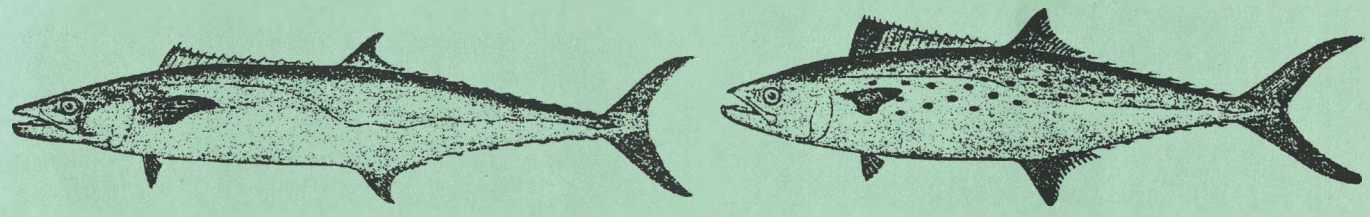
FRAMEWORK SEASONAL ADJUSTMENT OF HARVEST LEVELS AND PROCEDURES UNDER THE FISHERY MANAGEMENT PLAN FOR THE COASTAL MIGRATORY PELAGIC RESOURCES (MACKERELS) IN THE GULF OF MEXICO AND SOUTH ATLANTIC REGION

(INCLUDING REGULATORY IMPACT REVIEW, SOCIAL IMPACT ASSESSMENT AND ENVIRONMENTAL ASSESSMENT)

SEPTEMBER 1996



South Atlantic Fishery Management Council
1 Southpark Circle, Suite 306
Charleston, South Carolina 29407-4699
(803) 571-4366
(803) 769-4520 (FAX)
Email: safmc@safmc.nmfs.gov

Mid-Atlantic Fishery Management Council
Room 2115, Frear Federal Building
300 South New Street
Dover, Delaware 19904-6790
(302) 674-2331
(302) 674-5399 (FAX)

A publication of the South Atlantic and Mid-Atlantic Fishery Management Councils pursuant to National Oceanic and Atmospheric Administration Award Numbers NA67FC0003 and NA67FC0002

FRAMEWORK SEASONAL ADJUSTMENT OF HARVEST LEVELS AND PROCEDURES UNDER THE FISHERY MANAGEMENT PLAN FOR THE COASTAL MIGRATORY PELAGIC RESOURCES (MACKERELS) IN THE GULF OF MEXICO AND SOUTH ATLANTIC REGION

(INCLUDING REGULATORY IMPACT REVIEW, SOCIAL IMPACT ASSESSMENT AND ENVIRONMENTAL ASSESSMENT)

Prepared by the:

South Atlantic and Mid-Atlantic Fishery Management Councils

SEPTEMBER 1996

Financial assistance for producing this Amendment was provided by grant funds from the National Marine Fisheries Service, National Oceanic and Atmospheric Administration, under Public Law 94-265, the Magnuson Fishery Conservation and Management Act.

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

FRAMEWORK SEASONAL ADJUSTMENT COVER SHEET
(Atlantic Migratory Group King & Spanish Mackerel TAC/Bag Limits and Atlantic Migratory Group Spanish Mackerel Trip limits)

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

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

Responsible Agencies:

South Atlantic Fishery Management Council
Contact: Robert K. Mahood
1 Southpark Circle
Southpark Building, Suite 306
Charleston, South Carolina 29407-4699
(803) 571-4366
(803) 769-4520 (FAX)
Email: safmc@safmc.nmfs.gov

Mid-Atlantic Fishery Management Council
Contact: David R. Keifer
Room 2115, Frear Federal Building
300 South New Street
Dover, Delaware 19904-6790
(302) 674-2331
(302) 674-5399 (FAX)

National Marine Fisheries Service
Contact: Andrew J. Kemmerer
NMFS Southeast Regional Office
9721 Executive Center Drive N.
St. Petersburg, Florida 33702
(813) 570-5301
(813) 570-5300 (FAX)

NAME OF ACTION

(X) Administrative ( ) Legislative

SUMMARY

The proposed management program is to implement the following:

1. Establish a Total Allowable Catch (TAC) of 6.8 million pounds for Atlantic Migratory Group king mackerel for the 1996/97 fishing year. The commercial allocation is 2.52 million pounds (37.1%) and the recreational allocation is 4.28 million pounds (62.9%) which, based on an average weight of 9.76 pounds from the 1996 stock assessment, equates to 438,525 fish. The bag limit is to remain unchanged at 3 fish per person per day off New York through Georgia, and at 2 fish per person per day off Florida.

2. Establish a Total Allowable Catch (TAC) of 7.0 million pounds for Atlantic Migratory Group Spanish mackerel for the 1996/97 fishing year. The commercial allocation is 3.5 million pounds (50%) and the recreational allocation is 3.5 million pounds (50%) which, based on an average weight of 1.56 pounds from the 1996 stock assessment, equates to 2,243,590 fish. The bag limit is to remain 10 fish per person per day off New York through Florida.

3. Revise the trip limits for Atlantic Migratory Group Spanish mackerel. Because the reduced ABC range in conjunction with changes in state regulations have impacted the availability of fish to Florida net fishermen, the Council is recommending a change in the unlimited season starting date and a revision in the trip limits for Atlantic Migratory Group Spanish mackerel as follows:

In the northern zone boats are restricted to a possession limit of 3,500 pounds of Spanish mackerel.

The southern zone possession limits are as follows:

(a) From April 1 – October 31: 1,500 pounds per vessel per day.

(b) November 1 until 75% of the adjusted allocation is taken: (Vessel fishing days begin at 6:00 a.m. and extend until 6:00 a.m. the following day, and vessels must be unloaded by 6:00 p.m. of that following day.)

Monday, Wednesday, and Friday	Unlimited
Other days	1,500 pounds

(c) After 75% of the adjusted allocation is taken 1,500 pounds per vessel per day for all days.

(d) When 100% of the adjusted allocation is reached: 500 pounds per vessel per day to the end of the fishing year (March 31). Adjusted allocation compensates for estimated catches of 500 pounds per vessel per day to the end of the season.

ENVIRONMENTAL ASSESSMENT

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

SUMMARY

Issues and concerns to be addressed in the Environmental Assessment (EA) are: What is the best approach to stabilize yield at MSY and maintain population levels sufficient to ensure adequate recruitment? What approaches will provide a flexible management system? What is the best approach to optimize social and economic benefits?

The proposed management program is to implement the following:

1. Establish a Total Allowable Catch (TAC) of 6.8 million pounds for Atlantic Migratory Group king mackerel for the 1996/97 fishing year. The commercial allocation is 2.52 million pounds (37.1%) and the recreational allocation is 4.28 million pounds (62.9%) which, based on an average weight of 9.76 pounds from the 1996 stock assessment, equates to 438,525 fish. The bag limit is to remain unchanged at 3 fish per person per day off New York through Georgia, and at 2 fish per person per day off Florida.

2. Establish a Total Allowable Catch (TAC) of 7.0 million pounds for Atlantic Migratory Group Spanish mackerel for the 1996/97 fishing year. The commercial allocation is 3.5 million pounds (50%) and the recreational allocation is 3.5 million pounds (50%) which, based on an average weight of 1.56 pounds from the 1996 stock assessment, equates to 2,243,590 fish. The bag limit is to remain 10 fish per person per day off New York through Florida.

3. Revise trip limits for Atlantic Migratory Group Spanish mackerel:

In the northern zone boats would be restricted to possession limits of 3,500 pounds of Spanish mackerel.

The southern zone possession limits are as follows:

(a) From April 1 – October 31: 1,500 pounds per vessel per day.

(b) November 1 until 75% of the adjusted quota is taken: (Vessel fishing days begin at 6:00 a.m. and extend until 6:00 a.m. the following day, and vessels must be unloaded by 6:00 p.m. of that following day.)

Monday, Wednesday, and Friday	Unlimited
Other days	1,500 pounds

(c) After 75% of the adjusted allocation is taken 1,500 pounds per vessel per day for all days.

(d) When 100% of the adjusted quota is reached: 500 pounds per vessel per day to the end of the fishing year (March 31). Adjusted quota compensates for estimated catches of 500 pounds per vessel per day to the end of the season.

REGULATORY IMPACT REVIEW

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

TABLE OF CONTENTS **PAGE**

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. The purpose of the analysis is to ensure the regulatory agency or Council systematically considers all available alternatives so that public welfare can be enhanced in the most efficient and cost effective way.

The National Marine Fisheries Service (NMFS) requires a Regulatory Impact Review (RIR) for all regulatory actions that are of public interest. The RIR does three things: 1) it provides a comprehensive review of the level and incidence of impacts associated with a proposed or final regulatory action, 2) it provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the

problem, and 3) it ensures 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 regulations are a "significant regulatory action" under certain criteria provided in Executive Order 12866 and whether the proposed regulations will have a significant economic impact on a substantial number of small entities in compliance with the Regulatory Flexibility Act of 1980 (RFA) as amended by Public Law 104-121.

This RIR analyzes the probable impacts of the proposed changes in the TACs and bag limits for the Atlantic Migratory Groups of king and Spanish mackerels and the commercial trip limits for Atlantic Migratory Group Spanish mackerel.

Problems and Objectives

The general problems and objectives are found in the FMP, as amended (Section 1.0 and Appendix A). This framework seasonal adjustment proposes to adjust TAC for Atlantic Migratory Group king and Spanish mackerel, and revise trip limits for Atlantic Migratory Group Spanish mackerel. Further exposition of these issues are found in the discussions under each proposed action.

Methodology and Framework for Analysis

The basic approach adopted in this RIR is an assessment of management measures from the standpoint of determining the resulting changes in costs and benefits to society. The net effects should be stated in terms of producer and consumer surpluses for both commercial and recreational sectors. Ideally, the expected present values of net yield streams over time associated with the different alternatives should be compared in evaluating the impacts. However, estimates of the yield streams for the Atlantic Migratory Groups of king and Spanish mackerels are not available. The approach taken in analyzing alternative TACs and trip limits is to describe and/or quantify the changes in short-term net benefits. A qualitative discussion of long–term impacts is also attempted.

Summary of Regulatory Impact Review

ACTION	POSITIVE IMPACTS	NEGATIVE IMPACTS	NET IMPACTS
Action 1: TAC and Bag Limits for Atlantic migratory group king mackerel: TAC = 6.8 million pounds. Bag limit = No change: 3 from N.Y. thru GA. Bag limit = 2 off Florida.	Possible increase in long term economic benefits	Possible short term economic loss	Increased economic benefits in the long term
Rejected Option 1: No Action (TAC =7.3 million pounds)	Possible increase in short term economic benefits	Possible long term economic loss	Possible decrease in long term economic benefits
Rejected Option 2: TAC = 6.0 million pounds	Possible increase in short term economic benefits	Possible long term economic loss	Possible decrease in long term economic benefits
Rejected Option 3: TAC = 5.5 million pounds	Possible long term economic benefits	Decrease in short term economic benefits	Likely increase in long term economic benefits
Rejected Option 4: TAC = 4.1 million pounds	Possible long term economic benefits	Decrease in short term economic benefits	Likely increase in long term economic benefits
Rejected Option 5: TAC = 4.8 million pounds	Possible long term economic benefits	Decrease in short term economic benefits	Likely increase in long term economic benefits
Action 2: TAC and Bag Limits for Atlantic Migratory Group Spanish: Mackerel TAC = 7.0 million pounds Bag Limit = No change 10 fish	Possible increase in long term economic benefits	Possible short term economic loss	Likely increase in long term economic benefits
Rejected Option 1: No Action(TAC =9.4 million pounds)	Possible decrease in long term economic benefits	Possible increase in short term economic benefits	Possible decrease in long term economic benefits
Rejected Option 2: TAC = 6.0 million pounds	Likely increase in long term economic benefits	Possible decrease in short term economic benefits	Possible increase in long term economic benefits
Rejected Option 3: TAC = 5.0 million pounds	Likely increase in long term economic benefits	Possible decrease in short term economic benefits	Likely increase in long term economic benefits
Rejected Option 4: TAC = 5.3 million pounds	Possible increase in long term economic benefits	Possible short term economic loss	Likely increase in long term economic benefits
Action 3: Revised Trip Limits for Atlantic Migratory Group Spanish Mackerel From Nov. 1 until 75% of the adjusted allocation is taken: MWF – unlimited. Other days – 1,500 pounds per vessel per trip. After 75% of adjusted quota is taken 1,500 pounds per vessel for all days	Increase efficiency and increase economic benefits	None	Increased efficiency and long term economic benefits
Rejected Option 1: No Action	None	Likely decrease in benefits	Possible decrease in long term economic benefits

This Framework Seasonal Adjustment is not significant under Executive Order 12866.

SOCIAL IMPACT ASSESSMENT

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

TABLE OF CONTENTS **PAGE**

Introduction

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

Under the MFCMA, fishery management plans (FMPs) must "...achieve and maintain, on a continuing basis, the optimum yield from each fishery" [MFCMA Section 2 (b) (4)]. When considering "a system for limiting access to the fishery in order to achieve optimum yield" the Secretary of Commerce and Regional Fishery Management Councils are to consider both the social and economic impacts of the system [MFCMA Section 303 (b) (6)]. More recent amendments to the MFCMA require FMPs address impacts of any management measures on participants in the affected

fishery and those participants in other fisheries that may be affected directly or indirectly [MFCMA 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 negative impacts experienced by those affected.

Problems and Methods

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

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

In attempting to assess the social impacts of the proposed action it must be noted that there was little detailed socio-demographic information concerning mackerel fishermen upon which to base such an assessment. Data used for this analysis do not represent a comprehensive overview of the fishery; therefore, the analysis does not include all social impacts. What information was available pertains primarily to the commercial harvesting sector. Thus social impacts on non-commercial harvesters, the processing sector, the consumer and society as a whole are not fully addressed due to data limitations.

Summary of Social Impacts

Action 1. Total Allowable Catch (TAC) And Bag Limits For Atlantic Migratory Group King Mackerel

Establish a TAC of 6.8 million pounds for the 1996/97 fishing year. Allowable biological catch (ABC) is 4.1 - 6.8 million pounds. The commercial allocation is 2.52 million pounds (37.1%) and the recreational allocation is 4.28 million pounds (62.9%) which, based on an average weight of 9.76 pounds from the 1996 stock assessment, equates to 438,525 fish.

The bag limit is to remain at 3 fish per person per day off New York through Georgia, while off Florida, the bag limit remains unchanged at 2 fish per person per day.

Social Impacts

Both commercial and recreational king mackerel landings have been below their allocations for a number of years. The last time either sector was near their allocation was 1988/89 when TAC was exceeded (Table 5). This year's proposed TAC is well above the last two years' combined recreational and commercial landings, yet it would have been exceeded five of the last ten years. Overall, there seems to be a downward trend in landings. Whether either sector will exceed this year's allocation will depend upon a number of factors, but primarily the availability of fish.

There has been concern expressed over the status of Atlantic Migratory Group king mackerel for several years by both commercial and recreational fishermen on the Advisory Panel and among the general public. Comments suggested king mackerel stocks were not as well off as indicated by previous stock assessments. The Council reduced TAC and the bag limit last year in addition to recommending trip limits to address these concerns. This year's stock assessment seems more in line with those observations.

Because a review of Gulf Migratory Group king mackerel brought into question certain aspects of the assessment and fishermen in the north feared a closure if catches to the south were to increase dramatically given the fact the Council's requested trip limits have not been implemented thus far, the Council concluded that TAC at the upper level of the ABC was prudent at the time. However, there are still concerns about certain aspects of the assessment the Council wishes to be addressed in next year's analyses.

Action 2. Total Allowable Catch (TAC) And Bag Limits For Atlantic Migratory Group Spanish Mackerel

Establish a TAC of 7.0 million pounds for the 1996/97 fishing year. Allowable biological catch (ABC) is 5.0 - 7.0 million pounds. The commercial allocation is 3.5 million pounds (50%) and the recreational allocation is 3.5 million pounds (50%) which, based on an average weight of 1.56 pounds from the 1996 stock assessment, equates to 2,243,590 fish.

The bag limit is to remain 10 fish per person per day off New York through Florida.

Social Impacts

Estimated landings for the 95/96 fishing year were 1.87 million pounds as of March 12, 1996 (Table 5), well below the previous year. A recent factor contributing to lower landings has been the ban on entanglement gear in Florida state waters (see Appendix C) which has dramatically curtailed commercial landings of Spanish mackerel. Because fish have remained in state waters during their migration through that area, fishermen have not had ready access to these fish as in the past. It has also been suggested there is a lag with recreational fishing preferences for Spanish mackerel because fishermen may have switched to other species when they were unable to fish for Spanish mackerel due to quota overruns which prompted closures of the fishery and more recently reduced availability. All factors were considered when selecting the proposed TAC. There is a chance that the recreational sector will increase their landings of Spanish mackerel as more fish become available to them. Commercial fishermen, especially from Florida, must depend upon other factors to increase the availability of fish, so that they may meet their allocation. As fishermen adjust to new fishing techniques and possibly revised trip limits being considered in this framework, their opportunities may increase, giving them a chance at increasing their landings over last year.

Action 3. Revised Trip limits for Atlantic migratory group Spanish mackerel

In the northern zone boats would be restricted to possession limits of 3,500 pounds of Spanish mackerel.

The southern zone possession limits are as follows:

(a) From April 1 – October 31: 1,500 pounds per vessel per day.

(b) November 1 until 75% of the adjusted allocation is taken: (Vessel fishing days begin at 6:00 a.m. and extend until 6:00 a.m. the following day, and vessels must be unloaded by 6:00 p.m. of that following day)

Monday, Wednesday, and Friday	Unlimited
Other days	1500 pounds

(c) After 75% of the adjusted allocation is taken 1500 pounds per vessel per day for all days.

(d) When 100% of the adjusted allocation is reached: 500 pounds per vessel per day to the end of the fishing year (March 31). Adjusted allocation compensates for estimated catches of 500 pounds per vessel per day to the end of the season.

Social Impacts

Commercial fishermen in the southern zone requested revisions to the trip limits for Spanish mackerel because of the recent ban on entanglement gear in Florida state waters (see Appendix C)

and the tendency of these fish to remain in state waters during their migration. Large boat net fishermen felt an earlier starting date for the unlimited season would allow them the opportunity to capture Spanish mackerel before they migrate into state waters. The higher and expanded trip limits were requested by smaller boat operators who have recently made adjustments to cast netting and found the 1000 pound trip limit was not feasible economically for a two man cast netting crew. The Council considered these changes to be warranted as they do provide a flexible management system responsive to social and economic changes within a fishery. Because Spanish mackerel are not considered overfished and both sectors are having difficulty meeting allocations, these changes in trip limits do not seem to have any deleterious effects upon the stock, yet, provide commercial fishermen an increased harvesting opportunity. Because there have been significant adverse impacts, both socially and economically from the ban on entanglement gear in Florida, fishermen have requested the Council to consider these changes. With the recommendation of the Advisory Panel the Council has proposed these changes.

Social Impact Assessment Data Needs

Given the lack of sufficient data to conduct a complete social impact analysis, the following data needs are suggested to help improve assessments of future actions within the coastal migratory pelagic resources (mackerels) fisheries. As Atlantic king and Spanish mackerel stocks improve this type of information becomes increasingly important as the management issues within these fisheries become less focused upon stock abundance and more a question of allocation. The following categories include the types of data that need to be collected on all sectors including: commercial fishermen; non-commercial fishermen; buyers/processors/wholesalers; commercial and recreational fishing support industries; and fishing communities:

1. Demographic information may include but not necessarily limited to: Population; Age; Gender; Ethnic/Race; Education; Language; Marital Status; Children (age & gender); Residence; Household Size; Household Income (fishing/non-fishing); Occupational Skills; and Association with Vessels & Firms (role & status).
2. Social Structure information may include but not necessarily limited to: Historical Participation; Description of work patterns; Kinship Unit, Size and Structure; Organization & Affiliation; Patterns of Communication and Cooperation; Competition and Conflict; Spousal and Household Processes; and Communication and Integration.
3. Emic culture information may include but not necessarily limited to: Occupational Motivation and Satisfaction; Attitudes and Perceptions Concerning Management; Constituent Views of their Personal Future of Fishing; Psycho-social Well-being; and Cultural Traditions related to Fishing (identity and meaning).

This list of data needs is not exhaustive or all inclusive. Upcoming issues within the mackerel fisheries will center upon allocation and the need for reliable and valid information concerning the social environment will become necessary for managing these fisheries.

1.0 PURPOSE AND NEED

This Framework Seasonal Adjustment of Harvest Levels and Procedures under the Fishery Management Plan for the Coastal Migratory Pelagic Resources (Mackerels) was developed to adjust allowable biological catch (ABC) and total allowable catch (TAC) for Atlantic Migratory king and Spanish mackerel and revise trip limits for Atlantic Migratory Group Spanish mackerel based on the new 1996 stock assessment. Revised trip limits are proposed for Atlantic Migratory Group Spanish mackerel to allow the commercial user group to harvest their allocation and to spread out the harvest among the largest number of fishermen.

The ABC, TAC, user group allocations and bag limits for Atlantic Migratory Group king and Spanish mackerel are as follows:

	ABC	TAC	COMM	REC	BAG LIMIT
King Mackerel	4.1 - 6.8 Mlb	6.8 Mlb	2.52 Mlb	4.28 Mlb	3 NY-GA (no change, 2 FL (no change)
Spanish Mackerel	5.0 - 7.0 Mlb	7.0 Mlb	3.5 Mlb	3.5 Mlb	10 NY-FL (no change)

The Gulf of Mexico Fishery Management Council does not need to approve these actions as the framework procedure provides that "Recommendations with respect to the Atlantic groups of king and Spanish mackerel will be the responsibility of the South Atlantic Council, and those for the Gulf groups of king and Spanish mackerel will be the responsibility of the Gulf Council."

Adjustment of trip limits was added to the framework procedure in Amendment 6 (GMFMC and SAFMC, 1992):

> Section 1.2.6.1.1 D is revised as follows:
> D. If changes are needed in MSYs, TACs, quotas, bag limits, size limits, vessel trip limits, closed seasons or areas, gear restrictions, or initial permits for each stock of king or Spanish mackerel or cobia, the Councils will advise the Regional Director of the Southeast Region of the National Marine Fisheries Service (RD) in writing of their recommendations, accompanied by the assessment group's report, relevant background material, and public comment.
>
> Recommendations with respect to the Atlantic groups of king and Spanish mackerel will be the responsibility of the South Atlantic Council, and those for the Gulf groups of king and Spanish mackerel will be the responsibility of the Gulf Council. This report shall be submitted each year by such date as may be specified by the Councils.

The discussion section of Amendment 6 indicated that "Inclusion of these additional management options will provide the Councils and RD with more flexibility to respond to management needs to restore overfished stocks and achieve OY. The Gulf Council's Reef Fish FMP allows this flexibility as does Amendment 4 to the South Atlantic Council's Snapper-Grouper FMP."

Management Objectives

Objectives addressed in this framework seasonal adjustment are presented below. (See Appendix A for a complete listing of objectives from the Fishery Management Plan for Coastal Pelagics as amended.)

- Stabilize yield at MSY and maintain population levels sufficient to ensure adequate recruitment.
- To provide a flexible management system for the resource which minimizes regulatory delay while retaining substantial Council and public input in management decisions and which can rapidly adapt to changes in resource abundance, new scientific information, and changes in fishing patterns among user groups or by areas.
- To optimize the social and economic benefits of the coastal migratory pelagic fisheries.

Issues/Problems to be Considered

Issues/problems addressed in this framework seasonal adjustment are as follows. (See Appendix A for a complete listing of issues/problems from the Fishery Management Plan for Coastal Pelagics as amended.)

Stabilize Yield

- What is the best approach to stabilize yield at MSY and maintain population levels sufficient to ensure adequate recruitment?

Provide a flexible management system

- What approach will allow the commercial user group to harvest their allocation given recent changes migratory patterns for Spanish mackerel and gear restrictions within Florida state waters?

Optimize Social and Economic Benefits

- What is the best approach to optimize social and economic benefits? Avoiding closures which would differentially affect fishermen would address this problem.

History of Management

The original FMP was implemented in February 1983. Amendments 1 through 7 modified the management program. See Appendix B for details of the original FMP and Amendments 1 through 7. The present management regime for mackerel recognizes two migratory groups, the Gulf Migratory Group and the Atlantic Migratory Group. King mackerel seasonally mix on the east coast

of Florida. For management and assessment purposes, a boundary between groups of king mackerel (Figure 1) was specified at the Volusia/Flagler County border on the Florida east coast in the winter (November 1 - March 31) and the Monroe/Collier County border on the Florida southwest coast in the summer (April 1 - October 31). Spanish mackerel mix in south Florida but abundance trends along each coast of Florida are different indicating sufficient isolation between the two migratory groups. The boundary for Spanish mackerel is found at the Dade/Monroe County border on Florida's east coast from April 1 until March 31.

For the purpose of allocating a limited resource among users, the management plan has set ratios based on historic unregulated catches. The Atlantic Migratory Group of king mackerel is allocated with 62.9% to recreational fishermen and 37.1% to commercial fishermen. The Atlantic Migratory Group of Spanish mackerel is allocated equally between recreational and commercial fishermen.

Additional information on the history of mackerel management in Florida is contained in Appendix C.

Issues/Problems Requiring Regulatory Amendment

Estimates of mackerel bycatch mortality in the shrimp trawl fishery were incorporated into the stock assessment for Atlantic Migratory Group king and Spanish mackerel for the first time (Stock Assessment Panel, 1996). Allowable Biological Catch (ABC) range for both groups was revised downward: (1) king mackerel ABC was reduced from 7.3 - 10.5 million pounds to 4.1 - 6.8 million pounds; and (2) Spanish mackerel ABC was reduced from 4.9 - 14.7 million pounds to 5.0 - 7.0 million pounds. These changes in our understanding of the status of the stocks requires the Total Allowable Catch (TAC) for each migratory group be revised downward. The mackerel management program requires the Council review and revise where appropriate ABC, TAC, quotas and bag limits after each new assessment. The proposed actions would revise ABC, TAC and quotas downward; bag limits are not proposed to change.

The ban on use of entanglement gear in Florida's territorial seas and a shift in Atlantic Migratory Group Spanish mackerel migratory patterns have combined to prevent commercial fishermen from harvesting their allocation of Spanish mackerel. It is estimated only 1.87 million pounds of the 4.70 million pound commercial allocation was taken during the 1995/96 fishing year (Table 6).

The Council previously requested trip limits to prevent large catches during the month of April when the fish may be predominately Gulf Migratory Group fish which, in effect, results in "double-dipping" on Gulf fish. The trip limit would also spread-out mortality during the time of year and in areas where Atlantic Migratory Group king mackerel are more vulnerable given the narrow continental shelf and ready access by a large number of fishermen. The proposed trip limits would

also reduce the likelihood of closure which would impact states north of Florida, provide biological protection to help stabilize yield by limiting harvest during the spawning season and minimize gear and user group conflicts that are occurring and those that could occur with a shift in effort resulting from the net ban in the State of Florida and fishery closures in New England.

The need for these trip limits has become more critical and timely given the recently completed mackerel stock assessment. The allowable biological catch (ABC) for Atlantic Migratory Group king mackerel is 4.1 to 6.8 million pounds based on $F_{30\%SPR}$. The current ABC is 7.3 to 10.5 million pounds. In addition, the transitional SPR at the beginning of 1996/97 is estimated to be 29%; last year the SPR was estimated to be 55%. The total allowable catch (TAC) for the 1995/96 fishing year was 7.3 million pounds and the commercial allocation is proposed to be reduced from 2.71 million pounds for the 1995/96 fishing year to 2.52 million pounds for the 1996/97 fishing year. The lack of trip limits increases the potential for a closure later in the season which would differentially impact states to the north of Florida.

The problems addressed in this framework adjustment are: (1) stabilizing yield at MSY for Atlantic Migratory Group king and Spanish mackerel; (2) concern about the condition of Atlantic Migratory Group king mackerel; (3) competition/conflicts among gear and user groups; (4) potential impact on the biological status of the king mackerel fishery; (5) potential differential impacts on fishermen from early closure of the commercial king mackerel fishery; and (6) optimizing social and economic benefits from the harvest of Atlantic Migratory Group king and Spanish mackerel.

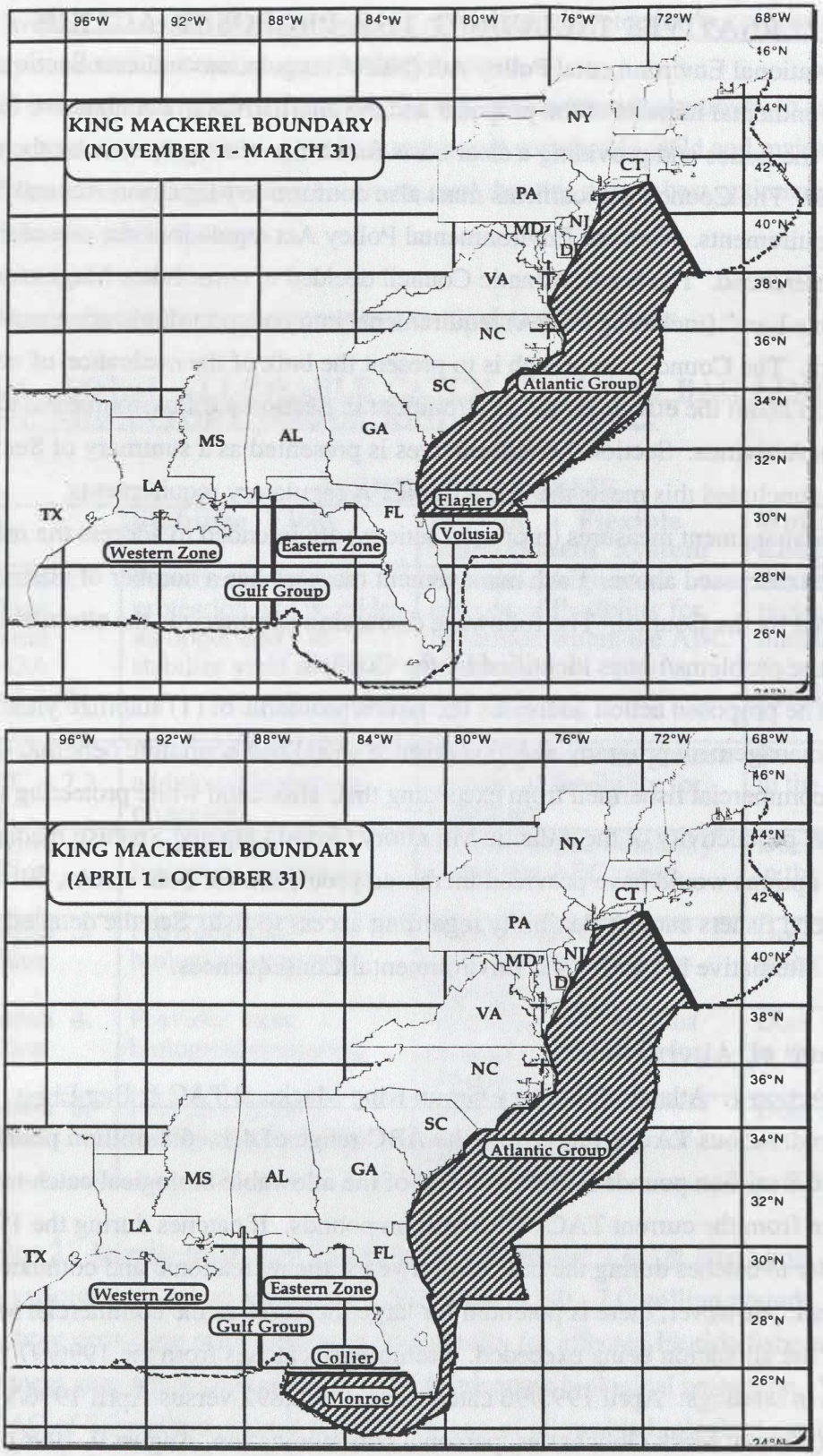


Figure 1. Seasonal boundary between Atlantic and Gulf Migratory Groups of king mackerel. (Source Roger Pugliese SAFMC Staff)

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

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

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

The proposed action addresses the issues/problems of (1) stabilize yield, (2) provide a flexible management program, and (3) optimize social and economic benefits. The proposed actions prevent commercial fishermen from exceeding their allocation while protecting the continued biological productivity of the Atlantic Migratory Group king and Spanish mackerel resources. Some rejected options would have provided increased protection for both stocks, but would not have given commercial fishers enough flexibility regarding access to fish. See the detailed analysis of impacts for each alternative in Section 4.0 Environmental Consequences.

Summary of Alternatives

Action 1. Atlantic Migratory Group King Mackerel TAC & Bag Limit. The Council considered various TAC levels within the ABC range of 4.1 - 6.8 million pounds. The proposed TAC of 6.8 million pounds is at the top end of the allowable biological catch range, yet represents a reduction from the current TAC of 7.3 million pounds. If catches during the 1996/97 fishing year are similar to catches during the past several years, the recreational and commercial allocations will not be met. However, there is potential for large increases in the commercial sector which could result in the allocation being exceeded. Preliminary catches from the 1996/97 fishing year support an increase in landings: April 1995/96 catches were 266,892 versus April 1996/97 catches of 409,300 pounds (Source: Mark Godcharles, personal communication, August 9, 1996). A higher TAC would increase the level of biological risk as it would be outside the ABC range and could lead to long term

losses. A lower TAC would increase the level of biological protection but would introduce unnecessary economic and social impacts on fishermen.

The Council concluded that the TAC of 6.8 million pounds continues to address the management objective of stabilizing yield at maximum sustainable yield and maintaining population levels sufficient to ensure adequate recruitment, and that this option best optimizes the social and economic benefits of the fishery.

Table 1. Summary of Effects of Alternatives on the Issues/Problems.

ACTION 1. TOTAL ALLOWABLE CATCH (TAC) AND BAG LIMITS FOR ATLANTIC MIGRATORY GROUP KING MACKEREL:

	ISSUES/PROBLEMS		
Alternatives	**Stabilize Yield**	**Provide a Flexible Management System**	**Optimize Social & Economic Benefits**
Proposed Action: TAC = 6.8 million pounds; Bag limit remains 3 fish GA through NY and 2 off FL	Provides biological protection and provides an opportunity to stabilize yield at MSY	Provides the greatest amount of flexibility for fishermen within the ABC range	Best balances biological protection while minimizing impacts to fishermen; Optimizes long term benefits
Rejected Option 1. No Action; TAC = 7.3 million pounds	Does not provide additional biological protection	Would provide the greatest amount of flexibility for fishermen	Does not optimize benefits in the long term
Rejected Option 2. TAC = 6.0 million pounds	Provides more biological protection	Provides some flexibility within the ABC range	Does not optimize benefits in the long term
Rejected Option 3. TAC = 5.5 million pounds	Provides more biological protection	Does not provide sufficient flexibility for fishermen	Does not optimize benefits in the long term
Rejected Option 4. TAC = 4.1 million pounds	Provides more biological protection	Would provide the least amount of flexibility for fishermen	Does not optimize benefits in the long term
Rejected Option 5. TAC = 4.8 million pounds	Provides more biological protection	Does not provide sufficient flexibility for fishermen	Does not optimize benefits in the long term

Action 2. Atlantic Migratory Group Spanish Mackerel TAC & Bag Limit. The Council considered various TAC levels within the ABC range of 5.0 - 7.0 million pounds. The Council is concerned about providing some increased opportunity for affected Florida fishermen due to the ban on entanglement gear while continuing to provide adequate biological protection. While the proposed TAC of 7.0 million pounds is at the top end of allowable biological catch range, the Council concluded this was justified given only 4.4 million pounds of the 9.4 million pound TAC was harvested during the 1995/96 fishing year.

ACTION 2. TOTAL ALLOWABLE CATCH (TAC) AND BAG LIMITS FOR ATLANTIC MIGRATORY GROUP SPANISH MACKEREL:

ISSUES/PROBLEMS

Alternatives	Stabilize Yield	Provide a Flexible Management System	Optimize Social & Economic Benefits
Proposed Action: TAC = 7.0 million pounds; Bag limit remains 10 off GA through FL	Provides biological protection and will stabilize yield at MSY	Provides the most flexibility within the ABC range for fishermen	Best alternative to optimize benefits by balancing reduction in TAC & providing a flexible management system
Rejected Option 1. No Action; TAC = 9.4 million pounds	Is outside ABC range and does not provide biological protection	Would provide the greatest amount of flexibility to fishermen	No increase in TAC but provides no biological protection; Could result in reduced benefits in the long term
Rejected Option 2. TAC = 6.0 million pounds	Provides more biological protection	Provides less flexibility to fishermen	Reduces TAC but provides more biological protection; non-optimal
Rejected Option 3. TAC = 5.0 million pounds	Provides the most biological protection	Does not provide sufficient flexibility to fishermen	Reduces TAC but provides more biological protection; non-optimal
Rejected Option 4. TAC = 5.3 million pounds	Provides some biological protection	Does not provide sufficient flexibility to fishermen	Reduces TAC but provides more biological protection; non-optimal

This option results in a decrease from the current TAC of 9.4 million pounds. A higher TAC would be outside the ABC range and significantly increases the level of biological risk and could lead to long term losses. A lower TAC would increase the level of biological protection but would introduce unnecessary economic and social impacts on fishermen.

The Council concluded the TAC of 7.0 million pounds best addresses the management objective of stabilizing yield at maximum sustainable yield (MSY) and maintaining population levels sufficient to ensure adequate recruitment while also providing a flexible and responsive management regime by providing an increased opportunity for displaced Florida net fishermen; also this option optimizes the social and economic benefits of the fishery.

Action 3. Revised Trip Limits for Atlantic Migratory Group Spanish Mackerel.

The Council is revising Spanish mackerel trip limits at the request of the commercial sector due to the recent ban on entanglement gear in Florida in conjunction with recent migratory patterns where fish tend to remain in state waters. These two factors, combined with a reduction in TAC concerned many Spanish mackerel fishermen in Florida who have had difficulty the past year making ends meet as they adjusted to new fishing techniques (e.g. cast netting) or search for new fisheries.

Commercial net fishermen recommended an earlier starting date for Atlantic Migratory Group Spanish mackerel along with increases in trip limits and the days allowed to reach those limits. The recommended opening date is November 1 which is one month earlier than the present opening of December 1. This change was suggested to give ample opportunity to large net boats to access migrating fish prior to their settling inside Florida state waters. The increase in trip limits from 1,000 to 1,500 pounds on days other than MWF, when it is unlimited, is to accommodate cast net fishermen who suggested that 1,000 pounds a day is insufficient for a two man crew to make a living given the change in Florida fishing regulations. The Mackerel Advisory Panel also recommended these changes.

ACTION 3. REVISED TRIP LIMITS FOR ATLANTIC MIGRATORY GROUP SPANISH MACKEREL:

ISSUES/PROBLEMS

Alternatives	Stabilize Yield	Provide a Flexible Management System	Optimize Social & Economic Benefits
Proposed Action: Revise trip limits for Atlantic Migratory Group Spanish mackerel as follows: From November 1 until 75% of the adjusted allocation is taken: MWF Unlimited Other days 1,500 lbs After 75% of the adjusted allocation is taken 1,500 lbs/day for all days	Continues to provide biological protection while allowing the commercial user group to harvest their allocation	Will provide commercial harvesters the opportunity to harvest their allocation and continue to protect stocks given current fish migratory patterns	Best alternative to optimize benefits by minimizing the reduction in producer surplus give the reduction in TAC
Rejected Option 1. No Action	May provide some additional biological protection	Does not address problem; Will continue probability that commercial allocation will not be met.	Does not optimize benefits; could reduce producer surplus

3.0 AFFECTED ENVIRONMENT

King and Spanish mackerel are major target species of important commercial fisheries in south Florida and North Carolina, as well as major target species for the private boat and charter boat recreational fishery along widespread areas within the South Atlantic and Mid-Atlantic regions. Information on recreational and commercial catches are included in Section 3.0 C. Status of the Stocks. King mackerel are particularly important to the charter boat and offshore, private boat fleets. In addition, smaller amounts of king mackerel are caught as a commercial supplement by the North Carolina charter boat fleet. North Carolina and Virginia follow Florida in commercial production of Spanish mackerel, their combined catches in 1994 amounting to about 900,000 pounds. Small amounts of Spanish mackerel are caught as an incidental catch or supplemental commercial target species off Georgia and South Carolina.

Recreational users in general have increased in numbers over time. Many come from outside the management unit, as well as areas within it. Increased income, leisure time, and a wide variety of supplies (fishing equipment, etc.) have increased participation. This participation has, in turn, generated significant amounts of economic value and also employment. A description of the mackerel fisheries was included in last year's framework action (SAFMC and MAFMC, 1995) and is not repeated here.

A. Optimum Yield

The long-term goal of optimum yield (OY) for mackerels is maximum sustainable yield (MSY). The amount of optimum yield which may be harvested annually for each species, defined as total allowable catch (TAC), may vary due to fluctuating recruitment, fluctuating abundance by area or unit of stock, intensity of fishing effort by area or unit of stock, social, economic, or ecological factors, and improved estimates of MSY (Revised Amendment 2; GMFMC and SAFMC, 1987).

The best available estimates for Atlantic Migratory Group king and Spanish mackerel are (in millions of pounds):

Table 2. Estimates of TAC, ABC and MSY.

	TAC	ABC RANGE	MSY (Atlantic & Gulf Groups)
King Mackerel			26.2
Atlantic Group	6.8	4.1 - 6.8	
Spanish Mackerel			18.0
Atlantic Group	7.0	5.0 - 7.0	

Maximum sustainable yield is the level of maximum surplus production of the population. It may be a target or goal which is to be achieved. In order to reach that goal, fishing mortality rate, and, thus, the catch must be altered. The annual catch levels specified as a particular strategy for achieving the goal are the TACs. Therefore, MSY is a biologically determined level which may be the target of management, whereas, TAC is the catch level specified solely by management to realize a particular management strategy and goal.

The sum of the Atlantic and Gulf ABCs does not necessarily add up to MSY. If one group is overfished its ABC will be lower than the long-term average; the reverse is true if a group is underfished. Only if both groups are producing exactly at MSY will the sum of the ABCs from both areas equal MSY.

Acceptable biological catch (ABC) is a biological determination from which TAC is derived.

B. Definition of Overfishing

Overfishing was defined in Amendment 5 (GMFMC and SAFMC, 1990) and modified in Amendment 6 (GMFMC and SAFMC, 1992). The revised wording is as follows:

a. A mackerel or cobia stock shall be considered overfished if the spawning potential ratio (SPR) is less than the target level percentage recommended by the assessment group, approved by the Scientific and Statistical Committee (SSC), and adopted by the Councils. The target level percentage shall not be less than 20 percent. (The Councils have subsequently set a minimum index for SPR of 30 percent for king mackerel and Spanish mackerel with the 1990 seasonal adjustment based on more recent data provided by the assessment group and endorsed by the SSC.)

b. When a stock is overfished (as defined in a.), the act of overfishing is defined as harvesting at a rate that is not consistent with programs to rebuild the stock to the target level percentage, and the assessment group will develop ABC ranges based on a fishing mortality rate that will achieve and maintain at least the minimum specified spawning potential ratio (currently set at 30 percent). The recovery period is not to exceed 12 years for king mackerel beginning in 1985 and 7 years for Spanish mackerel beginning in 1987.

c. When a stock is not overfished (as defined in a.), the act of overfishing is defined as a harvest rate that if continued would lead to a state of the stock that would not at least allow a harvest of OY on a continuing basis, and the assessment group will develop ABC ranges based upon OY (currently MSY).

Amendment 8 to the FMP for Coastal Pelagic Resources (GMFMC & SAFMC, 1996) proposes to revise the overfishing definition for mackerels to 20 percent SPR with target levels set by each council different than the overfished level (GMFMC 30% and SAFMC 40%). This definition is consistent with the recent final report of the SPR Management Strategy Committee. In that final report recommendations were made to revise overfishing definitions to ensure: 1)

consistency between FMPs in the overfishing definitions; 2) the definitions have separate components to distinguish the overfished condition from the act of overfishing; 3) explicit and unambiguous descriptions of the quantities for determining the act of overfishing and the overfished condition; and 4) a system to provide for alternative overfishing definitions depending upon the type and quality of data available.

The MSAP endorsed the recommendation of the SPR Management Strategy Committee to establish an overfishing threshold of $F_{20\%SPR}$ for king and Spanish mackerel. A mackerel stock should be defined as overfished when it is below the level of 20 percent of the spawning potential ratio. The overfishing threshold refers to a maximum fishing mortality rate beyond which some type of action must be taken to restore stocks above the overfished level. However, target levels are to be management goals separate from the threshold based upon social, economic and biological foundations and do not require action if not reached, although councils are encouraged to make progress toward those goals. Thus, fishing mortality rates should fluctuate around target levels, but never exceed the threshold level.

The Panel provided three distinct decision criteria in their 1996 report for the 1996/1997 fishing year: 1) the 1996/1997 yield resulting in a fishing rate at the optimal target; 2) the 1996/1997 yield resulting in an overfishing rate; and 3) the 1996/1997 yield which would cause the stock to be overfished or reduce the SPR below 20 percent by the end of the year.

C. Status of the Stocks

The 1996 report of the mackerel stock assessment panel (Stock Assessment Panel, 1996) contains the latest information on stock status (Appendix D):

A. Atlantic Migratory Group King Mackerel - The Panel believes the Atlantic Migratory Group of king mackerel is not undergoing overfishing because the fishing mortality rate is less than $F_{30\%\ STATIC\ SPR}$. The Panel notes that 1996/97 catches would have to be in excess of 8.1 million pounds before there would be a 50% chance or more that the stock would be undergoing overfishing.

The Panel believes the Atlantic Migratory Group of king mackerel is not overfished, since the median SPR at the beginning of 1996/97 is estimated to be 32%.

B. Atlantic Migratory Group Spanish Mackerel - The estimated fishing mortality rate is less than both the $F_{30\%STATICSPR}$ and $F_{20\%STATICSPR}$ rates. Therefore, the stock is not undergoing overfishing. Catches in 96/97 would have to be in excess of 7.9 million pounds before there would be more than a 50% chance of overfishing.

The Panel believes the Atlantic Migratory Group of Spanish mackerel is not overfished, since the median SPR at the beginning of 1996/97 is estimated to be 29%.

Recreational and commercial catches of Atlantic Migratory Group king mackerel are shown in Table 3 and for Atlantic Migratory Group Spanish mackerel in Table 4 (Stock Assessment Report, 1996).

Table 3. Catches of Atlantic Migratory Group king mackerel. Source: Stock Assessment Panel (1996).

Fishing	Numbers of fish in thousands			Weight of fish in thousands of pounds			Average Com &
Year	Com	Rec	Total	Com	Rec	Total	Rec Weight
1981/82	276	497	772	2,390	4,422	6,812	8.82
1982/83	382	530	911	3,938	5,246	9,185	10.08
1983/84	235	671	906	2,441	6,253	8,694	9.60
1984/85	182	613	794	1,947	6,131	8,078	10.17
1985/86	233	818	1,051	2,495	7,121	9,616	9.15
1986/87	277	700	977	2,837	5,979	8,816	9.02
1987/88	348	544	892	3,453	3,905	7,357	8.25
1988/89	340	556	897	3,091	4,881	7,972	8.89
1989/90	283	380	664	2,635	3,400	6,036	9.09
1990/91	310	439	750	2,676	3,718	6,394	8.53
1991/92	296	639	934	2,516	5,822	8,338	8.93
1992/93	270	673	943	2,227	6,251	8,477	8.99
1993/94	225	375	600	2,018	4,438	6,456	10.76
1994/95	226	382	607	2,197	3,727	5,924	9.76

With a reduced TAC and no change in bag limits for Atlantic group king mackerel, the recreational sector will most likely remain within their allocation based upon past landings under a similar bag limit. During the fishing years 1988/89 through 1990/91 recreational fishermen were under the same bag limit implemented under last year's seasonal adjustment. Recreational landings were 4.88 million pounds in 1988/89; 3.40 million in 1989/90; and 3.72 in 1990/91. Anecdotal information has suggested recreational fishermen may have been unaware of the bag limit change implemented in last year's framework. The Council used press releases and articles in its newsletter to restate the change in bag limits for king mackerel. Future recreational king mackerel catches may be reduced as more fishermen become aware of the bag limit change. As for Spanish mackerel, recreational landings have been well below their allocated quota for several years and are not likely to change dramatically in the near future.

Table 4. Catches of Atlantic Migratory Group Spanish mackerel. Source: Stock Assessment Panel (1996).

Fishing	Numbers of fish in thousands			Weight of fish in thousands of pounds			Average Com &
Year	Com	Rec	Total	Com	Rec	Total	Rec Weight
1984/85	2,184	942	3,126	3,292	1,311	4,602	1.47
1985/86	2,346	496	2,842	4,192	747	4,939	1.74
1986/87	1,907	798	2,704	2,565	1,196	3,761	1.39
1987/88	2,446	1,053	3,498	3,559	1,474	5,033	1.44
1988/89	2,647	1,726	4,373	3,524	2,740	6,264	1.43
1989/90	2,234	1,103	3,337	3,963	1,569	5,533	1.66
1990/91	2,067	1,323	3,390	3,560	2,075	5,635	1.66
1991/92	2,913	1,464	4,377	4,736	2,287	7,023	1.60
1992/93	2,274	1,210	3,484	3,716	1,995	5,712	1.64
1993/94	2,525	920	3,445	4,813	1,493	6,306	1.83
1994/95	3,165	1,083	4,248	5,233	1,374	6,607	1.56

4.0 ENVIRONMENTAL CONSEQUENCES

A. Introduction

This section is divided into two major parts. The first part addresses management measures and alternatives considered by the Council. The second depicts the consequences of management. The regulatory impact review (RIR) analysis; information for analyses required by the Regulatory Flexibility Act are incorporated into the discussion under the proposed action and each of the alternatives. The social impact assessment (SIA) analysis is presented under the "Social Impacts" heading and the Social Impact Assessment on page x.

Each Action is followed by four subheadings: 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."

B. Management Measures

ACTION 1. TOTAL ALLOWABLE CATCH (TAC) AND BAG LIMITS FOR ATLANTIC MIGRATORY GROUP KING MACKEREL

Establish a TAC of 6.8 million pounds for the 1996/97 fishing year. Allowable biological catch (ABC) is 4.1 - 6.8 million pounds (Table 5). The commercial allocation is 2.52 million pounds (37.1%) and the recreational allocation is 4.28 million pounds (62.9%) which, based on an average weight of 9.76 pounds from the 1995 stock assessment, equates to 438,525 fish.

The bag limit is to remain at 3 fish per person per day off New York through Georgia, while off Florida, the bag limit remains unchanged at 2 fish per person per day

Table 5. King Mackerel Stock Management Regulations and Landings (Pounds are in millions)* (Source Mackerel Stock Assessment Report and NMFS)

Fishing Year	ABC (pounds)	TAC (pounds)	Actual Combined Catch	Percent of TAC Caught	Rec. Alloc. (62.9%) (pounds)	Actual Rec Landings	Comm. Alloc (37.1%) (pounds)	Actual Comm. Landings
1986/87	6.9 - 15.4	9.68	8.82	(91%)	6.09	5.98	3.59	2.84
1987/88	6.9 - 15.4	9.68	7.36	(76%)	6.09	3.91	3.59	3.45
1988/89	5.5 - 10.7	7.00	7.97	(114%)	4.40	4.88	2.60	3.09
1989/90	6.9 - 15.4	9.00	6.04	(67%)	5.66	3.40	3.34	2.64
1990/91	6.5 - 15.7	8.30	6.39	(77%)	5.22	3.72	3.08	2.68
1991/92	9.6 - 15.5	10.50	8.34	(79%)	6.60	5.82	3.90	2.52
1992/93	8.6 - 12.0	10.50	8.48	(81%)	6.60	6.25	3.90	2.23
1993/94	9.9 - 14.6	10.50	6.46	(62%)	6.60	4.44	3.90	2.02
1994/95	7.6 - 10.3	10.00	5.92	(59%)	6.29	3.73	3.71	2.20
1995/96	7.3 - 10.5	7.30	5.86**	(80%)	4.59	4.01**	2.71	1.85**
1996/97	4.1 - 6.8	6.80++			4.28++		2.52++	

* Shaded cells indicate landings exceeded allocation
** Projected yield from NMFS
++ Proposed

Biological Impacts

The Mackerel Stock Assessment Panel (Panel) report indicated catches of Atlantic Migratory Group king mackerel remained relatively stable since 1981 not reaching the TAC for a number of years (Tables 3 and 5).

For fishing year 1996/1997, the Panel recommends an ABC range of 4.1 to 6.8 million pounds for Atlantic Migratory Group king mackerel. There is a 50% chance of the ABC being less than 5.5 million pounds and a 16% chance of it being less than 4.1 million pounds. There is an 84% chance that the ABC is less than 6.8 million pounds (Stock Assessment Panel, 1996). The proposed TAC is within the recommended ABC range. The user group allocation of TAC remains at 37.1% and 62.9% for commercial and recreational respectively. Also, bag limits remain the same at 2 fish per person per day off Florida and 3 fish per person per day off New York through Georgia effective January 1, 1996.

The bag limit was 2 fish in Florida and 3 fish north of Florida during fishing years 1988/89, 1989/90 and 1990/91 with recreational catches of 4.88, 3.40 and 3.72 million pounds respectively (Table 5). During the 1991/92 fishing year the bag limit was 5 fish everywhere and the recreational catch was 5.82 million pounds (Table 5). The bag limit was reduced to 2 fish off Florida and 5 fish north of Florida in the 1992/93 fishing year, with a recreational catch of 6.25 million pounds. Thus, based on past catch information, the bag limit of 2 fish in Florida and 3 north of Florida should constrain the recreational catch to their allocation of 4.28 million pounds. It should be noted, if the number of recreational fishermen and/or trips increases significantly, the allocation could be exceeded because the recreational sector is only managed with a bag limit and not a quota/closure.

Economic Impacts

Except for the 1988/89 fishing season, the TAC has not been filled. Since the 1989/90 fishing season 81% or less of the TAC has been filled. The highest at 81% was for the 1992/93 fishing season. During the 1994/95 fishing season only 59% of the TAC was filled. If the 1995/96 landings are representative of what landings would be in 1996/97, 86% of the TAC will be filled for the 1996/97 fishing season. On the commercial side, catches exceeded the commercial allocation by 490,000 pounds in 1988/89 (Table 5). For all other years the commercial catches have been below the commercial allocation. Recreational catches exceeded the recreational allocations by 480,000 in the 1988/89 fishing year. For all other years, the recreational catches have been below the recreational allocation.

In principle the preferred TAC of 6.8 million pounds for the 1996/97 fishing year means a 7% reduction in both commercial and recreational allowable harvests from the 1995/96 season. The reduction in TAC will result in a recreational allocation of 4.28 million pounds. Recreational

catches exceeded 4.28 million pounds during the 1993/94 fishing season. It was below 4.28 million pounds for the 1995/96 fishing season. Thus, assuming a similar catch trend from last season, the recreational catch would likely not exceed the recreational allocation. The bag limit of 3 fish per person per day off New York through Georgia, and 2 fish per person per day off Florida remain unchanged from last season. Through personal communication with fishermen, it is believed most recreational fishermen fishing for king mackerel were unaware of the new bag limits implemented January 1, 1996. More effort has been put into informing fishermen of the new bag limits. This may result in a reduction in the 1996/97 season recreational catch if fishermen comply with bag limit regulations. If this should happen, the decrease in recreational allocation would likely not affect recreational fishing for Atlantic Migratory Group king mackerel in the South Atlantic area.

Although the proposed TAC (Action 1) has been reduced, the commercial quota (2.52 million pounds) is still greater than the projected commercial catch (1.85 million pounds) for the 1995/96 season. The Florida net ban has not resulted in significant effort shift to this fishery thus far. The trip limits to be implemented under a prior regulatory amendment (SAFMC & MAFMC 1995) would keep the season open for as long as possible to maintain price and market stability.

Social Impacts

Both commercial and recreational king mackerel landings have been below their allocations for a number of years. The last time either sector was near their allocation was 1988/89 when TAC was exceeded. This year's TAC is well above the last two year's total landings, yet would have been exceeded five of the last ten years. Whether either sector will exceed this year's allocation will depend upon a number of factors, but primarily the availability of fish.

There has been concern expressed over the status of Atlantic Migratory Group king mackerel for several years by both commercial and recreational fishermen on the Advisory Panel and in testimony from the general public. Those comments suggested king mackerel stocks were not as well off as indicated by previous stock assessments. The Council reduced TAC and the bag limit last year, in addition to recommending trip limits for king mackerel to address these concerns. This year's stock assessment seems more in line with those observations, yet there are still some concerns about the assessment that the Council would like to be addressed given the recent review of Gulf Migratory Group king mackerel.

Choosing a TAC at this level will provide the commercial sector room to ensure that there may not be an early closure of the fishery as feared by fishermen in the north. Recreational fishermen on the Advisory Panel, however, indicated caution should be taken when setting TAC for king mackerel. Anecdotal information from king mackerel tournaments in states like South Carolina

and North Carolina is perceived as an indication king mackerel are not in as good a shape in the northern area as it might be in the southern area.

Conclusion

The Council remains concerned about the status of Atlantic Migratory Group king mackerel. The Council is also concerned about the potential negative social and economic impacts resulting from a closure in the commercial fishery given the trip limits previously requested have not yet been implemented. Catches in April 1996 were 409,300 pounds versus April 1995 catches of 266,892 pounds. The Council had intended for the trip limits to be in place by April 1996 to prevent large catches during the month of April. The lack of trip limits increases the potential for a closure later in the season which would differentially impact states to the north of Florida.

In approving a TAC of 6.8 million pounds which is at the upper end of ABC, the Council balanced the need to provide adequate biological protection with the desire to prevent differentially impacting fishermen in the northern range of the fishery. The Council recognized the TAC may be lowered next year but expects the trip limits to be in place which would put all fishermen operating under the same regulations for the next fishing year thereby preventing differential impacts. The Council concluded this option will stabilize yield at maximum sustainable yield, maintains population levels sufficient to ensure adequate recruitment and optimizes the social and economic benefits from the fishery.

Rejected Options for Action 1

Rejected Option 1. No action; TAC = 7.3 million pounds.

Biological Impacts

A total allowable catch (TAC) of 7.3 million pounds is outside the recommended allowable biological catch (ABC) range (4.1 - 6.8 million pounds). This option carries a considerable biological risk of pushing the stock below the overfished level.

Economic Impacts

The no action option would leave the TAC unchanged at 7.3 million pounds. The allocations for both recreational and commercial sectors would have been 4.59 and 2.71 million pounds respectively. Given the current level of the commercial harvest, this option would accommodate some increase in effort from existing fishermen and from new fishermen entering the fishery. This could increase the short term benefits to commercial fishermen. The extent of this increase in short term benefits would depend on how efficient these fishermen are in their operations and on market conditions. However, such short term benefits could lead to stock depletion resulting in long term economic losses and possible stock collapse.

Social Impacts

While this TAC would have maintained the status quo, it would have been outside the ABC range. With the concern expressed over the status of king mackerel by the Advisory Panel and other fishermen, it is likely that choosing a TAC outside the ABC range would have been perceived as unwise management.

Conclusion

Although the Council did consider the social and economic concerns within this fishery to be serious, they did not wish to jeopardize the stock by adopting the biological risks associated with this option. Choosing a TAC outside the ABC would be a very risk prone strategy. The Council concluded this option would not stabilize yield at maximum sustainable yield, would not maintains population levels sufficient to ensure adequate recruitment and would not optimizes the social and economic benefits from the fishery.

Rejected Option 2. TAC = 6.0 million pounds.

Biological Impacts

A total allowable catch (TAC) of 6.0 million pounds is toward the upper limit of the recommended allowable biological catch (ABC) range (4.1 - 6.8 million pounds). The stock assessment panel concluded there is a 84% chance that the ABC was below 6.8 million pounds which means that a TAC of 6.0 million pounds has less than an 84% chance of being incorrect. This option carries less biological risk than the Council's preferred option.

Economic Impacts

Rejected Option 2 provides for a TAC toward the upper end of the recommended ABC range. Given the trend in catches for the past ten fishing seasons, total catch has exceeded 6.0 million pounds in eight of the ten seasons. Thus, it is very likely that a TAC of 6.0 million pounds would be met during the 1996/97 season. The resulting closure could cause significant economic loss to the industry and to society in general.

Social Impacts

If these fish were to become more available to Florida commercial net fishermen, it is possible that the commercial allocation could be met early. If that were the case, commercial fishermen in North Carolina or the Mid-Atlantic states may be prevented from harvesting king mackerel with an early closure on the commercial quota. This concern was expressed by fishermen and Council representatives from North Carolina and the Council representative from the Mid-

Atlantic. If the recommended trip limits in last year's seasonal adjustment and modified in Amendment 8 (GMFMC & SAFMC 1996) are put in place it may slow the harvest in that area enough to ensure that fishermen to the north will have access to king mackerel.

Conclusion

The Council rejected this option because it did not adequately address the social and economic problems within the fishery and because of the increased level of risk of closure given the lower commercial allocation and lack of trip limits. The Council concluded this option would not optimizes the social and economic benefits from the fishery.

Rejected Option 3. TAC = 5.5 million pounds.

Biological Impacts

A total allowable catch (TAC) of 5.5 million pounds is within the recommended allowable biological catch (ABC) range (4.1 - 6.8 million pounds). The stock assessment panel concluded that there was a 50% chance that the ABC was below 5.5 million pounds which means that a TAC of 5.5 million pounds has better than a 50% chance of being correct.

This option carries less biological risk than the Council's preferred option.

Economic Impacts

Rejected Option 3 would have resulted in allocations of 3.46 and 2.04 million pounds to the recreational and commercial sectors respectively. This is less than the total catch of 5.86 million pounds for the 1995/1996 fishing season. It is very likely the recreational catch for the 1996/1997 fishing season will exceed this allocation, thus rejecting this option for a slightly higher TAC that is within the ABC range would likely prevent any disruption of recreational fishing activities. The allocation to the commercial sector under this option would be slightly higher than the commercial catch for the 1995/1996 fishing season. Thus, this option would seem to maintain the commercial catch at its current level.

Social Impacts

Choosing this TAC may have warranted a reduction in the bag limit for recreational fishermen since they exceeded the 3.46 million pounds last year which would have been their allocation under this option. However, it has been suggested many recreational fishermen were unaware of the lowered bag limit in last year's seasonal framework adjustment. Since the Council has again informed the public of this change through press releases and articles in the newsletter, recreational catches may be down from last year as fishermen become aware of the lowered bag

limit. This TAC would also increase the chance of an early closure of the commercial king mackerel fishery if harvesters in the southern area were to increase their landings early in the year.

Conclusion

The Council rejected this option because it did not adequately address the social and economic problems within the fishery and because of the increased level of risk of closure given the lower commercial allocation and lack of trip limits. The Council concluded this option would not optimizes the social and economic benefits from the fishery.

Rejected Option 4. TAC = 4.1 million pounds.

Biological Impacts

A total allowable catch (TAC) of 4.1 million pounds is at the lower end of the recommended allowable biological catch (ABC) range (4.1 - 6.8 million pounds). The stock assessment panel concluded that there was a 16% chance that the ABC was below 4.1 million pounds which means that a TAC of 4.1 million pounds has around an 84% chance of being correct.

This option carries less biological risk than the Council's preferred option.

Economic Impacts

A TAC of 4.1 million pounds would have resulted in allocations of 2.58 and 1.52 million pounds to the recreational and commercial sectors respectively. This is only 64% of the recreational and 82% of the commercial catches for the 1995/96 season. This option would result in a closure of the commercial fishery resulting in undue hardship to fishermen. In addition, fishermen in the northern end of the range would be differentially impacted. The recreational sector would exceed their allocation which could then require a future reduction in the bag limit.

Social Impacts

Both the recreational and commercial sectors would have seen a reduction from last year's landings with this option. Although concern has been expressed over the status of king mackerel, the Stock Assessment Panel considered the stock not in an overfished condition. There does not seem to be sufficient justification to impose such an adverse impact on both sectors of the fishery when stocks are relatively healthy.

Conclusion

The Council rejected this option because it did not adequately address the social and economic problems within the fishery and because of the increased level of risk of closure given the

lower commercial allocation and lack of trip limits. The Council concluded this option would not optimizes the social and economic benefits from the fishery.

Rejected Option 5. TAC = 4.8 million pounds.

Biological Impacts

A total allowable catch (TAC) of 4.8 million pounds is within the recommended allowable biological catch (ABC) range (4.1 - 6.8 million pounds). The stock assessment panel concluded there was a 16% chance that the ABC was below 4.1 million pounds which means that a TAC of 4.8 million pounds has slightly less than a 84% chance of being correct.

This option would be the highest TAC if the Council were managing this fishery at 40% SPR as has been recommended in Amendment 8 to the Coastal Pelagic Resources. This option carries less biological risk than the Council's preferred option.

Economic Impacts

A TAC of 4.8 million pounds would have resulted in allocations of 3.02 and 1.78 million pounds to the recreational and commercial sectors respectively. Again, both allocations are less than the recreational and commercial landings for the 1995/96 season. These are 75% and 96% of the recreational and commercial catches respectively, for 1995/96. This option would result in a closure of the commercial fishery resulting in undue hardship to fishermen. In addition, fishermen in the northern end of the range would be differentially impacted. The recreational sector would exceed their allocation which could then require a future reduction in the bag limit.

Social Impacts

Both the recreational and commercial sectors would have seen a reduction in landings from last year with this option. Again, concern has been expressed over the status of king mackerel, but the Stock Assessment Panel considered the stock not in an overfished condition. There did not seem sufficient justification to impose such an adverse impact on both sectors of the fishery when stocks are relatively healthy.

Conclusion

The Council rejected this option because it did not adequately address the social and economic problems within the fishery and because of the increased level of risk of closure given the lower commercial allocation and lack of trip limits. The Council concluded this option would not optimizes the social and economic benefits from the fishery.

ACTION 2. TOTAL ALLOWABLE CATCH (TAC) AND BAG LIMITS FOR ATLANTIC MIGRATORY GROUP SPANISH MACKEREL

Establish a TAC of 7.0 million pounds for the 1996/97 fishing year. Allowable biological catch (ABC) is 5.0 - 7.0 million pounds (Table 6). The commercial allocation is 3.5 million pounds (50%) and the recreational allocation is 3.5 million pounds (50%) which, based on an average weight of 1.56 pounds from the 1996 stock assessment, equates to 2,243,590 fish.

The bag limit is to remain 10 fish per person per day off New York through Florida.

Table 6. Spanish Mackerel Stock Management Regulations and Landings (Pounds are in millions).* Source: Mackerel Stock Assessment Report and FDEP.

Fishing Year	ABC (pounds)	TAC (pounds)	Actual Combined Catch	Percent of TAC Caught	Rec. Alloc. (pounds)	Actual Rec Landings	Comm. Alloc. (pounds)	Actual Comm. Landings
1987/88	1.7 - 3.1	3.10	5.03	162%	0.74	1.47	2.36	3.56
1988/89	1.3 - 5.5	4.00	6.26	156%	0.96	2.74	3.04	3.52
1989/90	4.1 - 7.4	6.00	5.53	92%	2.76	1.57	3.24	3.96
1990/91	4.2 - 6.6	5.00	5.64	113%	1.86	2.08	3.14	3.56
1991/92	5.5 - 13.5	7.00	7.02	100%	3.50	2.29	3.50	4.74
1992/93	4.9 - 7.9	7.00	5.71	82%	3.50	2.00	3.50	3.72
1993/94	7.3 - 13.0	9.00	6.31	70%	4.50	1.49	4.50	4.81
1994/95	4.1 - 9.2	9.20	6.61	72%	4.60	1.37	4.60	5.23
1995/96	4.9 - 14.7	9.40	4.4+	47%	4.70		4.70	1.87**
1996/97	5.0 - 7.0	7.00++			3.50++		3.50++	

* Shaded cells indicate landings exceeded allocation
\+ Projected yield
**From Florida Department of Environmental Protection, estimates as of March 12
++Proposed

Biological Impacts

The Stock Assessment Panel report indicated the total catch of Atlantic Migratory Group Spanish mackerel exceeded TAC during the 1987/1988, 1988/1989, 1990/1991 and 1991/92 fishing seasons. Total catch during other fishing seasons was below TAC. The recreational catch has been declining and has been below its allocation since the 1990/1991 fishing season. The commercial catch has exceeded its allocation throughout the period, with the exception of 1995/96.

For fishing year 1996/1997, the Panel recommends an ABC range of 5.0 to 7.0 million pounds for Atlantic Migratory Group Spanish mackerel. There is a 16% chance that the ABC is less than 5.0 million pounds and a 50% chance that the ABC is less than 6.0 million pounds. There is an 84% chance that the ABC is less than 7.0 million pounds (Stock Assessment Panel, 1996). The estimated fishing mortality rate is less than both the $F_{30\%\ STATICSPR}$ and $F_{20\%\ STATICSPR}$ rates. Therefore, the Panel affirms that the stock is not undergoing overfishing. For the 1996/1997 fishing season, catches would have to be in excess of 7.9 million pounds before there would be more than a

50% chance of overfishing. Further, the Panel estimates the median SPR at the beginning of the 1996/1997 fishing season at 29% and that even very large catches in 1996/1997 will only marginally increase the risk of SPR falling below 20%.

Economic Impacts

The proposed TAC will result in a decrease of 2.4 million pounds over last season's TAC. Since the 1991/92 fishing season recreational catch has declined steadily. The recreational catch for the 1994/95 season was 1.37 million pounds (only 30% of the allocation). Figures for the 1995/96 recreational catch are not yet available. Part of the reason for this sector consistently harvesting low percentages of its allocations in consecutive fishing seasons is because of the increase in its share of the total TAC. Another possible reason is the lagged reaction of recreational fishermen to quota overruns and controversial fishery closure in previous years. Given this pattern of harvesting by the recreational sector since the 50:50 split became effective, it is unlikely the decrease in TAC will have any effect on recreational catches for the 1996/97 season.

On the commercial side, harvests have consistently exceeded the seasonal allocations up to the 1995/96 season. The preliminary figure for the 1995/96 season indicates a commercial catch of 1.87 million pounds, well below the figure for the previous season. It is believed that most of the fish stayed in state waters in Florida and because there is a net ban in Florida state waters[1], the fish were not available to net fishermen who usually catch a significant part of the commercial allocation. The commercial trip limits have also helped to constrain this sector and to keep the fishery open throughout the season. Thus, the decrease in TAC would likely not affect commercial catch.

Social Impacts

Over the past four years combined Spanish mackerel landings have been well below the selected TAC. This is primarily because the recreational sector has not met their allocation since 1990/91 when the allocation for the commercial and recreational sectors was 76% and 24% respectively. It has been suggested there is a lag with recreational fishing preferences for Spanish mackerel because fishermen may have switched to other species when they were unable to fish for Spanish due to quota overruns which prompted closures of the fishery. Another recent factor contributing to lower landings has been the ban on entanglement gear in Florida state waters which has dramatically curtailed commercial landings of Spanish mackerel. Because fish have remained in state waters during their migration through that area, fishermen have not had ready access to these fish as in the past. Estimated commercial landings for the 1995/96 fishing year were 1.87 million pounds (Table 6) as of March 12. Both of these factors were considered when selecting the

[1] The State of Florida banned the use of entanglement gear in Florida State waters as of July 1995 (see Appendix C).

proposed TAC. There is a chance the recreational sector will increase their landings of Spanish mackerel as more fish become available to them. Commercial fishermen, on the other hand, must depend upon other factors, such as the proposed changes in management measures, to increase the availability of fish to them so that they may meet their allocation. As Florida fishermen adjust to new fishing techniques and possibly revised trip limits being considered in this framework, their opportunities may increase, giving them a chance at increasing their landings over last year.

Conclusion

The Council concluded that a TAC from the upper end of the ABC range is the most prudent course of action, primarily because of the social and economic impacts of lower TACs on the fishery. The recent effects of the ban on entanglement gear in Florida was also an influence as evidenced by the significantly lower commercial landings for the southern zone. That action in itself has dramatically changed the fishery and fishermen's access to fish. The total allowable catch of 7.0 million pounds best addresses the management objective of stabilizing yield at maximum sustainable yield and maintaining population levels sufficient to ensure adequate recruitment. The Council concluded that this option optimizes the social and economic benefits of the fishery. This was the preferred option of the Advisory Panel.

Rejected Options for Action 2

Rejected Option 1. No action; (TAC = 9.4 million pounds).

Biological Impacts

A total allowable catch (TAC) of 9.4 million pounds is outside the recommended allowable biological catch (ABC) range (4.1 - 6.8 million pounds). This option carries a considerable biological risk of pushing the stock below the overfished level.

Economic Impacts

This option will continue the status quo, but is outside the Stock Assessment Panel recommended ABC range. It is impossible to predict whether the fish will stay in state waters like they did this past season. If commercial catch trends returns to the pre–1995/96 season, the commercial allocation would be less than the expected catch. However, if catch follows the 1995/96 season, commercial catches would be below the allocation. The recreational sector is not likely to be affected since harvests in previous years have been well below this allocation.

Social Impacts

This option is outside the ABC range recommended by the Stock Assessment Panel . While some within the commercial sector suggested remaining with the status quo, it is likely that given the

recent ban on entanglement gear in Florida the commercial sector would not reach their allocated quota with this option. This is predicated on fish continuing their recent trend of remaining in state waters during their migration through southern areas. Spanish mackerel are an important component of the seasonal fishing round for net fishermen and they expressed much concern over their ability to continue to make a living fishing for Spanish mackerel. However, the Council considered the long term effects of choosing a TAC outside the ABC range to be risky and unwarranted.

Conclusion

Although the Council did consider the social or economic concerns within this fishery to be serious, they did not wish to jeopardize the stock by adopting the biological risks associated with this option. Choosing a TAC outside the ABC would be a very risk prone strategy.

The Council rejected this option because it did not adequately address the social and economic problems within the fishery and because this option would not optimizes the social and economic benefits from the fishery.

Rejected Option 2. TAC = 6.0 million pounds.

Biological Impacts

A total allowable catch (TAC) of 6.0 million pounds is within the recommended allowable biological catch (ABC) range (5.0 - 7.0 million pounds). The stock assessment panel concluded there is a 84% chance the ABC was below 7.0 million pounds which means that a TAC of 6.0 million pounds has slightly less than a 84% chance of being incorrect. This option carries less biological risk than the Council's preferred option but does not adequately address the social and economic concerns within the fishery.

Economic Impacts

Rejected Option 2 which proposed a TAC of 6.0 million pounds is the mid–point of the SAP recommended ABC range. It would result in allocations of 3.0 million pounds to both the recreational and commercial sectors respectively. Given the harvest pattern of the recreational sector, it is very unlikely the 1996/97 recreational catch will come close to its allocation, thus this option would not have impacted recreational fishing activities. The allocation to the commercial sector would have been well below previous catch levels except for the 1995/96 season. With the exception of the 1995/96 season, commercial harvests have been well above this level. Thus, this option would have impacted the commercial sector adversely. It would mean a reduction of 43% of the commercial harvest based on the figures for 1994/1995 fishing season which would have caused unnecessary economic hardship on commercial fishermen.

Social Impacts

Selecting this option would have had little impact upon the recreational fishery since recent landings would have been well below the allocation of 3.0 million pounds. The commercial sector on the other hand has been well above this level of quota for all but one of the last nine years. If Spanish mackerel continue to stay in state waters during their migration south, commercial fishermen in Florida will have to depend on other factors, such as the proposed changes to trip limits and the unlimited season opening to increase their landings to a level where they may reach an allocation of 3.0 million pounds.

Conclusion

The Council rejected this option because it did not adequately address the social and economic problems within the fishery and because this option would not optimizes the social and economic benefits from the fishery. Setting TAC at this level would increase the chances of closure for the commercial fishery. The Council concluded that this option would have negative social and economic impacts, especially for the commercial fishery.

Rejected Option 3. TAC = 5.0 million pounds.

Biological Impacts

A total allowable catch (TAC) of 5.0 million pounds is at the lower end of the recommended allowable biological catch (ABC) range (5.0 - 7.0 million pounds). The stock assessment panel concluded there was a 50% chance that the ABC was below 6.0 million pounds which means that a TAC of 5.0 million pounds has better than a 50% chance of being correct.

This option carries less biological risk than the Council's preferred option.

Economic Impacts

This rejected option is at the lowest end of the recommended ABC range and there is an 84% chance that the ABC is less than 7.0 million pounds. There is some possibility the recreational allocation of 2.5 million pounds would be harvested. Commercial harvests have tended toward 6 million pounds in recent years, except for the 1995/96 season. This option could cause undue hardship to commercial Spanish mackerel fishermen.

Social Impacts

Although commercial fishermen would not have met the anticipated allocation with this option based upon last year's catches, there is a chance that as Florida net fishermen adapt to new fishing techniques and possibly other framework changes that they could meet this level of

allocation. In addition, the recreational component could also very well meet their anticipated allocation with this option.

Conclusion

The Council rejected this option because it did not adequately address the social and economic problems within the fishery and because this option would not optimizes the social and economic benefits from the fishery. Setting TAC at this level would increase the chances of closure for the commercial fishery and overruns for the recreational fishery. The Council concluded that this option would have negative social and economic impacts for the fishery.

Rejected Option 4. TAC = 5.3 million pounds.

Biological Impacts

A total allowable catch (TAC) of 5.3 million pounds is within the recommended allowable biological catch (ABC) range (5.0 - 7.0 million pounds). The stock assessment panel concluded there was a 50% chance that the ABC was below 6.0 million pounds which means that a TAC of 5.3 million pounds has better than a 50% chance of being correct.

This option carries less biological risk than the Council's preferred option.

Economic Impacts

This option would have implemented a TAC below the mid point of the recommended ABC range. Again, it is likely the recreational allocation of 2.65 million pounds could be harvested. The commercial harvests have been well above this level, thus this option will impact the commercial sector adversely.

Social Impacts

This is the upper end of the ABC using 40% SPR as a target level for Spanish mackerel. This target level is that which the Council has suggested managing Atlantic group mackerels in Amendment 8 to the FMP for Coastal Pelagic Resources (GMFMC & SAFMC 1996). If this option were chosen this year, it would have been a substantial reduction in TAC. However, neither the commercial or recreational sector had estimated landings of 2.65 million pounds last year. The Council will need to address the impacts of managing Spanish mackerel at 40% SPR given the recent reductions in ABC range and subsequent reductions in TAC.

Conclusion

The Council rejected this option because it did not adequately address the social and economic problems within the fishery. Setting TAC at this level would significantly increase the

chances of a closure for the commercial fishery and overruns for the recreational fishery. The Council concluded that this option would have negative social and economic impacts for the fishery and would not optimizes the social and economic benefits from the fishery.

ACTION 3. REVISED TRIP LIMITS FOR ATLANTIC MIGRATORY GROUP SPANISH MACKEREL

In the northern zone boats would be restricted to possession limits of 3,500 pounds of Spanish mackerel.

The southern zone possession limits are as follows:

(a) From April 1 – October 31: 1,500 pounds per vessel per day.

(b) November 1 until 75% of the adjusted allocation is taken: (Vessel fishing days begin at 6:00 a.m. and extend until 6:00 a.m. the following day, and vessels must be unloaded by 6:00 p.m. of that following day.)

Monday, Wednesday, and Friday Unlimited

Other days 1,500 pounds

(c) After 75% of the adjusted allocation is taken 1,500 pounds per vessel per day for all days.

(d) When 100% of the adjusted allocation is reached: 500 pounds per vessel per day to the end of the fishing year (March 31). Adjusted allocation compensates for estimated catches of 500 pounds per vessel per day to the end of the season.

Biological Impacts

The biological impacts of revising trip limits for Spanish mackerel should have little if any biological impact since the quota provides the primary biological protection for the stock.

Economic Impacts

Commercial trip limits for Atlantic Migratory Group Spanish mackerel were implemented in 1992 to: 1) increase control on harvesting power in order to reduce the probability that commercial quota will be exceeded, 2) slow the pace of landings and extend the fishing year, and 3) change the distribution of landings such that smaller boats in Florida catch more of the available commercial quota than they have caught in recent years so that conflicts among fishermen are reduced.

In some years the fish arrived early in Federal waters and large boat fishermen were unable to fish under the 1,500 pounds trip limit until December 1. By that time the fish are already dispersing. The proposed revision in trip limits will open the unlimited season one month earlier so that in the event the fish arrive early, the big boats will be able to participate in the fishery. The proposed

change will allow fishermen to be able to catch the quota already allocated to them and likely increase net benefits from the fishery.

Also, a trip limit of 1,500 pounds for other days (excluding Monday, Wednesday and Friday) will allow small boat fishermen to operate more efficiently. Cast net fishermen have indicated a trip limit of 500 pounds per vessel per day on Saturdays and Sundays does not make for an efficient operation, particularly if they have lost fishing days during the week due to bad weather conditions. A 500 pound catch split between two cast net fishermen would hardly cover trip cost and earn a reasonable return.

Social Impacts

Commercial fishermen in the southern zone requested revisions to the trip limits for Spanish mackerel because of the recent ban on entanglement gear in Florida state waters and the tendency of these fish to remain in state waters during their migration. Large boat net fishermen felt an earlier starting date for the unlimited season would allow them the opportunity to capture Spanish mackerel before they migrate into state waters. The higher and expanded trip limits were requested by smaller boat operators who have recently switched to cast netting and found the 1000 pound trip limit after 75% of the adjusted allocation is taken was not practicable economically for a two man cast netting crew. The Council considered these changes to be warranted as they are to provide a flexible management system responsive to social and economic changes within a fishery. Because Spanish mackerel are not considered overfished and both sectors are having difficulty meeting allocations, these changes in trip limits would not seem to have any deleterious effects upon the stock, yet, provide commercial fishermen with an increased opportunity to harvest these fish. Because there seems to have been significant adverse impacts, both socially and economically from the ban on entanglement gear in Florida, fishermen have requested the Council to consider these changes.

Conclusion

Commercial fishermen in the southern zone have been especially impacted through the recent ban on entanglement nets inside Florida state waters because migrating fish have stayed in state waters in that area for the past several years. By allowing for an earlier starting date for the unlimited fishery, large net boats may have more opportunity to catch these fish before they migrate into state waters. In addition, the increased trip limit will allow cast net fishermen an opportunity to catch more fish when they are available. The Council concluded the proposed alternative would allow commercial fishermen greater access to fish, thereby alleviating some of the social and economic impacts they have been experiencing recently. Because biological protection is afforded largely through the quota this action will not have any deleterious effect upon the stock.

The Council concluded this option would optimize the social and economic benefits from the fishery.

Rejected Options for Action 3

Rejected Option 1. No action. The status quo remains as follows:

In the northern zone boats would be restricted to possession limits of 3,500 pounds of Spanish mackerel.

The southern zone possession limits are as follows:

(a) From April 1 – November 30: 1,500 pounds per vessel per day.

(b) December 1 until 75% of the adjusted allocation is taken: (Vessel fishing days begin at 6:00 a.m. and extend until 6:00 a.m. the following day, and vessels must be unloaded by 6:00 p.m. of that following day.)

Monday, Wednesday, and Fridays: Unlimited harvest.

Tuesdays and Thursdays: 1,500 pounds per vessel per day.

Saturdays and Sundays: 500 pounds per vessel per day.

(c) After 75% of adjusted allocation is reached: 1,000 pounds per vessel per day.

(d) When 100% of the adjusted allocation is reached: 500 pounds per vessel per day to the end of the fishing year (March 31). Adjusted allocation compensates for estimated catches of 500 pounds per vessel per day to the end of the season.

Biological Impacts

The biological impacts of not revising trip limits for Spanish mackerel should have little if any biological impact since the quota provides the primary biological protection for the stock.

Economic Impacts

This would have prevented fishermen from operating efficiently. The main reason for low commercial landings of Atlantic Migratory Group Spanish mackerel during the 1995/96 season is because the fish had already dispersed from Federal waters before the unlimited season opened. Thus, larger boat fishermen were effectively excluded from the fishery for the most part. The Council concluded that an earlier start of the unlimited season will enable fishermen to operate more efficiently and possibly increase net benefits from the fishery.

Social Impacts

Spanish mackerel are not overfished and are an important component of the seasonal fishing round for net fishermen, especially in Florida. Migrating fish have tended to stay in state waters, thereby, making fish unavailable to net fishermen in Florida since the ban on entanglement gear. The no action alternative may continue the already difficult situation for fishermen in the southern zone

and possibly exclude larger net boats entirely from this fishery. The Council considered the no action alternative to be contrary to their providing a flexible management system that is responsive to not only biological changes within the fishery, but also social and economic conditions.

Conclusion

The Council rejected this option because it did not adequately address the social and economic problems within the fishery and because this option would not optimizes the social and economic benefits from the fishery.

The Council concluded that the proposed alternative would allow commercial fishermen greater access to fish, thereby alleviating some of the social and economic impacts they have been experiencing recently. Because biological protection is afforded largely through the quota no action will have little if any deleterious effect upon the stock.

C. Unavoidable Adverse Effects

The proposed actions do not create unavoidable adverse effects. The TACs and bag limits are framework procedure measures to prevent overfishing. The revised trip limits for Spanish mackerel will provide increased opportunity for commercial fishermen from Florida to harvest their allocation since the ban on entanglement gear in state waters has hampered their access to these fish.

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

Short-term impacts of choosing TAC above the median ABC range should not have a significant impact upon rebuilding of either stock. The Council decided TACs at the higher range were necessary to lessen the social and economic impacts upon both the recreational and commercial sectors and that long-term productivity would not be affected.

The Council weighed the short-term impacts upon stocks against the long-term productivity and stability of this fishery and concluded the proposed action would result in net long-term benefits to society.

E. Irreversible and Irretrievable Commitments of Resources

There are no irreversible or irretrievable commitments of resources associated with the proposed actions. The Council established the framework procedure to regulate TACs, bag limits, trip limits, etc. to cap fishing mortality on king and Spanish mackerel. If such actions are not taken, substantial reductions in catches and future net benefits in the long term would likely occur.

F. Effects of the Fishery on the Environment

Damage to Ocean and Coastal Habitats

The proposed actions, and their alternatives, are not expected to have any adverse effect on the ocean and coastal habitats. The habitat of king and Spanish mackerel is described and was updated in Amendments 1 (GMFMC and SAFMC, 1985) and 3 (SAFMC and GMFMC, 1989a). No new information is available.

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

Public Health and Safety

The proposed actions, and their alternatives, are not expected to have any substantial adverse impact on public health or safety.

Endangered Species and Marine Mammals

The proposed actions, and their alternatives, are not expected to affect adversely any endangered or threatened species or marine mammal population.

Cumulative Effects

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

G. Summary of Expected Changes in Net Benefits

See Summary of Regulatory Impact Review on page ix.

H. Public and Private Costs

The 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 specific actions in this regulatory amendment follow. NMFS law enforcement indicated there would be no additional enforcement costs for this regulatory amendment.

Council costs of document preparation, meetings, public hearings and information dissemination	$10,000
NMFS administrative costs of document preparation, meetings and review	$5,000
NMFS law enforcement costs (costs should decline in Florida & North Carolina)	$0
Total	$15,000

Enforcement costs in the States of Florida will decline because regulations will be enforced dockside.

Determination of a Significant Regulatory Action

Pursuant to E.O. 12866, a regulation is considered a "significant regulatory action" if it is likely to result in a) an annual effect on the economy of $100 million or more; b) a major increase in costs or prices for consumers, individual industries, Federal, State, or local government agencies, or geographic regions; c) significant adverse effects on competition, employment, investment, productivity, innovation, or on the ability of United States–based enterprises to compete with foreign–based enterprises in domestic or export markets.

The entire commercial Atlantic Migratory Group king mackerel is valued at significantly less than $100 million. The proposed actions to reduce the Atlantic king mackerel TAC, bag limit and trip limits are expected to have only minimal revenue effects on both the commercial and recreational (including for–hire vessels) sectors of the fishery. The proposed action to decrease the TAC for Atlantic Spanish mackerel would have no effect on the recreational sector and only a relatively minimal effect on the commercial sector. Given the size of the fishery and the mentioned revenue effects of the proposed actions, it is concluded that impacts on the fishery resulting from this regulatory action would be significantly less than $100 million annually.

The proposed changes in the TAC for Atlantic Migratory Group king mackerel have been determined to result in some decrease in total catch. However, this will likely not result in a decrease in revenue to the commercial sector since the previous season's commercial landings were lower than the proposed commercial allocation. Such decrease could be minimized through higher prices to consumers. The proposed change in TAC and revised trip limits for Atlantic Migratory Group Spanish mackerel have been determined to result in a minimal decrease in revenue to the harvest sector. This would likely cause a slight upward pressure on prices (other things being equal) to consumers given that demand for Spanish mackerel is elastic.

The proposed changes in TAC for Atlantic Migratory Group of king mackerel, and the proposed changes in TAC and revised trip limits for Atlantic Migratory Group Spanish Mackerel are

expected to effect no major cost increase to the Atlantic mackerel industries. The $15,000 identified as federal cost has been incurred in preparation of the regulatory action.

The proposed change in TAC and revised trip limits for the Atlantic Migratory Group Spanish mackerel are also expected to rule out any adverse effects on employment, investment, productivity, innovation, or on the competitive status of the domestic fishery relative to domestic foreign markets.

It is therefore concluded that this regulation if enacted would not constitute a "significant regulatory action" under any of the mentioned criteria.

I. Effects on Small Businesses

Introduction

The purpose of the Regulatory Flexibility Act is to relieve small businesses, small organizations, and small governmental entities from burdensome regulations and record keeping requirements. The category of small entities likely to be affected by the proposed actions is that of commercial Atlantic Migratory Group king and Spanish mackerel fishermen. The impacts of the proposed action on these entities have been discussed in Section 4. The following discussion of impacts focuses specifically on the consequences of the proposed actions on the mentioned business entities. A "threshold–type analysis" is done to determine whether the impacts would have a "significant or non–significant economic impact on a substantial number of small entities." If impacts are determined to be significant, then an Initial Regulatory Flexibility Analysis (IRFA) is conducted to analyze impacts of the proposed action and alternatives on individual business entities. In addition to analyses conducted for the Regulatory Impact Review (RIR), the IRFA provides an estimate of the number of small businesses affected, a description of the small businesses affected, and a discussion of the nature and size of the impacts.

Determination of Significant Economic Impact on a Substantial Number of Small Entities

In general, a "substantial number" of small entities is more than 20 percent of those small entities engaged in the fishery (NMFS, 1991). For the south Atlantic area, a total of 1,983 mackerel permits were issued broken down into 1,008 commercial and 975 charter boat permits. The Small Business Administration (SBA) defines a small business in the commercial fishing activity as a firm with annual receipts of $3.0 million or less (Small Business Size Standards, 61FR 3280-3304). For charter or party vessels to be classified as a small business, annual receipts must be $5 million or less. All holders of Coastal Migratory Pelagics permits readily fall within the definition of small business. Since the proposed actions will directly and indirectly affect many of these permittees, the "substantial number" criterion will be met.

Economic impacts on small business entities are considered to be "significant" if the proposed action would result in any of the following: a) reduction in annual gross revenues by more than 5%; b) increase in total costs of production by more than 5% as a result of an increase in compliance costs; c) compliance costs as a percent of sales for small entities are at least 10% higher than compliance costs as a percent of sales for large entities; d) capital costs of compliance represent a significant portion of capital available to small entities, considering internal cash flow and external financing capabilities; or e) as a rule of thumb, 2% of small business entities being forced to cease business operations (NMFS, 1991).

The Council examined the following actions and alternatives: (1) TAC and bag limits for Atlantic Migratory Group king mackerel; (2) TAC and bag limits for Atlantic Migratory Group Spanish mackerel; and (3) Revised Trip limits for Atlantic Migratory Group Spanish mackerel.

Given that for this action (a) any impact would likely be equivalent to much less than a 5% reduction in annual gross revenues, (b) any increase in compliance costs would be much less than a 5% increase in total costs of production, (c) all entities involved are small entities, (d) capital costs of compliance represent a very small portion of capital, and (e) no entities are expected to be forced to cease business operations, the Council determined that the resulting impacts will not have a significant economic impact on a substantial number of small entities, therefore, this regulatory amendment is not significant under Executive Order 12866.

Explanation of Why these Actions are Being Considered

Refer to Section 1.0, Purpose and Need. This regulatory amendment addresses: (1) setting the TACs and bag limits for Atlantic Migratory Groups king and Spanish mackerel to maintain the stock at recommended biologically safe levels, (2) providing a flexible management system for commercial harvesters; (3) optimizing social and economic benefits from the harvest of Atlantic Migratory Groups king and Spanish mackerel.

Revising trip limits for Atlantic Migratory Group Spanish mackerel is to allow large vessels to harvest their allocation of the catch before the fish migrate to state waters in Florida and give small vessels more of an opportunity to catch fish once they are available by increasing their trip limit. These actions both provide a flexible management system for commercial harvesters while optimizing the social and economic benefits for the fishery.

Objectives and Legal Basis for the Rule

Refer to Section 1.0 and Appendix A for the Management Objectives. Objectives addressed in this amendment are: (1) Stabilize yield at MSY and maintain population levels sufficient to ensure adequate recruitment, (2) To provide a flexible management system, and (3) To optimize the social

and economic benefits of the coastal migratory pelagic fisheries. The Magnuson Fishery Conservation and Management Act of 1976 as amended provides the legal basis for the rule.

Demographic Analysis

Refer to Amendment 1 (GMFMC and SAFMC, 1985) and Section 3.0 of this regulatory amendment. Data on fishermen are very limited.

Cost Analysis

Refer to the summary of the impacts (Section 4.0, Subsections F and G, the Summary of Social Impacts, and the summary of government costs Section 4.0, Subsection H). The Council concluded benefits of the preferred alternative outweigh costs.

Competitive Effects Analysis

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.

Identification of Overlapping Regulations

The proposed action does not create overlapping regulations with any state regulations or other Federal laws.

Conclusion

The proposed measure will not have a significant effect on small businesses. Therefore, an initial regulatory flexibility analysis (IRFA) is not required.

5.0 LIST OF PREPARERS

Michael E. Jepson, Cultural Anthropologist, South Atlantic Fishery Management Council
Gregg T. Waugh, Deputy Executive Director, South Atlantic Fishery Management Council
Dr. Theophilus R. Brainerd, Fishery Economist, South Atlantic Fishery Management Council
Roger Pugliese, Fishery Biologist, South Atlantic Fishery Management Council

The following individuals assisted by providing valuable review comments:
Bob Mahood, Executive Director, South Atlantic Fishery Management Council
Mark Godcharles, Fishery Biologist, National Marine Fisheries Service, Southeast Region

Special thanks are due Daniel Basta, John Paul Tolson, Mike Shelby, Betsy Archer and Tom LaPointe of the Strategic Environmental Assessment Division NOAA for their assistance with the desktop information system and geographic boundary files used to produce Figure 1 in this document.

6.0 LIST OF AGENCIES AND ORGANIZATIONS

Responsible Agencies:
South Atlantic Fishery Management Council
1 Southpark Circle
Southpark Building, Suite 306
Charleston, South Carolina 29407-4699
Email: safmc@safmc.nfms.gov
(803) 571-4366
(803) 769-4520 (FAX)

Mid-Atlantic Fishery Management Council
Room 2115, Frear Federal Building
300 South New Street
Dover, Delaware 19904-6790
(302) 674-2331
(302) 674-5399 (FAX)

List of Agencies and Persons Consulted:
SAFMC Mackerel Advisory Panel
SAFMC Scientific and Statistical Committee
Florida Department of Natural Resources
Florida Marine Fisheries Commission
Georgia Department of Natural Resources
South Carolina Wildlife and Marine Resources Department
North Carolina Department of Environment, Health, and Natural Resources
National Marine Fisheries Service
- Southeast Region
- Southeast Center
Gulf of Mexico & Mid-Atlantic Fishery Management Councils

7.0 APPLICABLE LAW

A. VESSEL SAFETY CONSIDERATIONS

PL. 99-659 amended the Magnuson Act to require that a fishery management plan or amendment must consider, and may provide for, temporary adjustments (after consultation with the U.S. Coast Guard and persons utilizing the fishery) regarding access to the fishery for vessels otherwise prevented from harvesting because of weather or other ocean conditions affecting the safety of the vessels.

No vessel will be forced to participate in the fishery under adverse weather or ocean conditions as a result of the imposition of management regulations set forth in this amendment to the Coastal Pelagics 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.

B. ENDANGERED SPECIES AND MARINE MAMMAL ACTS

A formal Section 7 consultation under the Endangered Species Act (ESA) was completed for Amendment 6. In a biological opinion dated August 19, 1992, the National Marine Fisheries Service determined that fishing activities conducted under the amendment and its implementing regulations, as well as the fisheries for coastal migratory pelagic resources, are not likely to jeopardize the continued existence of any endangered or threatened species under its jurisdiction. However, it was also determined that gillnet fisheries may adversely affect the recovery of listed species of sea turtles. Accordingly, in compliance with the Endangered Species Act, an Incidental Take Statement was issued and reasonable and prudent measures were specified to minimize such adverse impacts. The measures described and considered herein are expected to have no additional impact on endangered or threatened species.

C. PAPERWORK REDUCTION ACT

The purpose of the Paperwork Reduction Act is to control paperwork requirements imposed on the public by the federal government. Authority to manage information collection and record keeping requirements is vested with the Director of the Office of Management and Budget. This authority encompasses establishment of guidelines and policies, approval of information collection requests, and reduction of paperwork burdens and duplications.

The Council does not propose additional permit and data collection programs within this amendment.

D. 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.

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

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/environmental assessment. A description of the affected environment is contained in Section 3.0.

The proposed amendment is not a major action having significant impact on the quality of the marine or human environment of the South Atlantic. The proposed action is an adjustment of the original regulations of the fishery management plan to protect the mackerel resource. The proposed action should not result in impacts significantly different in context or intensity from those described in the Environmental Impact Statement (EIS) published with the initial regulations implementing the approved fishery management plan. The preparation of a formal Supplemental Environmental Impact Statement (SEIS) is not required for this amendment by Section 102(2)(c)(c) of the National Environmental Policy Act or its implementation regulations.

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

The proposed regulations will protect the resource from depletion, better achieve the objectives of the fishery management plan, and lessen the environmental impacts of the fishery. Overall, the benefits to the nation resulting from implementation of this amendment are greater than management costs.

Finding of No Significant Environmental Impact (FONSI)

The Council's preferred action is to implement revised TACs and quotas for Atlantic Migratory Group king and Spanish mackerel, and revised trip limits for Atlantic Migratory Group Spanish mackerel. Section 4.0 describes the Council's management measures in detail.

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

Beneficial and Adverse Impacts

There are beneficial and adverse impacts from the proposed actions. The impacts are described for each action in Section 4.0 (See Section 4.0, Items G. Summary of Impacts, and I. Effects on Small Businesses) and summarized in Section 2.0. The Social Impact Assessment presents an analysis of the social impacts. Overall, the adverse impacts of the proposed measures are expected to be minor. Beneficial impacts are unquantifiable but preventing overfishing will ensure the long-term economic viability of the fishery.

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

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 not expected to have any significant adverse impact on unique characteristics of the area such as proximity to historic or cultural resources, park lands, wetlands, or ecologically critical areas. The Council evaluated the effects of the fishery on the environment (Section 4.0, Item F) and concluded that the fishery, as presently prosecuted, does not significantly impact the habitat essential to Atlantic Migratory Group king and Spanish mackerel under Council management.

Controversial Effects

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

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.

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 impacts that could have a substantial effect on the coastal pelagics resource or any related stocks, including sea turtles. (See Section 4.0, Item G. Summary of Impacts, I. Effects on Small Businesses, and Summary of Social Impacts.)

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 adversely affect any endangered or threatened species or marine mammal population. (See Section 7, Item B. Endangered Species and Marine Mammal Acts.) A Section 7 consultation was conducted with the NMFS Southeast Regional Office. A biological assessment was prepared which concluded the proposed actions will not adversely affect any threatened or endangered species or marine mammals.

Interaction With Existing Laws for Habitat Protection

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

Additional points analyzed by the Council in determining that a SEIS was not necessary are presented below.

Effects of the Fishery on the Environment

The habitat of king and Spanish mackerel is described and was updated in Amendment 1 (GMFMC and SAFMC, 1985) and Amendment 3 (SAFMC and GMFMC, 1989a). The Council evaluated the effects of the fishery on the environment (Section 4.0, Item F) and concluded that the fishery, as presently prosecuted, does not significantly impact habitat essential to the coastal migratory pelagic resources (mackerels) under Council management.

Bycatch

The measures in this regulatory amendment will not impact bycatch and do not have bycatch considerations.

Effort Directed at or From Other Fisheries

The measures in this regulatory amendment will not result in effort being shifted into other fisheries. Further, these measures will provide biological, economic and social benefits by revising vessel trip limits in the Atlantic Migratory Group Spanish mackerel fishery.

In view of the analyses presented in this document, I have determined the proposed action in this amendment to the Fishery Management Plan for the Coastal Migratory Pelagic Resources (Mackerels) in the Gulf of Mexico and South Atlantic Region would not significantly affect the quality of the human environment with specific reference to the criteria contained in NAO 216-6 implementing the National Environmental Policy Act. Accordingly, the preparation of a Supplemental Environmental Impact Statement for this proposed action is not necessary.

Approved: _____

Assistant Administrator for Fisheries Date

8.0 REFERENCES

CEQ. 1986. U.S. Council on Environment Quality. Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40 CFR 1500-1508). Washington: Government Printing Office, Washington, D.C. 20402.

GMFMC and SAFMC. 1983. Fishery Management Plan, Final Environmental Impact Statement, Regulatory Impact Review and Final Regulations for the Coastal Migratory Pelagic Resources (Mackerels). Prepared by the Gulf of Mexico and South Atlantic Fishery Management Councils, February 1983. Available from: SAFMC, 1 Southpark Circle, Suite 306, Charleston, South Carolina 29407-4699.

GMFMC and SAFMC. 1985. Final Amendment 1 to the Fishery Management Plan and Final Environmental Impact Statement, for the Coastal Migratory Pelagic Resources (Mackerels). Prepared by the Gulf of Mexico and South Atlantic Fishery Management Councils, April 1985. Available from: SAFMC, 1 Southpark Circle, Suite 306, Charleston, South Carolina 29407-4699.

GMFMC and SAFMC. 1987. Revised Amendment 2 to the Fishery Management Plan for the Coastal Migratory Pelagic Resources (Mackerels) includes Environmental Assessment, Supplemental Regulatory Impact Review, and Initial Regulatory Flexibility Analysis. Prepared by the Gulf of Mexico and South Atlantic Fishery Management Councils, April 1985. Available from: SAFMC, 1 Southpark Circle, Suite 306, Charleston, South Carolina 29407-4699

GMFMC and SAFMC. 1989. Revised Amendment 4 to the Fishery Management Plan for the Coastal Migratory Pelagic Resources (Mackerels) includes Environmental Assessment, Supplemental Regulatory Impact Review, and Initial Regulatory Flexibility Analysis. Prepared by the Gulf of Mexico and South Atlantic Fishery Management Councils, April 1985. Available from: SAFMC, 1 Southpark Circle, Suite 306, Charleston, South Carolina 29407-4699

GMFMC and SAFMC. 1990. Amendment Number 5 to the Fishery Management Plan for the Coastal Migratory Pelagic Resources (Mackerels) includes Environmental Assessment and Regulatory Impact Review. Prepared by the Gulf of Mexico and South Atlantic Fishery Management Councils, March 1990. Available from: SAFMC, 1 Southpark Circle, Suite 306, Charleston, South Carolina 29407-4699.

GMFMC and SAFMC. 1992. Amendment 6 to the Fishery Management Plan for Coastal Migratory Pelagics in the Gulf of Mexico and South Atlantic includes Environmental Assessment, Regulatory Impact Review and Initial Regulatory Flexibility Analysis. Prepared by the Gulf of Mexico and South Atlantic Fishery Management Councils, June 1992. Available from: SAFMC, 1 Southpark Circle, Suite 306, Charleston, South Carolina 29407-4699.

GMFMC and SAFMC. 1994. Amendment 7 to the Fishery Management Plan for Coastal Migratory Pelagic Resources in the Gulf of Mexico and South Atlantic includes Environmental Assessment, Regulatory Impact Review and Initial Regulatory Flexibility Analysis. Prepared by the Gulf of Mexico and South Atlantic Fishery Management Councils, June 1992. Available from: SAFMC, 1 Southpark Circle, Suite 306, Charleston, South Carolina 29407-4699.

GMFMC and SAFMC. 1996. Amendment 8 to the Fishery Management Plan for Coastal Migratory Pelagic Resources in the Gulf of Mexico and South Atlantic includes Environmental Assessment, Regulatory Impact Review and Initial Regulatory Flexibility Analysis. Prepared by the Gulf of Mexico and South Atlantic Fishery Management Councils, August 1996. Available from: SAFMC, 1 Southpark Circle, Suite 306, Charleston, South Carolina 29407-4699.

Interorganizational Committee on Guidelines and Principles. 1994. Guidelines and principles for social impact assessment. U.S. Dep. Commerce, NOAA Tech. Memo. NMFS-F/SPO-16, 29p.

NMFS. 1991. Operational guidelines: fishery management plan process. October 1992.

SAFMC and GMFMC. 1989a. Final Amendment 3 to the Fishery Management Plan for the Coastal Migratory Pelagic Resources (Mackerels) of the Gulf of Mexico and the South Atlantic includes Environmental Assessment, and Regulatory Impact Review. Prepared by the South Atlantic and Gulf of Mexico Fishery Management Councils, March 1989. Available from: SAFMC, 1 Southpark Circle, Suite 306, Charleston, South Carolina 29407-4699.

Stock Assessment Panel. 1995. 1995 report of the mackerel stock assessment panel. Prepared by the Mackerel Stock Assessment Panel, March 21-23, 1995. Miami Laboratory Contrib. No. MIA-94/94-30. USDOC/NOAA/NMFS/SEFSC 74 Virginia Beach Drive, Miami, FL 33149.

Stock Assessment Panel. 1996. 1996 report of the mackerel stock assessment panel. Prepared by the Mackerel Stock Assessment Panel, April 15-18, 1996 Miami Laboratory Contrib. No. MIA-94/94-30. USDOC/NOAA/NMFS/SEFSC 74 Virginia Beach Drive, Miami, FL 33149.

9.0 APPENDIXES

Appendix A. Existing FMP Problems (Issues) & Objectives

The problems (issues) listed in the Mackerel Fishery Management Plan as modified are:

1. The stocks of Spanish mackerel and Gulf king mackerel are below the level of producing MSY, and spawning stocks have been reduced such that recruitment has been affected. The harvest levels of Atlantic king mackerel are close to their upper limit. Uncontrolled fishing would further reduce biomass.

2. A. Available recreational catch statistics were not designed to track catch for quota purposes.

B. Additional biological and statistical data on both the recreational and commercial fisheries are needed, and social and economic information that assesses the impact of regulations and allocations is not available.

3. Intense conflicts and competition exist between recreational and commercial users of the mackerel stocks and between commercial users employing different gears.

4. The existence of separate state and federal jurisdiction and lack of coordination between these two make biological management difficult since, in some instances, the resource may be fished beyond the allocation in state waters.

5. The condition of the cobia stock is not known, and increased landings over the last ten years have prompted concern about overfishing.

6. Lack of information on multiple stocks or migratory groups of king mackerel which may mix seasonally confounds and complicates management.

7. Large catches of mackerel over a short period cause quotas and TAC to be exceeded before closures could be implemented. Therefore, some users obtained a share in excess of their allocation.

8. Closures of a fishery and reversion of bag limits to zero due to the filling of quota have deprived geographic areas of access to a fishery.

9. Fish caught under the bag limit and sold contribute to the filling of both the recreational and commercial quotas.

10. Part-time commercial fishermen compete with full-time commercial fishermen for the available quota.

The management objectives of the Mackerel Fishery Management Plan as modified are:

1. The primary objective of this FMP is to stabilize yield at MSY, allow recovery of overfished populations, and maintain population levels sufficient to ensure adequate recruitment.
2. To provide a flexible management system for the resource which minimizes regulatory delay while retaining substantial Council and public input in management decisions and which can rapidly adapt to changes in resource abundance, new scientific information, and changes in fishing patterns among user groups or by areas.
3. To provide necessary information for effective management and establish a mandatory reporting system for monitoring catch.
4. To minimize gear and user group conflicts.
5. To distribute the total allowable catch of Atlantic Migratory Group Spanish mackerel between recreational and commercial user groups based on the catches that occurred during the early to mid 1970's, which is prior to the development of the deep water run-around gill-net fishery and when the resource was not overfished.
6. To minimize waste and bycatch in the fishery.
7. To provide appropriate management to address specific migratory groups of king mackerel.
8. To optimize the social and economic benefits of the coastal migratory pelagic fisheries.

Appendix B. History of Management

The Fishery Management Plan for Coastal Migratory Pelagic Resources of the Gulf of Mexico and South Atlantic (FMP), approved in 1982 and implemented by regulations effective in February of 1983, treated king and Spanish mackerel each as one U.S. stock. Allocations were established for recreational and commercial fisheries, and the commercial allocation was divided between net and hook-and-line fishermen.

Amendment 1, implemented in September of 1985, provided a framework procedure for pre-season adjustment of total allowable catch (TAC), revised king mackerel maximum sustainable yield (MSY) downward, recognized separate Atlantic and Gulf Migratory Groups of king mackerel, and established fishing permits and bag limits for king mackerel. Commercial allocations among gear users were eliminated. The Gulf commercial allocation for king mackerel was divided into eastern and western zones for the purpose of regional allocation.

Amendment 2, implemented in July of 1987, revised Spanish mackerel MSY downward, recognized two migratory groups, and set commercial quotas and bag limits. Charter boat permits were required, and it was clarified that TAC for overfished stocks must be set below the upper range of acceptable biological catch (ABC). The use of purse seines on overfished stocks was prohibited.

Amendment 3 was partially approved in 1989, revised, resubmitted, and approved in 1990. It prohibited drift gill nets for coastal pelagics and purse seines for the overfished groups of mackerels.

Amendment 4, implemented in 1989, reallocated Spanish mackerel equally between recreational and commercial fishermen on the Atlantic group with an increase in TAC.

Amendment 5, implemented in August 1990, made a number of changes in the management regime which:

1. Extended management area for Atlantic groups of mackerels through the Mid-Atlantic Fishery Management Council's (MAFMC) area of jurisdiction;
2. Revised problems in the fishery and plan objectives;
3. Revised the fishing year for Gulf Spanish mackerel from July-June to April-March;
4. Revised the definition of "overfishing";
5. Added cobia to the annual stock assessment procedure;
6. Provided that the South Atlantic Fishery Management Council (SAFMC) will be responsible for pre-season adjustments of TACs and bag limits for the Atlantic Migratory Groups of mackerels while the Gulf Council will be responsible for Gulf Migratory Groups;
7. Continued to manage the two recognized Gulf Migratory Groups of king mackerel as one until management measures appropriate to the eastern and western groups can be determined;
8. Redefined recreational bag limits as daily limits;
9. Deleted provision specifying that bag limit catch of mackerel may be sold;

10. Provided guidelines for corporate commercial vessel permits;
11. Specified that Gulf group king mackerel may be taken only by hook-and-line and run-around gill nets;
12. Imposed a bag limit of two cobia per person per day for all fishermen;
13. Established a minimum size of 12-inch (30.5 cm) fork length or 14-inch (35.6 cm) total length for king mackerel and included a definition of "conflict" to provide guidance to the Secretary.

Amendment 6, implemented in November of 1992, made the following changes:
1. Identified additional problems and an objective in the fishery;
2. Provided for rebuilding overfished stocks of mackerels within specific periods;
3. Provided for biennial assessments and adjustments;
4. Provided for more seasonal adjustment actions, including size limits, vessel trip limits, closed seasons or areas, and gear restrictions;
5. Allowed Gulf king mackerel stock identification and allocation when appropriate;
6. Provided for commercial Atlantic Spanish mackerel possession limits;
7. Changed commercial permit requirements to allow qualification in one of three preceding years;
8. Discontinued the reversion of the bag limit to zero when the recreational quota is filled;
9. Modified the recreational fishing year to the calendar; and
10. Changed minimum size limit for king mackerel to 20 inches fork length, and changed all size limit measures to fork length only.

Amendment 7, implemented in August 1994, made the following changes:
1. Suballocated the eastern zone Gulf Migratory Group of king mackerel commercial quota at the Dade/Monroe County line with 50% in the northern area (Dade through Volusia County) and 50% in the southwestern area (Monroe to the Florida/Alabama border);
2. Further suballocate within the two areas between net and hook-and-line fishermen with no allocation by gear in the northern area and 50% hook-and-line/50% net in the southwestern area; and
3. Require permits to specify gear type fished: A gear permit endorsement for the use of nets is required for taking Gulf group king mackerel in the southern area. Permittees with the net endorsement may fish for king mackerel only with nets in that area.

The present management regime for king mackerel recognizes two migratory groups, the Gulf Migratory Group and the Atlantic Migratory Group. These groups seasonally mix on the east coast of Florida. For management and assessment purposes, a boundary between groups was specified which was the Volusia/Flagler County border on the Florida east coast in the Winter

(November 1 - March 31) and the Monroe/Collier County border on the Florida southwest coast in the summer (April 1 - October 31). The Gulf Migratory Group may be divided at the Florida/Alabama border when the stock assessment panel is able to provide separate acceptable biological catches for each group. The commercial allocation for the Gulf group is currently divided at this boundary into eastern (Florida) and western (Texas through Alabama) quotas.

For the purpose of allocating a limited resource among users, the FMP has set ratios based on historic unregulated catches. The Gulf Migratory Group is allocated with 68% for recreational fishermen and 32% for commercial fishermen. The commercial allocation is further subdivided 69% for the Eastern Zone and 31% for the Western Zone. The Atlantic Migratory Group of king mackerel is allocated with 62.9% to recreational fishermen and 37.1% to commercial fishermen.

There is a mechanism for seasonal framework adjustments (See Appendix I in Amendment 7) which provides that: "Recommendations with respect to the Atlantic groups of king and Spanish mackerel will be the responsibility of the South Atlantic Council, and those for the Gulf groups of king and Spanish mackerel will be the responsibility of the Gulf Council."

Appendix C. Florida's Constitutional Amendment

CONSTITUTION
OF THE
STATE OF FLORIDA

ARTICLE X

Section 16. Limiting Marine Net Fishing.

(a)e The marine resources of the State of Florida belong toe all of the people of the state and should be conserved and managed for the benefit of the state, its people, and future generations. To this end the people hereby enact limitations on marine net fishing in Florida waters to protect saltwater finfish, shellfish, and other marine animals from unnecessary killing, overfishing, and waste.

(b)e For the purpose of catching or taking any saltwatere finfish, shellfish, or other marine animals in Florida waters:

1. No gill nets or other entangling nets shall be used in any Florida waters; and

2. In addition to the prohibition set forth in 1., no othere type of net containing more than 500 square feet of mesh area shall be used in nearshore and inshore Florida waters. Additionally, no more than two such nets, which shall not be connected, shall be used from any vessel, and no person not on a vessel shall use more than one such net in nearshore and inshore Florida waters.

(c) For purposes of this section:e

1. "Gill net" means one or more walls of netting whiche captures saltwater finfish by ensnaring or entangling them in the meshes of the net by the gills, and "entangling net" means a drift net, trammel net, stab net, or any other net which captures saltwater finfish, shellfish, or other marine animals by causing all or part of heads, fins, legs, or other body parts to become entangled or ensnared in the meshes of the net, but a hand thrown cast net is not a gill net or entangling net;

2. "Mesh area" of a net means the total area of netting withe the meshes open to comprise the maximum square footage. The square footage shall be calculated using standard mathematical formulas for geometric shapes. Seines and other rectangular nets shall be calculated using the maximum length and maximum width of the netting. Trawls and other bag type nets shall be calculated as a cone using the maximum circumference of the net mouth to derive the radius, and the maximum length from the net mouth to the tail end of the net to derive the slant height. Calculations for any other nets or combination type nets shall be based on the shapes of the individual componants;

3.e "Coastline" means the territorial sea base line for thee State of Florida established pursuant to the laws of the United States of America;

4.e "Florida waters" means the waters of the Atlantic Ocean,e the Gulf of Mexico, the Straits of Florida, and any other bodies of water under the jurisdiction of the State of Florida, whether coastal, intracoastal or inland, and any part thereof; and

5. "Nearshore and inshore Florida waters" means all Floridae

waters inside a line three miles seaward of the coastline along the Gulf of Mexico and inside a line one mile seaward of the coastline along the Atlantic Ocean.

(d) This section shall not apply to the use of nets for scientific research or governmental purposes.

(e) Persons violating this section shall be prosecuted and punished pursuant to the penalties provided in section 370.021(2)(a),(b),(c)6. and 7., and (e), Florida Statutes (1991), unless and until the legislature enacts more stringent penalties for violations hereof. On and after the effective date of this section, law enforcement officers in the state are authorized to enforce the provisions of this section in the same manner and authority as if a violation of this section constituted a violation of Chapter 370, Florida Statutes (1991).

(f) It is the intent of this section that implementing legislation is not required for enforcing any violations hereof, but nothing in this section prohibits the establishment by law or pursuant to law of more restrictions on the use of nets for the purpose of catching or taking any saltwater finfish, shellfish, or other marine animals.

(g) If any portion of this section is held invalid for any reason, the remaining portion of this section, to the fullest extent possible, shall be severed from the void portion and given the fullest possible force and application.

(h) This section shall take effect on the July 1 next occurring after approval hereof by the vote of the electors.

Appendix D. Stock Assessment Panel Report (1996)

1996 REPORT OF THE MACKEREL STOCK ASSESSMENT PANEL

Prepared by the Mackerel Stock Assessment Panel
at the Panel Meeting Held April 15-18, 1996

Gulf of Mexico Fishery Management Council
Lincoln Center, Suite 331
5401 West Kennedy Blvd
Tampa, Florida 33609-2486
813-228-2815

&

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

This is a publication of the Gulf of Mexico Fishery Management Council and South Atlantic Fishery Management Council pursuant to National Oceanic and Atmospheric Administration Awards No. NA67FC0002 and NA67FC0003.

1996 REPORT OF THE MACKEREL STOCK ASSESSMENT PANEL
TABLE OF CONTENTS

1996 REPORT OF THE MACKEREL STOCK ASSESSMENT PANEL (MSAP)
April 15-18, 1996
MIAMI, FLORIDA

I. BACKGROUND

At the direction of the Gulf of Mexico and South Atlantic Fishery Management Councils the Mackerel Stock Assessment Panel (jointly appointed by the Councils) met in Miami from April 15-18, 1996. The tasks for this Panel are specified by the Councils in Amendment 1 to the Fishery Management Plan for the Coastal Migratory Pelagic Resources (Mackerels) dated Apri 1985 (and subsequent amendments). Actions required in subsequent amendments are reviewe in previous Panel Reports.

Amendment 6 was implemented in December 1992. Amendment 6 requires a rebuilding program for those stocks of king and Spanish mackerel identified as overfished. Recovery periods were based on the species' generation times that were provided to the Panel in 1992. Recovery periods not to exceed 12 and 7 years for king and Spanish mackerel were identified, respectively. The beginning of these recovery periods were identified as 1985 and 1987 for king and Spanish mackerel, respectively. The termination years of recovery are 1997 for king mackerel and 1994 for Spanish mackerel.

Amendment 6 requires a full stock assessments every other year. This year's full assessments include updated total catch by sector through 1994/1995, updated catch at age and updated CPUE indices for that period. Additionally, an age based assessment of cobia, separated into Gulf and Atlantic groups was completed. Dolphin catches were updated for the Gulf and Atlantic and presented to the Panel.

The list of documents that were reviewed by the Panel is included. Copies of documents are available from the Gulf of Mexico or South Atlantaic Fishery Management Councils or the Southeast Fisheries Science Center.

II. DATA AVAILABLE TO ASSESS MACKEREL STOCKS

U.S. commercial landings and size-frequency data for calendar years 1994 and part of 1995 were updated in this assessment. Estimates through the 1994/1995 fishing year for each species and stock were available from the appropriate sources. Recreational estimates from calender year 1981 to the present include the revised methodology of the Marine Recreational Fishing Statistics Survey. The Marine Recreational Fishing Statistics Survey (MRFSS) estimates from the initial years of 1979 and 1980 could not be revised due to their lacking particular data fields. Thus, only estimates of recreational landings from calendar year 1981 to 1995 were included in the assessments.

As in previous assessments, the current mackerel stock assessment also incorporated information on levels of king and Spanish mackerel caught as bycatch by the Gulf of Mexico shrimp trawl fishery. Updated estimates from 1974 through 1994 were provided by NMFS for incorporation into this year's analyses. Additionally, estimates of bycatch by shrimp trawls of king and Spanish mackerel in the Atlantic were made for the first time and incorporated into the assessments.

III. OVERFISHING CRITERIA

The MSAP endorses the recommendation of the SPR Management Strategy Committee relative to the adoption of new definitions of overfishing. The purpose of re-writing the definitions is to ensure: 1) consistency between FMP's in the overfishing definitions, 2) that the definitions have separate components that distinguish between the overfished condition and the act of overfishing, 3) explicit and unambiguous descriptions of the quantities used to determine the overfished condition and the act of overfishing, and 4) a system that provides alternative definitions depending on the amount or quality of data available.

The MSAP recognizes the importance of making distinctions between management targets and overfishing definition thresholds in the management process. While thresholds refer to a maximum fishing mortality rate beyond which some remedial action must be taken, targets are the goals of fishery management. That is, the fishing mortality rate should fluctuate about a target level, but never exceed the threshold level. In this sense, thresholds and targets are generally associated with biological reference points such as $F_{\%\ SPR}$. However, targets may also incorporate economic and social factors.

The MSAP recommends that overfishing definitions for mackerel stocks should be based on $F_{20\%\ SPR}$ threshold overfishing levels, whereas targets are set at $F_{30\%\ SPR}$. Thus, a mackerel stock should be defined as overfished when it is below the level of 20 per cent of the spawning potential ratio. When a stock *is* overfished, the act of fishing above the target is defined as harvesting at a rate that is not consistent with programs to rebuild the stock to the target level percentage. Under this condition it is required to develop ABC ranges based on fishing mortality rates that will achieve and maintain at least the minimum specified SPR. When a stock *is not* overfished, the act of overfishing should be defined as a harvest rate that if continued would lead to a state of the stock that would lead to the stock becoming overfished at the 20 percent SPR level. In this case ABC ranges are those associated with the objective of achieving the target of OY. Optimum Yield for mackerel stocks has been defined as MSY. Fishing mortality that maintains the stock at the 30 percent to 40 percent SPR target level will approximate MSY levels.

Therefore, there are three distinct decision criteria for the 1996/1997 fishing year which we will be presenting, herein: 1) the 1996/1997 yield resulting in a fishing rate at the optimal

target (termed, as in the past, *ABC*); 2) the 1996/1997 yield resulting in an *overfishing rate*, i.e. one which, if employed continually, would eventually reduce the stock below the 20 percent SPR level; and 3) the 1996/1997 yield which would cause the stock to be *overfished* within the 1996/1997 year, i.e. would reduce the SPR below 20 percent by the end of the year.

Adoption of the new overfishing definitions does *not* change the ABC criteria used previously by the MSAP. However, it is hoped that by defining threshold and targets and making the distinction between the two, the management process will be clarified. Nevertheless, there is a procedural and, perhaps, legal question that the Councils need to address in regards to the risk limits to be used to define the range of ABC when a stock is not overfished.

IV. REVIEW OF STOCK ASSESSMENT DATA

The Panel discussed the urgent need of more and in depth research in key components of the mackerel stock assessments. In this regard, it is imperative that actions be taken to address the effects of possible dynamic changes in catchability associated with the various indices of relative abundance used in the calibrations of the stock assessment algorithm. This condition is esspecially relevant with indices obtained from recreational fisheries where bag limits are in place and where effort saturation may affect catchability. Catch quotas in the commercial fisheries may have a similar statistical effect on the indices developed from these fisheries. It is important to note that the calibration indices are fundamentally driving the trends in the estimated stock abundance which may not correctly reflect true trends in population abundance. There is a need to make progress in the understanding of the true nature of the natural mortality rate, which is one of the key parameters driving the stock assessment.

Another key component in the stock assessments is the integration of length frequency samples into landings in fisheries which are characterized by numerous and diverse spatio-temporal operations. The Panel needs to evaluate the impact of unbalanced sampling designs resulting from irregular funding histories and from samplings of opportunity on the final estimated landings at size. These conditions may be generating length compositions in landings which are not representative of the entire take from given stocks. Also, annual estimates of bycatch and recreational catch are uncertain with statistical problems of accuracy and precision. Extrapolation of potentially biased length frequencies to uncertain catch data may be creating artifacts in the database which could be of significance to the overall stock assessment exercise. Similarly, the stratified age-length keys are not equally sampled by all gears (selectivities) and ages, and in some cases complete strata are not sampled. This condition, coupled with effects of natural changes in recruitment on age-length keys, needs to be evaluated to ensure that bias due to these sources are not systematically introduced in the analysis.

In the absence of the requested evaluation, the Panel cannot resolve many of the fundamental questions raised during the stock assessment meetings. This situation will be further aggravated as the catch at age series accumulates with time. This will be as a result of the subtle and cryptic nature

of the errors that may be present in the statistical data presently used in stock assessments.

The Panel expressed considerable concern about its participation in the "process" of stock assessment, and the relationship between Panel members and the NMFS during preparation of the assessment. Ideally, the Panel system is designed to encourage outside participation and peer review **during** synthesis of assessment data and subsequent VPA analyses. In practice, however, the Panel usually is convened after an assessment has been largely completed, and thus is able to provide little guidance to NMFS as the assessment is being developed. Moreover, lack of familiarity with model inputs, and too little time at Panel meetings to thoroughly examine data sources and model outputs, as well as the need to produce a Panel report before meetings end, make it difficult if not impossible for the Panel to provide an adequate post-assessment peer review.

In the Panel's opinion, contemporaneous collaboration with NMFS in workshop format constitutes the most effective use of Panel expertise, while simultaneously providing both assistance to NMFS and more arrant and pro-active peer review. If the Panel is expected to recommend ABC's with confidence provisional upon the best available scientific data, a more analytic approach to the stock assessment "process", including greater Panel participation while the assessment is being developed, is warranted. We recommend that future assessments be conducted via a workshop environment, and the final Panel products will continue to include the complete assessment and recommendation of ABC's.

V. ANALYTICAL METHODS

As in previous assessments, the status of exploitation of king and Spanish mackerel Gulf and Atlantic migratory groups is currently evaluated with age-based sequential models which requires that the catch be assigned ages. Size at age and length-weight conversions were updated for this year's analyses. The catch at age data through fishing year 1994/1995 were integrated into a virtual population assessment and calibrated to the CPUE indices as in the previous assessment (MSAP 1995[1]).

As in the past, the results of the above assessment analyses were used to determine biological reference points and to project forward in time to determine the acceptable catch during fishing year 1996/1997. Then, just as in previous assessments, the last estimated fishing mortality rate was adjusted upward or downward to reflect the observed catches in 1994/1995 and the early part of 1995/1996 and projected catches for the rest of 1995/1996. The adjusted F's in 1994/1995 and 1995/1996 and the target F's in 1996/1997 were used to project stock sizes and catches through 1996/1997 and to determine the ABC in that year.

---

[1] MSAP. 1995. 1995 report of the mackerel stock assessment panel. NMFS/SEFSC, Miami Laboratory Contribution No. MIA-94/95-30. 29 p.

As in the previous assessment, the uncertainty in the ABC's was calculated for the mackerels groups except for the Gulf group king mackerel. A mixed Monte Carlo/bootstrap method was used to evaluate uncertainty in the VPA and the projections and, hence, in the ABC and associated statistics. The key parameters of catch at age, natural mortality rate at age and abundance indices were assumed to be random variables exhibiting either known distributions or a distribution of the observed residuals in the original fit. The entire analysis was iterated 400 times. Projections were made using each iteration such that biological reference points, stock trends and ABC could be evaluated on an absolute or relative scale. Probability distribution from these 400 observations were used to construct confidence intervals.

The method of calculating current spawning potential ratios (SPR) called transitional SPR follows the recent recommendations of Mace et al. (1996). In previous stock assessments, recruitment was included when calculating SPR; however, the SPR review panel concluded that calculating SPR on a per recruit basis facilitated interpretation. This distinction is important in mackerels because the new way of calculating SPR produces lower values than the earlier method.

VI. STATUS OF STOCKS

A. KING MACKEREL

The Panel reviewed the updated stock assessment analyses presented. Virtual population analyses included estimates of catch-at-age for the Gulf and Atlantic migratory groups.

Maximum Sustainable Yield (MSY)

In 1983, the Councils adopted a maximum sustainable yield of 26.2 million pounds that was proportioned by historical landings into 18.5 million pounds for the Gulf migratory group and 7.7 million pounds for the Atlantic migratory group. Maximum sustainable yield is a dynamic quantity that is dependent upon environmental variables and fishery patterns governed by changes in selectivity and availability. In this regard, the Councils have changed the selectivity patterns of king mackerel by raising the minimum size limit from 12 inches to 20 inches fork length. Overall selectivities are also changed because stock assessments are beginning to include the impact associated with the harvest of mackerels in non-directed fisheries. Furthermore, closures of the commercial mackerel fishery have changed the temporal and geographic distribution of harvest which in turn has affected the age and sex structure of the harvest. Given these changes in the fishery, it is likely that the MSY for the Gulf and Atlantic king mackerel is less than 26.2 million pounds.

Stock Identity and Distribution

The present management regime specifies two migratory groups for management purposes based on tagging data, growth rate differences and temporal differences in the fisheries: the Gulf migratory group and the Atlantic migratory group (although fish captured in the eastern Gulf of Mexico off west Florida are genetically indistinguishable from the Atlantic). The Atlantic migratory group, which occurs along the U.S. east coast to New York, mixes with the Gulf migratory group along southeast Florida in winter. For management and stock assessment purposes, the boundary between migratory groups currently is specified as the Volusia - Flagler county border along the Florida east coast in winter (November 1 -March 31) and the Monroe-Collier County Florida border on the southwest coast is summer (April 1 - October 31). Those boundaries were established based upon the results of mark-recapture studies conducted from 1975-1979. The Mackerel Stock Assessment Panel has discussed the issue of mixing and concluded that the available information supports separation into Atlantic and Gulf migratory groups but that there appears to be sufficient mixing such that the genetic differences are weak.

The 1994 Panel Report included a recommendation that a working group independent of the Panel, but with pertinent and local knowledge of the fishery, be appointed to thoroughly review all available data relative to mixing rates between Atlantic and Gulf migratory groups

especially as they pertain to the east coast of Florida in the winter, including possible adjustments to tagging data using weighting factors based upon fishing effort and management measures since 1985. Further, the working group would be charged with determining the true mixing rate between the migratory groups and how the catch of king mackerel in that mixing zone should be allocated, and that subsequent stock assessments include an analysis using the recommended allocations.

The Working Group's report was reviewed and their conclusions are presented below:

(a) Borders of the Mixing Zone - The recent tagging data, which imply incomplete mixing between the two groups, was reviewed. The Group concluded However, without confidence in these uncorrected tag-return data and their derived mixing rates, we do not have confidence that the estimated mixing rates are correct. Sources of error in these uncorrected tagging data suggest true mixing rates may be higher than 3 percent and 6 percent, implying that present boundaries are not adequate to properly define the two stocks. Without reliable mixing data we do not feel confident in recommending boundaries other than to suggest retention of past practice until better data are available.

(b) Mixing Proportions - The Group concluded Because we do not have confidence in these uncorrected tagging data, we do not feel it possible to suggest mixing proportions on an overall basis, much less by season (We note further that all tagging studies to date have not introduced tags randomly into the stock(s) nor did they randomly recover tags. These considerations further weaken reliability of the present tagging data).

(c) Procedure for Future Evaluation and Modifications of Mixing Proportions - The Group offered two approaches: (1) a retrospective reanalysis of past tagging data and (2) new studies to estimate mixing proportions. They concluded the approach to analyze previous tagging data with the greatest potential for success would be the recreational data but they also suspected that this approach would not prove fruitful due to data limitations. They also concluded The continued use of the PEPA-2 locus as a genetic mark in king mackerel is not recommended until the observed non-random associations between PEPA-2 genotypes and the sex or age of individual fish are more fully understood. The use of mtDNA as a genetic mark also is not recommended. MtDNA is very useful as a means to test spatial genetic homogeneity, i.e., identify genetic stocks, but is constrained as a genetic mark because of its matrilineal mode of inheritance. The Group also recommended new studies to estimate mixing proportions and these are included in the research recommendations section of their report.

After a review of these findings, the Panel concluded that the biological information supports a zone of mixing on the Florida east coast. The current boundary was specified by the Councils at the Flagler/Volusia boundary. The Councils should be reminded that the east coast of Florida in the winter is a zone of mixing and that both Gulf and Atlantic fish occur there at that time. It is our understanding that some of the reasons that the original boundary was chosen was

to provide greater biological protection to the overfished Gulf migratory group.

1. Gulf Migratory Group

For reasons discussed in the section on review of stock assessment data (Section IV), more specifically, because of the abrupt increase in the receational pounds landed and effort since 1991, the Panel deemed that a thorough review of the underlying information used in the assessment should be undertaken especially of the Gulf migratory group king mackerel. The Panel therefore felt it inappropriate to recommend an ABC for the Gulf migratory group king mackerel at this time. The intent of the Panel is to convene a seven day workshop in late May or June to further evaluate the data and methods used in this assessment and at that time provide recommenations of ABC for the Gulf group. The workshop will address the following topics:

1) Recreational landings
2) Natural mortality
3) Indicies of abundance
4) Estimation of catch-at-size and catch-at-age
5) Bycatch

Table 1. King Mackerel Gulf Stock catch summary for number in thousands[1,2]. The listings for East and West Gulf represent catch estimates derived by assuming a zone of mising between these two hypothesized stocks. The assumed mixing zone ranges from Alabama through Texas with variable proportions of the catch attributed to each of the hypothesized stocks as a function of distance along the U.S. Gulf of Mexico coast.

	East Gulf			West Gulf			US Gulf		
Fishing Year	Com	Rec	Total	Com	Rec	Total	Com	Rec	Total
1981/1982	654	172	827	<0.5	126	126	654	299	953
1982/1983	406	435	841	42	388	430	449	823	1271
1983/1984	360	270	630	29	72	101	389	342	731
1984/1985	282	317	599	44	81	125	326	398	724
1985/1986	335	116	451	42	68	110	377	184	561
1986/1987	153	384	538	19	58	77	172	442	615
1987/1988	107	257	364	12	46	58	119	303	422
1988/1989	103	463	566	19	62	81	122	526	647
1989/1990	156	469	625	27	45	73	184	514	698
1990/1991	180	436	616	37	66	103	217	502	719
1991/1992	195	648	843	28	90	118	223	738	961
1992/1993	340	540	881	70	92	162	410	632	1042
1993/1994	215	560	775	52	125	177	267	685	952
1994/1995	281	709	991	55	83	137	336	792	1128

Table 1 (cont.). King Mackerel Gulf Stock catch summary for weight in thousands of pounds[1,2].

Fishing Year	East Gulf Com	East Gulf Rec	East Gulf Total	West Gulf Com	West Gulf Rec	West Gulf Total	US Gulf Com	US Gulf Rec	US Gulf Total
1981/1982	5646	1425	7071	<0.5	1476	1476	5646	2901	8548
1982/1983	3802	3735	7538	837	3958	4795	4640	7693	12333
1983/1984	2624	1626	4250	348	812	1161	2972	2439	5411
1984/1985	2601	2358	4959	603	751	1354	3205	3109	6313
1985/1986	2976	979	3956	574	852	1426	3550	1832	5382
1986/1987	1165	2618	37841	308	650	958	1473	3269	4742
1987/1988	690	1655	2345	178	490	668	868	2145	3013
1988/1989	1103	4515	5618	303	761	1063	1405	5276	66811
1989/1990	1521	2856	4377	432	504	937	1954	3360	5314
1990/1991	1395	3288	4683	421	664	1084	1816	3951	5767
1991/1992	1731	3966	5697	386	808	1194	2117	4773	6890
1992/1993	2839	5458	8297	760	800	1560	3599	6258	9857
1993/1994	1954	4923	6877	618	1224	1841	2572	6146	8718
1994/1995	2330	7205	9535	612	659	1271	2942	7863	10806

Table 1. (cont.) King Mackerel US Gulf Stock management regulations. Pounds are in millions.

Fishing Year	ABC (lbs)	TAC (lbs)	Rec. Alloc./Quota[4] (lbs / numbers)	Rec. Bag Limit[5]	Com. Allocation: East/West[6,7]
1986/1987	1.2 - 2.9	2.9	1.97	2/3 FL-TX	0.93 : 0.60/0.27 + PS=0.06
1987/1988	0.6 - 2.7	2.2	1.50	2/3 FL-TX	0.70 : 0.48/0.22
1988/1989	0.5 - 4.3	3.4	2.31	2/3 FL-TX	1.09 : 0.75/0.34
1989/1990	2.7 - 5.8	4.25	2.89 / 298,000	2/3 FL-TX	1.36 : 0.94/0.42
1990/1991	3.2 - 5.4	4.25	2.89 / 301,000	2/3 FL-TX	1.36 : 0.94/0.42
1991/1992	4.0 - 7.0	5.75	3.91 / 574,000	2 FL; 2/3 AL-TX	1.84 : 1.27/0.57
1992/1993	4.0 -10.7	7.80	5.30 / 715,000[9,10]	2 FL-TX	2.50+0.259: 1.73+0.259/0.77[8]
11993/19941	1.9 - 8.9	7.80	5.30 / 759,000	2 FL-TX	2.50 1.73/0.771
1994/1995	1.9 - 8.1	7.80	5.30 / 768,000	2 FL-TX	2.50 1.73/0.77
1995/19961	2.0 - 5.5	7.80	5.30 / 629,000	2 FL-TX	2.50 1.73/0.771

[1]Fishing year 1979/1980 begins on 1 July 1979 and ends on 30 June 1980.
[2]Sums within rows may not appear to equal the Total value shown due to rounding of numbers before printing.
[3]Information on Mexico catch and size distribution for calendar years 1979-1984 not sufficient for inclusion.
[4]Recreational quota in numbers is the allocation divided by an estimate of annual average weight (not used prior to fishing year 1989).
[5]Bag Limit "2/3" means 2 for private boats; for charterboats: 2 with, or 3 without, captain and crew.
[6]E/W com. allocations apply to all legal gears except purse seine in fishing year 1986 (only H&L and runaround gill[illegible]ter 198/1990).
[7]For quota monitoring, E/W com. allocations apply to East=FL and West=AL-TX, not accounting for mixing.
[8]0.259 million pounds added to com. allocation for FL east only, opened 2/18/1993.
[9]Bag limit will not be reduced to zero when allocation reached, beginning in fishing year 1992.
[10]Panel recommended ABC range changed from 16%-84% to 16%-50% and Gulf Council selected TAC accepting greater than 50% risk level.

2. Atlantic Migratory Group

This is the first Atlantic king mackerel assessment to include estimates of bycatch in the shrimp fishery. Inclusion of bycatch in the VPA changed the previous recommended levels of ABC. Last year's report included a statement that the ABC and SPR will be lower in the ne[illegible] assessment based on incorporating bycatch estimates. The 1992-1994 average bycatch using [illegible] ratio method was 227,695 king mackerel (Powers et al, 1996b: Table 84).

Landings and History of Management

Catches since 1981/1982 have ranged from a low of 6.04 million pounds in 1989/1990 to a high of 9.62 million pounds in 1985/1986 (Table 2 and Figure ATK-1a). Although population biomass and SPR appear to be relatively stable in recent years, catches have generally declined and have been less than TAC. As a result, the decrease in landings is attributed to a decrease in fishing mortality. For Atlantic kings, the 1995/1996 fishing mortality rate was assumed by the Panel to be equal to 1994/1995. This resulted in a median estimate of 1995/1996 yield of 5.4 million pounds.

Table 2. King Mackerel Atlantic Stock Catch summary for numbers in thousands.

	Mid and North (N. of NC)			South (NC - FL)			Combined		
Fishing Year	Com	Rec	Total	Com	Rec	Total	Com	Rec	Total
1981/1982	<0.5	3	3	275	494	769	276	497	772
1982/1983	2	<0.5	2	380	530	910	382	530	911
1983/1984	1	<0.5	1	234	671	905	235	671	906
1984/1985	<0.5	<0.5	<0.5	181	613	794	182	613	794
1985/1986	1	<0.5	1	232	818	1050	233	818	1051
1986/1987	<0.5	10	10	277	690	967	277	700	977
1987/1988	2	7	9	346	537	883	348	544	892
1988/1989	2	13	15	339	543	882	340	556	897
1989/1990	1	7	8	282	373	655	283	380	664
1990/1991	2	2	5	308	437	745	310	439	750
1991/1992	3	10	13	293	628	921	296	639	934
1992/1993	4	13	17	265	660	925	270	673	943
1993/1994	2	17	20	223	358	581	225	375	600
1994/1995	0	2	3	226	379	605	226	382	607

Table 2 (cont.). King Mackerel Atlantic Stock Catch summary for weight in thousands of pounds.

	Mid and North (N. of NC)			South (NC - FL)			Combined		
Fishing Year	Com	Rec	Total	Com	Rec	Total	Com	Rec	Total
1981/1982	3	28	31	2387	4394	6781	2390	4422	6812
1982/1983	14	<0.5	14	3924	5246	9170	3938	5246	9185
1983/1984	7	<0.5	7	2434	6253	8687	2441	6253	8694
1984/1985	3	<0.5	3	1944	6131	8075	1947	6131	8078
1985/1986	10	2	12	2485	7119	9604	2495	7121	9616
1986/1987	4	78	81	2833	5901	8734	2837	5979	8816
1987/1988	16	49	65	3436	3856	7293	3453	3905	7357
1988/1989	15	122	137	3076	4759	7835	3091	4881	7972
1989/1990	10	72	82	2625	3329	5954	2635	3400	6036
1990/1991	15	14	28	2662	3704	6366	2676	3718	6394
1991/1992	22	93	115	2494	5730	8224	2516	5822	8338
1992/1993	31	100	132	2195	6150	8345	2227	6251	8477
1993/1994	20	219	240	1997	4219	6216	2018	4438	6456
1994/1995	1	24	25	2196	3703	5899	2197	3727	5924

Table 2. (cont.) King Mackerel Atlantic Stock management regulations. Pounds are in millions.

Fishing Year	ABC (lbs)	TAC (lbs)	Rec. Alloc./Quota[3] (lbs / numbers)	Rec. Bag Limit	Com. Allocation[4] (lbs)
1986/1987	6.9 - 15.4	9.68	6.09	3	3.59 (PS=0.40)
1987/1988	6.9 - 15.4	9.68	6.09	3	3.59 (PS=0.40)
1988/1989	5.5 - 10.7	7.00	4.40	2 in FL, 3 GA-NC	2.60 (PS=0.40)
1989/1990	6.9 - 15.4	9.00	5.66 / 666,000	2 in FL, 3 GA-NC	3.34
1990/1991	6.5 - 15.7	8.30	5.22 / 601,000	2 in FL, 3 GA-NY	3.08
1991/1992	9.6 - 15.5	10.50	6.60 / 735,000	5 in FL-NY	3.90
1992/1993	8.6 - 12.0	10.50	6.60 / 834,000[5]	2 in FL, 5 GA-NY	3.90
1993/1994	9.9 - 14.6	10.50	6.60 / 854,000	2 in FL, 5 GA-NY	3.90
1994/1995	7.6 - 10.3	10.00	6.60 / 709,000	2 in FL, 5 GA-NY	3.71
1995/1996	7.3 - 10.5	7.30	4.60 / 454,000	2 in FL, 3[6] GA-NY	2.70

[1]Fishing year 1979/1980 begins on 1 April 1979 and ends on 31 March 1980.
[2]Sums within rows may not appear to equal the Total value shown due to rounding of numbers before printing.
[3]Recreational quota in numbers is the allocation divided by an estimate of annual average weight (not used prior to fishing year 1989).
[4]The commercial allocation includes the purse seine allocations listed.
[5]Bag limit will not be reduced to zero when allocation reached, beginning in fishing year 1992.
[6]Bag limit reduced from 5 to 3 effective 1/1/1996.

Estimates of Fishing Mortality Rates

The pooled F on adults Ages 3+ is shown in Figure ATK-1b. The decreasing trend in F for Ages 3+ coincides with implementation of regulations in the 1986/1987 fishing season. The fishing mortality rate for 1994/1995 was slightly below the target of $F_{30\% \text{ SPR}}$ and is the lowest fishing mortality rate observed.

Trends in Recruitment

Estimated recruitment is shown in Figure ATK-1c for Ages 1-2. Age 0 was not included due to adoption of constant bycatch in the analysis prior to 1992. Recruitment increased in the mid-1980's followed by a low 1988/1989 year class and subsequently increased in 1989/1990 and 1990/1991. Recruitment has followed a decreasing trend since the high in 1990/1991.

Trends in Biomass

The annual change in biomass for all ages is shown in Figure ATK-1e. Biomass of Ages 3+ declined from a high of slightly over 60 million pounds in 1981/1982 and 1982/1983 and has remained stable around 35-40 million pounds since 1987/1988 (Figure ATK-1d).

Acceptable Biological Catch

For the 1996/1997 fishing year, the Panel recommends an ABC range of 4.1 to 6.8 million pounds (Figure ATK-2c) based on not exceeding $F_{30\% \text{ SPR}}$. There is a 50 percent chance of the ABC being less than 5.5 million pounds and a 16 percent chance of it being less than 4.1

million pounds. There is an 84 percent chance the ABC is less than 6.8 million pounds.

The probability of exceeding $F_{20\% SPR}$ and $F_{40\% SPR}$ are also included for the Councils' use in examining the impacts of changing target and overfished levels (Figures ATK-2a and e).

Overfishing

The Panel concludes that the Atlantic migratory group of king mackerel is not undergoing overfishing because the fishing mortality rate is less than the F at 30 percent static SPR. Catches in 1996/1997 would have to be in excess of 8.1 million pounds before there would be more than a 50 percent chance of overfishing.

Overfished Status

The Panel concludes that the Atlantic migratory group of king mackerel is not overfished since the transitional SPR is above 30 percent (Figure ATK-1f).

Discussion of Stock Status

Our understanding of the stock status now includes an estimate of bycatch in the shrimp fishery. Last year's report included an example using a bycatch mortality of F=0.3 on Age 0, which would have resulted in an ABC of 6.7 million pounds. This is similar to the current ABC recommendation for 1996/1997 of 4.1 to 6.8 million pounds.

Dropping the MRFSS estimates for 1979 and 1980 had little to no effect on the results because those fish no longer contribute to the present F and most of the indices did not go back to 1979. As to the effects of MRFSS changes versus bycatch that is more difficult to evaluate quantitatively right now because the data were also resized. However, last year the report looked at the effect of the differences in overall changes in MRFSS as they existed at that time from 1987 forward (those changes are not significantly different from what we have now). At that time it was concluded that the effect of the MRFSS changes were small. Also, last year in the Panel report we reported on the significance of including bycatch at hypothesized F's and gave the resulting changes in SPR. The present assessment is similar to what we hypothesized last year. Therefore, the change in ABC and SPR is largely due to inclusion of bycatch.

B. SPANISH MACKEREL

The Panel reviewed the updated stock assessment analyses that were presented. These analyses included virtual population analyses of estimated numbers caught at ages for the Gulf and Atlantic migratory groups of Spanish mackerel.

Maximum Sustainable Yield (MSY)

While no new MSY estimate was developed, because of the comments discussed previously under king mackerel MSY, the Panel believes that the Spanish mackerel MSY is also most likely to be less than the previously estimated value of 18 million pounds.

Stock Identity and Distribution

In the absence of any new data on stock separation, the present boundary of Dade/Monroe Counties in south Florida along the Atlantic coast is maintained. Some mixing occurs in south Florida, but inferred abundance trends along each coast of Florida are different, indicating sufficient isolation to allow separate management.

1. Gulf Migratory Group

Landings and History of Management

Landings of Spanish mackerel from U.S. catches have ranged from 4.0 to 9.6 million pounds between fishing years 1984/1985 and 1994/1995 (Table 3). The total U.S. landings for this group in fishing year 1995/1996 is expected to be substantially less than the 4.1 million pounds landed in 1994/1995 due to the elimininination of entangling gear in Florida waters in July 1995.

This fishery has been fully regulated since 1986/1987. In 1987/1988 and 1988/1989, catches were greater than the TAC. Over the period 1989/1990 through 1994/1995 catches have been below TAC and the ABC range. The same relative F was used for Gulf Spanish mackerel. The projected 1995/1996 catches under those conditions was a median of 3.7 million pounds.

Table 3. Spanish Mackerel Gulf Stock catch summary.

Fishing Year	US Gulf - thousands of fish Com	Rec	Total	US Gulf - thousands of pounds Com	Rec	Total
1984/1985	1857	865	2722	3445	1178	4623
1985/1986	1706	1060	2766	3298	1355	4653
1986/1987	1250	6334	7584	2053	7520	9573
1987/1988	1488	1882	3370	2581	3124	5705
1988/1989	2466	1340	3806	3902	2177	6079
1989/1990	1101	1250	2351	2145	1856	4001
1990/1991	1124	1596	2720	2074	2138	4213
1991/1992	2075	2014	4089	4163	2889	7053
1992/1993	1804	2008	3812	3113	3130	6243
1993/1994	1432	1795	3227	2614	2696	5309
1994/1995	1532	1136	2668	2544	1556	4100

Table 3. (cont.) Spanish Mackerel US Gulf Stock management regulations. Pounds are in millions. Prior to fishing year 1990, management was based upon a July-June fishing year. The regulations shown for fishing year 1987 and later are relative to the July-June fishing year.

Fishing Year	ABC (lbs)	TAC (lbs)	Rec. Alloc./Quota[4] (lbs / numbers)	Rec. Bag Limit	Com. Alloc. (lbs)
1987/1988	1.9 - 4.0	2.50	1.08	3	1.42
1988/1989	1.9 - 7.1	5.00	2.15	4 FL, 10 AL-TX	2.85
1989/1990	4.9 - 6.5	5.25	2.26 / 1,614,000	4 FL, 10 AL-TX	2.99
1990/1991	3.9 - 7.4	5.25	2.26 / 1,569,000	3 TX, 4 FL[5], 10 AL-LA	2.99
1991/1992	7.1 -12.2	8.61	3.70 / 2,721,000	3 TX, 5 FL, 10 AL-LA	4.90
1992/1993	5.1 - 9.8	8.60	3.70 / 3,274,000[6]	7 TX, 10 FL-LA	4.90
1993/1994	4.7 - 8.7	8.60	3.70 / 3,274,000	7 TX, 10 FL-LA	4.90
1994/1995	4.4 - 8.7	8.60	3.70 / 2,202,000	7 TX, 10 FL-LA	4.90
1995/1996	4.0 -10.7	8.60	3.70 / 2,782,000	7 TX, 10 FL-LA	4.90

[1]Fishing year 1979 begins on 1 April 1979 and ends on 31 March 1980.
[2]Sums within rows may not appear to equal the Total value shown due to rounding of numbers before printing.
[3]Information on Mexico catch and size distributions for some years was not sufficient for inclusion.
[4]Recreational quota in numbers is the allocation divided by an estimate of annual average weight (not used prior to fishing year 1989).
[5]Rec. bag limit in FL changed from 4 to 5 on 1/1/1991, and changed from 5 to 10 on 1/1/1993.
[6]Bag limit will not be reduced to zero when allocation reached, beginning fishing year 1992.

Estimates of Fishing Mortality Rate

The pooled F on adults ages 2+ is given in Figure GFS-1b. It is similar to $F_{20\% SPR}$ and higher than $F_{30\% SPR}$. The median fishing mortality rate multiplier for fishing year 1994/1995 was estimated for the directed fishery to be higher than the target of $F_{30\% SPR}$ (0.30). As with Atlantic king mackerel, the trend in fishing mortality rates follows the trend for annual landings.

Trends in Recruitment and Biomass

Age 0 recruits have varied between 10 and 20 million fish since the early 1980's (Figure GFS-1c). The apparant cyclic trends in recuitment are reflected in similar trends in biomass, which is characteristically true among short-lived species.

Acceptable Biological Catch

The 1996/1997 range of ABC recommended by the Panel is from 1.6 to 9.5 million pounds (Figure GFS-2c) There is a 16 percent chance of ABC being less than 1.6 million pounds; a 50 percent chance of ABC being less than 5.9 million pounds, and a 84 percent chance that the ABC is less than 9.5 million pounds.

Overfishing

The current rate of fishing is estimated to be greater than $F_{30\%\ static\ SPR}$ but there is a greater than 50 percent chance that F in 1994/1995 was less than $F_{20\%\ static\ SPR}$; therefore the stock is not undergoing overfishing.

Overfished Status

The median estimate of transitional SPR at the beginning of the 1996/1997 fishing year is 22 percent (Figure GFC-2d) with the assumption that 1995/1996 harvest is only 60 percent of the previous year due to the eliminaion of entangling gear in Florida waters in 1995. Therefore, using the recommended level of the SPR Management Strategy Committee of 20 percent, the Panel concludes that this stock is not overfished.

2. Atlantic Migratory Group

Landings and History of Management

The summary of Atlantic Group Spanish mackerel catch statistics are given in Table 4. This fishery has been fully regulated since 1986/1987. While the commercial quota has been met every year except 1993/1994, the total harvest has not exceeded the TAC since the 1991/1992 fishing year. The preliminary commercial harvest for 1995/1996 was 1.9 million pounds reflecting the elimination of entangling nets in Florida state waters. During the period since regulation, the yield from this group has ranged from 3.8 to 7.0 million pounds. The expected yield from this group in fishing year 1995/1996 is about 5.5 million pounds. Note that as with the Atlantic king mackerel, the Atlantic Spanish mackerel assessment analyses are predicated on bycatch estimates for three recent years and applying the average bycatch value of those three to the previous years. As predicted in last year's Panel Report, the inclusion of bycatch has lowered the ABC and SPR values. The 1992-1994 average bycatch using the ratio method was 7,483,622 Spanish mackerel (Powers et al 1996a; Table 78).

The landings of Atlantic migratory group Spanish mackerel have not exceeded the ABC ranges since 1989/1990. The recreational sector has not filled their allocation since 1990/1991 and the TAC has not been exceeded since 1990/1991. For Atlantic Spanish mackerel the 1995/1996 fishing mortality rate was adjusted by the Panel, based upon the Florida net regulations, to be 75% of that in 1994/1995. The median estimate of 1995/1996 yield under these conditions was 4.4 million pounds.

Table 4. Spanish Mackerel Atlantic Stock catch summary for numbers in thousands.

	Mid and North (North of NC)			South (NC - FLA)			Combined		
Fishing Year	Com	Rec	Total	Com	Rec	Total	Com	Rec	Total
1984/1985	10	<0.5	10	2174	942	3116	2184	942	3126
1985/1986	38	<0.5	38	2308	496	2804	2346	496	2842
1986/1987	246	9	254	1661	789	2450	1907	798	2704
1987/1988	578	11	589	1868	1042	2910	2446	1053	3498
1988/1989	553	102	655	2094	1624	3718	2647	1726	4373
1989/1990	451	97	547	1784	1006	2790	2234	1103	3337
1990/1991	540	70	610	1527	1253	2780	2067	1323	3390
1991/1992	737	155	893	2176	1308	3484	2913	1464	4377
1992/1993	356	88	445	1918	1122	3040	2274	1210	3484
1993/1994	63	123	186	2462	797	3258	2525	920	3445
1994/1995	476	197	673	2689	886	3575	3165	1083	4248

Table 4 (cont.). Spanish Mackerel Atlantic Stock catch summary for weight in thousands of pounds.

Fishing Year	Mid and North (North of NC) Com	Rec	Total	South (NC - FLA) Com	Rec	Total	Combined Com	Rec	Total
1984/1985	10	<0.5	10	3281	1311	4592	3292	1311	4602
1985/1986	15	<0.5	15	4176	747	4923	4192	747	4939
1986/1987	176	11	186	2390	1185	3575	2565	1196	3761
1987/1988	381	15	396	3179	1458	4637	3559	1474	5033
1988/1989	327	153	480	3197	2587	5784	3524	2740	6264
1989/1990	423	113	537	3540	1456	4996	3963	1569	5533
1990/1991	600	100	699	2960	1975	4935	3560	2075	5635
1991/1992	765	217	982	3971	2070	6041	4736	2287	7023
1992/1993	396	118	514	3321	1877	5198	3716	1995	5712
1993/1994	83	159	242	4731	1333	6064	4813	1493	6306
1994/1995	504	231	735	4729	1143	5872	5233	1374	6607

Table 4. (cont). Spanish Mackerel Atlantic Stock management regulations. Pounds are in millions.

Fishing Year	ABC (lbs)	TAC (lbs)	Rec. Alloc./Quota[3] (lbs / numbers)	Rec. Bag Limit	Com. Alloc. (lbs)
1987/1988	1.7 - 3.1	3.1	0.74	4 in FL, 10 GA-NC	2.36
1988/1989	1.3 - 5.5	4.0	0.96	4 in FL, 10 GA-NC	3.04
1989/1990	4.1 - 7.4	6.0	2.76 / 1,725,000[4]	4 in FL, 10 GA-NC	3.24
1990/1991	4.2 - 6.6	5.0	1.86 / 1,216,000	4 in FL, 10 GA-NY	3.14
1991/1992	5.5 -13.5	7.0	3.50 / 2,778,000	5 in FL, 10 GA-NY	3.50
1992/1993	4.9 - 7.9	7.0	3.50 / 2,536,000[5]	10 FL-NY	3.50
1993/1994	7.3 -13.0	9.0	4.50 / 3,214,000	10 FL-NY	4.50
1994/1995	4.1 - 9.2	9.2	4.60 / 3,262,000	10 FL-NY	4.60
1995/1996	4.9 -14.7	9.4	4.70 / 3,113,000	10 FL-NY	4.70

[1]Fishing year 1979 begins on 1 April and ends on 31 March 1980.
[2]Sums within rows may not appear to equal the Total value shown due to rounding of numbers before printing.
[3]Recreational quota in numbers is the allocation divided by an estimate of annual average weight (not used prior to fishing year 1989).
[4]Allocations and rec. quota are as revised October 14, 1989.
[5]Bag limit will not be reduced to zero when allocation reached, beginning fishing year 1992.

Estimates of Fishing Mortality

The pooled F on adult ages (Age 2+) is given in Figure ATS-1b. The fishing mortality rate for fishing year 1994/1995 on the fully recruited year classes (Age 2+) is higher than the $F_{30\%\ SPR}$ fishing rate.

Trends in Recruitment

Estimates of Age-1 recruits have been variable without trend over the last decade (Figure ATS-1c).

Acceptable Biological Catch

The 1996/1997 ABC range recommended by the Panel is 5 to 7 million pounds (Figure ATS-2c). There is a 16 percent chance that ABC is less than 5 million pounds and a 50 percent chance that ABC is less than 6 million pounds. There is an 84 percent chance that the ABC is less than 7 million pounds.

Overfishing

The estimated fishing mortality rate is less than both the $F_{30\% \text{ static SPR}}$ and $F_{20\% \text{ static SPR}}$ rates. Therefore, the stock is not undergoing overfishing. Catches in 1996/1997 would have to be in excess of 7.9 million pounds before there would be more than a 50 percent chance of overfishing (Figure ATS-2a).

Overfished Status

The Panel concludes the Atlantic migratory group of Spanish mackerel is not overfished since the transitional SPR at the beginning of 1996/1997 is estimated to be 29 percent (Figure ATS-2d).

Discussion of Stock Status

Last year's Panel report noted that the levels of SPR and ABC would be lower when the bycatch is included in the assessment. As an example using a bycatch fishing mortality rate of F=0.3 on Age-0 and Age-1, the median estimate of ABC would have been 2.6 million pounds and the median SPR would have been 24 percent. As noted above, the estimated SPR was higher at 29 percent and the median estimate of ABC was higher at 6 million pounds.

C. COBIA

Catches of cobia from 1984 through 1995 for the Gulf were updated from Thompson (1995[2]) (Table 5). As a result of the 1992 assessment, the MSY combined for the commercial and recreational sectors and the Gulf and Atlantic "groups", was increased from 1 million pounds to 2.2 million pounds. This represented the average total catch over the time series 1984-1991 for the Gulf and Atlantic, commercial and recreational combined. Although VPA analysis of cobia stocks in southeast U.S. waters now is available (Thompson 1996[3]), the preliminary nature of the assessment due to uncertainty about several important biological parameters preclude revision of the current MSY level of 2.2 million pounds for the Gulf and Atlantic combined.

Table 5. Cobia U.S. Atlantic and Gulf of Mexico catch summary in number and by weight in pounds. Year denotes calendar year. The 1995 estimates are preliminary.

	Atlantic- thousands of fish			Atlantic- thousands of pounds		
Year	Commercial	Recreational	Total	Commercial	Recreational	Total
1984	1479	40750	42229	33.4	951.4	984.8
1985	1328	44204	45532	30.0	1313.6	1343.6
1986	3099	33012	36111	70.0	573.7	648.7
1987	5401	29809	35210	122.8	617.3	740.1
1988	4684	27132	31816	105.6	553.9	659.5
1989	5799	46498	52297	131.1	1339.7	1470.8
1990	5482	29085	34567	123.3	619.7	743.0
1991	5297	31554	36851	125.0	914.8	1039.8
1992	5604	54883	60487	137.3	1204.5	1341.8
1993	5627	31756	37383	123.8	684.8	808.6
1994	5410	30273	35683	126.6	671.6	798.2
1995	3739	18541	22280	97.2	521.1	618.3

	US Gulf - thousands of fish			US Gulf - thousands of pounds		
Year	Commercial	Recreational	Total	Commercial	Recreational	Total
1984	10161	54160	64321	174.4	1066.9	1241.3
1985	9404	48580	57984	161.4	1115.8	1277.2
1986	10301	71875	82176	176.8	1373.4	1550.2
1987	11764	54928	66692	201.9	919.9	1121.8
1988	10488	74480	84968	180.0	1348.7	1528.7
1989	3535	44913	58448	232.3	939.9	1172.2
1990	10143	41903	52046	174.1	811.6	985.7
1991	7225	60854	68079	176.3	1218.2	1294.5
1992	8615	52142	60757	232.6	950.5	1183.1
1993	9147	57988	67135	260.7	1034.2	1294.9
1994	9276	66394	75670	262.5	1392.5	1655.0
1995	5053	52720	57773	151.6	1050.0	1201.6

The recreational sector remains the primary source of landings and these estimates were

[2] Thompson, N.B. 1995. An assessment of cobia in southeast U.S. waters. Miami Laboratory Contribution No. MIA-94/95-31.

[3] Thompson, N.B. 1996. An assessment of cobia in southeast U.S. waters. Miami Laboratory Contribution No. MIA-95/96-28.

revised over the time series 1988-1995 using MRFSS catch estimates derived from the "new" method. There is little difference between these new estimates and the "old" estimates. Total catch in weight for both sectors and the Gulf and Atlantic combined in 1991 was estimated to be well above MSY at about 3.1 million pounds; in 1992, total combined landings were about 2.6 million pounds; in 1993 combined landings was about 1.8 million pounds; in 1994 combined landings were about 2.5 million pounds, and in 1995 combined landings were about 1.8 million pounds. While catches in the Gulf remain high and stable, the Atlantic catches demonstrate more variability and except for 1991 are low compared to Gulf catches. Catches in both the Atlantic and Gulf declined from 1994 to 1995.

Age-based assessments were completed for the Gulf and Atlantic respectively in the same way as in 1995. Age-length results from Franks and McBee (1991[4]) and Franks (1992) were applied to develop catch at age for Gulf catches from 1984-1994. It was noted that undersized fish were included in Franks sample which came primarily from recreational anglers. Undersized age 1 fish were also in the catch at age tables. An age-length key developed using data from Mr. Joseph Smith (NMFS Beaufort Laboratory, pers. comm. 1995, accepted for publication) was applied to estimate catch-at-age for the Atlantic catches. Smith's data also included undersized fish and these were also represented in the catches-at-age. How representative samples were of the fishery is not known.

Results of aging fish in the Gulf and Atlantic suggested that fish grow slower and live longer in the Atlantic relative to the Gulf. This result provides some biological evidence for separation of cobia into two groups, Atlantic and Gulf. However, recent but preliminary tagging studies (Franks and McBee 1994[5], Franks and Moxey 1996[6]) indicate that movement between the Gulf and Atlantic is typical and seasonal; the authors caution that it is too early to determine if Gulf and Atlantic groups represent two distinct breeding sub-populations.

Included in the Gulf catches-at-age were updated estimates of bycatch of fish aged 0 (70 percent) and 1 (30 percent). Bycatch in the past two years is relatively high compared to previous years; recruitment also was high in 1993 and 1994, but declined in 1995.

Shrimp trawl bycatch probably occurs in the Atlantic but there are no quantitative data

---

[4]Franks, J.S. and J.T. McBee. 1991. Age and growth in cobia from the northcentral Gulf of Mexico. In: Franks, J.S., T.D. McIlwain, R.M. Overstreet, J.T. McBee, J.M. Lotz, and G. Meyer. Investigations of the cobia (*Rachycentron canadum*) in Mississippi waters and adjacent Gulf waters. Gulf Coast Res. Lab., Ocean Springs, MS. Final Rep. to MS Dept. Wildl. Fish. and Parks/Bur. Mar. Res. and USFWS, Atlanta, GA. Project No. F-91.

[5]Franks, J.S. and J.T. McBee. 1994. Investigations of the cobia *Rachycentron canadum* in Mississippi marine waters and adjacent Gulf waters. Draft Annual Rep. Proj. No. F-91, Sport Fish Restoration USFWS, Atlanta, Ga.

[6]Franks, J. and M. Moxey. 1996. Investigations of cobia in Mississippi waters and adjacent Gulf waters: studies on the seasonal movements and migratory patterns of cobia in Mississippi marine waters and adjacent Gulf of Mexico. Rep. to Miss. Dept. Mar. Res. and the USFWS, Atlanta, GA.

available at this time for their inclusion into the stock assessment. While there is likely bycatch, the directed catches remain low relative to Gulf catches and as indicated in the 1993 assessment, Atlantic catches probably result in very small F; with high SPR.

Gulf "Group" VPA Results

An assessment combining the Gulf and Atlantic catches would essentially be a Gulf assessment given the difference in magnitude of catches. Thus, an age based analysis as described by Powers and Restrepo (1992[7]) was completed for the Gulf "group". Detailed results of the VPA are not presented because of considerable uncertainty about several of the biological parameters, especially length-at-age, fecundity-at-age, and natural mortality rate.

Briefly, using results from previous assessments, selectivities for ages 0 and 1 averag the period 1988-1933, with M=0.2 and M=0.4, and the catch-age-data including bycatch from and colleagues, the VPA was completed. CPUE indices based on the MRFSS and headboat were used to tune the VPA results. At M=0.2, the values of F for the fully recruited age classes 8+) were estimated to be 0.63 and 0.46 for 1993 and 1994, respectively, compared to cur $F_{0.1}$=0.198 and F_{max}=0.289. These most recent levels of F result in an $SPR_{M=0.2}$ of about 13 percent. At M=0.4, the values of F for the fully recruited age classes (2-8+) were estimated to be 0.42 and 0.32 for 1993 and 1994, respectively, compared to current $F_{0.1}$=0.275 and F_{max}=0.432. These most recent levels of F results in an $SPR_{M=0.4}$ of about 25 percent.

Because of the uncertainty of the VPA results, the dependency of those results on the level of M, and the appearance that current yield for both areas seems to be relatively stable at MSY, the Panel recommended that no management changes be considered at this time. However, the Panel expressed concern because these preliminary results suggest that F may be at or near F_{max}, owing in large part to the magnitude of the shrimp bycatch in the Gulf, which is approximately five times the harvest of the directed fishery. It is suggested that cobia assessments continue to be done separately for the Gulf and Atlantic.

---

[7]Powers, J.E. and V.R. Restrepo. 1992. Additional options for age-sequenced analysis. ICCAT Coll. Vol. Sci. Pap. 39:540-553

D. DOLPHIN

The following discussion and table is from Thompson (1996b).

Annual catches in numbers and whole pounds weight were updated for both the recreational and commercial sectors in the Gulf of Mexico and southeast Atlantic. Commercial landings are reported in whole pounds. Commercial landings by numbers od fish are estimated by dividing total pounds landed by average fish weight by year. Average weight is computed from trip interview program (TIP) samples from the commercial sector for the Gulf and south Atlantic separately.

Recreational landings for the Gulf of Mexico include data from MRFSS, the Texas creel survey, and the SEFSC Beaufort Laboratory headboat survey. Landings from the headboat survey are reported by numbers of fish and total weight in whole pounds. Texas creel survey landings are reported in numbers with samples taken to provide total length data. Total length is converted to fork length using data collected by the headboat survey. Fork length to weight conversions are completed using MRFSS samples. MRFSS landings are reported as numbers caught (types A + B1). To convert to weight, dolphin (catch type A) are measured and weighed. The average weight of type A catch is computed as the total pounds whole weight of type A catch divided by the total number of type A catch. This mean value, assuming type A catch are representative of type B1 catch, is multiplied by the total numbers of types A + B1 catch to estimate total pounds landed. The same procedure is used for the southeast Atlantic landings without the process of dealing with Texas catches.

Commercial data are reported in total whole pounds landed. To convert weight to numbers requires using length frequency samples collected from the commercial catches. These TIP data are used to convert from length per fish. The average whole weight is divided into total whole pounds landed to derive numbers of fish landed for the commercial sector.

Table 6. Annual dolphin landings in pounds, whole weight. Landings were estimated for the commercial and recreational sectors for Gulf of Mexico and SE Atlantic waters.
NA = Not Available

	Atlantic - thousands of pounds			Gulf - thousands of pounds		
Year	Commercial	Recreational	Total	Commercial	Recreational	Total
1984	216.7	5490.1	5706.9	330.5	1307.7	1701.2
1985	188.7	8295.1	8473.8	327.4	1557.9	1885.3
1986	228.9	6818.9	7047.8	679.1	3119.6	3798.7
1987	265.9	4386.8	4652.7	634.1	2797.8	3431.9
1988	261.3	6364.7	6726.0	723.2	2436.5	3159.7
1989	1461.7	9814.9	11231.6	1685.8	3122.9	4808.7
1990	679.4	7257.0	7936.4	1849.0	5160.7	7009.7
1991	638.2	11252.9	11891.1	1701.9	5573.8	7275.7
1992	334.5	5171.1	5505.6	771.8	4079.7	4851.5
1993	520.5	5402.3	5922.8	608.8	3598.2	4205.0
1994	627.3	9653.3	10280.6	687.7	2742.2	3429.0
1995	1155.8	NA	1155.8	1164.7	NA	1164.7

VII. FUTURE RESEARCH AND ASSESSMENT CONSIDERATIONS

In the process of reviewing the present assessment, the Panel noted areas where research was needed; and additionally, where future assessment analyses should be directed. The research recommendations (not in priority order) were:

To monitor and refine estimates of the bycatch of Atlantic migratory group king and Spanish mackerels in the directed shrimp fishery in Atlantic coastal waters and to improve bycatch estimates.

To evaluate potential bias of the lack of appropriate stratification of the data used to generate age-length keys for Atlantic and Gulf king and Spanish mackerel.

To determine the effects of gear standardization corrections via GLM techniques on temporal and spatial trends in bycatch of Gulf migratory group Spanish and king mackerels, paying particular attention to the time before and after the implementation of TED's in the directed shrimp fishery.

To develop fishery-independent methods of monitoring stock size of Gulf and Atlantic king and Spanish mackerels, with a consideration of the feasibility of alternative assessment methods such as aerial surveys in south Florida during winter.

To improve data collection of CPUE information on Gulf and Atlantic group king and Spanish mackerels, particularly in Florida waters, with emphasis on greater temporal and spatial resolution in estimates of CPUE and the distribution of fishing effort. Note: Log-books and/or trip intercept techniques focused on coastal pelagics should be among the techniques considered.

To develop methods to obtain the proportions of Gulf and Atlantic migratory group king mackerel that comprise the overwintering population off southeast Florida. One such method presently under exploration, otolith shape analysis, should be evaluated.

Consideration of the implications to managenment of alternative values of natural mortality in the VPA's for king mackerel (i.e., 0.20 rather than 0.15) and cobia (i.e., M's < 0.40).

Consideration of the implications to the fishery of changing the minimum size limits of Gulf king mackerel to increase the protection of immature fish.

Consideration of alternative stock assessment methods for short-lived species such as Spanish mackerel, such as non-equilibrium production models, which are more aggregated with respect to population age structure; these would be particularly useful when assessment are being projected from incomplete catch at age data.

VIII. LIST OF DOCUMENTS

DeVries, D.A. and C.B. Grimes. 1996. A biologically based method for allocation south Florida catches of king mackerel among eastern Gulf of Mexico and Atlantic Ocean groups. Completion Report for MARFIN Project No. 95MFIH 15. NMFS. MSAP 96/5. 10 p.

Ehrhardt, N.M., C.Legault and M. Ortiz. 1994. Hydroacoustic determination of the temporal-spatial distribution of schooling biomass of Spanish mackeerel (*Scomberomorus maculatus*). Final Report, MARFIN Grant No. NA37FF0045-01. University of Miami/RSMAS, Miami, FL. MSAP 96/8. 37 p.

Lyczkowski-Schultz, J. 1996. Abundance data for *Scomberomorus cavalla* (king mackerel) larvae in the Gulf of Mexico, 1982 to 1993. NMFS/SEFSC, Pascagoula, MS. MSAP 96/1. 7 p.

Mace, P. 1996. Defining overfishing: what is overfishing??!! (printouts of overhead transparancies) 15 p.

Mace, P., L. Botsford, J. Collie, W. Gabiel, P. Goodyea, J. Powers, V. estrepo, A. Rosenberg, M. Sissenwine, G. Thompson and J. Witzig. 1996. Scientific review of definitions of overfishing in U.S. fishey management plans: supplemental report. NMFS. MSAP 96/15. 20 p.

NMFS. 1996. Overview of southeastern U.S. king mackerel mark-recapture data: 1985-1996. Miami Laboratory Contribution No. MIA-95/96-??. NMFS/SEFSC, Miami, FL. MSAP 96/6. 25 p.

Nichols, S. 1996. An update of bycatch findings for mackerels and cobia in the Gulf of Mexico shrimp fishery. NMFS/SEFSC, Pascagoula, MS. MSAP 96/4 10 p.

Pellegrin, G. 1996. Annual data updates (indices of relative abundance: Gulf of Mexico). NMFS/SEFSC, Pascagoula, MS. MSAP 96/9 21 p.

Pellegrin, G. 1996. Annual data updates (indices of relative abundance: south Atlantic). NMFS/SEFSC, Pascagoula, MS. MSAP 96/10 11 p.

Powers, J.E., N. Parrack and P. Phares. 1996a. Stock assessment analyses on Gulf of Mexico migratory group Spanish mackerel and Atlantic migratory group Spanish mackerel. Miami Laboratory Contribution No. MIA-95/96-31. NMFS/SEFSC, Miami, FL. MSAP 96/11. 80 p. + additional notes

Powers, J.E., N. Parrack and P. Phares. 1996b. Stock assessment analyses on Gulf of Mexico migratory group king mackerel and Atlantic migratory group king mackerel. Miami Laboratory Contribution No. MIA-95/96-32. NMFS/SEFSC, Miami, FL. MSAP 96/12. 131 p. + additional notes

Restrepo, V.R. 1996. Report on smoothing sex-ratio-at-length data for king and Spanish mackerels in the southeast U.S.. University of Miami, RSMAS, Miami, FL. MSAP 96/7. 36 p.

SEAMAP-South Atlantic Bycatch Working Group. 1996. Estimates of finfish bycatch in the south Atlantic shrimp fishery. NMFS. MSAP 96/3. 70 p.

Thompson, N.B. 1996a. An assessment of cobia in southeast U.S. waters. Miami Laboratory Contribution No. MIA-95/96-28. NMFS/SEFSC, Miami, FL. MSAP 96/13. 51 p. + additional notes

Thompson, N.B. 1996b. Updated dolphin landings. Miami Laboratory Contribution No. MIA-95/96-27. MSAP 96/14. 3 p.

Vaughan, D.S. and J.M. Nance. 1996. Estimates of bycatch of mackerel and cobia in U.S. south Atlantic shrimp trawls. NMFS/SEFSC, Beaufort, NC and Galveston, TX. MSAP 96/2. 23 p.

IX. LIST OF PANEL MEMBERS AND ATTENDEES

Joseph Shepard, Chairman
James Cowan
Nelson Ehrhardt
Doug Gregory
Robert Muller
Joseph Powers
Gregg Waugh

Observers:

Roy Williams - Gulf Council/Florida Marine Fisheries Commission
Steven Atran - Gulf of Mexico Fishery Management Council
Michael Jepson - South Atlantic Fishery Management Council
Albert Jones - NMFS/SEFSC - Miami
Nancie Parrack - NMFS/SEFSC - Miami
Patricia Phares - NMFS/SEFSC -Miami
Michael Schirripa - NMFS/SEFSC - Miami
Nancy Thompson - NMFS/SEFSC -Miami
Doug DeVries - NMFS/SEFSC - Panama City
Tom McIlwain - NMFS/SEFSC - Pascagoula
Mark Godcharles - NMFS/Southeast Regional Office
Mauricio Ortiz - University of Miami RSMAS, Miami, Florida
Bob Zales, II - Chairman, Mackerel AP - Panama City, Florida
John Sanchez - Monroe County Commercial Fishermen, Inc., Marathon, Florida

..\msap496.wp6

[THIS PAGE LEFT INTENTIONALLY BLANK]

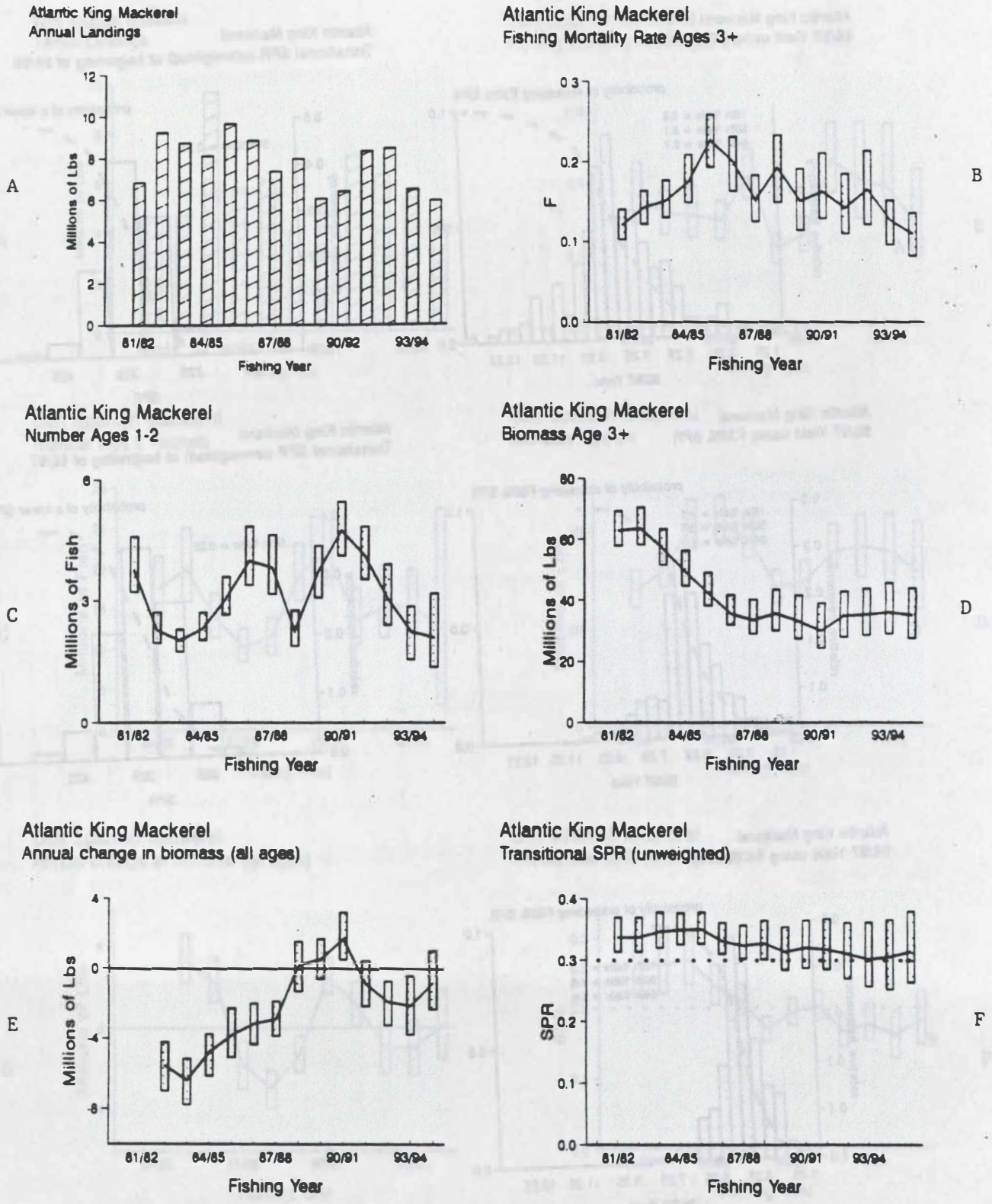
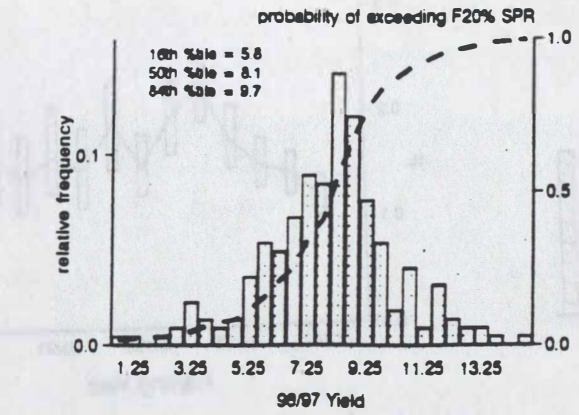
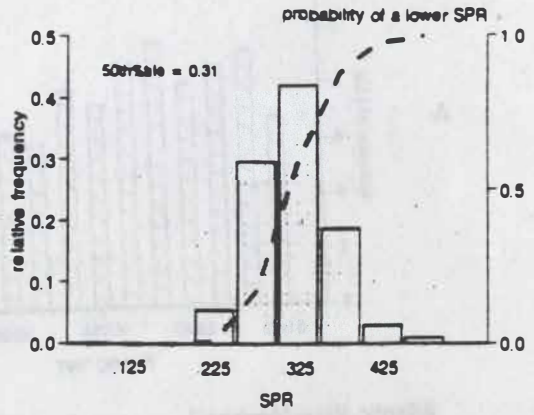


Figure ATK-1. Atlantic king mackeral catch and population trends with 80% bootstrap confidence intervals.

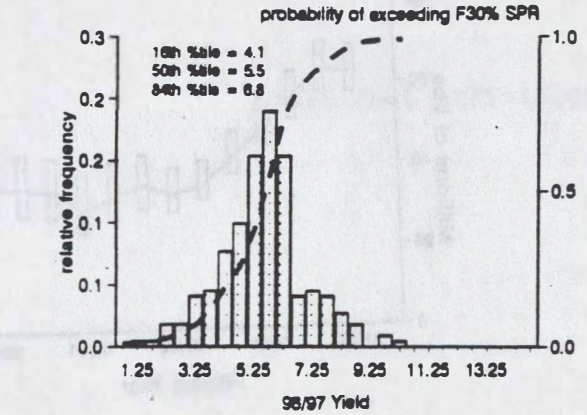
A



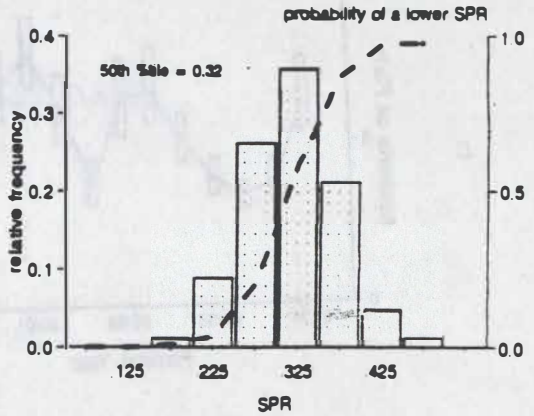
B



C



D



E

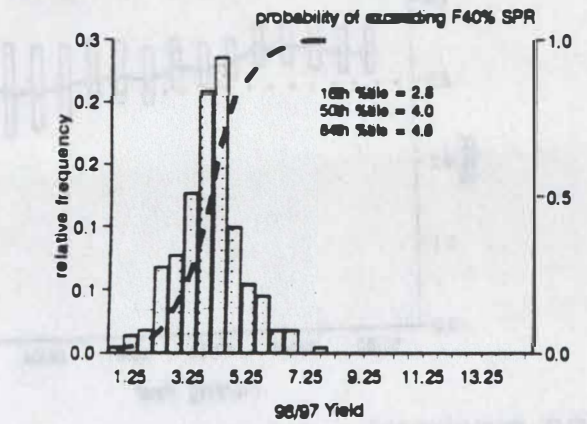


Figure ATK-2. Atlantic king yield at F SPR's and SPR's.

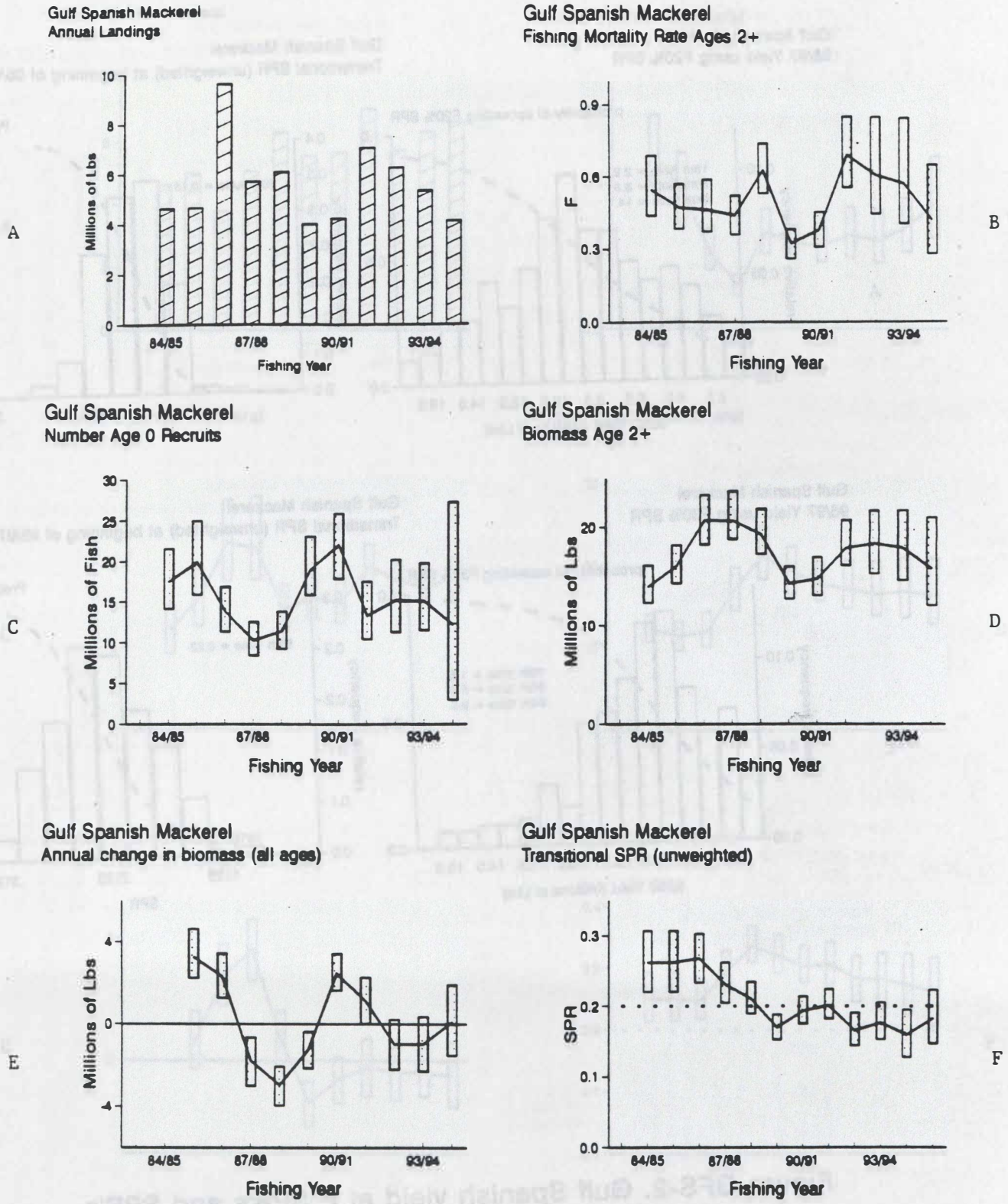


Figure GFS-1. Gulf Spanish mackeral catch and population trends with 80% bootstrap confidence intervals.

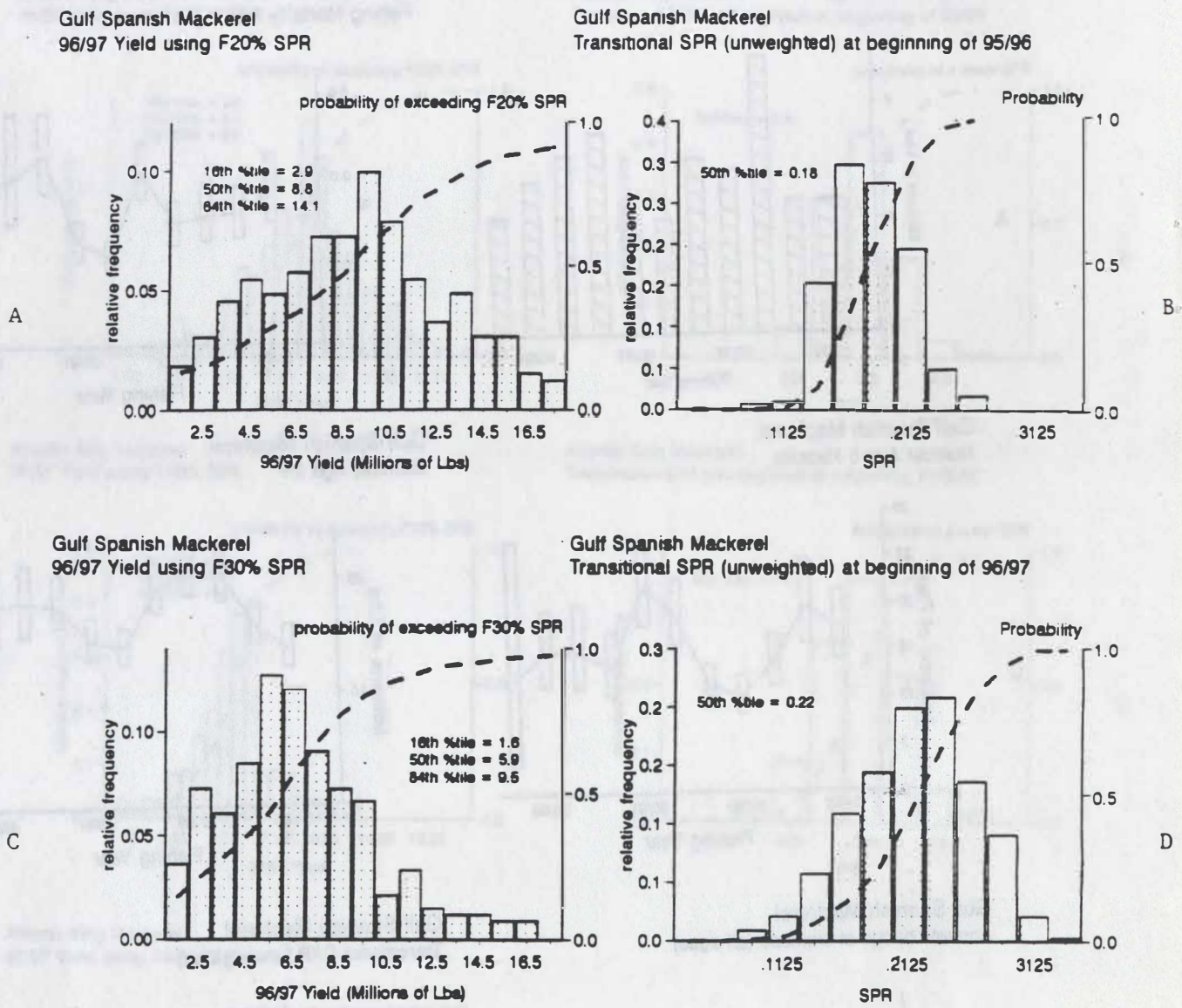
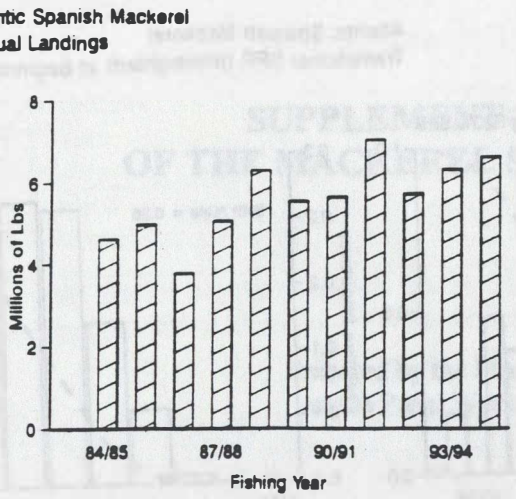
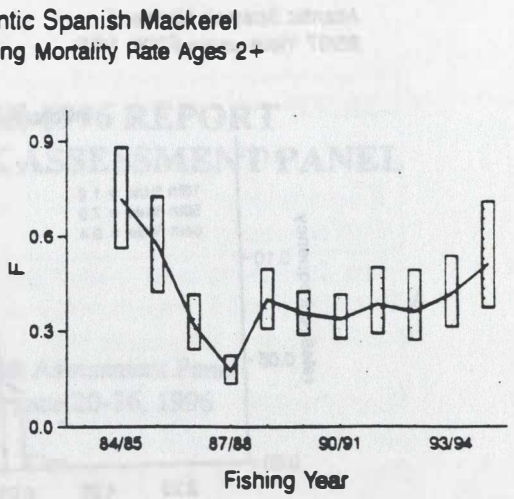


Figure GFS-2. Gulf Spanish yield at F SPR's and SPR's.

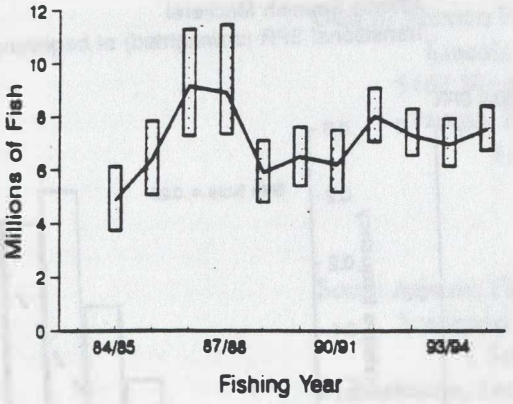
A



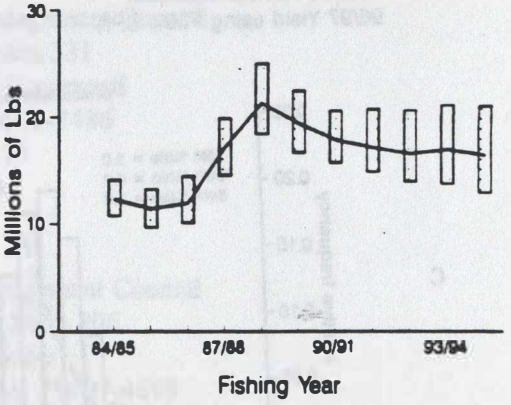
B



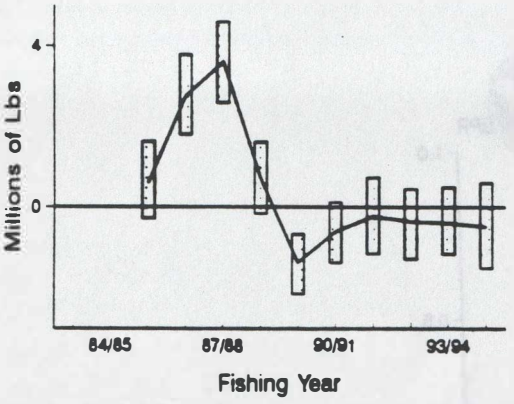
C



D



E



F

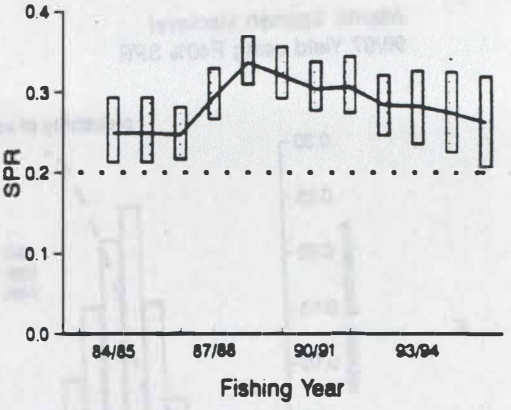
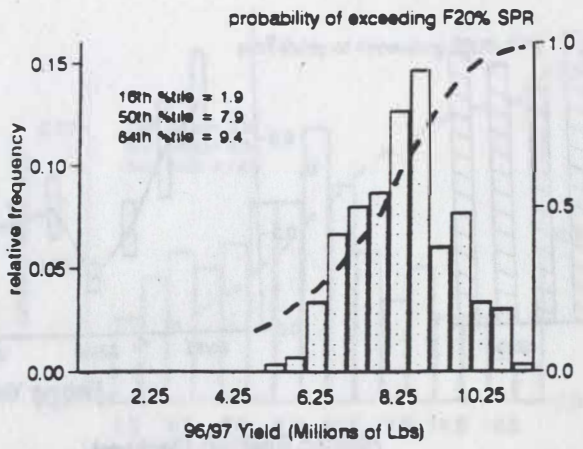


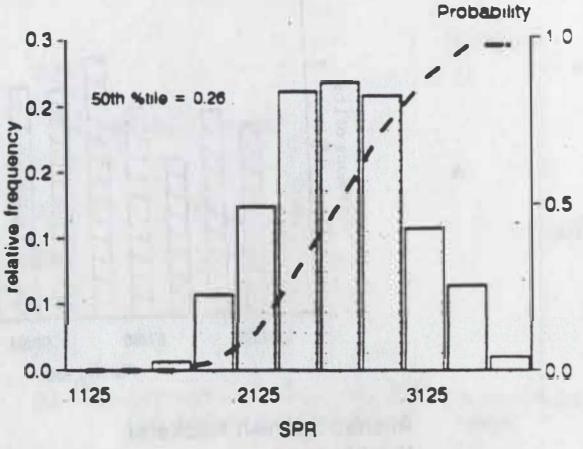
Figure ATS-1. Atlantic Spanish mackeral catch and population trends with 80% bootstrap confidence intervals.

Atlantic Spanish Mackerel
96/97 Yield using F20% SPR



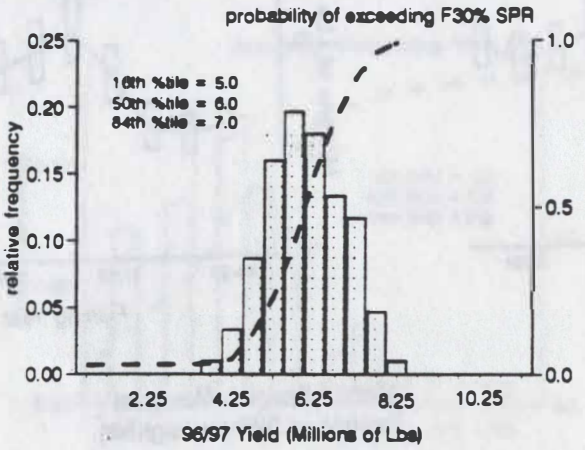
A

Atlantic Spanish Mackerel
Transitional SPR (unweighted) at beginning of 95/96



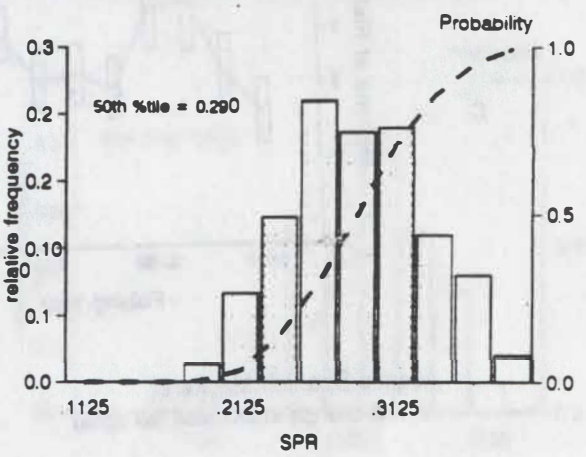
B

Atlantic Spanish Mackerel
96/97 Yield using F30% SPR



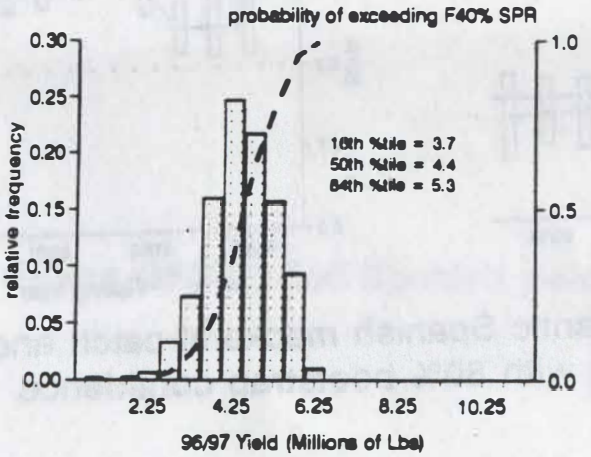
C

Atlantic Spanish Mackerel
Transitional SPR (unweighted) at beginning of 96/97



D

Atlantic Spanish Mackerel
96/97 Yield using F40% SPR



E

Figure ATS-2. Atlantic Spanish yield at F SPR's and SPR's.

SUPPLEMENT TO THE 1996 REPORT OF THE MACKEREL STOCK ASSESSMENT PANEL

Prepared by the Mackerel Stock Assessment Panel
at the Panel Workshop Held June 20-26, 1996

Gulf of Mexico Fishery Management Council
Lincoln Center, Suite 331
5401 West Kennedy Boulevard
Tampa, Florida 33609-2486
813-228-2815

&

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

This is a publication of the Gulf of Mexico Fishery Management Council and South Atlantic Fishery Management Council pursuant to National Oceanic and Atmospheric Administration Award No. NA67FC0002 and NA67FC0003.

SUMMARY OF RECOMMENDATIONS

GROUP	ABC RANGE for OY = F 30% SPR	SPR	OVERFISHED STATUS
King mackerel: Gulf migratory group	4.7 - 8.8 million pounds	23% transitional 19% static	Not overfished

*The "not overfished" classification is based on the recommendations of the SPR Management Strategy Committee and Councils' action on Draft Amendment 8 which conclude that the overfished level for mackerel should be set at 20 percent SPR.

Note: The ABC range indicated is based on the 16 to 84 percentile range reflected in the 1996 Report. For Gulf group king mackerel, however, the Panel recommends that given that F 30 percent SPR is the Council's objective, then the best estimate of yield to achieve that is 6.8 million pounds which is the 50 percentile mark.

Note: Transitional SPR is used to determine if a stock is currently in an overfished status. Static SPR (calculated for the 1994-1995 fishing year) is used to determine if a stock is being fished at a rate that will eventually lead to an overfished status.

ATTENDANCE:

Mackerel Stock Assessment Panel
Douglass Gregory
Robert Muller
Joseph Powers
Joseph Shepard
Russel Nelson (Proxy for Gregg Waugh)

Staff
Richard Leard

Others
Scott Nichols, NMFS, Pascagoula, MS
Phil Goodyear, NMFS, Miami, FL
Jean Cramer, NMFS, Miami, FL
Victor Restrepo, University of Miami, Miami, FL
Chris Legault, Rosential School of Marine and Atmospheric Science, Miami, FL
David Van Voorhees, NMFS, Silver Springs, MD
Nancy Cummings, NMFS. Miami, FL
Gerry Scott, NMFS, Miami, FL
Clay Porch, NMFS, Miami, FL
Mark Godcharles, NMFS, St. Petersburg, FL
Michael Schirripa, NMFS, Miami, FL
Patricia Phares, NMFS, Miami, FL
Bob Zales, II, Mackerel Advisory Panel, Panama City, FL
Roy Williams, GMFMC, Tallahassee, FL
John Sanchez, Monroe County Commercial Fishermen, Inc., Marathon, FL

ACKNOWLEDGEMENTS

The Mackerel Stock Assessment Panel would especially like to thank Gerry Scott, Nancie Cummings, Patricia Phares, Jean Cramer, Clay Porch, Scott Nichols and David Van Voorhees of the National Marine Fisheries Service for providing insight and analyses to address issues of catch estimation (recreational and bycatch), evaluation of fishery-dependent and fishery-independent indices of abundance and to estimation of stock status. These analyses were critical to achieving a level of understanding regarding Gulf king mackerel that allowed sufficiently accurate recommendations on the status of this stock to the GMFMC.

SUPPLEMENT TO THE 1996 REPORT OF THE MACKEREL STOCK ASSESSMENT PANEL
TABLE OF CONTENTS

I.e Introductione

In response to the recommendation made by the Mackerel Stock Assessment Panel (Section IV, MSAP report April 1996), the Gulf of Mexico Fishery Management Council convened a workshop to review the data and analytical methods used in the 1996 Gulf king mackerel stock assessment. In addition to Panel members, researchers with expertise in particular aspects of stock assessment were invited.

The main areas identified in the Panel report for review were:

. recreational landings
. assignment of lengths and ages to catches
e. bycatch estimatese
. indices of abundancee
. natural mortalitye

The workshop also reviewed the decisions used to configure the analyses, the effects of using the unweighted spawning potential ratio (SPR) as a substitute for of the previously used weighted SPR, and comparisons of management recommendations in recent years.

II.e Landingse

Three sources of recreational landings were used in mackerel stock assessments: NMFS's Marine Recreational Fisheries Statistics Survey (MRFSS), NMFS's Headboat Survey, and the Texas Parks and Wildlife Department's Survey. Most of the discussion regarding recreational landings centered on the charterboat estimates from MRFSS. At the April Panel meeting, estimated increases in charterboat effort in Florida were questioned. A representative from MRFSS in Silver Spring, MD reviewed how the estimates are derived, including some areas of concern, and concluded that the observed increases were real. Dr. Bob Muller noted that the State of Florida has 1,778 recreational angling vessels that meet MRFSS's definition of charterboat, which includes those vessels that are commonly known as guide boats. Since the measure of effort in the charterboat mode is angler trip, these boats can easily account for the reported effort of approximately 900,000 angler trips in 94/95 (1778 boats x 300 trips per year x 4 clients = 2, 133,600 angler trips). Also, trips were not distinguished between full-day and half-day trips. Further examination of the MRFSS charterboat catch estimates showed that the recent increases in trips were in the nearshore area and in the winter charterboat fishery in Florida. In addition, the 250 percent increase in sampling effort beginning in 1992 has improved the precision of the estimates in recent years. The conclusion of the Panel was to use the charterboat estimates as they were.

Concerns regarding the commercial landings used in the assessment included whether landings were under-reported, especially when the quota was close to being filled; and whether fish caught under the recreational bag limit and sold were being double-counted. Florida's experience with management of mackerels using quotas has been that landings are eventually reported. With limited entry possibilities, commercial fishermen want their landings reported to maintain historical participation in the fishery.

A question was raised regarding whether fish sold under the recreational bag limit are also reported as recreational landings and consequently double-reported. This situation occurs primarily in the Florida Keys and is apparent after the commercial quota is filled; however, the extent of recreational catch sold commercially during the open season is unknown with the currently available data. In recent years, this category of sale after the quota was filled amounted to 70,000-100,000 pounds or 7,000 to 10,000 fish calculated with an average weight of 10 pounds apiece. The amount of commercially sold, recreationally caught fish is not known. The Panel recommended that the extent of commercial landings coming from recreational sources be examined prior

to the next assessment.

III. Assignment of lengths and ages to catchese

SEFSC provided an overview of the procedures used for matching length samples to catch by migratory group, year, month, sector, and gear that were developed at the 1989 workshop held in Panama City, Florida (Memo dated 1 May 1996). Simply stated, the procedures combine all samples within a stratum into a composite sample. The composite samples are matched to the catches by strata. In the event that there are insufficient fish, usually 100 fish unless the catch is very small, additional composite samples are added until sufficient fish are obtained to size the catch. Each match is tagged with a code so that it is possible to discern how much of the catch is sized with exact matches (approximately 80%) and how much requires the addition of samples from an adjacent area or adjacent month (increasing the portion to 93%). The matching process as developed is effective. The numbers of fish at length are assigned sexes based upon length, migratory group, season, and year (Restrepo 1996). Weights are calculated by migratory group and sex, and catches (in weight) are converted to numbers of fish using the average weights within a stratum.

The catches by migratory group, length, sex, year, quarter of the year, sector, and gear are assigned ages either by the appropriate age-length key or by a stochastic model that spans years in order to provide an aging method for the appropriate month. These data are maintained at the stratum level so that they can be aggregated to conform to various management schemes.

The working group did not make any changes to the catch-at-age numbers of fish, i.e., the catch-at-age table is the same that used in the April 1996 assessment.

IV.eShrimp Trawl Bycatch of Gulf King Mackerele

During the April review of the stock assessment, the Panel expressed an interest in evaluating the potential for modifying the GLM model used to estimate annual bycatch levels to more directly incorporate potential changes in trawl efficiency suspected from implementation of TEDs in the Gulf shrimp fishery in 1989. Specifically, it appeared that the lower bycatch estimates resulting from use of the new observer data could have been due to a TED effect. Dr. Scott Nichols from the NMFS Pascagoula Laboratory noted that upon a closer examination of the model it was determined that a direct TED effect could not be incorporated because it was not separable from the year variable. It was also pointed out that other species with similar sizes and swimming characteristics, such as Spanish mackerel, actually exhibited the opposite relationship between the old and new observer data (Table 7, MSAP May 1994). However, an attempt to capture the differences in presumed catch rates between the pre- and post-TED era was made by using the annual bycatch estimates that resulted from combining both data sets (the ALL trend). It was noted that the majority of the king mackerel bycatch is captured in the nearshore shrimp fishery. The Panel did not change the annual bycatch estimates that were used in the April 1996 assessment.

V.eIndices of Abundancee

Catch per unit effort (CPUE) from various data collection sources is used in mackerel stock assessments as an index of population abundance. CPUE indices fundamentally drive assessment results by calibrating population size to trends in CPUE that are assumed to represent trends in age specific abundance. The Panel at its April 1996 meeting expressed concern that the available indices may not correctly reflect true trends in population abundance. To that end, an extensive evaluation of each index was conducted. The evaluation

consisted of reviewing the sources of CPUE estimates, the method used to derive the estimates, and the adequacy of using the estimates as an index of population abundance. The source document used in these evaluations was provided by SEFSC (Cummings 1996) and summarizes fishery-dependent abundance indices developed for the 1996 mackerel stock assessment. The Panel also developed additional indices of abundance that were incorporated into the final assessment. The indices used in the assessment are provided in Table 7.

1.e Indices Used in the Assessmente

Florida Department of Environmental Protection - Trip Ticket Program Panhandle

Commercial catches from the Florida Trip Ticket Program were subdivided into Florida north (Panhandle) and south (Collier and Monroe counties). The months of July through October were used in the Panhandle index to reduce the possibility of biasing the CPUE low due to restrictive catch limits. The king mackerel commercial fishery in the Panhandle is primarily hook and line. The index was standardized pounds per trip adjusted for months (Figure 1, Table 7). The index was applied to population size of fish ages three through six.

Florida Department of Environmental Protection - Trip Ticket Program South

Since the original FDEP commercial index only considered commercial trips from November through March, it was noted that the index was applicable only for south Florida. Furthermore, the working group noted that closures and trip limits cause trips from January through March to not be comparable to the open season. Consequently, a new index was developed that only used commercial trips from Collier and Monroe counties and the months of November and December. A threshold of 3,000 pounds for south Florida trip landings was used to identify hook and line catches in order to reduce the problem of differences in gear catchabilities. Similarly, only the months of November and December were used in the estimation of CPUE to reduce the influence of trip limits on the index. The indices are the standardized pounds per trip adjusted for month and county (Figure 1, Table 7). The index was applied to population size of fish ages three through eight.

MRFSS Florida Gulf

The working group discussed the MRFSS index extensively. Most of the discussion focussed on the selection of intercepts to be included in the index. The original index used only trips that caught king mackerel in the charterboat and the private/rental modes. The working group decided that using the intercepts that indicated king mackerel as a primary target species, even if they were unsuccessful, would result in CPUE estimates that would better reflect king mackerel abundance. Intercepts from July through December were chosen again to reduce the influence of trip limits. The index is the standardized number of fish per angler hour adjusted for month, county, and mode combined with the annual standardized probability of having a successful trip adjusted by the same factors(Lo et al. 1992) (Figure 1, Table 7). The index was applied to population size of fish ages two through eight.

Headboat South Florida Gulf

The Eastern Gulf Headboat index reported in Cummings (1996) used data from November through March. The index is standardized numbers of fish per trip divided by the number of anglers on a trip and adjusted for individual vessel and month (Figure 1, Table 7). The index was applied to the population size of fish ages two through six.

SEFSC Panama City Charterboat Northwest Florida Gulf

The SEFSC Panama City Charterboat survey for northwest Florida reported in Cummings (1996) used trips from 1989 through 1995 for the months April through November, and trolling and bottom fishing time in the offshore waters. The bottom fishing time was included because charterboats frequently use a surface line while bottom fishing. The index is standardized number of fish per angler hour adjusted for month and fishing method (Figure 1, Table 7). The index was applied to the population size of fish ages two through six.

SEFSC Panama City Charterboat Southwest Florida Gulf

The SEFSC Panama City Charterboat survey for Southwest Florida was developed from the eastern Gulf by removing the northwest data. The index also used data from 1989 through 1995 for the months of November through April, and trolling and bottom fishing time in the offshore waters. The bottom fishing time was included because charterboats frequently use a surface line while bottom fishing. The index is standardized number of fish per angler hour adjusted for month, area of the west coast of Florida, and fishing method (Figure 1, Table 7). The index was applied to population size of fish ages three through eight.

Texas Parks and Wildlife Recreational Angler Creel Survey

The Texas Parks and Wildlife index was recalculated using only month and fishing modes. Neither individual bays nor distance from shore were significant in the GLM and were not considered in the final estimation of the index. The index used data for May through September and the charterboat and private boat modes. The index was the standardized number of fish per 100 angler hours adjusted for months and fishing mode (Figure 1, Table 7). The index was applied to population size of fish ages two through eight.

Larval Survey

Lyczkowski-Shultz (MSAP/96/1) reported the frequency of occurance and the mean density of king mackerel larvae caught in Gulf of Mexico SEAMAP bongo nets from 1982 to 1992 and 3 of 8 cruises in 1993. The working group used the percent frequency of occurance as an index because the mean densities were not adjusted by age of larvae (Figure 1, Table 7). Since larval king mackerel are only a few days old, the larval index was used as an index of egg production by adults (ages 1 through 11 multiplied by their respective fecundity).

Shrimp Bycatch

A shrimp bycatch index was developed as an index of recruitment and used instead of the groundfish survey index that was used in previous assessments. The workgroup believed the shrimp index would provide a greater sample size and has greater spatial and temporal coverage (Figure 1, Table 7). The measure was the estimated total bycatch in numbers of age 0 fish divided by the total shrimping effort in hours.

2.e Indices Not Used in Assessments

Headboat Western Gulf

The western gulf headboat CPUE was dropped as an index of abundance. Headboats in the western Gulf primarily target reef fish not mackerel. The data from the survey did not allow the estimation of least squared means, and the Texas Angler Creel Survey using the charterboat and private boat modes was thought to have

better estimation properties. In either case, the trends are similar.

SEFSC Panama City Charterboat Western Gulf

The western charterboat survey index was evaluated but not included in the assessment because of the low sample size. The workgroup believed that the Texas Angler Creel Survey would adequately represent western gulf abundances.

Groundfish Survey

The groundfish survey was not used because the catch of king mackerel was considered to be too infrequent to reflect abundance with acceptable precision.

VI.e Natural Mortality Ratee

In the past, the Panel noted that natural mortality rates of Gulf king mackerel are uncertain and probably variable. Using general knowledge of life history parameters such as longevity, growth rates, and age of maturity aa well as empirical relationships between natural mortality rates and these parameters; it was argued that the natural mortality rate was probably small compared to other fishes such as Spanish mackerel. Based upon these relationships, the Panel previously selected a range of instantaneous natural mortality rates for assessment purposes that ranged uniformly between 0.1 and 0.25 per year, and the Panel could not make a choice of whether any number within this range was any more likely than any other. The median value of this range was 0.175 per year; however, the value of 0.15 per year was used for deterministic testing purposes.

At this meeting, the Panel revisited the selection of natural mortality rates. The life history parameters versus natural mortality relationships were re-examined on the basis of additional knowledge of maximum age observed from Gulf king mackerel ageing studies and examination of other scombroids. While the Panel was not overly confident in the additional information, the Panel agreed that very low natural mortality rates are probably less likely than originally specified. Therefore, the Panel chose to limit the lower end of the range to 0.15 per year instead of the previous 0.10 per year. Thus, the instantaneous natural mortality rates used for this assessment ranged uniformly between 0.15 and 0.25 per year. The median of this range is 0.2 per year.

Because estimation of natural mortality has always been problematic, a number of predictive equations have been developed based on observed relationships between M, the growth coefficient (K), and maximum observed age. Two available equations that use maximum age suggested a M of about 0.2 for king mackerel considering the maximum ages observed in the Gulf were 21 and 17 for east Gulf females and males, respectively, and ages 18 and 23 for west Gulf females and males, respectively.

VII. Spawning Potential Ratios

In previous mackerel assessments, the spawning potential ratios (SPR) were calculated by a method now called the weighted transitional SPR (Mace 1996). This method uses population sizes to calculate egg production, and it is influenced by changes in recruitment. The SPR committee recommended using an unweighted transitional SPR that is based strictly upon mortality rates. The distinction between these methods is that in years when king mackerel stocks are decreasing, the weighted SPR is lower than the unweighted because recruitment is decreasing (Figure GFK-1F); however, when recruitment is increasing (as in recent years), the

weighted SPR is higher than the unweighted. If recruitment is constant, the two methods would produce the same value; and if the recruitment and fishing mortalities are constant for a long enough time (i.e., until equilibrium is reached), both methods would produce the same value as the static SPR.

VIII. King Mackerel Gulf Migratory Group

Landings and History of Management

Catches since 1981/82 have ranged from a low of 3.01 million pounds in 1987/88 to a high of 12.33 million pounds in 1982/83 (Table 1 and Figure **GFK-1A**). Since 1986/87, landings have exceeded TAC. A preliminary estimate of 1995/96 landings is 8.5 million pounds which also exceeds TAC.

Estimates of Fishing Mortality Rates

The pooled F on age 4+ adults is shown in Figure **GFK-1B**. Fishing mortality generally declined from 1981/82 to it lowest point in 1987/88. Since 1989/90 fishing mortality rates remained relatively lower than the early to mid 80's with the exception of 1994/95 which was higher.

Trends in Recruitment

Ages 1-3 estimates of recruitment are shown in Figure **GFK-1C**. Recruitment declined from 1981/82 to a low in 1984/85 then steadily increased to a high in 1992/93. Since 1990/91, recruitment fluctuated with out trend at higher levels.

Trends in Biomass

Biomass estimates of ages 4+ showed a steady decline from 1981/82 to 1887/88 and increased steadily until 1993/94 (Figure **GFK-1D**). The biomass in 1993/94 and 1994/95 was the highest observed since 1981/82. The annual change in biomass for all ages is shown in Figure **GFK-1E**.

Acceptable Biological Catch (ABC)

For the 1996/97 fishing year, the Panel recommends that given that F 30 percent SPR is the Council's objective, then the best estimate of the yield to achieve that is 6.8 million pounds (Figure **GFK-2A**). There is a 50 percent chance of the ABC being less than 6.8 million pounds, a 16 percent chance of it being less than 4.7 million pounds, and an 84 percent chance of it being less than 8.8 million pounds.

Overfishing

The Panel concludes that the Gulf migratory group king mackerel fishery was overfishing the available stock because the fishing mortality rate was greater than F at 20 percent static SPR in 1994/95. The 1994/95 harvest of 10.8 million pounds resulted in a static SPR of 19 percent. Landings in 1996/97 would have to be in excess of 10.5 million pounds before there would be more than a 50 percent chance of overfishing in 1996/97 (Figure **GFK-2B**).

Overfished Status

The Panel concludes that the Gulf migratory group of king mackerel is not overfished since the transitional SPR is above 20 percent (Figures **GFK-1F,2C and 2D**).

Discussion of Stock Status

From the 1983/84 fishing year to the 1992/93 fishing year, SPR increased toward OY; but since 1992/93, high TAC's and consistent allocation overruns (Table 8) have caused SPR to decrease toward the overfished criteria of 20 percent. Overall harvest level must be maintained within the ABC range to achieve OY and to prevent continued overfishing. Although the Gulf migratory group of king mackerel is not overfished (transitional SPR 23%) current fishing mortality rates are expected to drive the stock below 20% in the future. A reduction in fishing effort is needed to prevent this occurance.

The assessment that was conducted this year contains several important differences from the assessments that were done in recent years. The differences include an increase in the natural mortality rate used, analytical review of the indices used previously to calibrate the analyses, and the substitution of the bycatch index of recruitment for the groundfish survey index of recruitment. Use of a higher natural mortality rate and the bycatch index produced more optimistic results, while the effect of the revised indices is more equivocal. The net effect of the changes is shown in Figures GFK-2E and GFK-2F. This year's assessment deviates from the previous ones primarily because of the more optimistic estimates of recruitment since 1990. This result is due largely to the use of the bycatch index instead of the groundfish index. While the Panel has accepted that the bycatch index is the best information available about recent recruitment levels, there is still uncertainty about the representativeness of the index. The index was newly presented this year and not fully explored analytically; therefore, the Panel recommends that the Council exercise caution in selecting TAC's.

REFERENCES:

Cummings, N. 1996. A summary of the king mackerel abundance indices developed for the 1996 Mackerel Stock Assessment. SEFSC, NMFS, Miami, Florida. 40 pp + appendices.

Lo, N.C., L.D. Jacobson, and J.L. Squire. 1992. Indices of relative abundance from fish spotter data based on delta-lognormal models. Can. J. Fish. Aquat. Sci. 49:2515-2526.

Lyczkowski-Schultz, J. 1996. Abundance data for Scomberomorus cavalla (king mackerel) larvae in the Gulf of Mexico, 1982 to 1993. MSAP/96/1.

Mace, P. 1996. Scientific review of definitions of overfishing in US fishery management plans: supplemental report. NMFS. March 1996. MSAP/96/15.

Report of the Mackerel Stock Assessment Panel. 1994. Gulf of Mexico Fishery Management Council, Lincoln Center, Suite 331, 5401 West Kennedy Boulevard, Tampa, Florida 33609. 27pp.

Restrepo, V.R. 1996. Smoothing sex-ratio-at-length data for king and Spanish mackerel in the southeast U.S. MSAP/96/7.

Table 7. Indices of Abundance used in the Gulf Migratory Group King Mackerel Assessment.

YR	INDEX								
	FDEP NW	FDEP SW	MRFSS	HEAD EGOM	PC C NW FL	PC C SW FL	TPWD	LARVAL	BY-CATCH
81							14.72		0.081
82							11:15		0.078
83							15.13		0.069
84							14.55		0.103
85	21.59	29.32		0.128			13.31		0.083
86	23.60	29.06	0.435	0.157			8.84	0.103	0.060
87	25.95	39.55	1.575	0.126			10.73	0.116	0.130
88	21.74	56.79	0.961	0.084	0.448	0.416	9.24	0.103	0.112
89	25.01	52.74	1.601	0.188	0.442	0.550	10.74	0.194	0.240
90	31.91	69.00	3.624	0.205	0.442	0.470	9.87	0.163	0.167
91	36.00	67.76	4.145	0.190	0.477	0.385	16.17	0.166	0.197
92	46.98	134.36	2.599	0.195	0.501	0.496	12.22	0.263	0.095
93	41.25	82.46	1.537	0.176	0.467	0.560	12.11	0.282	0.183
94	48.90	45.68	1.971	0.193	0.602	0.803	10.78		0.166
95	41.82	77.22			0.634				
TIME	MID	MID	MID	MID	MID	MID	MID	BEG	BEG
AGE	3-6	3-8	2-8	2-6	2-6	3-8	2-8	1-11	0

TABLE 8. Comparison of allocations and landings by fishing year in millions of pounds.

	RECREATIONAL		COMMERCIAL	
FISHING YEAR	ALLOCATION	LANDINGS	ALLOCATION	LANDINGS
1986-87	1.97	3.27	0.93	1.47
1987-88	1.50	2.15	0.70	0.87
1988-89	2.31	5.28	1.09	1.41
1989-90	2.89	3.36	1.36	1.95
1990-91	2.89	3.95	1.36	1.82
1991-92	3.91	4.77	1.84	2.12
1992-93	5.30	6.26	2.50	3.60
1993-94	5.30	6.15	2.50	2.57
1994-95	5.30	7.86	2.50	2.94

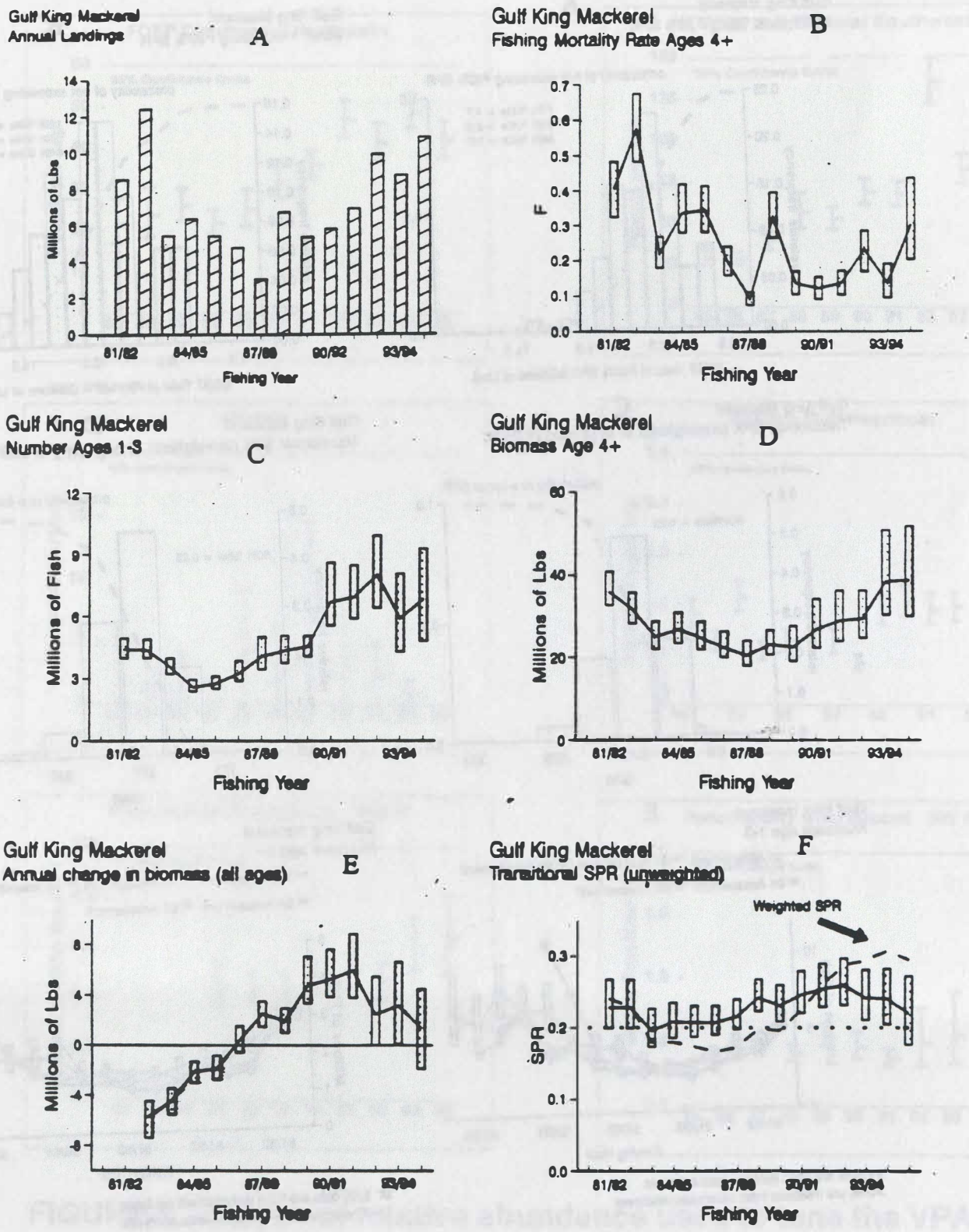


Figure GFK-1. Gulf king mackeral catch and population trends with 80% bootstrap confidence intervals.

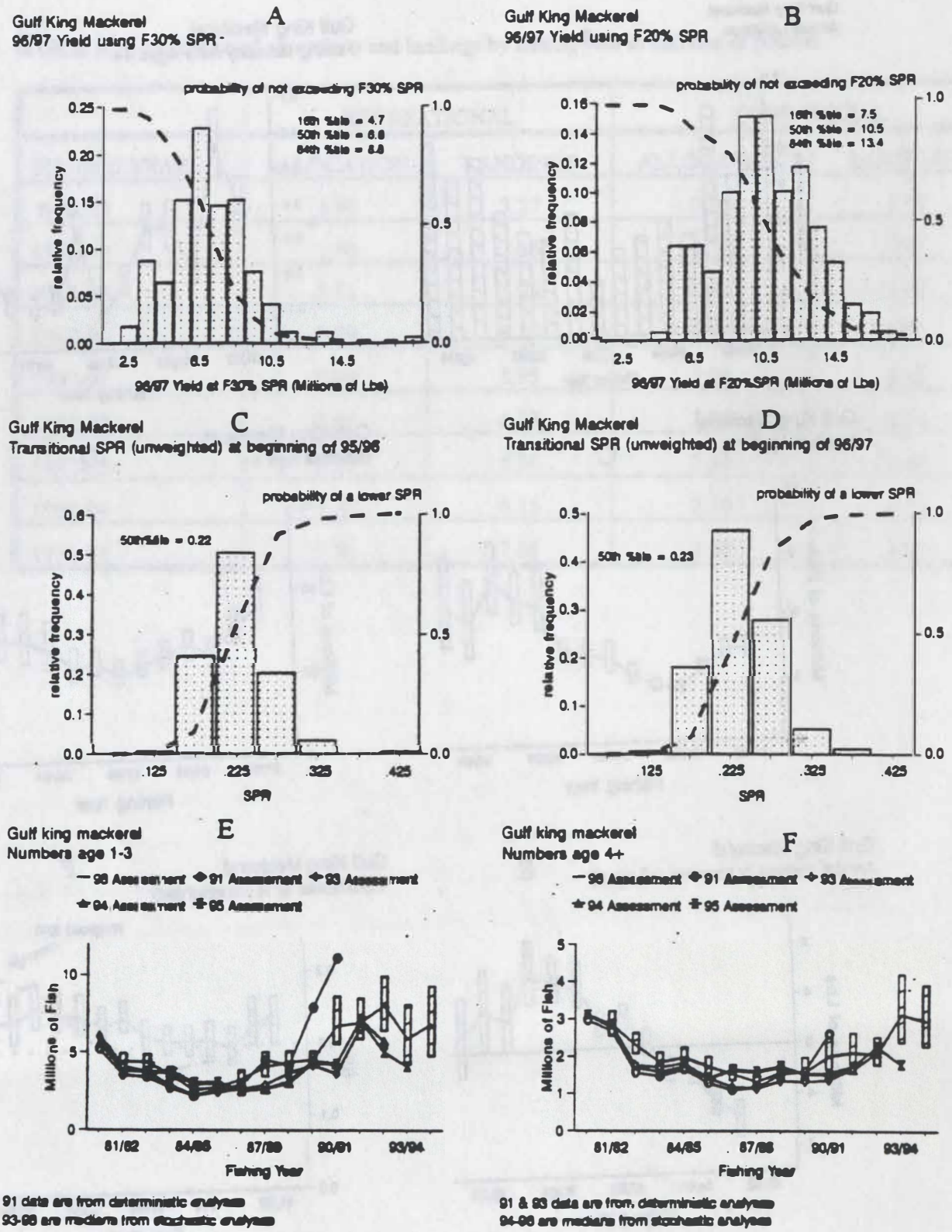
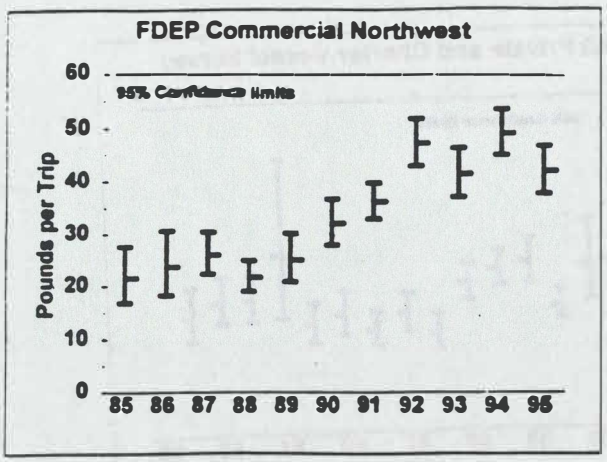
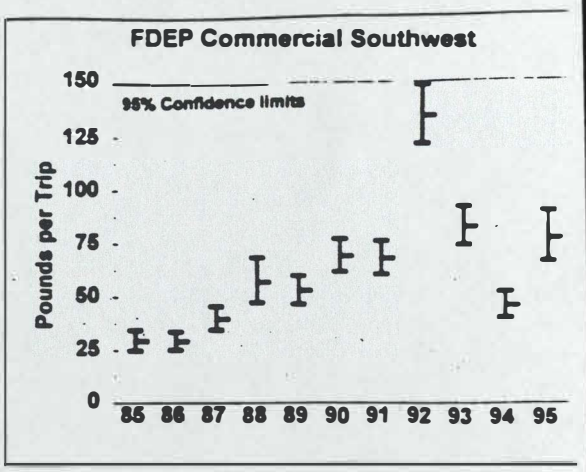
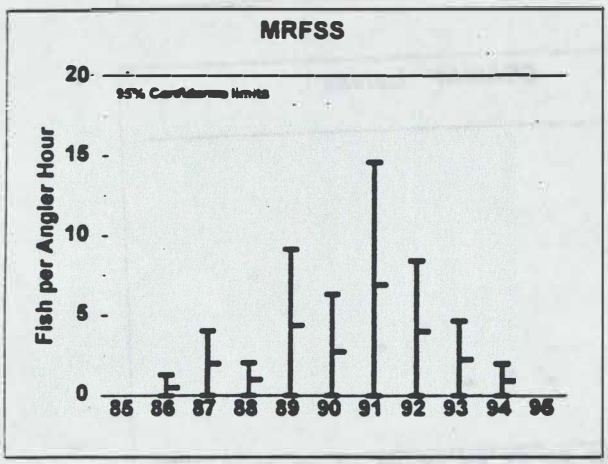
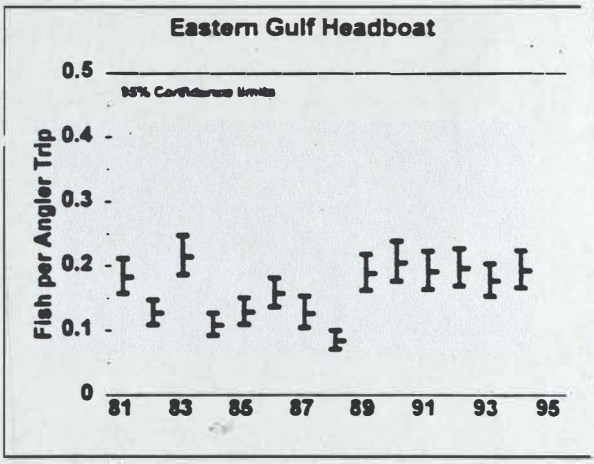


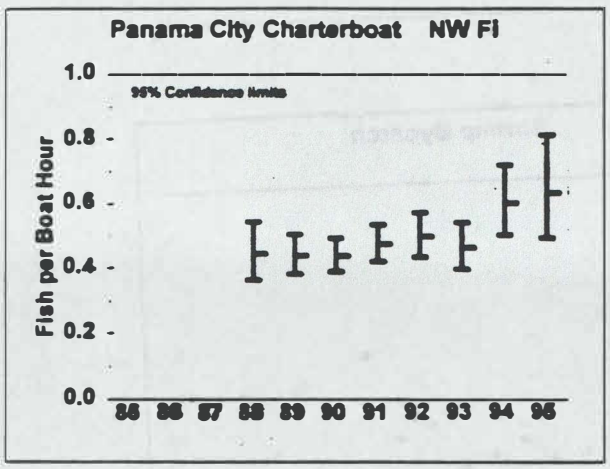
Figure GFK-2. Gulf king yield at F SPR's and SPR's.











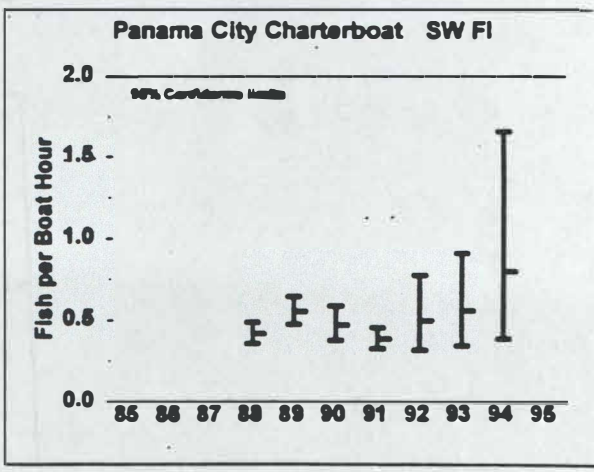
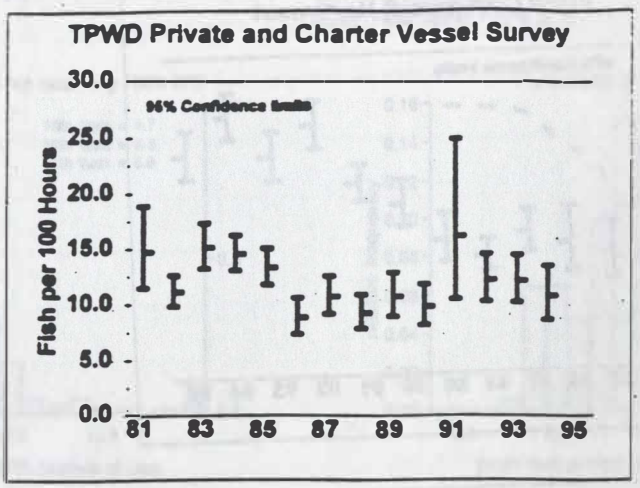
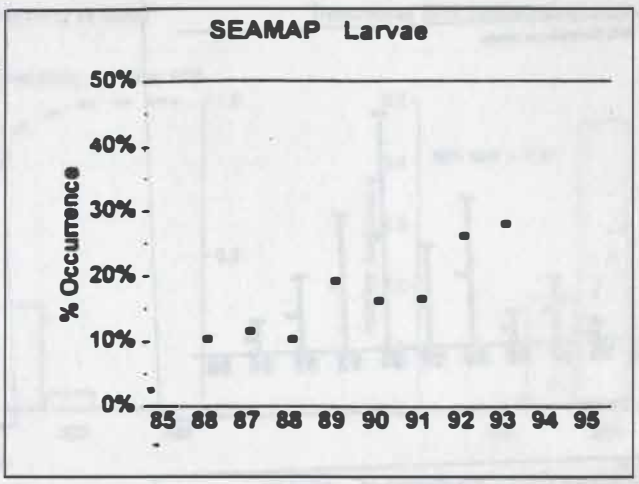


FIGURE 1. Indices of relative abundance used to tune the VPA.





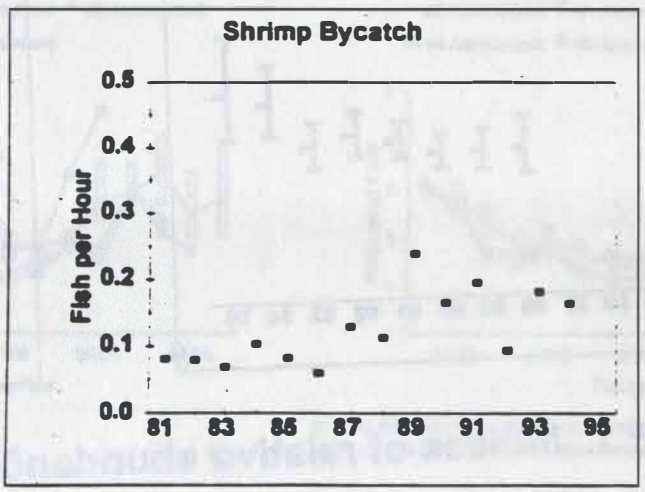


FIGURE 1 (Continued). Indices of relative abundance used to tune the VPA