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities and taking into account the protection of marine ecosystems. MSY is a ceiling for OY. OY may be lower than MSY, depending on relevant economic, social, or ecological factors. In the case of an overfished fishery OY should provide for rebuilding to B_{msy}.

Recruitment: A measure of a number of fish that enter a class during some time period, such as the spawning class or the fishing-size class.

Yield per Recruit (YPR). Amount of per-capita yield obtained at a given value of F, conditional on values of partial recruitment, growth and natural mortality.

Appendix J. *Oculina* Banks: Habitat Fish Populations, Restoration, and Enforcement.

Oculina Banks: Habitat, Fish Populations, Restoration, and Enforcement.

Christopher C. Koenig
Department of Biological Sciences
Florida State University

Report to the South Atlantic Fishery Management Council
December 2001

Oculina Banks: Habitat, Fish Populations, Restoration, and Enforcement.

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Department of Biological Sciences
Florida State University

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Abstract

The shelf-edge *Oculina* coral reef ecosystem, known only from off the central east coast of Florida, is unique among coral reefs and exists nowhere else on earth. The azooxanthellate (i.e., lack symbiotic algae) branching coral typically produces 1 – 2 meter diameter coral heads which often coalesce into thicket-like habitats with exceedingly high biodiversity, similar to that of tropical coral reefs. Historical accounts indicate very high densities of economically important reef fish as well as grouper spawning aggregations associated with the coral habitat. The uniqueness, productivity, and vulnerability of the *Oculina* habitat moved the South Atlantic Fishery Management Council (SAFMC) in 1984 to declare a significant portion (92 nmi^2) of the habitat an HAPC. This legislative action purportedly protected the coral from trawling, dredging, and most other mechanically disruptive activities. Evidence of demographic impacts of fishing on grouper spawning aggregations further stimulated the SAFMC in 1994 to close the original HAPC for a period of 10 years to bottom fishing as a test of the effectiveness of a fishery reserve in protecting the reproductive capacity of groupers. Further expansion of the original HAPC to cover 300 nmi^2 was instated in 2000. A 1995 submersible survey suggested that much of the habitat, the economically important fish populations, and the grouper spawning aggregations described in the 1970s were decimated by 1995. A broad-scale submersible and ROV survey conducted in September 2001 found that most (90%) of the *Oculina* habitat within the EORR is reduced to an unconsolidated rubble and the damage north of the EORR may be greater. To our knowledge, only about 8 hectares (20 acres) of fully intact Oculina thicket habitat remain in the OHAPC and probably in the world. Restoration experiments were run from 1996 to 1999 to evaluate the transplantation potential of *Oculina*. High rates of transplant survival induced NMFS to support a significant restoration effort in 2000 and 2001. Results of the restoration efforts of 2000 indicate that restoration structures designed to simulate Oculina habitat are attracting groupers, snappers, and amberjack, and may be sites of grouper spawning aggregations. Oculina habitat and fish populations within the EORR were described quantitatively (expressed in terms of density, nos./hectare) using a system of two cameras with attached lasers. Although fish populations observed in 2001 were not directly comparable to those observed in 1995, there was a noted increase in grouper numbers and size and especially an increase in the abundance of males of gag and scamp, suggesting the reoccurrence of spawning aggregations of both species. Juvenile speckled hind were observed in Oculina thickets, suggesting a nursery function for this species. Evidence is very strong that shrimpers are still illegally trawling within the OHAPC, and suggestions are made to eliminate such threats to this vulnerable, but productive habitat. We have initiated work on a habitat map of the OHAPC and produced a protocol to continue habitat mapping.

INTRODUCTION

Background

The shelf-edge *Oculina* coral reef ecosystem, known only from off the central eastern coast of Florida (Figure 1), is unique among coral reefs, existing nowhere else on earth. This area is called the *Oculina* Banks because the coral, *Oculina varicosa* (ivory tree coral), grows primarily on limestone ridges and pinnacles which are distributed throughout the area. The Banks extend about 167 km (90 nmi) along the shelf edge from Fort Pierce to Daytona, Florida, from about 32 to 68 km offshore in depths of 70-100 m (Avent et al., 1977; Reed, 1980; Thompson and Gulliland, 1980; Virden et al., 1996). The azooxanthellate (i.e., lack symbiotic algae) branching coral typically produces 1 – 2 meter diameter coral heads which often coalesce into thicket-like habitats with exceedingly high biodiversity (Reed et al. 1982, Reed and Mikkelsen 1987), similar to that of tropical coral reefs. The Banks are important because they are unique and productive; very high densities of economically important reef fish as well as grouper spawning aggregations have been recorded in the past.

History of Research and Management in the Oculina Banks

From as early as the 1970s researchers conducted acoustic and submersible studies of the Oculina Banks. These studies included initial descriptions of the pinnacle and ridge structures (MacIntyre and Milliman 1970, Avent et al. 1977, Thompson and Gulliland, 1980) and various studies of the surficial geology (Hoskin et al., 1983; Hoskin et al., 1987; Scanlon et al., 1999). Other studies focused on the habitat-structuring organism, *Oculina varicosa*, in terms of its growth form and distribution (Reed 1980), growth rate (Reed 1981), reproduction (Brooke 1998), and the effects on survival of transplantation (Koenig et al. 2000), upwelling (Reed 1983) and bioerosion (Reed and Hoskin 1987). Studies on the habitat-associated invertebrate communities (Reed et al., 1982; Reed and Mikkelsen, 1987) indicated very high species diversity. Submersible studies in early April 1980 showed a very high abundance of reef fish, including groupers, snappers, and amberjack and the occurrence of grouper spawning aggregations (Reed and Gilmore 1981, Gilmore and Jones 1992). However, comparable observations made a decade and a half later in 1995 showed dramatic declines in both economically important species and in the grouper aggregations (Koenig et al. 2000).

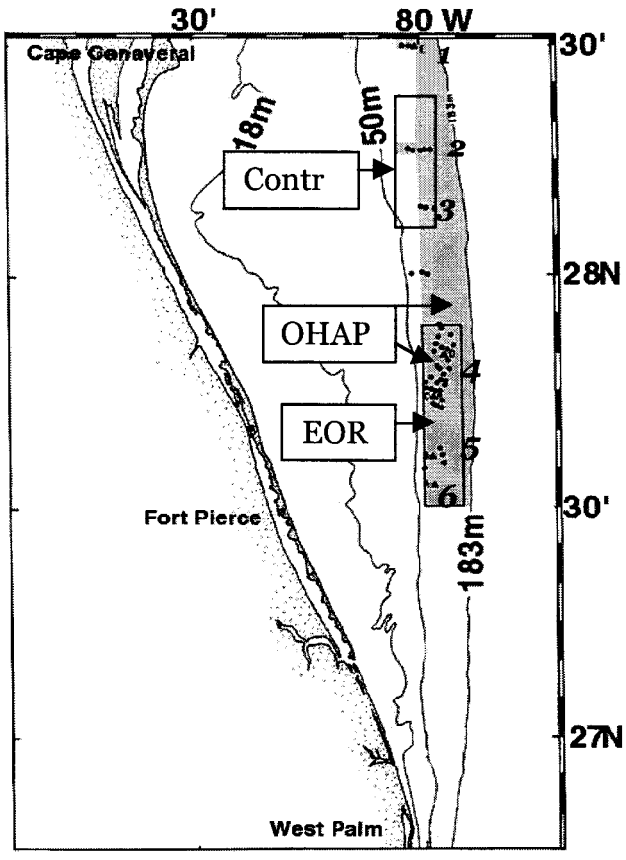


Figure 1. Chart of *Oculina* Banks Habitat Area of Particular Concern (OHAPC), includes the Experimental *Oculina* Research Reserve (EORR) showing dive areas visited in 2001 (numbers 1-6). Dots are historic dive sites visited in the 1970s and 1980s. Dive areas: 1. Cape Canaveral, 2. Cocoa Beach, 3. Eau Gallie, 4. Sebastian, 5. Chapman's Reef, and 6. Jeff's Reef. Note: the shaded area is the entire OHAPC, the EORR is the smaller inset box.

It was soon recognized that the Oculina habitat was not only unique and valuable fish habitat, it was also delicate and vulnerable to mechanical disruption. So, in 1984 a 92-nmi^2 portion was designated as the *Oculina* Habitat Area of Particular Concern (OHAPC) by the South Atlantic Fishery Management Council (SAFMC) within the Fishery Management Plan for Corals and Coral Reefs. This action prohibited the use of trawls,

dredges, traps, and long lines in this area. In 1994, acting on information suggesting that aggregation fishing induced severe demographic changes in grouper populations, the SAFMC closed the original HAPC to bottom fishing for a period of 10 years and called it the Experimental *Oculina* Research Reserve (EORR). The intent of this closure was to experimentally evaluate the effects of a marine protected area (MPA) on fish communities and grouper spawning aggregations. In 2000 the SAFMC expanded the OHAPC to 1029 km^2 (300 nmi^2) and prohibited the use of all gears that could cause mechanical disruption of the habitat.

In early September 2001, eight days of the "Islands in the Stream Expedition" (Co-PIs: A. Shepard, C. Koenig, J. Reed, G. Gilmore) were devoted to submersible (Clelia) and ROV studies in the OHAPC. The objectives of this cruise included: (1) estimation of the percentage of live relative to dead and destroyed Oculina habitat within the OHAPC, (2) quantitative characterization of the living habitat, (3) quantitative evaluation of the fish populations in the EORR and comparison with historic observations, (4) evaluation of fish populations associated with the restoration reefballs deployed in 2000, and (5) to initiate development of a GIS-based habitat map of the OHAPC. The primary purpose of this paper is to report on the present condition of the OHAPC with respect to habitat, fish populations, restoration, and surveillance and enforcement.

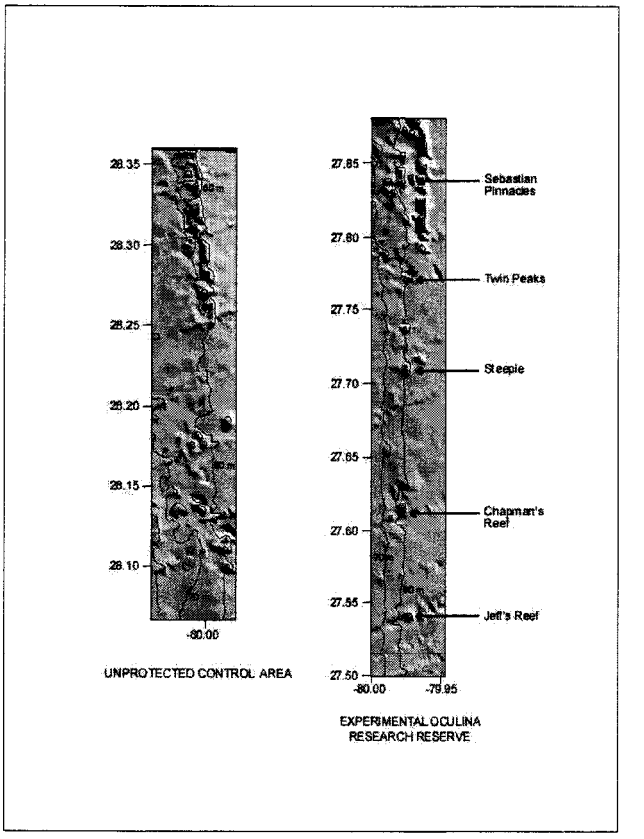


Figure 2. Shaded relief map (Scanlon et al. 1999). Coordinates are decimal degrees. Image to right is the EORR closed in 1994; image to left is just north west and includes protected habitat (OHAPC) and unprotected habitat (west of 80°W longitude).

MATERIALS AND METHODS

Habitat surveys:

We used a Phantom S4 ROV for habitat surveys. Our objectives in these surveys were: (1) to sample as much of the high relief areas as possible to estimate the percent live coral habitat remaining in areas where it had once flourished, and (2) to revisit historical sites identified in the 1970s to see if the habitat has changed since then. The first objective was met by running the ROV from south to north (with the Florida Current) at speeds of 0.5 to 1.5 knots. The ROV was tethered to a down weight with a 20 m line so that the tension was taken off the umbilical. The umbilical was clipped to the winch cable that suspended the down weight off the bottom while the ship drifted under power to the north in the current. Although the ROV could be maneuvered up and down to some extent, the ROV operator, captain, and winch operator were in constant communication. The captain would anticipate high-relief structures with the echosounder and relay that information to the winch and ROV operators and the ROV operator would indicate to the winch operator the extent to which the ROV was to be raised or lowered to avoid collision with high-relief structures.

ROV transects were arranged so that they crossed ridges and pinnacles, the structures supporting Oculina thicket habitat. The ROV transects were random in the sense that we had no a priori knowledge of the habitat condition. Reference point coordinates were recorded while ROV transects were under way to identify changes in habitat and/or depth. ROV videotapes were later reviewed to determine the condition of the habitat on the ridges and pinnacles, and to classify habitats as intact, sparse, or dead. Intact habitats are undisturbed, being composed of large coral heads of 1 to 2 m in diameter, arranged in a thicket-like pattern, and providing multi-scale interstices for a variety of reef fish. Sparse habitat has the appearance of disturbed habitat and is composed of small colonies sparsely distributed in a field of rubble, providing little cover for larger species of fish. Dead habitat is composed of unconsolidated coral rubble, providing little to no habitat cover for any species of reef fish. The ROV transects can be thought of as long thin random samples of ridges throughout the region. The relative area of each habitat class (intact, sparse, or dead) was estimated as the percent time the

ROV passed over that habitat class. Our best estimates of habitat condition are in the EORR because our sampling intensity was greatest there.

We also tried to revisit a number intact coral habitat sites throughout the OHAPC that were observed and videotaped during the 1970s (Reed 1980). However, the coordinates of those sites were based on LORAN A and C, which is far less accurate than DGPS, which is now used for positioning. Thus, we could not be certain that the same sites observed in the past were revisited, with the exception of the Cape Canaveral site. That site is associated with a distinct ridge and cannot be confused because there are no surrounding ridges.

Habitat characterization:

A protocol for mapping deep reefs was developed by Koenig and Coleman (unpublished) and was adapted to the OHAPC conditions for the 2001 cruise (a copy is included in the Appendix). We used a submersible and an ROV in our studies and relied heavily on the side-scan sonar maps developed by Scanlon et al. (1999) to provide the locations (based on geomorphology) for investigation.

Habitat was characterized through the use of belt transects with the submersible. Harbor Branch Oceanographic Institution's (HBOI) submersible, Clelia, was equipped with two video cameras, down-looking and forward-looking, and a set of lasers associated with each. The down-looking camera had 2 parallel laser beams, 25 cm apart, in the field of view; these lasers gave us scale and allowed us to standardize quadrat size. The forward-looking camera had 3 lasers, two parallel beams 10 cm apart and one beam, in line with the others and 10 cm apart from the adjacent laser, converging on the other two. The converging beam was adjusted so it touched the adjacent beam at a distance of 5 m. The three lasers allowed us to determine sizes of fish, coral heads, and habitat features, but most importantly, distance. We used the distance estimates to determine visibility, and the area (length x width) of the belt transects. Transect areas were calculated (see below under 'Fish Populations') and fish counts were recorded for each transect as numbers per square meter of transect, then the fish densities for each transect were averaged for all transects within that habitat type and expressed as numbers per hectare.

Percent live coral cover was determined from the down-looking video. Random frames from transect videos were selected and standardized relative to the laser metric in the frame. Standard-size quadrats were overlain with a set of 100 randomly distributed dots. The percentage of dots touching live coral was taken as the percent cover. Randomly selected coral heads were measured using the laser metric in the frame.

Fish Populations:

The forward-looking camera with its three lasers was used to estimate fish density. We realize that the error associated with determining the density of small cryptic species is great, but our main concern was with larger economically important species (Koenig et al. 2000). Nevertheless, all fish seen in a transect were counted. Species that tend to follow the submersible and circle it, such as amberjack, were not repeatedly counted as they passed through the video field, but their total abundance was estimated as a group by observers in the submersible.

Estimates of the area of a transect require several values: the effective distance for identifying fish species (D), the camera's horizontal angle of view (A), and the length of the transect (L). The effective distance (D) may not be the limits of visibility, but instead the limit at which the fish can be identified with a high degree of certainty. In the work we report here, the visibility was consistently greater than 5 m, but we used 5 m as our standard distance for counting and counted no fish beyond that distance from the camera. The horizontal angle of view (A) depends on the camera used and the position of the zoom. Transects on the IIS 2001 cruise were run with an Insite-Tritech high sensitivity (0.0003 lux), high resolution (560 video lines), monochrome _ inch CCD underwater (rated to 3000 m) video camera with a 92 degree angle of view (no zoom). The exact coordinates (DGPS) of the sub at the start and end points of transects were recorded and transect length (L) was measured using an ArcView program.

First we calculated the width of the field of view (W) at distance (D) by:

$$W = 2 (\tan (\_A)) (D),$$

Then we calculated the area of the transect (TA) as:

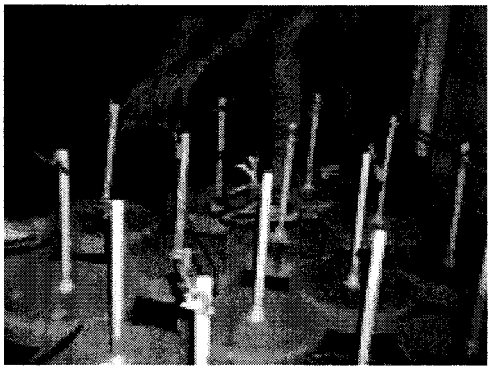
$$TA = (L \times W) - \_ (W \times D)$$

Estimating the area of a transect allowed us to calculate the average density (number per hectare) and standard error of observed fish species.

Restoration

In EORR locations like Sebastian Pinnacles (Figures 1and 2), virtually all the coral has been reduced to unconsolidated rubble, apparently by trawling (Koenig et al. 2000). Preliminary coral transplant experiments were conducted from 1996 to 1999 and demonstrated the high survival rates of transplanted coral. In 2000 on Sebastian Pinnacles, we started the first large-scale transplanting. Two types of transplant structures were deployed, reefballs (Figure 3) and reefdisks (Figure 4). Reef balls, perforated hemispherical concrete structures of 1-m diameter and 0.7 m high, simulate *Oculina* coral heads and provide fish with benthic structure similar to natural coral heads. Reefdisks, small 0.3 m diam concrete disks with attached vertical 0.4 m PVC posts with attached coral, were deployed to evaluate the effect of fragment size on transplant survival and growth (smaller fragments mean less impact to donor sites).

Figure 3. Reefball with attached Oculina. The orange float is for relocation with the ship's ecosounder.



Our purpose for deploying reefballs and reefdisks were two-fold, first to start large-scale restoration in denuded areas, and second, to evaluate the most effective restoration approaches. One hundred and five reefballs were arranged in clusters of 5, 10, and 20 in a randomized block design (Table 1) to determine the most effective cluster size in terms of attracting fish, and especially grouper spawning aggregations. Four hundred and fifty reefdisks (Table 1) were also deployed in a randomized block design to evaluate fragment size in terms of survival and growth of the coral transplants.

Figure 4. Reefdisks with attached Oculina fragments.

We observed reefballs and the reefdisks deployed in 2000 with the submersible in 2001, thirteen months after deployment. Although our observations were too soon after deployment to determine transplant survival and growth, we recorded the reeffish populations associated with the reefballs. Over time we will continue our observations of these restoration sites to follow coral growth and fish populations. We anticipate that coral fragments will grow to cover the concrete structures to further simulate natural habitat with a concomitant development of reeffish populations.

Surveillance and Enforcement

We looked for trawl tracks in all areas searched with the submersible. We also obtained a list of trawling violations in the OHAPC from the Office of General Council for Enforcement and Litigation, NOAA, NMFS, SERO. We also contacted the Coast Guard office in Charleston and will give a presentation to their group on the Oculina Banks and the necessity for surveillance and enforcement.

RESULTS

Habitat Surveys:

We made 7 ROV transects over high-relief features within the EORR and 3 outside the EORR for a total of 9,686 m of ROV video on ridges. Only the portions of the transects that were on these features were counted, and several transects that did not include high-relief features were excluded. Within the EORR, 7,645 m of ridge features were viewed in 7 transects in both the Chapman's Reef area (3 transects) and the Sebastian area (4 transects). Of the 7,645 m of ridge transected within the EORR, 464 m (6%) were intact habitat, 302 m (4%) were sparse habitat, and 6,877 m (90%) were unconsolidated rubble. The only intact habitat we found was Jeff's

Reef and the western ridge of Chapman's Reef. Jeff's Reef is about 4 hectares in area and the western ridge of Chapmans Reef about the same size, so the total area of live thicket habitat is about 8 hectares, or about 20 acres. The only sparse habitat we found was on the south-facing eastern ridge of Chapmans Reef. Outside the EORR, we found only unconsolidated rubble in 2,041 m of transected ridges. In nearly all cases, there were occasional small colonies of live Oculina associated with the unconsolidated rubble. We also observed sparsely distributed small colonies of Oculina on low relief rocky bottom often associated with large boulders. Some of these colonies were dead but standing.

We attempted to revisit sites documented in the 1970s (Reed 1980). Although there was uncertainty about the exact site locations, none of the sites assumed to be the same as those observed in the 1970s were now intact. The Cape Canaveral site, where the location was certain, was reduced to rubble.

Habitat Characterization:

Submersible videotape analyses are not yet finished. When finished we will have quantitative descriptions of the habitat conditions we observed with the submersible and will quantitatively classify habitats accordingly. The down-looking camera allows us to calculate coral habitat coverage and sizes of coral heads; the forward-looking camera allows us to calculate colony heights, diameters, and spacing. We also have descriptions of the surficial geology (Scanlon et al. 1999) and ROV transects over features of both high and low relief. We anticipate putting together a first-cut habitat classification scheme and map of the OHAPC over the next year which will be available in a GIS format for easy access to the geo-referenced data. In 2002 we are planning a multibeam survey which will give us a more accurate map of the geomorphological features upon which we will build our habitat maps.

Fish Populations

On the 2001 OHAPC cruise we were able to estimate transect areas and therefore described the fish populations in terms of density (numbers per hectare). This is a superior method of video sampling fish populations because it allows statistical comparisons of fish population densities both spatially and temporally, which is important for the evaluation of the effectiveness of an MPA. There is a clear relationship between fish population densities and habitat condition (Figures 5, 6,and 7) as observed in 2001in the southern part of the EORR at Jeff's and Chapmans Reefs. Even pelagic amberjack species were much more abundant in areas of intact habitat.

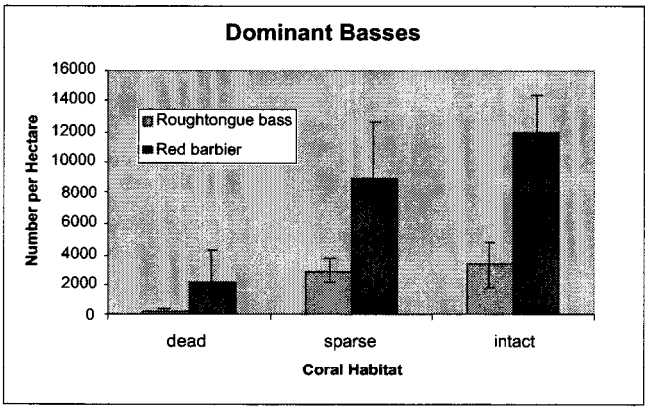


Figure
5. Density of dominant basses (Antheinae) in three habitat classes. Error bars represent standard errors.

We are unable to make quantitative comparisons between our submersible observations in 1995 and those made in 2001 because observations were made in different seasons, and because the approach used in 1995 was intended as a survey rather than a quantitative evaluation of fish populations. At that time we had no idea of the condition of the habitat and the associated fish populations, nor did we have sidescan images to guide us in our submersible studies. At that time the only live habitat we found was on Jeff's Reef, a 4 hectare ridge in the southern-most portion of the EORR (Figure 2). So, our comparisons between 1995 and 2001 must be restricted to Jeff's Reef and must be qualitative.

Our 1995 observations were made in March, during the gag and scamp spawning season, and the 1980 observations (Koenig et al. 2000) were made during the same period. However, our 2001 observations were made during early September, well after aggregations have dispersed. Nevertheless, we saw more and larger groupers (we have not completed our fish measurements) in 2001 and male gag and scamp were common in intact habitat. This observation suggests that both gag and scamp aggregations are functional again in intact habitat areas where they were observed in 1980. We also observed juvenile (yellow phase) speckled hind

associated with the Oculina habitat suggesting that Oculina thickets function as juvenile habitat for this species. Amberjack were more abundant in 2001 than in 1995.

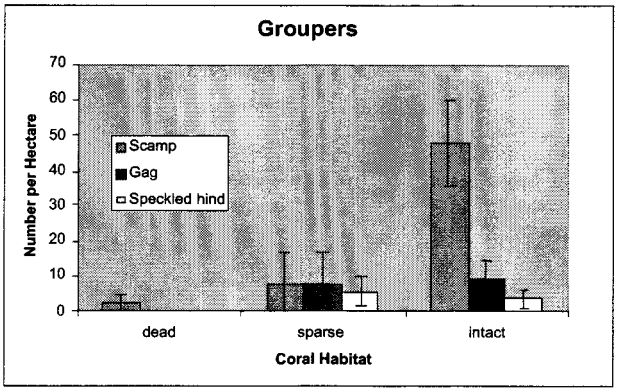
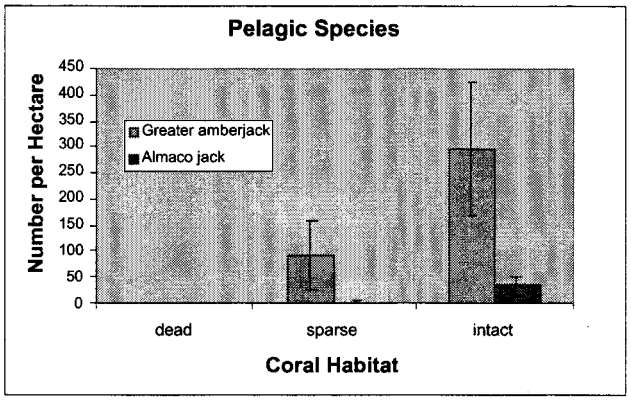


Figure 6. Density of groupers in three habitat classes. Error bars represent standard errors.

Reef fish abundance around reefballs was much greater than over the dead habitat that surrounded them (compare Tables 2, 3, and 4). Especially important is the observation of economically important species associated with the reefballs. These species include groupers, snappers and amberjack. We observed behaviors similar to that of courtship behavior in scamp (see Gilmore and Jones (1992) for description), but it appeared to be between males. It is possible that some of the reefball sites are already functioning as spawning aggregation sites, but we won't be certain until we observe the area during the spawning season. We also observed male gag in the vicinity of the reefballs.

Figure 7. Density of pelagic species in three coral habitat classes. Error bars represent standard errors.



Restoration

We could not be certain of the survival rates of the transplanted coral associated with reefballs and reefdisks. However, the few close-up views we had of the coral suggest very high rates of survival. We must wait until the coral has had more time to grow to be certain.

Surveillance and Enforcement

During our submersible observations of the reefballs and reefdisks we noted that two of the reefdisk clusters were missing and left in their place were several broken pieces of PVC. The PVC was broken, not detached, from the concrete-disk bases indicating strong mechanical impact. In the vicinity of the missing reefdisk clusters were apparent trawl tracks in the rubble (Figure 8).

Poaching trawlers apparently continue to operate within the EORR and other parts of the OHAPC. Arrests for poaching occurred on 21 July 1993, 2 October 1994, 19 November 1994, and 19 January 2000.

DISCUSSION

This report describes the present condition of the OHAPC in terms of the habitat, fish populations, and restoration work. The data are predominantly derived from the first leg of the 2001 "Islands in the Stream" Expedition which involved the use of a manned submersible (HBOI's Clelia) and an ROV (see http://oceanexplorer.noaa.gov/explorations/islands01/islands01.html for details). We are still processing these data, so this report is not complete. In eight days, sixteen sub dives and thirteen ROV dives were conducted throughout the EORR and other portions of the OHAPC (Figures 1 & 2), resulting in more than 70 hours of underwater videotape documentation. Unexplored areas and their associated fish populations were surveyed, characterized, quantified, and video documented. Over all, the habitat is in very poor condition, with about 90% of it reduced to an unconsolidated rubble, and poaching trawlers continue to operate within the OHAPC.

After just one year, all species of groupers observed in 1980, with the exception of Warsaw grouper, were seen in association with the reefballs. Also, there were signs suggestive of the formation of scamp and possibly gag spawning aggregations in association with these artificial structures. These signs included the presence of males of both species and scamp male gray-head patterns characteristic of spawning sites. However, these encouraging signs must be verified with observations during the spawning season.

Figure 9. Juvenile speckled hind on Chapman's Reef among Oculina thickets.

Restoration

A good understanding of Oculina life history is important to the success of restoration efforts. For example, we know that coral fragments survive to grow into new colonies, but we also know that Oculina produces billions of free-swimming larvae each year. Why then does recruitment appear to occur in the OHAPC at a such a slow rate? On all the concrete structures we have deployed thus far (56 reefblocks and 105 reefballs) we have observed a new recruit only once. Yet artificial reefs and wrecks off St. Augustine and Jacksonville are covered with small Oculina colonies (Koenig, personal observation). Clearly, current regimes at several scales and settlement conditions play important roles in recruitment. But our understanding of recruitment process in this species is very poor.

Starting in 1996 and continuing through 1998 we tested the survival of Oculina fragments affixed to PVC posts on reefblocks (18 concrete blocks strapped together). We deployed 56 such reefblocks, half (28) of which had coral attached to the four upper corners of the blocks. Half the reefblocks were deployed in the northern portion of the EORR and half were deployed in the southern portion. Over the years, including 2001, we observed some reefblocks from different regions of the EORR with both ROV and submersible, as conditions would allow. In all cases that we observed where the coral was present, it was alive and growing. In not a single case did we find attached fragments that were dead, although some fragments were apparently stripped off by fishing activities, because in those cases the reefblocks were entangled with fishing line.

When we began our reefblock studies of Oculina fragment survival a significant problem we encountered was the collection of enough coral to conduct the transplant experiments. We selected heavily damaged sites for these collections and had to collect the coral with an ROV equipped with a front-mounted dip net. But recently we discovered that large deepwater wrecks within and just outside of the OHAPC are covered with large Oculina colonies (Figure 10). Some of these wrecks were sunk by U-boats during World War II, but some are thought to have been around since the turn of the last century. Some Oculina colonies on these wrecks are several meters in diameter (Mike Barnette, Association of Underwater Explorers, personal communication). This year for the first time we collected some of the coral growing on these wrecks to use in our restoration work. Mr. Barnette and his associates volunteered to collect the coral using trimix gas in open circuit SCUBA.

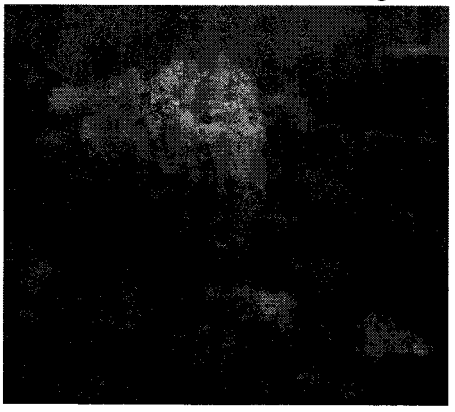


Figure 10. Oculina coral heads on wreck in the OHAPC.

In contrast, the apparent success of the restoration experiments and the observations of increased grouper abundance suggesting the reoccurrence of aggregations is encouraging.

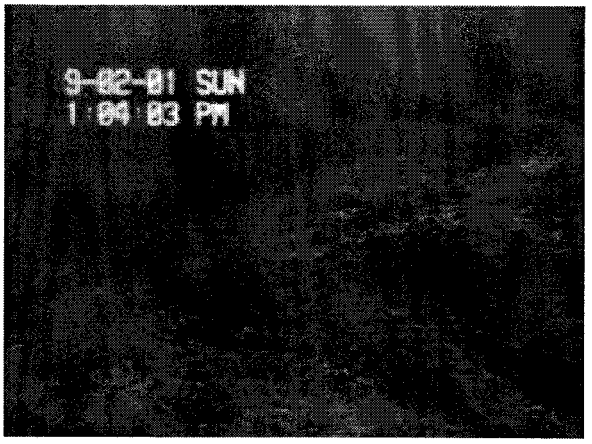


Figure 8. Apparent trawl tracks in the Sebastian area of the EORR.

Habitat Surveys

ROV surveys were designed to sample the geomorphology most likely to support intact coral thicket habitat, namely, ridges and pinnacles. We found no new sites of live coral thickets and the status of known intact coral habitat was either similar or worse compared to past studies. Intact coral thickets were still in good condition at Jeff's Reef and the western ridge of Chapman's Reef, both of which are at the southern end of the EORR. In other places, live coral primarily inhabited low-relief (< 1 m) sites, but the small size and dead standing colonies suggest these low relief areas are marginal for the survival and growth of the coral. Future experiments should examine Oculina senescence and test the hypothesis that low relief provides marginal survival conditions.

Although trawling activities have undoubtedly contributed to destruction of *Oculina* coral habitat of the *Oculina* Banks, impacts from other factors may also be significant. The incriminating evidence implicating trawlers includes trawl tracks, lost and broken experimental coral transplant structures, and recent (2000) arrests of poaching trawlers. Also, reefs in the northern OHAPC that had extensive live coral in the 1970s and 80s had been reduced to rubble when revisited in 2001. Other factors that may account for damaged coral habitat include (1) Extreme temperatures. Bottom temperature in the OHAPC range from 7.4 to 26.7°C, as upwelling events occur annually (Reed, 1981), but the impact on *Oculina* is unknown. (2) Excessively high nutrient and sedimentation levels. Upwelling events may raise nutrient and sedimentation levels by an order of magnitude, but *Oculina*, especially the shallow form, appears tolerant of turbidity and sedimentation (Reed, 1981, 1983). (3) High currents. Currents on the bottom in the OHAPC may exceed 100 cm sec^{-1}, enough to erode tips of coral branches (Reed, 1981; Hoskins et al., 1983), but it is unknown whether entire colonies can be destroyed by high currents and it seems unlikely that currents would destroy habitat in one area, but not in an adjacent area. (4) Pathogens. Deep-water corals may be susceptible to pathogens as are shallow-water reef corals, but there have been no directed studies of coral diseases in the OHAPC or in any other deep-water coral habitats. (5) Anthropogenic impacts other than trawling. Explosive depth charges used in the area during World War II may have also impacted the coral. (6) Freshwater seepage may cause localized mortality. However, among the many factors that potentially could have killed *Oculina* coral, the most likely for most of the OHAPC is trawling because most of the banks are reduced to unconsolidated rubble which would likely result from mechanical impacts. Nevertheless, further research on potential impacts from factors other than trawling could provide explanations for some of the coral loss.

Habitat Characterization

Quantitative habitat characterization is important because it allows meaningful temporal comparisons, an important consideration for MPAs. It is impossible to ascertain whether the habitat is growing or senescing from single observations. To determine the trajectory of habitat development periodic measurements must be made. For example, we do know whether sparse coral habitats are growing back from some historical mechanical disruption or if the habitat remains as such because ambient conditions don't allow continued growth and development. Also, we know that linear growth is between 1 to 2 cm per year, but under marginal habitat conditions growth might be very much slower than this.

In the future we intend to establish permanent reference stations in selected habitat classes throughout the OHAPC. Habitat classes will be based on quantitative descriptors of coral coverage and the size of coral heads. Reference stations with permanent monuments will allow quantitative evaluation of future changes in OHAPC habitats and fish populations. Selection of reference stations will be based on our habitat descriptions, which

are a combination of geomorphology and benthic biological features, and will include selected historic sites observed and videotaped in the 1970's, in 1995, and in 2001. Emphasis will be on intact *Oculina* habitat, but we will also establish reference sites in other areas of the OHAPC, including sparse and dead coral habitat.

Fish Populations

Overfishing has resulted in a drastic decline of reef fish stocks throughout the southeastern U.S. (SAFMC, 1999). Most of the snapper-grouper complex that inhabited the OHAPC are considered overfished. These include red porgy, black sea bass, gag, scamp, snowy grouper, red grouper, Warsaw grouper, speckled hind, red snapper, and vermilion snapper. It is not certain whether hook and line fishing has continued within the EORR but clear evidence of it was reported to the SAFMC in 1997 (Koenig, unpublished data), three years after the area was closed to bottom fishing. Nevertheless, there are signs of recovery of the fish populations, especially the dominant groupers and amberjack. Future observations should be scheduled in the late winter and early spring so that comparisons can be made to historical observations.

Fish population quantification through the use of belt transects is much preferable to non-quantitative surveys because they provide a statistical basis for spatial and temporal comparisons. Such quantitative measurements are relative abundance, not absolute abundance, so comparisons in time and space must be consistent. That is, comparisons should only be made between the same seasons and at the similar times of the day because populations change seasonally (e.g., seasonal aggregations) and all fishes have diurnal activity patterns. Also, as shown in this report, comparisons must be within similar habitat types.

Positive trends in fish populations within the EORR include observations of relatively abundant gag and scamp populations and males of both species. Over the past couple of decades the size, age, and proportion of males of these species has declined in both the Gulf and the south Atlantic regions (Koenig 1996, Coleman et al. 1996, McGovern et al. 1998, and Koenig et al. 2000), apparently the result of intense aggregation fishing. But the protection of aggregations through the use of year-round MPAs appears to reestablish historical demographics, including sex ratio (Koenig, unpublished data from the Gulf MPAs). The presence of gag and scamp males in the EORR and the greater size of these fish relative to observations in 1995 support the contention that MPAs protect the demographics of these species. However, it is necessary to observe the spawning aggregations in February and March, the time of peak spawning, before we can be certain.

We observed juvenile speckled hind in association with the Oculina thickets of Jeff's and Chapman's Reefs (Figure 9). Speckled hind has been vastly overfished in the past several decades, to the point where they are being considered for threatened species status. Apparently, Oculina serves a juvenile habitat function for this recovering species.

They easily collected more than enough in a single dive. Now that we are aware of this coral resource, we are testing survival rates on coral that is broadcast directly onto the bottom from the surface without any structure to support the fragments off the bottom. If coral survival rates are high for this simple and inexpensive broadcast method, we will use it to start coral growing in rubble areas throughout the HAPC. Restoring destroyed Oculina habitat is similar to restoring a forest from a plowed field; it will take many decades.

It is important to understand the causes of habitat loss before restoration efforts are put into place. Without this understanding, we can't be sure that our efforts will be productive. In the *Oculina* Banks the evidence is strong that trawling is responsible for a large part of the damage we have observed. That is not to say that trawling is responsible for all of it. We know nearly nothing about natural senescence of *Oculina* coral or natural causes of mortality. The reference sites we intend to establish will contribute to our understanding of natural (non-anthropogenic) mortality because we will be able to follow the course of development of individual coral heads over time while we are monitoring environmental factors. However, in areas where the habitat has been reduced to unconsolidated rubble, and there are trawl tracks and missing and broken reefdisks, the most likely cause of the destroyed habitat is trawling. Therefore our restoration structures were deployed in these trawl-destroyed areas.

This year, 2001, we deployed another set of reefballs (120) in six clusters of 20 each and reefdisks (450) in 18 clusters of 25 each near the sets we deployed last year, in the Sebastian area of the EORR (Table 6). In the 2000 set we observed that smaller reef fish such as the red barbier and the roughtongue bass, which are extremely abundant in live Oculina habitat, occurred in relatively low numbers around the reefballs. Assuming that this was because of a lack of small-scale habitat complexity, we tested that idea by increasing the internal complexity of half of the clusters of reefballs with plastic-coated wire mesh. This experiment will be evaluated in the future.

Surveillance and Enforcement

Observations show that trawling activities have impacted and continue to impact the OHAPC. The typical penalty to trawlers caught poaching in the OHAPC is confiscation of their catch. This was the penalty imposed on the trawler caught poaching in 2000. However, if the fine is insufficient and is perceived by the captain of the trawler as the cost of doing business, poaching will continue. For example, trawlers presumably go into the OHAPC because catch per effort is increased. Say the catch per effort is doubled, but the trawler is only caught in the reserve 10% of the time he poaches. A confiscated catch is relatively insignificant to his poaching gains. I do not know how often night time surveillance of the OHAPC is conducted because I was told by Coast Guard officials that that is classified information and the Coast Guard will not release it, but I would doubt that it is more than once every 10 days. In that case, if our trawler example poaches every night he would only be caught 10% of the time on average.

The poaching arrests may not represent the degree of poaching that is going on in the OHAPC. When the trawler was caught in 2000 there were actually three trawlers observed in the OHAPC, but only one was run down after a half-hour chase (J. Reed, personal communication). And they were caught at 9 AM, not at night, suggesting that if they had left before sun-up they would not have been caught.

NMFS agents confiscated the plotter trawling zone information from the vessel caught poaching in 2000, but this information on illegal trawling locations is not available to fishery managers and scientists working in the area because it is considered proprietary and cannot be released without the consent of the vessel owner (Karen Raine, NMFS senior enforcement attorney, personal communication). However, this information is important to managers because it shows where surveillance should be concentrated and it is important to scientists to compare trawled and untrawled habitat.

Special protection should be given to the remaining Oculina thicket habitat occurring on Jeff's Reef and on the western portion of Chapman's Reef. To our knowledge these are the only Oculina thicket habitats remaining in the world, and it amounts to only about 8 hectares (20 acres). A trawler could easily destroy all of it in a single night.

I have several recommendations to improve surveillance and enforcement within the OHAPC. (1) The SAFMC and scientists conducting experiments within the OHAPC should be appraised of the level of night time surveillance that is taking place and has taken place within the OHAPC in the past so that the level of surveillance effort is understood by all concerned. (2) The information derived from poachers on the location of their illegal activities should be made available to managers and scientists so that this information can be used

for management and restoration purposes. (3) Special measures should be taken to ensure that the only known remaining Oculina thicket habitat is protected. (4) Penalties to poachers should be stiff enough to deter future poaching, like confiscation of their vessels. (5) Novel approaches to surveillance/enforcement should be installed as soon as possible such as vessel monitoring systems (VMS) and listening buoys in key areas identified by confiscated plotter information and in the area of Jeff's and Chapman's Reefs.

Habitat classification and mapping in the OHAPC

Habitat maps are fundamental to the study and management of living natural resources. In the marine environment, the development of objective, systematic, and intuitively understandable habitat maps has just begun (Mumby and Harbourne 1999). In the southeastern United States, habitat mapping is urgently needed in areas of greatest fishery production, such as shelf-edge reefs so that management of these most essential of fish habitats can be effectively managed. We are in the process of developing a habitat map of the OHAPC (see our protocol to habitat mapping in the Appendix).

A habitat map includes three primary components: geomorphology, community structure and distribution, and a data management system. The geomorphological map consists of acoustic imagery of the bottom, either sidescan or multibeam, and is the first step in developing a map. Patterns of community distribution are then associated with the various geomorphological features and described using video documentation with ROVs and submersibles. The data management system integrates these data into a geographically referenced database, or Geographic Information System (GIS), that provides easy access to the data.

NMFS, with funding from the National Coral Reef Initiative, intends to support a synoptic multi-beam bathymetric and survey of the entire OHAPC in May 2002 (Andy Shepard, NURC-Wilmington, personal communication). And the principal investigators of this years Island in the Stream study have a proposal into the Ocean Exploration Program to continue the 2001 work into 2002. If these projects come about we will be able to put together a first-cut OHAPC habitat map by late 2002 or early 2003.

Acknowledgements

Thanks go to those who organized and helped run the "Islands in the Stream" cruise, including Andy Shepard and Tom Potts of NURC-Wilmington and John McDonough and Sammy Orlando of NOS, and Felicia Coleman of FSU. The principal investigators of that cruise, John Reed of HBOI, Grant Gilmore of Dynamac Corp., Andy Shepard, and the author of this report, contributed perspectives from the distant and recent past and coordinated the cruise objectives. Mike Barnette and other members of the Association of Underwater Explorers collected the *Oculina* coral for the restoration work off deep wrecks in the OHAPC. Kathy Scanlon of USGS, Woods Hole continues to contribute to our understanding of the surficial geology. I would especially like to acknowledge the support of the NMFS Panama City Laboratory with particular thanks to John Brusher, who reviewed all the ROV and submersible videotapes, Lyman Barger, who analyzed the ROV and submersible track data, and Andy David who helped organize and run the cruise. John Brusher and Chris Palmer of NMFS-PC and John Reed and Sandra Brooke of HBOI contributed significantly to the restoration work. Special thanks go to Lance Horn of NURC-Wilmington for his expert piloting of the ROV. Funds for the "Islands in the Stream" OHAPC study were supplied by NOS and NMFS-SEFSC.

Appendix J

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TABLES

Table 1. Time and location of reefball and reefdisk deployment in the Sebastian Pinnacles area of the EORR in September 2000.

Structure	Date	Location	Site	Latitude	Longitude	Deployment
ReefBall	9/8/00	Sebastian Pinnacles	B1a	27o 50.974'	79o 57.698'	Cluster-8, 1 frag.ea., no floats
ReefBall	9/8/00	Sebastian Pinnacles	B1a'	27o 50.895'	79o 57.710'	Cluster-2, 1 frag.ea, 2 floats
ReefBall	9/8/00	Sebastian Pinnacles	B1b	27o 51.098'	79o 57.750'	Cluster-20, 1 frag.ea., 2 floats
ReefBall	9/8/00	Sebastian Pinnacles	B1c	27o 51.200'	79o 57.700'	Cluster-5, 1 frag.ea, 2 floats
ReefBall	9/8/00	Sebastian Pinnacles	B2a	27o 51.501'	79o 57.742'	Cluster-20, 1 frag.ea, 2 floats
ReefBall	9/10/00	Sebastian Pinnacles	B2b	27o 51.600'	79o 57.700'	Cluster-5, 1 frag.ea, 2 floats
ReefBall	9/10/00	Sebastian Pinnacles	B2c	27o 51.700'	79o 57.700'	Cluster-10, 1 frag.ea, 2 floats
ReefBall	9/10/00	Sebastian Pinnacles	B3a	27o 51.960'	79o 57.831'	Cluster-5, 1 frag.ea., 2 floats
ReefBall	9/10/00	Sebastian Pinnacles	B3b	27o 52.085'	79o 57.902'	Cluster-20, 1 frag.ea., 2 floats
ReefBall	9/10/00	Sebastian Pinnacles	B3c	27o 52.208'	79o 57.911'	Cluster-10, 1 frag.ea., 2 floats
Reefdisk	9/9/00	Sebastian Pinnacles	D1a	27o 51.000'	79o 57.650'	Cluster-25, 1small frag.
Reefdisk	9/9/00	Sebastian Pinnacles	D1b	27o 51.100'	79o 57.690'	Cluster-25, 1small frag.
Reefdisk	9/9/00	Sebastian Pinnacles	D1c	27o 51.200'	79o 57.650'	Cluster-25, 1small frag.
Reefdisk	9/9/00	Sebastian Pinnacles	D2a	27o 51.000'	79o 57.750'	Cluster-25, 1 large frag.
Reefdisk	9/9/00	Sebastian Pinnacles	D2b	27o 51.100'	79o 57.790'	Cluster-25, 1 large frag.
Reefdisk	9/9/00	Sebastian Pinnacles	D2c	27o 51.200'	79o 57.750'	Cluster-25, 1 large frag.
Reefdisk	9/9/00	Sebastian Pinnacles	D3a	27o 51.500'	79o 57.700'	Cluster-25, 1small frag.
Reefdisk	9/9/00	Sebastian Pinnacles	D3b	27o 51.600'	79o 57.650'	Cluster-25, 1small frag.
Reefdisk	9/9/00	Sebastian Pinnacles	D3c	27o 51.700'	79o 57.650'	Cluster-25, 1small frag.
Reefdisk	9/9/00	Sebastian Pinnacles	D4a	27o 51.500'	79o 57.800'	Cluster-25, 1 large frag.
Reefdisk	9/9/00	Sebastian Pinnacles	D4b	27o 51.600'	79o 57.750'	Cluster-25, 1 large frag.
Reefdisk	9/9/00	Sebastian Pinnacles	D4c	27o 51.700'	79o 57.750'	Cluster-25, 1 large frag.
Reefdisk	9/9/00	Sebastian Pinnacles	D5a	27o 51.960'	79o 57.780'	Cluster-25, 1small frag.
Reefdisk	9/9/00	Sebastian Pinnacles	D5b	27o 52.085'	79o 57.850'	Cluster-25, 1small frag.
Reefdisk	9/9/00	Sebastian Pinnacles	D5c	27o 52.208'	79o 57.861'	Cluster-25, 1small frag.
Reefdisk	9/9/00	Sebastian Pinnacles	D6a	27o 51.960'	79o 57.880'	Cluster-25, 1 large frag.
Reefdisk	9/9/00	Sebastian Pinnacles	D6b	27o 52.085'	79o 57.950'	Cluster-25, 1 large frag.
Reefdisk	9/9/00	Sebastian Pinnacles	D6c	27o 52.208'	79o 57.961'	Cluster-25, 1 large frag.

Table 2. Reef fish associated with three clusters of reefballs with 5 reefballs per cluster.

5 per cluster

Species		**Number**	**Percentage**
Roughtongue bass	Pronotogrammus martinicensis	7	41.18
Scamp*	Mycteroperca phenax	3	17.65
Red porgy*	Pagrus pagrus	2	11.76
Snowy grouper*	Epinephelus niveatus	2	11.76
Bank seabass*	Centropristis ocyurus	1	5.88
Tattler	Serranus pheobe	1	5.88
Bank butterflyfish	Chaetodon aya	1	5.88
	Sum	17	

*economically important species

Table 3. Reef fish associated with three clusters of reefballs with 10 reefballs per cluster.

10 per cluster			
Species		**Number**	**Percentage**
Roughtongue bass	Pronotogrammus martinicensis	120	41.52
Greater amberjack*	Seriola dumerili	109	37.72
Almaco jack*	Seriola rivoliana	20	6.92
Scamp*	Mycteroperca phenax	15	5.19
Red snapper*	Lutjanus campehanus	6	2.08
Reef butterflyfish	Chaetodon sedentarius	4	1.38
Blue angelfish	Holocanthus bermudensis	3	1.04
Short bigeye	Pristigenys alta	2	0.69
Cardinalfish	Apogon pseudomaculatus	2	0.69
Bank butterflyfish	Chaetodon aya	2	0.69
Spinycheek Soldierfish	Corniger spinosus	2	0.69
Sharpnose puffer	Canthigaster rostrata	1	0.35
Wrasse	Labridae	1	0.35
Red barbier	Hemanthias vivanus	1	0.35
Snowy grouper*	Epinephelus niveatus	1	0.35
	Sum	289	

*economically important species

Table 4. Reef fish associated with three clusters of reefballs with 20 reefballs per cluster.

20 per cluster			
Species		*Number*	*Percentage*
Greater amberjack*	Seriola dumerili	100	41.32
Roughtongue bass	Pronotogrammus martinicensis	53	21.90
Red barbier	Hemanthias vivanus	25	10.33
Almaco jack*	Seriola rivoliana	20	8.26
Scamp*	Mycteroperca phenax	14	5.79
Wrasse	Labridae sp.	10	4.13
Blue angelfish	Holocanthus bermudensis	5	2.07
Speckled hind*	Epinephelus drummondhayi	3	1.24
Reef butterflyfish	Chaetodon sedentarius	3	1.24
Red porgy*	Pagrus pagrus	2	0.83
Red snapper*	Lutjanus campehanus	2	0.83
Tattler	Serranus pheobe	2	0.83
Puffer	Canthigaster rostrata	1	0.41
Queen angelfish	Holocanthus ciliaris	1	0.41
Snowy grouper*	Epinephelus niveatus	1	0.41
	Sum	242	

*economically important species

Table 5. Reef fish community[1] recorded on rubble bottom in Sebastian area.

Species		Number	Percentage
Red barbier	Hemanthias vivanus	100	45.87
Roughtongue bass	Holanthias martinicesis	51	23.39
Yellowtail reeffish	Chromis enchrysurus	19	8.72
Tattler	Serranus pheobe	16	7.34
Wrasse	Labridae	15	6.88
Bank butterflyfish	Chaetodon aya	7	3.21
Reef butterflyfish	Chaetodon sedentarius	6	2.75
Blue angelfish	Holocanthus bermudensis	2	0.92
Snapper, unknown*	Lutjanus sp.	2	0.92
	Sum	218	

[1] fish observed in 5 transects covering a total of 3609 m^2
*economically important species

Table 6. Time and location of reefball and reefdisk deployment in the Sebastian Pinnacles area of the EORR in October 2001.

Structure	Date 2001	Location	Site	Latitude	Longitude	Deployment
ReefBall	22-24 Oct.	Sebastian Pinnacles	B4a	27 50.769	79 57.807	Cluster-20, internal complexity
ReefBall	22-24 Oct.	Sebastian Pinnacles	B4b	27 50.673	79 57.506	Cluster-20, internal complexity
ReefBall	22-24 Oct.	Sebastian Pinnacles	B4c	27 50.595	79 57.721	Cluster-20, no inter complexity
ReefBall	22-24 Oct.	Sebastian Pinnacles	B4d	27 50.465	79 57.708	Cluster-20, no inter complexity
ReefBall	22-24 Oct.	Sebastian Pinnacles	B4e	27 50.390	79 57.795	Cluster-20, no inter complexity
ReefBall	22-24 Oct.	Sebastian Pinnacles	B4f	27 50.254	79 57.791	Cluster-20, internal complexity
Reefdisk	21 Oct.	Sebastian Pinnacles	D7a	27 50.769	79 57.861	Cluster-25, 1 large fragment
Reefdisk	21 Oct.	Sebastian Pinnacles	D7b	27 50 662	79 57.853	Cluster-25, 1small frag.
Reefdisk	21 Oct.	Sebastian Pinnacles	D7c	27 50.591	79 57.782	Cluster-25, 1 large frag.
Reefdisk	21 Oct.	Sebastian Pinnacles	D7d	27 50.462	79 57.768	Cluster-25, 1 large frag.
Reefdisk	21 Oct.	Sebastian Pinnacles	D7e	27 50.380	79 57.846	Cluster-25, 1 small frag.
Reefdisk	21 Oct.	Sebastian Pinnacles	D7f	27 50.252	79 57.847	Cluster-25, 1 small frag.
Reefdisk	21 Oct.	Sebastian Pinnacles	D7g	27 50.147	79 57.844	Cluster-25, 1 large frag.
Reefdisk	21 Oct.	Sebastian Pinnacles	D7h	27 50.054	79 57.844	Cluster-25, 1small frag.
Reefdisk	21 Oct.	Sebastian Pinnacles	D7i	27 49.976	79 57.848	Cluster-25, 1small frag.
Reefdisk	21 Oct.	Sebastian Pinnacles	D7j	27 49.973	79 57.742	Cluster-25, 1 large frag.
Reefdisk	21 Oct.	Sebastian Pinnacles	D7k	27 50.053	79 57.733	Cluster-25, 1 large frag.
Reefdisk	21 Oct.	Sebastian Pinnacles	D7l	27 50.142	79 57.740	Cluster-25, 1 large frag.
Reefdisk	21 Oct.	Sebastian Pinnacles	D7m	27 50.261	79 57.744	Cluster-25, 1small frag.
Reefdisk	21 Oct.	Sebastian Pinnacles	D7n	27 50.384	79 57.736	Cluster-25, 1small frag.
Reefdisk	21 Oct.	Sebastian Pinnacles	D7o	27 50.472	79 57.662	Cluster-25, 1large frag.
Reefdisk	21 Oct.	Sebastian Pinnacles	D7p	27 50.591	79 57.684	Cluster-25, 1 small frag.
Reefdisk	21 Oct.	Sebastian Pinnacles	D7q	27 50.664	79 57.756	Cluster-25, 1 large frag.
Reefdisk	21 Oct.	Sebastian Pinnacles	D7r	27 50.774	79 57.756	Cluster-25, 1 small frag.

APPENDIX

Protocol for OHAPC Habitat Classification and Mapping

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Introduction:

Habitat maps are fundamental to the study and management of living natural resources. In the marine environment, the development of objective, systematic, and intuitively- understandable habitat maps has just begun (Mumby and Harborne 1999). In the southeastern United States, this mapping is urgently needed in areas of greatest fishery production, such as shelf-edge reefs (50 – 120 m deep), particularly in areas where there has been extensive fishing-induced damage, attendant loss of fishery production, and declining biodiversity (e.g., Oculina Coral Banks off central eastern Florida, Koenig 2000). In addition, these areas are likely to experience heavier fishing pressure as shallower areas become depleted, and increased oil and gas exploration for new energy sources. Most of these areas in the Gulf of Mexico not only lack habitat maps, but also lack adequate descriptions of the benthic geomorphology, the basis on which habitat maps should be developed.

As pointed out by Mumby and Harborne (1999) a problem associated with most habitat mapping is that the term "habitat" is rarely defined explicitly. Thus, the terminology used in habitat mapping often mixes geomorphology (e.g., spur and groove) with physiognomy (e.g., coral reef), ecology (e.g., turf algae), and geological history (e.g., relict reef) in a non-systematic way. This is because the majority of habitat mapping is carried out subjectively on an *ad hoc* basis. In addition, very few habitat maps have quantitative descriptors for the habitat classes. Their systematic scheme of habitat classification presented here avoids a multitude of problems of interpretation and scale associated with non-systematic classification and ambiguous descriptions of marine habitats. It also provides a basis for the scientific investigation of habitat function on national and international scales.

The "Islands in the Stream"(IIS) expedition, by visiting offshore areas of the southeastern United States, Mexico, Belize, and Cuba, has the unique opportunity to lay the groundwork for an internationally consistent, objective, and systematic classification of shelf-edge habitats throughout the region. The purpose of this document is to provide the rationale and procedures for the development of benthic habitat maps in shelf-edge areas that will be surveyed by IIS-2001, 2002. The "islands" or sites to be visited can be thought of as representative sites for each region. We propose making habitat descriptions based on a combination of exploratory dives by submersibles, and relatively simple transect studies, to be conducted by a submersible, by ROV, and, where practicable, by SCUBA divers. Future habitat mapping could then be based on these descriptions, in a sense, to connect the dots that will eventually lead to complete coverage of shelf-edge reefs of the regions. Also, archived video records from this expedition, when connected to accurate geographic coordinates, would serve as benchmarks for future comparisons.

Methods

The approach we propose to mapping shelf-edge habitat follows closely that used by Mumby and Harborne (1999) for habitat classification and mapping of shallow coral reefs in the Caribbean. They subdivided geomorphological and biological components into tiers. For instance, their first tier of geomorphological features contained major categories such as "forereef", "backreef", "reef crest", "lagoon", and the second tier for tier one category "lagoon" included such subdivisions as "shallow lagoon" or "deep lagoon".

Brief quantitative definitions are provided for each category and subcategory. For instance, "deep lagoon" was defined as > 12m deep, and "shallow lagoon" defined as < 12 m. For the benthic community, the first-tier category "coral classes" was defined as > 1% hard coral cover, and the second tier under this category included "branching coral", "sheet coral", "fire coral", and "massive encrusting corals" with definitions for each. These benthic community categories are classified using standard multivariate hierarchical classification techniques. Measures of similarity of the communities are calculated first, then a clustering algorithm is used to classify community types.

We add to Mumby and Harbourne's classification scheme by including the associated fish community. We consider this an important inclusion because fish production is the primary impetus for the habitat mapping, and changes that might occur when areas are declared MPAs would likely be most immediately apparent in the fish communities.

A classification of OHAPC geomorphology, benthic habitat characteristics, and fish communities are given in Tables 1, 2, and 3, respectively. Quantitative descriptors may be modified depending on the results of our studies. Each habitat class will have an associated geomorphology and fish community with quantitative descriptors defining the limits.

The choice of both similarity index and clustering method is important to the resulting classification pattern and should be chosen on the basis of ecological understanding (Krebs 1999). The communities of fishes and motile invertebrates associated with the various habitats can also be classified using the same similarity and clustering techniques. Habitats of special significance, such as the grouper spawning habitat, could be described in fine detail, whereas other shelf-edge habitats of lesser immediate importance could be described in less detail. Thus, the hierarchical approach to habitat mapping proposed here allows the researcher to describe and classify habitats of interest in great detail and those of lesser interest in a more general way, but additional descriptions can be added at any time as interest increases.

Habitat maps readily accessible to scientists and resource managers result from the application of this classification scheme. Indeed, the maps, even if applied only in the areas surveyed by IIS-2001, would provide a benchmark for monitoring temporal and spatial changes in the habitat and its associated community. Each location polygon on a habitat map would include the following in a GIS database:

- a geomorphological descriptor
- a benthic sessile community descriptor
- a motile community descriptor.
- an associated time of observation (to evaluate temporal changes)

Mumby and Harbourne (1999) used optical remote sensing (by satellite and/or aircraft) to provided a broad-scale map of the geomorphology of the regions. We can't use this method because shelf-edge depths are too great to be detected by remote optical techniques. Thus, we will rely on acoustic remote sensing (side-scan sonar or multibeam bathimetry) to provide the primary geomorphological categories. Percent cover (and other measures such as density of dominant taxa) data must be collected optically *in situ*. Quadrat methods (e.g., strip transects) using a down-looking video camera with a laser metric are most efficient for this purpose at shelf-edge depths. A forward-looking video system should be used to record the abundance, size, and species composition of fishes and motile invertebrates and to observe growth forms of habitat components.

Procedure:

1. Examine and classify major geomorphological features of the shelf-edge reefs from the side-scan (or multibeam) images of the study area. (If such maps do not exist, they should be produced, otherwise habitat mapping is very difficult.)
   (a) Classify and define first tier (major) categories; examples include:
      - Pinnacles
      - ridges (Paleo-shorelines)
      - drowned patch reefs
      - low relief hard bottom
      - rocky outcrops
      - hard bottom with a veneer of sand
      - sand waves
   (b) Subdivide first tier into second tier categories (and third, depending on level of interest). As an example using Paleo-shorelines, subdivided into:

- upper ridge
- escarpment
- rubble bottom
- other

2. Conduct a brief reconnaissance of the defined geomorphological feature to be mapped noting subcategories of features and discontinuities in habitat characteristics.

3. Make quantitative strip (belt) transects within defined geomorphological features using videography (digital is preferable) and visual observations (recorded on a tape recorder and written) with an ROV and a submersible. For example, surveys along a Paleo-shoreline ridge should be made parallel along the ridge, along the steep slope, and along the boulders at the base of the ridge, rather than perpendicular transects, which would cut across several subcategories.

   The ROV can be used to document habitat features such as sand waves and silty sediments that have few benthic macro-organisms. The submersible would be most useful for "live bottom" characterization. Still photos of high resolution should be taken of dominant or representative organisms after transects are run. All surveys should record an accurate lat/lon position (or track) of the sub or ROV so that observational/video information can be referred to the acoustic image.

   In high current conditions, as exist in the OHAPC, the ROV can be used for long transects with the current in a controlled drift. Such transects are useful for describing the habitat conditions, but not for quantitatively characterizing the habitat nor for quantifying fish populations.

Transects:

- *Documentation:* Use digital video and audio and/or written notes to record habitat features and fish community.

- *Number of transects:* At least five (5) transects within each defined feature should provide an adequate sample size (Aronson et al. 1994).

- *Length of transects:* Length should be at least 25 m.

- *Sub or ROV speed:* The speed at which transects are made should be slow enough to ensure clear images on the down-looking video, that is, speeds of 0.1 to 0.2 m/s (= 0.36 to 0.72 km/hr) or less. (Faster speeds produce blurred images in the down-looking video, depending on distance off the bottom.) This means that each transect should take between 2 and 4 minutes to complete.

- *Videography.* Transects should be run with two video systems in place, one downward-looking camera, and one forward-looking (oblique) camera. Each video system should have laser metrics in the recorded image. Submersible and ROV should maintain an elevation of approximately 0.5 to 1.0 meter off the bottom for transect duration to ensure that the downward looking camera produces a clear image.

  (i) Downward-looking video: two parallel-beam lasers a known distance apart, say 25 cm, can be used to judge quadrat size and organism size in the downward-looking video frames.
  (ii) Forward-looking video: Three lasers arranged horizontally in one plane projected at an oblique angle so that they reach the seafloor ahead of the path of the sub. Two lasers, 10 cm apart, project parallel beams and the third laser, 10 cm from the adjacent laser, projects a beam that converges on the parallel beams. The converging laser is set to touch the beam of the adjacent laser at 5 m and the distal laser at 10 m. The parallel beam lasers give scale at a distance, and the converging laser allows the determination of distance from the camera.

4. Samples of both sediments and dominant sessile organisms should be collected. Sediment samples (including rocks) can be collected using a Van Veen grab. Samples of dominant sessile organisms (or any unknown or unusual organisms) should be collected with a manipulator arm and placed in a sample basket attached to the outside of the submersible or ROV.
   (a) *Sediment samples:*
   - *Method:* Store at room temperature in pint plastic freezer containers labeled with the lat/lon position of collection, date, and any other relevant information (e.g., in strong currents, record the

direction and angle of the winch cable supporting the Van Veen so that sample position corrections can be estimated.)

- *Timing:* Sediment samples can be collected at any time, but for efficient use of ship time, collection at night is preferred.
- *Rationale:* Sediment samples are important for the interpretation of surficial geology and acoustic backscatter characteristics of the side-scan sonar.

(b) *Biological samples:*

- *Method:* specimens should be preserved aboard ship in 5% formalin and labeled with lat/lon, date, and other relevant notes (e.g., characteristics of growth, relationships with other organisms, etc.)
- *Rationale:* Biological samples collected for species identification primarily, but also for determination of ecological relationships.

5. *Data analysis and handling of records.*--Videotapes (mini DVs, preferably) and notes (written notes and audio tapes) from the various transects should be duplicated and carefully archived making sure that transect begin and end positions, and dates are recorded. Time and date should be recorded on the tapes. Videotape annotation should begin on board ship. Annotations should include: divers names, date, dive no. tape ID, time code in and out (min:sec), real time (hr:min), fish species and no. observed, invertebrate species and no. observed, brief habitat descriptions, human impacts, depth, and notes. Analysis of community characteristics can begin on board the ship, if there is an appropriate tape deck and high-resolution monitor available. Easily determined are the following:

- % cover
- density of dominant sessile species
- species composition
- species richness and other species diversity measures
- spatial pattern of dominant species (i.e., random, regular, or clumped).

Procedures for analyzing the video frames (quadrats) for these characteristics are standard and are clearly presented in Krebs (1999). Percent cover may be quickly analyzed from the videos using the method used by Aronson et al. (1994), which entails laying sets of random dots over random captured images from the down-looking camera. The proportion of dots touching live coral is an estimate of the % cover.

For the purposes of the habitat characterization and classification:

- habitat structuring organisms may be evaluated as major taxa, for example, gorgonians or sponges, or they may be further subdivided on the basis of morphology and color. (Species identification may be done later, if necessary, from both the videos and the preserved biological samples.)
- Similarity of benthic communities can be analyzed using Morisita's index of similarity. Krebs (1999) recommends this measure from over 20 such measures because it is not affected by sample size as other measures are. (The Bray-Curtis measure, used by Mumby and Harborne (1999) is strongly affected by sample size and is not recommended.) For cluster analysis, Krebs recommends average linkage clustering by the UPGMA (unweighted pair-group method using arithmetic averages) method. Computer programs compiled by Krebs (1999) to perform these and many more analyses can be purchased from Exeter Software (http://www.exetersoftware.com).

Operational Considerations

Sampling, behavior, site location, and speed

Transect type. Strip transect samples are preferable to square or round quadrat samples because transects (long thin quadrats) cut across many variations or patches (habitat heterogeneity) in the habitat and thus increase precision. For short transects, only a compass heading is necessary to achieve a straight line. It is far better to take multiple short transects than few long ones. Multiple random transects are useful for density (number per unit area) determination and many other community measures, but a single long transect will only allow the measurement of spatial pattern, as it is a single sample, or if subsampled, it is at best multiple samples in systematic arrangement. We therefore recommend many short random transects.

Transects in highly altered habitat. In areas with high incidence of habitat alteration, the focus may be on distinguishing between altered and intact habitat (e.g., the *Oculina* Banks). In this case, a systematic survey is preferable to random transecting to ensure maximum coverage of areas. Thus, in each geomorphological feature of concern, transects should be conducted in long parallel transects. The ROV is preferable over the submersible for this component because of the ease of deployment and use. This component is simply to search and find. Other than this change in transect protocol, the habitat characterization should proceed as described. Transect locations should be drawn out ahead of time across acoustic images of each feature of interest. Once an intact habitat is located, random transects should be conducted with the submersible (and/or the ROV) within that habitat.

Choosing transect locations. It is preferable, but not necessary that transect locations be chosen ahead of time. Transect start position and heading can be randomly generated using a random numbers table. These positions can be drawn out on an expanded side-scan image of the feature of interest. In this way, the topside sub tracker can orient the sub pilot to transect positions, especially in conditions of low visibility. The same methods can be used for ROV transects under low current conditions. However, in all cases, the transect start and stop position should be recorded.

In the absence of acoustic imagery, sea floor features can be located by repeated passes of the supporting vessel's echosounder over the bottom. Features identified in this manner can then be plotted, producing a very rough acoustic map that can be used to orient subsequent ROV or submersible transects. A quick reconnaissance dive using ROV would determine whether or not a submersible dive was desirable. Rough transect positions could be drawn across the plotted feature as a reference.

Submersible or ROV speed. If speed cannot be determined from the submersible's navigation system, it can be estimated by recording the time it takes to travel a known distance. If the point of convergence of the converging forward-looking lasers is set at 5 m in front of the submersible, an object at that point can be used as a reference point. If the desired speed is 0.1 m/s, then it should take 50 s to arrive at the reference point, and so on. In poor visibility, the laser metrics do not operate appropriately for determining speed. In this event, sub pilots should move at a speed equivalent to what might be considered a "slow walk" for a period of 4 minutes.

Returning to previously selected locations. There may be inaccuracies in determining position of the submersible due to a number of factors. Therefore, returning to the same exact location on a repeat dive or at some later date could prove difficult and time consuming. If it is necessary to return to the same spot, a monument may be erected at that spot. A monument constructed of a lead weight (5 kg +) and a hard plastic float (ca. 0.5 L volume) tethered to it at about 2 – 4 m above the weight will allow relocation acoustically and visually. Such monuments are simple and inexpensive and last many years; other more expensive monuments may have acoustic pingers to facilitate relocation.

Fish behavior relative to submersible or ROV. There are a number of factors to consider when sampling motile species (fish and invertebrates) if valid measures and comparisons are to be made. The most important consideration is that different species have different behaviors relative to the submersible and the time of observation. Factors associated with the submersible such as lights, disturbance of the bottom by thrusters, movement, and just the physical presence affect behaviors and therefore community measures. Some species tend to follow and circle the submersible (e.g., amberjack, scamp), some species remain stationary (e.g., bigeyes), others are cryptic (e.g., cardinal fish) and still others are cryptic at times and schooling at others (e.g., antheids). Observation notes should include such behaviors and any other behaviors, such as color changes and presumed courtship behavior. The most important temporal factors affecting behavior are time of day and

season. Within a season, observations should be made during daylight hours, avoiding early morning and late afternoon (crepuscular periods). Annual comparisons should be made within the same seasons.

Data recording.-- Data collection should involve verbal records, written records, videography, and still photography. On each dive, the beginning of the record should include date, time, dive number, pilot, position, depth, and mission. Also, each transect should indicate transect number and position. Emphasis is placed on collection of high quality video imagery to record behavior and diagnostic characteristics of animals and plants, but still photographs should be taken frequently because their higher resolution is useful for organism identification.

Site-related descriptions: In the verbal and/or written site records the following items should be included.

- hierarchical habitat descriptors (use standard classification terminology)
- qualitative habitat descriptions including dominant organisms
- behavioral observations
- evidence of human impacts (e.g., trawl lines, fishing gear, artificial reef).

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Appendix J

Table 1. Geomorphological features of the OHAPC cast in a hierarchical classification scheme.

First Tier			Second Tier		
Code	Label	Characteristic	Code	Label	Characteristic
1	Pinnacle	Isolated limestone prominence	1.1	Low relief	< 0.5 m
			1.2	Medium relief	0.5 – 2.0 m
			1.3	High relief	> 2.0 m
2	Ridge	Long continuous limestone prominence	2.1	Low relief	<0.5 m
			2.2	Medium relief	0.5 – 2.0 m
			2.3	High relief	> 2.0 m
3	Depression	Scoured area typically at the base of a ridge or pinnacle	3.1	Low relief	< 2.0 m
			3.2	High relief	> 2.0 m
4	Flat	Featureless bottom of mud or sand	4.1	No relief	< 0.5 m

Table 2. Benthic habitat features of the OHAPC cast in a hierarchical classification scheme

First Tier			**Second Tier**		
Code	Label	Characteristic	Code	Label	Characteristic
1	Hard bottom with live coral	Live *Oculina* present (> 0.1% coverage)	1.1	Intact *Oculina* habitat	Intact colonies > 1 m diam in thicket-like habitat with > 50% coral coverage.
			1.2	Disturbed *Oculina* habitat	Broken and toppled coral heads with < 50% coral coverage.
			1.3	Small isolated *Oculina* colonies	No evidence of large coral colonies in the past.
2	Hard bottom without live coral	Little (< 0.1 % coverage) or no *Oculina* coral	2.1	Unconsolidated dead coral rubble	Rubble reduced to finger-size pieces
			2.2	Intact dead *Oculina* colonies	Colonies are dead but standing.
			2.3	Limestone ledges and rocky outcrops	Bare limestone prominences
			2.4	Limestone pavement	Bare limestone with < 0.5 m relief
			2.5	Hard clay outcrops	Rock-like clay prominences with extensive bore holes
3	Soft bottom	Mud, sand or clay	3.1	Silty sand	Very little epibenthos
			3.2	Sand shell hash	Moderate epibenthos
			3.3	Soft clay	White with little epibenthos
4	Artificial structure	Restoration structures and wrecks	4.1	Reef balls	Dome-shaped structures with attached *Oculina*
			4.2	Reef blocks	Block-shaped structures with or without attached *Oculina*
			4.3	Reef disks	Cement disks with *Oculina* attached to PVC post.
			4.4	Wrecks	Typically large with possible extensive *Oculina* growth on deck

Table 3. Habitat associations of economically and ecologically important reef fish of the OHAPC cast in a hierarchical classification scheme.

First tier			Second tier.		
Code	Label	Characteristic	Code	Label	Characteristic
1	Spawning aggregations of economically important species.	Densities > 30/hectare plus courtship behavior plus gonad evidence and/or observation of spawning.	1.1	Gag	Densities > 30/hectare, males present, hydrated ovaries, and/or observation of spawning.
			1.2	Scamp	Densities > 30/hectare, courting males, hydrated ovaries
			1.3	Black sea bass	Densities > 30/hectare, courting males, hydrated ovaries.
2	Economically important juveniles	Juveniles common	2.1	Speckled hind	Juveniles present > 10/hectare
			2.2	Snowy grouper	Juveniles present > 10/hectare
			2.3	Warsaw grouper	Juveniles present > 10/hectare
3	Economically important adults	Consistent presence of adults	3.1	Gag	Present
			3.2	Scamp	Present
			3.3	Red grouper	Present
			3.4	Red snapper	Present
			3.5	Red porgy	Present
			3.6	Warsaw grouper	Present
			3.7	Snowy grouper	Present
			3.8	Black sea bass	Present
			3.9	Greater amberjack	Present
			3.10	Almaco jack	Present
4	Ecologically important species	Species with high densities.	4.1	Roughtongue bass	Density greater than 1000/hectare
			4.2	Red barbier	Density greater than 1000/hectare
			4.3	Yellowtail reeffish	Density greater than 1000/hectare
			4.4	Purple reeffish	Density greater than 1000/hectare