

REVISED
AMENDMENT NUMBER 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

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GULF OF MEXICO FISHERY MANAGEMENT COUNCIL
LINCOLN CENTER, SUITE 881
5401 WEST KENNEDY BOULEVARD
TAMPA, FLORIDA 33609
(813) 228-2815

AND

SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL
1 SOUTHPARK CIRCLE
CHARLESTON, SOUTH CAROLINA 29407
(803) 571-4366

I. Introduction

A fishery management plan for coastal migratory pelagic fishes was prepared by the Gulf of Mexico and the South Atlantic Fishery Management Councils and was implemented by federal regulation in February, 1983. Severe recruitment problems developed in the fishery for king mackerel, and the plan was amended in September of 1985 to allow more flexible and responsive management, particularly for king mackerel. Recently obtained information indicates that a substantial reduction of catch of Spanish mackerel is needed to allow the stock to recover from a population decline. The structure of the amended plan does not provide for allocation of Spanish mackerel among fishing interests; therefore, a simple reduction of allowable catch could result in an unfair allocation geographically or to users by right of first access to the migratory species.

This second amendment clarifies the intent of the Councils to set total allowable catch (TAC) for mackerels within framework guidelines, revises maximum sustainable yield, adjusts TAC, and establishes allocation procedures for Spanish mackerel, regulates mackerel fishing gear, and provides for fishing permits.

II. Description of Fishery and Utilization Patterns

The Amendment No. 1 to the FMP described the fishery and landings through 1983. Recent landings for king mackerel are shown in Table 1 and for Spanish mackerel in Table 2.

The fishery for Atlantic group king mackerel expanded rapidly from 1979 through 1985 and has reached a level near full exploitation. Significant increases in catch would likely result in loss of yield (Appendix 1).

For the Gulf migratory group of king mackerel there continue to be reductions in recruitment and spawning stock biomass since 1979. Reductions are more severe in U.S. waters if that is a separate group from an international Gulf group (Appendix 1).

Landings of Spanish mackerel were relatively stable until the mid-1970s. Following several years of exceptionally high production, catches have declined. The commercial fishery has changed from a six-month fishery to one consolidated in three southeast Florida counties and occurs in December, January, and/or February (Table 3).

The Councils' Stock Assessment Panel reported: "The recent history of Spanish mackerel catches is one of declining landings and catch rates. Over 90 percent of the commercial fishery occurs in Florida and is mostly by gill nets, and most catches come from south Florida during winter. Commercial fisheries account for over 77 percent of the landings in the South Atlantic during 1979-84 and 64 percent of catches in the Gulf" (Appendix 1).

The use of purse seines to take limited quotas of king and Spanish mackerel for study purposes was authorized in Federal waters with the implementation of the FMP in 1983. Prior to that time the use of purse seines to take mackerel in State waters was severely restricted by state laws.

The original FMP provided for king mackerel purse seine quotas of 400,000 pounds each for the Gulf and South Atlantic. Amendment 1 revised this to not more than 284,000 pounds for the Gulf migratory group in the initial amendment year and no more than 400,000 pounds in the South Atlantic. In subsequent years the Gulf purse seine allocation was to be six percent of the Gulf group commercial allocation but no more than 400,000 pounds.

All king mackerel purse seine catches were made in the Atlantic on Gulf group fish with the highest landings being under 135,000 pounds in the 1983-1984 season, Fable, et al. (1986).

Annual purse seine quotas of 300,000 pounds of Spanish mackerel were set for the Atlantic and Gulf areas. Gulf catches were low while Atlantic catches reached 189,000 pounds in 1985, Fable, et al. (1986).

The number of permitted purse seine vessels ranged from 18 in 1983 to 11 in the 1985-1986 season. Of the permitted vessels using purse seines in 1986 all but two also indicated the use of gear other than purse seines for mackerel (gill nets, hook and line, etc.).

III. Issues To Be Addressed

1. Amendment 1 provided a mechanism for annual determination and adjustment of MSY, acceptable biological catch (ABC), total allowable catch (TAC), quotas, bag limits, and permits. It is the intent of the Councils that these changes may be implemented by Notice Action at any appropriate time.
2. Amendment 1 and implementing regulations are in conflict regarding the relationship of TAC to ABC.
3. Amendment 1 provided for an estimate of MSY for Spanish mackerel at 27 million pounds (M). More recent information indicates that MSY should be 18 M and allowable catch should be reduced to restore the condition of depleted stocks. The amended plan did not provide an allocation procedure for this species which is necessary to distribute the reduced catch fairly among fishermen.
4. The fishing year for Spanish mackerel is the calendar year; however, peak commercial catches are made in December and January; thus the fishing year splits the actual fishing season.
5. Yield per recruit may be increased by increasing the size (age) of the Spanish mackerel landed.
6. The FMP and amendment provided for a three-year evaluation of a purse seine fishery for mackerels. The study and final report were completed in 1986, and changes in allocation or regulation of gear may be implemented only by FMP amendment.
7. The Councils have allocated and restricted landings of recreational fishermen through bag limits and commercial fishermen through catch quotas. Charterboat operators are allowed to fish in either allocation; however, their

catch is not known and the identification of charter boats for survey purposes is difficult.

IV. **Proposed Action**

The action proposed through this amendment to Amendment 1 of the FMP consists of the following new measures or revision of existing measures:

- o The framework measures providing for seasonal adjustment are clarified and revised within new guidelines.
- o The relationship of TAC to ABC is re-specified.
- o MSY for Spanish mackerel is revised downward, present and probable future condition of stocks are assessed, a reduced TAC is specified, and allocations are provided to distribute the allowable catch among fishermen.
- o A geographic division of the stock into subpopulations or management groups is provided to conform to recently obtained biological information.
- o The fishing year for Spanish mackerel is modified to conform to fishing patterns and to allow equitable allocation.
- o Purse seines are prohibited for stressed mackerel stocks and the allocation is redistributed; gill net mesh size is specified for Spanish mackerel.
- o Permits are to be required for commercial Spanish mackerel boats and for charter boats fishing for coastal migratory pelagics.
- o Seasonal closures are provided for commercial fishing for Spanish mackerel as quotas are filled.
- o Recreational bag limits are established for Spanish mackerel.

ACTION 1: SPANISH MACKEREL MSY, PRESENT AND PROBABLE FUTURE CONDITION OF STOCK

Section 5.4.2.1 Spanish Mackerel: Assessment and Specification of MSY is revised as follows:

5.4.2.1 Spanish Mackerel: Assessment and Specification of MSY

Based on 1975 commercial landings and the adjusted estimate of recreational catch from the 1970 Saltwater Angling Survey, the original FMP and Amendment 1 set MSY for Spanish mackerel at 27 M in a range of 13.5 to 49.1 M. This wide range was due to data limitations, and MSY was set too high.

The procedure used yield-per-recruit values calculated from data on growth rates, maximum size, and rates of fishing, and natural mortality. An estimate was made of the number of recruits entering the fishery for 1970 and 1975. Yield was also calculated by multiplying yield-per-recruit values by the number of recruits. The MSY was selected from the 1975 estimates which were considered to be more accurate. The natural mortality rates used were 0.5 to 0.9.

Eldridge (1986) provided estimates of Spanish mackerel MSY using stock production and yield per recruit methods. He suggested 15 to 19 M as a reasonable range of sustainable yield.

He repeated the original work using mortality rates of 0.2 to 0.4 and new growth data. He found the two major effects of lowering the annual instantaneous natural mortality rates were to decrease substantially the estimate of recruits and to raise slightly the yield-per-recruit values. Also the age/size at first capture increased when the lower mortality rates were used. The overall effect of lowering the natural mortality rate was to decrease the MSY estimate.

The Councils' Stock Assessment Panel reviewed Eldridge's work and analyses using virtual population analysis, revised mortality estimates, and recent catches to determine MSY for the U.S. stock, Nichols (1986). The Panel recommended a range of 15.7 to 19.7 M with the best estimate of 18 M (Appendix 1).

In this amendment the Councils have revised their specification of MSY for Spanish mackerel to 18 M in a range of 15.7 to 19.7 M.

Rationale: Additional information obtained subsequent to the implementation of Amendment 1 showed that the original estimate of MSY was too high and would result in recruitment overfishing of the stock.

Rejected Alternatives for Action 1

a. No change, MSY to remain at 27 M with a range of 13.5 to 49.1 M.

Rationale: Estimated U.S. landings of Spanish mackerel since 1967 were about 15 M until they rose to about 23 M in 1977. Since that time there has been a general decline to the present levels below 10 M, Eldridge (1986).

Section 5.4.2.2 Spanish Mackerel: Assessment and Specification of Present and Probable Future Condition is Revised as Follows:

5.4.2.2 Spanish Mackerel: Assessment and Specification of Present and Probable Future Condition

The present level of unrestricted catch of Spanish mackerel is about 9M or about half of MSY. Landings have declined in both Gulf and Atlantic. The average size of fish has appeared to decline, especially in the Atlantic (Appendix 1).

Recovery of the stock is approximately achieved when the spawning stock biomass is doubled. Continued fishing at a level of about 9M would allow the spawning stock biomass to increase 15 percent in 5 years but not increase after that. A reduction to 3.7 to 4.5M would allow the spawning stock biomass to increase 100 percent in 3 years (Appendix 2).

With recent reductions in allowable catch of king mackerel it is likely that both recreational and commercial fishermen will transfer effort to the Spanish mackerel fishery. Without a reduction in allowable catch the fishery can be expected to expand resulting in a decrease in spawning stock biomass and an eventual further decline in stock.

ACTION 2: OY – TAC FOR MACKERELS

Section 12.5.1.1 Specification of OY and TAC for Mackerels is revised as follows:

12.5.1.1 Mackerels

The long-term goal of optimum yield from mackerels is maximum sustainable yield. 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.

The best available estimates are in millions of pounds:

	MSY*	TAC**ABC RANGE***	
King Mackerel	26.2		
Gulf Group		2.9	1.2 – 2.9
Atlantic Group		9.68	6.9 – 15.4
Spanish Mackerel	18.0		
Gulf Group		1.8	1.6 – 1.8
Atlantic Group		2.9	2.2 – 2.9

* MSY is assessed and specified in Section 5.4. MSY 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 (J. Powers, 1983, pers. comm.).

** Note: 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.

Rationale: This action sets the biological base for OY and uses maximum sustainable yield as a goal, not a fixed number. It established the base for flexible management which can address both mackerel species and multiple stocks within each species. The annual amount of OY (TAC) is limited within a range (from zero to an upper limit which may not exceed MSY by more than 10 percent and may not exceed the upper range of ABC if overfishing occurs). It is possible to set it extremely low to protect an overfished stock or set it very high to take advantage of exceptionally good recruitment.

It can protect a stock from overfishing or restore depleted stocks while maintaining a goal of obtaining MSY.

The TACs specified initially for the amended plan conform in principle to the ABC recommendations made in the report of the Councils' Stock Assessment Panel, March 5-6, 1986 (Attachment 1) and a stock assessment review provided by the Southeast Fishery Center (Appendix 2).

The king mackerel TACs as specified have been implemented by Notice Action. Because the Stock Assessment Panel focused on issues which could be revised by Notice Action, the TAC recommendation for Spanish mackerel of 3.7 to 4.5M was for a total U.S. catch. By plan amendment the Council is adopting another recommendation of the panel, to divide the stock geographically. The separate TACs for each group were discussed by the panel and further analyzed by the Center as being approximately equivalent to the management option for the total U.S. stock. Rapid recoveries are expected on average to increase spawning stock biomass 100 percent in three years according to the Center's analysis (Appendix 2).

The Councils set the TACs at the upper range of the ABCs, a reduction of the allowable catch to about 42 percent of the average total landings of the last five years.

These initial TACs reduce the 1985 total catch of 9.4M pounds to 4.7M pounds for three years, with the expectation that the MSY of 18M pounds would be available at that time. Unfortunately, comparable commercial and recreational values for both the foregone and increased catches are not available. If the average ex-vessel commercial price of .30 per pound for Spanish mackerel is taken as a proxy for the true values and a discount rate of 10 percent is assumed, a present value analysis indicates that the unregulated fishery would be worth \$28.2 M at present, if it did not decline further. The fishery subjected to a three year reduction in catch with a subsequent return to the 18M pound MSY would have a present value of \$44 M.

Yields to the commercial fishery under some of the various options considered are shown in Table 4.

Rejected Alternatives for Action 2

Rejected Alternative 1: No Action – TAC (and MSY remains at 27 M for Spanish mackerel.

Rationale: This action would allow the fishery to continue without restraint. MSY however has been determined to be 18M and TAC may not exceed MSY by more than ten percent. No action would result in continued overfishing of the stocks.

Rejected Alternative 2: Set TAC at MSY, 18 M for Spanish mackerel.

Rationale: The fishery at about 9 M is currently operating well below its MSY. The ultimate goal is to restore the stock to a level at which MSY may eventually be achieved. The Stock Assessment Panel recommended reduced catches to restore the stock to that level.

Rejected Alternative 3: Set TAC for Spanish mackerel at 3.7 M, the lower limit of ABC.

Rationale: This action would be more conservative and would provide for a more rapid recovery of the stock. The cost to current users would be greater due to the lost catch (see Table 4).

Rejected Alternative 4: Set TAC for Spanish mackerel in the Gulf EEZ at zero.

Rationale: This action would close the Gulf EEZ to catching Spanish mackerel. Any catch would have to come from the territorial sea of the states. In the case of Texas and the Florida west coast which have nine-mile territorial seas a large portion of the distribution of Spanish mackerel would be under the regulatory authority of the states. Off states with a three-mile territorial sea much of the resource would become unavailable to fishermen.

Rejected Alternative 5: Set TAC for U.S. Spanish mackerel initially at some point at or below upper bound of ABC and allocate by area and user according to recent catch patterns. In subsequent years when the stock assessment panel has endorsed separate ABCs for Atlantic and Gulf migratory groups separate TAC's may be implemented by Notice Action.

Rationale: The emphasis of the recommendations made by the Councils' Stock Assessment Panel was for procedures which may be taken by Notice Action. The panel suggested an ABC range of 3.7 to 4.5 M for the total U.S. Spanish mackerel stock. The stock may not be divided by Notice Action. The Councils considered various alternatives for TAC and for allocations based on various time series for which catch data were available. The effects of these options on spawning stock biomass are described in Appendix 2.

The Councils sought a TAC which would restore the spawning stock biomass to 100 percent in a reasonable period of time and still have a minimum of economic and social impact on the fishermen. The restoration of the spawning stock biomass was of principal importance to conform to the primary objective of the plan to stabilize yield at MSY.

The Council deemed the upper level of ABC, 4.5 M pounds to provide an acceptable level of catch which would restore the spawning stock biomass in three years and still provide a limited fishery. The separate ABC ranges discussed in Appendix 2 are approximately equal to the one ABC range, and the Councils selected the upper range of each for TAC.

Rejected Alternative 6: Reduce mortality on small fish and increase total allowable catch.

Rationale: A combination of management options could allow an increase in TAC (see Appendix 2, Table 1). The Council considered increasing the minimum size limit but determined that retention of 12-inch limit was appropriate (see Action 13).

Rejected Alternative 7: Allow a recovery period of five years and set TAC at 5.1 M.

Rationale: This would allow an increase of 0.4 M over the preferred option but would require a longer period of reduced catches. The present value of this alternative is \$26.2 million and is about \$3 million below the preferred option. This alternative provided by the Southeast Fisheries Center would on the average increase the spawning stock biomass by 100 percent in five years (Coastal Resources Division, 1986).

ACTION 3: FISHING YEAR

Section 12.2 of Amendment 1 is modified as follows with respect to Spanish mackerel:

Fishing Year: For the Gulf groups of king and Spanish mackerel the fishing year is July 1st through June 30th. April 1st through March 31st is to be the fishing year for the Atlantic groups. For other species in the fishery the fishing year remains January 1st through December 31st.

Rationale: The calendar year, the fishing year for Spanish mackerel as specified in the original FMP, was convenient because catch statistics are usually presented in that time frame. The commercial fishery which is the major user of the fishery lands the great majority of its catch in December, January, and February which straddles fishing years (Table 3). A change to a more appropriate biological year would allow the commercial fishery allocation to be set for a fishing season. The change would distribute commercial fishing opportunity geographically. In the case of a low commercial quota it is possible that the entire quota could be taken in January in Southeast Florida. There is little commercial fishing elsewhere throughout the year, but the opportunity for such activity would be provided.

A fishing year beginning during the warmer months allows recreational fishing to begin when the fish are widely distributed, giving a fair opportunity to recreational fishermen throughout the migratory range.

The magnitudes of the social and economic impacts of changing the fishing year are unknown. However, it is evident that if the fishing year remains on the calendar year basis, the entire commercial quota (given the low TAC) could be taken in a couple of counties on the southeast coast of Florida by February, leaving none for other areas. While the commercial activity in other areas is not known to be great, it undoubtedly encompasses a large number of individuals. To meet the spirit of National Standard 4, the fishing year should be set so as not to discriminate against these geographically and temporally disadvantaged users.

This seasonal arrangement corresponds to that for king mackerel and thus allows for simultaneous stock assessment and review for preseason adjustment reducing administrative costs. Setting the seasons to be the same as king mackerel would facilitate permit application for fishermen.

Rejected Alternatives for Action 3

Rejected Alternative 1: No change – Retain the fishing year January 1st through December 31st.

Rationale: While this simplifies utilization of annual catch records, the commercial fishing season is split in the middle of its most productive period.

Setting seasonal quotas for a biological season would be difficult. The entire annual quota could be taken in South Florida in January. If the commercial fishing year splits the next productive fishing period, economic theory indicates that, ceteris paribus, competition among fishermen for the available catch will lead to a shortened seasonal "race", with each boat taking as much as it can immediately on season opening until the quota is filled. The early part of the normal productive season will be eliminated due to the filled quota at the beginning of the year. Not only will fishermen in other areas be precluded from obtaining their small share of the quota, but the competition in the intense South Florida fishery is likely to lead to intervessel conflicts on the grounds. Starting the fishing year in an "off" season may not greatly reduce the adverse economic social consequences of the intense competition in the South Florida fishery, but it will preserve more of the normally productive fishing season as well as distribute parts of the quota to areas where the stock is not so concentrated.

Rejected Alternative 2: Set a single fishing year for Spanish mackerel for some period, i.e., April through March, July through June, or June through May.

Rationale: Any one of the above periods which do not divide the peak fishing months would be more suitable than the calendar year. All were considered but rejected in favor of seasons compatible with king mackerel.

ACTION 4: DELINEATION OF SPANISH MACKEREL GROUPS

A new Section 12.6.2.A is added to read as follows:

12.6.2.A Delineation of Spanish Mackerel Groups

12.6.2.A.1 Preferred Delineation of Spanish Mackerel Groups

The Dade/Monroe County line (25° 20.4' N. latitude) in south Florida is to be the migratory group boundary for Spanish mackerel. Commercial fishery landings and recreational catch have historically included Monroe County landings with the Gulf. There are few commercial landings off Dade and Palm Beach Counties and few ports available north of Marathon in Monroe County. Thus, there is a broad area of low catch on either side of this line which will facilitate enforcement.

Rationale: While the stock identification for Spanish mackerel is not well defined, there is some evidence of Gulf and South Atlantic subpopulations with a mixing zone off south Florida, Williams, Murphy, and Muller (1985). The Councils' Stock Assessment Panel basing its recommendation on evidence from electrophoresis studies, distributional patterns, spawning areas, and the history of exploitation felt a separation of Gulf and Atlantic groups to be appropriate. The Panel suggested the Dade/Monroe County, Florida boundary as being a practical boundary because both recreational and commercial catch data for the Gulf and Atlantic have used this boundary. Dade County is the Miami area; while Monroe County includes the Florida Keys.

Rejected Alternative for Action 4:

12.6.2.A.2 Rejected Alternative 1: Use the boundary between the Councils dividing Monroe County through the Keys to separate the Spanish mackerel groups.

Rationale: This action would allow individual Council management of a migratory group through agreement to allow each to manage its own group. Monroe County, Florida, an area of high Spanish mackerel landing has historically been included in Gulf landings in fishery statistics.

Recreational catch for Monroe County cannot be extracted from the Gulf data. Commercial catch for Monroe County can be separated roughly to Gulf and Atlantic Areas. In recent years (1981-85) an average of 20 percent of the U.S. commercial landings are from Monroe County. If this amount is redistributed between the Gulf and Atlantic (based on the estimates of NMFS statistical agents as in Table 2) and the recreational catch is not divided, the catch ratios between these users changes in the Gulf and Atlantic areas. This procedure unnecessarily complicates the calculations of TACs. The Stock Assessment Group will not likely be able to estimate ABCs based on a U.S. Highway 1 dividing line, but will use the Dade/Monroe line for which the data conform.

ACTION 5: REVIEW OF ANNUAL REPORT OF STOCK ASSESSMENT PANEL

Section 12.6.1.1 C is revised as follows:

The Councils will consider the report and recommendations of the assessment group and such public comments as are relevant to the assessment group's submission. A public hearing will be held at a time and place where the Councils consider the group's report. the Councils may convene the joint Advisory Panel and may convene the Scientific and Statistical Committee to provide advice prior to taking final action. After receiving public input, Councils will make findings on the need for changes.

Rationale: This section presently requires the convening of the joint Advisory Panel whether or not changes are being proposed. A meeting of the Scientific and Statistical Committee may be held if the Councils choose. A change of the wording gives the Councils more flexibility to convene the Advisory Panels as appropriate.

A new Section 12.6.1.4 is added as follows:

Section 12.6.1.4 Rejected Alternative 3.

Alternative 1: No change in Section 12.6.1.1 C - Councils continue to require annual meetings of the Advisory Panels. Scientific and Stasticial Committee meetings remain at the discretion of the Council.

ACTION 6: ANNUAL ADJUSTMENT OF TAC

Section 12.6.1.1, F.2 is revised as follows:

Appropriate regulatory changes which may be implemented by the Regional Director by Notice Action (in the Federal Register) include:

- 2. Setting total allowable catches (TAC's) for each stock or group of fish which should be managed separately, as identified in the FMP provided:**

- a. No TAC may exceed the best point estimate of MSY by more than ten percent.
- b. No TAC may exceed the upper range of ABC if it results in overfishing as defined in Section 12.6.1.1, A.4.
- c. Downward adjustments of TAC of any amount are allowed in order to protect the stock and prevent overfishing.
- d. Reductions or increases in allocations as a result changes in the TAC are to be as equitable as may be practical utilizing similar percentage changes to allocations for participants in a fishery. (Changes in bag limits cannot always accommodate the exact desired level of change.)

Rationale: A limitation that TAC may not be increased by more than 30 percent in any year has been eliminated as overly restrictive and unnecessary. With this restriction a TAC of zero could never be increased. This limit also would prevent the achievement of OY when stocks increase by preventing a TAC in excess of a 30 percent increase.

Item b. is a new requirement that TAC be controlled by the upper range of ABC. It provides flexibility by allowing a TAC higher than ABC on underfished stocks. ABC is calculated using a fishing mortality rate of $F_{0.1}$ which is a conservative figure used for rebuilding depleted stocks. Variations in other uncertain parameters are used to provide a range in the ABC. When a stock is in good condition and recruitment is high, fishing at $F_{0.1}$ is very conservative and may unnecessarily restrict the yield with a low ABC range. In such a case, fishing above ABC would be permissible within the limit of the surplus production.

The following Sections are added:

12.6.1.5 Rejected Alternative 4: Retain limitation of no more than 30 percent increase in TAC in one year.

Rationale: This limit was imposed in Amendment 1 to provide a reasonable limit for changes by Notice Action. It is unnecessary and overly restrictive by preventing appropriate increase in very low TAC's.

12.6.1.6 Rejected Alternative 5: No change – TAC may be at any point but may not exceed MSY by more that ten percent.

Rationale: This procedure was in conflict with the implementing regulations, and NMFS was reluctant to approve a TAC in excess of ABC or allow modification of regulations. It could allow a TAC which results in recruitment overfishing.

12.6.1.7 Rejected Alternative 6: Require that TAC be set within the range of ABC.

Rationale: This would prevent overfishing but would deny the Councils the option of setting TAC below ABC if they thought it appropriate. the Councils may determine it to be more appropriate to close a fishery completely for a year to restore it more quickly or to prevent stock collapse.

12.6.1.8 Rejected Alternative 7: Require that no TAC may exceed the upper limit of ABC.

Rationale: This option would limit flexibility of the Council options to fish above the ABC range when a strong year class recruits to the fishery.

ACTION 7: KING MACKEREL ALLOCATION

Section 12.6.3.1 King Mackerel Allocation is amended as follows:

12.6.3.1 King Mackerel Allocation

- 1. The TAC's for king mackerel have been divided between recreational and commercial fishermen based on catch ratios from 1975 to 1979.**
- 2. The TAC for king mackerel in the Gulf group is to be allocated with 68 percent for the recreational fishermen and 32 percent for the commercial fishermen.**
- 3. The commercial allocation for the Gulf migratory group is divided between eastern and western zones with the separation to be the Florida-Alabama border and extending south. The allocation is divided with 69 percent of the TAC for the eastern zone and 31 percent for the western zone.**
- 4. For the Atlantic group of king mackerel the TAC is allocated with 62.9 percent for recreational and 37.1 percent for commercial fishermen.**
- 5. The initial allocation is to be as follows:**

Gulf king mackerel TAC =	2.9 M
Gulf recreational allocation (68%)	1.97 M
Gulf commercial allocation (32%)	0.93 M
Eastern zone commercial (69%)	0.64 M
Western zone commercial (31%)	0.29 M

Atlantic king mackerel TAC =	9.68 M
Atlantic recreational allocation (62.9%)	6.09 M
Atlantic commercial allocation (37.1%)	3.59 M

Rationale: There is no change in the current ratios of allocation between commercial and recreational fishermen established in Amendment 1. This amendment provides a technical deletion of the provision for future readjustment of the ratios of allocations between recreation and commercial fishermen based on all years for which catch data are available. This provision was not approved by NMFS in Amendment 1 and is not applicable. Therefore, the ratios are retained without change.

This amendment also provides for the deletion of separate allocations for purse seine studies withing the commercial allocations. The use of purse seines for mackerel is prohibited in Action 14 following completion of the study period in 1986.

Section 12.6.3.2. is amended by adding:

Rejected Alternative 9: Retain purse seine allocations for king mackerel. (Six percent of Gulf group commercial allocation but not to exceed 400,000 pounds and 400,000 pounds from the Atlantic group. No more than 400,000 pounds is to come from the South Atlantic Council's area of jurisdiction.)

Rationale: the purse seine studies were completed in 1986, and on the basis of the final report the Councils have concluded that the use of purse seines are not warranted in the mackerel fishery. (See Action 9.)

ACTION 8: SPANISH MACKEREL ALLOCATION

Sections 12.6.3.3 and 12.6.3.4 are deleted and replaced with the following:

12.6.3.3 Spanish Mackerel Allocation

- 1. Allocation of TAC within each migratory group of Spanish mackerel is to be divided between commercial and recreational fishermen based on the average ratio of the catch for the period 1979 through 1985.**
- 2. For the Atlantic group the ratio is to be 76 percent for commercial fishermen and 24 percent for recreational fishermen.**
- 3. For the Gulf group the ratio is to be 57 percent for commercial fishermen and 43 percent for recreational fishermen.**
- 4. The initial allocation is to be as follows:**

Gulf Group (ABC range 1.6 – 1.8M) TAC =	1.8
Commercial allocation (57%) =	1.03
Recreational allocation (43%) =	0.77
Atlantic Group TAC = (ABC range 2.2 – 2.9)	2.9 M
Commercial allocation (76%) =	2.2 M
Recreational allocation (24%) =	0.7 M

Rationale: This allocation uses the average ratio of catches from 1979–1985, the most recent period for which comparable catch statistics are available, to allocate the TAC's (set in Action 2) between recreational and commercial fishermen.

The decrease in TAC to restore the fishery requires a limitation of catch. In order to distribute the catch fairly allocations are made for recreational and commercial users. The allocations are to be revised with TAC adjustments using fixed ratios to assure that each group receives its fair share.

The present value of the commercial fishery under this action is \$29.45 million using an ex-vessel price of .30 per pound (Fisheries of the United States, 1985) as a proxy for average value and a sidcount rate of 10 percent. This compares favorably with the present value of \$18.6 million for the unregulated fishery (Table 4).

12.6.3.4 Rejected Alternatives to Action 8

Rejected Alternative 1: No change. No allocation is provided among users. Fishing ceases when the TAC is filled.

Rationale: Fishermen with most advantageous access at the commencement of the fishing year (by reason of geographic availability or gear efficiency) would have the opportunity to fill the total TAC to the exclusion of other users.

Rejected Alternative 2: the initial allocation of Spanish mackerel is as follows:

Gulf Group TAC = (49%)	2.2 M
Commercial allocation (60%)	1.32 M
Recreational allocation (40%)	0.88 M
Atlantic Group TAC = (51% TAC)	2.3 M
Commercial allocation (74%)	1.7 M
Recreational allocation (26%)	0.6 M

Rationale: This ratio of allocation uses catch data for the past five years, 1981-1985, based on a division of the stock into migratory units at the Dade/Monroe County line. The TAC's are allocated both geographically and to user groups using a U.S. TAC set at the upper level of the ABC range of 3.7 - 4.5 M. the Councils determined that the preferred option using separate ABC ranges was a more technically sound procedure for setting TAC's for migratory groups.

Rejected Alternative 3: The initial allocation of Spanish mackerel is based on division of groups at the Council boundary is as follows:

Gulf Group TAC = (44% TAC)	1.98 M
Commercial allocation (55%)	1.09 M
Recreational allocation (45%)	0.89 M
Atlantic Group TAC = (56% TAC)	2.52 M
Commercial allocation (76%)	1.92 M
Recreational allocation (24%)	0.6 M

Rationale: This ratio of allocation uses catch data for the past five years but separates the migratory groups at the Council boundary and divides the commercial landings of Monroe County between Gulf and Atlantic. The recreational catch remains separated at the Dade/Monroe County line because there is no way to further subdivide the data. This option was eliminated when the Councils chose to separate the migratory groups at the Dade/Monroe County line in Action 4.

Rejected Alternative 4: A combination of an allowable catch of 4.3 to 5.1 million pounds with no fish killed under 14 inches would allow the 100 percent recovery of the spawning stock biomass in three years and 125 percent recovery in five years.

U.S. TAC = 5.1 M*
Gulf TAC (49%) = 2.5 M
Commercial Allocation (60%) = 1.5 M
Recreational Allocation (40%) = 1.0 M

Atlantic TAC (51 %) = 2.6 M
Commercial Allocation (74%) = 1.92 M
Recreational Allocation (26 %) = 0.68 M

*Based on Dade/Monroe boundary, allocations on 1981–1985 catches.

Rationale: This option provides virtually the same recovery time as the 4.5 M TAC. If the Councils choose options for a 14 inch fork minimum size or a 14 inch minimum size for recreational fishermen with a minimum gill net mesh size for commercial fishermen, this option becomes available.

This alternative was rejected by the retention of the 12 inch minimum size limit in Action 13. The benefits are dependent on adoption of the larger (14-inch) size limit by the States. Most of the recreational fishery occurs in state waters, and it is unlikely that they would adopt this measure. Therefore, the lower TAC is a more conservative action given the reality of the situation.

ACTION 9: PURSE SEINE ALLOCATION

Section 12.6.3.6 Purse Seine Allocation is revised as follows:

12.6.3.6 No allocation of king and Spanish mackerel is made for purse seines and the use of purse seines for these species is prohibited except for incidental catch allowances.

A bycatch of no more than one percent of king mackerel or ten percent of Spanish mackerel by weight or number, whichever is less, is allowed in purse seines. This bycatch is to be counted in the commercial quota, and when the quota is filled, no more of that species may be landed for sale.

When a stock or migratory groups of overfished mackerel recovers to the level that it can produce MSY and when traditional commercial fishermen are not taking their allocation, the Councils will re-evaluate the use of purse seines at that time.

The Councils consider the prohibition of the use of purse seines to be severable with respect to the Atlantic migratory group of king mackerel.

Rationale: The stocks of king and Spanish mackerels are stressed with restrictions placed on catch of all migratory groups in order to rebuild the stocks. Traditional participants in the fishery have faced limited bag limits and seasonal closures. The one exception is in the fishery of the Atlantic migratory group of king mackerel. The seasonal commercial quotas for this group have not yet been filled though the total catch is approaching its TAC. The Councils are concerned there may be a shift of effort to this group as fishermen are restricted from fishing other groups of mackerel. There is no traditional use or indeed no known record of any purse seine fishery on the Atlantic migratory group of king mackerel.

The use of purse seines to take mackerel was essentially prohibited by regulation in most states and by Florida fishermen anywhere when introduced at the insistence of NMFS with implementation of the mackerel plan in 1983. A limited catch was provided for study purposes. At the end of the three-year study, the Councils were to decide on the future of the special allocation.

The study has shown that all directed purse seine catches were made off Florida. All king mackerel were from the Gulf group, and most Spanish mackerel were from the Atlantic group. Some incidental catch of Spanish mackerel was made off Louisiana.

The catches since the introduction of the use of purse seines for king mackerel have been relatively declining in spite of small allocations in recent years (Tables 5 and 6). The purse seine fishery is minor and is an opportunistic fishery for mackerels. As an efficient gear, it has, however, the potential for taking a major portion of the commercial quota in a short time.

The largest catch was 66,600 pounds of Spanish mackerel off Ft. Pierce. Catches during the study amounted to less than three percent of the commercial catch of Gulf group king mackerel and less than three percent of the commercial catch of Spanish mackerel. Subsequent to the study in 1986, purse seine catch was 296,000 pounds in quota of 300,000 pounds.

The Councils reviewed the results of the three-year purse seine study, Fable and Nakamura (1986), for which the temporary allocation was made. They reported the annual landings by purse seines never equaled their annual quota, and even the aggregate landings for the entire period from March 1983 through March 1986 have not equaled the first year's king mackerel quota.

The Councils concluded that the allocation and use of purse seines for mackerels should be discontinued because:

1. Purse seine boats are not historic participants in the mackerel fishery, not having been used since 1969, until introduced in federal waters in 1983 for study purposes. The mackerel fishery appears to be only an opportunistic fishery for purse seines with mackerel being taken in 48 of the 305 purse seine trips (16 percent) reported by Fable and Nakamura, 1986.
2. It is imprudent and unfair to introduce a new user group into a stressed fishery while existing, historic users are forced to limit catches because of reduced allocations. As stocks recover and traditional commercial fishermen are not taking their allocation, this issue will be reconsidered. The effect of commercial closures and resulting transfer to other mackerel fisheries and migratory groups is not clear at this time.
3. The Councils are allocating the resource fairly based on traditional use to the greatest number of fishermen.
4. The use of purse seines for mackerel is inconsistent with the management procedures in all adjacent state waters.
5. Given that the low purse seine quotas have remained untaken while other commercial king mackerel fisheries have been and assuredly will be closed on reaching their quotas, it is obvious that the marginal value of a fish allocated to the traditional commercial fisheries is higher than that of a fish allocated to the purse seine fisheries (See SFI, in press for the economic condition for optimal allocation). Thus, the economic value of the commercial quota would be increased by reallocating the small, unused purse seine quota to the

traditional commercial fishermen.

Rejected Alternatives for Action 9

Section 12.6.3.7 is revised as follows:

12.6.3.7 Rejected Alternative 1: No change, continue a special allocation for purse seines.

Rationale: The purse seine allocation comes from the commercial allocation and is unavailable to other commercial fishermen. The purse seine fishery during the study period failed each year to take its quota even though other commercial king mackerel fishermen filled their own quotas and had to cease fishing. The special purse seine allocation is a loss to traditional commercial fishermen.

Rejected Alternative 2: Do not specify a separate allocation for purse seines and allow them to fish under the commercial quota.

Rationale: While purse seine catches have been relatively small, they have the potential of taking large quantities of mackerel in a short period of time. This catch would be taken at the expense of traditional commercial mackerel fishermen already fishing under severely reduced quotas.

ACTION 10: PERMITS

Section 12.6.4 Permits is revised as follows:

12.6.4 Permits

12.6.4.1 A Commercial Vessel Permits

Annual permits are required for vessel fishing under the commercial quota on king or Spanish mackerel. These vessels are exempt from the recreational bag limit.

All fishermen who apply for permits must be able to show they derived more than ten percent of their earned income from commercial fishing, i.e., the sale of one's catch during the previous calendar year.

Vessels fishing a group for which commercial permits are issued and which do not possess a permit are presumed to be recreational boats and are subject to recreational bag limits.

Qualifying Charterboats may obtain commercial permits to fish under the commercial quotas but must adhere to bag limits when under charter or when more than three persons are aboard.

Permits are issued for an April through March permit year and are available at any time and are valid through the following March. Permits valid for the following permit year become available in February.

Permits are transferable on sale of vessel with new owner being responsible for changing name and address. The new owner or operator must be able to show that ten percent or more of his earned income was derived from commercial fishing

the previous calendar year.

Boats with permits must cease fishing for that group or zone for mackerel when its commercial quota is reached and the season closed. Charterboats with commercial permits may continue to fish under the bag limit.

A fee may be charged for the permit, but shall not exceed administrative costs incurred in issuing the permits. Fees are expected to be less than ten dollars.

The vessel's official number is to be displayed on the port and starboard sides of the deckhouse or hull and on an appropriate weather deck so as to be clearly visible from enforcement vessels and aircraft. The number is to be in black arabic numerals at least 18 inches in height for vessels over 65 feet in length and 10 inches in height for all other vessels.

12.6.4.1 B Charterboat Permits

Annual permits are required for charter boats fishing for coastal migratory pelagics for hire. Charter boats normally fish under bag limits but may also be eligible to obtain commercial permits to fish under the commercial quota when not under charter.

Permits are issued for an April through March permit year, are available at any time, and are valid through the following March. Permits for the following permit year become available in February.

Rationale: This action makes no change in the commercial permit requirements for king mackerel. It provides for availability of permits throughout the year. It brings the amended FMP into conformance with changes made subsequently by Notice Action. New requirements under this action are for a commercial permit for vessels fishing for Spanish mackerel under the commercial quota and for charterboat permits for vessels fishing for hire for coastal migratory pelagics.

The same need for commercial permits applies to Spanish mackerel vessels as did for king mackerel vessels under allocation of a reduced TAC.

It is the Councils' intent that the reductions in allocations made from within the TAC's be fair and equitable. This is to be accomplished by restricting the users other than charter boats to one or the other allocation. It will also provide further assurance that the TAC is not exceeded.

The Councils believe that requiring permits of boats fishing a commercial quota that is likely to be reached during a fishing season is the procedure which imposes the least regulation and imposition on fishermen while still maintaining the catch within TAC. In 1986 there were 1,216 permits issued for Atlantic and 771 for Gulf commercial king mackerel boats. There are duplications in permits for the two areas, however.

The limitation of quota permits to commercial fishing vessels is not intended as economic distribution; rather it is to be a means of achieving an equitable reduction in catch by both recreational and commercial fishermen. The allocations are based on recent catch ratios. In order to prevent large numbers of recreational fishermen from fishing under the commercial permit system, not

selling their catches, and causing TAC to be exceeded through this uncounted catch, the permit is limited to commercial fishermen. The ten percent of earned income from commercial fishing was judged by the Councils to be sufficient to include those who may be partially dependent on social security, retirement benefits, or investments. New entrants in the mackerel fishery may establish eligibility with a record of income from other commercial fishing and bag limit sales. King and Spanish mackerel taken under the bag limit may be sold until the commercial quota for that group or zone is closed.

Danville Research Associates estimated the Spanish mackerel commercial fishery to consist of 188 small and 121 power assisted net boats in 1983. By the 1985-86 season the number of the latter declined to less than 50 according to testimony presented to the Florida Marine Fisheries Commission, Williams (1986). These are located in south Florida and are the source of the great majority of the commercial catch. Most vessels also fish for king mackerel.

The Magnuson Act provides that a permit fee may be charged but that it not exceed administrative costs of issuing the permit. It is expected that this will be less than ten dollars per permit if any fee is changed.

Charter boats are treated separately with the ability to fish both with commercial permit under that quota and under the recreational allocation. Charter boats also may have more liberal bag limits (Gulf king mackerel). The number of charter boats in the area is believed to be about 1,500, Burgess (1986); however, all may not fish for coastal pelagics. The annual catch by this major user group and relation to commercial sales is not fully understood. Attempts to identify vessel owners or operators have been unsuccessful. There is a high turnover among operators, and there is no licensing program by which most charter fishing boats may be identified. A permit system for this group would identify the users and make possible an estimate of their use of the resource.

Amend Section 12.6.4.2 Alternative Permit Requirements Considered and Rejected by adding:

Rejected Alternative 6: Require permits for all vessels fishing for coastal pelagics.

Rationale: Requiring that all vessels fishing for coastal pelagics have permits would provide a universe for data gathering and would, if separate permits are required, identify recreational and commercial boats. The public cost of operation and analysis of the system would be large and not cost effective. It would duplicate some states' licensing programs.

Rejected Alternative 7: Require no permits.

Rationale: Permits are an imposition, and some vessel owners may forget to obtain them. The use of a permit system is, however, intended to allocate the resource fairly and to prevent exceeding quotas and TAC. It would be difficult to enforce a recreational bag limit when the commercial season is open. The acquisition of a free permit is a very small imposition to pay for commercial use of a public resource.

Rejected Alternative 8: Status Quo, permits required only for commercial king

mackerel boats.

Rationale: Allocation of Spanish mackerel between commercial and recreational fishermen becomes very difficult when the users are not identified. Charter boats would remain an unknown entity with special allocation privileges but whose catch and sales are not known.

ACTION 11: SEASONAL CLOSURES

Section 12.6.5, Seasonal Closures is revised as follows:

12.6.5 Seasonal Closures

12.6.5.1 Boats with commercial permits for mackerel must cease fishing in the EEZ for the species within a migratory group or zone for the remainder of the fishing year when the commercial quota for that species is reached for that zone. Charter boats with commercial permits may continue to fish under recreational bag limits; however mackerel caught within a zone after its quota is reached may not be sold. Commercial quotas may be adjusted by Notice Action in accord with Section 12.6.3, Allocations. The initial commercial quotas for mackerel are specified in Section 12.6.3 under Actions 7 and 8.

Rationale: Seasonal closure procedures now applicable to king mackerel are extended to apply to Spanish mackerel in order to restrict commercial fishermen to their quotas. (Atlantic king mackerel were previously included by Notice Action.)

The closure of the commercial permit fishery when the quota is reached will require coordinated closure by adjacent states in order for this measure to be effective. States will be requested to adopt similar measures so that the fishery may be closed in the territorial sea as well as in the EEZ when the quota is filled for a season.

Sections 12.6.5.2 and 12.6.5.3 are deleted. These sections provided separate mechanisms for closures of Spanish and Atlantic king mackerel. These have been revised and are included in the new Section 12.6.5.1.

Section 12.6.5.4 is renumbered as Section 12.6.5.1 and an additional Alternative 3 is added as follows:

Rejected Alternative 3: No Action – All fishing for Spanish mackerel is to cease when the TAC is reached.

Rationale: Prior to establishment of allocations among users and division of the stocks, this procedure would have limited total catch to TAC. With separate allocations it no longer becomes necessary to close the entire fishery when an allocation is filled.

ACTION 12: BAG LIMITS

Section 12.6.6.1 is revised:

12.6.6.1 King and Spanish Mackerel Bag Limits

The recreational allocation of mackerels will be controlled by bag limits for anglers per boat trip. Different bag limits may be set for anglers on charter or private recreation vessels. The bag limit is intended to reduce the recreational catch and distribute fairly throughout the fishing year. If overfishing as defined in Section 12.6.1.1, A4 is occurring in a stock or group of fish, the bag limit for that group will revert to 0 when its quota is caught.

The initial bag limits proposed by this amendment are:

o Gulf Migratory Group King Mackerel

Private recreation boats: 2 per person per trip

Charterboats: 3 per angler excluding captain and crew or 2 per person all inclusive per trip, whichever is greater.

o Atlantic Group King Mackerel

All recreational boats: 3 per person per trip.

o Spanish Mackerel

Action deferred and to be implemented by notice action.

Rationale: No changes are made in the king mackerel bag limits which are presently in effect. They are based on percent reductions described in the amended FMP and by Eldridge and Powers, 1983.

This action does clarify the intent of the Councils that the recreational catch be terminated (i.e., reversion of the bag limit to 0) when the recreational allocation is filled on a mackerel group which is overfished. This action is conservative in that it provides a safeguard to prevent overfishing the allocation and TAC. It is recommended for mackerels because of the poor condition of the stocks. It protects the stocks perhaps to the disadvantage of some fishermen. An early closure of the season could result in exclusion of opportunity to retain fish in some geographical areas and could interrupt scheduled fishing tournaments.

It is Councils' intent to distribute the recreational allocation of Spanish mackerel so that the catch can be apportioned fairly to all users throughout the geographic range of the management area.

The use of a bag limit to restrict the recreational catch to an allocation can be a fair and efficient method of reducing catch. Recent recreational catch ratios may be used to estimate the percent reduction in catch resulting from a specific bag limit. This procedure was previously used to reduce king mackerel recreational catches to a quota as proposed by Eldridge and Powers (1983). Data from the Marine Recreational Fishery Statistics Survey were used to estimate percentage reduction in Spanish mackerel recreational catch by various bag limits.

The Councils will receive the annual report of their stock assessment panel in April of 1987. They will review the recommendations of the panel and take appropriate action to adjust TAC and revise allocations in accord with ratios specified in Section 12.6.3.3. Bag limits to distribute and restrict recreational catch are to be set at that time by notice action.

If the TAC for Spanish mackerel remains unchanged from the initial allocation as specified in Section 12.6.3.3, the following is an example of a method to reduce the recreational catch through the use of bag limits.

If the 1985 recreational catch (Table 2) is used as proxy for current unregulated catch, the percent reduction to achieve the proposal recreational allocations are:

For the Gulf group

1985 recreational catch	=	2.0	M
Allocation	=	0.77	M
Percent reduction needed	=	61	%

For the Atlantic group

1985 recreational catch	=	1.2	M
Allocation	=	0.7	M
Percent reduction needed	=	42	%

Tables 7A, 7B, or similar procedures may be used to reduce the recreational catch by the desired amount.

Section 12.6.6.2 Alternative Bag Limits considered and Rejected is amended by adding new Rejected Alternatives:

Rejected Alternative 10: Status Quo for Spanish mackerel, i.e., no bag limit.

Rationale: With the specification of a reduced TAC for Spanish mackerel it becomes necessary to allocate among users if everyone is to have an opportunity to fish. Without a bag limit those recreational fishermen with first access to fish could quickly fill the quota before fishermen in other areas had access.

Rejected Alternative 11: Limit the recreational fishery only by a bag limit estimated to reduce the seasonal catch to the desired level.

Rationale: This option has the advantage of providing a consistent fishery through a season. It distributes the allocation to all recreational fishermen. It also runs the risk of exceeding the allocation if the bag limit is overestimated or if fishing pressure is greater than anticipated. It may, however, be reduced to the appropriate level the following year. It would prevent reversion of the bag limit to zero for the latter part of a season, thereby allowing scheduled fishing tournaments during that period.

Alternative 12: A uniform bag limit is to be established for each migratory group.

Rationale: Consistent bag limits would be in effect throughout the ranges of a migratory group. The local effect of a bag limit may vary, however, due to variations in fishing effort and local availability of fish.

Alternative 13: A bag limit different for Florida than other states; i.e., four fish for Florida and 10 fish for other states.

Rationale: On October 30, 1986, Florida implemented a recreational bag limit of four fish to reduce mortality by an estimated 45 percent based on 1979-1984 catches. Consistent bag limits in Florida and adjacent federal waters would enhance enforcement by enabling dockside check of catches.

Most of the total U.S. catch of Spanish mackerel will continue to be landed in Florida because of the larger recreational and commercial fisheries in that state.

Florida's efforts to reduce commercial catches could shift considerable effort to the recreational fishery for the large overwintering schools off that states. It is likely that a decline in the mackerel stocks began with the large catches made off Florida in the mid 1970's.

Florida fishermen (commercial and recreational) catch the vast majority of Spanish mackerel, and the commercial harvest outside of Florida is minimal. The differential bag limit will insure that Florida fishermen do not harvest a disproportionate share of the Spanish mackerel resource.. In addition the four-fish bag limit in Florida corresponds to existing Florida law thus providing dockside enforcement. State directors from states other than Florida indicate they may be able to implement a ten-fish bag limit in state waters but that a four-fish limit would be next to impossible to implement at the state level.

While the estimated reduction in catch from the 10/4 bag limit alone may not achieve the target allocation, a reversion of the bag limit to 0 on filling the quota will prevent overfishing.

ACTION 13: SPANISH MACKEREL SIZE LIMITS

No Change: Minimum size limit for Spanish mackerel is to remain 12 inches fork length or 14 inches total length. An undersized catch of up to five percent by weight of the boat catch of Spanish mackerel is allowed. Section 12.6.7.1 remains unchanged.

Amend Section 12.6.6.3 by adding a new rejected alternative as follows:

Rejected Alternative 4: A minimum Spanish mackerel size of 14-inch fork length for recreational fishermen.

Rationale: The FMP provides for a minimum size limit of 12 inches fork length or 14 inches total length for Spanish mackerel which corresponds to a fish less than one year old and at a weight of 0.5 pounds. Female mackerel grow faster and attain a larger size than males. Some age I females (14 inches, Florida) apparently spawn and age II (18.6 inches, Florida) fish likely make a significant contribution to the stock.

The Councils considered advantages of increased yield by increasing the 12-inch minimum size limit. A change was rejected because fish available from piers and small boats in state waters are usually smaller fish. The Councils had requested states to adopt the 12 inch limit, and several have done so. It is unlikely that further changes would be adopted by those states. The larger commercial fishery is directed at larger size fish.

The commercial fishery targets fish of 1.25 pounds and above (16 inches, FL) and uses 3-1/2 inch stretch gill nets. Larger fish may bring a slightly higher price per pound over the usual 27 to 34 cents ex-vessel price paid.

The report of the Stock Assessment Panel has said that yield per recruit can be maximized with a minimum size of 18 inches. There would be a short run reduction of 10 percent but spawning stock could double in five years.

The Southeast Fisheries Center has estimated that a 25 percent increase in spawning stock biomass would occur in five years as a result of no fish under 14 inches being killed (Coastal Resources Division, 1986).

Almost all of the commercial catch is made by gill net, and mesh size regulation does not provide a knife-edge control of fish size. Thus, a minimum size limit could result in discard and waste of a portion of the catch unless some tolerance was provided.

The Gulf Mackerel Advisory Panel recommended that the commercial size be regulated by net mesh size and that the recreational fishery be regulated by a bag limit.

ACTION 14: PURSE SEINES FOR KING AND SPANISH MACKEREL

Section 12.6.8.2 is amended as follows:

12.6.8.2 Purse Seines for King and Spanish Mackerel

The use of purse seines to take king and Spanish mackerel is prohibited.

Rationale: the rationale for this measure is provided in Action 9 (Section 12.6.3.6) Purse Seine Allocation. An allowable bycatch is provided in that section.

ACTION 15: SPANISH MACKEREL GILL NETS

A new Section 12.6.8.4 is added as follows:

12.6.8.4 Spanish Mackerel Gill Nets

Minimum mesh size may not be less than 3 1/2 inches stretched mesh.

Rationale: See discussion in item 13 regarding Spanish mackerel size. Gill net studies conducted by NMFS, Trent et.al. (1983), found gill nets with 3 1/2-inch and larger mesh took few Spanish mackerel under 14 inches and practically none smaller than 12 inches. This mesh size will direct commercial catch to preferred commercial size.

Florida has set 3 1/2-inch mesh for its east coast, 3 3/8-inch mesh for its southwest coast, and three inches for its northwest coast. This applies to the monofilament portion of Spanish mackerel nets. There are about 50 power assisted Spanish mackerel net boats in the Florida fishery, (Williams, 1986). NMFS port agents estimate approximately 40 to 50 in Monroe County and 17 in the Port Solerno - Fort Pierce area with some duplication numbers.

Florida's territorial jurisdiction extends three nautical miles off its east coast and 9 nautical miles off its west coast. The Florida Marine Fisheries Commission has estimated that the percent catch of Spanish mackerel in state waters is 60 percent on the east coast, 90 percent on the southwest coast, and 100 percent off the Panhandle. Thus, where there is a substantial EEZ fishery, the mesh conforms to those allowable in state waters.

A new Section 12.6.8.5 is added as follows:

12.6.8.5 Alternatives to Regulation of Spanish mackerel nets.

Rejected Alternative 1: Minimum mesh size may not be less than 3 1/2 inches stretched mesh after (April, 1988) or (October, 1988).

Rationale: The Gulf Councils' advisory panel has recommended the April date effective at the end of the 1987-88 season, and Florida has adopted the October date effective prior to the 88-89 season to go to 3 5/8 inches throughout the State. This opportunity to phase out smaller mesh nets allows fishermen to amortize the cost of smaller mesh nets made obsolete. There are some 50 power block vessels in the fishery. The cost of a replacement net is about \$18,000. If half of the vessels have undersize mesh, immediate replacement costs would be \$450,000. The nets may, however, be used in some state waters until October 1988.

Rejected Alternative 2: No Change - No regulation of mesh size, size of fish to be regulated only by a minimum length.

Rationale: Fishermen using a small mesh would have an excessive bycatch of small fish especially if the minimum fish size is increased. This would result in discard and waste and growth overfishing of the resource.

Rejected Alternative 3: Prohibit the use of gill nets on weekends.

Rationale: Florida has proposed this restriction in order to reduce effort and to reduce conflict among users. The Councils rejected this option because the commercial fishery has already been restricted to a quota.

ACTION 16: ADD A NEW OBJECTIVE TO the FMP

No Action.

Amend Section 12 as follows by adding: Section 12.4.1 Rejected Alternative Objectives.

Rejected Alternative 1: Restore the Spanish mackerel fisheries to the condition of the early 1970s.

Rationale: The Councils proposed the objective as a means to direct efforts to restoration of the stocks. They noted that fishing effort and fishing areas have changed in the last 16 years so that the earlier conditions are impractical to restore. The present 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.

ACTION 17:

Reconsider an alternative to Section 12.6.2.1. Delineation of king mackerel migratory group to establish the winter boundary from the Flagler/Volusia to the Volusia/Brevard County line.

No action.

Amend Section 12.6.2 by adding a new rejected alternative as follows:

Rejected Alternative 12.6.2.7. Rejected Alternative 6. Set winter boundary for king mackerel at the Volusia/Brevard county line.

Rationale: Preliminary results of 1985 tagging studies support those that believe the winter fishery off Volusia county are Atlantic fish. All recoveries of fish tagged in that area have thus far come from the Atlantic side of Florida. The study however is incomplete at this time. the average king mackerel landings in Volusia county 1981-1985, are 265 thousand pounds.

Moving the line would require a recalculation of the TAC's for the migratory groups and transfer of allowable catch from the Gulf to the Atlantic group. Because the Councils are to convene a stock identification workshop on mackerel in early 1987, this action is postponed for further study.

V. Environmental Consequences

The actions proposed in this amendment have no adverse impact on the physical environment.

The effect of these actions is to reduce catches temporality in order to restore the spawning biomass of Spanish and king mackerels to levels that can produce maximum sustainable yields. Present yields of Spanish mackerel are about 9 M whereas MSY is estimated to be 18 M. Recruitment of king mackerel has declined severely, and prior to Amendment No. 1 to the FMP the fishery was producing only about 18 million pounds with MSY estimated to be 26.2 M.

Spanish mackerel catches are to be reduced by about 50 percent from about 9 M to 4.7 M beginning in 1987. the expected result is the rapid rebuilding of the stock with the biomass to be doubled in three years.

Continued fishing of Spanish mackerel at current effort levels would result in further degradation of the spawning stock, loss of recruitment, and a continued decline in catch.

Economic and social impacts include the short term loss of yield. Using a discount rate of 10 percent yields a present ex-vessel value of the unregulated commercial fishery of \$18 M, assuming that catches continue indefinitely at a level of 6.2 M pounds per year instead of declining as expected. Quota restrictions on the commercial fishery would reduce annual landings from about 6.2 M in 1985 to about 3 M. The average ex-vessel value of the catch is about 30 cents per pound yielding a short term loss of \$960,000 per year to the commercial fishery. The Stock Assessment Panel estimated that the spawning stock biomass would double in three years, and presumably the MSY of 18 M would be available at that time. If commercial catches are reduced to 3 M pounds per year for three years and then return to 12 M pounds per year (two-thirds of an 18 M pound MSY) for posterity, then the present ex-vessel value of the catch stream is \$29.3 M (Table 4). Clearly, the commercial fishery benefits from proposed actions. If marginal valuations for the recreational catch were available comparable to ex-vessel price (or, better, consumer price), a similar analysis would be possible for the recreational catch stream. While the absolute magnitudes of the present values of the catches with and without the action would doubtless vary from the commercial values, a similar result would hold in terms of benefit from the action.

The proposed actions have no anticipated impact on threatened or endangered species or on marine mammals. A Section (7) consultation was held for the FMP with a "no jeopardy opinion" being rendered. The proposed actions do not alter provisions of the FMP that would affect these animals.

IV. Conclusions

o Mitigating Measures Related to the Proposed Action

None.

o Unavoidable Adverse Effects

None.

o Relationship Between Local, Short-Term Users of the Resource and Enhancement of Long-Term Productivity

The reduction in allowable catch of Spanish mackerel from current levels of about 9 M to 4.7 M will substantially reduce the harvest of both commercial and recreational fishermen for the immediate period but should provide for recovery of the stocks within a few years. The stock is presently producing about half of its potential MSY; because it has been overfished. Allowing the stocks to rebuild, should restore total harvest to about 18 M.

o Irreversible or Irrecoverable Commitment of Resources

None.

o Enforcement Costs

Updated enforcement costs for management measures of this amended plan are estimated to be \$58,000 annually if states adopt compatible regulations for their

LIST OF PREPARERS

Gulf of Mexico Fishery Management Council

- Terrance Leary, Biologist
- Paul G. Hooker, Ph.D., Economist

South Atlantic Fishery management Council

- Gregg Waugh, Biologist

LOCATION AND DATE OF PUBLIC HEARINGS

September 29, 1986:	Corpus Christi, Texas
September 30, 1986	Houma, Louisiana
October 1, 1986	Biloxi, Mississippi
October 2, 1986:	Tampa, Florida
October 6, 1986	Key West, Florida
October 7, 1986	Ft. Pierce, Florida
October 8, 1986	Daytona Beach, Florida
October 9, 1986	Hilton Head Island, South Carolina
October 10, 1986	Myrtle Beach, South Carolina
October 14, 1986	Kure Beach, North Carolina
October 15, 1986	Atlantic Beach, North Carolina
October 16, 1986	Manteo, North Carolina
October 27, 1986	St. Simons, Georgia

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TABLE I

Annual Catch Estimates For King Mackerel
In Pounds (Through October 1985) From Nichols (1986b)

Gulf Migratory Group July - June Fishing Year

	COMMERCIAL			<u>Recreational</u>	<u>Total U.S. Gulf</u>
	<u>West Zone</u>	<u>East Zone</u>	<u>Total</u>		
1981-82	0	5996433	5996433	8564018	14560451
1982-83	1272625	3485186	4757811	3269797	8026608
1983-84	529165	2599873	3129038	2750942	5879980
1984-85	902887	2419544	3322431	3906242	7228673
1985-86*	137876	7163	145039	1364416	1509455

Atlantic Migratory Group April - March Fishing Year

	<u>Commercial</u>	<u>Recreational</u>	<u>Total Atlantic</u>
1981-82	2567044	5649584	8216628
1982-83	4225567	5456806	9682393
1983-84	2592358	10047380	12639736
1984-85	2070650	8064796	10135446
1985-86*	1920844	7491826	9412670

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1985-86*	1920844	7491826	9412670

TABLE 2

Estimated Catch of Spanish Mackerel 1981 - 1985
 (Source: Eldridge (1986) and NMFS Statistics for 1985 and Monroe County)
 Thousands of Pounds

GULF OF MEXICO
 (Including Monroe County)

ATLANTIC

Year	GULF OF MEXICO (Including Monroe County)			ATLANTIC			U.S. Grand Total	
	Commercial	Recreational	Total	Monroe* County Commercial	Commercial	Recreational		Total
1981	3,709	2,871	6,580	2,213	4,227	1,729	5,956	12,536
1982	3,455	1,342	4,797	2,284	3,951	2,357	6,308	11,104
1983	2,266	3,162	5,428	1,317	5,989	208	6,197	11,626
1984	3,505	1,086	4,592	3,099	2,526	1,626	4,153	8,744
1985	2,742	2,033	4,775	1,881	3,418	1,179	4,597	9,372

*Note: Monroe County commercial landings may be reallocated to reflect area of capture as follows:

Year	Gulf	Atlantic
1981	90%	10%
1982	50%	50%
1983	80%	20%
1984	95%	05%
1985	40%	60%

TABLE 3
**Spanish Mackerel Commercial Landings on East and West Coasts of Florida for
 1975-76 through 1985-86 Fishing Seasons, in Thousands of Pounds (FROM ELDRIDGE, 1985)**

Fishing Year Month	<u>East Coast</u>											1985-86
	<u>1975-76</u>	<u>1976-77</u>	<u>1977-78</u>	<u>1978-79</u>	<u>1979-80</u>	<u>1980-81</u>	<u>1981-82</u>	<u>1982-83</u>	<u>1983-84</u>	<u>1984-85</u>	<u>1985-86</u>	
November	309	727	710	139	88	97	162	77	332	83	42	
December	1,189	1,161	2,355	2,087	697	4,375	2,073	842	1,807	456	710	
January	2,960	4,368	2,502	1,184	4,132	1,561	229	3,465	679	729	897	
February	2,946	2,803	520	2,581	1,049	153	166	65	328	1,490	1,654	
March	1,444	474	173	119	47	24	2,171	25	765	218	194	
April	111	12	28	33	19	11	73	96	14	13	28	
Annual Total	9,217	9,738	6,549	6,076	6,136	6,313	5,078	4,754	3,925	2,989	3,525	
Fishing Year Month	<u>West Coast</u>											1985-86
	<u>1975-76</u>	<u>1976-77</u>	<u>1977-78</u>	<u>1978-79</u>	<u>1979-80</u>	<u>1980-81</u>	<u>1981-82</u>	<u>1982-83</u>	<u>1983-84</u>	<u>1984-85</u>	<u>1985-86</u>	
November	442	387	225	65	24	50	555	633	171	303	143	
December	1,160	902	508	122	635	132	1,266	611	362	1,373	774	
January	2,576	925	411	208	573	392	818	717	1,135	984	193	
February	2,138	193	408	445	363	68	87	180	276	322	153	
March	1,051	73	75	71	38	38	414	35	49	175	84	
April	305	109	106	213	220	661	312	178	121	267	333	
Annual Total	8,369	3,282	1,984	1,609	2,179	1,845	3,997	2,884	2,114	3,424	1,680	

Table 4

Comparison of Present Value (P.V.) of Spanish Mackerel Commercial Yield Streams for Three Management Options

1. No Action (Unregulated Fishery): PV* = \$18.6M

Year	1	2	3	4	5	...
Mlbs	6.2	6.2	6.2	6.2	6.2	...

2. Immediate TAC reduction to 4.7M and commercial catch reduction to 3.23 M: PV* = \$29.45 M

Year	1	2	3	4	5	...
Mlbs	3.23	3.23	3.23	12	12	...

3. Immediate TAC reduction to 6.1 M and commercial catch reduction to 4.22 M for 5 years: PV* = \$22.7M

Year	1	2	3	4	5	6	7	...
Mlbs	4.22	4.22	4.22	4.22	4.22	9.6	9.6	...

4. Immediate TAC reduction to 5.1 M and commercial catch reduction to 3.42 M for 5 years: PV* = \$26.2 M

Year	1	2	3	4	5	6	7	...
Mlbs	3.42	3.42	3.42	3.42	3.42	12	12	...

* Assumes value of \$0.30 per pound and an annual discount rate of 10 percent.

Table 5. Commercial landings (pounds) of Gulf Migratory Group king mackerel (from E. Snell).**

	3/1/83-6/30/83	7/1/83-6/30/84	7/1/84-6/30/85	7/1/85-2/28/86	3/1/83-2/28/86
Hook and line	669,000	1,678,000	1,809,000	1,806,000	5,962,000
Gill net	908,000	1,069,000	968,000	1,185,000	4,130,000
Purse seine	20,102	134,643	56,620	32,486*	243,851
Total commercial	1,597,102	2,881,643	2,833,620	3,023,486	10,335,000
Percentage of total commercial catch by purse seine	1.26%	4.67%	2.00%	1.07%	2.36%
Purse seine quota	400,000	400,000	400,000	284,000	

* Includes 1,667 lbs taken in northern gulf as a by-catch. No observer was present or required since king mackerel were less than 1% of the total catch.

** From Nakamura and Fable (1986)

Table 6. Commercial landings (pounds) of Spanish mackerel (from E. Snell).**

	3/1/83- 12/31/83	1984	1985	1/1/86- 2/28/86	3/1/83- 2/28/86
Atlantic total	2,911,000	4,835,000	3,840,000	1,939,000	13,525,000
Purse seine catch	21,250	62,986	189,224	175,370	448,830
Purse seine %	0.73	1.30	4.93	9.04	3.32
Purse seine quota	300,000	300,000	300,000	300,000	
Gulf total	912,000	1,224,000	1,954,000	700,000	4,790,000
Purse seine catch	37,055	9,300	11,567*	0	57,922
Purse seine %	4.06	0.76	0.59	0	1.21
Purse seine quota	300,000	300,000	300,000	300,000	
Overall total	3,823,000	6,059,000	5,794,000	2,639,000	18,315,000
Purse seine catch	58,305	72,286	200,791	175,370	506,752
Purse seine %	1.53	1.19	3.47	6.65	2.77

* Taken in northern gulf as by-catch. No observer was present or required since Spanish mackerel were less than 10% of total catch.

** From Nakamura and Fable (1986)

Table 7

Recreational Catch Achieved by a Bag Limit. Percent Reduction of Present Spanish Mackerel.

7A Table is based on Florida catches* of Spanish mackerel from 1979 through 1984 (Powers, 1986).

<u>BAG LIMIT PER PERSON</u>	<u>EAST COAST</u>	<u>WEST COAST</u>	<u>TOTAL FLORIDA</u>
3 FISH	50%	55%	54%
4 FISH	43%	51%	48%
5 FISH	37%	46%	43%
7 FISH	31%	40%	37%
10 FISH	25%	35%	30%
15 FISH	20%	33%	23%
20 FISH	15%	21%	19%

7B Table is based on regional Spanish mackerel catches* from 1981 through 1985.

<u>BAG LIMIT PER PERSON</u>	<u>SOUTH ATL</u>	<u>GULF</u>	<u>EAST FL</u>	<u>WEST FL</u>	<u>ATL x * FL</u>	<u>GULF x * FL</u>
2	60	68	44	62	67	70
3	52	59	34	53	60	60
4	45	52	27	47	53	53
5	39	46	21	42	47	46
6	34	40	17	38	42	41
7	30	36	15	34	37	36
8	27	32	12	31	34	33
9	25	29	10	28	31	30
10	23	27	9	25	29	27

* Based on National Recreational Fishery Statistics Surveys.

x* Exclusive of Florida

REPORT OF THE MACKEREL STOCK ASSESSMENT

PANEL MEETING

MARCH 5-6, 1986
MIAMI, FL.

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 on March 5-6, 1986. The tasks of this Panel were specified by the Councils in their Fishery Management Plan for the Coastal Migratory Pelagics (Mackerels): Amendment 1 (April, 1985). Specifically, the Panel was directed to reassess the status of each stock of king and Spanish mackerel and to make recommendations on MSY and the level of Allowable Biological Catch (ABC) for the next fishing season. The level of ABC is to be based upon criteria specified in Amendment 1. In addition the Panel was directed to delineate possible management options for achieving ABC, to address other biological considerations as appropriate, and to present a written report of their findings and recommendations to the Councils. The Report of the Panel is presented below.

KING MACKEREL

The Panel reviewed the updated stock assessment analyses presented to the Panel. These analyses included virtual population assessments through October, 1985; catch-per-unit-effort indices from northwest Florida 1965-1985; summer east coast of Florida 1973-1984; Texas-recreational catch-per-effort 1979-1985; and other catch-per-effort series of shorter duration. Additionally, stock identification information was examined. These data and analyses (in addition to information previously reviewed by the Panel) were the bases of the Panel's deliberations (List of Documents attached).

Stock Identification

In 1985 the Panel suggested that other boundaries separating the Atlantic Migratory Group from the Gulf Migratory Group on the east coast of Florida might be more appropriate, but information was lacking to make that choice; thus, the Panel had recommended a tagging research program to be directed at this problem. In response to this recommendation, the research program was initiated. However, that study has not yet concluded.

Therefore, the present Panel again concluded that there was not an adequate scientific basis to alter the present boundary separating the Atlantic Migratory Group from the Gulf Migratory Group.

The evidence for stock separation within the Gulf Migratory Group was re-examined. The Panel evaluated separations within the US portion of the Group and between the Mexican and US portions.

Tagging data indicated some mixing throughout the US Gulf. Catch-per-effort data were not supportive of different recruitment patterns within the US Gulf. Preliminary biochemical studies suggest hypotheses for separation within the US Gulf. However, the results of these analyses do not allow the separation of the eastern and western Gulf at this time. The Panel concluded that there is more evidence for a single stock than for multiple stocks. Therefore, the Panel again concluded that stock separation within the US Gulf is not biologically warranted.

The Panel, also, concluded that no additional information has arisen to support separation of the US portion of Gulf Migratory Group catches from the Mexican portion. However, since there has been little study of this, the Panel continued the convention (established in the August, 1985 meeting) of presenting recommendations for two Gulf Migratory Group alternatives:

- 1) United States Gulf Migratory Group, and
- 2) Total Gulf Migratory Group (US and Mexico, combined)

Gulf Migratory Group

Status of Stock

The assessment analyses continued to indicate that there have been reductions in recruitment and spawning stock biomass in the Gulf Migratory Group since 1979 for both the US Gulf hypothesis and the Total Gulf hypothesis. The decreases have been more severe for the US Gulf, if, in fact, the US Gulf is separate. These conclusions are insensitive to the assumptions required to generate the population analyses. Therefore, the Panel remains confident that significant declines in recruitment and spawning stock biomass in the US Gulf have occurred.

For the Total Gulf hypothesis, a steady decline in spawning stock biomass is still indicated, as well as some decline in recruitment in the 1981-82 period. In neither case are these declines as extreme as indicated in the Panel's 1985 report. However, the results of the new analyses using Mexican data are sensitive to changes in catch and size frequency data from last year to the present. This indicates that less confidence can be placed in these results and that greater uncertainty exists in the management advice that can be offered about the stock that is impacted by Mexican removals.

Criteria for ABC

Procedures for determining the range of ABC and for projecting future stock sizes were discussed. The methods available to the Panel were essentially proscribed by two mandates:

- 1) the definition of allowable rates of recovery specified in Amendment 1 of the Fishery Management Plan (MSAP/86/1); and
- 2) the need for an expression of the degree of reliability in the ABC recommendations.

The Panel selected the set of procedures which met these two requirements. Thus, the recommended ranges of ABC were based upon the mandated recovery rates and expressed the uncertainty in the projections. The specific criteria used for generating the ranges of ABC were the same as used in August, 1985, i.e.,

- 1) Reduction in recent catch
- 2) Fishing Mortality Rate of $F(0.1)$
- 3) Natural Mortality between 0.15 and 0.3
- 4) Future recruitment between the levels that existed in 1975-78 and 1980-81 (the periods of high and low recruitment, respectively).

ABC Determination

Using these criteria the following recommendations for ABC are made:

If the Gulf Migratory Group is impacted solely by US fisheries (US Gulf hypothesis), then

The present season's catch (1985-86) is projected to be approximately 5 million pounds.

Allowable Biological Catch for the 1986-1987 season is estimated to be between 1.2 and 2.9 million pounds. If this regulatory strategy is maintained, then the spawning stock is expected to recover to between 18 and 112 percent of the 1975-78 level in the next decade.

If the catch were to be reduced to zero, the spawning stock is expected to recover to between 39 and 266 percent of the 1975-78 level in the next decade.

If fishing effort were allowed to continue at recent levels, then the spawning stock could continue to decline, perhaps to 9 percent of 1975-78 levels in the next decade.

If the Gulf Migratory Group is impacted by both US and Mexican fisheries (Total Gulf hypothesis), then

The present season's catch (1985-86) is projected to be about 15 million pounds (assuming a Mexican catch of about 10 million pounds).

Allowable Biological Catch for the 1986-1987 season is estimated to be between 5.1 and 11.2 million pounds. If this regulatory strategy is maintained, then the spawning stock is expected to be between 35 and 128 percent of the 1975-78 level in the next decade.

If the US and Mexican catch were to be reduced to zero, the spawning stock is expected to recover to between 106 and 424 percent of the 1975-78 level in the next decade.

Recent Recruitment

The Panel remains confident that the qualitative results are valid, i.e., that spawning stock and recruitment declines have occurred within the US Gulf. Similarly, the Panel remains less confident in quantitative projections of ABC into the future. For this reason, available data and fishery information were reviewed to determine if recruitment in 1985 has been substantially different from recent years. Evidence of exceptionally high levels of recruitment would indicate that the range of ABC estimated using the above methods could be raised. Conversely, exceptionally low levels of recruitment would indicate that the range should be lowered.

Increases in catch-per-effort were shown by several indices in the Gulf in 1985. However, the levels of increase were not indicative of an exceptionally good year class entering the fishery. The indices also include fish that are older than recruitment age. Therefore, the increases in CPUE's are even less likely to reflect exceptionally good recruitment.

The Panel again concluded that overfishing in the US Gulf has occurred. Therefore, as specified in Amendment 1 of the FMP, an ABC must be determined such that stock recovery is achieved. It should be recognized that a catch that is higher than the upper end of the range of ABC may have a small chance of allowing the stock to begin recovery. However, the Panel agrees that there would be a large chance that a higher catch would not allow the stock to recover at all. The risks of continued decline would be large. Thus, the mandate for recovery of the over-fished stock would not be met. For these reasons, the Panel concluded that the range of ABC given above reflects the reasonable risks faced by the stock.

Atlantic Migratory Group

Status of Stock

The fishery on the Atlantic Migratory Group rapidly expanded from 1979 to the present such that catches are now high and variable from year to year. Analyses indicated that recruitment levels are near to those of the 1975-78 period and spawning biomass has not declined. Fishing mortality rates appear to be near rates of full exploitation. Significant increases in the fishing rate would likely result in losses of yield.

ABC Determination

A range of catch predictions was generated using the results of the virtual population analysis and the criteria: $M = 0.15$ to 0.3 , future fishing mortality rate levels maintained at $F(0.1)$ and future recruitment to be between that which occurred in 1975-78 and that which occurred in 1980-81. The resulting range of catch was estimated as 5.4 to 18.5 million pounds. This is not substantially different from our present estimate of MSY of 6.9 to 15.4 million pounds. Therefore, Allowable Biological Catch for the 1986-87 season is estimated to be between 6.9 and 15.4 million pounds. If this regulatory strategy is maintained, then spawning biomass should remain at adequate levels.

The 1985-86 season's catches are projected to be approximately 10 million pounds.

SPANISH MACKEREL

The recent history of Spanish mackerel catches is one of declining landings and catch rates. Over 90% of the commercial fishery occurs in Florida and is mostly by gill nets and most catches come from South Florida during winter. Commercial fisheries account for over 77% of landings in the South Atlantic during 1979-84 and 64% of catches in the Gulf.

On the Gulf coast, commercial catches were relatively stable until the 1976/77 season when they declined from a 10-year average of 7.3 million lbs to 2.5 million lbs thereafter, most of the decline occurring from the 1975/76 to 1976/77 season. At the same time, recreational catches in Everglades National Park declined from over 6,000 fish in 1974 to about 500 fish annually during 1981-85. The NMFS, 1979-84 recreational catches on the Florida Gulf coast showed a decline in size of fish but no change in catch rates.

On the Atlantic coast, commercial landings were relatively stable before 1975, averaging 3.5 million lbs in the previous decade. Landings increased to over 9 million lbs in 1975/76 and 1976/77, declining steadily thereafter to 4

million lbs in 1983/84. Recreational catch rates on the east coast of Florida steadily declined from 4.5 fish/angler in 1979 to 0.9 fish/angler in 1984 and mean size declined significantly.

Stock Identification

Little study has been made of stock identification of Spanish mackerel. Presently in the FMP, Spanish mackerel in US waters are considered to represent a single stock occurring in the Gulf and the Atlantic. There is currently evidence for discriminating between Gulf and Atlantic groups of Spanish mackerel with a zone of mixing in south Florida. This evidence is based on electrophoresis studies, distributional patterns, spawning areas and the history of exploitation. The Panel felt that such a separation of Atlantic and Gulf groups was appropriate. The Dade-Monroe County line in south Florida was suggested as the most practical boundary between the two at this time.

However, under the mandate of the FMP, the Panel continued to present advice relative to a total US stock.

The Panel concluded that there was no available information to support stock differentiation within the US Gulf, thus a single stock was assumed. Over 90% of the US Gulf catch occurs in the eastern Gulf. Therefore, results of analyses assuming a US Gulf are virtually indistinguishable from results assuming an eastern Gulf.

Stock assumptions which include Mexican catches were rejected by the Panel. Although such connections may exist, the Mexican historical catch and size-frequency data are of limited reliability. Mexican catches in recent years have appeared relatively stable at 11-13 million pounds. Therefore, the Panel could offer no advice on the status of a stock that might include Mexican catches.

Status of Stocks

Spanish mackerel landings have declined in both the Gulf and Atlantic. In addition, the average size of fish has appeared to decline, especially in the Atlantic. Indices are inconclusive about recruitment levels.

Analyses were conducted using virtual population methods, mortality estimates and recent catches to determine the surplus production. Based upon these results, the Panel determined that the maximum surplus for the US stock (MSY) was

<u>Range</u>	<u>Best Estimate</u>
15.7 to 19.7 million lbs	18 million lbs

The Panel concluded that this maximum surplus would not be achieved without some reduction in fishing pressure.

The Panel felt that the natural mortality rate (M) on Spanish mackerel is between 0.3 and 0.5 with more likelihood that it is at the lower end of the range. If M is low, then the decline in the fishery's production is more attributable to reduced yield-per-recruit (too many young fish are taken). If M is high, then the decline in production is more attributable to reduced recruitment. The Panel could not distinguish the relative contribution of these two factors.

ABC Determination

Under Amendment 1 of the FMP, the Councils have available a limited number of management options. Most importantly, current procedures to reduce fishing mortality are limited to establishing a quota on total take within the total US fishery. Other management procedures may be more appropriate for the Councils' objectives and these are presented in the section below entitled Other Management Strategies. However, the set of procedures presently available for current action implies a management strategy which limits total fishing mortality alone. Therefore, an ABC may be estimated which reduces fishing mortality and stimulates recovery.

The Panel used the $F(0.1)$ criterion suggested in the Amendment as the fishery mortality rate for recovery. The ABC was estimated to be current catches times the ratio of $F(0.1)$ to the current fishing mortality rate. Current catches were defined by the Panel to be a range between 1984 and the average of 1983-84 levels.

This strategy will result in rapid rebuilding of the stock and lower risk of recruitment declines. The spawning stock biomass is expected to double in three years. However, such restrictions would lower the harvest of the current fishery.

The ABC range under rapid ($F(0.1)$) recovery would be 3.7 to 4.5 million lbs.

Other Management Options

Potentially, the Spanish mackerel fishery in both the Gulf and the Atlantic could respond very favorably to management raising the minimum size of capture. Yield per recruit would be maximized with a minimum size of about 18 inches at current levels of fishing. Establishment of an 18-inch minimum would in the short run reduce yields about 10%, but after 3-5 years, yield per recruit would increase to 20% above current levels, if the current intensity of fishing on fish above 18 inches were maintained. Spawning stocks would approximately double within 5 years, enhancing chances for

improved recruitment, so increases in yields might be greater than 20%. There would be some risk in employing increased minimum size management without an ultimate cap on catch or fishing mortality, because if fishing mortality on fish above the minimum increased with enactment, most of the improvement in spawning stock would not be realized.

However, there are some inherent problems (cryptic mortality, wasted yield) with trying to regulate all forms of fishing by minimum size regulation. A good management strategy might be to apply different standards of regulation to each type of gear to minimize wasting undersized fish and to eliminate hidden fishing mortality.

The Panel also recommends that alternative fishing years be considered due to the seasonal nature of the fishery.

LIST OF PARTICIPANTS

Mackerel Stock Assessment Panel

Joseph E. Powers (Chairman)
Gilbert W. Bane
Roy Williams
Nelson M. Ehrhardt
Gregg T. Waugh
Edward D. Houde (unable to attend, comments telephoned)

Non-member Participants

Scott Nichols, Southeast Fisheries Center
Terrance R. Leary, Gulf Council Staff
Peter Eldridge, Southeast Fisheries Center,
Chairman South Atlantic SSC
Gene Nakamura, Southeast Fisheries Center,
Special Mackerel Committee
Walter R. Nelson, Southeast Fisheries Center
Alex M. Jernigan, Gulf Council
Bradford E. Brown, Southeast Fisheries Center
Bill Lindall, Southeast Regional Office

King and Spanish
Mackerel Management
Options

Coastal Resources Division
Miami Laboratory
Southeast Fisheries Center
Miami, FL

September 26, 1986

ATLANTIC MIGRATORY
GROUP KING MACKEREL

Based upon data through October, 1985, presented at the meeting of the Stock Assessment Panel in March, 1986, the following statements were made relative to the Atlantic Migratory Group of king mackerel:

Status of Stock

"The fishery on the Atlantic Migratory Group rapidly expanded from 1979 to the present such that catches are now high and variable from year to year. Analyses indicated that recruitment levels are near to those of the 1975-78 period and spawning biomass has not declined. Fishing mortality rates appear to be near rates of full exploitation. Significant increases in the fishing rate would likely result in losses of yield."

ABC Determination

"A range of catch predictions was generated using the results of the virtual population analysis and the criteria: $M = 0.15$ to 0.3 , future fishing mortality rate levels maintained at $F(0.1)$ and future recruitment to be between that which occurred in 1975-78 and that which occurred in 1980-81. The resulting range of catch was estimated as 5.4 to 18.5 million pounds. This is not substantially different from our present estimate of MSY of 6.9 to 15.4 million pounds. Therefore, Allowable Biological Catch for the 1986-87 season is estimated to be between 6.9 and 15.4 million pounds. If this regulatory strategy is maintained, then spawning biomass should remain at adequate levels."

"The 1985-86 season's catches are projected to be approximately 10 million pounds."

During the period November, 1985 through March, 1986, the commercial king mackerel landings from the Atlantic Migratory Group were approximately 0.5 million lbs. Recreational landings during this period were estimated to be less than 0.2 million lbs. These values are very similar to historical landings during the winter period that were used in the assessment analyses presented to the Panel. Therefore, the actual 1985-86 season catches were not significantly different from the projection used by the Panel.

This cursory examination of the data does not indicate that the Panel's advice should be changed based upon completion of the 1985-86 fishing year. However, as the Panel indicated, the fishery appears to be near full exploitation. Given that situation, a rapid expansion to the upper end of the ABC range will increase the risk of subsequent declines in yield.

SPANISH MACKEREL

The following definition of overfishing given in Amendment 1 of the FMP (12.6.1.1.A.4) formed the basis for the determination of ABC for spanish mackerel:

"Overfishing. A stock of fish shall be considered overfished if the fishing mortality rate exceeds F_{msy} or $F_{0.1}$, or spawning biomass is low enough to affect recruitment. The $F_{0.1}$ fishing rate is the level of fishing mortality at which an increase in effort produces ten percent of the increase in yield that would occur in a lightly fished fishery for a comparable increase in effort. An $F_{0.1}$ yield per recruit management strategy better protects against growth overfishing and maintains a larger spawning population than does a F_{max} management strategy. If any stock or subgroup is overfished, the assessment group will estimate levels of ABC which would allow that stock to recover in one year, three years, five years, or other period as requested by the Councils."

The Stock Assessment Panel responded to these directives, as well as to the recognized management limitations in the present Amendment by providing the following advice:

"Under Amendment 1 of the FMP, the Councils have available a limited number of management options. Most importantly, current procedures to reduce fishing mortality are limited to establishing a quota on total take within the total US fishery. Other management procedures may be more appropriate for the Councils' objectives and these are presented in the section below entitled Other Management Strategies. However, the set of procedures presently available for current action implies a management strategy which limits total fishing mortality alone. Therefore, an ABC may be estimated which reduces fishing mortality and stimulates recovery."

"The Panel used the $F(0.1)$ criterion suggested in the Amendment as the fishery mortality rate for recovery. The ABC

was estimated to be current catches times the ratio of $F(0.1)$ to the current fishing mortality rate. Current catches were defined by the Panel to be a range between 1984 and the average of 1983-84 levels."

"This strategy will result in rapid rebuilding of the stock and lower risk of recruitment declines. The spawning stock biomass is expected to double in three years. However, such restrictions would lower the harvest of the current fishery."

"The ABC range under rapid ($F(0.1)$) recovery would be 3.7 to 4.5 million lbs."

Other Management Strategies

"Potentially, the spanish mackerel fishery in both the Gulf and the Atlantic could respond very favorably to management raising the minimum size of capture. Yield per recruit would be maximized with a minimum size of about 18 inches at current levels of fishing. Establishment of an 18-inch minimum would in the short run reduce yields about 10%, but after 3-5 years, yield per recruit would increase to 20% above current levels, if the current intensity of fishing on fish about 18 inches were maintained. Spawning stocks would approximately double within 5 years, enhancing chances for improved recruitment, so increases in yields might be greater than 20%. There would be some risk in employing increased minimum size management without an ultimate cap on catch or fishing mortality, because if fishing mortality on fish above the minimum increased with enactment, most of the improvement in spawning stock would not be realized."

"However, there are some inherent problems (cryptic mortality, wasted yield) with trying to regulate all forms of fishing by minimum size regulation. A good management strategy might be to apply different standards of regulation to each type of gear to minimize wasting undersized fish and to eliminate hidden fishing mortality."

"The Panel also recommends that alternative fishing years be considered due to the seasonal nature of the fishery."

The Stock Assessment Panel recommended that reductions in fishing mortality will contribute to longer term increases in yield approaching MSY. However, results were inconclusive as to whether the declines in catch relative to the 1970's were due to reductions in yield-per-recruit or to reductions in recruitment or both. The Panel suggested options which would address both problems, simultaneously, by decreasing overall fishing pressure and/or fishing pressure on small fish. Both mechanisms would likely lead to increases in yield per recruit. Similarly, both methods would increase spawning biomass (to address recruitment problems should they exist).

As can be seen, the Panel addressed rapid recovery (two or three years) using the $F(0.1)$ criterion and longer term recovery (approximately five years) by suggesting limitation on the mortality of small fish. Obviously, there are combinations of these options which would produce the same ends.

Additionally, the Panel suggested the establishment of separate management units between the Atlantic and Gulf with the Dade/Monroe county line as being an analytically convenient border. Although the Panel was presented analyses based upon such a separation, they limited their advice to management options which could be implemented under the existing amendment, i.e., for the total US (Gulf plus Atlantic) resource.

The following is a discussion of expanded management options which address the issues of alternative "recovery periods" and separation of management units.

MANAGEMENT OPTIONS

Total US Stock

Table 1 gives several management options for the total US resource and their consequences on spawning biomass. The options are grouped into quota options (which control overall fishing mortality), minimum size options (which control fishing mortality on small fish) and combinations of the two. The stock will have approximately "recovered" to MSY when the spawning biomass is doubled (spawning biomass increases 100%). Note that the recovery times are very imprecise. A single, moderately large year class of spanish mackerel which was protected from fishing until it matures at 2 or 3 years could produce rapid recovery of the spawning biomass. Conversely, a low year class will delay the process. When we say "the spawning stock will recover in five years", we mean that on average we expect enough good year classes to enter the fishery in the next five years such that the spawning biomass will increase to levels that will produce yields that are near MSY. See Table 1.

Note that the spawning biomasses in Table 1 are based upon constant fishing mortality strategies over the five years. It is possible for management to be more stringent in the first part of the five years and less stringent in the second part and still end up at the same place. The converse is also true.

The effects of other options may be determined by interpolating in Table 1. For example, if an overall quota of 5.2 to 6.1 million lbs is specified and a minimum size of 14 inches were to be imposed in a segment of the fishery, then the effect on spawning stock biomass would be between that of Option III.A.) and I.C.).

Separate Stock Options

The Panel was presented an analysis in which the spanish mackerel were separated into Gulf and Atlantic Groups with the boundary being the Dade/Monroe county line in south Florida. Management options which result from that analysis were generated using the rapid recovery criterion ($F(0.1)$) and a slower recovery (no fish killed less than 18 inches). The results were:

Separate Stock Management Options for Spanish Mackerel

<u>Option</u>	<u>Quota</u>	<u>Expected Catch in 1987 (on average)</u>
A). Quota Only (rapid recovery)		
Atlantic stock	2.2 to 2.9	2.2 to 2.9
Gulf stock	1.6 to 1.8	1.6 to 1.8
B) No Fish Killed Less Than 18 inches (slower recovery)		
Atlantic stock	--	3.8 to 4.8
Gulf stock	--	4.1 to 4.5

The "recovery" times are approximately equal to the equivalent management option for the total US stock, i.e., the rapid recoveries are expected on average to increase spawning stock biomass 100% in three years, whereas the slower recoveries are expected on average to increase spawning stock biomass 100% in five years.

Resulting average expectations of catch and recovery period resulting from other options of quotas and reductions in small fish catch can be generated by looking at the equivalent options for the total US stock and using the percentage changes.

Note that alternative stock boundaries will change what the above ranges will be. At this point we cannot tell even qualitatively what the changes would be. For example, it has been proposed that the boundary should be the same as the Councils' boundary. If that were the case, Monroe County in south Florida would be split between Atlantic and Gulf. From 1981-85, the annual commercial landings in Monroe County were 2.2 million lbs. The annual percent of these catches (in lbs) that occurred in the Atlantic (as defined by the Council boundary) varied from 5% to 60%. Thus, it is unclear what the qualitative effect of this proposed boundary would have upon an assessment.

Table 1. Spanish mackerel management options

Management Option	Expected Catch in 1987 (on average) Given Management Option	^{1/} Effects on Spawning Biomass (SSB)
<u>2/</u> I. Implement a quota only		
I.A.) 3.7 to 4.5 million lbs	3.7 to 4.5	On average SSB will increase 100% in 3 years and 130% in 5 years
I.B.) 4.3 to 5.1 million lbs	4.3 to 5.1	On average SSB will increase 100% in 5 years
I.C.) 5.2 to 6.1 million lbs	5.2 to 6.1	On average SSB will increase 50% in 5 years and will not increase further after that.
I.D.) 7.9 to 9.2 million lbs	7.9 to 9.2	On average SSB will increase 15% in 5 years and will not increase further after that.
<u>3/</u> II. Reduce Mortality on Small Fish Only		
II.A.) No fish killed which are less than 18 inches	7.9 to 9.2	On average SSB will increase 100% in 5 years.
II.B.) No fish killed which are less than 16 inches	8.3 to 9.7	On average SSB will increase 60% in 5 years and will not increase further after that.
II.C.) No fish killed which are less than 14 inches	8.5 to 10.0	On average SSB will increase 25% in 5 years and will not increase further after that.
III. Combinations of I and II		
III.A.) Overall quota of 5.2 to 6.1 million lbs and no catch of fish less than 14 inches [(I.C) (II.C)]	5.2 to 6.1	On average SSB will increase 80% in 5 years and not increase further after that.
III.B.) Overall quota of 4.3 to 5.1 million lbs and no catch of fish less than 14 inches [(I.B) (II.C)]	4.3 to 5.1	On average SSB will increase 100% in 3 years and 125% in 5 years.

^{1/}"Recovery" of the stock is approximately achieved when the spawning stock biomass (SSB) doubles, i.e., increases 100%.

^{2/}"Quota Only" options assume that the present minimum size 12" and the present fishing practices relative to size remain in place.

^{3/}Mortality on Small Fish Options assume that no fish less than the critical size die due to fishing and that there will be no change in overall fishing effort