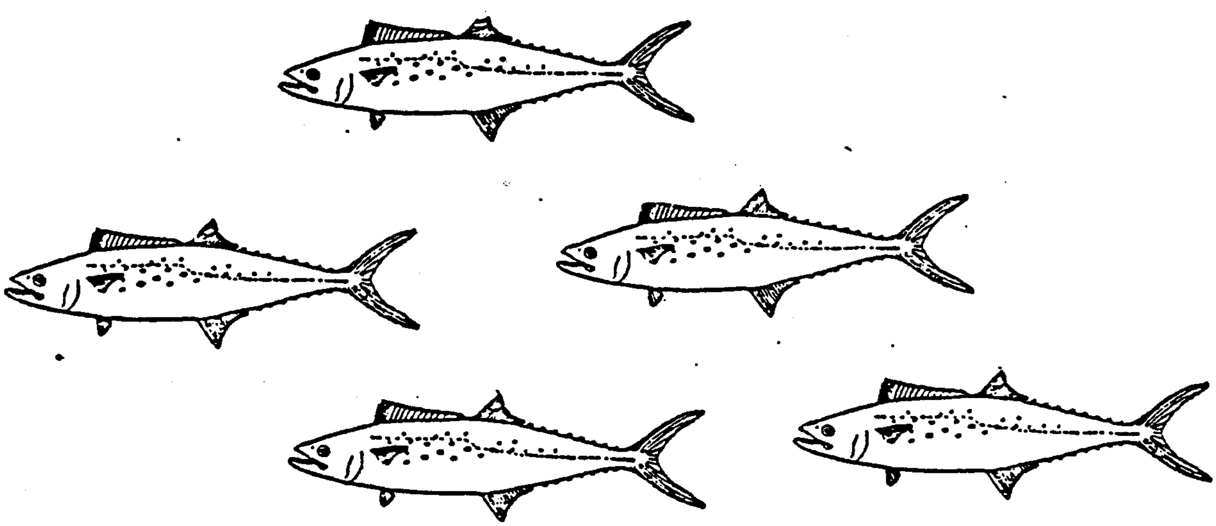
FISHERY MANAGEMENT PLAN
FINAL ENVIRONMENTAL IMPACT STATEMENT
REGULATORY IMPACT REVIEW
FINAL REGULATIONS
FOR THE
COASTAL MIGRATORY PELAGIC RESOURCES
(MACKERELS)



PREPARED FOR

THE GULF OF MEXICO AND SOUTH ATLANTIC
FISHERY MANAGEMENT COUNCILS

FEBRUARY, 1983

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FINAL ENVIRONMENTAL IMPACT STATEMENT

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FOR

COASTAL MIGRATORY PELAGIC RESOURCES (MACKERELS)

IN

THE GULF OF MEXICO

AND

SOUTH ATLANTIC REGION

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2.0 SUMMARY

2.1 Fishery Definition

The coastal migratory pelagic resources (mackerels) are those species in the waters of the Gulf of Mexico and in the coastal and fishery conservation zone (FCZ) off the south Atlantic coast as specified below. The fishery year is to commence July 1 and terminate June 30.

2.2 Management Area

Area for management: Federal regulation pursuant to this plan will apply to the FCZ within the jurisdiction of the Gulf and South Atlantic Councils. However, maximum sustainable yield and optimum yield are based on the stocks in the U.S. FCZ, the territorial sea, and internal waters of the various states. Consequently the allocations to various gear types include catches both from the FCZ and waters landward thereof. The states bordering the areas of jurisdiction of the Gulf of Mexico and South Atlantic Council. Fishery Management Councils are urged to adopt regulations which are compatible with those applying in the FCZ. Regulations are not applied in the area of jurisdiction of the Mid-Atlantic Council because the catches there and the quantities of regulated species occurring there are so small that regulation would not be cost effective and is not necessary to accomplish the objectives of the plan. Similarly, catches there are not included in OY or in catch allocations. Should a fishery develop which significantly affects the stocks and is in the FCZ beyond the area for management, the management area may be extended by plan amendment.

2.3 Species

2.3.1 Species in the Management Unit (for which regulations are proposed)

King mackerel	*Scomberomorus cavalla*
Spanish mackerel	*Scomberomorus maculatus*
Cobia	*Rachycentron canadum*

2.3.2 Species in the Fishery but not in the Management Unit (no regulation proposed)

Cero mackerel	*Scomberomorus regalis*
Little tunny	*Euthynnus alletteratus*
Dolphin	*Coryphaena hippurus*
Bluefish (Gulf of Mexico only)	*Pomatomus saltatrix*

2.4 Statement of MSY, OY, EDAH and TALFF (millions of pounds)

	MSY	OY	EDAH (1981)	TALFF
King mackerel	37	37	37	0
Spanish mackerel	27	27	27	0

For cobia, optimum yield is defined as all cobia equal to or larger than 33 inches in length from the tip of the head to the center of the tail (fork length) which can be harvested by U.S. fishermen. MSY is estimated at 1,057,000 pounds, EDAH is estimated as 1,000,000 pounds in 1981, and TALFF is zero.

2.5 Problems in the Fishery

1. Current and accurate biological and economic data needed as a basis for management decisions are not available.

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

3. Rapidly increasing fishing effort for king mackerel could soon result in overfishing if no action is taken.

4. Cobia are presently harvested at a size below that necessary for maximum yield and may be overfished in some areas beyond the management area.

2.6 Management Objectives

2.6.1 King Mackerel

1. Institute management measures necessary to prevent exceeding MSY.

2. Establish a mandatory statistical reporting system for monitoring catch.

3. Minimize gear and user group conflicts.

2.6.2 Spanish Mackerel

1. Institute management measures necessary to prevent exceeding MSY.

2. Establish a mandatory statistical reporting system for monitoring catch.

3. Minimize gear and user group conflicts in the event they arise.

4. Promote the maximum use of the resource up to the OY estimate.

2.6.3 Cobia

1. Institute management measures necessary to increase yield per recruit and average size and to prevent overfishing.

2.7 Proposed Management Measures

2.7.1 Proposed Management Measures for King Mackerel

A. The Secretary of Commerce may implement measures designed to provide limitations, where appropriate, on any gear or device used in the king mackerel fishery to reduce gear and user group conflicts. The Secretary, after consultation with the affected Councils, may take the following action by regulatory amendment based on the following criteria:

(1) When a conflict arises through expansion of a historical fishery in a traditional fishing area or region, the Secretary shall investigate the causes and extent of the conflict, the economic and sociological impacts of any viable limitations on the expanded fishery or other users, other solutions to the conflict and other relevant factors. The Secretary, after consultation with the affected Councils and states, may resolve the conflict as fairly as possible by taking one or more of the following actions:

(a) Separate the users or gear by area (fishing zone).

(b) Separate the users or gear by time (day of week).

(c) Assign local quotas to each gear or user group based on the historical catches of each for that local area.

(d) Allow unlimited usage of the gear or device.

(2) When the conflict arises through the introduction of gear or devices into new regions where they have not been historically fished, the Secretary shall investigate the harvesting capacity and efficiency of the new gear or device in the local area, the economic and sociological impacts on users of historical gear, the historical level of stock abundance in the area and the other relevant factors. The Secretary may, after consultation with the affected Councils and states, take one or more of the following actions:

(a) Prohibit use of the gear or device in that geographical area.

(b) Allow only limited use of the gear or device to more fully evaluate its impacts and potentials.

(c) Limit the number of units of the gear or device which can be utilized in that area.

(d) Allow unlimited usage of the gear or device.

(3) When a conflict arises as a result of circumstances in the fishery, other than as described in (1) or (2) above, the Secretary may implement measures designed to obviate such conflicts by measures provided for in (1) and (2) above, or take such other action as may be appropriate and necessary to resolve such conflicts in a manner consistent with the goals and objectives of the plan, the National Standards, the MFCMA and other applicable law.

B. When the Regional Director, Southeast Region, NMFS, determines, based on reliable information, that a conflict, as described in FMP Section 8.2.6, exists or is about to exist, he will take one of the following actions by field order. The time period during which such restrictions shall be enforced will be determined by length of time a direct conflict exists or is expected to exist.

(1) Establish a fishing window within the following points:

(a) Bethel Shoal light (27° 44.3'N, 80° 10.4'W).

(b) A wreck 15 miles southeast of Fort Pierce inlet (27° 23.5'N, 80° 3.7'W).

(c) Marker WR 16, five miles northeast of Jupiter inlet (27° 0.6'N, 80° 2.0'W).

(d) 100 fm depth due east of point c (27° 0.6'N, 79° 55.0'W).

(e) 100 fm depth due east of point b (27° 23.5'N, 79° 54.0'W).

(f) 100 fm depth due east of point a (27° 44.3'N, 79° 53.5'W).

The Regional Director may prohibit use of gill-net gear to take king mackerel within the area a-b-e-f, b-c-d-e or a-c-d-f. If additional action is needed, prohibit use of hook and line gear to take king mackerel within a window landward of a line between the points a-b, b-c or a-c.

(2) Establish two fishing zones seaward (east) of state jurisdiction. These zones shall be the waters of the FCZ between 27° 10' north latitude and 27° 50' north latitude divided into two areas along the line of 27° 30' north latitude.

(a) In the first year in which a conflict arises, the use of gill nets for taking of king mackerel shall be prohibited in the area south of 27° 30' north latitude and use of hook and line gear for taking of king mackerel shall be prohibited in the area north of 27° 30' north latitude. In any succeeding year when a conflict develops, the area in which each gear is prohibited may be changed.

(b) When a conflict arises, use of each gear within the zone between 27° 10'N and 27° 50'N may be alternated daily.

(i) On even days of the month, use of gill-net gear to take king mackerel may be prohibited.

(ii) On odd days of the month, use of hook and line gear to take king mackerel may be prohibited.

(c) Close the fishery for king mackerel to all users within the zone between 27° 10'N and 27° 50'N. This measure shall only be imposed if the conflict results in:

(i) Death or serious bodily injury.

(ii) Significant gear loss.

Procedures for evaluating the existence of a conflict:

(1) The following procedures must be employed by the Regional Director in his decision process regarding the existence of a conflict for which a field order is appropriate and prior to the implementation of such a field order.

(a) At such time as the Regional Director is advised by any party that a conflict exists, he must confirm the existence of such a conflict through information supplied him by NMFS, U.S. Coast Guard or other appropriate law enforcement agencies.

(b) In the event that such information is not ascertainable from those law enforcement personnel as provided in (a) above, such confirmation may be made through information supplied by personnel of the state agency with marine fishery management responsibility.

(c) Confer with the Chairmen of the affected Councils, the office of the state agency(s) with the marine fishery management responsibility, and such other persons as the Regional Director deems appropriate, if any.

(2) Restrictions on field orders

(a) No field order may be implemented which results in the exclusive access of any user group or gear type to the fishery during the time the field order is in existence.

(b) A field order may be rescinded by the Regional Director if he finds through application of the same procedures set forth in (1) above that the conflict no longer exists.

(c) No field order may be implemented for a time period greater than five (5) days except under the conditions set forth in Section (e) above.

(d) At such time as the Regional Director submits to the Federal Register a field order for implementation under these provisions, he shall immediately arrange for a fact-finding meeting in the area of the conflict to be convened no later than 72 hours from the time of implementation of the field order. The following shall be advised of such fact-finding meeting:

(1) The Chairmen of the affected Councils;

(2) The office of the state agency with fishery management responsibility;

(3) Local media;

(4) Such user group representatives or organizations as may be appropriate and practicable;

(5) Others as deemed appropriate by the Regional Director or as requested by Chairmen of the affected Councils or the state agency.

This fact-finding meeting shall be for the purpose of evaluating the following:

(1) The existence of a conflict needing resolution by the field order;

(2) The appropriate term of the field order, i.e., either greater or less than five (5) days;

(3) Other possible solutions to the conflict other than federal intervention;

(4) Other relevant matters.

(e) In the event it is determined as a result of the fact-finding meeting that the term of the field order should exceed five (5) days, the Regional Director may, after consultation with the Chairmen of the affected Councils and the involved state agency, extend such field order for a period not to exceed 30 days from the date of initial implementation. In the event the Regional Director determines that it is necessary or appropriate for the term of such field order to extend beyond 30 days, such extension may be made after consultation with the Chairmen of the affected Councils and for such period of time as necessary and appropriate to resolve the conflict.

C. A total allowable catch shall be established at 37 million pounds per year.

(1) Annual stock allocations shall be made as follows: 28 million pounds for the recreational fishery and nine million pounds for the commercial fishery.

(2) The commercial allocation shall be divided between hook and line gears and net gears as follows:

Hook and line:	3,877,200 pounds
Nets	5,122,800 pounds

(3) If the catch of any user group exceeds its allocation, the Secretary shall close the fishery to that group for the remainder of the fishing year.

(4) Commercial and recreational fishermen defined as follows:

- A commercial fisherman is a person who sells his catch.

- A recreational fisherman is a person who does not sell his catch.

D. The minimum mesh size in the FCZ for all king mackerel gill nets shall be 4-3/4 inches stretched mesh in the Gulf of Mexico and South Atlantic Regional Councils' areas of jurisdiction.

E. (1) The Regional Director, Southeast Region, NMFS, may institute a bag limit for king mackerel taken by recreational or recreational for hire users and/or a trip limit for commercial users by the regulatory amendment process when supporting data becomes available and after consultation with the affected Councils.

(2) The Regional Director, Southeast Region, NMFS, may institute a size limit by the regulatory amendment process when supporting data becomes available and after consultation with the affected Councils.

2.7.2 Proposed Management Measures for Spanish Mackerel

A. The Secretary of Commerce may implement measures designed to provide limitations, where appropriate, on any gear or device used in the Spanish mackerel fishery to reduce gear and user group conflicts. The Secretary, after consultation with the affected Councils, may take the following action by regulatory amendment based on the following criteria:

(1) When a conflict arises through expansion of a historical fishery in a traditional fishing area or region, the Secretary shall investigate the causes and extent of the conflict, the economic and sociological impacts of any viable limitations on the expanded fishery or other users, other solutions to the conflict and other relevant factors. The Secretary, after consultation with the affected Councils and states, may resolve the conflict as fairly as possible by taking one or more of the following actions:

(a) Separate the users or gear by area (fishing zone).

(b) Separate the users or gear by time (day of week).

(c) Assign local quotas to each gear or user group based on the historical catches of each for that local area.

(d) Allow unlimited usage of the gear or device.

(2) When the conflict arises through the introduction of gear or devices into new regions where they have not been historically fished, the Secretary shall investigate the harvesting capacity and efficiency of the new gear or device in the local area, the economic and sociological impacts on users of historical gear, the historical level of stock abundance in the area and the other relevant factors. The Secretary may, after consultation with the affected Councils and states, take one or more of the following actions:

(a) Prohibit use of the gear or device in that geographical area.

(b) Allow only limited use of the gear or device to more fully evaluate its impacts and potentials.

(c) Limit the number of units of the gear or device which can be utilized in that area.

(d) Allow unlimited usage of the gear or device.

(3) When a conflict arises as a result of circumstances in the fishery, other than as described in (1) or (2) above, the Secretary may implement measures designed to obviate such conflicts by measures provided for in (1) and (2) above, or take such other action as may be appropriate and necessary to resolve such conflicts in a manner consistent with the goals and objectives of the plan, the National Standards, the MFCMA and other applicable law.

B. (1) A 12-inch fork length minimum size limit shall be set on Spanish mackerel in both the commercial and recreational fisheries.

(2) A catch allowance for underized fish will be allowed equal to five percent of the total catch by weight of Spanish mackerel on board a vessel in the Spanish mackerel fishery or any other fishery.

C. The Regional Director, Southeast Region, NMFS, may institute a bag limit for Spanish mackerel taken by recreational or recreational for hire users and/or a trip limit for commercial users by the regulatory amendment process when supporting data become available and after consultation with the affected Councils.

D. If OY is taken, the fishery for Spanish mackerel will be closed for the remainder of that fishing year.

2.7.3 Proposed Management Measures for Cobia

The following measure is proposed for cobia by the Gulf of Mexico and South Atlantic Councils:

A. Possession of cobia less than 33 inches fork length shall be prohibited in the FCZ.

2.7.4 Proposed Management Measures for Purse Seines

A. (1) Harvest of king mackerel by purse seine gear will be allowed up to a maximum of 400,000 pounds per year in the area of jurisdiction of the Gulf Council, and 400,000 pounds per year in the area of jurisdiction of the South Atlantic Council. Any purse seine harvest will be counted within the commercial allocation for all net gears.

(2) Harvest of Spanish mackerel by purse seine gear will be allowed up to a maximum of 300,000 pounds per year in the area of jurisdiction of the Gulf Council, and 300,000 pounds in the area of jurisdiction of the South Atlantic Council.

B. Observers, under the direction of the National Marine Fisheries Service, must be required on all purse seine vessels while fishing for king or Spanish mackerel during the first three fishing years after this plan is in effect.

2.7.5 Statistical Reporting Measures

A. The Councils conceptually accept a vessel enumeration system and creel census data system that would provide sufficient information for fishery management. Mechanics of the system are to be developed by National Marine Fisheries Service and the Regulatory Measures Committee.

B. Require a reporting system for all user groups and processors based on statistical sampling whereby it would be mandatory for a selected respondent to provide answers to the sampling questionnaire on a recurring basis that is not of great frequency.

2.8 Recommendations

2.8.1 Special Recommendations to the Secretary

The Councils recommend several areas where special research is needed. These are listed in priority order in FMP Section 14.4.

2.8.2 Special Recommendations to the States

A. In the future, effective and equitable management will require a workable means of differentiating true commercial from true recreational fishermen. This is particularly important in implementing allocations to user groups. Therefore:

> The Councils formally recommend to each state in their area that consideration be given to requiring all persons who sell fish to have a commercial license, that the commercial license be of significant dollar value and that severe penalties be levied against any commercial operator purchasing fish from an individual not possessing a commercial license.

B. The Councils recommend that the states implement the management measures proposed in this plan within their territorial jurisdiction, where applicable. The Councils further encourage the states to assist the Secretary in addressing and supporting the research and other special recommendations.

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4.0 INTRODUCTION

The Magnuson Fishery Conservation and Management Act gives responsibility to the Regional Fishery Management Councils to prepare and submit fishery management plans for fisheries within their geographical area. The South Atlantic and Gulf of Mexico Fishery Management Councils, in accordance with their legislative mandate, have prepared a joint plan for the coastal migratory pelagic resources (mackerels) management unit.

Following the format for a complete fishery management plan, this report begins with Section 4.0, Introduction, followed by Section 5.0, Description of the Stocks Comprising the Management Unit. The latter section includes discussions of the biological characteristics of each species in the management unit, the abundance and condition of the stocks, their ecological relationships, and estimates of maximum sustainable yield. Section 6.0 describes the condition of the habitats of the various species. Section 7.0 presents a discussion of the management institutions and the laws that are relevant to the species in the management unit. Section 8.0 describes the character of the commercial and recreational fishing activities, and it is followed in Section 9.0 with an analysis of the economic characteristics of the fishery. In Section 10.0 the business and market characteristics, and organizations associated with the fishery are described. Section 11.0 presents a discussion of the social and cultural aspects of the commercial and recreational fisheries. Section 12.0 specifies management objectives, optimum yield, and management measures and assesses their impacts. Section 13.0 summarizes management measures required under the plan. Section 14.0 specifies statistical reporting required under the plan. Section 15.0 discusses the relationship of the plan to existing laws and policies. Section 16.0 discusses Council monitoring of the plan. References cited are in Section 17.0.

5.0 DESCRIPTION OF STOCKS COMPRISING MANAGEMENT UNIT

5.1 Description of Species and Their Distribution

The Coastal Pelagic Species Fishery Management Plan for the south Atlantic and Gulf of Mexico fishery management regions covers the following seven species: Spanish mackerel (*Scomberomorus maculatus*), king mackerel (*Scomberomorus cavalla*), cero mackerel (*Scomberomorus regalis*), bluefish (*Pomatomus saltatrix*), cobia (*Rachycentron canadum*), little tunny (*Ethynnus alletteratus*), and the common dolphin-fish (*Coryphaena hippurus*). Following are summaries of the information on the distribution and biology of each species. Additional and more detailed information may be obtained in a Resource Document available through the Gulf of Mexico Fishery Management Council.

Several of the summaries use the von Bertalanffy growth equation to relate age to length. To facilitate understanding, the general form of the equation is given here and the terms described:

$$L_t = L_{oo} (1 - e^{-K(t-t_o)})$$

where L_t is length at a given age, L_{oo} is theoretical maximum length, K is rate of change of growth rate, t is a given age, and t_o is the theoretical age at beginning of growth (when L_t is zero).

5.1.1 Description of King Mackerel (*Scomberomorus cavalla*)

The king mackerel is the largest *Scomberomorus* species in the western Atlantic and may achieve 5.5 feet in length, weighing 100 pounds. The form of the king mackerel is elongate and laterally compressed. The body is covered with rudimentary scales. The color is bluish or iron gray dorsally and silvery on the sides and belly (Berrien and Finan, 1977).

5.1.1.1 Distribution and Migration

The king mackerel inhabits the waters of the western Atlantic from the Gulf of Maine to Rio de Janiero, Brazil, including the Gulf of Mexico and the Caribbean. The species occurs regularly as far north as Virginia and North Carolina. It is a coastal species which is not normally found beyond the continental shelf.

Seasonal movement along the Gulf of Mexico and Atlantic coastlines of the United States is apparent, and the species is more abundant in the northern part of its range during the summer and in south Florida during the winter. The movements are probably related to water temperature. Annual or long term changes in temperature may affect seasonal migration patterns or their timing. Fable, et al. (in prep.) report that king mackerel occurred later in the year during years of low mean air temperature than in years when the temperature was high. In the areas off St. Petersburg, Florida, the timing of the spring "run" of king mackerel is correlated with winter air temperature and limited by a minimum offshore water temperature of 20°C (68°F) (Williams and Taylor, in prep.).

Migratory patterns of king mackerel change with increasing size or age. Such behavioral changes are common to many scombrid species (Beaumariage, 1973). In a given area different size classes are present at different times of the year. This has been observed off Ft. Pierce, Florida, (R. Williams, FDNR, pers. comm.) and can be inferred from monthly change in the average size of fish caught in North Carolina (Manooch and Laws, 1979). Very large individuals are present off Louisiana during the entire year. Such large fish are abundant in winter off Louisiana, Texas, and northeast Florida, when small fish are very rare. It has been suggested that these concentrations of large fish are separate stocks. This seems unlikely given the narrow size distribution.

There appear to be at least two exploited groups of king mackerel in U.S. waters which may be separate stocks. Tagging data, (Williams, unpub. man., 1976, 1977) shows at least two migration patterns which may indicate two separate stocks. Members of one group are found along the southeast coast of Florida near Ft. Pierce and Sebastian Inlet from December to March. In the late winter and early spring, these fish reappear off Ft. Pierce at about the same time each year (Williams, unpub. man., 1977). This migration pattern has been shown for fish tagged off Ft. Pierce from December to March and in August, off Islamorada in January, Key West in February, Naples in March, and Port Aransas, Texas, in August. Two tag returns from Mexico indicate some interaction with Mexican stocks. The extent of this is unknown.

A second group was defined by tagging in the spring off Boynton Beach and Jupiter, south of Ft. Pierce. These fish (with two exceptions) travel north during the spring and summer as far as Virginia. Again, size affects migration patterns. Fish recaptured in summer in South Carolina, North Carolina and Virginia were larger than those recaptured in summer in south Florida (Williams, 1977). The length-frequency data of Trent, et al., (in prep.) support this concept.

Recent analysis of length-frequency data suggest at least three exploited groups of king mackerel in U.S. waters which may be separate stocks (Trent, Williams, Saloman, and Manooch, in prep.). These are the small- and medium-sized fish in Florida, the medium-sized fish along the northern Gulf and south Atlantic, and the large fish off Louisiana. Not all of the Florida group seems to join the northward migration. Some remain in south Florida during the summer. There appears to be a size differential in the migration pattern. Fish tagged in Ft. Pierce and recaptured in the northern Gulf are larger (approximately 8.75 pounds), and probably sexually mature, while those recaptured in south Florida during the summer averaged 5.5 pounds and were probably not sexually mature (Williams, unpub. man., 1977).

Size selective migration of larger fish to the northern extremes of the range does not adequately explain size of fish caught in these areas. Catches of king mackerel by the charter boat fleet in Panama City and Destin are primarily small fish averaging four to six pounds (Captain H. L. Hilpert, pers. comm.). Catches by the North Carolina charter boat fleet are primarily small fish in April and May. Mean weight was 5.6 pounds during those months in 1977 (Manooch and Laws, 1979). In that area, mean weight of the catch increases steadily during the season. The season average weight in 1977 was 8.43 pounds (Manooch and Laws, in prep.). Large fish are reportedly caught off Texas and Louisiana in winter. A possible explanation for this may be that some immature fish remain in south Florida, while others continue with the larger fish. The four to six pound fish caught in the northern Gulf of Mexico and along the North Carolina and Virginia coasts are approximately one year of age. They may not have been large enough for very many to have been captured during tagging the previous winter. If a smaller percentage of smaller fish than larger fish migrate northward, the average size of the recaptures from the northern areas will be larger.

If this is not the explanation, then it is possible that other groups exist that have not been defined by tagging. Further work is needed to accurately define the migratory patterns and possible stock divisions for king mackerel. If separate stocks do exist, they should be managed separately.

5.1.1.2 General Behavior

Smaller individuals of this species form immense schools, while larger individuals are often solitary. Schools are comprised of similar sized individuals, and small king mackerel sometimes run in schools of Spanish mackerel of the same size.

Schools of king mackerel tend to congregate in areas of bottom relief such as holes or reefs. Older, solitary individuals, in particular, are often found around structures such as wrecks and oil rigs.

5.1.1.3 Age and Growth Parameters

The only available estimates of age and growth parameters for king mackerel in U.S. waters are found in Beaumariage (1973). Namura and Rodrigues (1967) calculated age in king mackerel in Brazil by a similar method. However, the results were quite different. Data from Beaumariage is used in this analysis as the most applicable to U.S. waters.

a) Growth equation

The calculated von Bertalanffy theoretical growth equations for male and female king mackerel are as follows:

$$\text{Males:} \quad SL_t = 840\ (1-e^{-.35(t + 2.5)})$$

$$\text{Females:} \quad SL_t = 1150\ (1-e^{-.21(t + 2.4)})$$

where SL is standard length in millimeters and t is age in years.

The following table developed from Beaumariage (1973) shows average standard length and weight at each age.

	Males		Females	
	SL (mm)	W (g)	SL (mm)	W (g)
I	594	1867	614	2025
II	679	2765	699	3038
III	718	3258	777	4228
IV	760	3850	819	4984
V	777	4109	882	6282
VI	789	4298	956	8082
VII	811	4660	999	9273

b) Age-Frequency Distribution

Although precise age-frequency data are not available, length-frequency distribution in two different commercial king mackerel fisheries, the trolling fishery on the southeast coast of Florida and the gill-net fishery on the southwest coast of Florida, was determined by Beaumariage (1973). King mackerel taken by gill net are slightly larger than those taken by hook and line. Eighty-eight point six percent of the gill-net catch was between 650 and 900 mm standard length, while 88.8 percent of hook and line landings were between 600 and 850 mm.

c) Age at Recruitment

King mackerel cohorts in Florida become fully vulnerable to capture at Age II and Age III in the handline fishery of Florida, and at Age III and IV in the gill-net fisheries (Beaumariage, 1973). Full recruitment to the recreational fishery probably occurs at or before Age I.

d) Life Expectancy

King mackerel can achieve an age of at least 14 years; a 90 pound female of that age was caught off Key West (Beaumariage, pers. comm.).

e) Survival

Beaumariage (1973) determined survival rate for Florida king mackerel from catch curves based on length frequency distributions. Annual survival rate calculated from the catch of the east coast trolling fishery was S = 0.46, and for the west coast gill-net fishery, S = 0.52.

5.1.1.4 Reproduction

a) Sex Ratios

No precise estimate of sex ratio exists. Recent work indicates that sex ratios vary significantly from a 1:1 ratio both spatially and temporally (Trent, et al., in prep.).

b) Age at Maturity

Age at first maturity is not well understood. Beaumariage (1973), studying gonadal development in king mackerel from Florida waters, concluded that major spawning occurs at Age IV and over in females and at Age III and over in males, although some Age III females and Age II males are reproductively active. Hook and line fishermen report that ripe ovaries are commonly found in five to six pound fish (R. Farlow, pers. comm.). This suggests that significant spawning may occur in females as young as Age II. However, histological examination of developing gonads from Age II and III females indicated that those fish did not spawn (Beaumariage, pers. comm.). Recent work by NMFS indicates that some fish collected in the northeastern Gulf of Mexico off Panama City had maturing ovaries as young as Age I+ which suggests that some females spawn in their second year (John Finucane, pers. comm.).

c) Fecundity

No fecundity studies have been made on king mackerel in Florida. Fecundity equations based on measurements from 39 king mackerel in Brazilian waters were developed by Ivo (1974). These may not be valid for Florida.

d) Spawning Season (Excerpted from Berrien and Finan, 1977a)

The spawning season in this species is protracted (Beaumariage, 1973; Ivo, 1972; Wollam, 1970) with several spawning peaks (Beaumariage, 1973). Along the Florida west coast the season is from April through November with a peak in May (Beaumariage, 1973). However, NMFS 1978 king mackerel data from Panama City indicates spawning peak in the northwest Florida area occurs in the late summer and fall (John Finucane, pers. comm.).

Larvae and juveniles are found from May to November in U.S. waters (Berrien and Finan, 1977). Ivo (1972) observed spawning stage gonads in Brazilian waters the year round; although Menezes (1969) said the species spawns in Brazil during the first and fourth quarters.

Gonadal development and spawning appear to be correlated with some seasonally varying environmental factor such as photoperiod or temperature (Beaumariage, 1973).

e) Spawning Area

The outward boundary of spawning in king mackerel is probably the landward edge of oceanic currents such as the Gulf Stream and the Loop Current, and the shoreward edge is probably bounded by inshore areas of high turbidity and low salinity. This generalized statement is based on examination of the larval distribution patterns of Wollam (1970), Schekter (1972) and Mayo (1973), and Dwinell and Futch (1973). King mackerel apparently spawn further offshore than Spanish mackerel (Wollam, 1970; Dwinell and Futch, 1973; and McEachran and Finucane, 1979). There does not appear to be any small, well defined areas for spawning. Larval distribution indicates spawning occurs in the western Atlantic off the Carolinas, Cape Canaveral (Wollam, 1970), and Miami (Schekter, 1972, and Mayo, 1973); in the eastern Gulf of Mexico off the Dry Tortugas (Wollam, 1970); in the northern Gulf of Mexico off the Florida panhandle (Wollam, 1970, and Dwinell and Futch, 1973), and the Texas coast (McEachran and Finucane, 1979); and in the Yucatan Channel (Wollam, 1970). Relative abundance of larvae off the Texas coast suggests that area may be a major spawning site (McEachran and Finucane, 1979). The abundance of very large king mackerel off Louisiana suggests that this may also be a significant spawning area. There is little spawning in the eastern Gulf between Naples and Apalachicola (Houde, et al., 1979).

5.1.1.5 Larvae

Larvae and juveniles have been found off southwestern Florida in May, in the Yucatan Channel in June and July, off eastern Florida and in the northern Gulf of Mexico in September, and off Cape Hatteras, North Carolina, in August, September, and November (Wollam, 1970). Dwinell and Futch (1973) found *S. cavalla* larvae off Florida and Alabama every month that they sampled, from June through October. Juvenile *S. cavalla* were collected off Louisiana during June and September (Perret, et al., 1971) and in St. Andrew Bay, Florida (Nakamura, 1976). Larvae of king mackerel were captured from 1975 through 1977 off the Texas coast from May through October with the greatest number occurring over the outer continental shelf during September (McEachran and Finucane, 1979). Schekter (1971) and Mayo (1973) found king mackerel larvae in the Florida current over a 16-month period, but did not report periodicity.

Dwinell and Futch (1973) collected more king mackerel larvae at mid-depths than at the surface in June, but more at the surface than at mid-depths in September. Sampling occurred during the evening and at night at most stations. Salinities where *S. cavalla* larvae were collected by Dwinell and Futch (1973) ranged from 25.85 ppt. to 34.47 ppt.

5.1.2 Description of Spanish Mackerel (*Scomberomorus maculatus*)

5.1.2.1 Distribution and Seasonal Movements

The species *S. maculatus*, as redefined by Collette and Russo (1979), is restricted to the western Atlantic coast of the U.S. and the Gulf of Mexico. The southward extent of its range is the Florida Keys and the northward extent in the Atlantic is normally New York or southern New England, although occasional strays are found to the Gulf of Maine (Berrien and Finan, 1977).

Spanish mackerel make seasonal migrations along the Atlantic and eastern and northern Gulf coasts and appear to be much more abundant in Florida during the winter. They move northward each spring to occur off the Carolinas by April, off Chesapeake Bay by May, and, in some years, as far north as Narragansett Bay by July (Berrien and Finan, 1977). In the eastern Gulf of Mexico they migrate to the west of Cape San Blas. They remain in the north until September and migrate south in the fall (Beaumariage, 1970; Wollam, 1970). Seasonal north-south movements of Spanish mackerel along the Mexican and south Texan Gulf coasts are suggested by one fish tagged in Port Aransas, Texas, whose tag was returned from Vera Cruz, Mexico. Genetic differences in Spanish mackerel from the Atlantic and Gulf were detected in biochemical studies by Collette and Chittenden (M. Chittenden, pers. comm.). This suggests that migration patterns of Spanish mackerel may be different from those of king mackerel, which circumnavigate the Florida peninsula (R. Williams, unpub. man., 1977).

5.1.2.2 General Behavior

The Spanish mackerel is a fast-moving surface-feeding fish that forms immense schools of similar sized individuals. Schools are often known to pass very near to the beach on their seasonal migration journeys. They frequently enter tidal estuaries, bays, and lagoons (Berrien and Finan, 1977; and others).

5.1.2.3 Age and Growth Parameters

a) Growth Equation

Female Spanish mackerel grow faster and reach a larger size than males (Powell, 1975). According to Powell's (1975) growth equations, the theoretical maximum length of the female of the species is approximately 645 mm while the theoretical maximum length of males is about 515 mm.

Power (1975) determined the age of 128 males and 183 females by interpretation of annular marks on otoliths. The theoretical growth equations he calculated for the two sexes are:

$$\text{Males:} \quad SL_t = 515 \quad (1 - e^{-0.48(t + 1.12)})$$

$$\text{Females:} \quad SL_t = 645 \quad (1 - e^{-0.45(t + 0.78)})$$

where SL is standard length in millimeters and t is age in years.

The following tables prepared from the data and equations of Powell (1975) show average standard length and calculated weight at each age.

Age	Males		Females	
	SL (mm)	W (g)	SL (mm)	W (g)
I	362	492	404	714
II	405	688	459	1065
III	445	911	528	1653
IV	476	1113	559	1922
V	497	1266	598	2443

Klima (1959) also estimated age and growth for Spanish mackerel in Florida. His estimated growth rates were much less than Powell with neither sex reaching one pound weight until size II+.

b) Age Frequency Distribution

Powell (1975) determined age of 2,060 fish from the commercial and sport catch in Florida in 1968 and 1969. It can be inferred from Powell (1975) that 42.7 percent of the sample was Age I fish, 93 percent was fish three years old or younger, and 99.08 percent was fish Age V or younger. One eight year old fish, a female, was found. Length-frequency information could also be obtained from catch curves published by Powell (1975); however, the curves are based on the catch obtained from gill nets of different mesh sizes and all are based on relatively small samples.

Commercial gear used in 1968 and 1969 was principally gill nets with stretched mesh ranging in size from three to 3-5/8 inches (7.6 to 9.2 cm), 3-3/8 inches (8.5 cm) being the most prevalent. Other gear used commercially in Florida for Spanish mackerel at that time were beach seines and by special permit a purse seine (Powell, 1975). Stretched mesh sizes of beach seines were 1-1/4 inches and 2-3/4 inches (3.2 and 4.2 cm). Purse seine mesh size was 3/4 inches (1.9 cm). Sport catch was by hook and line. Powell (1975) does not give the proportion sampled from each gear type.

c) Age at Recruitment

According to Powell (1975), Age I fish were the most abundant size class in the commercial and sport catches of 1968 and 1969. Few Age 0 fish were taken possibly because Florida law prohibits taking Spanish mackerel less than 12 inches (304.8 mm) in fork length.

d) Survival Rate

Based on Powell's (1975) observation of one Age VIII fish in a sample of 2,060 individuals, 42.7 percent of which were Age I fish, it can be estimated that the survival rate (S) of Spanish mackerel is 0.38 (38 percent of the population) per year. The instantaneous rate of total mortality (Z) is 0.9686. Calculations are based on the following equation and relationships:

$$N_t = N_o e^{-Zt}$$

where N_o is initial population, N is number at time t, Z is instantaneous total mortality, and t is age in years. The relationship between survival and instantaneous total mortality is as follows:

$$S = e^{-Z}$$

Based on Powell's (1975) data, let $N_t = 1$ (number of Age VIII fish); $N_o = 880$ (number of Age I fish), and $t = 7$ (Age VIII - Age I).

$$Z = \frac{\ln (1/880)}{-7} = 0.9686$$

$$S = e^{-0.9686} = 0.3796$$

Doi and Mendizabal (1979) determined the instantaneous total mortality (Z = 0.903), natural mortality (M = 0.693), and fishing mortality (F = 0.210) of Spanish mackerel on the Mexican coast on the basis of age-length relationships and length frequencies. The annual survival rate for this fishery can be calculated to be 0.41.

5.1.2.4 Reproduction

a) Sex Ratio

Percent of female Spanish mackerel caught in south Florida by gill nets was 51 percent and by hook and line 80 percent (Klima, 1959). Different feeding behavior between sexes was suggested as a likely reason for the high percent of female fish caught by hook and line.

b) Age at Maturity

Although Powell (1975) found maturing oocytes in Age I and Age II females his analytical results suggested that very few of these actually spawned. This interpretation is questionable (Houde, pers. comm.) because of the small number of ripe fish in his sample. Given a high mortality rate and short life span, it is more likely that Age II females make a significant contribution to the spawning potential of the stock.

c) Fecundity

Earll's (1883) report from the Chesapeake Bay area appears to provide the only existing information on fecundity in S. maculatus. He estimated that a six pound (2.7 kg) mackerel carried 1,500,000 eggs.

He counted the number of eggs in the ovaries of one immature female weighing one pound 13 ounces (823 g) and 18.5 inches (470 mm) in length and determined that the ovaries contained approximately 525,000 eggs. Gesteira (1972) studied fecundity in the mackerel in Brazil that is now known to be a separate species (Collette and Russo, 1979).

d) Spawning Season

Spawning of Spanish mackerel occurs repeatedly during a prolonged spawning season from about April until September (Powell, 1975).

e) Spawning Areas

The prolonged spawning season of individual Spanish mackerel may allow spawning to be distributed over a wide area, which should reduce the chances of fluctuations in year class strength due to environmental variations caused by nature or man.

Indirect evidence of spawning areas comes from larval collecting studies. Wollam (1970) found Spanish mackerel larvae in the Gulf of Mexico along the west coast of Florida from Naples to Panama City. Dwinell and Futch (1973) found them widely distributed in the northern Gulf from Mobile, Alabama, to Cedar Key, Florida. McEachran and Finucane (1979) found them off the Texas coast. Larval abundance of Spanish mackerel is greatest in the eastern Gulf of Mexico (McEachran and Finucane, 1979). Spanish mackerel spawn closer to shore and in more shallow water than king mackerel (Dwinell and Futch, 1973; McEachran and Finucane, 1979).

It seems likely that Spanish mackerel spawn in the Atlantic off North Carolina and Virginia, although Spanish mackerel larvae were not found in the western Atlantic in the few sites examined by Wollam (1970), Schekter (1971) and May (1973), and the only published evidence of spawning by Spanish mackerel in the western Atlantic comes from the early observations of ripe females in Chesapeake Bay by Earll (1883) and Ryder (1887).

5.1.2.5 Larvae

a) Identification

Embryonic and early larval stages of *S. maculatus* were described by Ryder (1881) and later stages were described by Wollam (1970). These descriptions are summarized, with drawings, in Berrien and Finan (1977b).

b) Distribution

Spanish mackerel larvae have been found in nearshore shallow water environments of the Gulf of Mexico from Florida to south Texas (Wollam, 1970; Dwinell and Futch, 1973; McEachran and Finucane, 1979). Abundance appears to be greatest in the northeastern Gulf (McEachran and Finucane, 1979).

5.1.3 Description of Cobia (*Rachycentron canadum*)

5.1.3.1 Distribution and Migration

Cobia has a circumtropical distribution (Briggs, 1960). The species is found in the northern part of its range in summer and it winters in south Florida (Austin, et al., 1978) and the West Indies (Richards, 1967). Charterboat fishermen in the area from Mexico Beach, Florida, to Mobile, Alabama, report that their catch of cobia is heaviest during the spring, from late March to the first of May, when the species passes very close to the beach on a westward migration (Austin, et al., 1978). This latter observation is somewhat at variance with the statement by Reid (1954) that May to August is the season of occurrence of the species around Cedar Key, Florida. In the Bahamas, cobias are principally known from the Bimini area or the Grand Bahama Bank (Bohlke and Chaplin, 1968).

According to Bohlke and Chaplin (1968), cobia are found in open water, in inlets, in bays, and in mangroves. Briggs (1960) describes cobia as a "shore species." In the Florida Keys it is often caught by sports fishermen in waters only 20 feet (6 m) deep (Austin, et al., 1978).

5.1.3.2 General Behavior

According to Bohlke and Chaplin (1968) young cobia, with their black and white stripes, bear a striking resemblance to sharksuckers and sometimes behave very much like them by swimming along with a shark or a ray. Both young and adult cobia often associate with floating objects (Baughman, 1950; Reid, 1954). Cobia often swim around pilings, buoys and wrecks.

5.1.3.3 Age and Growth Parameters

a) Length-weight Relation

Female cobia grow faster and attain a larger size than male cobia. By Age VII, female cobia are twice the weight of males the same age (Richards, 1967). There is, however, no significant difference in the relationship of weight to length in the two sexes. Richards (1977) gave this relationship as:

$$\log_{10}W = (3.088 \log_{10}L) - 3.506$$

where L is fork length in inches and W is weight in pounds.

b) Growth Equations

Age of cobia in Chesapeake Bay was determined by Richards (1967) on the basis of annualar marks on scales of 288 specimens measuring from 107 to 1,544 mm in fork length. Growth equations calculated from scale interpretations were later updated by Richards (1977). The most recent growth equations are:

$$\text{Males:} \quad L_t = 1{,}210\ [1-e^{\,0.28\ (t\ +\ 0.06)}]$$

$$\text{Females:} \quad L_t = 1{,}640\ [1-e^{\,0.226\ (t\ +\ 0.08)}]$$

where L_t is fork length in millimeters and t is age in years.

Richards (1977) also gives the growth equation for weight:

$$\text{Males:} \quad W = 21.3(1-e^{-0.28t})^{3.088}$$

$$\text{Females:} \quad W = 54.5(1-e^{-0.225t})^{3.088}$$

The following table from Richards (1967) gives the calculated fork length and weight of cobia for each age in the range of the samples.

Length and weight solutions for cobia growth equations.[1]

t in years	Females				Males			
	Fork Length		Weight		Fork Length		Weight	
	in	cm	lbs	kg	in	cm	lbs	kg
1	14.0	36	0.85	0.4	12.2	31	0.6	0.3
2	24.2	61	5.2	2.4	20.8	53	3.4	1.5
3	32.3	82	13.3	6.0	27.3	69	8.2	3.7
4	38.8	99	24.0	10.9	32.3	82	13.9	6.3
5	44.0	112	35.7	16.2	36.0	91	19.6	8.9
6	48.1	122	47.5	21.5	38.8	99	24.8	11.2
7	51.4	131	58.6	26.6	40.9	104	29.3	13.3
8	54.0	137	68.7	31.2	42.5	108	33.1	15.0

[1] Adapted from Richards, 1967.

c) Age-Frequency Distribution

The following table adapted from a table in Richards (1967) shows the age frequency distribution of his sample.

Age	Number Males	Number Females	Total
I	4	6	10
II	37	15	52
III	18	30	48
IV	10	20	30
V	13	39	52
VI	12	22	34
VII	4	14	18
VIII	0	7	7
IX	2	3	5
X	1	0	1
	101	156	257

The samples were from the commercial pound catch of cobia in Chesapeake Bay from 1960-1964.

d) Age at Recruitment

According to Richards (pers. comm.) sport catches of 15 inches (381 mm) cobia (Age I) are common for the average fishermen, but more knowledgeable fishermen usually return fish of that length to the water and predominantly take fish Age II or older. Cobia are not fully recruited to the pound net fishery in Chesapeake Bay until Age III (based on the age-frequency distribution from Richards, 1967).

e) Life Expectancy

The maximum life expectancy of cobia is at least ten years (Richards, 1967) and may be 15 years or more.

f) Survival

No published estimates of survival in cobia are available. Data on age-frequency of 257 fish from Chesapeake Bay taken between 1960 and 1964 (Richards, 1967) were used to calculate a survival rate using the methodology of Robson and Chapman (1961). Annual survival rate for sexes combined and associated 95 percent confidence limits is: $S = 0.66 \pm 0.04$.

5.1.3.4 Reproduction

a) Sex Ratios

The ratio of females to males in the sample of Richards (1967) was 1.54:1.

b) Age at Maturity

Male cobia are sexually mature at Age II and females are sexually mature at Age III (Richards, 1967).

c) Fecundity

The relationship between fecundity and body weight in cobia, as determined by Richards (1967), is:

$$F = (0.98W - 6.39)\times 10^5$$

where W is weight in kilograms and F is number of eggs.

d) Spawning Season

Cobia spawn at least from late June through mid-August in the Chesapeake Bay area (Richards, 1967). Spawning starts earlier in the year in the northern Gulf of Mexico (Dawson, 1971). Larval collections of cobia off south Texas indicate that spawning occurs in late summer and early fall (Finucane, et al., 1978a) and off Galveston, Texas in July (Finucane, et al., 1978b).

e) Spawning Areas

According to Richards (1967), spawning of cobia probably occurs along or near Virginia's eastern shore in Chesapeake Bay or the Atlantic.

The presence of cobia under 150 mm SL in the northern Gulf of Mexico indicates cobia spawn in that area (Dawson, 1971). Finucane, et al. (1978a) report larvae as small as 5.1 mm SL in their ichthyoplankton study in the northwestern Gulf of Mexico.

5.1.3.5 Larvae

Juvenile cobia have been collected from the Chesapeake Bay area, off North Carolina and South Carolina on the Atlantic, and from Florida to Louisiana in the Gulf. Fairly small cobia (less than 770 mm) are not uncommon in the Gulf of Campeche in the winter. Until recently, it was thought that cobia was an inshore spawner due to the occurrence of eggs in Chesapeake Bay (Ryder, 1887); however, according to D. Hammond (pers. comm.), cobia spawn well offshore (52 miles off the coast of South Carolina) and the larvae move into inshore waters of low salinity (15-20 ppt) as soon as they are mobile. Hassler (Hassler and Rainville, 1975a) found cobia eggs when he was searching for dolphin eggs in the Gulf Stream. The cobia that were hatched from the eggs were raised in the laboratory (Hassler and Rainville, 1975a).

Dawson (1971) noted that the specimens he identified showed a preponderance of smaller individuals (13-15 mm) in collections made 30-40 miles offshore and larger individuals (45-140 mm) had been most frequently collected in inshore localities. There were, however, so few specimens and the specimens were taken by so many different collectors, that Dawson could not definitely attribute his observation to a differential onshore-offshore distribution of sizes. D. Hammond (pers. comm.) obtained all the specimens for his collection at marinas. They were invariably associated with floating debris.

5.1.4 Description of Cero Mackerel (*Scomberomorus regalis*)

Cero mackerel is the third member of the genus *Scomberomorus* to occur in the Gulf of Mexico and south Atlantic regions. This species is between the Spanish and the king mackerel in size. It is not distinguished from king mackerel in landings so no catch information is available on cero mackerel. The cero is silvery below and dark blue above. A blackish longitudinal band on the side runs from the base of the pectoral nearly to the base of the caudal, crossing the lateral line (Evermann, 1899). Below the band are rows of oblong gold spots.

Biological information on the cero mackerel in the literature apears to be limited to brief mentions and short descriptions (Cervigon, 1966). Apparently nothing is known about the population dynamics of this species. Howell-Rivero (1953) discussed the importance of this species to the Cuban fishery.

5.1.4.1 Distribution and Seasonal Movements

The range of cero mackerel is thought to be more restricted to the tropics than that of the other two *Scomberomous* species. Evermann (1899) gave the range of cero mackerel as Cape Cod to Brazil; not very common on the south Atlantic coast of the U.S., but abundant around Cuba; known also from Jamaica, Martinique, and Puerto Rico. Cervigon (1966) also gave Massachusetts as the northern limit of the range of cero. According to D. de Sylva (pers. comm.), Massachusetts as a northern range limit for cero is unlikely. The cero is not normally found in abundance north of Dade County, Florida. In Cuba, the landings of this species are slightly greater than the landings of king mackerel (Howell-Rivero, 1953). Cero is the species of *Scomberomorus* most frequently encountered near shore in the Bahamas (Bohlke and Chaplin, 1968).

5.1.4.2 General Behavior

The cero mackerel is primarily a reef species. It is found in small schools or as individuals.

5.1.4.3 Other

Specific information is not available on growth, demography, or reproduction.

5.1.5 Description of Bluefish (*Pomatomus saltatrix*)

5.1.5.1 Distribution and Migration

The bluefish generally occurs in temperate and warm temperate continental shelf waters (Briggs, 1960). In the eastern side of the New World, bluefish have been reported from Nova Scotia to Texas, Brazil to Uruguay, in Bermuda, Cuba, and Venezuela. They also are reported from Portugal to Senegal, Angola to South Africa, in the Azores, the Mediterranean, the Black Sea, the Indian Ocean, the east coast of southern Africa, Madagascar, the Mayala peninsula, Tasmania, and Australia. On our Atlantic coast, the bluefish aggregations migrate seasonally - northward in spring and summer and southward in fall and early winter. In winter much of the population remains offshore (Lund and Maltezos, 1970). Groups of larger fish not only travel farther and faster but tend to congregate in the northern part of their range.

Bluefish in the Gulf of Mexico appear to be a different stock from those in the Atlantic. Extensive tagging in the Atlantic has been done, and no returns have been recorded from the Gulf. On the west coast of Florida commercial fishermen catch bluefish year around at different locations, but the fish are less abundant than on the east side of the peninsula. In addition, it is common knowledge among fishermen that the bluefish caught in the Gulf of Mexico are smaller than those caught in the Atlantic and at Key West.

5.1.5.2 General Behavior

The fish school by size and swim continuously at speeds varying with water temperature and body size. These groups are loosely associated into larger aggregations.

5.1.5.3 Age and Growth Parameters

Relationship between age, length, and weight of bluefish was studied by Kendall and Walford (1979) and is shown graphically in Wilk, (1977). There is no evidence of sexual variation in size in this species.

There are large variations in length and weight in each age group due to the bimodal nature of spawning (Wilk, 1977).

a) Growth Equation

Age and length at age in U.S. waters have been estimated by Richards (1976), Lassiter (1962), Backus (1962), and Wilk and Walford (ms). Age and growth have been estimated in other parts of the world by van der Elst (1976), Kolarov (1964), and Thomson (1957).

b) Age-Frequency Distribution

Age I through Age IV fish made up the bulk of the bluefish sampled in a study by Kendall and Walford (1979); however, fish older than Age IV were quite evident especially in the area from Maryland to southern New England. Year classes 1962, 1963, 1964, 1965, and 1966 all appeared to be equal in strength.

c) Age at Recruitment

It can be inferred from Wilk (1977) that Age 0 fish are not important in the catch and recruitment effectively occurs at Age I.

d) Life Expectancy

Out of 25,000 fish aged at the National Marine Fisheries Service's Sandy Hook Laboratory, the oldest was Age IX; however, larger, presumably older fish have been reported (Wilk and Walford, ms), (Wilk, 1977). The graph in Wilk, (1977) includes fish to Age XIV.

c) Survival Rate

An estimate could probably be developed from information in Kendall and Walford (1979). It would probably be necessary to calculate separate survival rates for fish tagged in different areas because separate populations exist that may have entirely different survival characteristics (Wilk, 1977).

5.1.5.4 Reproduction

a) Sex Ratios

According to Wilk (1977) the sex ratio is 1:1. Bluefish do not appear to school by sex at any time of life (Wilk, 1977).

b) Age at Maturity

Bluefish become sexually mature in their second year of life (Wilk, 1977). Males mature at a smaller size than females.

c) Fecundity

Number of eggs produced is a function of age and size (Lassiter, 1962). A bluefish 20.8 inches (528 mm) long contained about 900,000 maturing eggs; one 23.0 inches (585 mm) long contained about 1,100,000 eggs (Wilk, 1977).

d) Spawning Season

There are two different groups of spawners in the western Atlantic. The first group spawns in the spring and the other group spawns in the summer. Spawning of both groups probably proceeds in waves (Wilk, 1977). Collections of bluefish larvae in November off the Texas coast suggests that spawning occurs in the fall in the northwestern Gulf of Mexico (Barger, et. al., 1978). A spring spawning also probably occurs in the northeastern Gulf of Mexico off Louisiana and Panama City, Florida (H.A. Brusher, pers. comm.).

e) Spawning Areas

Separate areas for spring and summer spawning groups have been defined. The spring spawning area is in the offshore area of the South Atlantic Bight, roughly between Cape Canaveral and Cape Hatteras. The summer spawning area is in the inshore area of the Mid-Atlantic Bight, between Cape Hatteras and Cape Cod. Although not well documented, spawning undoubtedly occurs in the northern Gulf of Mexico.

5.1.5.5 Larvae

a) Identification

The original descriptions of eggs, larvae, larval, and juvenile development were given by Deuel, et al. (1966), Norcross, et al. (1974), and Pearson (1950). These works were summarized by Lippson and Moran (1974) whose summary was recounted by Wilk (1977).

b) Distribution

Larvae from the spring spawning area in the South Atlantic Bight move into the estuaries of the Mid-Atlantic Bight to grow up. Larvae from the summer spawning area in the Mid-Atlantic Bight develop in the area where they were spawned and winter in the south Atlantic (Kendall and Walford, 1979). In the Gulf of Mexico, bluefish larvae have been collected off the Texas coast (Barger, et al., 1978). They probably occur through much of the northern Gulf of Mexico.

5.1.6 Description of Little Tunny (Euthynnus alletteratus)

The little tunny is one of the most common scombrids in the western Atlantic (Rivas, 1951) accounting for 40 percent of the fishes taken in a trolling survey off the southeastern U.S. coast (Anderson, 1954). This species also is abundant in the Gulf of Mexico. In collections of young fishes in the Gulf of Mexico, this was the species that was the best represented (Klawe and Shimada, 1959).

5.1.6.1 Distribution and Seasonal Movements

The little tunny is found on both sides of the Atlantic throughout tropical and subtropical areas including the Mediterranean. It is a coastal species (de Sylva and Rathjen, 1961; Marchal, 1963; Postel, 1950; Whiteleather and Brown, 1945; and Zhudova, 1969) which may be found in open ocean waters in small numbers.

The available literature indicates that the majority of the stock or stocks of little tunny found in U.S. waters remain within U.S. jurisdiction throughout spring, summer, and fall and may remain in U.S. waters during winter (Davis, 1979). Little tunny migrate seasonally, moving south and offshore during fall and winter, then returning northward in the spring (de Sylva and Rathjen, 1962). In summer, little tunny is abundant in the Gulf of Mexico and Atlantic at least as far north as Cape Hatteras. In winter, large numbers of little tunny are found off south Florida, primarily in the Gulf, south and west of Naples (Charles Carter, pers. comm.), and in the Tortugas (de Sylva and Rathjen, 1962). At the same time, some are found offshore in more northern regions such as off Georgia (Carlson, 1952). Some fraction of the stock(s) may extend into the Caribbean in winter; however, there is no available data to document such an extension (Davis, 1979).

5.1.6.2 Other Data

More detailed biological data is contained in a Resource Document which is available through the Gulf of Mexico Fishery Management Council. This material is not included in the FMP because no management measures are proposed at this time.

5.1.7 Description of Dolphin (Coryphaena hippurus)

The dolphin is the larger of two open-ocean pelagic congenetors that are cosmopolitan in distribution in tropical and subtropical waters (Bohlke and Chaplin, 1968). It is a valuable commercial species in Japan, China, and Hawaii and is an important source of food in many islands of the Pacific and Caribbean (Beardsley, 1967). In Florida the dolphin is an important sport fish and is taken on more trips and in greater numbers by Florida east coast charterboats than any other species (Ellis, 1967). It is also an important sport fish in North Carolina (Rose and Hassler, 1969).

5.1.7.1 Distribution and Migration

According to Shcherbachev (1973), C. hippurus penetrates temperature latitudes to range above 40°N in the summer. Gibbs and Collette (1959) give the latitudinal limit of the species in the Atlantic as the 45° line, which corresponds to the poleward limits of the 15°C (59°F) isotherm. Rose and Hassler (1968) give Prince Edward Island, Nova Scotia, and the southern tip of Africa as the range limits of the dolphin in the Atlantic. Sightings in the extreme limits of the range reportedly are rare, and the general range of this species probably is best described by the 20°C (68°F) isotherm (Gibbs and Collette, 1959). Hochachka (1974) alludes to the common dolphin as a "tropical eurythermal species." C. hippurus is common in the Caribbean, the Gulf Stream, and the Gulf of Mexico. The occurrence of this species in large numbers off the Texas coast has been reported (Baughman, 1941).

This species comes close to shore where blue waters are found near the shore, notably southeastern Florida, Cape Hatteras, and Ocean City, Maryland (Gibbs and Collette, 1959). Schuck (1951) found that the best fishing for dolphin off North Carolina was by trolling in areas where bottom depths were between 21 and 100 fathoms. Gibbs and Collette (1959) cited by de Sylva (pers. comm.) as saying that in south Florida C. hippurus adults are caught both in the Gulf Stream and at its junction with coastal waters. This species occasionally enters inshore waters of somewhat high turbidity (Gibbs and Collette, 1959, citing de Sylva, pers. comm.).

5.1.7.2 General Behavior

The dolphin is well known for its propensity to station itself near nonmotile objects on the ocean surface. Kojima (1956, 1960a, 1960b, 1966) has published specifically on this subject. According to Kojima (1965), the high returns (27.2 percent average) resulting from his tagging study in Japan demonstrated the ecological significance and effects of floating objects on dolphins. There is a greater availability of food near floating objects, and dolphins leave them only when there is food nearby. In the Florida current and Gulf Stream, dolphin associate with Sargassum windrows and, according to Beardsley (1967) and Gibbs and Collette (1959), take much of their food from that community.

Young dolphin school, but older individuals are more solitary. Dolphin 300-500 mm long (fork length, probably) are referred to as "school" dolphin (Beardsley, 1967). Baughman (1941) considered the dolphin a highly gregarious species, but his observations are of young individuals. Although no specific description of the size of dolphin schools was found in the literature, it is the general impression that they do not contain the vast number of individuals found in schools of species such as the mackerel.

5.1.7.3 Other Data

More detailed biological data is contained in a Resource Document which is available through the Gulf of Mexico Fishery Management Council. The material is not included in the FMP because no management measures are proposed at this time.

5.2 Abundance and Present Condition

The information for this section has been included in Section 5.4.1.2 for king mackerel, 5.4.2.2 for Spanish mackerel, 5.4.3 for cobia, 5.4.4 for cero mackerel, 5.4.5 for little tunny, 5.4.6 for bluefish, and 5.4.7 for dolphin. This was done because the information leading to the respective conclusions followed more coherently the presentation in Section 5.4.

5.3 Ecological Relationships

Prey-predator relationships, food chains, and competitive or mutualistic interactions are the most important factors to consider in developing an understanding of biological relationships of fishery species. A description will be given of the specific prey and predator organisms of each of the species of the management unit, followed by a general discussion of the food chains affecting these species, including larval food chains. Competitive and mutualistic interactions will be discussed where any information is available.

5.3.1 Prey-Predator Relationships of King Mackerel

a) Prey Species

The primary food of king mackerel in Florida waters are clupeid fishes, particularly Opisthonema oglinum (the Atlantic thread herring) and Harengula jaguana (scaled sardine), and invertebrates, including penaeid shrimps and squid. Fish of the families Carangidae (jacks), Lutjanidae (snapper), and Pomadasyidae (grunts) make up a small percent of the diet. The three groups account for 59 percent, 33 percent, and eight percent of stomach contents by number respectively (Beaumariage, 1973). Beaumariage examined 366 king mackerel stomachs, but only 70 held identifiable food; most (179) were empty.

In a Texas study, Knapp (1949) found that shrimp were the number one food item of king mackerel, accounting for 43.5 percent of food items in stomachs. Squid was also an important food item, making up 25.1 percent of food items. Fish of various types made up 50.6 percent of the food items in stomachs. Of this, 7.9 percent were menhaden. Other fish species were not separated out. The stomachs of 327 were examined.

Stomachs of 831 king mackerel were examined from fish caught offshore of Louisiana--(C. Saloman and S. Naughton, pers. comm.). Fish were the dominant food, comprising over 99 percent by weight, and volume, and frequency of occurrence of the stomach contents. Primary species were in the families Clupeidae, Carangidae, Sciaenidae, and Trichiuridae.

In the stomachs of 355 king mackerel collected off Panama City, the volume of food was 85.4 percent fish and 14.1 percent squid. Minor amounts of various crustaceans made up the remainder of the volume of food items. Three fish species, Decapterus punctatus (round scad), Sardinella anchovia (Spanish sardine), and Brevoortia patronus (Gulf menhaden), were dominant (S. Naughton, pers. comm.).

b) Predator Species

The bottle-nose dolphin (Tursiops truncatus) and several shark species are thought to be the major predators of both king and Spanish mackerel due to their common occurrence around mackerel schools. Bottle-nose dolphins are a problem for both handline and gill-net mackerel fishermen on the Florida east coast (Cato and Prochaska, 1976), as they pull hooked fish off the line and tear them out of nets. Several shark species are mentioned by Bigelow and Schroeder (1948) as predators of the mackerels. These are tiger sharks (Galeocerdo cuvier), bull sharks (Carcharhinus leucas), the smooth hammerhead (Sphyrna zygaena), and the short-fin mako (Isurus oxyrinchus).

Sharks often are found in areas where gill nets are being set around Spanish and king mackerel and damage to nets by sharks is a common occurrence. The speed and severity with which the sharks attacked the nets off Key West in 1978 suggested that the sharks were in the mackerel schools before the nets were set, rather than coming to the area to feed on trapped fish. The lemon shark (Negaprion brevirostris) is said to be one of the principal species interfering with the king mackerel fishing operations off Key West (S. Gruver, pers. comm.). There is little information on the diet of the lemon shark in the literature.

Two little tunny collected from the Florida current by Klawe (1961) had 20-30 mm Scomberomorus larvae in their stomachs. Unfortunately, the larvae could not be identified to species (Klawe, 1961), however, judging from habitat they very likely were king mackerel.

5.3.2 Prey-Predator Relationships of Spanish Mackerel

a) Prey Species

The following organisms are given by Klima (1959) as food items of Spanish mackerel in Florida based on analysis of 292 stomachs, 38 percent of which were empty. Listed in order of abundance in stomachs the organisms are: herrings (the Clupeidae) (69 percent); pilchards (Harengula pensacolae and related species) (nine percent); shrimp (Penaeus spp.) (six percent); mullet (Mugil sp.) (four percent); needlefish (Strongylura) and anchovy (Engraulidae) (less than one percent). Unidentified fish made up an additional eight percent of stomach contents.

A Texas study determined that 30 percent of stomachs containing food contained menhaden (Miles and Simmons, unpublished data). The stomachs of 3,428 Spanish mackerel were examined in this study. Thirty-four percent of the stomachs were empty. Klima (1959) reported on a subsidiary study using material collected by Miles and Simmons. In all 611 mackerel stomachs containing food were examined: 82 contained shrimp; 30 squid; 53 ribbonfish; six menhaden, and four, other species.

In another Texas study, Knapp (1951) found that fish, excluding menhaden, made up 62.7 percent of the total number of stomach contents. Shrimp made up 23.4 percent, squid 10.9 percent, crabs 4.6 percent, and menhaden 3.7 percent.

No analysis has been made of the relative weights or volumes of types of food organisms in stomachs to help determine which food types provide the major part of the energy requirements of this species.

b) Predator Species

Sharks are a major predator of Spanish mackerel. The species has been listed among the stomach contents of the dusky shark (Carcharhinus obscurus) in Florida (Clark and von Schmidt, 1965). According to Bigelow and Schroeder (1948), the smooth hammerhead (Sphyrna zygaena) preys on Spanish mackerel. The mackerels in general are referred to as a component of the diet of bull sharks (Carcharhinus leucas), porbeagles (Lamna nasus), and tiger sharks (Galeocerdo cuvier) (Bigelow and Schroeder, 1948).

5.3.3 Prey-Predator Relationships of Cobia

a) Prey Species

The cobia feeds primarily on demersal organisms, especially crustaceans. In a Texas study (Knapp, 1951), mantis shrimp and eels were the organisms that occurred the greatest percent of the time (58 percent and 50 percent respectively). Next in percent occurrence were shrimp (46 percent), crabs (42 percent), and squid (17 percent). Thirty-two percent of the stomachs contained fish, four percent of which were Spanish mackerel. A total of 29 stomachs were examined and 17 percent were empty.

b) Predator Species

None have been determined so far.

5.3.4 Prey-Predator Relationships of Cero Mackerel

The prey-predator relationships of cero mackerel are thought to be similar to those of king and Spanish mackerel.

5.3.5 Prey-Predator Relationships of Bluefish

a) Prey Species

According to Wilk (1977), bluefish feed throughout the water column on a large variety of fishes and invertebrates, both pelagic and demersal. Wilk (1977), observing populations in the northern part of their range, noted that they eat butterfish (Peprilus triacanthus), menhaden (Brevoortia spp.), round herring (Etrumeus teres), sand lance (Ammodytes americanus), silverside (Atherinidae), Atlantic mackerel (Scomber scombrus), anchovy (Engraulidae), and Spanish sardine (Sardinella anchovia). They also eat juvenile spotted seatrout (Cynoscion nebulosus), Atlantic croaker (Micropogon undulatus), and spot (Leiostomus xanthurus) (Wilk, 1977). Among the invertebrates fed on by bluefish are shrimps, lobsters, squids, crabs, mysids, and annelid worms (Wilk, 1977).

Richards (1976) examined the stomach contents of 66 bluefish in Long Island Sound from July to November. He found that 44 percent had empty stomachs. The most common prey organism was the adult bay anchovy (Anchoa mitchilli) (37 percent of total items). The squid (Loligo pealei) was next in abundance (18 percent). Menhaden (B. tyrannus) adults and juveniles and butterfish (P. triacanthus) juveniles were equally represented, each comprising 16 percent of food items.

Striped mullet (Mugil cephalus), Atlantic thread herring (Opisthonema oglinum), pinfish (Lagodon rhomboides), and shrimp (Penaeus spp.) are organisms common to Florida waters that were included in Wilk's (1977) list of food items of bluefish in the mid-Atlantic. Relative importance of these organisms was not given by Wilk (1977). Apparently measurements of relative weight or relative volume of food types have not been made.

b) Predator Species

Sharks are thought to be predators of bluefish. Shark species that are known to feed on bluefish are the sand tiger (Odontaspis taurus) and the thresher (Alopias vulpinus) (Bigelow and Schroeder, 1948). Wilk (1977) said that sharks, tunas, swordfish, and wahoo would be the only potential predators that would pose a threat to the fast-swimming bluefish.

5.3.6 Prey-Predator Relationships of Little Tunny

a) Prey Species

The round herring (Etrumeus teres) was the most important food species of Euthynnus alletteratus in specimens collected from the southern Atlantic coast of the U.S., making up 39 percent of stomach contents items (Carlson, 1952). Squid also was important, accounting for 28 percent of food items, and the Spanish sardine (Sardinella anchovia) made up 12 percent of food items. Other components of the stomach contents were the round scad (Decapterus punctatus), Spanish mackerel and mud parrotfish (Sparisoma flavescens). Unidentified fish made up 11 percent of total food items (Carlson, 1952). In another study, both little tunnys collected contained Spanish mackerel. One little tunny contained larval little tunny indicating cannibalism (Klawe, 1961). Carangidae (jacks), and Exocoetidae (flyingfish) are some other groups fed upon by little tunny (Dragovich, 1969).

b) Predator Species

Little tunny was one food item identified in the stomach of a bull shark (Carcharhinus leucas) collected on the central Gulf coast of Florida (Clark and von Schmidt, 1965).

5.3.7 Prey-Predator Relationships of Dolphin

a) Prey Species

The dolphin is an opportunistic species, which will prey on most smaller fishes or squid which may be available. It is thought to be a day feeder (Erdman, 1958) and perhaps does not feed effectively in darkness (Gibbs and Collette, 1959), although they will feed at night on small fishes and squid attracted to light from ships.

The importance of the Sargassum community in providing food for common dolphin, particularly juvenile and younger mature individuals, has been noted by several authors. Rose and Hassler (1974) found significantly more empty stomachs in small female dolphin in a summer when tidelines off the North Carolina coast were relatively rare, which suggests that this community makes an important contribution to the food supply of this group. Kojima (1965), Rose and Hassler (1974), and Beardsley (1967) considered the Sargassum community to have great ecological importance to the dolphin because of the food supply it provides. Furthermore, the Sargassum community provides protection for younger individuals from predation by other species. Segregation of younger from older individuals through behavioral differences reduces cannibalism. An adaptive significance to the attraction of smaller individuals to the Sargassum community is suggested (Rose and Hassler, 1974).

Apparently, emphasis on different types of food items changes throughout the life cycle of the dolphin. Shcherbachev (1973) noted that larvae and fingerlings of dolphin feed primarily on invertebrates, particularly copepods, while adult common dolphin eat flying fish of the genus Cypselurus. Kojima (1963) found juveniles of the families Engraulidae (anchovies), Mullidae (goatfish) and Oplegnathidae (a primitive perciform) in the stomachs of dolphin 500 to 1,500 mm in length in Japanese waters.

Erdman (1958) commented that the pelagic stages of young shore and reef fishes seemed to form the most abundant and frequent foods of the pelagic species he studied in Puerto Rico, which included the dolphin. He mentioned filefishes, triggerfishes, goatfishes, squirrelfishes, doctorfishes, and threadfins as young shore fishes which are important food items of pelagic fishes. He said that bottom fishes such as snapper and grouper and deep sea fishes were noticeably rare in stomachs compared with shore fishes.

b) Predator Species

Two known predators of the common dolphin in western Atlantic waters are the blue marlin (Makaira nigricans) Gibbs and Collette (1959) and the swordfish (Xiphias gladius) (D. de Sylva, pers. comm.). One 6.4 kg (14 pound) dolphin was found in the stomach of a whitetip shark (Carcharhinus longimanus) by Schuck and Clark (1951); although dolphin did not occur in any of 88 whitetip stomachs examined by Backus, et al. (1956). According to Backus, et al. (1956), the dolphin is a common associate of the whitetip shark.

5.3.8 Comparison of Food Habits of Species of the Management Unit

Clupeid fishes, penaeid shrimp, and squid are the principal prey organisms of five out of seven species in the coastal pelagic management unit: the three mackerels (if cero can be included), the bluefish, and the little tunny. The cobia feeds primarily on crabs and mantis shrimp, which it takes from the bottom. The diet of the dolphin consists mostly of flyingfish, jacks, triggerfish, and filefish.

The mackerels feed primarily on pelagic species, particularly herrings, although a fairly large percentage of the diet of king mackerel is made up of shrimp. The diets of the Spanish and king mackerel overlap. The one quantitative study that was done on the food of these mackerels in the same area (Knapp, 1949) suggests that the Spanish mackerel is more dependent on fish and less dependent on invertebrates than the king mackerel, which eats a large percentage of shrimp and squid.

The same herring species that was identified as the king mackerel's principal prey in Forida (Beaumariage, 1973) was given as the principal prey of the Spanish mackerel in Brazil (Menezes, 1970). This was the Atlantic thread herring.

The feeding spectrum of the bluefish appears to be wider than that of the mackerels. This species feeds throughout the water column. Small herring-like fishes and the juveniles of estuarine bottomfish such as spotted seatrout, Atlantic croaker, and spot serve as its prey. Mullet are included in the diet of bluefish as in the diet of Spanish mackerel.

An important prey of the little tunny is the round herring (Carlson, 1952). Squid also is important to this species as is the Spanish sardine. Little tunny also feed on flyingfish, which causes the diet of this species to overlap with that of the more oceanic dolphin. Scads (Decapterus spp.) also are thought to be important to this species based on volumetric stomach analysis of a related species in Hawaiian waters.

Mantid shrimp, crabs, eels, and squid are the main food organisms of cobia.

The diet of dolphin consists of flyingfish, jacks, triggerfish, and filefish.

5.3.9 Principal Prey Species of the Mangement Unit and Their Food Habits

Small schooling fishes in the family Clupeidae (herring and sardines) are the most important prey fishes of the coastal pelagic unit. Major prey species of this family are Opisthonema oglinum (Atlantic thread herring), Harengula jaguana (scaled sardine), Etrumeus teres (round herring), and Sardinella anchovia (Spanish sardine). Other prey organisms of apparently equal importance are penaeid shrimp and squid. The only species name mentioned for squid was Loligo pealei (Wilk, 1977). In subtropical waters this species is replaced by Loligo piei (Laroe, 1970).

Other neritic squid that occur in areas frequented by the coastal pelagics are the genera Sepioteuthis, Dortheuthis, and Lolliguncula (Voss, 1973). Other fish families that are major sources of food for one or more species of the management unit include the Engraulidae (anchovies), specifically Anchoa mitchilli, the Exocoetidae (flyingfishes and halfbeaks), the Carangidae (jacks, scads, and pompano) including Decapterus punctatus, and Peprilus triacanthus (butterfish).

Most of the clupeids, including Atlantic thread herring and Spanish sardine, feed on zooplankton, particularly copepods (Low, 1973; Hildebrand, 1963; Bohlke and Chaplin, 1968). Atlantic thread herring eat anchovy larvae as well as copepods (Low, 1973). Preferential rather than nondiscriminant feeding is apparent in those species of clupeids for which food habits have been determined (Low, 1973). Clupeids are capable of feeding in either the picking or the filtering mode. They filter feed when dense concentrations of food of a suitable size is available (O'Connell, 1972; E. Houde, pers. comm.).

Penaeid shrimp are bottom feeders. The pink shrimp (Penaeus duorarum) feeds in shallow inshore areas where there are bottom grasses such as Diplanthera and Thalassia. According to Burukovsky (1968), their food consists mainly of animals, although other workers have found plant material in their stomachs (Eldred, et al., 1961). In a quantitative volumetric analysis of pink shrimp (n = 305) off the coast of Africa, Burukovsky (1968) found that amphipods and isopods made up 20.4 percent by volume of stomach contents, followed by polychaetes (19.3 percent); mullusks (16.1 percent); principally gastropods; shrimp (15.4 percent); and fish (10.6 percent). Other significant components (more than one percent) were crabs and hermit crabs. Vegetable remains accounted for only 0.03 percent and plankton only 0.02 percent of the volume of stomach contents. In another study Burukovsky (1975) found that the diets of three other penaeid shrimp were very similar to that of pink shrimp.

Neritic squid such as Loligo pealei are carnivores whose prey organisms change with age. At early stages they eat small crustacean such as euphausiids and similar organisms (Vovk, 1974). Later fish larvae and juveniles form a major part of their diet (Vovk, 1974). They also eat other squids and small adult fish (Vovk, 1974). According to Lipinski (1973), the fish families of greatest importance in the diet of squid are Clupeidae, Gadidae (codfishes), and Myctophidae (lanternfishes). In general, the young feed on planktonic forms, whereas adults feed on benthic and more motile nekton forms (Vovk, 1974). Laroe (1970) found that coral reef mysids and juvenile or larvae fish were the only organisms that elicited feeding response in newly hatched Sepioteuthis and Doryteuthis in culture. According to Vovk (1974), Loligo pealei may belong to three different tropic levels if all age groups are considered. Squid are voracious feeders that grow rapidly. Stomach contents frequently comprise 12 percent of their body weight (Lipinski, 1977).

The diet of flyingfish consists of small fish, the squid Loligo, eggs deposited on Sargassum, and hemipterus insects of the genus Halobates (Barroso, 1967). Larval and juvenile flyingfish feed principally on calanoid and cyclopoid copepods (Schekter, 1971). According to Berkeley, et al. (1975), the principal foods of the ballyhoo species (Hemiramphus brasiliensis and H. balao) are microcrustaceans (decapods, copepods, amphipods, and cladocera), although manatee grass (Syringodium filiforme) frequently is the dominant food of large H. brasiliensis (ballyhoo). Polychaetes are important in the diet of H. balao (balao) (Berkeley, et al., 1975).

Young butterfish feed primarily on jellyfish (Murawski, 1978). The diet of adult butterfish is known to include small fish, squid, crustacea such as amphipods, copepods and shrimp, and annelid worms (Murawski, et al., 1978). Tunicates and chaetognaths also are reported foods of butterfish (Murawski, et al., 1975)

5.3.10 Larval Food Chains

Size of potential prey relative to the size of the predator is probably the single most important determinant of who eats who in marine food chains and prey species change as the predator grows (Detwyler and Houde, 1970). Prey-predator roles sometimes reverse with time, meaning that marine food chains are actually circles, larval fish being fed on by the prey of their parents. The influence of relative size on predation puts an evolutionary premium on the ability of a marine species to grow fast and attain a large size.

Coastal pelagic species are not exceptions to the generalities just stated. All are carnivores throughout their lives and are thought to eat copepods at early stages. Young cobia are known to require crustaceans in their diet and do poorly on a diet of pure fish (Hassler and Rainville, 1975a).

5.4 Estimate of MSY, Abundance and Present and Future Condition

Estimates of MSY for coastal pelagic species were developed especially for this management plan. These estimates were reviewed by the Scientific and Statistical Committee and accepted by them as the best available given the constraints imposed by the quality of available data. Additional detail on how some of the parameters were estimated and other technical discussion is contained in the Resource Document for this FMP. This document is available through the Gulf of Mexico Fishery Management Council.

5.4.1 King Mackerel

5.4.1.1 Calculation of Maximum Sustainable Yield for King Mackeral

The calculation of maximum sustainable yield by the dynamic pool (Beverton and Holt) model is a three-step process. First, yield per recruit entering the fishery is calculated from data on growth rate, maximum size, and rates of fishing and natural mortality. Second, an estimate is made of the number of recruits entering the fishery. Third, yield is calculated by multiplying yield per recruit by number of recruits.

Yield per recruit: estimation of parameters

Beverton and Holt (1957), Gulland (1969), Ricker (1975), and other texts, describe in detail, with some differences in symbols, the development of the simple Beverton and Holt yield equation and its parameters. Chittenden (1977) concisely described techniques for estimating the parameters and employed Gulland's (1969) symbols for this equation and its parameters. The present work follows Chittenden's (1977) format and symbols. The equation used to calculate yield per recruit is the "long form" (Beverton and Holt, 1957).

The data required to use this equation include what may be termed "growth", "mortality", and "time" parameters. The procedures and rationale used to estimate these parameters were those of Chittenden (unpub. man.). A brief description is given below.

The "growth pattern" parameters, L_{oo}, K and t_o were calculated using the von Bertalanffy growth equation (Ricker, 1975). Asymptotic length (L_{oo}) is defined as the maximum length obtained by the average fish if it continued to grow indefinitely according to the von Bertalanffy formula. Asymptotic weight (W_{oo}) is the weight at L_{oo}. The Brody growth coefficient (K) is a constant, determining the rate of growth in length. Age t_o is the theoretical age at which a fish would have been zero length if it always grew according to the von Bertalanffy equation.

Data from Beaumariage (1973) on length-weight relation and observed length at age were used to estimate the values, L_{oo} = 1099mm, W_{oo} = 9411g, t_o = -3.4698, and K = 0.21. These values were estimated for sexes combined, assuming a 1:1 sex ratio (Chittenden, unpub. man.). The calculated W_{oo} is much lower than the actual maximum weight for king mackerel. This probably results from dependence of the age and growth estimates on the younger age groups and on the fact that this species schools by size. Younger, fast growing fish are found with older, slow growing fish. Therefore, the sample used to estimate age and growth is not representative of the entire stock. However, that sample is representative of the sizes and ages being exploited. Therefore, it is reasonable to use the calculated W_{oo}.

The "mortality" parameters Z, M, and F are the instantaneous annual rates of total mortality, natural mortality, and fishing mortality, respectively, where Z = M + F. Data from Beaumariage (1973) were used to estimate a total mortality rate Z = 0.71, the average of Z values for the two commercial fisheries (Chittenden, unpub. man.). No direct estimates of the actual values of M and F exist, but their upper bound must be Z = 0.71.

Chittenden (unpub. man.) developed likely estimates for M and F based upon Beverton and Holt's (1959) suggestion that a relationship existed within reasonable bounds between the mortality parameter M and the growth parameter K. Chittenden estimated reasonable bounds for the M/K ratio based upon Lenarz, et al. (1974) and Joseph and Calkin's (1969) studies on the related scombrids of tropical and subtropical waters *Thunnus albacares* and *Euthynnus pelamis*. For king mackerel, assuming K = 0.21 based upon observed growth, the most likely range for M may be 0.3 to 0.6 and the "best" estimate of M would be about 0.4. Tanaka (1960) postulated a relation between M and maximum age. His work suggests that M may be less than 0.4, but greater than 0.3. The corresponding values of F are 0.41 to 0.11 and the "best" estimate of F is 0.31.

It should be clearly recognized that these "likely" and "best" estimates may need to be revised as further research is conducted and actual data become available. The validity of extrapolating M/K ratios from other scombrid species to Spanish and king mackerel is not precisely known.

The "time parameters" t_r, t_L, and t_c define three states in the life of an exploited species. The parameter t_L is defined as the age at the effective end of the fishable life of a year class. That is, the age at which the year class no longer contributes a significant proportion of the catch. The parameter t_r is defined as the age of recruitment to the fishing grounds. Time at first capture, t_c, is the average age at which a year class becomes vulnerable to the fishing gear.

The values t_L = 8 and t_r = 0 were chosen (Chittenden, unpub. man.) using data from Beaumariage (1973), Rodrigues and Bezerra (1968), and Nomura and Rodrigues (1967). The average age of recruitment, t_c, is not precisely known but is probably between age 1.0 and age 1.5. Three values of t_c were chosen to estimate yield per recruit, 1.0, 1.5, and 2.0.

Yield per recruit: calculation

Maximum yield per recruit can be equated with maximum sustainable yield of the stock only if recruitment is completely independent of the size of the spawning stock. Likewise, the value for fishing mortality that gives maximum yield per recruit (F_{max}) will produce a maximum sustainable yield only if those conditions are met. If recruitment is variable or dependent to some degree on stock abundance, fishing at F_{max} can severely damage the stock.

In many stocks of fish the relation between yield per recruit and instantaneous fishing mortality is a flat-topped curve. Yield per recruit rises rapidly at low levels of F, then levels off. There is no clearly defined peak in the curve to define F_{max}. In such cases, fishing at F_{max} is very likely to reduce the spawning stock below the level needed to maintain adequate recruitment.

To deal with this problem, other more appropriate values of F have been proposed (Doubleday, 1976; Sissenwine, 1977). The most accepted at present is $F_{0.1}$, defined as the point at which an increase in F of one unit will give an increase in Y/R equal to 1/10 the increase in Y/R at F values near zero. This gives a small decrease in Y/R from that at F_{max} but results in greatly reduced fishing mortality, increased stock biomass, and increased catch per unit effort.

The relation of yield per recruit to fishing mortality in king mackerel was calculated for four levels of natural mortality (M) and three ages of first-capture covering the range of most reasonable values. Values for yield per recruit in this analysis are yield per recruit entering the fishery at age t_c. Yield per recruit to the fishery was calculated from estimates of Y/R at age t_o (Chittenden, unpub. man.) by the following conversion:

$$Y/R_{t_c} = Y/R_{t_o} \cdot 1/e^{-M(t_c - t_o)}$$

The term $e^{-M(t_c - t_o)}$ represents the mortality of recruits between age t_o and age t_c. For all parameter combinations, these curves are of the flat-topped form previously described. In all cases, the value for F_{max} is not well defined but approaches F = 5. Fishing at F_{max} at any of these levels of t_c and any reasonable value for number of recruits will leave essentially no spawners at Age IV, the first year in which most females are sexually mature. Fishing at this level would certainly affect recruitment. In addition, even if recruitment was not affected, catch per unit effort at F_{max} would be much too low to support a commercial fishery or to satisfy the sportfishermen.

For king mackerel, $F_{0.1}$ is clearly the more reasonable value both biologically and economically. Values for $F_{0.1}$ are much less than F_{max}, varying from 0.5 at t_c = 1.0 and M = 0.4 to 1.0 at t_c = 2.0 and M = 0.6 (Exhibit 5.1). Yield per recruit at $F_{0.1}$ will be used to compute MSY. Values for yield per recruit at $F_{0.1}$ vary from 1,625 g at M = 0.6 and t_c = 1.0 to 2,595 at M = 0.3 and t_c = 2.0 (Exhibit 5-1).

Estimating the number of recruits for king mackerel

There is presently no estimate of recruitment for king mackerel and no data available from which a precise estimate of recruitment can be obtained. However, using available data on total catch and total mortality rate and by assuming several rates of fishing mortality a range of estimates for number of recruits can be computed.

Exhibit 5-1

Estimated values for $F_{0.1}$, Y/R,[1] and Y for 12 combinations of t_c and M for king mackerel, using 1970 commercial landing statistics (Wheeland, 1973) and 1970 uncorrected recreational landings from Deuel (1973).

t_c	M	$F_{0.1}$	Y/R[1] (g)	R[1] (# fish)	Y(kg)	Y(lb.)
1.0	0.3	0.5	1980	14,042,000	27,803,000	61,240,000
1.0	0.4	0.6	1792	18,572,000	33,281,000	73,306,000
1.0	0.5	0.8	1722	27,416,000	47,210,000	103,988,000
1.0	0.6	0.9	1625	52,340,000	85,053,000	187,340,000
1.5	0.3	0.5	2233	14,042,000	31,356,000	69,066,000
1.5	0.4	0.6	2044	18,572,000	37,961,000	83,615,000
1.5	0.5	0.8	1990	27,416,000	54,578,000	120,171,000
1.5	0.6	1.0	1945	52,340,000	101,801,000	224,232,000
2.0	0.3	0.6	2595	14,042,000	36,439,000	80,262,000
2.0	0.4	0.7	2394	18,572,000	44,461,000	97,933,000
2.0	0.5	0.9	2320	27,416,000	63,605,000	140,099,000
2.0	0.6	1.0	2217	52,340,000	116,038,000	255,590,000

[1] R is defined as number of recruits entering the fishery.

Calculation of population and recruits is possible if natural and fishing mortality occur simultaneously, recruitment is constant from year to year and occurs continuously throughout the fishing season, and the stock is at equilibrium. King mackerel probably do not satisfy these conditions exactly, but are close enough to make application of the model valid. If these assumptions are met, the average population number (N) is equal to the number caught (C) divided by the instantaneous rate of fishing mortality (F).

$$\bar{N} = C/F$$

The total number of recruits (R) at the average age of full vulnerability to the gear (t_c) is equal to the average number in the population (N) multiplied by the total mortality rate (Z).

$$R = Z\bar{N}$$

Each value of F which we assume gives a different value for N and R.

Catch statistics from which number caught in the U.S. recreational fishery can be obtained are available in the saltwater angling surveys of 1960, 1965 and 1970 (Clark, 1962; Deuel and Clark, 1968; and Deuel, 1973). The recreational catch of king mackerel in 1970 was estimated as 7,282,000 fish.

These surveys are generally considered to overestimate the recreational catch. They are based on interviews and require the angler to remember his total catch and its average size for the preceding year. The experimental design probably assures an adequate sample of anglers; and, therefore gives an accurate picture of relative magnitude of catches from different areas. However, the possibilities for exaggeration of both the number and size of fish caught are, unfortunately, very great.

An attempt was made to correct the 1970 survey using creel census data from localized studies. Two studies made in 1975 are available which represent a significant proportion of the recreational catch. Wade (1977) estimated catch of king mackerel in Alabama as 1,053,986 pounds for the year 1975. Data in that report on mean number and weight caught per trip were used to calculate a total catch of 91,189 fish. Brusher, et al., (1978) estimated the catch of king mackerel in Bay County (Panama City), Florida, for the same year as 222,020 fish.

Calculation of total recreational catch in 1975 was made based on these two studies and the following assumptions:

1. Bay County catch equals 0.25 of the total catch on the Florida Gulf coast excluding the Keys.

2. Total catch in Mississippi and Louisiana east of the Mississippi River was equal to the Alabama catch.

3. The ratio of the catch estimate reported in Deuel (1973) to that made from data in Wade (1977) and Brusher, et al., (1978) for the same area (the eastern Gulf of Mexico excluding the Florida Keys) will remain constant for other areas.

The estimate of recreational catch in the eastern Gulf of Mexico for 1975 was 1.070×10^6 fish. Deuel (1973) reported 2.813×10^6 fish for the same area, a ratio of 0.381:1.000. Deuel's estimate of total catch was reduced according to this ratio. The total recreational catch of king mackerel from all areas was then estimated as 2.754×10^6 fish.

Commercial landing statistics for each state are available from the National Marine Fisheries Service separated by type of gear. The vast majority of the commercial catch is made in Florida using either gill nets or hook and line. Total U.S. commercial landings were 6,732,500 pounds in 1970 and 6,442,100 pounds in 1975.

Using data on length frequency of the catch of the two major gears (Beaumariage, 1973; Williams, unpub. man., 1977), a mean weight of 7.13 pounds for hook and line catches and 8.96 pounds for gill-net catches was estimated. From this, the estimated number of fish landed commercially in 1970 and 1975 was 826,500 and 814,000 respectively.

Two estimates of total number caught from all sources were made. For one, the 1970 recreational catch statistics (Deuel, 1973) and the 1970 commercial catch were used to estimate a total catch of 8,109,000 fish. For the other, the corrected estimates of recreational catch in 1975 and the 1975 commercial catch were used to calculate a total catch of 3,568,000 fish.

The total catch estimates were 8,109,000 fish from the 1970 uncorrected data and 3,568,000 fish using the 1975 corrected data.

Number of recruits was calculated based on the two estimates of number caught and three possible levels of fishing mortality within the limits previously defined for F and M. Using the estimate for 1970, the estimated number of recruits varies from 14,042,000 at F = 0.41 to 52,340,000 at F = 0.11 (Exhibit 5-2). Using the corrected estimate for 1975, the number of recruits varied from 6,179,000 at F = 0.41 to 23,030,000 at F = 0.11 (Exhibit 5-3).

Estimates of MSY in king mackerel

Estimates of MSY using the 1970 uncorrected catch statistics varied from 61,240,000 pounds at t_c = 1.0 and M = 0.3 to 255,590,000 pounds at t_c = 2.0 and M = 0.6 (Exhibit 5-1). By comparison, the 1970 total uncorrected catch was estimated as 69,359,000 pounds.

Estimates of MSY using the 1975 corrected catch statistics varied from 26,948,000 pounds at t_c = 1.0 and M = 0.3 to 112,461,000 pounds at t_c = 2.0 and M = 0.6 (Exhibit 5-4). By comparison, the total estimated 1975 catch (corrected) was 30,127,000 pounds. The larger estimates of MSY may be too large. Estimates of MSY at values of M = 0.6 is probably too high if data on catch per unit effort in the commercial fishery is valid. Catch per unit per effort has declined in the commercial fisheries as effort has increased indicating that fishing mortality must be a significant portion of total mortality. In that case, estimates of MSY at M = 0.6 (F = 0.11) is too high and M values of 0.4 or 0.5 are more likely. This is supported by the "best" estimate of M = 0.4, from the M/K ratio (Chittenden, unpub. man.). The estimate of average time at recruitment, t_c = 2.0, may also be too large. Average time at recruitment appears to be between 1.0 and 1.5. If so, estimates of MSY at t_c = 2.0 are too large.

If values of MSY made from estimates of M = 0.6 and t_c = 2.0 are discarded, then the upper bound estimates of MSY are reduced. In that case, for the 1970 uncorrected catch data, the upper bound estimate of MSY is 120,171,000 pounds (t_c = 1.5 and M = 0.5). For the estimates based on the 1975 corrected catch data, the likely upper bound is 52,875,000 pounds (t_c = 1.5 and M = 0.5).

If the use of the M/K ratio is valid and the recreational catch estimates in Deuel (1973) are inflated, then the "best" available estimate of MSY for king mackerel is 36,792,000 pounds corresponding to t_c = 1.5 and M = 0.4. This represents MSY under current fishing conditions. In many fisheries adjusting t_c can increase the yield. For king mackerel, the available data does not allow a precise determination of the best value for t_c but indicates that the present best estimate of t_c is at or near the point where yield per recruit is maximized. Where M is greater than or equal to 0.4, Y/R (R at age 0) at $F_{0.1}$ increases slowly as t_c declines. This increase becomes asymtotic below t_c = 1.0 when M = 0.4 and below t_c = 2.0 for M = 0.3. In the case of M = 0.3, Y/R declines when t_c = 1.0 or less.

Exhibit 5-5 summarizes the range of MSY estimates for king mackerel based on currently available data. These were derived using the Beverton and Holt approach. This approach estimates MSY based on estimates of the values of a number of parameters pertaining to the king mackerel fishery. The MSY estimates provided by this approach use as an input an estimate of total catch for some year. Because of uncertainty in the total recreational catch, estimates have been provided using data from the 1970 Saltwater Angling Survey (Deuel, 1973) which is believed to be an overestimate and also using adjusted data to estimate the total recreational catch. In either case, the MSY estimates are in similar relative proportions to the estimate of the total catch. The likely upper and lower bounds represent a reasonable limit to the range of MSY estimates based on currently available data. The "best estimate" represents a reasonable estimate for the most likely value of MSY based on currently available data. Future research may provide revised data with which to revise the MSY estimate. The estimates of the critical parameters, M (instantaneous fishing mortality), and t_c (time at first capture) for the MSY model are also presented in Exhibit 5-5.

Exhibit 5-2

Estimated number of recruits (R) and mean population number (n) of king mackerel[1] using 1970 commercial landing statistics (Wheeland, 1973) and uncorrected recreational landing statistics (Deuel, 1973 1973).

F	M	$\overline{N}$ (# of fish)	R (# of fish)
0.41	0.30	19,778,000	14,042,000
0.31	0.40	26,158,000	18,572,000
0.21	0.50	38,614,000	27,416,000
0.11	0.60	73,718,000	52,340,000

[1] Assuming Z = 0.71, C = 8,109,000 fish, $\overline{N}$ = C/F, and R = Z$\overline{N}$

Exhibit 5-3

Estimated number of recruits (R) and mean population number ($\overline{N}$) of king mackerel[1] based on 1975 commercial landing statistics (preliminary estimate, NMFS) and on recreational landing statistics from Deuel (1973) corrected with 1975 data from Wade (1977) and Brusher, et al. (1978).

F	M	$\overline{N}$ (# of fish)	R (# of fish)
0.41	0.30	8,702,000	6,179,000
0.31	0.40	11,510,000	8,172,000
0.21	0.50	16,990,000	12,063,000
0.11	0.60	32,436,000	23,030,000

[1] Assuming Z = 0.71, C = 3,568,000 fish, $\overline{N}$ = C/F, and R = Z$\overline{N}$

Exhibit 5-4

Estimated values for $F_{0.1}$, Y/R,[1] and Y for nine combinations of t_c and M for king mackerel, using 1975 commercial landings (preliminary estimates, NMFS) and recreational landings from Deuel (1973) corrected with creel census data (Wade, 1977; Brusher, et al. 1978) from 1975.

t_c	M	$F_{0.1}$	Y/R[1] (g)	R[1] (# fish)	Y(kg)	Y(lb.)
1.0	0.3	0.5	1980	6,179,000	12,234,000	26,948,000
1.0	0.4	0.6	1792	8,172,000	14,644,000	32,256,000
1.0	0.5	0.8	1722	12,063,000	20,772,000	45,754,000
1.0	0.6	0.9	1625	23,030,000	37,424,000	82,431,000
1.5	0.3	0.5	2233	6,179,000	13,798,000	30,391,000
1.5	0.4	0.6	2044	8,172,000	16,704,000	36,792,000
1.5	0.5	0.8	1990	12,063,000	24,005,000	52,875,000
1.5	0.6	1.0	1945	23,030,000	44,793,000	98,664,000
2.0	0.3	0.6	2595	6,179,000	16,035,000	35,318,000
2.0	0.4	0.7	2394	8,172,000	19,563,000	43,042,000
2.0	0.5	0.9	2320	12,063,000	27,986,000	61,643,000
2.0	0.6	1.0	2217	23,030,000	51,058,000	112,461,000

[1] R is defined as number of recruits entering the fishery.

Exhibit 5-5

King Mackerel MSY Estimate Summary
(million pounds)

	Based on Deuel's 1970 Data[1] for Estimate of Recreational Catch	Based on Adjusted Estimates for 1975 Recreational Catch	Parameter Value Estimates	
			M	t_c
Likely Upper Bound	120.2	52.9	0.5	1.5
"Best Estimate"	83.6	36.8	0.4	1.5
Likely Lower Bound	61.2	26.9	0.3	1.0
Corresponding Estimate of Total Recreational and Commercial Catch	69.4[2]	30.1[3]		

[1] From the 1970 Saltwater Angling Survey (Deuel, 1973).

[2] Unadjusted estimate for 1970.

[3] Adjusted estimate for 1975.

The observed reduction in catch per unit effort (CPUE) discussed in Section 5.4.1.2 is generally consistent with results one would expect under a surplus yield model of MSY approach if total catch in the fishery were approaching or slightly above the proportion of MSY as typified by the "best estimate" presented in Exhibit 5-5.

5.4.1.2 Present Condition of the King Mackerel

Present condition of the stock(s) of king mackerel cannot be conclusively established. The data available to assess present condition is somewhat contradictory. Detailed analysis of available data is presented below. The weight of this data indicates that the king mackerel stock is not presently overfished nor has been in the past. Effort and total catch are rising rapidly and may exceed MSY in the future if no measures are taken to control the total harvest.

Length frequency data from the commercial catch for both hook and line and gill-net gear has not changed at all from 1969 to 1977. This suggests that the degree to which the stock has been affected by fishing has not changed during that period. Upon further examination, however, these results can be expected when highly selective gears are used to harvest the resource. The mesh sizes of gill nets used in the king mackerel fishery have their highest efficiency in catching medium sized king mackerel and may not be efficient in capturing small or large individuals. Although only a limited amount of gill-net selectivity information exists for king mackerel (Beaumariage, 1973), it is clear that strong selectivity exists based on studies of Spanish mackerel (Trent and Pristas, 1977; Powell, 1975; Klima 1959). The commercial hook and line fishery is also selective in that they normally seek "school size" fish (small and medium sizes) and when the large fish are hooked they often break off. Based on preliminary analyses, it appears the recreational hook and line caught fish may be more representative of the fished stock and these data do reflect changes in size composition between years, times of the year, and areas (Trent, et al., in prep.).

Catch per unit effort (CPUE) for the two major commercial gears in south Florida, measured as mean catch per boat year, declined by 59 percent for hook and line vessels and 60 percent for power roller gill-net vessels between 1969 and 1976. This measure of CPUE is a very crude one. Many factors such as gear competition and relative availability of alternative species can cause this measure of CPUE to change without any change in real CPUE. While these and other factors are probably depressing our measure of CPUE, they are not sufficient to explain all of the decline.

During the period for which CPUE was calculated, effort increased 400 percent for hook and line boats and 200 percent for gill-net vessels. The effect of increasing levels of effort on CPUE, total catch, and fishable stock size depends to a great degree on the relative magnitude of fishing mortality and total mortality. In a stock where fishing mortality is large in relation to mortality, increases in fishing effort do not yield equivalent increases in catch, catch per unit effort declines and the fishable stock declines. An extreme example of this is the Florida spiny lobster fishery where essentially all of the recruits are captured each year. Because the fishable stock is reduced to near zero by the end of each season, increases in effort do not yield any increase in catch and CPUE declines in inverse relation to that increase in effort. In a stock where fishing mortality is very small in relation to total mortality, increases in effort will give corresponding increases in catch. The increased catch is still small in relation to the fishable stocks, so there is very little reduction in stock size and little or no reduction in CPUE.

The king mackerel lies somewhere between these two extremes. Increases in effort have brought both increases in total catch and decreases in CPUE. It is probable that there has also been some decline in stock abundance during that period. The data is not sufficiently precise to estimate the magnitude of this decline.

Three sets of data on recreational fishery CPUE are available from the northwest coast of Florida (Exhibit 5-6). Two of the data sets are from catch records of charterboat captains from Destin (Captain A. L. Hilpert) and Panama City (Captain J. Finnegan - see Fable, et al., in prep.) and the third set is from a private marina in Bay County, Florida (name withheld upon request). The latter is a record of the total catch of king mackerel and the total number of boat days during which king mackerel were caught. All three data sets show similar trends in CPUE. The magnitude of annual changes in CPUE is less for the charter captain. This is not unexpected because of the professional's greater skill and more consistent effort.

These data are too variable and from too short a time period to perform the type of analysis done for the commercial data. They do show clearly the decline in catch and CPUE in 1977 and 1978 reported by many recreational fishermen in the northern Gulf of Mexico. Similar declines are reported along the west central Florida coast.

The causes of this decline are not known. It could be attributed to a decline in stock size or changes in migration patterns. Most charter fishermen along northwestern Florida believe that there has been a decline in abundance. It seems likely that such a dramatic decline in abundance would have been accompanied by reduced landings in the winter fisheries in south Florida, both commercial and recreational. This does not seem to be the case, although landing statistics and other documentation are lacking.

It is possible that the decline in catch and CPUE is being caused by changes in the migratory pattern of the fish. The winters of 1976-77 and 1977-78 were both extremely cold, causing reduced water temperatures along the coast. This might have caused the king mackerel schools to stay offshore, where they were not available to the fishermen. Data that support this hypothesis are presented by Fable, et al. (in prep.). Other supporting data is contained in Williams and Taylor (in prep.).

The range of estimates for MSY from either of the two different estimates of number of recruits is rather broad. In both cases, the lower bound estimates of MSY are slightly less than the total catch, while the upper bound estimates are approximately 1.7 times the estimates of present total catch. If either of the upper bound estimates is correct, then the stock is not presently in any danger of being overfished and present levels of fishing pressure are not significantly affecting the abundance of the stock. If one of the lower bound estimates of MSY is correct, then the stock is overfished and is declining. If our "best" estimate is correct, the stock is not now overfished, but increasing fishing pressure in recent years may have caused some decline in abundance.

The weight of the available information indicates that the king mackerel stock is not presently overfished but that fishing pressure has had some effect on the abundance of the stock.

The above analysis is based on data through 1977. This analysis, along with additional data on catch, effort and size distribution during 1978 and 1979, were reviewed by the Gulf Council Scientific and Statistical Committee in April, 1980. The majority of the Committee concluded that the additional data was insufficient to change the original conclusion. At most, it introduces reasonable doubt that the average level of catch may be somewhat closer to MSY than previously believed. Since that time no major changes have occurred in the fishery or the available data base. Commercial harvest increased in 1980 to slightly above the historical average, after having been depressed during 1978 and 1979. Recreational catch rates appear to have fluctuated greatly, increasing in some areas and decreasing in others. An estimate of recreational catch in 1979 has become available which is substantially less than previous estimates (see Section 8.2.2.2).

Exhibit 5-6

Fishing effort for king mackerel and catch per unit effort of two charter boat captains in northwestern Florida.

	Destin		Panama City	
Year	Fishing hours	King mackerel/ hour	Fishing hours	King mackerel/ hour
1970	---	---	552	4.10
1971	---	---	550	3.57
1973	432	2.5	495	2.83
1974	440	1.4	329	1.98
1975	488	3.1	592	3.83
1976	424	1.7	589	2.42
1977	352	0.7	676	1.44
1978	---	---	706	1.29

Source: Captain A.L. Hilpert (Destin); Captain J. Finnegan (Panama City). See Fable, et al., in prep.

Effort, catch, and catch per unit effort by recreational fishermen from a commercial marina in Bay County, Florida

Year	King mackerel boat days	Total number caught	Catch/boat day
1973	3,000	8,100	2.70
1974	3,300	2,700	0.82
1975	4,000	19,000	4.75
1976	3,700	4,900	1.32
1977	3,700	2,400	0.65

Source: Marina Operator

5.4.1.3 Future Condition of King Mackerel

The future condition of the king mackerel depends to a great degree on the rate of increase in fishing effort and catch and on the true value of MSY.

Commercial effort has been increasing rapidly. This has been primarily in response to the great expansion of the power roller gill-net fleet. The number of power roller vessels equipped with king mackerel nets increased from 18 in 1973 to 33 in 1977. The present number is unknown but exceeds 60 and probably approaches 80. The number of hook and line boats in the Florida king mackerel fishery has increased from approximately 100 in 1969 to 300 in 1976.

Recreational fishing effort has also been increasing, although it is very difficult to quantify this increase. North (1976) estimated a 4.5 percent annual increase in recreational fishing effort. Another estimate can be made from the rate of increase in the number of recreational boats. The number of recreational boats 16-25 feeet in length can be used as a rough proxy of fishing effort in salt water. This size boat comprises the vast majority of private boats fishing for king mackerel and other coastal pelagic species. The number of boats in this size class registered in Florida increased from 58,998 in 1965 to 147,851 in 1975 (Florida registered boat records) at an annual rate of approximately 9.5 percent. It is probable that recreational fishing effort has been increasing at a rate approaching this.

The rate of increase in commercial harvest is slowing. From 1971 through 1977, commercial catch statistics showed a fairly rapid increasing trend. Catches declined sharply in 1978 and 1979, then increased in 1980 to slightly above the 1975-1979 average.

How increases in both recreational and commercial effort will affect the stock depends greatly on the true value of MSY. If one of the lower bound estimates of MSY is most nearly correct, then the stock is already overfished and increases in effort will result in decreases in abundance, yield, and catch per unit effort. If one of the "best" estimates are most nearly correct, there is room for some expansion in effort and catch. However, given the apparent rate of increase in fishing effort, MSY will be reached in the near future. If one of the upper bound estimates of MSY is correct, then there is room for large increases in effort and catch. Such an increase appears unlikely, given present trends in commercial harvest.

Without precise estimates of the parameters, particularly M, used to calculate MSY, it is impossible to be more specific. Interpretation of the future condition of the stock on the basis of MSY estimates should be very conservative.

5.4.2 Spanish Mackerel

5.4.2.1 Estimate of MSY for Spanish Mackerel

Maximum sustainable yield for Spanish mackerel was computed using the dynamic pool model of Beverton and Holt (1957). The procedure followed is identical to that used to estimate MSY in king mackerel. Selection of parameters follows Chittenden (unpub. ms.).

Yield per recruit: parameters

The "growth" pattern parameters L_{∞}, K, t_o, and W_{∞} were determined from data in Powell (1975). Estimates of K = 0.47, t_o = 0.8955, and L_{∞} = 558 were obtained by pooling Powell's (1975) data on back calculated length at age for each sex and calculating a "sexes combined" Walford plot and von Bertalanffy growth equation. A 1:1 sex ratio was assumed (Chittenden, unpub. man.). An estimate of W_{∞} = 1,816 g was made using Powell's length weight equation for sexes combined.

The mortality parameter Z was estimated from comparison of a variety of published estimates of mortality and other data from which Z could be calculated (Powell, 1975; Klima, 1959; Klima, 1976; Powell, unpublished). Estimates of Z from these sources varied from 0.71 to 1.25 depending on the data source and the method of calculating Z. The best estimate of present Z was 1.00 (Chittenden, unpub. man.). It falls between estimates (0.85 to 0.98) based upon Powell's recent data and estimates (0.95 to 1.25) based upon Klima's (1959) older data.

No precise estimate of M and F exist for the U.S. stock of Spanish mackerel. Doi and Mendizabal (1979) estimated M = 0.693 and F = 0.210 for a stock of Spanish mackerel in Mexican waters. This stock may or may not contribute to the U.S. fishery. The most likely range of values for M (and therefore, F) was determined using the ratio M/K in the same manner as for king mackerel. The most likely values for M varied from 0.50 to 0.80 and for F from 0.20 to 0.50 (Chittenden, unpub. man.).

The time parameter $t_r = 0$ was chosen (Chittenden, unpub. man.) because spawning occurs primarily in the northern Gulf of Mexico where there is an active sport fishery for Spanish mackerel. Larvae enter the area of the fishery at birth. The parameter $t_L = 5$ was chosen from the age frequency data in Powell (1975), Klima (1959), and Powell (unpublished). Fish older than five years exist but do not make a significant contribution to the catch (Chittenden, unpub. man.). Three values for t_c, 1.0, 1.5, and 2.0 were chosen to cover the most likely range for the true value of t_c.

Yield Per Recruit: Calculation

As in the case of the king mackerel, the relation of Y/R to F is a flat topped curve. For Spanish mackerel, F_{max} for most values of M and t_c is approximately 5.0, while the gain in Y/R for values of F greater than 1.5 is very small.

To estimate MSY, $F_{0.1}$ was chosen as a more reasonable value than F_{max}. Fishing at any of the indicated values of F_{max} would reduce the age structure of the stock to the point that the fishery would be almost entirely dependent on new recruits entering the fishery each year. Fishing at F_{max} could also affect recruitment by reducing the spawning stock, although that is not as certain as in the case of king mackerel. However, one year of poor recruitment from natural or other causes combined with heavy fishing pressure could severely reduce the number of spawners and further reduce recruitment in the following years. In addition, fishing at F_{max} would reduce catch per unit effort below the level needed to support a commercial fishery or to satisfy the recreational fishermen.

For Spanish mackerel, values of $F_{0.1}$ varied from 0.7 at $t_c = 1.0$ and M = 0.5 to 1.3 for $t_c = 2.0$ and M = 0.8. Yield per recruit at $F_{0.1}$ varied from 318 g at $t_c = 1.0$, M = 0.8, and $F_{0.1} = 1.0$ to 625 g at $t_c = 2.0$, M = 0.5, and $F_{0.1} = 1.0$ (Exhibit 5-7).

Estimating Number of Recruits for Spanish Mackerel

Two estimates of recruitment in Spanish mackerel were made using the same assumptions and formulae as were used to calculate recruitment for king mackerel.

Two estimates of recreational catch were used to calculate total catch and number of recruits. For one, the 1970 landing statistics (Deuel, 1973; Wheeland, 1973) were used. Because the estimates of recreational catch in Deuel, 1973 are generally considered to be overestimates, they were adjusted downward by the same method used for king mackerel and a second estimate of total catch was calculated for 1975.

Commercial landings for 1970 for the combined Gulf and Atlantic coasts from Texas to Virginia totaled 12,138,000 pounds. The vast majority of this, 11,674,000 pounds, was landed by Florida fishermen

Exhibit 5-7

Estimated values for $F_{0.1}$, Y/R,[1] and Y for Spanish mackerel for 12 possible combinations of t_c and M. Values for R estimated from 1975 commercial landings and adjusted values from Deuel (1973).

t_c	M	$F_{0.1}$	Y/R[1] (g)	R[1] (# of fish)	Y(kg)	Y(lbs.)
1.0	0.5	0.7	381	16,044,000	6,113,000	13,464,000
1.0	0.6	0.8	356	20,055,000	7,140,000	15,726,000
1.0	0.7	0.9	334	26,740,000	8,931,000	19,648,000
1.0	0.8	1.0	318	40,110,000	12,755,000	28,061,000
1.5	0.5	0.9	509	16,044,000	8,166,000	17,988,000
1.5	0.6	1.0	480	20,055,000	9,626,000	21,204,000
1.5	0.7	1.1	459	26,740,000	12,273,000	27,001,000
1.5	0.8	1.2	442	40,110,000	17,729,000	39,004,000
2.0	0.5	1.0	625	16,044,000	10,028,000	22,087,000
2.0	0.6	1.1	599	20,055,000	12,013,000	26,460,000
2.0	0.7	1.2	574	26,740,000	15,349,000	33,768,000
2.0	0.8	1.3	556	40,110,000	22,301,000	49,062,000

[1] R is defined as number of recruits entering the fishery.

using gill nets. Length frequencies and sex ratio from Powell (1975) were used to estimate a mean weight of 1,052 g (2.32 pounds) for the catch from gill nets of 3-3/8 inch stretch mesh, the predominant mesh size in the fishery. A catch of 5,232,000 fish was estimated by assuming this mean weight for the entire commercial catch. The total commercial and recreational catch was 13,342,000 fish using the uncorrected Deuel data. Mortality parameters follow those used to estimate yield per recruit. Instantaneous total mortality rate (Z) was estimated as 1.0. Estimated values of F from 0.5 to 1.0 were used. Estimates of number of recruits varied from 26,684,000 at F = 0.5 to 66,710,000 at F = 0.2.

A second estimate of total catch was made using commercial landings data for 1975 (preliminary estimate, NMFS). Commercial landings in 1975 were estimated at 11,751,000 pounds. Assuming an average weight of 2.32 pounds, this represents 5,065,000 fish.

The recreational catch estimate is almost certainly inflated. For the king mackerel, the ratio of Deuel's estimate to the alternate estimate using local studies was 1:0.381. For lack of other data, the ratio established for king mackerel was used to adjust Deuel's estimate. On this basis, the recreational catch of Spanish mackerel in 1975 was 2.957×10^6 fish using the corrected data. The corresponding estimates of number of recruits varied from 16,044,000 at F = 0.5 and M = 0.5 to 40,110,000 at F = 0.2 and M = 0.8 (Exhibit 5-8). Although this adjusted estimate of total catch is probably more accurate than Deuel, (1973), the assumption used to adjust Deuel's estimate cannot be directly demonstrated for Spanish mackerel. The adjusted catch estimate and the estimates of recruitment made from it should be viewed with caution.

Exhibit 5-8

Estimated number of recruits (R) and mean population number ($\overline{N}$) for Spanish mackerel,[1] based on 1975 commercial landing statistics and recreational catch estimates from Deuel (1973), corrected with 1975 data on king mackerel from Wade (1977) and Brusher, et al. (1978).

F	M	$\overline{N}$	R
.5	.5	16,044,000	16,044,000
.4	.6	20,055,000	20,055,000
.3	.7	26,740,000	26,740,000
.2	.8	40,110,000	40,110,000

[1] Assuming Z = 1.00, C = 8,022,000 fish, $\overline{N} = C/F$, $R = Z\overline{N}$

Calculation of MSY

Estimates of MSY were made for both sets of recruitment estimates at 12 combinations of t_c and M. Using recruitment estimates calculated from the 1970 uncorrected catch statistics, estimates of MSY varied from 22,393,000 pounds at t_c = 1 and M = 0.5 to 81,698,000 pounds at t_c = 2.0 and M = 0.8. Within that range the most likely value of M is 0.7. This estimate lies near the middle of the range calculated from the M/K ratio and is the same as that calculated for a Mexican stock of Spanish mackerel (Mendizabal, unpublished). The most likely value of t_c is probably 1.5 or slightly above. At this combination of M and t_c, MSY = 44,963,000 pounds. This compares with a total uncorrected catch estimate for 1970 of 35,515,000 pounds.

Using the 1975 commercial landings and the adjusted estimate of recreational catch from Deuel (1973), estimates of MSY varied from 13,464,000 pounds at M = 0.5 and t_c = 1.0 to 49,062,000 pounds at M = 0.8 and t_c = 2.0 (Exhibit 5-7). At the most likely combinations, M = 0.7 and t_c = 1.5, the estimate of MSY is 27,001,000 pounds. This compares with a total adjusted catch estimate of 20,158,000 pounds.

In many fisheries yield can be increased by adjusting age at recruitment, t_c. For Spanish mackerel, the present value of t_c is at or near the age where Y/R is maximized. At present t_c cannot be precisely determined, but lies between age 1.0 and 2.0. If natural mortality, M, equals 0.7 (the best estimate) or greater, Y/R at $F_{0.1}$ is maximized at t_c = 1.0. At smaller values of M, Y/R is maximized at progressively larger values of t_c.

Exhibit 5-9 summarizes the range of MSY estimates for Spanish mackerel based on currently available data. The MSY estimates provided by this approach use as an input an estimate of total catch for some years. Because of uncertainty in the total recreational catch, estimates have been provided using data from the 1970 Saltwater Angling Survey (Deuel, 1973), which is believed to be an overestimate and using adjusted data to estimate the total recreational catch. In either case, the MSY estimates are in similar relative proportions to the estimate of the total catch. The likely upper and lower bounds represent a reasonable limit to the range of MSY estimates based on currently available data. The "best estimate" represents a reasonable estimate for the most likely value of MSY based on currently available data. Future research may provide revised data with which to revise the MSY estimate. The estimates of the critical parameters, M (instantaneous fishing mortality), and t_c (time at first capture) for the MSY model are also presented in Exhibit 5-9.

5.4.2.2 Present Condition of Spanish Mackerel

The present condition of the Spanish mackerel is not well defined. There is no documented information on changes in length frequency of the catch, changes in catch per unit effort, relative abundance, or distribution. The only available information which can be used to assess the present condition of the stock are the estimates of MSY presented in Section 5.4.2.1 and its relation to present catch.

If the estimates of Deuel (1973) for the recreational catch are accepted, then the total catch, recreational and commercial, in 1970 was 35,515,000 pounds. This is larger than the lower bound estimate of MSY, but below the "best estimate" of 44,963,000 pounds, and much less than the upper bound estimate of MSY. If our best estimate is correct, then the Spanish mackerel is not presently overfished; nor has it been in the past. However, this estimate of MSY is based on imprecise estimates of many parameters. It is advisable to be very conservative in inferring present condition from these estimates of MSY alone.

5.4.2.3 Future Condition of Spanish Mackerel

Predicting the future condition of the Spanish mackerel stock is dependent on the rate at which the catch and fishing effort are increasing and on the true values of MSY and present total catch.

Recreational fishing effort for most species of saltwater fish is increasing and will continue to increase in the foreseeable future. North (1976) estimated a rate of increase in saltwater recreational fishermen as 4.5 percent per year. Recreational boats of the size class used by most saltwater anglers (16-25 feet) have been increasing by approximately 9.5 percent in Florida. This

Exhibit 5-9

Spanish Mackerel MSY Estimate Summary
(million pounds)

	Based on Deuel's 1970 Data[1] for Estimate of Recreational Catch	Based on Adjusted Estimates for 1975 Recreational Catch	Parameter Value Estimates M	t_c
Likely Upper Bound	81.7	49.1	0.8	2.0
"Best Estimate"	45.0	27	0.7	1.5
Likely Lower Bound	22.4	13.5	0.5	1.0
Corresponding Estimate of Total Recreational and Commercial Catch	35.5[2]	20.1[3]		

1 From the 1970 Saltwater Angling Survey (Deuel, 1973).

2 Unadjusted estimate for 1970.

3 Adjusted estimate for 1975.

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is probably a reasonable proxy for an estimate of the rate of increase of recreational fishing effort. Recreational fishing effort for Spanish mackerel is probably increasing at a rate within this range.

Commercial fishing effort and fleet capacity have been increasing for Spanish mackerel, primarily because of the rapid increase in power roller gill-net vessels in south Florida. Most of these vessels are now equipped to fish for either Spanish or king mackerel. The total number is unknown, but approaches 80. The increase in number of vessels and effort is expected to continue.

The effect of these increases in effort depend on the true values of present catch and MSY. If either estimate of present catch is correct, and the corresponding lower bound estimate of MSY is correct, then the Spanish mackerel is already overfished and further increases in catch could result in severe reductions in the abundance of the stock, total yield, and catch per unit effort. If one of our "best estimates" is correct, then there is some room for expansion. However, if effort and catch increase as rapidly as seems possible, MSY will be reached in a few years.

5.4.3 Cobia

5.4.3.1 Cobia: MSY and Present Condition

A crude estimate of MSY was obtained from the landing statistics. Deuel (1973) reported the 1970 recreational catch to be 775,000 pounds in the Atlantic and 125,000 pounds in the Gulf. These may be overestimates, but no data exists with which to correct them. For the period 1965-1977, maximum reported commercial landings on the Atlantic coast were 24,000 pounds in 1965 and 23,000 pounds in 1970. The maximum reported in the Gulf was 133,000 pounds in 1974. The maximum total catch was, therefore, 1,057,000 pounds.

This was accepted as the best available estimate of MSY. It is accepted with caution and considered an upper limit estimate. Using maximum reported catch for MSY in a stock which may be overfished (see below) could overestimate the real value. Additionally there is a high probability that the recreational catch is overestimated.

At present, there is not sufficient data available to calculate an accurate estimate of MSY for cobia. The only information available which could be used to make a crude estimate are commercial and recreational catch statistics and data from Richards (1977). These data indicate that there may be two stocks of cobia in U.S. waters; one in the Atlantic which may be overexploited, and one in the Gulf of Mexico which appears to be underexploited.

Although total yield or MSY cannot be calculated from the yield per recruit analyses used for king and Spanish mackerel, it was possible to examine the relation between present Y/R and optimum Y/R. Because of lack of data, this analysis was limited to bounding the possible values for present and optimal Y/R.

The necessary parameters were estimated as follows: The values for the Brody growth coefficient, K = .25, maximum weight, W = 38.25 kg and total mortality, Z = .41, were computed from the average of values for males and females given in Richards (1967, 1977), or estimated from data contained in those publications (see Section 5.1.3). Age at recruitment to the fishing grounds (t_r) was assumed to be equal to age at recruitment to the recreational fishery, $t_c = 1.0$. Bounds for values of fishing mortality, F, and natural mortality, M, within Z were established based on the theoretical relation between maximum age and natural mortality (Tanaka, 1960). Maximum age recorded in a small sample from a relatively heavily fished population was ten years. It is reasonable to assume that maximum age for cobia approaches 15 years. For this maximum age, Tanaka (1960) predicts M = .17. To allow for uncertainty, a range of M $\pm$ 0.05 was arbitrarily set. Estimates of Y/R, optimum size at recruitment for a given value of M and Y/R at that optimum size are given below.

At the upper bound estimate of F, the population from which this data was taken was being overfished. Yield could be increased by increasing size at recruitment or decreasing fishing effort. Maintaining F and increasing t_c to 44 inches would increase yield by 79 percent. At the lower bound estimate of F, the population was not overfished. Yield could be increased by increasing t_c and/or increasing F. Maintaining F and increasing t_c to 33 inches would result in increasing yield by 23 percent.

Estimated bounds of M and F when Z = .41		Y/R(g) T_c = 1.0	Optimal Size at Recruitment L_{opt} (inches)	Y/R(g) at L_{opt}
M	F		For Specified F	
.12	.29	5,314	44	9,503
.22	.19	3,064	33	3,761

These should be considered very crude estimates for Y/R in the early 1960's. Since that time, fishing effort has increased by more than 100 percent. Fishing mortality has undoubtedly increased also. If fishing mortality has exceeded one half the value of Z, then the population from which this data was taken is presently overfished, given the above range of estimates of M and the present age at recruitment. Although there is no recent data to quantify the increase in F, or its magnitude in relation to Z, it is possible that this population is presently overfished. This supports the conclusion of Richards (1977). Landings data suggests that this conclusion could be applied to the entire Atlantic coast population.

Data from Richards (1977) strongly suggests that there is a population of cobia which returns to the area in and around Chesapeake Bay each summer and which is presently being overfished. Tagging returns indicate a high fishing mortality rate. Total number and weight caught have declined, in both the commercial and recreational fisheries, and the mean size of the fish caught by recreational fishermen has declined.

This trend may apply to the entire population on the Atlantic coast. Commercial landings of cobia on the Atlantic coast declined from 48,000 pounds in 1960 to 15,000 pounds in 1977 (see Exhibit 5-10). This decline has been consistent in all areas except Florida, where landings have been relatively stable since 1970 (Exhibit 8-8). This may reflect a decline in abundance.

There is little evidence that the cobia population in the Gulf of Mexico is following the same pattern. Cobia landings from the Gulf of Mexico rose from 40,000 pounds in 1960 to 133,000 pounds in 1974, then declined to 89,000 pounds in 1977. There is no available documentation of any decline in abundance of cobia in the recreational catch. Declining catch rates of charter boats (Captain Charles Sebastian, pers. comm.) in Louisiana indicate some decline in abundance in that area.

Exhibit 5-10

Commercial Landings of Cobia Between 1960 and 1977 (pounds)
(NMFS Commercial Fishery Statistics)

Year	Atlantic Coast	Gulf Coast	Total
1960	48,000	40,000	88,000
1961	46,000	29,000	75,000
1962	44,000	37,000	81,000
1963	56,000	39,000	95,000
1964	36,000	25,000	61,000
1965	24,000	21,000	45,000
1966	17,000	38,000	55,000
1967	22,000	40,000	62,000
1968	20,000	82,000	102,000
1969	13,000	70,000	83,000
1970	23,000	106,000	129,000
1971	22,000	104,000	126,000
1972	21,000	118,000	139,000
1973	15,000	113,000	128,000
1974	18,000	133,000	151,000
1975	22,000	120,000	142,000
1976	19,000	110,000	129,000
1977	15,000	89,000	104,000

5.4.3.2 Cobia: Future Condition

The abundance of cobia is apparently much lower, even in unfished populations, than the abundance of other coastal pelagic species. It is a moderately long-lived species with a correspondingly low natural mortality rate and low rate of recruitment. This combination of characteristics makes the cobia more susceptible to overfishing than other coastal pelagic species.

The cobia is subject to intense recreational fishing pressure during the summer in Chesapeake Bay, in spring and summer in the northern Gulf of Mexico, and to a lesser degree during the winter in south Florida. If this fishing pressure increases, as seems very likely, the cobia could become severely overfished. This may be happening already in the Atlantic; however, until more data is available this conclusion is not definitive.

5.4.4 Cero Mackerel: MSY, Present Condition, Future Condition

There is no available information from which any estimate of MSY for cero mackerel can be produced. Neither recreational nor commercial catch statistics are available.

The size of the cero mackerel stock in U.S. waters is apparently much smaller than the king or Spanish mackerel. There is no commercial fishery and very little recreational fishing effort directed at the cero mackerel in U.S. waters. The current landings are primarily incidental catches. It is therefore unlikely that the cero mackerel is presently overfished or in any danger of becoming overfished if current trends continue.

5.4.5 Little Tunny: MSY, Present Condition, Future Condition

There is no available information from which any estimate of MSY for little tunny can be produced. The little tunny stock in U.S. waters is apparently very large. It is the most abundant scombrid larvae out of eight species found in the eastern Gulf of Mexico (E. Houde, pers. comm.). There is very little commercial fishery and no comprehensive landing statistics available, either commercial or recreational. The recreational catch is probably quite large. Manooch and Laws (in prep.) reported 58,953 pounds of little tunny caught by the charter fishing fleet in North Carolina. Gentle (1977) reported the little tunny to be the second most abundant fish in the catch of the charter fishing fleet in Miami, Florida. In that study little tunny were often caught as bait for sharks and large billfish (Edgar Gentle, pers. comm.). Data in Carlson (1952) indicated that the abundance of little tunny along the Atlantic coast was very high. Wade (1977) estimated the Alabama recreational catch in 1975 at 388,444 pounds.

Although there is no estimate of present catch, it is very unlikely that the little tunny is being overfished or that it will become overfished in the forseeable future if present trends continue.

5.4.6 Bluefish

5.4.6.1 Bluefish: MSY and Present Condition

The bluefish stock or stocks in the Gulf of Mexico appear to be small relative to those along the Atlantic coast. The available data is not sufficient to calculate a reasonable estimate of MSY. The present condition of the stock appears to be healthy; no significant trends in catches, either up or down are seen in either commercial or recreational catches. There is little directed fishery for bluefish in the Gulf and no reason to believe that the total catch is approaching MSY.

5.4.6.2 Bluefish: Future Condition

Without more accurate information on MSY and present catch, it is impossible to predict the future condition of the bluefish. Bluefish populations are known to undergo large fluctuations in abundance of unknown cause. Some data indicate that the bluefish may be in a period of stock expansion along the Atlantic coast. At present, it appears to be underexploited in the Gulf. How rapidly this could change as the total catch increases cannot be predicted with the available data.

5.4.7 Dolphin: MSY, Present Condition, Future Condition

There is no available data from which to rigorously attempt an estimate of MSY for dolphin; however, at the present time it is unlikely that the dolphin is being exploited at MSY. The dolphin is a species with a high growth rate, high mortality rate, low age at maturity, and high fecundity (see Section 5.1.7 on biological description). A species with this combination of biological characteristics is difficult to overfish, either in terms of recruitment overfishing or growth overfishing.

5.5 Probable Future Condition

The information for this section has been included in Section 5.4.1.3 for king mackerel, 5.4.2.3 for Spanish mackerel, 5.4.3 for cobia, 5.4.4 for cero mackerel, 5.4.5 for little tunny, 5.4.6.2 for bluefish, and 5.4.7 for dolphin. This was done because the information leading to the respective conclusions followed more coherently the presentation in Section 5.4.

6.0 DESCRIPTION OF HABITAT

6.1 Condition of Habitat

6.1.1 Adult Habitat

The habitat of all adults of all the species in the coastal pelagic management unit, except dolphin, is the coastal waters out to the edge of the continental shelf in the Gulf of Mexico and Atlantic Ocean. Dolphin is an oceanic species that may be found on the shelf. Within that area, the occurrence of these species is governed by temperature and salinity. All species except bluefish are seldom found in water temperatures less than 20°C. Bluefish are commonly found in water temperatures down to 12°C. Salinity preference varies, but is generally for high salinity. Dolphin are seldom found in waters with salinity less than 36 ppt. The scombrids prefer high salinities, but less than 36 ppt. Salinity preference of little tunny and cobia is not well defined. Bluefish exhibit a wide preference and can be found in estuarine waters of relatively low salinity. Some populations of bluefish are estuarine dependent in the juvenile stage.

There appears to be little direct effect of man on the adult habitat which adversely affects adults of these species, nor does it appear likely that there will be significant effect in the foreseeable future. Habitat degradation is more likely to affect eggs and larvae or indirectly affect the adults through predator-prey relations.

6.1.2 Larval Habitat

The larval habitat of all species in the coastal pelagic management unit is the water column in the area of spawning. These areas are identified for each species in Section 5.1. Within the spawning area, eggs and larvae are concentrated in the surface waters.

There is, at present, no documented evidence that larval habitats have been degraded by natural or man-made impact to a degree sufficient to affect recruitment; however, man's impact on the habitat has greater potential to affect the larvae than the adults, and the magnitude of man's impact in the spawning area has been rapidly increasing.

Oil pollution from offshore oil spills or chronic leakage or discharge from operating oil wells is a potential danger to the spawning grounds of coastal pelagic species. The water soluble aromatic hydrocarbon component of crude oil is damaging to fish eggs and embryos. Fifty percent mortality was experienced in herring and anchovy larvae exposed to benzene in the range of 20 to 25 ppm in a laboratory experiment (Struhsaker, et al., 1974). Sublethal effects observed in laboratory experiments were abnormal development and altered respiration rates. Eggs and larvae were collected from San Francisco Bay and other locations. San Francisco Bay eggs showed a lower hatching rate (20-25 percent did not hatch) and San Francisco larvae showed a higher percent of abnormalities than eggs and larvae collected from other sites (Struhsaker, et al., 1974).

San Francisco Bay is an area of chronic oil pollution. Other pollutants such as pesticides may act synergistically with oil to produce the deleterious effects on the young stages of fish (Struhsaker, et al., 1974). Oil dispersants with water soluble aromatic hydrocarbon fractions also have been found to be damaging to eggs and larvae (Wilson, 1977), although the second generation dispersants are less toxic than those originally used after oil spills, due to the reduction in aromatic hydrocarbons (Wilson, 1977).

Although no adverse impacts have yet been documented, growing offshore drilling activity in the Gulf of Mexico is a potential threat to king mackerel in particular. A major spawning center is located off the coast of Texas. The possible impact of chronic oil leaks or oil bearing brine discharges on the development of king mackerel larvae should be considered. The recent IXTOC oil spill demonstrates the potential for single accidents to impact a very large fraction of the total spawning area.

6.1.3 Habitat of Prey Species

Estuaries are critical habitats for most of the major prey species of coastal pelagics. For this reason, estuarine habitats and factors which affect them should be considered critical to the coastal pelagic management unit.

All the species of the coastal pelagic management unit, except the dolphin, have one thing in particular in common. They move from one area to another and harvest seasonal abundances of local resources. Many of the prey species of the coastal pelagics are estuarine dependent in that they spend all or a portion of their lives in estuaries. This means that the coastal pelagic species, by virtue of the ultimate source of their food, are to some degree dependent upon estuaries also. Therefore, coastal pelagic species can be expected to be detrimentally affected if the productive capabilities of estuaries are greatly degraded.

6.2 Habitat Areas of Particular Concern

The critical habitats of the species of the coastal pelagic management unit, generally speaking, are:

1) Offshore areas of peak spawning activities

2) All the estuaries on their migration routes.

Some general statements can be made as to actions that would serve to protect the areas of critical habitat:

1) Locate the centers for spawning activity for the coastal pelagic species, evaluate their current habitat quality, and protect them from further degradation.

2) Determine whether or not king mackerel hatching or larvae development in the western Gulf, a major spawning area, are significantly affected by proximity to operating oil wells (or brine discharges) and if this affects recruitment.

3) Recognize the importance of estuaries to the coastal pelagic species and act against damage to natural support capabilities of estuaries by dredging, filling, bulkheading, and change in freshwater runoff, etc.

6.3 Habitat Protection Programs

As discussed in the previous sections, the coastal pelagic fish do not inhabit any site specific habitat. Rather they are spawned in very large (generally) offshore, geographical areas, and as adults, migrate over great distances. There are comprehensive coastal zone management programs being developed that focus on protecting and enhancing estuarine environments along with other coastal areas. Indirectly these programs will affect in a positive manner the productivity of the management unit. The status of their plans are summarized in Exhibit 7-4.

At the federal level no comprehensive habitat protection programs exist. A marine sanctuary program was established by the Marine Protection, Research and Sanctuaries Act. The Act permits the designation (by the Office of Coastal Zone Management, NOAA) of specific marine sanctuaries (see FMP Section 7.3). Existing or proposed sanctuaries will not significantly affect the habitat of coastal pelagic species.

7.0 FISHERY MANAGEMENT JURISDICTION, LAWS, AND POLICIES

Management institutions currently involved with the species in the coastal pelagic management unit include the Fishery Management Councils and various states within the range of the stocks. King mackerel, Spanish mackerel, cero mackerel, dolphin and cobia are caught almost entirely within the south Atlantic and Gulf of Mexico regions. Bluefish are caught in substantial amounts from Mississippi to Massachusetts, but are considered by this plan only in the Gulf of Mexico. Little tunny is caught by recreational fishermen in the south Atlantic and Gulf of Mexico regions, and there is a moderate commercial catch off New England.

Exhibit 7-1 shows the proportion of the U.S. commercial catch caught inside and outside of three miles from shore. King mackerel is caught predominantly beyond three miles from shore. Bluefish is caught predominantly inside of three miles. Spanish mackerel and little tunny appear to have substantial catch both inside and outside of three miles. The recreational catch appears to follow the same general pattern as the commercial catch. While specific data are not available for cobia and dolphin, they appear to be caught both inside and outside of three miles in substantial amounts. Dolphin in particular is frequently caught considerable distances offshore. No data are available on distances from shore where cero mackerel is caught, although its distribution is believed to be predominantly limited to southern Florida.

There may be some interaction between the stocks of king and Spanish mackerel caught in United States waters and those caught by Mexicans off Vera Cruz.

7.1 Management Institutions

Exhibits 7-2 and 7-3 summarize basic characteristics of the state institutions involved in fishery management. Brief narrative descriptions are presented below for each state. The characteristic of primary importance in this description is the identification of authority for establishing management regulations in the various states. While all states authorize some degree of authority to administrative bodies, only North Carolina, Alabama, Mississippi, and to a certain degree Texas, utilize administrative authorities for establishing substantive management regulations. In the remaining states, the statutes contain the specific regulatory measures used to manage fishery resources. For instance, in Florida, the legislature passes detailed statutes for fisheries resources statewide as well as special laws applicable to particular counties. The embodiment of such detailed regulations in statutory law limits the flexibility of management programs. Because changes in regulations require legislative approval, efforts to coordinate management programs will be hampered by the relatively slow pace of the legislative process.

North Carolina

The agency responsible for the management of fishery resources in North Carolina is the Department of Natural Resources and Community Development. The Marine Fisheries Commission is a seven-member board appointed by the governor which serves as the policy-making body for marine fisheries. The Commission has the power to adopt rules and regulations consistent with statutes to properly manage the taking, processing and disposition of marine resources. Regulations are adopted by majority vote of the Commission. There also exists within the department a nine-member Commercial and Sports Fisheries Committee. It is composed of representatives of fishing interests and the scientific community. Its responsibilities are largely to advise and recommend actions to the Secretary of the Department.

North Carolina statutes deal with matters such as licenses and fees, enforcement, and leasing procedures for oysters and clams. Management authority such as size limits, seasons, or gear restrictions is left largely to the discretion of the Marine Fisheries Commission, and Department of Natural Resources and Community Development, Division of Marine Resources.

Exhibit 7-1

Commercial Landings by Species and by Distance Caught off U. S. Shores[1]
(1000 lbs.)

Species[2]	1975	1976	1977	3-Year Average	Percent
King mackerel					
0-3 miles	820	1,070	2,022	1,304	16.2
3-200 miles	6,003	7,866	6,438	6,769	83.8
Spanish mackerel					
0-3	4,428	5,093	7,756	5,759	45.6
3-200	7,323	8,984	4,265	6,857	54.4
Little tunny					
0-3	25	41	63	43	52.4
3-200	29	37	52	39	47.6
Bluefish					
0-3	9,545	9,312	9,423	9,427	86.9
3-200	1,292	1,075	1,897	1,421	13.1

1 None of the fish in the Management Unit were reported caught beyond 200 miles.

2 Data on cobia and dolphin unavailable.

Source: U.S. Department of Commerce, National Marine Fisheries Service, Fisheries of the United States, annual reports for 1975, 1976, and 1977.

EXHIBIT 7-2

STATE MANAGEMENT INSTITUTIONS - SOUTH ATLANTIC REGION

	ADMINISTRATIVE BODY AND ITS RESPONSIBILITY	ADMINISTRATIVE POLICY-MAKING BODY AND DECISION RULE	LEGISLATIVE INVOLVEMENT IN MANAGEMENT REGULATIONS
NORTH CAROLINA	DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT • administers management programs • makes recommendations to Commission • enforcement • conducts research	MARINE FISHERIES COMMISSION • seven-member board • establishes regulations based on a majority vote of the members consistent with statutes	Authority for detailed management regulations delegated to Commission • statutes concerned with licensing and enforcement
SOUTH CAROLINA	DEPARTMENT OF WILDLIFE AND MARINE RESOURCES • administers management programs • makes recommendations to Commission and Legislature • enforcement • conducts research	WILDLIFE AND MARINE RESOURCES COMMISSION • nine member board • establishes regulations based on majority vote of a quorum (five members constitute quorum)	Detailed regulations contained in the statutes; changes require legislative approval
GEORGIA	DEPARTMENT OF NATURAL RESOURCES • administers management programs • conducts research • enforcement • makes recommendations to Board and Legislature	BOARD OF NATURAL RESOURCES • 15 member board • establishes regulations based on majority vote of quorum (8 members constitute a quorum)	All management regulations currently contained in statutes; changes require legislative approval.
FLORIDA[1]	DEPARTMENT OF NATURAL RESOURCES • makes recommendations to Legislature • administers management programs • conducts research	DEPARTMENT OF NATURAL RESOURCES • may establish regulations consistent with statutes; require approval of Govenor and Cabinet	Detailed regulations contained for individual counties and entire state included in statutes; require legislative approval and limit regulatory authority of Department of Natural Resources

Exhibit 7-3

STATE MANAGEMENT INSTITUTIONS - GULF OF MEXICO REGION[1]

	ADMINISTRATIVE BODY AND ITS RESPONSIBILITIES	ADMINISTRATIVE POLICY-MAKING BODY AND DECISION RULE	LEGISLATIVE INVOLVEMENT IN MANAGEMENT REGULATIONS
ALABAMA	DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES o administers management programs o enforcement o conducts research	Commissioner of Department has authority to establish management regulation.	o authority for detailed management regulations delegated to Commissioner o statutes concerned primarily with licensing, enforcement, and general gear restrictions.
MISSISSIPPI	BUREAU OF MARINE RESOURCES o administers management programs o enforcement	COMMISSION ON WILDLIFE CONSERVATION o five-member board o establishes ordinances on recommendation of Bureau director.	o authority for detailed management regulations delegation to Commission statutes concern Licenses and taxes with some specific restrictions on oysters.
LOUISIANA	DEPARTMENT OF WILDLIFE AND FISHERIES o administers management programs o enforcement o conducts research	WILDLIFE AND FISHERIES COMMISSION o seven-member board establishes regulations based on majority vote of a quorum (four members constitute a quorum) consistent with statutes.	o detailed regulations contained in statutes; changes require legislative approval.
TEXAS	PARKS AND WILDLIFE DEPARTMENT o administers management programs o enforces statutes and regulations o conducts research o makes recommendation to legislature	PARKS AND WILDLIFE COMMISSION o six-member body establishes regulations for "regulatory authority counties" based on majority vote of quorum (four members constitute a quorum).	o detailed regulations for "general law counties" contained in statutes; o licensing requirements and size limits contained in statutes.

1 Florida is included in both the Gulf of Mexico and South Atlantic Councils. See Exhibit 7-1 for summary of Florida institutional characteristics.

.egulations currently in effect do not specifically address the resources of the management unit. However, the flexibility allowed by the current institutional arrangements would permit the establishment of such regulations without legislative approval.

South Carolina

The Wildlife and Marine Resources Department is responsible for marine fisheries resource management in South Carolina. A nine-member governing board, the Wildlife and Marine Resources Commission, establishes policy for the Department. Regulations of the Commission are adopted by majority vote of a quorum (five members required for a quorum). Within the Department is the Marine Resources Division. Its personnel serve as staff to the Commission. The Division has the authority to adopt and implement rules and regulations for the control of fisheries consistent with the laws and policies of the state and is responsible for enforcement of the state's fisheries laws. The Division has jurisdiction over:

> All salt water fish, fishing and fisheries, all fish, fishing and fisheries in all tidal waters of the state and all fish, fishing and fisheries in all waters of the state whereupon a tax or license is levied for use for commercial purposes [including] shell fish, crustaceans, diamond-back terrapin, sea turtles, porposes, shad, sturgeon, herring and all other migratory fish except rock fish (striped bass). S.C. Code S28-159.

The legislature has passed rather detailed laws concerning the major species sought off South Carolina. Because all rules and regulations are currently contained in the statutes, changes in the management scheme require legislative action. Current statutes include provisions for allowable fishing methods and seasons for oysters, prawn, shrimp, crabs, clams, industrial fish, shad, sturgeon, terrapin and sea turtles.

Georgia

Fisheries management is the responsibility of the Department of Natural Resources in Georgia. The policies for the Department are established by the Board of Natural Resources, a fifteen-member commission. Regulations may be adopted by a majority vote of a quorum (eight members constitute a quorum). Marine fisheries resource management is administered by the Coastal Resources Program of the Division of Fish and Game. The Department and the Board have authority to fix creel limits and establish closed seasons for all wildlife on a statewide, regional, or local basis consistent with the state statutes. They may also regulate the method, manner and devices used for the taking of fish except where otherwise provided by law.

Migratory pelagic resources are currently not specifically addressed in the state statutes or regulations; however, under its mandate the board has considerable latitude in establishing such regulations if it deems necessary. Those resources for which relatively detailed statutes are in effect include oysters, shrimp, prawns, and crabs.

Florida

In Florida, the Division of Marine Resources in the Department of Natural Resources is responsible for the preservation, management and protection of marine fisheries. In addition, it is the duty of the Division to regulate operations of all fishermen and vessels engaged in taking state fishery resources both within and without the state. Any rules or regulations designed by the Division of Marine Resources and approved by the Director of the Department of Natural Resources must also be approved by the governor and his cabinet.

While rules and regulations may be established without legislative consent, any such rules must be consistent with the existing statutes. Currently the state statutes include extensive provisions for the management of shrimp, lobster and oysters. Specific statutory provisions have also been enacted for stone crab, blue crab and shad. The only provision directed specifically at migratory pelagic resources statewide are size limits for mackerel and bluefish.

In addition to laws passed by the legislature for statewide application, the legislature also passes special laws directed at local areas, usually counties, that regulate fishing practices in the designated areas. Several special laws affect the mackerel fishery and are explained in Section 7.4.

Alabama

Management authority of marine fishery resources in Alabama is held by the Commissioner of the Department of Conservation and Natural Resources and the administrative organizations that he designates. The Commissioner may promulgate rules or regulations designed for the protection, propagation and conservation of all seafoods. He may prescribe manner of taking, the times when fishing may occur, and designate the areas where fish may or may not be caught. However, all regulations are to be directed at the best interests of the seafood industry.

Within the Department of Natural Resources is the Division of Marine Resources. It has responsibility for enforcement of state laws and regulations, for conducting marine biological research, and serves as the administrative arm of the Commissioner with respect to marine resources.

Currently there are no statutes, rules or regulations directed specifically at coastal migratory pelagic resources. Current statutes focus on licensing requirements and general gear restrictions. There are several provisions aimed specifically at the shrimp and oyster fisheries.

Mississippi

The management of marine fishery resources in Mississippi is the responsibility of the five-member Commission on Wildlife Conservation. The Department of Wildlife Conservation which includes the Bureau of Marine Resources is responsible for administrative and enforcement functions. Regulations are promulgated by the Commission upon recommendation of the Bureau Director.

Louisiana

The Louisiana Wildlife and Fisheries Commission is a seven member body with the constitutional mandate for the "control of supervision of wildlife of the state, including all aquatic life . . ." (Louisiana Constitution, Article IX, Section 7(A)). The administrative body responsible for management and law enforcement is the Louisiana Department of Wildlife and Fisheries within which the Office of Coastal and Marine Resources is located. All rules promulgated by the Commission require a majority vote of a quorum (quorum requires four members) at any meeting of that body.

While the Commission has authority for promulgating regulations administratively, the Louisiana legislature has enacted a substantial amount of statutory law covering licensing of commercial and recreational fishing, size limits for particular fish, gear restrictions and a detailed scheme for regulating shrimp and oysters. To date there are no statutes or regulations directed at coastal migratory pelagic resources.

Texas

In Texas, the agency responsible for mangement of marine fisheries is the Parks and Wildlife Department. Within the Department, the Coastal Fisheries Operations section of the Fish and Wildlife Division serves as the administrative arm for marine fisheries management. All rules and regulations permitted by statute are established by the Parks and Wildlife Commission, a six-member body appointed by the governor. Regulations are adopted by majority vote of a quorum (four members constitute a quorum). The personnel of the department are responsible for developing recommendations for regulations and for enforcing the laws and statutes already adopted.

The Commission and the Department of Parks and Wildlife have the authority to regulate only counties specified by the legislature. These are termed "regulatory authority counties." Each year the Commission issues the statewide Hunting, Fishing, and Trapping Proclamation which contains the regulations for the various regulatory authority counties. The Proclamation contains regulations for seasons, bag limit, size limits and methods of taking for saltwater resources which come under the Commission's jurisdiction. All remaining counties, termed "general law counties," are regulated directly through the passage of laws in the legislature.

Statutes passed by the legislature that apply to the entire state include all licensing requirements and regulations directed specifically at oysters, shrimp, clams, mussels, and sponge crabs. The only regulation specific to the management unit is a size limit on Spanish mackerel. In addition, the state codes include local and special laws which adddress the fishing regulations on a county by county basis.

7.2 International Treaties and Agreements

Other than agreements resulting from the Magnuson Fishery Conservation and Management Act of 1976 (MFCMA), there are currently no international treaties or agreements that directly affect the management unit. The MFCMA directs the Secretary of State to negotiate Governing International Fishing Agreements (GIFA). These are general bilateral agreements in which the participating nations agree to abide by the fishing laws and regulations of the other nation when fishing in the other nation's waters. The specifics of the allowable catch, methods of fishing, and time frame for harvesting fish in U.S. waters are to be determined through the promulgation and implementation of fishery management plans. GIFA's have been negotiated with Cuba, Mexico and Japan, the nations adjacent to the region or currently fishing in the fishery conservation zone. Currently there have been no applications for foreign fishing permits for the species in the management unit in the Gulf of Mexico and south Atlantic regions.

Under ICNAF, the U.S. signed bilateral agreements with Rumania and Poland to restrict fishing for bluefish (and scup and butterfish) in areas of the mid-Atlantic region during the winter. Currently, under the MFCMA, no foreign directed fisheries for bluefish are allowed. This is because the windows for foreign fishing are so far offshore that there is no catch of bluefish, although limited incidental catch is allowed under current preliminary fishery management plans.

The only foreign fishermen known to be currently fishing within the fishery conservation zone of the south Atlantic and Gulf of Mexico are the Japanese. They are seeking bluefin tuna. The tuna are "highly migratory species" and as such are exempt from the provisions of the MFCMA. The Japanese fishermen are operating under the regulations set forth by the International Convention for the Conservation of Atlantic Tuna (ICCAT). There is currently no evidence suggesting that their efforts significantly affect the coastal migratory pelagic resources.[1]

7.3 Federal Laws, Regulations and Policies

Existing federal laws, other than the MFCMA, have no apparent significant impact on the coastal migratory pelagic resources; however, implementation of coastal zone management programs may have indirect beneficial impacts on the habitat of the fishery (see Section 6.3). Also, the Marine Mammal

[1] The NMFS Foreign Fisheries Observer Program reports that there is only an inconsequential foreign bycatch.

Protection Act is related to the Spanish and king mackerel and bluefish fishery.[1] These conclusions were reached after a review of the following legislation:

- Coastal Zone Management Act (and current status of state coastal zone programs);
- Marine Mammal Protection Act;
- Endangered Species Act;
- Fish and Wildlife Act of 1956;
- Marine Protection, Research and Sanctuaries Act;
- Federal Water Pollution Control Act; and
- Outer Continental Shelf Lands Act.

This legislation was identified and reviewed with the assistance of personnel from the National Oceanic and Atmospheric Administration and Department of Interior General Counsels' offices, and the National Marine Fisheries Service. Coastal zone management programs were reviewed through communication with Office of Coastal Zone Management personnel and review of available program documentation.

The Coastal Zone Management Act places responsibility for comprehensive land and water management of the coastal zone upon the coastal states. The Act also requires that federal actions directly affecting the coastal zone of a state be consistent (to maximum extent possible) with the approved state plans.[2] Exhibit 7-4 summarizes the status of the states' coastal zone programs. This FMP has been reviewed by Coastal Zone Management Programs offices from each state and has been determined to be consistent with those programs.

The final regulations of the Marine Mammal Protection Act make it a federal crime to kill, capture or harass any marine mammal. Amended regulations prohibit the intentional killing under any circumstances of the bottlenose dolphin, a species which preys on fish in the management unit. Occasionally these porpoises are a nuisance to the fishermen. They bite and tear fish from gill nets used to take Spanish and king mackerel or bluefish and sometimes damage fishing nets. They pull hooked king mackerel off of handlines, sometimes damaging the handliner's gear and injuring the fishermen. There are no sections of the Act that restrict the provisions of the management plan.

The remaining legislation listed above has no impact on the management unit. The Endangered Species Act protects particular species of marine life, none of which are known to be affected by the harvesting of the pelagic fish in the management unit. The Fish and Wildlife Acts affecting habitat protection are unrelated to pelagic resources.

Under the Marine Protection, Research and Sanctuaries Act, administered by the Office of Coastal Zone Management, three marine sanctuaries have been established within the area of management and several others have been proposed. These do not significantly affect present fishing practices or proposed management measures for these species.

The Key Largo Coral Reef Sanctuary extends an existing state coral reef sanctuary bounded at the three mile limit another five miles into the conservation zone. The Sanctuaries Act does not affect the management plan.

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1 Porpoises, which are protected under the Act, reportedly interfere with the catching of these species. Porpoises are also a major predator of species in the management unit.

2 Plans must be approved by the Secretary of Commerce.

Exhibit 7-4

Status of Coastal Zone Management Programs
in the South Atlantic and Gulf of Mexico Regions

	Program Status	
State	CZM Program In Planning Phase	CZM Program In Review Phase
North Carolina	completed	completed
South Carolina	completed	completed
Georgia	-	-
Florida	under revision	-
Alabama	completed	completed
Mississippi	completed	completed
Louisiana	completed	near completion
Texas	under revision	-

The Monitor Marine Sanctuary, located off the coast of North Carolina, is a very small sanctuary, protecting the remains of the U.S.S. Monitor. Restrictions within this area do not affect coastal pelagic species.

Looe Key Marine Sanctuary, located between Marathon and Key West, Florida, is a small sanctuary designed to protect an exceptional coral reef community. No regulations within the sanctuary affect fishing for coastal pelagic species.

Among the provisions of the Federal Water Pollution Control Act are sections on the protection of estuaries, establishment of standards for marine sanitation, and prohibition of dumping hazardous substances into marine waters. None of these directly affect the pelagic resource plan. Finally, the Outer Continental Shelf Lands Act requires that the character of fishing shall not be affected by the development of outer continental shelf resources. If anything, this clause serves to protect the fishery resources.

7.4 State Laws, Regulations and Policies

Coastal migratory pelagic resources are regulated, to a certain extent, by the states of the south Atlantic and Gulf of Mexico regions. No states have extensive management restrictions (as compared to shellfish, for example) directed at king or Spanish mackerel or other coastal migratory pelagic resources. However, several states do regulate size limits and have restrictions on the use of fishing gear that affect this management unit.

Florida, the state where most fishing for mackerel occurs, has several laws which affect the management unit. First, minimum size limits have been placed on mackerel and bluefish. They are 12 inches and ten inches respectively, measured from the nose to the rear center edge of the tail, and apply to commercial and recreational fishermen alike. It is illegal to catch, buy, sell, or have in one's possession any fish not meeting the minimum size. Second, the use of purse seines is prohibited for taking any food fish. Third, there are several special acts passed by the legislature which have local applicability. The only special act directed specifically at fish in the mangement unit is for Monroe County. It prohibits the use of gill nets having stretched mesh of less than 3-1/4 inches for the taking of mackerel. Special acts also prohibit the use of seines and nets in designated waters of Broward and Palm Beach Counties. In Duval, St. Johns, Volusia, and Broward Counties, special acts place restrictions on mesh size of nets and seines for catching any fish in designated waters.

An agreement was recently signed between the State of Florida and the United States concerning the enforcement of MFCMA provisions with respect to foreign fishing in the Gulf of Mexico. There, the state's jurisdiction extends to three marine leagues (approximately nine nautical miles). According to the agreement, only federal fishery laws will be applied to foreign fishing between three and nine miles off the coast of Florida. Also, state personnel are authorized to enforce federal laws within that geographical area.[1]

There is another Florida law concerning jurisdictional issues which is worthy of noting. Florida, in the absence of federal law, has claimed jurisdiction over the "operations of all fishermen and vessels of this state engaged in the taking of such fishery resources within or without the boundaries of state waters" (Florida State Code, Section 370.02 (1) (a)). Such extended state jurisdiction has been

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[1] The same agreement was signed by the State of Texas, which also has a seaward boundary of three marine leagues.

upheld in the courts prior to the federal government's initiation of a management program under the MFCMA.[1] When a management plan is implemented, the MFCMA apparently supercedes the state code with all waters beyond the state territorial sea to the 200-mile limit coming under federal jurisdiction.

A law was recently passed in the Florida legislature to regulate the depth of gill nets used for king mackerel. It was instituted to resolve a gear dispute between hook and line and gill-net king mackerel fishermen on the state's east coast. The new law restricts gill nets to 200 mesh (a hanging depth of approximately 57 feet) and a mesh size of 4-3/4 inches in any county on the Atlantic Ocean except Monroe. One effect of the Act is to separate the areas fished by the two groups of fishermen, thereby reducing gear conflicts.

The only other states that have laws or regulations specific to the mangement unit are Texas and South Carolina. In both states, restrictions are placed on the minimum size of fish taken. In South Carolina, it is unlawful to buy, sell, or offer to sell any mackerel of length less than twelve inches, measured from the nose to the tip of the tail. In Texas, it is unlawful for commercial fishermen, wholesale dealers or retail dealers to possess (on a boat or place of business), sell, or offer for sale, and for a person to buy, any mackerel of length less than 14 inches.

Several states on the Gulf coast have general gear restrictions which may affect the management unit. In Alabama, minimum net mesh may not be less than 1-1/2 inches from knot to knot with a 2-1/2 inch stretch for use in the Gulf of Mexico.[2] Purse seines may not be used within state waters to take species in the management unit. Mississippi prohibits harvest of most food fish species, including king and Spanish mackerel, by purse seine gear. Possession of these species aboard a purse seine vessel is also prohibited. Louisiana has minimum limits for various types of nets; for seines minimum mesh of 7/8 inches square or 1-3/4 inches stretched; for gill nets not less than 1-1/2 inches square or three inches stretched; for trammel nets not less than one-inch square or two-inches stretched. For species other than menhaden, purse seines may be used in state waters only by special permit. At present there are no permits for species in the management unit. No nets or seines in Louisiana may exceed 2,000 square feet in length. In Louisiana, recreational fishermen are restricted to taking game fish (including the species in the management unit) with a reel, artifical bait, spinner, spoon device, or spear, or from taking commercial fish with bows and arrows for sport. In Texas, gear restrictions include a maximum length of nets and seines of 1,800 feet; minimum mesh size of nets and seines of 1-1/2 inches square; minimum mesh of trammel nets of eight inches square on the outer walls and 1-1/2 inches square for the mesh of the center wall; and trot lines should have a maximum length of 600 feet. Purse seines may not be used in state waters except for menhaden.

The south Atlantic coastal states also have general gear restrictions for commercial fishing that may affect the mangement unit. In North Carolina, the use of purse seines is prohibited for taking foodfish, and no nets may be pulled by more than one boat except in long haul fishing operations. South Carolina restricts the mesh size of seines to a minimum of 2-1/2 inches. In Georgia, gillnetting is prohibited, as is the use of power drawn nets. The latter restriction effectively prohibits purse seines. Gear restrictions in Florida include only those discussed earlier in this section. There are no gear restrictions on recreational fishermen in any of the south Atlantic states.

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1 In Skiriotes v. Florida the Supreme Court held that a state regulation prohibiting the use of specific gear for harvesting sponges outside the territorial limits of the state was a valid exercise of the police power by the state upon one of its citizens, permissible in the absence of any conflict with federal law.

2 In the Baldwin County area permissible net mesh is 1-1/2 inches from knot to knot.

The general management programs of all states in both regions include some licensing requirements for commercial fishermen, wholesale dealers and retail dealers; however, none of the licensing requirements are species specific with respect to coastal migratory pelagic resources. Only Louisiana and Texas have licensing requirements for recreational fishermen. Recreational licenses obtained in either state can be used for both freshwater and saltwater sportfishing. Closed seasons for fishing or taxes on fish landed are not used in the management programs for coastal migratory pelagic resources by any of the states.

7.5 Local and Other Applicable Laws, Regulations and Policies

There are no laws passed by local jurisdictions that directly affect the management unit. State laws having local applicability are in effect in Florida, and are discussed in Section 7.4.

According to officials of the Trust Responsibilities, and Fishing and Hunting Rights Divisions of the Bureau of Indian Affairs, U.S. Department of Interior, there are no treaties that grant Indians rights to fishery resources of the open ocean in the south Atlantic and Gulf of Mexico regions.

8.0 DESCRIPTION OF FISHING ACTIVITIES AFFECTING THE STOCKS COMPRISING THE MANAGEMENT UNIT

8.1 History of Exploitation

The species in the management unit have traditionally been sought after by both commercial and recreational fishermen. King mackerel, Spanish mackerel, and bluefish have been historically important as target species of major commercial fisheries. The species in the management unit have been important in supporting recreational fishing from charter boats and private boats. King mackerel, in particular, has been traditionally important as a mainstay of the commercial charterboat fishery. Dolphin has been caught commercially as a seasonal supplement to other fisheries. Cobia has been primarily a recreational species and the commercial catch is incidental. Little tunny has been mainly a recreational species within the Gulf and south Atlantic regions. Cero mackerel is not particularly abundant in the United States and has been an incidental commercial and recreational catch. To date there has been little, if any foreign participation in the coastal pelagic management unit fisheries in the waters of the United States fishery conservation zone.

King mackerel in recent years has been caught commercially primarily in south Florida and to some extent off North Carolina. Historically, there was a small amount of commercial fishing for king mackerel in Chesapeake Bay. Large scale commercial exploitation in Florida did not begin until the early 1900s. This coincides with the beginnings of the development of Florida fisheries in general. Total commercial catch appears to have averaged around four million pounds during the 1920s and 1930s. The trend in total commercial catch dropped to about two and one-half million pounds in the early 1950s, increasing to about an eight million pound catch in the mid-1970s. Catches declined in 1978 and 1979 then increased to slightly above average during 1980.

Traditional commercial user groups include hook and line fishermen and gillnetters. King mackerel is a primary target species for these groups, although they catch several other species in the off season. The number of participants in both of these groups has increased dramatically in recent years. In 1969 there were an estimated 100 hook and line boats and 12 large gill-net vessels operating in this fishery in south Florida. This has increased to an estimated 300 hook and line boats and 33 large gill-net vessels by 1977. Just recently a significant number of large gill-net boats which fished primarily for Spanish mackerel have entered the king mackerel fishery. The total number of larger gill-net vessels is approximately 80.

Over the past 20 years there have been several developments in gear and fishing techniques. Beginning approximately in the mid-1960s electronic fish finders came into widespread use. Boat construction changed from predominantly wood to predominantly fiberglass. Hook and line boats began to use power reels for hauling in lines. Gill-net boats increased in size and the depth of nets increased. A significant development beginning in approximately 1965 was the development and adoption of power rollers for hauling in gill nets. In about 1967, monofilliment mesh began to be used for nets. Also, in the late 1950s several fishermen began to use spotter aircraft for spotting schools of fish. The use of spotter aircraft has gradually increased so that today nearly all of the gill-net vessels and some hook and line vessels use them.

In recent years the center for commercial fishing activity for Spanish mackerel has also been centered in south Florida. Earll (1883) reports that Spanish mackerel were taken off Sandy Hook, New Jersey, beginning around 1850. Gill nets were introduced into Chesapeake Bay in 1887. Pound nets were also used during that period in New Jersey, and by the 1880's were the principle means of taking Spanish mackerel in that area (Earll, 1883). A thorough discussion of the Spanish mackerel fishery was provided by Trent and Anthony (1979).

Large-scale commercial exploitation of Spanish mackerel comparable to today's levels did not begin until the early 1920s, when commercial exploitation began on a large scale in Florida. Total U.S. commercial landings averaged about six to seven million pounds between 1920 and 1940. The 1948 commercial landings were reported to be 12 million pounds which was not equaled until 1976. Landings dropped to about eight million pounds between 1950 and 1965. Landings began to increase again in the late 1960s to a current commercial catch of about 15 million pounds (most recent statistics).

As in the case of king mackerel, power rollers on the larger vessels and monofilament nets came into use in the 1960s. Spotter planes were first used in the 1950s, although widespread use by the larger gill-net vessels did not occur until the 1960s. The number and size of vessels in the fishery has increased over the last several years although precise quantification is not possible at this time.

Saltwater sport fishing has been a major recreational activity in the southeastern portion of the nation for many years. Much of the activity was shore-based or took place from boats relatively close to shore until the 1950s. As transportation systems improved and as leisure time increased with affluence, demand for recreational opportunities grew dramatically. With the growth in demand for leisure activity came improvements in recreational equipment. Sales of boats and motors that could be used for offshore fishing climbed. Fishing tackle became more elaborate.

Fishing by private boat for the species in the mangement unit has taken place for many years. However, beginning in the late 1950s small boats capable of fishing for these species became available to large numbers of people. Beginning in the late 1960s specialized sportfishing boats in the 20-foot range were developed and became popular with recreational fishermen. This type of craft is capable of venturing offshore to areas where species such as king mackerel, dolphin, and little tunny can be caught. These boats met a growing demand from recreationisis with growing incomes. These developments brought the opportunity to fish for species in the management unit to large numbers of people. Section 8.2.1.2 presents data on the growth of the number of private boats in the Gulf of Mexico and south Atlantic regions. Between 1967 and 1974 the number of private boats of 16-foot length and greater increased at an average annual rate of 10.3 percent.

8.2 Domestic Commercial and Recreational Fishing Activities

8.2.1 Participating User Groups

King mackerel and Spanish mackerel are major target species of an important commercial fishery in south Florida as well as a major target species for the private boat and charterboat recreational fishery along widespread areas within the Gulf and south Atlantic regions. King mackerel is particularly important to the charterboat and offshore private boat fleets. In addition, smaller amounts of king mackerel are caught as a commercial supplement to the North Carolina charterboat fleet. Small amounts of Spanish mackerel are caught as an incidental catch or supplemental commercial target species off Alabama, Mississippi, Louisiana, North Carolina, and to a smaller degree Georgia and South Carolina.

Bluefish is a commercial target species off the Florida east and west coasts. While the amounts caught in these fisheries are rather large, the nature of the catch is that of a supplement to fisheries whose primary target is other species. Minor amounts of bluefish are also caught commercially on a supplemental or incidental basis off Alabama, Mississippi, and Louisiana. Bluefish is also an important recreational species. In the Gulf of Mexico region it is caught predominantly from private boats.

There appears to be a small commercial catch of little tunny within the Gulf of Mexico and south Atlantic regions. However, little tunny is a major supplemental recreational species, particularly for private and charter boats, in various localities throughout these regions.

Small amounts of dolphin are caught commercially as a seasonal supplement to other fisheries in south Florida. It is caught recreationally in significant amounts by the small boat and charterboat fleets in this area.

Cobia are caught commercially as a minor supplement to other commercial fisheries in Florida and excess recreational catches are sold by charterboat operators. There is an incidental catch by shrimp trawlers off Florida, Alabama, Mississippi, and Louisiana. For the recreational fishermen, cobia is a prized game fish throughout the Gulf and south Atlantic regions and is particularly sought from Mississippi to Florida.

8.2.1.1 Primary Commercial User Groups

The primary commercial user groups for species in the mangement unit include:

- The Florida king mackerel hook and line fleet.
- The Florida king mackerel large boat gill-net fleet.
- The Florida small boat (20-28 feet) Spanish mackerel gill-net fleet.
- The Florida large boat (45-48 feet) Spanish mackerel gill-net fleet.

Many gill-net vessels of all sizes are equipped to fish for both king and Spanish mackerel.

Significant secondary commercial user groups include:

- The southeast Florida small boat gill-net fleet which takes a supplemental catch of king mackerel.
- The North Carolina charter boat fleet which rigs up for commercial king mackerel fishing in the spring and fall.
- The Florida haul seine fleet which takes a moderate catch of Spanish mackerel.

Florida King Mackerel Hook and Line Fleet

The Florida king mackerel hook and line fleet includes a group on the east coast centered around the Ft. Pierce area. These have been a major traditional user group catching king mackerel along the coast from approximately Palm Beach north to Cape Canaveral. The size of these boats range from about 24 to 36 feet. Their numbers have greatly increased in recent years from about 50 in 1969 to 250 in 1976. These fishermen typically obtain about 70 percent of their value of landings from king mackerel (Morris, Prochaska, Cato, 1977).

The other major hook and line user group operates out of the Florida Keys. The boats are somewhat larger -- from 32 to 40 feet. Most of these vessels are primarily dependent upon other fisheries such as spiny lobster, stone crab, pompano, snapper or grouper. Their fishing effort for king mackerel varies greatly, dependent upon the availability of fish and success of the lobster season. The number of vessels from the Florida Keys actually fishing for king mackerel averages approximately 50 vessels per year.

King Mackerel Large Boat Gill-net Fleet

The Florida king mackerel large boat gill-net fleet had traditionally operated in the Florida Keys and along the Florida west coast around the Naples area. The Naples area has not been a major producer of king mackerel in recent years, and these vessels typically move around the coast in search of the king mackerel. These vessles typically range in size from 40 to 65 feet and are equipped with power rollers. The number of such vessels increased from an estimated 12 in 1969 to 33 in 1977. The primary reason for investing in these vessels is the profitable king mackerel fishery (Prochaska and Williams, 1976); however, these vessels also fish for Spanish mackerel. In addition, they obtain support from other fisheries such as spiny lobster. The spiny lobster and king mackerel fisheries tend to complement each other during the year as they have different fishing seasons.

Small Boat Spanish Mackerel Gill-net Fleet

The Florida small boat Spanish mackerel gill-net fleet has traditionally operated along the east coast from about Salerno (in Martin County) to about Sebastian (in Indian River County). These boats are typically 20-22 feet in length and may obtain roughly 40 percent of their value of landings from Spanish mackerel (Cato, Morris, Prochaska, 1978). They are also the major Florida commercial user group for bluefish which provides them with about ten to 15 percent of their value of landings. Other revenues for this fleet include catches of king mackerel, pompano and mullet. King mackerel landings include some incidental catch along with Spanish mackerel, and a directed catch. Some of these fishermen use small gill nets of 4-3/4 inch mesh when king mackerel are present in shallow water.

Large Boat Spanish Mackerel Gill-net Fleet

The Florida large boat Spanish gill-net fleet has traditionally operated in three main areas of Florida: the Naples area on the west coast, the Keys, and the east coast between Palm Beach and Cape Canaveral. These vessels typically range in size from 30 to 60 feet and are equipped with power rollers. They obtain up to roughly 80 percent of their value of landings from Spanish mackerel. Some of the vessels also fish for king mackerel. Other revenues for their fleet include catches of bluefish (10 to 15 percent by value of landings) and spiny lobster for those operating in the Keys.

Secondary Commercial User Groups

Of the secondary commercial user groups there has traditionally been a small boat gill-net fleet taking king mackerel on the southeast Florida coast from Dade to St. Lucie County. These are typically 18 to 30 foot boats. This fleet is not particularly directed to any single species, although it does take substantial amounts of Spanish mackerel as well as king mackerel. Precise quantification of the number of boats fishing for king mackerel is not possible, but the total number of gill-net boats on the Florida east coast is slightly over 300.

The North Carolina charterboat fleet numbers approximately 130. Of these, approximately 25 percent fish commercially for king mackerel in the off season (C. Manooch, NMFS, Beaufort, pers. comm.). The number of vessels and trolling effort expended has increased significantly in recent years resulting in increased catch.

In Mississippi, processors have initiated purse seine operations to test the feasibility of small scale purse seines in that area. Target species vary with availability, at times including bait species and foodfish, thread herring, Spanish sardine, blue runner, crevalle jack, lady fish, redfish, mullet and Spanish mackerel. Spanish mackerel landings were expected to take place between May 1 and August 31. An unknown amount of mackerel was caught before passage of a state law prohibiting harvest of most food fish species. Six to seven vessels, 48 feet in length each, are presently operating. These vessels were once part of the power roller gill-net fleet and are typical of such vessels. Spotter aircraft are used to locate fish.

8.2.1.2 Recreational User Groups

Recreational users have increased in numbers over time. Many come from outside the management unit as well as areas within it. Increased income, leisure time, and a wide variety of supplies have increased participation. This participation has, in turn, generated significant amounts of economic value and also employment. These aspects of this user group are described below.

Estimated Number of Anglers

Exhibit 8-1 presents estimates of the number of fishermen who caught particular species in the coastal migratory pelagic resources management unit. In 1975 there were an estimated 6.4 million persons who participated in saltwater recreational fishing in the south Atlantic and Gulf of Mexico regions. These estimates are based on the state reports of the 1975 National Survey of Fishing and Hunting and Wildlife Recreation (U.S. Department of Interior, 1977) and historical data from the 1960, 1965, and 1970 Saltwater Angling Survey. The total number of anglers in 1975 was determined by aggregating the number of participants from the various states for the state reports. The estimate of fishermen who caught particular fish in the management unit was based on trend data from the Saltwater Angling Surveys. An analysis of data for 1960, 1965, and 1970 showed that the ratio of anglers in the management area who caught a particular fish in the mangement unit to total anglers in the south Atlantic and Gulf regions, did not vary greatly over the period of the surveys. In fact, bluefish showed the largest variation, and that variation was relatively small. In 1960, 13.3 percent of all anglers in the two regions caught bluefish. In 1965 that figure was 7.9 percent and in 1970 it was 8.4 percent, a maximum difference of less than six percent of the total number of anglers. Because these ratios were relatively stable, it was assumed that the 1975 ratios were the same as those for 1970. Ratios were calculated from the 1970 Saltwater Angling Survey and applied to the estimates of number of anglers obtained from the 1975 National Survey of Fishing and Hunting. While there may be accurate data from the 1970 Saltwater Angling Survey, it is relatively more accurate than data on participation (except for species which are caught with relative infrequency such as cobia). The figures presented here provide a general indication of the importance of the species in the mangement unit to total recreational fishing.

It is also recognized that the number of anglers actually catching king and Spanish mackerel may have declined in the last two to three years. These species have not recently been as readily available to recreational anglers in the eastern Gulf of Mexico and participation is affected. The figures presented above indicate participation interest by recreational anglers in these species in what may be considered a "baseline" year.

Type of Fishing

Exhibit 8-2 presents data from the 1970 Saftwater Angling Survey on the method of fishing for coastal pelagic species. The category reported as "Party or Charter Boat" relates mainly to charter boats because local studies show that the coastal pelagics are not a predominant portion of head or party boat catches, but they are of major significance to the charterboat catch. Charter boats refer to craft available for hire at a fixed price per day regardless of passenger or load, while head or party boats refer to craft which charge a per passenger fee and may have a regular schedule. It should be noted that there is a high standard error in this survey associated with dividing data into this many categories. Nevertheless, the data are probably indicative of general trends, and are generally consistent with perceptions of persons knowledgeable in the fishery and other local studies. General conclusions include the fact that king mackerel is caught almost entirely from private boats or charter boats with a relatively even split between the two. Spanish mackerel is caught predominantly by private boats, although significant catches are obtained from charter boats, pier fishing, and beach fishing. The majority of dolphin being found further offshore is caught by private boats, although significant amounts are caught by charter boats. It is generally true that cobia are caught predominantly in pier and private boat fishing, although a number of them are caught from charter boats.

Commercial Charter Fishing Boat Fleet

The charterboat fleet is heavily involved in fishing for coastal pelagic species. King mackerel, in particular, has historically been one of the most important species in supporting charter-boat operations throughout the south Atlantic and Gulf of Mexico regions. This is in contrast to head or party boats which tend to target other species such as snapper and grouper.

In North Carolina, 92 percent of the total number of fish taken by anglers from charter boats in 1977 were coastal pelagic species. King mackerel accounted for 36.7 percent of the total number caught,

Exhibit 8-1

Estimated Number of Anglers Who Caught Fish
In the Coastal Migratory Pelagic Species in 1975*

Species	Number of Anglers** South Atlantic	Gulf of Mexico	Percent of Total Anglers	Total
Bluefish	454,000	89,000	8.4	543,000
Cobia	14,000	10,000	0.4	24,000
Dolphin	184,000	212,000	6.2	396,000
King Mackerel	374,000	343,000	11.2	717,000
Spanish Mackerel	382,000	397,000	12.1	779,000
Little Tunny	-***	-***		-***
Total Saltwater Anglers in Region	2,820,000	3,608,000		6,428,000

* Estimates based on 1975 National Survey of Fishing and Hunting, State Reports and historical data from the 1960, 1965, 1970 Saltwater Angling Surveys.

** Number of anglers is not additive because an angler may catch several kinds of fish.

*** Data insufficient to estimate number of fishermen who caught little tunny.

followed by bluefish (28.2 percent), Spanish mackerel (14.8 percent), dolphin (9.3 percent) and little tunny (2.9 percent) (Manooch and Laws, 1979).

In southeastern Florida, these species are also important to the charter fleet. In a study of the Dade County, Florida, charterboat sport fishery, Gentle (1977), found dolphin, little tunny and king mackerel accounted for 55.9 percent of the total catch. Dolphin and king mackerel were the second and third most sought-after species.

In a recent study (conducted in early 1978) of the charterboat fleet along the Florida coast from Escambia County (next to Alabama) to the Keys (Browder, et al., 1978), king mackerel was found to be a major target species of offshore charter boats. The percentage of total fishing effort directed to king mackerel by season and by Florida coastal area was found to be as follows:

Season	Keys	West Coast	Northwest Coast
Spring	3.9%	49.0%	31.4%
Summer	-	-	49.5
Fall	9.3	19.0	50.7
Winter	34.3	13.0	7.9

Charter boats fishing in the coastal waters adjacent to the St. Andrews Bay system (Bay County on the northwest Florida coast) are heavily dependent on coastal pelagic species and king mackerel in particular. There, fish from the management unit, accounted for 91 percent of the total charterboat catch in 1973. King mackerel was the most important species, accounting for 74 percent of the total catch in numbers (Sutherland, 1977).

In Alabama in 1975 the percentage of charterboat catch in weight was reported by Wade (1977). He found that king mackerel made up 21.9 percent of the total catch, followed by little tunny (13.6 percent) and Spanish mackerel (4.1 percent).

Similar patterns hold true for charterboat fishing in Texas. In a study of marine recreational fishing in southern Texas[1] during the 1975-1976 season, (Trent, 1976) king mackerel, Spanish mackerel, cobia, dolphin, and little tunny were among the ten most abundantly caught species in fishing from inboard boats. This pattern is consistent with reports of the composition of catch from charter boats. King and Spanish mackerel and cobia were among the ten most abundantly caught species from outboard boats. King mackerel was far and away the most abundant species caught in all types of boat fishing.

The charterboat fleet in the south Atlantic and Gulf of Mexico consists of an estimated 982 boats. Exhibit 8-3 presents the estimated number of boats by state for each region in 1977. The estimates were determined from local charterboat studies conducted between 1971 and 1978, and were adjusted up or down for 1977 based on whether charter activity was known to increase or decrease in the area.

Private Boats

A wide range of types of private boats are used by recreational fishermen to pursue coastal pelagic species. They range from open outboards 16 feet in length or even smaller in some cases up through sportfishing boats of 60 feet or larger. Typically, however, fishing for these species tends to be done by boats of about 18-20 feet or larger because the boats must be capable of venturing offshore. This is particularly true of fishing for king mackerel, dolphin, and little tunny.

[1] The study area ranged from Port Aransas south to Port Isabel near Brownsville, Texas.

Exhibit 8-2

Percent of Fish Caught by Principal Method of Fishing by Species and by Area in 1970[1]

Area[2]/ Species[3]	Private or Rented Boat	Party or Charter Boat	Bridge, Pier or Jetty	Beach or Bank	Total
South Atlantic					
Dolphin	72.5	27.5	-[4]	0.0[4]	100.0
King Mackerel	50.6	48.1	1.1	0.2	100.0
Spanish Mackerel	69.4	6.4	12.6	11.6	100.0
East Gulf					
Bluefish	58.1%	-[4]%	-[4]%	41.9%	100.0%
Dolphin	100.0	-[4]	-[4]	-[4]	100.0
King Mackerel	62.8	31.5	5.7	-[4]	100.0
Spanish Mackerel	51.3	23.1	21.1	4.5	100.0
West Gulf					
Bluefish	74.4%	16.2%	2.5%	6.9%	100.0%
Dolphin	-[4]	-[4]	-[4]	-[4]	100.0
King Mackerel	47.5	45.2	7.3	-[4]	100.0
Spanish Mackerel	45.5	39.5	1.7	13.5	100.0
South Atlantic and Gulf of Mexico					
Bluefish	19.3%	9.2%	10.2%	61.3%	100.0%
Dolphin	75.6	24.5	-[4]	-[4]	100.0
King Mackerel	55.2	41.6	3.1	0.1	100.0
Spanish Mackerel	62.5	13.4	14.5	9.6	100.0

1 Adapted from David Deuel, 1970 Saltwater Angling Survey, (Washington, D.C.: U.S. Government Printing Office, 1973). pp. 21-24.

2 South Atlantic includes Cape Hatteras, N.C., to southern Florida including the Florida Keys; East Gulf of Mexico includes coast from Florida Keys to and including the Mississippi River Delta; West Gulf of Mexico includes coast from the Mississippi River Delta to the Mexican Border.

3 Data specific to little tunny not available. Cobia mackerel data are not included because of high error associated with the survey.

4 Data shows no participation by this category due to low participation in this category relative to sample size.

No comprehensive data exist on the number of characteristics of private boats that are used specifically for species in the management unit. However, a study of the king mackerel fishery in Bay County, Florida, (Brusher, et al., 1978) does indicate the size and relative use of private boats. In Bay County, Florida, private boats in a wide range of sizes are involved in the king mackerel fishery. The fishing effort for king mackerel increased with boat size. Boats greater than 20 feet in length tended to fish for king mackerel a considerably greater number of days. Approximately 50 percent of the catch and effort of king mackerel was accounted for by boats greater than 20 feet in length. Approximately 85 percent of the catch and effort was accounted for by boats greater than 15 feet in length.

Exhibit 8-4 presents data on the total number of registered boats greater than 16 feet in length in the states within the Gulf of Mexico and south Atlantic regions by year. Not all of these boats are used in salt water and not all of them fish for species in the management unit. However, the number of boat registrations has increased at a rate of 10.3 percent per year over the period 1967 through 1974.

In order to estimate the recreational catch for 1975, and adjusting procedure was used which is described in Section 5.4. This adjusted catch estimate is the amount on which the best estimate of MSY is based.

8.2.2 Landings/Catch

8.2.2.1 Commercial Landings

Exhibits 8-5 through 8-8 present statistics on commercial landings in the United States in terms of weight and value for king mackerel, Spanish mackerel, bluefish, and cobia, respectively. Cero mackerel is not broken out separately in available landing statistics but is aggregated with king mackerel.

The current total U.S. commercial landing of king mackerel is approximately 6.6 million pounds (average of 1975 and 1979). Roughly two percent or less of the landings occur outside of Florida waters. Record landings were 10.5 million pounds in 1974. Landings began to increase significantly after 1973 from levels of 4.5 to 6.7 million pounds between 1965 and 1973.

The current total U.S. commercial Spanish mackerel landing is approximately 11.1 million pounds (average of 1975 and 1979). Roughly three percent or less of the landings occur outside of Florida waters. Record landings were 18.0 million pounds in 1976.

The current total U.S. commercial bluefish landings is approximately 13.3 million pounds (average 1978 to 1980). However, most of these landing occurred in the Mid-Atlantic region. Gulf of Mexico landings were stable from 1966 through 1976 at five to six million pounds. Gulf landings have since increased to approximately one million pounds.

The current commercial landing of cobia is approximately 114,000 pounds (1975-1979 average), having ranged between 83 and 151 thousand pounds between 1968 and 1979. More than 95 percent of commercial cobia landings occurs within the Gulf of Mexico and south Atlantic regions. Commercial dolphin landings in the Gulf and south Atlantic regions have varied between 60 thousand and 189 thousand pounds over the period 1966 through 1977. Total reported U.S. commercial landings include about 60-80 thousand pounds landed in Hawaii.

8.2.2.2 Recreational Catch

Data on the recreational catch are much less comprehensive. Historical data on the catch of saltwater anglers are available from surveys for 1960, 1965, 1970 and 1979 for the entire south Atlantic and

Exhibit 8-3

Number of Registered Boats in Southeastern Coastal States Greater than 16 Feet in Length
1967-1974

Year	North Carolina	South Carolina	Georgia	Florida	Alabama	Mississippi	Louisiana	Texas	Total
1974	53,291	34,382	34,064	152,372	32,774	18,415	57,251	145,213	527,764
1973	48,235	31,627	24,912	132,862	31,192	16,112	49,051	125,756	460,517
1972	41,358	26,664	38,000	127,054	27,956	19,023	47,621	111,987	439,663
1971	35,935	23,391	37,596	116,205	25,724	14,665	47,301	102,035	402,852
1970	39,952	20,865	31,683	106,933	22,362	10,764	43,034	83,722	359,315
1969	37,184	20,326	30,349	96,227	20,319	10,760	40,714	80,096	335,979
1968	32,699	18,600	25,491	87,774	18,573	9,400	38,247	64,963	295,747
1967	29,334	16,643	24,313	79,249	16,768	7,244	33,917	58,697	266,165

Source: U.S. Coast Guard.

Exhibit 8-4

Estimated Number of Charter Boats in the South Atlantic and Gulf of Mexico by State (in 1977)

State	Number
North Carolina	130
South Carolina	35
Georgia	20
Florida (East coast)*	230
South Atlantic	415
Florida (West coast)*	382
Alabama	25
Mississippi	40
Louisiana	30
Texas	90
Gulf of Mexico	567
Total	982

* Florida (East coast) includes Dade County to the Georgia state border; Florida (West coast) includes Monroe County to the Alabama border.

Source: See text.

Gulf of Mexico regions.' These are presented in Exhibit 8-9. Data are not available on the recreational catch of little tunny. Cero mackerel is aggregated with Spanish mackerel in these surveys.

The data presented in Exhibit 8-9 should be viewed with caution. The National Surveys for 1960, 1965, and 1970 conducted to obtain the estimates used relatively small regional samples. There was also recall bias (those interviewed were asked to recall the number and weight by type of fish caught for up to a 12-month period). Substantial positive bias is believed to have been introduced into the estimates. The NMFS researchers who conducted the 1970 survey suggest that the survey may overstate the recreational catch by perhaps a factor of two or more on the average for all species (Deuel, 1973, p. 34). In addition, there is a high standard error associated with data on the catch of individual species within a region. Thus, the data may contain an additional error beyond the recall bias associated with the statistical survey procedure. This latter error is more severe for species not caught frequently such as cobia.

The 1979 survey was designed to solve most of the problems associated with previous studies. It will be the basis for an ongoing series of surveys on an annual or semiannual basis. The resulting catch estimates are believed to be more accurate than earlier estimates. However, estimates from the first year should be used with caution. The initial distribution of sampling effort did not adequately cover all segments of the fishery. For example, charter boats were poorly sampled. In the case of king mackerel, this resulted in an unknown, but probably large, underestimate of the total catch. This type of error will be corrected in future surveys.

Notwithstanding the problems that have been encountered in conducting recreational fishing research, the results consistently show that anglers are catching substantial numbers of fish in the management unit. However, because of the high associated error, and differences in methodology between the three surveys, the data presented in Exhibit 8-9 are not considered reliable in drawing conclusions as to trends in the amount of catch over time.

In order to estimate the recreational catch for 1975, and adjusting procedure was used which is described in Section 5.4. This adjusted catch estimate is the amount on which the best estimate of MSY is based.

8.2.2.3 Fish Caught Recreationally and Sold Commercially

In addition to the expenditures associated with purchases of goods and services for recreational fishing, some fish caught by anglers are sold in commercial markets. Very little is known about the final disposition of the recreational catch. Existing evidence is too limited to approximate the value of fish sold; however, information from several local areas does, by way of example, provide some insight into the amount of recreational catch sold commercially.

Preliminary results from a study of Florida Gulf coast charter boats reveal that 53 percent of the operators responding to the survey sold recreationally caught fish to commercial markets. Seventy percent of the fish sold went to wholesale fish houses, 13 percent was sold directly to the public, twelve percent went to restaurants, and five percent went to other retail establishments (Browder, et al., 1978).

Bay County, Florida, is a major recreational fishing area for king mackerel, but there is virtually no commercial troll line fishery there for king mackerel. (As explained in Section 8.2.4.2, trolling is the dominant method of recreational angling for king mackerel.) In 1975 the estimated recreational catch of king mackerel from private and charter boats was 1.1 million pounds (Brusher, et al., 1977). In that same year the National Marine Fisheries Service commercial catch statistics show that 48,300 pounds of king mackerel sold in Bay County fish houses were caught using troll lines. Since there is virtually no commercial troll line fishery, most, if not all, of the reported troll line catch must

Exhibit 8-5
Commercial Landings of King Mackerel
(1000 pounds and 1000 dollars)

By State

Year	North Carolina pounds	North Carolina dollars	South Carolina pounds	South Carolina dollars	Georgia pounds	Georgia dollars	Florida (East) pounds	Florida (East) dollars	Florida (West) pounds	Florida (West) dollars	Texas, Alabama, Louisiana, Mississippi pounds	Texas, Alabama, Louisiana, Mississippi dollars
1979	382	274	80	60	16	12	2800	2240	1570	911	*	*
1978	172	108	13	10	35	24	3402	1968	1745	628	*	*
1977	245	126	7	3	4	2	3236	1783	4950	1732	-	-
1976	156	109	8	5	4	2	4821	2538	2801	891	-	-
1975	100	60	8	4	1	1	3697	1715	2622	640	-	-
1974	40	24	4	2	6	2	4267	1678	6133	1594	-	-
1973	26	7	11	5	-	-	3712	1537	2217	597	-	-
1972	9	3	1	*	-	-	3489	1051	1378	255	-	-
1971	9	2	6	1	1	*	2907	820	2738	472	-	-
1970	12	3	*	*	1	*	4338	1015	2372	320	-	-
1969	16	4	2	*	-	-	2943	599	3242	415	-	-
1968	8	2	*	*	-	-	2586	503	3604	464	-	-
1967	24	5	-	-	-	-	2988	497	3084	351	-	-
1966	95	19	4	*	-	-	1782	323	2633	320	-	-
1965	139	28	-	-	-	-	2549	374	1898	232	-	-

By Region

Year	New England pounds	New England dollars	Middle Atlantic pounds	Middle Atlantic dollars	Chesapeake pounds	Chesapeake dollars	South Atlantic pounds	South Atlantic dollars	Gulf of Mexico pounds	Gulf of Mexico dollars	United States pounds	United States dollars
1980[1]	**	**	**	**	**	**	**	**	**	**	7035	5361
1979[1]	-	-	*	*	9	5	3278	2586	1570	911	4857	3502
1978[1]	-	-	-	-	11	8	3622	2110	1745	628	5378	2746
1977	-	-	1	1	17	7	3492	1914	4950	1732	8460	3654
1976	7	4	1	*	10	4	4989	2244	2801	1634	7808	3886
1975	-	-	1	*	13	4	3806	1780	2622	640	6442	2424
1974	-	-	*	*	15	4	4317	1706	6133	1594	10465	3304
1973	-	-	1	1	7	1	3749	1549	2217	597	5974	2148
1972	-	-	-	-	2	*	3499	1054	1378	255	4879	1309
1971	-	-	-	-	7	1	2923	823	2738	472	5568	1296
1970	-	-	-	-	5	1	4351	1018	2372	320	6728	1339
1969	-	-	-	-	2	*	2961	603	3242	415	6205	1018
1968	-	-	-	-	3	1	2594	505	3604	464	6201	970
1967	-	-	-	-	3	1	3012	502	3084	351	6099	854
1966	-	-	-	-	7	1	1881	342	2633	320	4521	663
1965	-	-	-	-	6	1	2688	402	1898	232	4592	635

Note: * = <500 pounds or $500
** = Not Available
[1] Preliminary

Source: U.S. Department of Commerce. Fishery Statistics of the United States (Various Years). Washington, D.C.: Government Printing Office.

Exhibit 8-6
Commercial Landings of Spanish Mackerel
(1000 pounds and 1000 dollars)

By State

Year	North Carolina pounds	North Carolina dollars	South Carolina pounds	South Carolina dollars	Georgia pounds	Georgia dollars	Florida (East) pounds	Florida (East) dollars	Florida (West) pounds	Florida (West) dollars	Texas, Alabama, Louisiana pounds	Texas, Alabama, Louisiana dollars	Mississippi pounds	Mississippi dollars
1979[1]	13	4	*	*	2	1	4709	989	1603	335	146	29	30	7
1978[1]	13	4	*	*	*	*	5511	1061	1725	438	47	7	58	14
1977	46	7	-	-	2	*	9708	2078	2000	428	92	12	151	30
1976	31	5	3	1	3	1	9559	1779	7783	1360	179	24	379	82
1975	49	7	10	2	6	1	5145	902	5621	962	292	40	224	39
1974	73	9	2	*	1	*	2346	459	8267	1444	246	30	41	6
1973	64	9	4	*	5	1	3203	538	6194	999	165	14	98	14
1972	96	13	5	1	5	1	3369	426	6532	816	205	20	485	57
1971	95	14	4	1	*	*	2582	308	7383	830	96	8	179	20
1970	63	9	2	*	*	*	3574	459	8100	939	155	28	43	5
1969	39	12	4	1	-	-	2359	253	8175	946	155	12	12	1
1968	69	8	8	1	1	*	4406	382	7066	797	52	14	114	11
1967	73	8	2	*	2	*	1802	153	5867	611	33	3	76	7
1966	78	10	1	*	1	*	2181	232	7004	813	57	6	5	*
1965	117	12	13	2	1	*	2901	290	4883	586	19	2	3	*

By Region

Year	New England pounds	New England dollars	Middle Atlantic pounds	Middle Atlantic dollars	Chesapeake pounds	Chesapeake dollars	South Atlantic pounds	South Atlantic dollars	Gulf of Mexico pounds	Gulf of Mexico dollars	United States pounds	United States dollars
1980[1]	**	**	**	**	**	**	**	**	**	**	11968	3137
1979[1]	-	-	*	*	2	*	4724	994	1779	371	6505	1365
1978[1]	-	-	*	*	*	*	5524	1065	1830	459	7354	1524
1977	-	-	-	-	22	4	9756	2085	2243	470	12021	2559
1976	-	-	2	*	80	13	9596	1786	8341	466	18019	3265
1975	1	*	4	1	62	12	5210	912	6137	1041	11415	1966
1974	-	-	2	*	24	4	2422	468	8554	1480	11002	1952
1973	-	-	*	*	50	9	3276	548	6457	1027	9783	1584
1972	-	-	*	*	23	4	3475	441	7222	893	10720	1338
1971	*	*	*	*	52	9	2681	323	7658	858	10391	1190
1970	*	*	*	*	201	31	3639	468	8298	972	12138	1471
1969	*	*	-	-	124	18	2452	266	8342	959	10918	1243
1968	-	-	*	*	60	10	4484	391	7232	812	11776	1213
1967	-	-	-	-	30	5	1879	161	5976	621	7885	787
1966	-	-	*	*	142	23	2261	242	7066	819	9469	1084
1965	*	*	-	-	74	11	3032	304	4905	588	8011	903

Note: * = <500 pounds or $500
** = Not Available
[1] Preliminary

Source: U.S. Department of Commerce. Fishery Statistics of the United States (Various Years). Washington, D.C.: Government Printing Office.

Exhibit 8-7
Commercial Landings of Bluefish
(1000 pounds and 1000 dollars)

Year	Florida (West)		Alabama		Mississippi		Louisiana		Texas		Gulf of Mexico		United States	
	pounds	dollars	pounds	dollars	pounds	dollars	pounds	dollars	pounds	dollars	pounds	dollars	pounds	dollars
1980[1]	**	**	**	**	**	**	**	**	**	**	**	**	**	**
1979[1]	900	120	15	1	32	7	*	*	-	-	947	128	12881	2151
1978[1]	850	109	9	1	11	2	*	*	-	-	870	111	11300	1570
1977	952	132	2	*	26	4	3	*	-	-	983	136	11320	1315
1976	490	78	2	*	66	8	1	*	-	-	559	86	10387	1091
1975	436	48	7	1	75	12	12	1	-	-	530	62	10841	1487
1974	501	55	9	1	16	2	11	1	-	-	537	59	10541	1143
1973	493	58	27	3	10	1	*	*	-	-	530	62	10597	1173
1972	511	54	22	1	14	2	*	*	-	-	547	57	7415	866
1971	410	49	13	1	9	1	-	-	-	-	532	51	6318	726
1970	650	62	22	2	22	2	*	*	-	-	694	66	7203	742
1969	529	51	32	2	26	3	*	*	-	-	587	56	5978	709
1968	556	59	4	*	84	8	-	-	-	-	644	67	5404	719
1967	513	54	4	*	79	8	-	-	-	-	596	62	4279	529
1966	584	61	9	1	102	10	-	-	-	-	695	72	5484	647
1965	859	88	5	1	72	8	-	-	-	-	936	97	5008	582

Note: * = <500 pounds or $500
** = Not Available
1 Preliminary

Source: U.S. Department of Commerce. <u>Fishery Statistics of the United States (Various Years).</u> Washington, D.C.: Government Printing Office.

Exhibit 8-8
Commercial Landings of Cobia
(1000 pounds and 1000 dollars)

By State

Year	North Carolina pounds	North Carolina dollars	South Carolina pounds	South Carolina dollars	Georgia pounds	Georgia dollars	Florida (East) pounds	Florida (East) dollars	Florida (West) pounds	Florida (West) dollars	Texas, Alabama, Louisiana, Mississippi pounds	Texas, Alabama, Louisiana, Mississippi dollars
1979[1]	4	1	*	*	*	*	6	3	78	24	6	1
1978[1]	2	*	*	*	-	-	9	5	87	26	3	1
1977	1	*	-	-	-	-	12	4	68	14	21	5
1976	2	*	-	-	1	*	13	4	104	21	6	*
1975	2	*	-	-	-	-	14	4	84	13	35	5
1974	1	*	-	-	-	-	12	2	89	10	44	5
1973	2	*	-	-	-	-	11	2	77	8	36	3
1972	3	*	-	-	-	-	14	2	74	6	44	4
1971	11	1	-	-	-	-	7	1	77	6	27	1
1970	7	*	-	-	-	-	14	2	60	5	46	4
1969	6	*	-	-	-	-	4	1	45	3	25	3
1968	7	*	-	-	-	-	9	1	41	3	41	4
1967	10	*	-	-	-	-	9	1	24	2	16	1
1966	10	*	-	-	-	-	5	*	28	2	10	*
1965	10	1	-	-	-	-	4	*	11	1	3	1

By Region

Year	New England pounds	New England dollars	Middle Atlantic pounds	Middle Atlantic dollars	Chesapeake pounds	Chesapeake dollars	South Atlantic pounds	South Atlantic dollars	Gulf of Mexico pounds	Gulf of Mexico dollars	United States pounds	United States dollars
1979[1]	-	-	-	-	*	*	10	4	84	25	94	29
1978[1]	-	-	-	-	*	*	11	5	90	27	101	32
1977	-	-	-	-	2	*	13	4	89	19	104	13
1976	-	-	-	-	3	*	16	6	110	22	129	28
1975	-	-	-	-	6	1	16	4	120	18	142	23
1974	-	-	-	-	5	1	13	2	133	15	151	18
1973	-	-	-	-	2	*	13	2	113	11	128	13
1972	-	-	-	-	4	*	17	2	118	10	139	12
1971	-	-	-	-	4	*	18	2	104	7	126	9
1970	-	-	-	-	2	*	21	2	106	9	129	11
1969	-	-	-	-	3	*	10	1	70	6	83	7
1968	-	-	-	-	4	*	16	1	82	7	102	8
1967	-	-	-	-	3	*	19	1	40	3	62	4
1966	-	-	-	-	2	*	15	*	38	2	55	2
1965	-	-	-	-	10	1	14	1	21	2	45	4

Note: * = <500 pounds or $500
[1] Preliminary

Source: U.S. Department of Commerce. Fishery Statistics of the United States (Various Years). Washington, D.C.: Government Printing Office.

Exhibit 8-9

Estimated Weight and Number of Coastal Migratory Pelagic Fish Caught by Anglers in 1960, 1965, 1970, and 1979 by Species and Region
(weight is in 1000's of lbs., numbers are in 1000's)

	1960		1965		1970		1979**		
	No. of Fish	Estimated Weight	No. of Fish	Estimated Weight	No. of Fish	Estimated Weight	No. of Fish	Estimated Weight	Adjusted Estimate of Weight for 1975
South Atlantic									
Cobia	-	-	-	-	26	775	-	-	
Dolphin	152	1,000	166	1,118	2,166	27,806	2,762	14,126	
King Mackerel	*	*	6,639	74,132	4,165	54,942	373	4,033	
Spanish/Cero Mackerel	7,380	24,830	7,548	18,186	4,967	14,623	898	2,098	
Little tunny	-	-	-	-	-	-	136	593	
Total	14,713	39,470	22,423	104,728	24,175	97,417	4,169	20,850	
Gulf of Mexico									
Bluefish	54	80	685	2,700	563	1,659	1,057	1,481	
Cobia	-	-	216	2,029	93	125	-	-	
Dolphin	313	1,250	464	873	268	2,133	36	363	
King Mackerel	*	*	1,675	16,299	3,072	27,459	598	5,931	
Spanish/Cero Mackerel	5,149	11,330	1,708	4,283	2,793	7,808	1,196	2,257	
Little tunny	-	-	-	-	-	-	147	288	
Total	5,516	12,660	4,748	26,184	6,789	39,184	3,034	10,320	
South Atlantic and Gulf of Mexico									
Cobia	-	-	216	2,029	119	900	-	-	
Dolphin	465	2,250	630	1,991	2,434	29,939	2,805	14,872	
King Mackerel	*	*	8,314	90,431	7,237	62,401	975	9,931	23,700
Spanish/Cero Mackerel	12,529	36,160	9,256	22,469	7,760	22,451	2,107	4,574	8,500
Little tunny	-	-	-	-	-	-	303	995	
Total	20,229	52,130	27,171	130,912	30,964	136,621	6,190	30,372	

* 1960 survey included king mackerel with Spanish and cero mackerel.

** 1979 catch includes fish landed whole and fish gutted or filleted at sea. Released fish are not included.

Sources: Saltwater Angling Surveys for 1960, 1965, and 1970; Marine Recreational Fishery Statistics Survey, 1979.
See Section 5.4 for adjusted weight for 1975.

come from recreational landings. Thus, 4.3 percent (.048 million pounds/1.1 million pounds) of the total recreational catch was sold through fish houses in one county alone. If king mackerel caught from private boats are disposed of in a manner similar to those caught from charter boats, then the 48,300 pounds represents about 70 percent of the king mackerel sold in the county. The total sold, then, would be 69,000 pounds, or 6.2 percent of the recreational catch.

In another area of Florida, Dade County, an estimated 12.5 percent of all fish caught from charter boats in 1976 were sold. Other fish caught were used for bait (24.8 percent), consumed by customers (19.6 percent), mounted (14.8 percent), and released (1.5 percent). The disposition of the remaining 26.8 percent of the catch was unknown. The researcher also found that king and cero mackerel were generally consumed by customers or used for bait (Gentle, 1977).

8.2.3 Fishing and Landing Areas

8.2.3.1 Commercial

Total U.S. commercial landings of both king and Spanish mackerel take place almost entirely within Florida, over 95 percent of both in the last five years. The king and Spanish mackerel fisheries are local fisheries in the sense that the catch is generally landed at ports within a few hours run of where the fish are caught. Typical one-way trip lengths between fishing and landing areas average about 20 miles on the Florida east coast. In the Florida Keys these distances may be about 40 miles. However during the winter, king and Spanish mackerel season boats may travel around the coast of Florida and temporarily operate out of ports closest to where the fish are currently available.

The three main traditional Florida landing areas for king and Spanish mackerel have been:

- Collier and Lee Counties on the west coast of south Florida
- Monroe County in the Florida Keys
- Indian River, St. Lucie, Martin, and Palm Beach Counties on the east coast of south Florida.

In Collier and Lee Counties major ports at which fish are landed include Naples and Ft. Myers. In the Florida Keys major landing ports include Key West and Marathon. On the Florida east coast major landing ports include Boynton Beach, Palm Beach, Jupiter, Port Salerno, Ft. Pierce and Sebastian.

The major fishing areas have included an area known as "No Man's Land" located approximately 40 miles west of Key West between the Marquesas and the Dry Tortugas. Another major area on the Florida west coast is located southwest of Cape Romano near Naples. Spanish mackerel are frequently caught in Florida Bay. On the Florida east coast major fishing areas are located along the narrow continental shelf just inside the Gulf Stream from about Palm Beach north to Sebastian. During the winter season, schools of Spanish and king mackerel will migrate and congregate in certain areas, such as over reef outcroppings, for a period of time. The boats will converge to the areas where the fish are located. Specific areas and times at which fish are available will vary from year to year due to ocean and weather conditions.

There has historically been considerable season-to-season variation in the proportion of the king mackerel catch landed in areas of the state. While Collier and Lee Counties have been major landing areas in many past seasons, in some seasons they account for only a small percentage of the catch. This has been the case for the last couple of seasons. In the 1976-1977 season, Monroe and Dade Counties accounted for the majority of the landings as they did in 1959 through 1961. Most of these landings were believed to be from fish caught in "No Man's Land", west of Key West.

There appears to be somewhat greater consistency in the areas in which Spanish mackerel are landed. The Dade/Monroe County area and the southeast coast area account for about 80 percent of the catch.

In northwest Florida there is a small catch of king and Spanish mackerel, taken primarily by haul seines. This generally occurs in the summer season. Bluefish are taken at many locations around the Florida east and west coasts. In North Carolina king mackerel, and Spanish mackerel are caught off various points along the coast such as Wanchese, Oregon Inlet, and Beaufort. In addition, there is a small commercial catch of king and Spanish mackerel off South Carolina and Georgia. In addition, Spanish mackerel are caught commercially off Alabama, Mississippi, and Louisiana. Small amounts of bluefish are taken commercially off Alabama, Mississippi, and Louisiana. Dolphin are taken commercially primarily in the Florida Keys, although significant amounts are also taken off St. Lucie County on the Florida east coast, and in northwestern Florida. Cobia are taken commercially in Florida (particularly off St. Lucie, Monroe, Pinellas, and Bay Counties) and in Texas. In Texas cobia are frequently caught in the vicinity of shrimp trawlers.

8.2.3.2 Recreational

Unlike the commercial harvesting of fish in the management unit, the recreational fishing activity is widely distributed throughout both the south Atlantic and Gulf of Mexico regions. Fishing occurs out of virtually all marinas and boat docks that have access to coastal waters. Similarly, anglers can be found on most accessible beaches and shore-based locations such as bridges, piers or jetties. The following discussion mentions those locations that are generally thought to be heavily frequented by anglers catching species included in the management unit.

In the south Atlantic during typical years, recreational fishing for king mackerel and Spanish mackerel occurs heavily in North Carolina and along the eastern coast of Florida. While dolphin, and little tunny are among the fish caught by anglers, they are landed much less frequently in the northern part of the region than in southern Florida. Cobia is a prized sportfish, but is the least frequently landed of the species in the management unit. In North Carolina areas such as Morehead City, Oregon Inlet, Harker's Island, or Hatteras are often frequented by anglers. Along the Florida east coast there is considerable recreational fishing activity out of the Jacksonville, Palm Beach, Fort Lauderdale, and Miami areas. In South Carolina considerable fishing occurs out of Charleston and Murrel's Inlet, and in Georgia the St. Simons Island area is a popular offshore angling site.

In the Gulf of Mexico, recreational activity is most heavy in Florida, Texas and Alabama; significant recreational effort also occurs off Mississippi and Louisiana as well. For recreational fishing, king and Spanish mackerel are the most important species of the management unit in the Gulf of Mexico. Cobia, dolphin and little tunny are landed by anglers throughout the Gulf coast, but as in the south Atlantic they are caught much less frequently. There is very little fishing from shore-based locations for species in the mangement unit. Most fishing occurs offshore from privately owned boats and charter boats.

On the west coast of Florida major fishing areas include the Keys, the Fort Myers-Naples area, the Clearwater-St. Petersburg area and the Panama City-Destin area. These areas are popular for charterboat fishing as well as fishing from private boats, although charter fishing is most concentrated in the Keys and Panama City-Destin (Bay county) locations. Angling for king mackerel is normally particularly heavy in the Bay County area. In Alabama, the Mobile Bay area, Dauphin Island, and Gulf Shores are heavily frequented fishing areas. Biloxi and Ocean Springs are major areas for coastal recreational fishing in Mississippi, and in Louisiana anglers seeking to fish offshore often depart from areas such as Eades or South Pass. The long Texas coast has many fishing locations. Among the more important recreational fishing ports for the coastal migratory pelagic species are areas such as Freeport, Port O'Connor, Rockport, Port Aransas, South Padre and Port Isabel. In short, recreational activity is highly dispersed, but in the aggregate it accounts for a large amount of fishing effort.

8.2.4 Vessels and Gear

8.2.4.1 Commercial

a) King Mackerel

King mackerel are caught commercially with a variety of gears which include gill nets, trolled lines, hand lines, haul seines and trammel nets. Currently, trolling and gillnetting are the most widespread fishing methods in use. Exhibit 8-10 presents catch by gear type for the Florida east and west coasts. From 1971 through 1975, of the total Florida king mackerel catch, 58 percent was by gill net, 40 percent was by hook and line (either troll line or hand line), and less than one percent each by haul seine and trammel net. During the year up through 1975, the reported east coast gill-net catch was by boats in the smaller (20 to 30 feet) size ranges. The reported west coast catch was predominantly by larger boats (up to 40 to 65 feet) operating in the Keys and Naples area. Traditionally, nearly all of the catch in other states (which is small compared to the Florida catch) has been by troll line.

Hook and line boats operating on the Florida southwest coast typically range from about 24 to 36 feet. Of a survey of ten such boats in February, 1977 (Morris, Prochaska, Cato, 1977), the average boat had a length of 29.9 feet and a fish carrying capacity of 4,000 pounds. Eighty percent were built of fiberglass and 20 percent wood. These boats are usually operated by one man, although some may have one crew member. Hook and line boats operating out of the Florida Keys are somewhat larger typically ranging in size from 32 to 40 feet. These boats may operate with crews of two or three men. Most hook and line boats are now equipped with electronic or hydraulic reels for retrieving lines. Many boats have loran for navigation and marking good fishing spots. Fish are caught on lines with artifical spoons or feathered jigs. Strips of mullet, squid, or dead ballyhoo may also be used for bait. North Carolina fishermen usually use 300 pound monofilament line trolled on the surface or at various depths using planers or weights. Florida hook and line boats usually use No. 9 trolling wire. It has been reported that in the past, hook and liners could land 2,000 to 4,000 pounds of king mackerel per boat per day on a good day in the Florida fishery. Off North Carolina catches of 1,000 to 2,000 pounds per day are not unusual. Much of the North Carolina king mackerel fleet consists of charter boats which rig up for commercial fishing during the spring and fall.

Troll line boats generally fish by seeking out spots where mackerel congregate, such as reefs. Electronic fishfinders aid in locating the fish, and many fishermen know and mark specific spots where king mackerel are expected to congregate. As fish are found, the boats will begin operating in concentric circles over the schools.

The other major component in the king mackerel fishery is the large gill-net fleet. These are vessels typically ranging in size from 40 to 65 feet with an average size which is probably between 45 and 55 feet. These vessels have typical carrying capacities of 25,000 to 35,000 pounds. The typical set of the net yields about 8,000 to 10,000 pounds although sets as high as 50,000 pounds have been reported. Most of these vessels are constructed of fiberglass and have diesel engines. Vessels are operated by a captain and crew of three to five.

Fishing gear consists of gill nets of nylon mesh with a center band of monofilament mesh. The common mesh size is 4-3/4 inches stretched. Typical nets are 400 to 700 yards long with an average of about 500 to 550 yards. Typical stretched mesh depths are about 80 feet. This allows fishing in waters of up to 57 feet.

These vessels use power rollers mounted near the stern for retrieving nets. These are usually hydraulically powered. Aircraft are generally used as spotters. The spotter pilot will locate schools of king mackerel and will direct vessels to their location. The vessels will then proceed to

Exhibit 8-10

King Mackerel
Commercial Catch By Gear

Florida East Coast
(pounds)

Year	Haul Seine	Otter Trawl(shrimp)	Runaround Gillnet	Hand Line	Troll Line
1977[1]	-	-	1,183,807	63,688	2,653,399
1976[1]	-	-	2,068,700	109,700	2,642,500
1975	-	-	1,197,500	63,400	2,435,900
1974	-	-	1,593,200	109,200	2,565,000
1973	-	-	1,175,600	89,500	2,446,600
1972	-	-	1,290,500	15,200	2,183,700
1971	-	-	1,629,900	52,200	1,224,500
1970	-	-	2,354,000	13,400	1,970,500
1969	-	-	1,756,000	17,000	1,169,700
1968	-	-	1,483,100	22,000	1,081,100
1967	-	-	1,899,800	32,200	1,056,200

Florida West Coast
(pounds)

Year	Purse Seine	Haul Seine	Runaround Gillnet	Trammel Net	Hand Line	Troll Line	Drift Gillnet
1977[1]	-	*	4,668,397	*	16,099	479,082	*
1976[1]	-	*	2,396,600	*	104,300	300,400	*
1975		80,800	1,895,400	-	239,900	406,200	
1974		33,400	5,109,100	-	445,400	545,600	
1973		74,400	1,747,300	400	106,900	287,800	
1972		46,400	977,900	-	213,100	140,500	52,000
1971		51,200	2,293,900	800	135,900	203,700	19,000
1970		97,300	1,796,000	-	68,900	390,500	44,700
1969	116,400	63,200	2,389,400	600	88,300	539,500	15,000
1968	332,700	78,200	2,880,900	1,100	68,900	226,700	45,000
1967	283,300	41,800	2,398,900	13,000	55,900	247,100	

[1] Preliminary
* Not Available

Source: U.S. Department of Commerce. Fishery Statistics of the United States (Various Years). Washington, D.C.: Government Printing Office.

"set" the net around the school or portions of it. The net will then be closed driving the fish into the net. The process of setting, retrieving, and unloading a net takes several hours.

There has been a small boat gill-net fleet operating on the southeast Florida coast for a number of years. Historically this catch was made from 18 to 30 foot boats. Some fishermen in this group have small monofilament king mackerel nets. These boats are not usually equipped with power rollers. The main fishing area was from Dade County to St. Lucie County. Many of these boats fish primarily for Spanish mackerel. King mackerel has not been their primary target although significant quantities are landed.

Landings by haul seine or trammel net are not a significant part of total king mackerel landings. Most of this catch takes place on the northwestern Florida coast. King mackerel are not the primary target species for craft using this gear. Bycatch of king mackerel in otter trawls appears to be insignificant.

b) Spanish mackerel

Spanish mackerel are caught commercially primarily with run-around gill nets. Small amounts are taken by haul seine, trammel net and hook and line. Minor amounts are taken as a bycatch in shrimp otter trawls. Exhibit 8-11 presents catch by gear type for the Florida east and west coasts. Florida accounts for about 90 to 95 percent of the U.S. Spanish mackerel catch. In Florida from 1971 through 1975, 85 percent of the Spanish mackerel catch was caught by gill nets. This includes both small boats (18 to 20 feet) as well as larger boats (up to 60 feet). During those same years approximately nine percent of the catch was caught with haul seines and six percent was caught by hook and line. Less than one percent was caught in trammel and shrimp otter trawls in Florida. In North Carolina less than one percent of the total U.S. catch is taken through a combination of haul seine, anchor nets, and long seines. One or two percent of total U.S. catch is typically taken in shrimp otter trawls off the Gulf states. The rest of the Gulf states catch is primarily by gill net.

There is both a small boat and large boat gill-net fishery for Spanish mackerel off the Florida southeast coast. The small boats are typically open skiffs, 20 to 22 feet in length with a fish carrying capacity of 2,500 to 6,000 pounds. The average capacity was approximately 4,900 pounds of fish in 1977 (Cato, et al., 1978). Of the boats in the survey, 14.5 percent used a spotter plane.

These boats are frequently operated by one man although they may have one or two crewmen on board for some trips during the year. Both strike or run-around gill nets and drift nets are used.

The large Spanish mackerel gill-net boats typically range in size from 30 to 60 feet in length and have a fish carrying capacity of 15,000 to 50,000 pounds. According to the survey of Cato, Morris, Prochaska (1978), the average capacity was approximately 29,000 pounds of fish. Of the boats in the survey, 83 percent used a spotter plane. These boats operate with a captain and from one to five crewmen with an average of three crewmen in addition to the captain. Nets with a typical mesh size of 3-3/8 to 3-3/4 inches are used when fishing for Spanish mackerel.

c) Cobia

Cobia is not a primary commercial target species. It is caught on a supplemental basis in the Florida hook and line and gill-net fisheries. In Texas it is caught by hook and line as a commercial supplement to the charterboat fleet. It is also caught by shrimp trawler crews.

Exhibit 8-11

Spanish Mackerel
Commercial Catch By Gear

Florida East Coast
(pounds)

Year	Haul Seine	Otter Trawl(shrimp)	Runaround Gillnet	Hand Line	Troll Line
1977[1]	*	*	10,202,253	14,067	769,766
1976[1]	*	*	8,731,400	195,400	627,000
1975	16,400	600	4,753,900	161,200	212,700
1974	6,900	7,000	2,164,400	79,200	88,600
1973	7,000	20,900	3,020,300	78,600	76,200
1972	40,000	3,400	3,221,200	38,200	66,200
1971	25,000	5,500	2,416,400	32,300	102,600
1970	6,000	7,000	3,457,300	60,900	43,200
1969	15,000	4,700	2,239,900	36,300	62,900
1968	22,000	13,600	4,219,000	56,100	95,800
1967	unclassified	3,300	1,667,400	57,000	73,800

Florida West Coast
(pounds)

Year	Purse Seine	Haul Seine	Runaround Gillnet	Trammel Net	Hand Line	Troll Line	Drift Gillnet
1977[1]	*	*	6,619,600	*	117,100	613,800	*
1976[1]	*	*	1,709,969	*	61,187	482,929	*
1975		265,600	4,527,900	88,000	184,000	555,800	
1974		486,400	6,972,000	162,100	298,100	348,600	
1973		602,400	5,370,100	101,800	61,600	58,400	
1972		1,541,000	4,524,700	130,900	105,300	230,100	
1971		1,319,400	5,651,300	126,800	130,000	88,900	66,900
1970		1,224,000	6,476,500	119,500	103,000	78,700	98,200
1969		882,200	6,903,500	96,100	108,100	71,300	113,400
1968	198,800	822,100	5,646,900	113,700	130,600	83,600	70,000
1967	194,600	648,600	4,604,500	88,000	103,700	129,300	70,000

1 Preliminary
* Not Available

Source: U.S. Department of Commerce. Fishery Statistics of the United States (Various Years). Washington, D.C.: Government Printing Office.

d) Cero Mackerel

Cero mackerel is an incidental catch to the king mackerel fishery. No separate landing statistics are available. They are aggregated with king mackerel. Cero mackerel is not thought to be particularly abundant in United States waters.

d) Bluefish

Bluefish are caught commercially in the Gulf of Mexico region primarily with haul seines, gill nets, and hook and line. Small amounts are landed in shrimp otter trawls, and trammel nets. Exhibit 8-12 presents bluefish catch within the Gulf region for 1973, a typical year. Of the total catch of 531,000 pounds, 39.4 percent was landed by haul seine, primarily in Florida. Gill nets landed 43.7 percent, the bulk of which was in Florida. The hook and line catch was 8.5 percent of the total and this was all in Florida.

In Florida bluefish provide a supplement to fishermen targeting other fisheries. Bluefish are caught here in small gill-net boats (18 to 22 feet), of the same type used for Spanish mackerel using stretched mesh nets. In their survey of small Spanish mackerel net fishermen (Cato, et al., 1978) reported that 13 percent of the value of catch and 19 percent of the weight of catch was bluefish.

Florida haul seiners use small open boats in the 20 foot size class. These boats are typically operated by two persons.

Exhibit 8-12
Bluefish Commercial Catch by Gear 1973
(1000 lbs.)

	Haul Seine	Shrimp Otter Trawl	Trammel Net	Gillnet	Hook and Line
Florida (West)	209	-	32	206	45
Alabama	-	9	3	15	-
Mississippi	-	-	-	11	-
Louisiana	-	(1)	-	-	-
Texas	-	-	-	-	-
Total	209	10	35	232	45
Percent of Total Landings in Gulf and South Atlantic Regions	39.4	1.9	6.6	43.7	8.5

(1) Less than 500 lbs.

Source: U.S. Department of Commerce. N.M.F.S. Fishery Statistics of the United States, (Various Years). Washington, D.C.; U.S. Government Printing Office.

f) Little Tunny

There appears to be a small commercial catch of little tunny within the Gulf and south Atlantic regions. Purse seines are the main gear used for catching little tunny. It is used primarily for bait.

g) Dolphin

Dolphin is caught commercially exclusively by hook and line. It is not a primary commercial target species. It serves as a seasonal supplement to the Florida mackerel troll line fishery. It is caught commercially mostly in April through July, primarily in Monroe County and the southeastern Florida coast.

8.2.4.2 Recreational

Recreational fishermen use rod and reel when they angle for fish in the management unit. Both natural and artificial baits are used, and three different fishing methods are employed. Trolling is the most commonly used technique by charter and private boat fishermen. Charter boats often use four lines, two unweighted lines for fishing at the surface and two weighted lines at some depth below. Private boats generally troll with fewer lines and remain closer to shore. Boats troll in a straight line or in a random pattern until fish are hooked, and then trolling continues in circles until fish are no longer being caught. Trolling often is used when circling surface structures or underwater reefs. Both natural and artificial baits are used. A second technique, jigging, involves casting a lure or bait into the water and retrieving it with a jerking motion. This method is often used from fixed platforms such as bridges or piers. Jigging is also employed from boats when the boat is near a surface or underwater structure. The third method is float fishing and is usually done from a drifting or anchored boat, although it can be employed from a fixed platform. Hooks are baited and suspended below the surface in the water column with a float. Frequently chum is used to attract the fish (Manooch, 1978; Brusher, et al., 1977).

Section 8.2.1.2 presents a discussion of the types of private boats used by recreational fishermen for species in the management unit. Studies of charter boats from North Carolina, Florida and Texas provide a somewhat more detailed description of these commercial boats than is available for private boats. The length of charter boats in North Carolina range from 29 to 55 feet and have an average length of 42 feet. Charter boats there range in age from new to 44 years old and on average are 16 years old. Sixty percent of the boats have single diesel engines, and approximately 25 percent have twin diesel engines. The remaining boats have gasoline engines. Nearly all boats were equipped with CB and VHF radios and a fathometer. Just over one-half of the charter boats are equipped with long range navigational devices (loran C or loran A) (Abbas, to be published).

In Texas the average length of boats is about 31 feet. More boats are gasoline powered than diesel powered. Gasoline powered boats accounted for 76 percent of those sampled. Nearly all boats were equipped with VHF and CB radios and fathometers. Only 28 percent were equipped with loran (Ditton, et al., 1977).

On the west coast of Florida the average boat length is 37 feet. Seventy-eight percent of the boats are diesel driven, the remaining boats having gasoline engines (Browder, et al., 1978).

8.2.5 Employment

8.2.5.1 Associated with Commercial Harvest

This section describes the estimated employment associated with the commercial harvest of king and Spanish mackerel. An estimated 657 fishermen are involved in the commercial fishery for king mackerel, 525 hook and line fishermen and 132 gill-net fishermen. For Spanish mackerel, an estimated 772 gill-net fishermen are employed. There is some crossover of fishermen between king and Spanish mackerel. In addition, there are 1,719 charter fishermen partially dependent on species in the management unit.

The employment associated with commercial king and Spanish mackerel is seasonal, occurring predominantly in the winter months. This is also true for recreational fishing, although the peak season varies with the area.

Also there is an additional number of people who fish for either king or Spanish mackerel on a supplemental basis and who can be considered secondary user groups. Precise quantification of the number of such fishermen is not possible; however, in a survey of Florida commercial fishermen, Prochaska and Cato (1977) reported that 13.4 percent responding caught king mackerel and 10.6 percent caught Spanish mackerel. Prorating these results to the total number of Florida fishermen would suggest that roughly 1,300 Florida fishermen catch at least some king mackerel, and 1,000 catch Spanish mackerel.

In addition to employment in the direct fish harvesting, the fishery can be associated with employment generated in industries providing inputs to fish harvesting (i.e., gear manufacture, boat building, gear repair, fishing supplies, etc.).

The amount of additional employment generated in these sectors was estimated at approximately 40 person-years of employment for king mackerel and 25 person-years for Spanish mackerel. Note that the actual number of people involved may be considerably greater than this; the above estimates were produced by prorating the time actually devoted to producing goods and services used in the king and Spanish mackerel fishery. Also in certain years when a number of boats are built for use in the fishery, the above estimates (which are long-term averages) would be greatly increased. These estimates were derived using the economic impact ratios to determine average expenses for the boats and vessels in the fisheries. The results of a national input/output study of the impacts of the U.S. commercial fishing industry (Centaur Management Consultants, 1975) were then used to estimate employment in the direct economic sectors supplying inputs to fish harvesting.

In addition to the above employment, there is employment associated with the processing and distribution of the products from the fishery. Using techniques similar to those described above, employment associated with the processing and distribution of king mackerel was estimated to be approximately 220 person-years for king mackerel and 230 person-years for Spanish mackerel. The estimate for Spanish mackerel is higher even though the value of landings for Spanish mackerel is lower; the value per pound for Spanish mackerel is lower than that for king mackerel because they are not sold as fresh. The above employment estimates include employment in processing as well as wholesale and retail trade.

8.2.5.2 Associated with Recreational Angling

Employment in manufacturing, wholesale trade and retail trade related to recreational fishing activity for the coastal migratory pelagic fish of the mangement unit in the south Atlantic and Gulf of Mexico is estimated to have been 2,990 person-years in 1977. Employment related to the king and Spanish mackerel fisheries is estimated to have been 1,170 person-years and 900 person-years, respectively, in 1977 for the two regions. These estimates include employment related to purchases of equipment such as boats, motors, trailers or fishing gear; nondurable goods such as boat fuel or live bait; and services such as charterboat fees, use of marine facilities, or food, lodging and travel.

The estimates represent employment benefits which accrue to the nation and not just to the two regions. For example fishing equipment purchased in Florida for use in mackerel fishing may be manufactured in New England and distributed through a mid-Atlantic state. This nonlocal manufacturing and wholesale distribution employment related to equipment used in Florida is included in the employment estimates presented above. The method for determining these estimates is presented in Section 9.1.2.

As discussed in Section 8.2.1.2, the coastal migratory pelagic resources management unit is particularly important to the charterboat fleet. Charterboat fishing is often not a full-time occupation for the boat operators. For some it provides seasonal employment. Other operators may charter these boats only on weekends. For example only 34 percent of Texas operators surveyed in 1975 said that charter fishing was their only occupation. Nearly 60 percent of the operators earned less than 50 percent of their income from charter fishing (Ditton, et al., 1977). In North Carolina very few captains rely on charter boating as a sole source of income (Abbas, to be published). Because of the seasonal and intermittent characteristics of charterboating activity, it is not possible to provide an estimate of related employment in terms of person-years; however, the estimated number of persons involved in providing charterboating services is presented below.

In Section 8.2.1.2 the number of charter boats that operated in 1977 was estimated to be 982. Each boat requires a captain, and many boats also used a mate. In Texas 60 percent of the boats used mates (Ditton, et al., 1977). On the west coast of Florida just over 90 percent of the boats used mates (Davis, et al., unpub. ms.). Assuming then that 75 percent of all charter operators employed a mate for their trips in 1977, the total number of persons involved in providing charter fishing services was 1,719; 982 captains and 737 mates. Regionally 727 persons are estimated to have been involved in charter fishing in the south Atlantic and 992 provided services in the Gulf of Mexico.

A significant portion of those employed in charter boating in both regions are affected by the mackerel and other pelagic species fisheries. As described in Section 8.2.1.2, 92 percent of the catch of boats operating from North Carolina ports were fish in the management unit, 37 percent of which were king mackerel. In southeastern Florida, 41 percent were from the management unit, and from portions of northwest Florida over 90 percent (74 percent were king mackerel) of the fish caught were from the mangement unit. Potential employment in charter boats is related to the management unit in similar proportions.

8.2.6 Conflicts Among Domestic Fishermen

In recent years there has been a significant degree of controversy among the various user groups participating in the Florida king mackerel fishery. Although it is difficult to document these conflicts through scientific studies, they are substantiated through public testimony, advisory panel meetings, and personal observations. Because king mackerel is a species which is very important to both the commercial and recreational fishermen, there has been significant competition for the resource which has heightened in recent years. In addition the hook and line and gill-net commercial fishermen (two of the main commercial user groups) have been involved in a continuing conflict which escalated during the 1977-78 season.

Traditionally the southern Florida peninsula has been the center of the king mackerel commercial fishery during the winter season. Northwestern Florida has recreational fishing during the summer season. Since 1975 king mackerel became less and less available to the recreational fishermen along the Florida Gulf coast from Naples north and west. The 1975 season was reported to be the last good year for recreational fishing in that section of Florida. The recreational catch then dropped in 1976 and 1977 and has been variable in 1978. A somewhat similar pattern has existed with respect to the northern Gulf of Mexico in recent years. During this period the number of large king mackerel roller rig gill-net vessels showed a significant increase. This has led to a widespread perception among recreational fishermen that the large gill-net vessels are depleting the resources. This is denied by the gill-net fishermen. This climate has led to a series of initiatives by recreational fishing interests to curtail or prohibit the large-scale gillnetting of king mackerel. See Section 7.4 for a description of a recently enacted Florida state law placing certain limitations on king mackerel gillnetting. On the southeast Florida coast there have recently been occasional reports of vessel conflicts for fishing grounds between recreational and commercial fishermen.

Significant gear conflicts have occurred between large king mackerel gill-net vessels and the king mackerel hook and line boats on the southeast Florida coast between Sebastian, and Ft. Pierce. The conflicts occurred because the two types of craft would disrupt each other's fishing operations. The large net vessels must move in circles of roughly 200 yards diameter while setting their nets on a school of fish. Hook and line boats must troll above and around such schools. This causes physical gear conflicts when both types of craft are attempting to fish in the same area. It is widely believed that the two types of gear are basically incompatible when fishing in localized areas. It is also believed that gill nets scatter the fish, decreasing the catch rates for hook and line boats for some time afterwards.

This gear conflict issue errupted to a significant extent in February, 1978, over ridge areas between Sebastian and Ft. Pierce in southeast Florida. This became an important public issue and resulted in the Florida legislature enacting a law limiting gill-net depth to an effective fishing depth of approximately 57 feet along the Florida Atlantic coast. It was felt that the conditions are such that the potential for the above type of gear conflict may exist along the eastern Florida coast covering Brevard, Indian River, St. Lucie, Martin and Palm Beach Counties.

The primary fishing area of hook and line boats in that area are relatively narrow, rocky ridges. These ridges run parallel to shore and are more productive in approximately 60 to 90 feet of water. These ridges tend to attract the mackerel into a relatively small, well defined area where they can be consistently located and fished on a daily basis.

The primary fishing area of gill-net vessels is in the expanses of relatively flat sandy bottom between the ridges. The majority of the favorable bottom lies between 40 and 60 feet of water. Because of the strong currents often present in that area, setting the net on rocky bottom often results in damage to the net, loss of the catch and occasionally loss of the entire net. However, given conditions of no current and calm seas, nets can be effectively set on a rocky bottom.

Until recent years the conflict between the two groups was minimal both because the best fishing areas were on different types of bottom and because the nets were not deep enough to effectively fish water as deep as the best area for hook and line fishermen. The severity of the conflict has increased with the increase in depth of the nets (before the Florida law was passed) and the number of net vessels in the area.

8.2.7 Assessment of U.S. Harvesting Capacity

Harvesting capacity has been growing rapidly in the U.S. king mackerel fishery in recent years. The number of king mackerel hook and line boats operating in Florida has increased from an estimated 50 to 300 in the last eight years. The number of roller rig gill-net boats has increased from an estimated 12 in 1969 to 33 in 1977. In the 1977-78 season many Spanish mackerel gill-net boats rigged up to fish for Spanish mackerel and the number of roller rig gill-net boats capable of fishing for king mackerel is believed to range between 60 and 80. The recreational fishing pressure and corresponding capacity has been increasing at approximately ten percent per year or more (see Section 8.2.1.1.).

Exhibit 8-13 presents a lower bound estimate of current U.S. harvesting capacity for king mackerel. It is based on taking the highest catch per unit of gear for the various user types of experienced over the last ten years. The estimate for the Florida east coast hook and line is based on the catch per boat experienced in 1970 using the current estimate of the number of boats in the fleet. The estimate for the large roller rig gill-net fleet is the estimated catch per boat experienced in 1974 using the current estimate of vessels capable of fishing for king mackerel. For the other user groups nominal capacity is expressed as the greatest amount of landings experienced by that user group over the last ten years. The recreational capacity is expressed as the estimated 1975 catch increased to 1978 by the estimated 10.3 percent annual increase in fishing effort.

Current capacity is considerably above current catch levels. Using the estimates in Exhibit 8-13, current capacity is estimated at 56.6 million pounds (using adjusted recreational catch data) (see Section 5.4.1) versus an estimated adjusted total catch for 1975 of 30.1 million pounds. Similar relationships hold if the unadjusted recreational catch data is used.

Exhibit 8-14 presents a lower bound estimate of harvesting capacity for Spanish mackerel. The capacity for the large and small Florida gill-net fleets is based on an estimate of the number of boats in each fleet times the average harvest during the 1976 season of a sample of each vessel type (Cato, Morris, Prochaska 1978). While the sample may represent those vessels that target Spanish mackerel more heavily than others in the fleet, it does provide an indication of the capacity of each vessel in the fleet.

Current Spanish mackerel harvesting capacity is considerably above current catch estimates. From Exhibit 8-14 it is estimated at 59.1 million pounds versus an adjusted total catch estimate for 1975 of 20.1 million pounds.

While these estimates of capacity for both king and Spanish mackerel would seem to indicate overcapitalization, the fact that these boats and vessels participate in two or more other fisheries precludes such an obvious conclusion. There have been no direct studies of this issue for this fishery, and methodology until very recently has been lacking to deal with capacity for multispecies craft. In addition the catch rates used to compute commercial capacity were for years of near perfect weather conditions and very high availability. The effective capacity is less under average conditions.

8.2.8 Assessment and Specification of the Extent to Which U.S. Vessels Will Harvest Optimum Yield

It has been determined that U.S. fishing vessels will harvest the entire optimum yield specified by the Councils both for king mackerel and Spanish mackerel. There is, therefore, no total allowable level of foreign fishing (TALFF).

8.2.8.1 King Mackerel

The Councils have specified optimum yield to be 37 million pounds. There is an allocation of nine million pounds to the commercial fishery and 28 million pounds to the recreational fishery.

Commercial users have the intent and capacity to take their allocation. The commercial fishery has exceeded nine million pounds in the past (1974). Gill net users exceeded the proposed net allocation in 1974 and possibly in 1977 (statistics incomplete).

In order to estimate the 1982 expected commercial harvest, the increase in landings between 1965 and 1977 was assumed to be a linear function. The following linear regression was calculated:

$$\text{Annual landings (thousand pounds)} = -5.513 \times 10^5 + 283.00 \text{ (year)} \qquad r^2 = .44$$

From this formula, commercial landings for 1982 were estimated at 9.6 million pounds, slightly above the proposed allocation. Actual landings, if the catch was not limited, could vary greatly from this estimate due to weather and availability of fish. Under proposed management restrictions, the estimated catch would be limited to nine million pounds. The recreational fishery harvested an estimated

Exhibit 8-13

King Mackerel Harvesting Capacity
(pounds)

Florida East Coast Hook and Line Fleet	250 boats @ 36,071	9,018,000
Large Roller Rig Gill-net Fleet	70 boats @ 204,364	14,305,000
Florida West Coast Haul Seine Fleet	1970 landings	97,000
Florida West Coast Trammel Net Fleet	1972 landings	131,000
Florida West Coast Hook and Line Fleet	1974 landings	991,000
North Carolina Commercial Capacity	1977 landings	245,000
South Carolina Commercial Capacity	1973 landings	11,000
Georgia Commercial Capacity	1974 landings	6,000
Recreational Fishing Capacity (Total)	1975 catch estimate by 10.3 percent annual increase in fishing pressure to 1978	31,785,000[1]
Total		56,589,000

[1]Based on the adjusted recreational catch data. Using angling survey data from Deuel (1973) directly the corresponding recreational fishing capacity is estimated at 84,046,000 pounds and the corresponding total capacity is 108,850,000 pounds.

Exhibit 8-14

Spanish Mackerel Harvesting Capacity
(pounds)

Large Florida Gill-net Fleet	70 boats @ 425,000	29,750,000
Small Florida Gill-net Fleet	250 boats @ 58,360	14,590,000
Florida Haul Seine Fleet	1972 landings	1,581,000
Florida Hook and Line Fleet	1975 landings	1,114,000
Commercial Fleet in Other States in Gulf and South Atlantic Regions	1972 landings	796,000
Recreational Fishing Capacity (Total)	1975 catch estimate by 10.3 percent annual increase in fishing pressure to 1978	11,300,000[1]
Total		59,131,000

1 Based on the adjusted recreational catch data.

23.7 million pounds in 1975 (based on the adjusted catch estimates for 1975 - see Section 5.4). If the catch increased at the same rate as the estimated 10.3 percent annual increase in recreational fishing pressure, the 1980 recreational catch would be considerably in excess of 28 million pounds. Because catch per unit effort will decrease as effort increases, the actual catch is not expected to exceed the 28 million pound allocation. Currently available data is not sufficient to accurately estimate recreational catch. For the purposes of estimating domestic annual harvest, recreational catch in 1981 is estimated at 28 million pounds. Recreational harvest should be closely monitored in the first years of the plan to insure that excess harvest does not occur.

Expected domestic annual harvest by all users in 1982 was estimated as 37 million pounds, equal to OY.

8.2.8.2 Spanish Mackerel

The Councils have specified optimum yield to be 27 million pounds.

In order to estimate commercial harvest in 1982, the increase in commercial landings between 1965 and 1977 was assumed to be a linear function. The following linear regression was calculated:

$$\text{Annual landings} = -8.003 \times 10^5 + 411.65 \text{ (year)} \qquad r^2 = .41$$

From this formula, commercial landings for 1982 were estimated to be 15.6 million pounds. The actual landings may vary widely from this estimate due to weather or availability of fish. The recreational fishery harvested an estimated 8.4 million pounds in 1975. If the catch increased at the same rate as the estimated 10.3 percent compounded annual increase in fishing pressure, the 1982 recreational catch would be 15.1 million pounds. However, catch per unit effort declines as effort increases. The actual recreational catch cannot be accurately predicted, but is expected to be between 8.4 and 15.1 million pounds. For the purpose of determining expected domestic harvest, the expected recreational catch for 1981 was estimated at 12 million pounds.

Expected domestic annual harvest by all users in 1982 was estimated at 27 million pounds, equal to OY.

8.2.8.3 Cobia

The Councils have determined that optimum yield for cobia is the available amount of cobia equal to or greater than 33 inches fork length. This amount is estimated to be equal to 1,004,000 pounds per year under present conditions and is expected to increase under the proposed management regime.

Expected domestic harvest in 1982 is estimated as 1,004,000 pounds. This is the best estimate of present catch. The U.S. fishermen have the intent and capacity to harvest all available cobia larger than 33 inches. Most of the present catch is larger than 33 inches. Although commercial landings have decreased in the Atlantic and increased in the Gulf, total landings have remained relatively stable since 1970. Recreational catch since 1970 has increased in some areas and decreased in others according to participants in the fishery. No clear trend in the amount of the total catch is discernible from the limited data available. Data on growth, mortality, and catch, indicated that the most recent estimate of total catch is approximately equal to MSY (see Section 5.1.6.4 and 5.4.6.1).

8.2.9 Assessment and Specification of the Portion of the Optimum Yield Which U.S. Harvesters Propose to Deliver to Foreign Vessels

U.S. harvesters do not propose to deliver any fish in the management unit to foreign vessels.

8.3 Foreign Fishing Activities

There are no foreign fishing participants believed to be operating in the coastal pelagic management unit fisheries within the fishery conservation zone (FCZ). The only known foreign fishermen operating within the FCZ of the south Atlantic and Gulf of Mexico are the Japanese seeking bluefin tunas. The National Marine Fisheries Service Foreign Fisheries Observer Program reports that only a negligible amount of foreign bycatch for the species in the management unit. There is no history of foreign fishing for the species in the management unit as target species within the United States FCZ.

There are extensive Mexican fisheries for king mackerel and Spanish mackerel. These are centered off the State of Veracruz. From 1968 through 1976 reported landings on the Mexican Gulf coast varied between 7.3 and 14.4 million pounds for Spanish mackerel and 1.7 and 4.8 million pounds for king mackerel (G. Nakamura, NMFS, pers. comm.). There may be some interaction between these and the U.S. stocks.

8.4 Interactions Between Foreign and Domestic Participants

8.4.1 Harvesting Interactions

There are currently no interactions between domestic and foreign participants in the fishery (see Section 8.3) except for an insignificant bycatch.

8.4.2 Transfers at Sea to Foreign Vessels

There are no known transfers of fish in the management unit from U.S. harvesters to foreign vessels. None have been proposed or are anticipated.

8.5 Domestic Processing Capacity

There is currently sufficient domestic processing capacity to harvest the commercial harvest of king and Spanish mackerel. The domestic processing industry has in recent years handled the expected commercial harvest necessary to take optimum yield (see Section 8.2.8).

Capacity is to be measured in terms of adequate capacity and the intent to utilize that capacity on fish caught by U.S. fishermen. Intent to utilize capacity is essentially an economic decision by firm owners. In this regard capacity is defined as the maximum sustainable level of output the industry can attain within a very short time if demand were not a constraining factor, and when the industry is operating its existing stock of capital at its customary level of intensity (Klein and Summers, 1966).

Processors appear to have the ability and intent to utilize their capacity. Fish houses in St. Lucie, Martin, Palm Beach and Monroe Counties, Florida, have from 29 to 59 percent of their fish species represented by Spanish mackerel. King mackerel represents from 47 to 53 percent of the fish volume of fish houses in Indian River, St. Lucie and Palm Beach Counties. Bluefish represent from two to nine percent of the fish volume of these three counties and Martin County. This level of dependence on these species indicates a high level of economic dependence and thus the desire to continue the utilization of these species.

The harvest areas lie in fairly close proximity to processing areas of these fish. Since the major commercial production is in Florida, the fish houses and processors have organized an efficient system to accommodate the migratory patterns of these fish. The organizational systems follow three basic patterns. First, some fish houses have established themselves in the most highly productive areas and are highly dependent on locally caught fish. Other fish houses around Florida may also own vessels which "follow" the fish. Trucks are then sent to the seasonal landing locations and the fish are transported to the fish house or point of handling or sale by the trucks. The third method has seen some processors set up satellite freezers or handling locations along the coast to handle the fish as they are harvested near these locations. These techniques have insured adequate refrigeration and freezing capability near harvest areas.

King mackerel are predominately marketed fresh or frozen whole. Much smaller amounts are processed into the steak or smoked form. About 65 percent of Florida's east coast production has in recent years gone to the New York market iced in boxes in whole form. About 75 percent of king mackerel production from the Florida Keys and the Florida west coast has gone to Puerto Rico. This "lack" of processing has been the result of market preference rather than being due to the inability to "process" the fish.

Spanish mackerel production is usually sold as fillets in either fresh or frozen form with frozen the predominant market form. During 1974 slightly over one half of all landings were marketed in that form. Some sources suggest this market form may account for as high as 90 percent of total landings. In recent years record high harvest levels were not fully absorbed by the market and some freezer companies and a cafeteria chain had carry-over freezer stocks one year old; however, the overall market for Spanish mackerel fillets has increased.

Availability and capacity of labor force, processing machinery, freezers, etc. appear adequate. Secondary handlers presently use machines for gutting and removing backbones of Spanish mackerel; therefore, there is no constraint by available labor supply in this segment of the total industry. Capacity in the king mackerel processing sector is a function of available labor supply since the product is mainly handled fresh whole and iced or frozen whole; however, since this requires relatively unskilled labor the supply can be expanded rapidly. The chief capacity restraint in the king mackerel sector is the market distribution system; however, the market is expected to handle increased supplies since prices have been increasing along with increased landings and because of the expanding market in Puerto Rico.

Seasonal schedules are variable due to the variability in seasonal landings for king and Spanish mackerel. During peak production months in the king mackerel fishery, much of the landings move into adequate freezing facilities and thus fill markets needs during peak demand periods. During the record production year for Spanish mackerel, fishermen were placed on a 15,000 pound per day limit. This gives an indication of the capacity which is approximately 18.0 million pounds. This is considerably above the average or expected commercial harvest.

9.0 DESCRIPTION OF ECONOMIC CHARACTERISTICS OF THE FISHERY

9.1 Domestic Harvesting Sector

9.1.1 Commercial

Value of Landings

Exhibit 8-5 in Section 8.2.2 presents complete data on the value and amount of the total U.S. commercial landings of king mackerel. It should be noted that a predominant portion of the exvessel landings of king mackerel is sold rather than passed through non-market transactions. This is true for the other species in the management unit as well. About 95 percent of total value landed comes from Florida.

About 95 percent of the U.S. Spanish mackerel commercial landings occur in Florida, although at least some landings occur in all of the states in the Gulf and south Atlantic regions except Texas.

The value of Spanish mackerel landings in North Carolina, South Carolina, Georgia, and Alabama has averaged less than $10,000 per year over the last ten years. Complete data on the value and amount of total U.S. landings for Spanish mackerel is presented in Exhibit 8-6 in Section 8.2.2. Spanish mackerel prices have not risen as fast as have king mackerel prices. In the late 1950's Spanish mackerel prices were about seven to nine cents per pound which was only about three cents per pound below prices of king mackerel. Spanish mackerel prices began to rise in 1973 and reached 21 cents per pound in 1977 which was about half the price per pound of king mackerel. This may help explain the recent trend for boats formerly exclusively in the Spanish mackerel fishery to become involved in the king mackerel fishery as well.

Florida is the only state in the Gulf of Mexico to have significant commercial landings of bluefish. The value of commercial landings of bluefish has generally been less than two thousand dollars per year in each of the other states in the Gulf. Bluefish prices are relatively low compared to other fish, and landings easily glut the market. They are not a primary target species but are sought when other more valuable species are not available.

Cobia and dolphin are not major target species for commercial fishermen, but are caught on a supplemental basis. They are both landed commercially, predominantly in Florida. Total annual commercial value of landings in the Gulf and south Atlantic regions have typically been less than $30,000 for dolphin and $20,000 for cobia.

Economic Characteristics of the Fleet

Cost and return data was obtained from surveys of boats in the king mackerel hook and line fleet, and the Spanish mackerel small and large boat gill-net fleets, (Morris, et al., 1977, 1978). Of the boats in the survey, the average hook and line boat had total revenue of $24,500, $17,500 of which was from king mackerel. The average small Spanish mackerel net boat in the survey had total revenue of $26,700, $10,500 of which was due to Spanish mackerel. The average Spanish mackerel large boat in the survey had total revenue of $96,400, $76,000 of which was due to Spanish mackerel. The net returns to the captain/owner were $14,900 - king mackerel hook and line boat; $15,900 - small Spanish mackerel net boat; and $21,800 - large Spanish mackerel net boat.

Overall yearly profit for vessels and boats in the coastal migratory pelagic fishery is the remainder of total revenue after fixed and variable costs are paid. Variable costs, which include fuel, crew shares, gear repair, and maintenance, must be paid to continue fishing during one season. Fixed costs, which include boat payments, insurance, and depreciation, could be postponed temporarily either totally or in part if total income is inadequate. Vessels and boats such as these that do participate in several fisheries have their fixed costs spread over several activities. Therefore, analysis of the financial performance of a boat or vessel in only one fishery is incomplete or would be biased if it included all fixed costs.

Data from these surveys were used to calculate economic ratios of investment, costs, and personal income to value of the catch for these fleets. These ratios were then applied to estimate the economic characteristics for the respective commercial fisheries as a whole. Catch was estimated as the 1976-77 average. Then the current (1977) price was applied to determine the value of landings. To estimate personal income, the ratio of personal income/value of catch from the surveys was applied to the value of landings. A similar procedure was used to estimate investment in the fishery. The total personal income in the commercial fishery derived from the king mackerel in the Gulf and south Atlantic regions was estimated to be $2,111,000, from the Spanish mackerel fishery $1,888,000, and from the bluefish fishery $326,000.

9.1.2 Recreational Fishing

The following sections present a description of the direct economic contribution to the nation associated with recreational fishing for the coastal pelagic species. The estimates are presented in the context of impacts associated with all marine recreational fishing in the southeast to illustrate the relative importance of the fisheries. Presented first are estimates of total expenditures by recreational fishermen and the associated employment, wages and salaries generated by their purchases.

It is conceptually difficult to identify economic effects associated with a particular species of fish. Often fishermen seek multiple species. Similarly, those fishermen who do direct their effort at particular fish often catch other fish incidentally. These confounding characteristics of recreational fishing activity make it difficult to clearly delineate activity attributable to a particular species. Fully recognizing these conceptual difficulties, species specific estimates were determined by prorating total economic activity using an indicator of participation such as catch or effort. The indicators chosen were largely dictated by the limits of available data. In all instances where prorating procedures were used, the method has been described.

Thus, while the estimates presented may not fully represent the economic impacts within the desired accuracy range, they do provide a reasonable perspective of the relative magnitude of the coastal pelagic fishery vis a vis other saltwater sportfishing.

Total Direct Economic Impacts

Participation in marine recreational fishing results in substantial purchases of goods and services. It has been estimated that in 1975 the expenditures associated with saltwater angling activity in the south Atlantic and Gulf of Mexico regions were $289 million and $644 million respectively (Centaur Management Consultants, 1977, pp. 39-42). Exhibit 9-1 presents estimates of direct economic impacts associated with coastal pelagic species in 1977.

As can be seen from the exhibit, anglers' expenditures related to the coastal pleagic species amounted to nearly ten percent of expenditures for all saltwater fishing in the two regions. Regionally, angler expenditures in the south Atlantic and Gulf of Mexico related to coastal pelagic species amounted to an estimated 15 percent and eight percent of total angler expenditures in the respective regions. In dollar terms, however, expenditures related to these species were greater in the Gulf than in the south Atlantic.

With respect to individual species, total expenditures attributable to king mackerel were estimated to be $40 million, and for Spanish mackerel about $36 million. These figures each represent about f r

Exhibit 9-1

Estimated Economic Impacts Associated with Marine Recreational Fishing in 1977

	Value of Sales ($1,000	Employment (Person-Years)	Wages and Salaries ($1,000)
South Atlantic[1]	330,980	7,780	60,750
Management Unit[2]	51,070	1,290	10,450
King Mackerel	14,430	380	3,170
Spanish Mackerel	13,850	360	2,840
Gulf of Mexico[1]	749,910	17,420	148,310
Management Unit[2]	57,940	1,700	12,860
King Mackerel	25,750	790	6,040
Spanish Mackerel	21,710	560	4,320
Total[1]	1,080,890	25,200	209,060
Management Unit[2]	109,010	2,990	23,310
King Mackerel	40,180	1,170	9,210
Spanish Mackerel	35,560	920	7,160

[1]Represents total impacts associated with marine recreational fishing for all species.

[2]Represents impacts prorated to species in the Management Unit except little tunny, based on relative participation by recreational anglers. Data on participation specific to little tunny are not available.

Source: See Text.

to five percent of the total of both regions. Regionally, expenditures associated with king and Spanish mackerel in the south Atlantic were about $14 million for each, while in the Gulf expenditures amounted to an estimated $26 million for king mackerel and $22 million for Spanish mackerel.

Angler purchases create and sustain employment and personal income in the production, distribution, and retail sale of the goods and services bought. These employment and wage and salary impacts are also presented in Exhibit 9-1. Of the estimated 25,200 person-years of employment generated by expenditures of all anglers in the Gulf and south Atlantic regions in 1977, approximately 2,990 person-years can be attributed to all coastal pelagic species. Wages and salaries generated were just over $23 million. Approximately $9.2 million can be associated with king mackerel and $7.2 million with Spanish mackerel. Regionally, employment and income impacts were greater for fishing that occurred in the Gulf of Mexico than occurred in the south Atlantic.

It should be noted that these direct economic impact estimates represent benefits that accrue to the entire nation and not just to the two regions. Included in the estimates are impacts associated with purchases of durable goods such as boats, motors, boat trailers, and fishing tackle; nondurable goods such as boat fuel, car fuel, or live bait; and services such as charter and head boat fees, use of marine facilities, equipment rental, or food, travel, and lodging.

The above estimates were determined by allocating the estimated regional direct economic impacts associated with all saltwater sportfishing in the southeast to coastal pelagic species using a methodology employed in a recent report prepared for the National Marine Fisheries Service (Centaur Management Consultants, 1977). Economic impacts are prorated based on the number of anglers who caught fish in the management unit. This procedure was modified to adjust for the significant role that the charter fleet plays in the fishery. The methodology provides a reasonable estimate of the national impacts associated with a particular fishery.

The procedure employed takes into account the fact that many purchases by anglers are not made for the singular purpose of fishing. This is particularly true of durable goods. For example, a boat may be purchased for fishing as well as for cruising or water skiing. Moreover, a boat used solely for fishing is rarely (if ever) used for seeking only one species of fish. On the other hand, it would be inappropriate to completely discount purchases that are not wholly attributable to a particular activity (e.g., angling for king mackerel). Here it is assumed that the expenditures for the purchase of equipment are attributable to a particular activity in proportion to the amount of time that the equipment is used for that activity.

Impact estimates for 1977 are based on the 1975 estimates presented in the report prepared for the NMFS (Centaur, 1977). To obtain the 1977 estimates, real growth in angler expenditures and associated employment was assumed to increase at 3.6 percent annually (North, 1976, p. 42).[1]

The effects of inflation were accounted for by using the Bureau of Labor Statistics consumer price index for expenditures and labor cost index for wages and salaries.

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[1] It has been reported that sales of fishing equipment for king mackerel fishing in northwestern Florida have recently declined because fish have declined in abundance there over the past two to three years. However, the data presented in this section are designed to represent the impacts as if 1977 were a typical or average year.

harter Boats

Of the estimated $1.1 billion in total expenditures associated with all marine recreational fishing in the south Atlantic and Gulf of Mexico regions in 1977, an estimated $23.9 million were for charter boat fees. Estimates of charter revenues and personal income illustrating the relative importance of the coastal pelagic fish are presented in Exhibit 9-2. Charter fees associated with coastal pelagic species were estimated to be $11.5 million. Similarly, estimated charter fees associated with fishing for king and Spanish mackerel were $6.2 million and $1.8 million respectively.

Personal income of the charter operators is estimated to be $8.3 million in 1977. Personal income attributable to coastal pelagic species was an estimated $4.0 million. Estimated income associated with king and Spanish mackerel was $2.2 million and $0.6 million respectively.

The revenue estimates were determined by using recent studies of charter operations in North Carolina (Abbas, to be published), Georgia (Brown and Holemo, 1975), southeastern Florida (Gentle, 1977), the Gulf coast of Florida (Browder, et al., 1978), and Texas (Ditton, et al., 1977).

The above research provided estimates of the average annual gross revenues for a boat operating in the area studied. These estimates were assumed to be typical of the proximal geographic region. Data on North Carolina boats were also assumed to represent boats from South Carolina. Data from studies of charter boats in Georgia and Dade County, Florida were used to represent the remaining portion of the south Atlantic coast. Northwestern Florida charter boats were assumed to be representative of Alabama charter activities and Louisiana and Mississippi boats were assumed to be similar to those in Texas.

While revenues may vary from year to year because of weather conditions, availability of fish or other reasons, the studies (which were conducted in different years) were assumed to represent typical fishing years. Revenue estimates were normalized only for inflation. To obtain the total revenue estimates, the number of boats in each area (see Section 8.2.1.2) was multiplied by the respective average annual revenue per boat.

Personal income earned by the operators was estimated through an analysis of cost and revenue data of charter boats presented in studies of North Carolina, Georgia and Texas boats. Operators' income as a percent of gross revenues was 32 percent in North Carolina, 33 percent in Georgia, and 39 percent in Texas. Personal income here includes all profit remaining after fixed expenses (excluding depreciation) and variable expenses have been paid, but before payment of interest and taxes. Based on the relatively small range of personal income observed in the three studies, it was assumed that operators' income is 35 percent of all charter operations. This percentage was applied to gross revenue estimates for the two regions.

The allocation of gross revenue and personal income to coastal pelagic species and separately to king and Spanish mackerel is based on catch statistics for all areas except the Florida Gulf coast and Alabama. There the allocation was determined using effort data. Statistics on the number of fish caught from North Carolina boats (Manooch and Laws, unpub. ms.) and southeastern Florida (Gentle, 1977) were used in prorating gross revenue and income for the eastern Gulf (Browder, et al., 1978). In the absence of catch or effort data specific to charter boats in the western Gulf, statistics on the catch from inboard boats fishing in the Gulf off the Texas coast were used to determine the allocation factors (Trent, 1976).

Tourism

Tourism is a significant aspect of the marine recreational fisheries of the southeast. Recent regional surveys conducted by the National Marine Fisheries Service show that a substantial number of anglers in the eastern United States do at least some of their fishing in the coastal states of the south Atlantic and Gulf of Mexico, most of them traveling to Florida, (Ridgely and Deuel, 1975).

Exhibit 9-2

Estimated Gross Revenue
and Operator's Income for Charter Boats
in the South Atlantic and Gulf of Mexico, 1977

	South Atlantic	Gulf of Mexico	Total
Total	9,899,000	14,081,000	23,980,000
All Coastal Pelagic Species	5,445,000	6,230,000	11,675,000
King Mackerel	2,324,000	4,064,000	6,388,000
Spanish Mackerel	1,485,000	365,000	1,850,000

Charter Operators' Income

	South Atlantic	Gulf of Mexico	Total
Total	3,465,000	4,928,000	8,393,000
All Coastal Pelagic Species	1,906,000	2,181,000	4,087,000
King Mackerel	814,000	1,422,000	2,236,000
Spanish Mackerel	520,000	138,000	648,000

Source: See Text.

Comprehensive tourism data specific to the coastal pelagic fisheries are not available, but studies of charter boat operations (the importance of the management unit to the charter fleet is discussed in Section 8.2.1.2) show that tourism is very important to the charter fishery.

A recent study of charter boat fishermen in Mississippi revealed that only 17 percent of the participants live in the coastal counties of that state, and that 57 percent of the participants were from outside Mississippi (Etzold, et al., 1977, p. 10). A study of Texas charter boat fishing in 1976 shows that only two percent of the participants were from Texas coastal counties, while 92 percent were from inland areas of the state (Ditton, et al., 1977, pp. 41-42). In Dade County, Florida, 81 percent of the participants in charter fishing surveyed were non residents of the county, and 77 percent were from outside of Florida (Gentle, 1977, p. 101). Also, charter boat operators in Bay County, Florida, have estimated that 98 percent of their customers are nonresidents of the county (Brusher, et al., 1977). Clearly, the charter boat fleet is heavily dependent on tourism for its business.

In addition to the business tourists bring to the charter boat operators, they spend considerable sums of money in the local economy for other items such as food, lodging, and travel. It is estimated that approximately 456,000 tourists participated in charter fishing in 1977 in the south Atlantic and Gulf of Mexico. In addition to the $23.9 million they spent for charter fees (see previous section), an estimated $17.9 million was spent on food, lodging, transportation and miscellaneous items for the days they fished. Approximately $8.2 million of that total was spent in southern Florida.

Tourist expenditures attributable to king mackerel and Spanish mackerel were estimated using a prorating procedure similar to that applied in the analysis of charter boat revenues and income (i.e., based on the proportion of coastal pelagic species that were caught while charter fishing to tota ish caught). Accordingly, expenditures by tourists for food, lodging and travel attributable to coastal pelagic species were an estimated $10.0 million in 1977. Tourist expenditures associated with king mackerel charter fishing were an estimated $5.6 million. Approximately $0.85 million were associated with Spanish mackerel.

It should be noted that while tourists who engage in charter fishing likely comprise the majority of nonlocal participants, there are other tourists who also fish for recreation. Many persons trailer their boats to the southeast for long winter vacations. There are also nonlocal anglers who catch coastal pelagic species from shore-based locations such as beaches, piers or jetties. These tourists are not included in the estimates presented above. Therefore, the above expenditure estimates should be viewed as a lower bound of total tourist expenditures associated with coastal pelagic resources.

9.2 Domestic Processing Sector

King mackerel is sold in fresh whole (eviscerated), frozen whole, frozen steak, and smoked product forms. The great majority is sold in either fresh or frozen form. Although data are incomplete, a review of NMFS processed product statistics indicates that less than ten percent is steaked. It is reported that the amount of smoked product is very minor. A survey conducted by Prochaska and Cato in 1975 (Prochaska and Cato, 1977) indicated that 65 percent of total U.S. king mackerel landed on the Florida east coast was shipped to New York Fulton Fish Market. Fish from this area is roughly half of total U.S. king mackerel production. Fish are landed at primary wholesalers and boxed and iced by them. The fish are then trucked to New York by independent truckers. These king mackerel do not change form until they are sold through the New York market.

In 1971 prices at the New York Fulton Fish Market (these are prices for fish sold by New York wholesalers) generally varied between 40 and 70 cents per pound, while Florida east coast exvessel prices varied between 20 and 40 cents (Prochaska and Cato, 1977). The average New York price was estimated at about 50 cents, and average Florida exvessel price was estimated at about 30 cents. The marketing margin during this period typically varied between ten and 30 cents, with an estimated average of about 20 cents. By 1974, king mackerel prices on the Fulton Fish Market generally varied between 70 cents and $1.00, with an estimated average price of about 90 cents. The Florida east coast price was estimated at about 60 cents, and the marketing margin had increased to about 30 cents. (The above is based on data presented in Prochaska and Cato, 1977.)

In addition to the lew York market there is a similar product flow for a significant amount of king mackerel sold fresh in the local Florida market (e.g., in Miami).

A large volume of king mackerel is frozen and shipped to Puerto Rico. An estimated 75 percent of landings in the Florida Keys and Florida west coast is reported to be shipped to Puerto Rico. This market began to greatly expand in the late 1960's, when widespread use of refrigeration became available in the Caribbean areas (Austin, et al., 1978).

King mackerel is primarily sold in fresh and frozen form, and there is no real processing involved, except for handling and freezing. Capacity in handling at fish houses is mainly a matter of labor, which can be increased on a relatively short-term basis. Capacity in freezing involves interaction with all other frozen fish products. King mackerel is only a moderate portion of total Florida freezings. The chief capacity constraint on processors is dictated by the market. The frozen market in Puerto Rico is continuing to expand. Evidence of the continually expanding market for king mackerel is the fact that while landings have increased in recent years, prices have continued upward (see Section 9.1.1). Processors indicate that there is considerable room left for expansion of king mackerel production and marketing.

Major product forms for Spanish mackerel include frozen fillets and fresh whole. Currently, the great bulk of Spanish mackerel is sold as frozen fillets. In 1975, 3.057 million pounds of Spanish mackerel fillets were processed, valued at $2.342 million. Most of this was processed in Florida.

Amounts of Spanish mackerel also go to the local Florida fresh fish market. Spanish mackerel is also sold as marine mammal food to aquarium-type attractions. A certain amount is also sold for bait.

Processing capacity for Spanish mackerel appeared to be reached in the 1975-76 winter season, when boats were placed on 15,000-pound limits. The landings during that season were approximately 18 million pounds, which represents an approximation of market/processing capacity at that time based on the earlier definition. Processors indicate that the market is continuing to expand.

Bluefish is sold in fresh, frozen and fillet product form. Historical data are not available on amounts. Bluefish is a rather low priced fish. The market for bluefish is unorderly. There is not a consistent marketing channel for bluefish. When they are available in the fishery and other more attractive species are not, fishermen will catch them. However, they glut the market rather easily.

Cobia and dolphin are primarily sold in fresh form. There is not a well developed marketing channel for them. They are generally sold in local areas to a small group of consumers who are familiar with them.

9.3 Other Sectors of the U.S. Fishing Industry

The dependence of other sectors of the fishing industry follows the relationships presented in Section 11.3.

9.4 International Trade

International trade of king and Spanish mackerel appears to occur on a relatively small scale in comparison to domestic trade for these fish. (Trade with Puerto Rico, a major market for king and Spanish mackerel is not included in the analysis of international trade.) Imports originate from Latin America, chiefly Mexico, Venezuela, and Ecuador (E. Serry, NMFS, pers. comm.). Foreign markets are reported to include Canada and Venezuela (Austin, et al., 1978). Records of international trade in king and Spanish mackerel are generally aggregated with all mackerel, making international activity somewhat difficult to trace.

United States imports of mackerels are relatively small, and most is other species than those in the management unit. Mexico is a major source of king and Spanish mackerel imports, but in 1977 the total imported to the United States was less than 55,000 pounds. The fish is generally sold frozen, although small amounts of fresh Mexican fish do make their way into Brownsville, Texas, markets. Other Latin American countries which exported mackerel to the U.S. include Venezuela, Columbia, Ecuador, Nicaragua and Honduras. Combined, these countries exported less than 50,000 pounds of frozen mackerel to the U.S. in 1977. Nearly 150,000 pounds of canned mackerel from Peru entered southeastern markets through Mobile and New Orleans in 1977, but these are believed to be Pacific varieties.

Historically, the largest importer of canned mackerel from southeast ports was Japan, but its imports dropped dramatically (from a high of nearly 5.8 million pounds in 1973) to just over 100,000 pounds in 1977. The substantial amounts of canned mackerel are in all likelihood Atlantic and/or Pacific mackerel. Because these fish sell at a lower price than king and Spanish mackerel and are sold canned, they probably have little effect on king and Spanish mackerel markets which generally are sold in fresh and frozen forms. Moreover, Japanese imports should have little impact now because they have been so drastically reduced.

European countries intermittently export mackerel products to the southeast U.S. The nations include Holland, Poland, Germany, the United Kingdom, Denmark, Norway, Spain, and Portugal. Like the imports to Japan, these are believed to be other than king and Spanish mackerel. Also, they appear in small quantities and should not affect U.S. king and Spanish mackerel markets.

As in the case of imports records on exports of king and Spanish mackerel are also highly aggregated. Canned products are included with all other mackerel and frozen products are aggregated with many non-mackerel species. Data on canned products suggest that exports of king and Spanish mackerel are quite small. In total only 1.2 million pounds of all types of canned mackerel were reported to have been exported from U.S. ports; however, the majority of this is believed to be Atlantic mackerel.

According to U.S. census statistics Venezuela received no canned mackerel from the U.S. in 1977 and the only shipments to Canada were from Pacific coast ports. Shipments from Florida ports went to Guatemala, the Bahamas, and the Dominican Republic.

Except for Venezuela, tariffs on mackerel products do not appear to be restrictive to international trade. Tariffs for selected nations for frozen and canned mackerel products are presented below. As can be seen from the exhibit Venezuela has strong protective tariffs, 300 percent on the value of canned products. Canada, the other export market, has no tariff on frozen products and a 15 percent tariff on canned products. This is comparable to the U.S. tariff of 12.5 percent on the value of shipments.

Tariff Rates for Selected Nations

	Frozen	Canned
Canada	0	15%
Japan	10%	15%
Mexico	35%	20%
United States	0.35¢/lb.[1]	12.5%
Venezuela	15%	300%

1 The U.S. tariff is being phased out and will be zero by 1985

10.0 DESCRIPTION OF THE BUSINESS, MARKETS, AND ORGANIZATIONS ASSOCIATED WITH THE FISHERY

10.1 Relationship Among Harvesting, Brokering, and Processing Sectors

Historically, king and Spanish mackerel have been sold by fishermen to local fish dealers. These primary wholesalers in turn sell to fresh fish markets and restaurants, freezer companies, and secondary wholesalers. The relatively recent organization of several fishermen's cooperatives and corportions has modified the market structure for king mackerel by eliminating the primary wholesale level in some instances. The industry structure and markets for king and Spanish mackerel are separately described below.

10.1.1 King Mackerel Industry Structure and Markets

Commercial fishermen have traditionally had a rather close relationship with the fish houses. The fish houses and fishermen generally have operated under unwritten agreements in which the wholesaler provides a guaranteed market for the catch and boat services such as free docking facilities and ice, fuel, and fishing equipment for a fee. In exchange, the fishermen agree to sell their catch to particular fish houses. There is some evidence that these relationships are decreasing in importance.

There are approximately 30 fish houses in Florida that purchase king mackerel from commercial fishermen. Three are located in Collier County (Florida west coast), and the remaining fish houses are divided about equally between the Keys and the east coast of Florida. While fishermen are guaranteed a market for their catch, the price they receive is not guaranteed. Fish houses pack the fish in ice, find a buyer and generally arrange and pay for shipping. The fish are transported by truck, usually by independent firms.

Because of concern for the low prices received for their catches, several groups of fishermen have organized cooperatives in order to bypass the fish house and sell directly to the secondary wholesaler. The fishermen organizations have had a significant effect on dockside prices. These organizations are discussed in Section 10.2.

In past years almost all gillnet-caught king mackerel sold has been passed through five secondary wholesalers. Firms in Miami, Palm Beach, St. Petersburg, and Jacksonville handle most of the secondary distribution. Several new firms reportedly have entered the market.

In instances where fish houses cannot process any more fish either because the facility is temporarily overloaded or the market is saturated, fishermen are informed in advance which species of fish will not be accepted. In some instances catch limits will be set for each fisherman. In the Florida Keys where truck loads are limited to 15,000 pounds of iced fish, the availability of trucking facilities may also limit the catches that fish houses will handle.

The major markets for king mackerel are Puerto Rico, New York, Florida, Canada and Venezuela. King mackerel is marketed in several product forms including gutted and iced fresh fish, frozen whole or in steaks, smoked, and as a canned smoked paste.

An estimated 75 percent of the catch from the Florida's southwest coast and Keys are marketed frozen to Puerto Rico. This is primarily the gill-net catch. The remaining portion of the catch is sold fresh primarily through Fulton's Fish Market in New York. On the east coast of Florida, approximately 65 percent is marketed fresh. The local Florida market is attributed largely to the Miami Cuban population (Austin, et al., 1978). This is primarily the hook and line catch.

10.1.2 Spanish Mackerel Industry Structure and Markets

The arrangement between Spanish mackerel fishermen and fish houses is similar to that for the king mackerel fishery (see Section 10.1.1). The major primary and secondary wholesalers are the same as those dealing in king mackerel.

There are sizable markets for both fresh and frozen Spanish mackerel. Traditionally it has been an important product in the fresh fish market. Geographically the major market for fresh Spanish mackerel is the southeast, including Florida.

The market for frozen Spanish mackerel fillets has seen recent expansion. A large majority, possibly as much as 90 percent, are now sold in frozen form, most going to institutions. One large cafeteria chain is purchasing as much as five million pounds of frozen Spanish mackerel yearly or nearly 50 percent of total annual landings.

Product forms are determined in part by the size of the fish. Fish over one and one quarter pounds are preferable for fillets. Some companies ship whole frozen fish three pounds or greater to Puerto Rico.

Although the demand is increasing, the record production of Spanish mackerel recently has sometimes exceeded expected demand. For example, record high harvest in the 1975-76 winter-spring season was not fully absorbed by the market. At the end of 1977, some freezer companies and a cafeteria chain still had stocks of 1976 landings.

There are three major markets for Spanish mackerel. By far the most important market outlet is to approximately 15-20 cafeteria chains in the southeast that purchase frozen Spanish mackerel fillets. It is estimated that about 75 percent of Spanish mackerel landings are sold to cafeteria chains. The second largest outlet is to retailers who service home consumers. Products sold to retailers consist primarily of fresh and frozen fillets and whole drawn, the latter being both fresh and frozen.

The third market outlet consists of two major user groups, i.e., for animal feeding in zoos, aquariums, etc., and for bait by both commercial and recreational fishermen.

The Spanish mackerel sold to these outlets consists primarily of the smaller sized fish that have limited acceptance in the restaurant and retail outlets.

10.2 Fishery Cooperatives or Associations

Two fishermen's cooperatives have been identified in the coastal migratory pelagic fishery. Their offices and facilities are located in (1) the Port Salerno-Sebastian area, and (2) Key West.

The formation of cooperatives results from two or more firms desiring to increase competition and/or to take advantage of consolidated purchasing of supplies. Increased competition takes place through the addition of one or more buyers in the market bidding on supplies or through the cooperative returning part of the marketing spread to its members. The advantage of consolidated purchase enables a cooperative to benefit from quantity discounts offered by sellers for materials. Through these means, cooperatives can operate both as buyers and sellers for their members.

King mackerel fishermen are the predominant members in both cooperatives. The Florida Fishermen's Association in Port Salerno-Sebastian is are made up of hook and line king mackerel fishermen.

In Key West another cooperative was recently formed by five king mackerel net fishermen. The new corporation sells directly to a secondary wholesaler in Miami. It provides docking facilities, boat equipment, ice, and covers some overhead expenditures for the fishermen involved. The fishermen's catches are packed in ice and loaded directly onto trucks from the boats. The trucks are provided by the wholesaler specifically for the day's catch (Austin, et al., 1978).

There are three other groups of fishermen associations important to the fishery. Several organizations promote commercial fishing interests. These associations tend to represent different fishermen constituencies such as small hook and line or net boats, large net operations, and processors. From a statewide area all are involved in lobbying for legislation supporting commercial fishing and developing markets for their products. They have also been involved in resolving disputes among fishermen such as the recent conflict between hook and line and net mackerel fishermen on the Florida east coast.

Charter boat operators have also formed associations, but membership is generally limited to a local area. Associations have been organized in communities throughout the south Atlantic and Gulf regions. Among their activities are the promotion of charter fishing services through advertising as well as involvement in supporting sport fishing interests in their state legislatures and local governments. In northwest Florida several charter associations have expressed their concern over the recent decline in king mackerel in that area of the Gulf of Mexico which they attribute to the growth of commercial net fishing in southern Florida.

Recreational fishermen also are involved in organizations and associations that serve sport fishing interests. In addition to the organizations that have a national or international membership, there are a large number of local angler clubs established for social reasons and concern about the decline of king mackerel caught in northwest Florida. Several sportfishing associations have also expressed their organizational purposes. There are an estimated 184 sport fishing clubs in the south Atlantic and Gulf of Mexico coastal states. They are distributed by states as follows: North Carolina, 23; South Carolina, 2; Georgia, 13; Florida, 40; Alabama, 39; Mississippi, 20; Louisiana, 25; and Texas, 22. Not all of the members of these clubs are salt water anglers. Based on the preliminary results of a recent survey of sport fishing organizations, the estimated total club membership in the two regions is 14,720. Of these an estimated 10,300 are salt water recreational fishermen (Stroud, pers. comm.).

10.3 Labor Organizations

There are no known labor organizations in the harvesting or processing sectors that are involved in the fishery.

10.4 Foreign Investment

There is no significant foreign investment in the domestic sectors of the fishery.

11.0 SOCIAL AND CULTURAL FRAMEWORK OF DOMESTIC FISHERMEN

11.1 Ethnic Character, Family Structure, and Community Organization

Commercial fishermen who fish for coastal pelagic species, in general, have an ethnic and social character similar to the cross section of people in the states and counties in which they reside. The major exception to this is the hook and line fishery for king mackerel operating out of the Florida Keys (Monroe County), which contains a concentration of fishermen of Cuban-American heritage, although specific numbers are not available at this time.

The boat captains in the fisheries for the species in the management unit are predominantly owner/operator entrepreneurs although there are a few cases of company-owned boats or vessels or a captain owning more than one boat or vessel, in which case captains may work on an employee basis.

The hook and line king mackerel fishery and small scale Spanish mackerel net fishery typically consist of an owner/operator who may fish alone or who may have one or possibly more crew members for at least part of the year. In these cases the crew member frequently is a relative such as a son. The larger net boats operating in the king and Spanish mackerel net fisheries usually consist of an owner/captain and three to five paid crew members. Many of the captains try to work with the same crew year after year. In other cases boats may be operated with one or more itinerant crew members.

There is a considerable number of instances where fishermen in this fishery have come from families where the father was a fisherman operating in the same or other local fisheries. Currently, a number of father/son combinations are commercially fishing for species in the management unit. Many of these fishermen appear to express a desire that their sons may be able to continue with a family tradition of commercial fishing.

The predominant portion of the fishermen reside in those coastal communities surrounding the ports from which they operate. Certain of the communities in which the commercial fishermen live such as Monroe County (Florida Keys), Salerno, Ft. Pierce, Sebastian, (Florida east coast), and Naples (Florida west coast) have a large proportion of the total population involved in the fishing community.

11.2 Age, Education, and Experience of Commercial Fishermen

Specific data on age and years of fishing experience for king and Spanish mackerel fishermen are available only from surveys conducted of Florida Atlantic coast king mackerel hook and line fishermen (Morris, Prochaska, Cato, 1977) and Florida east coast large and small boat Spanish mackerel fishermen (Cato, Morris, Prochaska, 1978).

The king and Spanish mackerel fishermen in the surveys are about the same age as Florida fishermen as a whole, but they have considerably more years of fishing experience than Florida fishermen. In 1974, the average age of Florida commercial fishermen was 48 years with a range of 16 to 85 years. Florida Atlantic coast hook and line king mackerel fishermen had an average age of 49 years in 1976 (Morris, Prochaska, Cato, 1977). Similarly, Spanish mackerel fishermen on the Atlantic coast averaged 45.6 years of age for small boats and 45.6 years of age for large fishing boats.

With respect to years of experience in commercial fishing, Florida fishermen as a whole, averaged 16.5 years in 1974. In contrast, hook and line king mackerel fishermen in the survey had 20.9 years of experience, small boat Spanish mackerel fishermen had 27.3 years of experience and large boat Spanish mackerel fishermen had 33.7 years.

It should be noted that the fishermen in the survey were boat captains and may be skewed toward the more experienced persons in the fishery. However, contact with people in the fishery indicates that Florida king and Spanish mackerel fishermen have demographic characteristics similar to those of Florida fishermen as a whole. The majority (52 percent) of all Florida fishermen were between 41 and 60 years of age with only eleven percent less than 31 years old and 19 percent over 61 years of age, (Prochaska and Cato, 1977). The average Florida fisherman has fished for approximately 16 years and most have fished between seven and 30 years. Educational attainment averaged 11.3 years for Florida fishermen surveyed in 1974. Years of schooling declined with the age of the fishermen. Data on educational attainment specific to mackerel fishermen are not available.

11.3 Employment Opportunities and Unemployment Rates

Unemployment has risen sharply in the Florida counties (Martin, Indian River, St. Lucie, Palm Beach, Monroe, Collier) where most commercial fishing of king and Spanish mackerel occurs.[1] Despite relatively high rates of unemployment in the local economies, overall employment opportunities in commercial fishing appear to have remained favorable as have opportunities in the mackerel fisheries.

In all six counties the 1977 unemployment rate was more than double the 1973 rate. With the exception of Martin County, all areas had rates well above the 7.7 percent rate for all of Florida in 1977. In Martin and Monroe Counties the unemployment rate dropped between 1975 and 1977 while in Indian River and St. Lucie Counties the rate contined to climb during that period. Thus opportunities for employment in the local economies have generally declined since the early part of the decade.

No directly comparable unemployment data are available specifically for fishermen, but estimates of the number of fishermen in all types of fishing activity by county between 1970 and 1975 do provide an indication of the employment opportunities in fishing.[2] The total number of fishermen in the six counties increased from nearly 3,150 in 1970 to just over 3,900 in 1975, indicating that employment opportunities in fishing increased during the time when unemployment rates for the local economies also increased. Not all counties gained in fishing employment, however. The number of fishermen in Monroe County increased by more than 50 percent from 1970 to 1975. During that period the county unemployment rate tripled. On the east coast of Florida a similar pattern occurred in St. Lucie and Indian River Counties although the percent increase in the number of fishermen was not as large. In contrast the total number of fishermen in Martin, Palm Beach and Collier Counties decreased between 1970 and 1975. There is no clear reason for the declining trend there. The statistics on number of fishermen are gathered at the location where fish are landed. The temporary migration of fishermen to other fishing areas (e.g., Monroe County) may partly explain the decline.

Employment opportunities in the mackerel fisheries have increased as demonstrated by the increase in number of boats participating in the fishery. For example, the estimated number of hook and line boats on the east coast of Florida involved in the king mackerel fishery increased from approximately 50 in 1970 to over 200 in 1975. During that period the number of fishermen in the area remained relatively constant. In 1970 the total number of fishermen in St. Lucie, Martin, and Indian River was 384, and in 1975 the total was 391. It is likely that much of the increase in boats is due to fishermen temporarily entering the fishery when fish were readily available, or are drawn in by rising prices for king mackerel relative to other fish (see Section 9.1).

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1 Source of all unemployment estimates: Florida Department of Commerce; Division of Employment Security.

2 Source of number of fishermen employed: National Marine Fisheries Service, unpublished data.

ike hook and line boats, the number of net boats in the fishery has also increased. In 1970 there were an estimated 15 boats. By 1975 the number of boats had nearly doubled and in 1977, 33 gill-net boats participated in the king mackerel fishery. At present, the total is near 80. Overall then, opportunities for employment in fishing and in the fishery have been favorable despite the rather poor overall employment situation in the local areas of concern.

On the southern Florida Atlantic coast (i.e., Indian River, St. Lucie, Martin and Palm Beach Counties) employment in the king mackerel fishery is a very major component of total fishery employment. An estimated 70 to 80 percent of fishermen in that area are major participants in the king mackerel fishery. These are predominantly the hook and line fishermen. The Spanish mackerel fishery is also of great importance to total fishing in the area. While total employment in that area is high because of the large population, the amount of total unemployment is several times higher than the total employment in the fishery.

In Monroe County fishing is an extremely important industry to the local economy. The number of fishermen reported for the county is nearly 15 percent of total county employment. Major participants in both the king and Spanish mackerel fisheries comprise about eight percent of total fishermen. Unemployment is high in the area being nearly ten times the number of major participants in either the king or Spanish mackerel fisheries.

On the southern Florida west coast (Collier and Lee Counties), employment in the king mackerel fishery is relatively small. However, major participants in the Spanish mackerel fishery are about 15 percent of total fishermen. Again, the total county unemployment rate is several times the employment in the fishery.

Still many fishermen are not employed full time in fishing (see Section 11.5). A recent survey of Florida fishermen showed that those with income from nonfishing activities had widely varied employment. Based on those who specifically reported type of employment, 28 percent were in residential or commercial construction. Seventeen percent were employed in marine related jobs such as tug boat cpatains, marina operators and boat builders. Ten percent were involved in agriculture, nine percent were employed in security type jobs, and seven percent held jobs as mechanics and repairmen. Twenty-two percent held other occupations such as teachers, chemists, optometrists, broadcasters and flight inspectors. Only 21 percent of the respondents said that their nonfishing employment was seasonal (Prochaska and Cato, 1977, pp. 20-21).

King and Spanish mackerel fishing in the major commercial areas in south Florida takes place primarily in the months of December through February. However, the king mackerel hook and line fleet in the Atlantic coast and the large boat gill-net fleet depends heavily on the king mackerel season to justify its investment. In Monroe County participants in the king and Spanish mackerel fishery gain additional income from the spiny lobster fishery. Spiny lobster fishing takes place predominanty from August through November; thus the two fisheries are seasonal complements to one another. Mackerel fishermen also fish for other species such as snapper, grouper, stone crab, mullet, spiny lobster, and pompano.

11.4 Recreational Fishing

The motivations and cultural characteristics of anglers seeking species in the management unit are diverse. Many seek the excitement of the sport, the chance to relax and socialize with their friends, or the opportunity to be in a natural environment. A discussion of the demographic characteristics of marine recreational fishermen and their values in participation is presented below.

11.4.1 Demographic Characteristics of Recreational Fishermen

Basic demographic characteristics of marine recreational fishermen in the south Atlantic and Gulf of Mexico were determined by the U.S. Department of Interior (1972, 1977a, 1977b). Over 51 percent of participants were between the ages of 25 and 54 in 1975. Anglers under 25 accounted for 32.4 percent of the participants, and anglers 55 years old or older accounted for 16.3 percent of the fishermen. Salt water anglers are predominantly male. Nearly one third of the participants were female in 1975. Forty-three percent of the recreational fishermen had incomes between $10,000 and $25,000 (U.S. Department of Interior, 1977b). A 1971 study of southeastern wildlife recreation suggests that of the anglers surveyed, there was no heavy concentration of participation from any particular occupational group, although professionals, management, and skilled crafts persons tend to participate more often than members of other occupational groups (Horvath, 1974).

These characteristics apply to anglers in general from the southeast. Data specific to anglers that seek or catch the coastal pelagic species are not available. With the exception of bluefish, these species are caught predominantly by private or charter boats (see Section 8.2). Because of the widespread and growing popularity of smaller boats in the 18-22 foot category capable of fishing for king mackerel as well as other species in the management unit, these species tend to be highly sought by middle income fishermen as well as fishermen owning the larger sportfishing craft.

Recent research on charter boat fishing in the Gulf of Mexico, the other important component of the coastal pelagic recreational fishery, suggests that charter fishermen are of higher socioeconomic status than anglers as an entire group. Mississippi charter fishermen tend to have higher incomes than anglers overall. Eighty percent of the charter fishermen had incomes over $15,000 and 36 percent had incomes over $25,000. Occupationally, charter fishermen in Mississippi were much more often employed in professional and managerial positions than the general population of southeastern anglers (Etzold, et al., 1977). A study of Texas charter fishermen yielded similar results. There, 78 percent of charter fishermen surveyed had incomes over $20,000 and 34 percent had incomes over $40,000 (Ditton, et al., 1977).

11.4.2 Social Benefits of Recreational Fishing

Recreational fishing yields significant benefits over and above those measured by the value of expenditures presented in Section 9.0. Researchers have found that participants pursue angling opportunities for multiple reasons. Among the benefits are the fulfillment of a desire for solitude; to be outdoors in a natural environment; to have companionship; to explore and have an adventurous experience; for the scenery; to get away from it all and reduce tension; to experience achievement in catching fish or obtaining a trophy; or for the opportunity to "think things through." These, of course, are in addition to the satisfaction gained from the feeling of sporting accomplishment in successfully catching fish (Bryan, 1976, p. 85). For example, a study of sport fishermen in Rhode Island showed that "catching the fish" ranked second behind "experiencing tension and/or relaxation" among the six categories of values of recreational fishing expressed (Spaulding, 1970). There is general agreement that the great majority of persons go fishing with at least the expectation that fish will be caught.

In efforts to estimate how fishermen value these benefits of recreational fishing, researchers have devised methodologies for expressing them in monetary terms. For example, a 1971 study of the southeast indicated that saltwater fishermen received benefits valued at $59.80 for each day of fishing (Horvath, 1974, p. F-48). In contrast, a 1970 national study showed that saltwater anglers spent an average of only $10.77 per day (U.S. Department of Interior, 1972, p. 10). Although the valuation procedure used by Horvath is not necessarily precise because of its subjective nature, the results of such a methodology provide a benchmark of the value of the social benefits associated with recreational fishing.

economic impacts of marine recreational fishing show that salt water angling adds substantially to the local economies. A 1971 study of Morehead City (Carteret County), North Carolina, estimated that marine recreational fishing there by nonresidents yielded $1,046 million in direct net income to the local area. Charterboat fishing activity which is heavily dependent on king and Spanish mackerel and bluefish yielded over $310,000 in direct net income (Coastal Zone Resources Corporation, 1972). In a study of Texas charter fishing, it was estimated that charter fishermen spent over $4.2 million in five Texas coastal communities in 1976 for charter fees, food, lodging, travel and miscellaneous expenses (Ditton, et al., 1977). And in Dade County, Florida, charter fishermen spent an estimated $4.1 million (Gentle, 1977). While the last two studies did not estimate personal income derived from fishermen expenditures, it is easily seen that the income portion of these services is quite sizeable. Furthermore, as Ditton notes, because charter fishing is so much a tourist activity, the income derived is a nonlocal addition to the coastal economies. Thus recreational fishing in general and charter fishing in particular (because it is so important to the coastal migratory pelagic resources management unit) also are important contributors to local economies where the activity occurs.

specifically for catching king mackerel. According to a southeastern distributor of fishing tackle products, these firms are more dependent on the king mackerel sport fishery than most other manufacturers. Sales of these products have reportedly declined in the last two seasons, possibly because of the decline of king mackerel fishing in the eastern Gulf of Mexico (G. Foti, Miami, pers. comm.). The precise extent of economic dependence on the king mackerel fishery of these firms is unknown presently.

11.6 Distribution of Income Within Fishing Communities

Specific data on income distribution from this fishery are not available.

On Florida's east coast in St. Lucie, Indian River, Martin and Palm Beach Counties, the private industry sectors that contribute the most to total personal income are wholesale-retail trade, services, contract construction and manufacturing. Palm Beach County has the largest population of these counties, 460,100 in 1975, and the highest per capita income, $6,940 in 1975. St. Lucie County is the next most populous area, but it is much smaller, only 66,300 persons. Its per capita income was the lowest of four counties in 1975, $4,814. Fisheries, forestry, and agriculture account for about two percent of the personal income in each of the counties except Palm Beach, where less than one percent is derived from those sources. It is not possible to subdivide the available data into fishery derived personal income.[1]

Monroe County, the southernmost county of Florida, has a somewhat different economic base. Personal income derived from government is significant in all six counties, but in Monroe County it is the leading income source. This is largely because of the federal government installations in Key West, which can be quite cyclical. Retail and wholesale trade and services are the next largest sectors contributing to personal income. In 1975 Monroe County had a population of 51,400 and the per capita income was $5,478. The county has virtually no agriculture or forestry, so that the personal income estimates for "other industries" represents the contribution of fisheries to local personal income. It amounts to about five percent, or $5 million, of the income derived from private industry. Note that this does not include income related to processing and retail sale of fishery products which are included in the wholesale and retail trade sector.[1]

In the southwestern portion of Florida, Collier County is important to the king and Spanish mackerel commercial fishery. In 1975 the population there was 62,400 and the per capita income was relatively high, $6,647. As with the counties on the east coast, services, wholesale and retail trade, and construction were the private industries contributing the most to personal income in 1975. "Other industries" (including fisheries) accounted for just over three percent of the total.

Thus the fisheries (harvesting) sector constitutes a significant element of the local economies where king and Spanish mackerel are landed. While contributions of two or three percent of total personal income may not seem large at first glance, in terms of dollars of income each percentage point represents a substantial amount of money earned. Unfortunately available data do not show all fishery-related (processing, retail sale) personal income. Such data would illustrate more clearly the even larger contribution that fisheries make to the local economies.

Recreational fishing also makes an important contribution to the local economies of communities throughout the south Atlantic and Gulf of Mexico. There are numerous communities in both regions from which anglers embark to catch coastal pelagic species, and the available data is too limited to show precisely the variations in income contribution that sport fishing makes. But several studies of

[1] Data source: U.S. Department of Commerce, Bureau of Economic Analysis.

12.0 DETERMINATION OF OPTIMUM YIELD

Optimum yield (OY) from a fishery is the amount of fish which will provide the greatest overall benefit to the nation with particular reference to food production and recreational opportunities, and which is prescribed as such on the basis of the maximum sustainable yield from that fishery as modified by any relevant economic, social, or ecological factor (P.L. 94-265). This section contains a discussion of the important factors which affect the selection of OY and the management measures to achieve OY in the coastal migratory pelagic fishery.

The definition of the fishery is as follows:

> The coastal migratory pelagic resources (mackerels) are those species in the waters of the Gulf of Mexico and in the coastal waters and fishery conservation zone (FCZ) off the south Atlantic coast as specified below., The fishery year is to commence July 1 and terminate June 30.

Area for management: Federal regulation pursuant to this plan will apply to the FCZ within the jurisdiction of the Gulf and South Atlantic Councils. However, maximum sustainable yield and optimum yield are based on the stocks in the FCZ, the territorial sea, and internal waters of the various states. Consequently the allocations to various gear types include catches both from the FCZ and waters landward thereof. The states bordering the areas of jurisdiction of the Gulf of Mexico and South Atlantic Fishery Management Councils are urged to adopt regulations which are compatible with those applying in the FCZ. Regulations are not applied in the area of jurisdiction of the Mid-Atlantic Council because the catches there and the quantities of regulated species occurring there are so small that regulation would not be cost effective and is not necessary to accomplish the objectives of the plan. Similarly, catches there are not included in OY or in catch allocations. Should a fishery develop which significantly affects the stocks and is in the FCZ beyond the area for management, the management area may be extended by plan amendment.

Management unit: king mackerel, Spanish mackerel, and cobia.

Other species in the fishery: dolphin, little tunny, cero mackerel and other species caught incidental to the directed fishing effort are minor species in the fishery. In the Gulf of Mexico, bluefish is included as a minor species in the fishery. No management measures other than data collection are proposed for those species at present. Bluefish in the south Atlantic region are not included because a separate Bluefish Management Plan for the entire Atlantic coast is being prepared.

The scientific names of the above species are as follows:

King mackerel (*Scomberomorus cavalla*)
Spanish mackerel (*Scomberomorus maculatus*)
Cero mackerel (*Scomberomorus regalis*)
Little tunny (*Euthynnus alletteratus*)
Bluefish (*Pomatomus saltatrix*)
Cobia (*Rachycentron canadum*)
Dolphin (*Coryphaena hippurus*)

Problems in the Fishery

1. Current and accurate biological and economic data needed as a basis for management decisions are not available.

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

3. Rapidly increasing fishing effort for king mackerel could soon result in overfishing if no action is taken.

4. Cobia are presently harvested at a size below that necessary for maximum yield and may be overfished in some areas beyond the area for management.

12.1 Specific Management Objectives

In consideration of the relevant biological, economic, social and ecological factors, the following Specific Management Objectives have been specified for the coastal migratory pelagic resources management unit.

King Mackerel

1. Institute management measures necessary to prevent exceeding MSY.

2. Establish a mandatory statistical reporting system for monitoring catch.

3. Minimize gear and user group conflicts.

Spanish Mackerel

1. Institute management measures necessary to prevent exceeding MSY.

2. Establish a mandatory statistical reporting system for monitoring catch.

3. Minimize gear and user group conflicts in the event they arise.

4. Promote the maximum use of the resource up to the OY estimate.

Cobia

1. Institute management measures necessary to increase yield per recruit and average size and to prevent overfishing.

12.2 Description of Alternative Optimum Yields

12.2.1 King Mackerel

Optimum yield (OY) was determined to be 37 million pounds per year for king mackerel. Determination of optimum yield was hampered by the lack of precise biological and catch data. The lack of definitive data has resulted in an imprecise estimate of MSY. The Councils realize that the estimate of MSY used to determine OY and user group catch allocations was, to a great degree, based on the best available estimate of present catch. If better landing statistics become available and indicate that the present landing statistics and associated estimate of MSY are in error, then the Councils will re-evaluate MSY, OY and user group allocations before actions to severely restrict any part of the migratory pelagics fishery are taken.

Six specific optimum yield options were considered. They cover the most probable range within which the true value of MSY is found. These are listed and discussed below.

Alternative 1. Optimum yield equal to 27 million pounds per year.

This optimum yield is equal to the likely lower bound estimate of MSY. It is a very conservative approach to protecting future yield from the fishery and requires a reduction in present catch. The risk of growth or recruitment overfishing is reduced to a minimum. Conversely, the chance of OY being less than the real value of MSY is considerable.

If this OY were adopted and the present catch reduced, there is a high probability of a small increase in standing stock, availability, average size and catch per unit effort. Reducing the present catch would require very restrictive management measures. These would probably include size limits, quotas and/or effort restrictions for the commercial fishery, bag limits for the recreational fishery, and possibly time and area closures on a routine basis.

This value for OY was rejected as too conservative. The possibility that this would result in less than optimal use of the resource, negative impacts of regulation on the users, and high cost of restrictive management were considered more adverse than the slight risk that a higher OY is above the true level of MSY.

Having to restrict the fishery to this OY alternative would result in lesser supply to consumers and a corresponding higher consumer price, reduced employment and economic returns to the commercial fishery. The recreational for hire fishery and businesses selling goods and services to recreational fishermen would reduce recreational opportunities to the recreational fishermen.

In recent years unemployment rates have been high in several activity centers of the fishery (see Section 11.3).

Alternative 2. Optimum yield equal to 30 million pounds per year.

This option lies between the likely lower bound estimate for MSY and the most likely point estimate. It is a moderately conservative approach to establishing OY. The risk of overfishing the stock is still minimal, while the chance of having set OY below the true value of MSY is less than in Alternative 1. This option is approximately equal to the estimated catch in 1975, the last year for which data was available. Because effort in the fishery has continued to increase, this OY would probably require some reduction in the present catch.

Harvesting at this OY would cause little or no change in abundance, average size, or catch per unit effort. If the actual present catch is much above the 1975 estimate, some increase in these parameters might occur as the actual catch is reduced. Limiting the present catch to the 1975 level will require restrictive management, although it would be less severe than that required under OY Alternative 1. These management measures would probably include minimum size limits, commercial quotas, and recreational bag limits.

This measure was not accepted because there was not adequate justification for restricting the fishery to an OY less than the best point estimate of MSY, and adverse economic and social effects would occur to users and consumers.

Alternative 3. Optimum yield equal to 37 million pounds per year.

This optimum yield is equal to the best estimate of MSY. The risk of overfishing is evenly balanced against the chance of failing to maximize utilization of the resource. Adoption of this OY permits some increase in the present catch and may result in slight declines in abundance, average size, and catch per unit effort. The magnitude of changes in these parameters depends on how large the present catch is. If the total catch has increased since 1975 and is now approaching MSY, as is probable, then little change will occur. Management measures required to obtain this OY are much less restrictive than the two lower OYs. The primary measure needed to maximize the biological yield is a total catch limit.

This option was selected as optimal yield. It was considered to be equal to the best estimate of MSY and offered the most favorable trade-off between the risks involved in either overfishing or underfishing the stock. Management restrictions associated with the negative impacts needed to obtain this OY are minimal and are greatly outweighed by the positive impacts. This OY allows for the optimization of economic and social benefits to current and future users of the resource, including commercial fishermen, recreational for hire fishermen, private recreational fishermen, consumers, processors, businessmen selling goods and services to recreational fishermen and other affected users.

Alternative 4. Optimum yield equal to 45 million pounds per year.

This optimal yield is larger than the best point estimate for MSY but still within the likely range of the true value. The risk of overfishing is considerably greater than the lower OY option, while the possibility of underutilizing the stock is minimized. This option should be considered a high risk, high benefit approach to OY.

If this OY were adopted, abundance, availability, average size, and catch per unit effort would decline even if the OY estimate were equal to or less than MSY. The management measures required to achieve this OY are minimal. No restrictive measures would be necessary in the first years of the plan.

This option was rejected. The possible benefits of an increased total catch if the true value of MSY was equal to or greater than 45 million pounds were not considered to be worth the risk of overfishing the stock, and the expected declines in catch per unit effort which would be expected whatever the true value of MSY.

Achievement of this optimal yield would likely require specific measures to encourage increased yields from the fishery. This OY would have the risk of adverse social and economic impacts in the future, if the stock were overfished and availability were reduced for future needs.

Alternative 5. Optimum yield equal to 53 million pounds per year.

This optimum yield is equal to the upper bound of the most likely range in which the true value of MSY lies. Of all the options considered, it has the highest risk of overfishing the stock and offers the greatest potential if the true value of MSY is as large as OY. The effect of harvesting at this OY is similar to the 45 million pound option, but has a more extreme effect on the biological parameters of the stock. This measure was rejected for the same reasons given for rejecting the 45 million pound option.

Alternative 6. Optimum yield equal to a range from 30 to 37 million pounds per year.

The concept of OY as a range of values was discussed. It was rejected because it was felt that it was better to have a point estimate of OY. Sufficient data to justify a variable OY were not available nor was any system available which could be used to calculate an annual OY within the given range.

12.2.2 Spanish Mackerel

Optimum yield was determined to be 27 million pounds for Spanish mackerel. Four specific optimum yield options were considered covering the probable range of the true value of MSY.

Alternative 1. Optimum yield equal to 13 million pounds per year.

This is a very conservative approach to protecting the stock. It would require severe curtailment of the fishery with severe adverse economic and social impacts on users.

Alternative 2. Optimum yield equal to 20 million pounds per year.

This is a moderately conservative approach to protecting the stock. The OY is equal to the estimated 1975 catch. Given expanding effort it would require restrictions on allowable catch in the fishery by the time of plan implementation. This OY was not accepted because there was not adequate justification for restricting the fishery to an OY less than the best point estimate of MSY given the adverse economic and social impacts on users of curtailing the fishery.

Alternative 3. Optimum yield equal to 27 million pounds per year.

This optimum yield is equal to the best available estimate of MSY. The risk of overfishing is evenly balanced against the chance of failing to maximize utilization of the resource. This OY permits some increase in the present catch. Management restrictions to attain it are minimal, and it allows optimization of economic and social benefits to all users.

Alternative 4. Optimum yield equal to 49 million pounds per year.

This optimum yield in the upper likely bound on the range of the true value of MSY. It has the highest risk of overfishing the stock. It was rejected because the possible benefits of increased catch were not worth the risk of adverse social and economic impacts in the future if the stock became depleted.

12.2.3 Cobia

Optimum yield for cobia was determined to be the available amount of cobia at a size equal to or greater than 33 inches fork length, as measured from the tip of the head to the center of the tail. This amount is estimated as 1,000,000 in 1981 and is expected to increase if the proposed management measures are implemented.

Two alternatives for optimum yield were considered:

Alternative 1. Optimum yield equal to the best estimate of MSY, 1,057,000 pounds.

This alternative was rejected. The estimate of MSY is extremely crude, due to incomplete and inaccurate estimates of catch and lack of any estimates of fishing effort or recruitment. Harvest at any numerical estimate based on such poor data may significantly overfish or underfish the stock(s). Neither possibility is in the best interest of the nation. Enforcement and data collection costs required to limit the harvest to a fixed amount would be prohibitive.

Alternative 2. Optimum yield equal to the amount of cobia of a size equal to or greater than 33 inches fork length, which is harvested by U.S. fishermen given prevailing economic conditions and fishing techniques.

This optimum yield will greatly reduce the possibility of recruitment overfishing, stabilize catch at or near MSY, and increase present yield, average size, and availability of large, trophy-size fish.

The proposed limit protects the cobia until the age at first maturity. This greatly reduces the possibility of recruitment overfishing. Under the estimated levels of fishing mortality in the early

1960s (the latest available data) this measure would increase yield between 23 percent and 58 percent. If the cobia stock in the Atlantic is presently overfished, this OY will restore the stock and prevent overfishing in the future. See Section 5.4.3.1 for a more detailed analysis of yield per recruit.

Estimated Limits of M & F where Z = .41		Y/R(g) for present size at Recruitment	Y/R(g) for 33" size at Recruitment	Y/R(g) for Optimum Size at Recruitment
M	F			
.12	.29	5,314	8,416	9,503
.22	.19	3,064	3,761	3,761

As fishing mortality increases, the gain in yield from increasing the minimum size also increases. Because fishing effort and mortality have undoubtedly increased since the early 1960s, the expected increase in yield from this measure is greater than estimated above. Reducing the mortality of smaller fish will increase the average size and number of larger fish available. This benefits the recreational user who prefers a trophy fish.

It is expected that there will be a small mortality of undersized fish which are caught and released. It was felt that this mortality would be far outweighed by the gain in yield which would result from this OY.

This size limit was adopted rather than some other size because it provides a large gain in yield and protects the species from recruitment overfishing, while reducing any possible loss from mortality of released fish to a minimum. According to the best available data, a 33-inch limit would provide between 89 percent and 100 percent of the theoretical maximum Y/R at given values of fishing mortality (see Section 5.1.4). While a larger limit would theoretically result in further increases in yield, mortality of released fish would increase. The small additional gain from a larger size limit was not considered worth the risk of significantly larger mortality of undersized fish or the added imposition on the fishermen.

12.2.4 Other Species in the Fishery

Optimum yield was not specified for the other species because of lack of data to estimate MSY. When sufficient data become available to estimate MSY and/or OY for other species in the fishery, and the need arises for management measures, the Council will develop such estimates. At that time, these species will be added to the management unit by plan amendment.

12.3 Analysis of Beneficial and Adverse Impacts of Potential Management Options

12.3.1 King Mackerel

12.3.1.1 Proposed Measures

A. The Secretary of Commerce may implement measures designed to provide limitations, where appropriate, on any gear or device used in the king mackerel fishery to reduce gear and user group conflicts. The Secretary, after consultation with the affected Councils, may take the following action by regulatory amendment based on the following criteria:

(1) When a conflict arises through expansion of a historical fishery in a traditional fishing area or region, the Secretary shall investigate the causes and extent of the conflict, the economic and sociological impacts of any viable limitations on the expanded fishery or other users, other solutions to the conflict and other relevant factors. The Secretary, after consultation with the affected Councils and states, may resolve the conflict as fairly as possible by taking one or more of the following actions:

   (a) Separate the users or gear by area (fishing zone).

   (b) Separate the users or gear by time (day of week).

   (c) Assign local quotas to each gear or user group based on the historical catches of each for that local area.

   (d) Allow unlimited usage of the gear or device.

(2) When the conflict arises through the introduction of gear or devices into new regions where they have not been historically fished, the Secretary shall investigate the harvesting capacity and efficiency of the new gear or device in the local area, the economic and sociological impacts on users of historical gear, the historical level of stock abundance in the area and the other relevant factors. The Secretary may, after consultation with the affected Councils and states, take one or more of the following actions:

   (a) Prohibit use of the gear or device in that geographical area.

   (b) Allow only limited use of the gear or device to more fully evaluate its impacts and potentials.

   (c) Limit the number of units of the gear or device which can be utilized in that area.

   (d) Allow unlimited usage of the gear or device.

(3) When a conflict arises as a result of circumstances in the fishery, other than as described in (1) or (2) above, the Secretary may implement measures designed to obviate such conflicts by measures provided for in (1) and (2) above, or take such other action as may be appropriate and necessary to resolve such conflicts in a manner consistent with the goals and objectives of the plan, the National Standards, the MFCMA and other applicable law.

Background: Gear and user group conflicts occur within many fisheries in the southeast. These conflicts are the result of competition for the resource. They may take the form of competition for a limited available yield or competition for fishing space. In some cases the area where fish are available may be quite small and/or the operation of one gear may be incompatible with other gears in the same area.

These conflicts can become very serious, resulting in property damage, violence, even death. Conflicts between shrimp fishermen in Texas recently lead to the death of one fisherman. In Florida, conflicts between shrimp and stone crab fishermen caused tens of thousands of dollars in property loss to stone crab fishermen and resulted in gun battles with automatic weapons. These conflicts usually occur when a new or technically improved gear is introduced or a traditional gear is expanded into new areas. Conflicts often arise suddenly with little advance warning.

Gear and user group conflicts may endanger proper biological management because of the highly emotional atmosphere which develops. In some cases, there may be legitimate biological grounds for gear regulation. However, in an emotionally polarized fishery, where all groups are making poorly documented claims and counter claims, it is often impossible to determine whether or not a biological problem exists. Decisions made in such an atmosphere may either inadequately protect the stock or, conversely, overregulate the fishermen.

In the mackerel fishery there is a long history of conflict between users of net gear and of hook and line gear. Because of the seasonal nature of the fishery, direct conflicts are usually of short duration, one to eight weeks per year, and may reoccur in the same area each year. (See Section 8.2.6.) Because of the mobility of the gill-net fleet and the migratory habits of the fish, these conflicts may arise suddenly, with little warning. The present conflict in the Fort Pierce area is an example (see king mackerel Measure B). As effort by all groups increases and commercial gear technology continues to improve, expanding the fishable area available to net gears, the potential for conflicts increases. It is expected that such conflicts will further intensify in the future and spread to areas where no direct conflict exists today.

Rationale: Measure A is designed to enable the Council to address gear and user group conflicts as quickly as possible through the use of the regulatory amendment process. It supports Management Objective 3, and to a lessor degree, Objective 1. It follows the framework plan concept which is intended to greatly increase the flexibility of management under the MFCMA. It delegates authority from the Council to the Secretary of Commerce to address such conflicts. The delegation of authority is limited by certain fixed guidelines. In practice, the Regional Director of the Southeast Region of the National Marine Fisheries Service acts as designee for the Secretary in implementing this measure.

Any conflict which arises will come to the attention of the Council before the Secretary or the Regional Director is aware of it. The problem and potential solution will be conveyed to the Regional Director by the Council. It is intended that any action taken by the Regional Director will be based on consultation with and recommendation by the Councils. Should the action (or nonaction) of the Regional Director be unacceptable to the Council, the plan amendment process can be started.

If action is needed, the Regional Director, after consultation with the Councils, will issue proposed regulations. If significant, an Environmental Impact Statement and Regulatory Analysis will be prepared. Public hearings will be held to allow full public review before final regulations are issued. The entire process requires a minimum of 90 days but is expected to require more time under normal circumstances. Because mackerel fisheries are highly seasonal, it is likely that a regulatory amendment could not be implemented until the fishing season one year after a conflict develops. In some cases, where conflicts are particularly intense, regulations will be needed very quickly. At such times the Councils expect that emergency implementation of a regulatory amendment will be necessary. This will reduce the required implementation time to less than 30 days.

This measure can be used to address almost any gear or user conflict which may arise. It has two major benefits. First, it can quickly prevent violence and property damage. Second, it can allow time for a scientific study to obtain reliable information on which to base long-term management measures. As an example of the type of problem which may arise and a solution designed to obtain the first type of benefit, see king mackerel Measure B. As an example of the second, see the measures proposed for purse seine use. Specific positive benefits will result, but cannot be quantified until a specific conflict is addressed. Specific positive and/or negative impacts of this measure will vary greatly with the circumstances surrounding any particular conflict.

Impacts of future conflicts cannot be analyzed in advance because it is impossible to predict the circumstances before the fact. The regulatory amendment process requires such analysis at the time a specific conflict is addressed. Public review of the proposed regulation is also required.

Numerous alternatives to this measure were considered by the Councils. These alternatives fall into three categories, no action, plan amendment, and field order. None of these alternatives offered an acceptable combination of speed and flexibility.

If neither the Councils nor the Regional Director takes action on gear conflicts, it is expected that these conflicts will grow increasingly more severe and more costly. The potential for violence and physical injury will steadily increase. The increasingly emotional nature of this fishery will make it more and more difficult to make correct management decisions. This would not be conducive to the economic, biological, or social wellbeing of the fishery and would interfere with achieving optimum yield. The Councils do not consider this option to be consistent with its responsibility under the Act.

Gear conflicts could, in theory, be dealt with through plan amendments. However, the process of review and approval of FMPs and plan amendments is very long. A conflict arising in one year could not be dealt with until the following season, at the earliest. Past experience indicates then that an amendment would not be implemented until the beginning of the third fishing season. Two seasons of conflict would pass before action could be taken. A further consideration arises from the fact that such conflicts often change rapidly in character and extent. Potential solutions that can only be implemented two years after the fact may never catch up with changing conditions in the fishery. The Council does not consider the plan amendment process to be a viable or timely process to use in addressing most gear and user group conflicts.

The Councils considered ways to use a field order to address future conflicts. A field order is, in effect, a specific regulation which has already been approved but which is not enforced until certain specified conditions occur. The advantage of a field order is very fast response time, a field order can be implemented in five days or less. However, a field order must be very specific in its action. This is a serious disadvantage where future action cannot be predicted accurately, as in this case.

A measure was developed which incorporated the provisions of the preferred alternative into a field order and set up guidelines for implementation which were very similar to those in king mackerel Measure B. This alternative was rejected because its lack of specific actions was legally questionable. Additionally the regulatory analysis required at the time a specific field order was proposed would greatly decrease the speed of implementation, removing most if not all of the advantages of the field order approach.

The following management measure addresses a specific gear and user group conflict which has already developed in the FCZ off the coast of Florida between 27° 50' north latitude and 27° 0.6' north latitude.

B. When the Regional Director, Southeast Region, NMFS, determines, based on reliable information, that a conflict, as described in FMP Section 8.2.6, exists or is about to exist, he will take one of the following actions by field order. The time period during which such restrictions shall be enforced will be determined by length of time a direct conflict exists or is expected to exist.

(1) Establish a fishing window within the following points:

(a) Bethel Shoal light (27° 44.3'N, 80° 10.4'W).

(b) A wreck 15 miles southeast of Fort Pierce Inlet (27° 23.5'N, 80° 3.7'W).

(c) Marker WR 16, five miles northeast of Jupiter Inlet (27° 0.6'N, 80° 2.0'W).

(d) 100 fm depth due east of point c (27° 0.6'N, 79° 55.0'W).

(e) 100 fm depth due east of point b (27° 23.5'N, 79° 54.0'W).

(f) 100 fm depth due east of point a (27° 44.3'N, 79° 53.5'W).

The Regional Director may prohibit use of gill-net gear to take king mackerel within the area a-b-e-f, b-c-d-e or a-c-d-f. If additional action is needed, prohibit use of hook and line gear to take king mackerel within a window landward of a line between the points a-b, b-c or a-c.

(2) Establish two fishing zones seaward (east) of state jurisdiction. These zones shall be the waters of the FCZ between 27° 10' north latitude and 27° 50' north latitude divided into two areas along the line of 27° 30' north latitude.

(a) In the first year in which a conflict arises, the use of gill nets for taking of king mackerel shall be prohibited in the area south of 27° 30' north latitude and use of hook and line gear for taking of king mackerel shall be prohibited in the area north of 27° 30' north latitude. In any succeeding year when a conflict develops, the area in which each gear is prohibited may be changed.

(b) When a conflict arises, use of each gear within the zone between 27° 10'N and 27° 50'N may be alternated daily.

(i) On even days of the month, use of gill-net gear to take king mackerel may be prohibited.

(ii) On odd days of the month, use of hook and line gear to take king mackerel may be prohibited.

(c) Close the fishery for king mackerel to all users within the zone between 27° 10'N and 27° 50'N. This measure shall only be imposed if the conflict results in:

(i) Death or serious bodily injury.

(ii) Significant gear loss.

Procedures for evaluating the existence of a conflict:

(1) The following procedures must be employed by the Regional Director in his decision process regarding the existence of a conflict for which a field order is appropriate and prior to the implementation of such a field order.

(a) At such time as the Regional Director is advised by any party that a conflict exists, he must confirm the existence of such a conflict through information supplied him by NMFS, U.S. Coast Guard or other appropriate law enforcement agencies.

(b) In the event that such information is not ascertainable from those law enforcement personnel as provided in (a) above, such confirmation may be made through information supplied by personnel of the state agency with marine fishery management responsibility.

(c) Confer with the Chairmen of the affected Councils, the office of the state agency(s) with the marine fishery management responsibility, and such other persons as the Regional Director deems appropriate, if any.

(2) Restrictions on field orders

(a) No field order may be implemented which results in the exclusive access of any user group or gear type to the fishery during the time the field order is in existence.

(b) A field order may be rescinded by the Regional Director if he finds through application of the same procedures set forth in (1) above that the conflict no longer exists.

(c) No field order may be implemented for a time period greater than five (5) days except under the conditions set forth in Section (e) above.

(d) At such time as the Regional Director submits to the Federal Register a field order for implementation under these provisions, he shall immediately arrange for a fact-finding meeting in the area of the conflict to be convened no later than 72 hours from the time of implementation of the field order. The following shall be advised of such fact-finding meeting:

(1) The Chairmen of the affected Councils;

(2) The office of the state agency with fishery management responsibility;

(3) Local media;

(4) Such user group representatives or organizations as may be appropriate and practicable;

(5) Others as deemed appropriate by the Regional Director or as requested by Chairmen of the affected Councils or the state agency.

This fact-finding meeting shall be for the purpose of evaluating the following:

(1) The existence of a conflict needing resolution by the field order;

(2) The appropriate term of the field order, i.e., either greater or less than five (5) days;

(3) Other possible solutions to the conflict other than federal intervention;

(4) Other relevant matters.

(e) In the event it is determined as a result of the fact-finding meeting that the term of the field order should exceed five (5) days, the Regional Director may, after consultation with the Chairmen of the affected Councils and the involved state agency, extend such field order for a period not to exceed 30 days from the date of initial implementation. In the event the Regional Director determines that it is necessary or appropriate for the term of such field order to extend beyond 30 days, such extension may be made after consultation with the Chairmen of the affected Councils and for such period of time as necessary and appropriate to resolve the conflict.

Rationale: This measure addresses an existing conflict (see Section 8.2.6) by separating groups of fishermen who use different gears. This will reduce the severe social and economic conflicts which have occurred in this fishery in recent years.

The measure offers considerable flexibility in response to this gear conflict. If, after the plan is implemented, little or no active conflict exists, no action need be taken. If an active conflict again develops, several options are available. The most appropriate can be implemented by field order within a very short time period. The procedures for evaluating the existence of a conflict (see king mackerel Measure A) ensure that no unnecessary action will be taken. Rapid public review, through

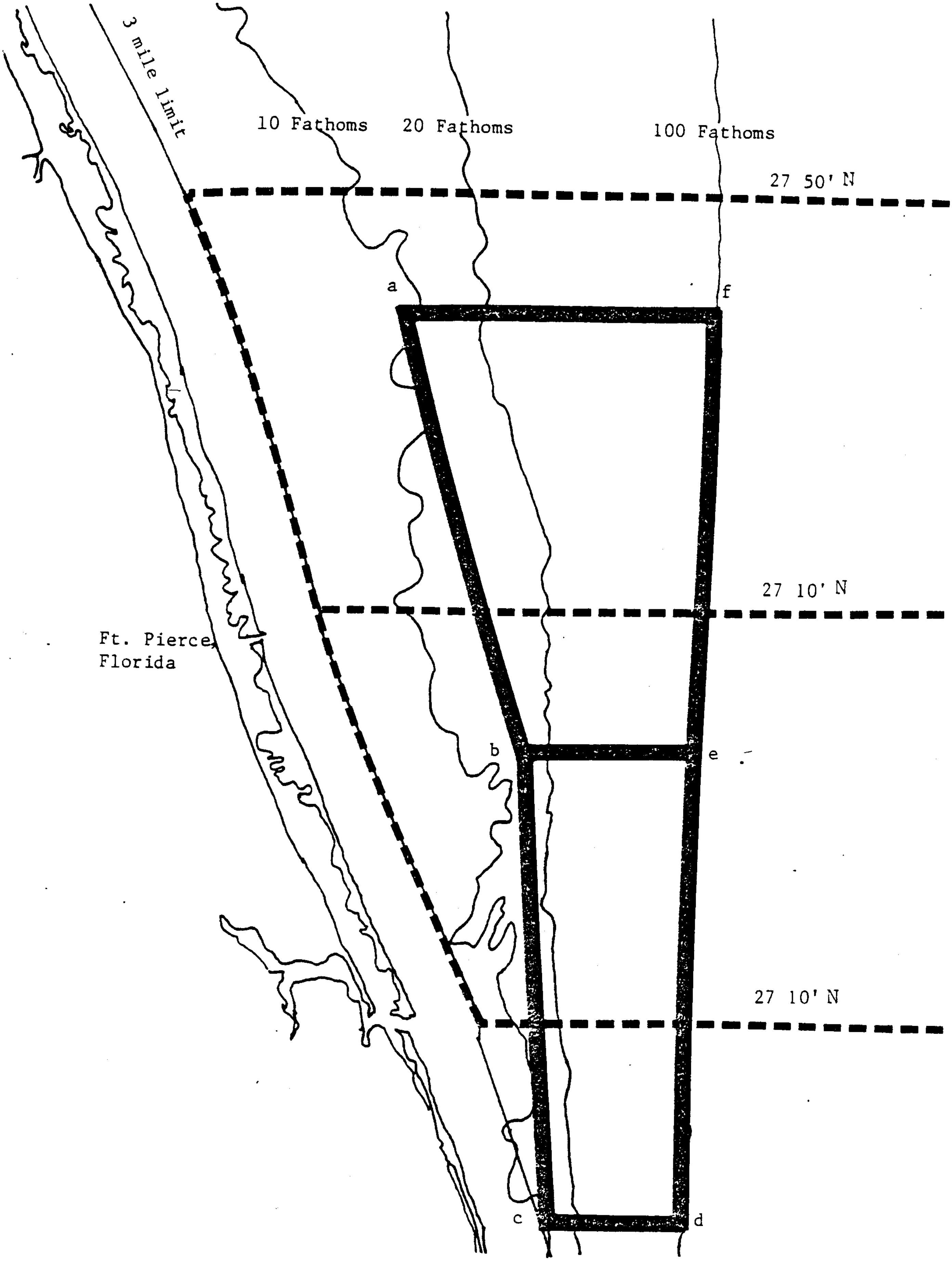

Exhibit 12-1 Area divisions possible under king mackerel Measure B.

the required fact-finding meeting, will ensure that the most appropriate action had been taken. This is particularly important if the fishery is totally closed. In that case the fact-finding meeting can then be used as the basis to choose a less restrictive solution to the conflict.

Option (1) would establish an inshore, offshore division of the users. Several alternatives for closed areas are provided to ensure that a viable solution is available which affects the least possible area. The division corresponds to a natural and traditional separation of fishing grounds. Hook and line fishermen normally fish over rocky reef areas, most of which are enclosed within points a-c-d-f. Net fishermen more often fish over smooth bottom, most of which is located inshore of a line between points a-b-c. Nets can only be used over rocky areas when wind and currents are unusually calm.

Options (2)(a) and (2)(b) would establish a north/south division of fishing grounds. Within a designated zone, fish schooling at any depth or over any type of bottom would be available to the designated gear. This measure is equally restrictive to both user groups. Neither group is permanently restricted from any area. The average availability and catch of each user group is not expected to be affected, although short-term fluctuations may be intensified. King mackerel are present in both areas every year, but the area of greatest concentration and best catch per unit effort may shift from year to year. Shifting availability may be advantageous or disadvantageous to either group in the short term, but each group shares an equal risk.

Option (2)(c) provides for total closure of the fishery in cases of extreme conflict. This measure can be used as a cooling-off period. Rapid public review through the required fact-finding meeting can result in a less restrictive field order within a very short period of time.

The area affected is a major fishing zone. It lies off the coast of two counties, St. Lucie and Indian River. For the period 1972-1977, an average of 17 percent of the total annual U.S. commercial harvest was landed in those counties during the affected time period.

Approximately 200 of the estimated 300 hook and line vessels in the fishery are based in these two counties and fish primarily in the affected area. A significant, but unknown number of vessels from other areas also fish in the area. The number of commercial hook and line fishermen affected is estimated at 320 or more.

The number of large power roller gill-net vessels based in the area is unknown. Because of the high mobility of the gill-net fleet, all of the vessels in Florida could be expected to fish this area at some time. In most years, approximately 30 vessels or less are present. The number of fishermen affected is estimated at 120.

The number of private recreational or charterboat fishermen who might be affected by this measure is unknown.

Efficiency of both gears will be increased by separation. At present the setting of gill nets is sometimes delayed or prevented by the presence of hook and line fishermen over schools of king mackerel. Conversely, many fishermen allege that the setting of gill nets on a school of fish which have congregated over a given spot disperses that school and makes the fish less available to hook and line fishermen.

This measure if implemented, will probably result in increased fuel and maintenance costs in some years; this is expected to be minor. Participants in the present fishery follow the largest concentrations of fish up and down the coast. This often involves distances in excess of twenty miles, the length of the proposed area of restriction. Because the present pattern of travel to the fishing grounds varies greatly from year to year, it is not possible to calculate the amount of increased costs, if any, from the proposed regulations.

This measure replaces one very similar to Option (2)(a). It offers several additional advantages through increased flexibility of action. No restrictions will be implemented unless they are necessary. Additional options allow flexibility to choose the best possible solution in a rapidly changing situation. The Councils have determined that the decrease in social and economic conflict and increases in efficiency of both gears are of greater value to the nation than the small increases in costs and year-to-year fluctuations in catch by each gear.

C. A total allowable catch shall be established at 37 million pounds per year.

(1) Annual stock allocations shall be made as follows: 28 million pounds for the recreational fishery and nine million pounds for the commercial fishery.

(2) The commercial allocation shall be divided between hook and line gears and net gears as follows:

Hook and line:	3,877,200 pounds
Nets	5,122,800 pounds

(3) If the catch of any user group exceeds its allocation, the Secretary shall close the fishery to that group for the remainder of the fishing year.

(4) Commercial and recreational fishermen defined as follows:

- A commercial fisherman is a person who sells his catch.

- A recreational fisherman is a person who does not sell his catch.

Rationale: These measures support Management Objectives 1 and 3. Setting a total catch limit equal to MSY is intended to prevent overexploitation caused by increasing effort. Such overexploitation would cause a long-term decline in yield from the fishery.

Dividing the total catch into allocations between the three major user groups will prevent one or more groups from taking such a large fraction of the total allowable catch that other users are unable to engage in their traditional fishing activity. Fish produced by each group has a different price structure, distribution system and eventual consumer. Allocation by user groups prevents the disruption of the present, orderly systems and helps assure the supply of fish to the traditional consumers.

The amounts allocated to hook and line gears and net gears, was based on their average percent contribution to the total commercial landings during the period 1971 through 1975.

Placing a limit on total catch may potentially result in closure of the fishery before the normal end of the fishing year. This may cause short-term economic impact on the fishermen and those who provide support facilities and supplies. In the case of the commercial for hire industry, businesses serving tourists who come to an area to fish will be affected. It will also result in disruption of the price structure, distribution system and consumption of the product by consumers.

The severity of these impacts would depend on when, where and on which groups a closure was imposed. Because of the present structure of the fishery and its timing in relation to the fishing year, it is unlikely that such closures would last very long or have a large impact in relation to the total value of the fishery. However, the fleet using net gears may be significantly impacted in some years. Hypothetical catches in excess of the allocation should be regarded as opportunity costs, i.e., foregone revenue in an alternative enterprise which cannot be engaged in, in this case. The opportunity cost concept can b applied to the gill-net segment in which the proposed allotment was exceeded in 1974 and possibly in 1977. The estimate for the difference in catch in 1974 (1.63 million pounds) would be $1.24 million using the $0.76/pound king mackerel price for 1980.

It is possible that a closure could be applied to one or more groups in a year when the total catch did not reach 37 million pounds. This measure could, therefore, prevent attaining OY in some years.

It is probable that OY will be exceeded in some years without a limitation on the total catch. Effort by all user groups is increasing. The capacity of the fleet is now well above OY and the expected annual catch is very close to MSY and OY. The economic impacts of closing the fishery for a short period near the end of some years are small in relation to the total economic value of the fishery and the potential for depletion of the resource through exceeding OY.

This simple allocation system balances the benefits of allocation against the risk that the system will cause the fishery to be unnecessarily restricted. A great deal of effort was expended in attempts to design a complex system which would have divided the catch be area, time, and user group in order to guarantee that no user group would be unfairly restricted or denied access to the resource. This proved exceedingly difficult; increasing the complexity of the system merely increased the risk of unnecessary restrictions, and made the system administratively unwieldy.

Management Measure C(3) replaces a measure which would have allowed fishing slightly in excess of the allocations if the negative economic impacts of a closure were greater than the biological benefits. The old measure was considered unworkable. The new measure gives more protection to the stock.

Measure C(4) provides definitions of commercial and recreational fishermen which are necessary to implement the allocations in Measures C(1) and C(2). This measure is intended to establish a basis for the allocation between user groups using the available commercial landing statistics. These statistics inherently contain the assumption that when a fisherman sells his catch, he is a commercial fisherman. In order to use the available statistics for allocation purposes, this assumption must be maintained.

One potential negative impact of the accepted definitions along with Measure C(1) is that recreational fishermen who do not depend on the fishery for a living can contribute to the allocation of the commercial fishery. Once the quota was filled, the recreational fishermen could continue to fish recreationally, but the commercial fishermen depending on the fishery for a source of living would have to become unemployed. Another potential problem is the fact that the usual means of obtaining "recreational" landing statistics (i.e., some form of asking the fishermen what his or her catch was) may double count fish which are subsequently sold.

No adverse impacts are expected if the allocation is not exceeded or if the percentage of fish sold by those who are in reality recreational fishermen does not change. However, if the hook and line allocation was exceeded and a larger than normal fraction of the catch had been sold by recreational fishermen, then the traditional commercial fishermen would be unable to harvest his normal share of the resource.

In the first year or two of the plan, it is unlikely that the percentage of fish sold by different user groups fishing with hook and line will change enough to cause a restriction to sales by other user groups. Therefore, no negative impact is expected within that time frame. In the long term, better statistical data will allow the development of better definitions to use in allocating the resource. This data will be available as the result of other recommendations contained in this management plan.

D. The minimum mesh size in the FCZ for all king mackerel gill nets shall be 4-3/4 inches stretched mesh in the Gulf of Mexico and South Atlantic Regional Councils' areas of jurisdiction.

Rationale: This measure will slightly increase biological and economic yields of king mackerel, prevent recurrence of wasteful fishing practices, help reduce user group conflicts and increase the effectiveness of regulation by the State of Florida.

This measure will eliminate the recurrence of a wasteful fishing practice, the use of small mesh gill nets to take king mackerel. At times, particularly along the southeast Florida coast, gill-net fishermen have used small mesh gill nets designed to catch Spanish mackerel, in trying to catch king mackerel. During 1978 and 1979, an extremely intense conflict developed along the southeast coast between gill-net fishermen and hook and line fishermen. Much of this conflict concerned alleged loss or "drop-out" of king mackerel from gill nets. Subsequent testimony at several public hearings and research into the drop-out problem indicated that dropout from 4-3/4 inch stretch mesh nets was probably minimal but that significant waste had occurred when small mesh nets were used. To the degree that waste occurs with use of small mesh nets, this measure will increase the potential yield from the fishery.

Use of large mesh nets results in harvest of larger, more valuable fish. Freezer processors are the major market for gill-net catches. These processors report that smaller fish are less desirable and that large catches of small fish would result in lower exvessel prices. The size distribution of catches made with 4-3/4 inch stretch mesh results in the optimal marketable product.

Trial and error experimentation by commercial fishermen indicates that the 4-3/4 inch mesh size is the optimal mesh size for maximum average catches out of the average size distribution in fish schools on which the nets are normally set. Only when set on schools of fish which are primarily smaller than 25 inches fork length will this mesh size be inefficient. During the normal fishery, schools of such small fish are uncommon.

This measure will aid the State of Florida's enforcement of their identical regulation, reducing enforcement costs to the state and improving effectiveness of that enforcement.

This measure will help defuse some of the intense user conflicts in the fishery, contributing to king mackerel plan Objective 3. The use of gill nets is and has been a very contentious issue. Sport and commercial hook and line fishermen perceive this measure as one badly needed as one form of control over net fishing. State regulation on mesh sizes has helped reduce perceived conflict between these user groups. Federal regulation will maintain this benefit. Conversely, failure to adopt this measure will increase user conflicts.

This measure will have minimal adverse impacts. Because of Florida law and normal fishing practices, most vessels which could fish for king mackerel have 4-3/4 inch mesh nets. Only a small percent of the gill-net fleet does not normally fish for king mackerel and, therefore, does not have a suitable net. This measure does not prohibit any fisherman from entering the king mackerel fishery. The cost of a net is relatively small in relation to the overall cost of gill-net fishing and the potential benefits which could be realized from the net. Most gill-net operators own three to five different nets.

Additional enforcement costs will be minimal. The primary impact of this measure will be in the State of Florida. It will have little, if any, impact in other states. In areas other than the Florida coast, king mackerel do not normally school in densities high enough for effective gillnetting. No significant gill-net fishery for king mackerel exists in other states, nor is any likely to develop. No fishermen from states other than Florida are involved in the gill-net fishery off Florida. In Florida, existing state enforcement agents are cross-deputized for MFCMA enforcement and can enforce this measure with no additional federal expenditure. Any increase in federal expenditure to enforce this measure will be balanced by reduced state expenditures resulting from uniform regulation in the FCZ and state waters.

Benefits and costs of this measure cannot be stated numerically due to lack of data. The above discussion describes the types and relative magnitudes of the costs and benefits. Although they cannot be accurately quantified, it is clear that the benefits substantially exceed the costs and that this measure is necessary and appropriate for management of the fishery.

Alternative mesh sizes were considered and rejected because (1) there was no reason to believe that any mesh sizes, either slightly larger or slightly smaller than 4-3/4 inches would be more beneficial than the proposed mesh; (2) a mesh size smaller than 4-3/4 inches would conflict with Florida law causing difficulties in enforcement for both state and federal agencies; (3) the proposed mesh size is consistent with advice of the Advisory Panel, review by the Scientific and Statistical Committee, and present fishing practices in the industry; (4) an increase in the minimum mesh size would adversely affect the industry by forcing many operators to purchase new nets.

It may be argued that no regulation is needed, that the fishery will police itself. This argument is patently false in open access fisheries such as this one. Competition and economic pressure often force fishermen into inefficient fishing practices or practices which are detrimental to the stock even though many fishermen may realize the long-term negative aspects of their activities. The use of small mesh nets to catch king mackerel on the east coast of Florida is a prime example. It has been well established by trial and error of other fishermen since the early 1960s that large mesh nets (approximately 4-3/4 inches) result in the best and most efficient harvest of king mackerel. On the southeast coast of Florida small mesh nets were used by fishermen who did not yet have large mesh nets, many fishermen knowing that small mesh nets were less efficient. Less than optimum catches and waste through drop-out were the result.

The wholesaler and processor face similar problems. A processor may not wish to buy or process small king mackerel. However, in a competitive atmosphere, he must often buy a less desirable product in order to guarantee his future supply of more desirable fish.

This measure may be misinterpreted to be an unfair restriction of one user group when no restrictions are proposed which would control waste of fish by other gear types. This interpretation is incorrect because (1) this measure benefits rather than penalizes users of gill nets; (2) there does not appear to be any feasible way to reduce losses from hook and line gears; (3) there is no economic advantage to restricting catches of small fish by recreational fishermen; and (4) there is less economic advantage for commercial hook and line fishermen to harvest larger fish than there is for gill-net fishermen. Most hook and line catches enter different marketing channels, going either to local, fresh markets or to the New York market. Smaller fish are relatively more desirable in these markets than in the freezer processor market.

This measure is a clear case of the industry asking for a regulation to help police their industry for the benefit of fish, fishermen, processors, and consumers.

E. (1) The Regional Director, Southeast Region, NMFS, may institute a bag limit for king mackerel taken by recreational or recreational for hire users and/or a trip limit for commercial users by the regulatory amendment process when supporting data becomes available and after consultation with the affected Councils.

(2) The Regional Director, Southeast Region, NMFS, may institute a size limit by the regulatory amendment process when supporting data becomes available and after consultation with the affected Councils.

Rationale: This measure contributes to National Standard 1 and Plan Objective 1, providing an additional mechanism to prevent the catch from exceeding optimum yield. This measure is an alternative to the total closure of the fishery, offering several advantages to fish, fishermen and consumers.

Total closure of the fishery is a necessary part of this FMP, but it is a drastic measure and requires accurate and timely catch data to be effective. At present, delays in collection of recreational catch statistics make it impossible to enforce a closure on the recreational user group within a given year. Catch estimates are not available until the following year. Predicting when to close the fishery in the following year on the basis of one year old data will be difficult at best and could result in either biological damage to the stocks or unnecessary regulation on the fishermen. Commercial catch statistics suffer delays similar, if less severe, than for recreational data. Commercial allocation closures are possible within a given year but may not be implemented until months after the allocation is reached. Such delays may result in substantial overharvest.

Closures of the fishery(s) will have substantial adverse effects on fishermen and consumers, particularly some recreational fishermen. Closure will inevitably result in some fishermen being more seriously affected than others because of their location or availability of fish. This is particularly true for recreational fishermen and charter boat operators who fish in the summer in the northern Gulf and along the Carolina coast. A closure late in the fishing year could deny those users an opportunity to fish during the first two months in which king mackerel are available to them.

Closures will disrupt the present marketing structure, especially those channels which handle fish caught by commercial hook and line fishermen. This will adversely affect employment in those marketing channels. It will eliminate the supply of fresh fish to the consumer during the closed period, adversely affecting consumers, restaurants and retail fish markets.

These negative aspects of closure are acceptable only if the alternative is overharvest and even more severe long-term impacts on all concerned. The intent of Measure E is to prevent overfishing at a lower economic and social cost than a closure and to spread the burden of controlling the catch among many users. A number of options are available to provide a flexible approach to future regulatory needs.

If catch data indicates that recreational harvest has exceeded the allocation in a previous year or years, a bag limit could be imposed. Data on catch rates and total effort available at the time would be used to calculate a bag limit which would reduce the catch to the allocation amount. This bag limit would remain in force until the following year, when new data become available. At that time, the newer data would be analyzed to determine if the bag limit was effective and if modifications are needed.

So long as a bag limit allows a reasonable opportunity to retain some fish, it appears unlikely that it would result in any significant economic costs to charter or private recreational fisherman. Much of the recreational value to the fish is in the experience of catching rather than in landing many pounds. A bag limit will spread the burden of controlling the total recreational catch among all recreational fishermen. High economic and social costs on local areas which could result from the closures will be eliminated.

Trip limits on commercial fishermen could be used to spread the total catch over a longer period of the fishing year. This could increase the economic value of the catch by maximizing the amount going into fresh fish marketing chains where it has a higher value per pound. This would benefit the consumers by maintaining a high availability of high quality fresh fish. Costs to the fishermen would increase as more trips would be made for the same total catch.

Trip limits could also be useful to slow down the catch rate as OY or an allocation is approached. This would reduce or prevent overharvest resulting from slow data reporting and subsequent delays in closing the fishery.

If trip limits are proposed under this measure, the specific proposal will be analyzed to determine if the increased value of the catch, reduction of socioeconomic costs for local areas and biological protection of the stock outweigh any negative aspects, such as increased operating costs imposed on the fisherman and increased cost of government regulation.

Size limit restrictions could be applied to all users as another method to keep the total catch within optimum yield. If the total catch must be limited, it is economically advantageous from the commercial standpoint to place the greatest restriction on smaller, less valuable fish in order to maximize the catch of larger, more valuable fish. Likewise, recreational fishermen generally desire larger fish.

The impact of size limits would differ between areas and user groups because fish size varies with area and selectivity of the gear. For instance, at certain times recreational catches of king mackerel in the northeastern Gulf of Mexico are almost entirely composed of fish less than 25 inches fork length. If a size limit is proposed under this measure, size distribution by area will be compared with potential size limits to determine impacts on all users and estimate effectiveness of the measure in controlling the total catch. The Councils have requested research to monitor size distribution by area (see Section 14.4). Selection of a specific size limit will depend on the tradeoff between effectiveness in controlling the catch, increased economic value of the total catch, and differential impacts on different groups of fishermen.

Actions under Measure E will reduce the danger of overfishing contributing to Plan Objective 1. If closures were the only measure controlling total catch, problems with data reporting delays could easily result in repeated catches in excess of optimum yield and lead to overfishing and stock decline. The flexible, framework approach under this measure can reduce the degree and frequency of such excess catches, protecting the stocks and long-term benefits to the nation. This measure will spread the total catch over a larger time and area. This may also be advantageous to the stock. Recent tagging data indicates that king mackerel aggregate in local populations to a significant degree. This tendency is not accounted for in the MSY analysis. Spreading out the catch would reduce the fishing effort on heavily fished populations and increase fishing pressure on lightly fished populations. To a degree that these populations exist, such action under this measure would increase and protect the total yield from the stock.

As an alternative approach within this measure, strict guidelines and parameters for implementation which would be written into the measure were considered. Such parameters for implementation would clarify the intent and better inform the public of when the measure was likely to be implemented and what effect it would have. This approach was rejected in favor of broad wording of the measure because the Council did not feel that they could adequately anticipate all possible situations that might arise in the future. To specify parameters for implementation in advance would severely limit the flexibility of the measure, leaving the probability that loopholes would exist and that adverse situations would develop which could not be addressed other than through plan amendment -- a very slow process. The intent and possible use of the measure are clearly described in the rationale and do not need to be specifically included in the wording of the measure.

The interest of the public is protected by the process involved in regulatory amendment. When data become available which indicate a need for action, appropriate regulation will be proposed, its positive and negative impacts analyzed, and public comment requested. Thus, flexibility to respond to a wide variety of problems is retained and, at the same time, an adequate analysis of regulatory impacts is still required.

12.3.1.2 Measures Rejected for King Mackerel

The following management measures were rejected for king mackerel:

F. A four (4) pound size limit for all fishermen both commercial and recreational.

Rationale: The four pound size limit corresponds to a 25-inch limit. This measure would prevent harvest of king mackerel below the size of a maximum economic yield (see discussion of Management Measure S). It was rejected because survival rate of released king mackerel by the average recreationalist would be low and because most recreational fishermen are nonselective in the size of fish they catch. In addition, the measure would have had a severe economic and social impact on the recreational sector in some areas since in some years in specific locations as much as 79.5 percent of the catch is less than 25 inches in fork length (northwest Florida in 1978, based on data supplied to Council by NMFS, Panama City Laboratory) this measure would be to virtually eliminate a very valuable fishery in that and other areas. The potential gain in total yield was not considered of great enough value at this time to offset the adverse impact on the recreational fishery.

G. Bag limit of five (5) fish per person per day for recreational fishermen.

Rationale: This measure would temporarily decrease the total catch by recreational fishermen by an amount which cannot be calculated with available data. As effort increases the total catch would rise. It would probably make king mackerel more available to the less experienced fishermen by limiting the catch of the more experienced in the same area.

The available data does not indicate that a reduction in recreational harvest is needed at this time.

H. Minimum mesh size of five inches and 5-1/2 inches for gill nets.

Rationale: This measure would increase the mesh size used in gill nets, increasing the minimum size at capture. No data are available to estimate what the minimum size would be for these two mesh sizes.

There would be no beneficial impact on total production and might slightly reduce total production. Furthermore, available biological information suggests this mesh size would result in a minimum size at capture greater than the optimum for harvesting fish. Management Measure D which requires a 4-3/4 inch mesh was proposed as a substitute measure.

I. The plan shall incorporate machinery designed to provide length and height limitations on nets used in the king mackerel fishery, or other gear restrictions where appropriate, should an expanding net fishery develop in areas not historically fished, and when such a limiting measure is dictated by developing conditions adversely affecting the stocks.

Rationale: Measure I was rejected and Measure A(1) was proposed in its place since Measure A(1) was more completely defined and would provide for a more expedient approach.

J. Require permits for all vessels fishing in the FCZ.

Rationale: This measure was discussed as a possible method to facilitate data collection and allocation between user groups. The statistical reporting system discussed in Section 12.3.5 was proposed as substitute measures to accomplish the same results at less cost and burden to the public.

K. Prohibit the use of purse gill nets and that this issue be discussed at public hearings.

Rationale: The concept of a gill net which could be pursed was discussed by the management committee. Little was known about the feasibility of this type of gear and there was little indication that it would be introduced into the fishery at this time. No action was deemed necessary. This measure was rejected because a study is currently underway which will assess the impact of this fishing method.

L. That a 25-inch minimum size limit be established for the commercial fishery and that no size limit be set for the recreational fishery.

Rationale: This measure is very close to Measure S proposed by the Council and would have the same beneficial impacts. It was rejected, in favor of Measure S because it imposed less burden on the fishermen. The reasons for which Measure S was later rejected also apply to this measure.

M. Restrict the use of spotter aircraft in the king mackerel fishery.

Rationale: This measure would reduce the efficiency of fishing effort of a particular user group. Spotter aircraft are used predominantly by large boat gillnetters and by a small percentage of hook and line boats. These actions may make more fish available for other user groups.

This measure was rejected because it would reduce economic efficiency, and increase the variability of the catch. This would adversely affect the economic returns of the user groups being restricted, and cause interruptions in the supplies of fish to consumers. Since catch limits (Measure C) are provided to prevent exceeding MSY, the use of spotter planes will not lead to overfishing.

N. Restrict the number of lines and hooks used in the king mackerel fishery.

Rationale: This measure would also reduce the efficiency of fishing effort for a particular group. It was rejected because of the adverse economic affect on the user group being restricted and possibly reduced supply to traditional consumers. It was not considered to be necessary because of catch limitations to prevent exceeding MSY.

O. When a conflict results in repeated acts of violence, the Secretary shall aid in the prosecution of the perpetrators of the violence, and shall implement as a temporary emergency measure one or more of the options under A(1). Said temporary emergency measure shall remain in effect no more than 45 days (or 90 days).

Rationale: This measure was orginally part of the recommended measures for resolving gear and user group conflicts. It was felt to be unnecessary.

P. (1) Annual stock allocations will be made as follows: 8.0 million pounds for the commercial fishery and 25.0 million pounds for the recreational fishery with the remaining 4.0 million pounds held in reserve. Furthermore, if time/catch and effort data indicate that either or both allocations might be exceeded, one or more of the management measures in (5) will be instituted, after consultation with the affected Councils, to prevent closure of the fishery.

(2) Annual allocations of the stock will be made for commercial hook and line and for net fishermen in accordance with their percentage contribution to the total catch for the years 1971-75 and thereafter for the latest five-year period for which statistics are available.

(3) No area quotas will be established, except in an emergency.

(4) Commercial fisherman defined: A commercial fisherman is a person who sells his fish.

(5) A time/catch and effort by area table shall be utilized by the Secretary both for allocation of a portion of the reserve to either commercial and recreational segments and for implementation of the management measures to prevent closure of the fishery under (1). These measures are as follows:

(a) Recreational Fishery

- A daily, per person limitation of king mackerel landed shall be three fish.

- If projected landings at periodic intervals of the fishing season indicate that one geographic area (state or zone) shall exceed an average proportion of the landings in relation to the annual available resource, the Secretary shall institute more restrictive "bag" limits for the remainder of the fishing season in more "favored" zones after consultation with affected Councils.

(b) Commercial Fishery

- Commercial landings/catch shall be limited to no more than 10,000 pounds per day per gill-net boat, 400 pounds per day per hook and line commercial boat throughout the range.

- If the projected commercial landings in any geographical area (state or zone) indicate that proportionally higher landings will occur over that of historical landings in proportion to the expected annual resource, the Secretary, after consultation with the affected Councils, shall either (1) adjust the allocation of the reserve so that it will be equally available to commercial fishermen in the "less favored" geographical areas on a proportion relative to their historical catches or (2) reduce the per boat allocation in the more "favored" zones while not restricting those boats in other zones until the total quota is reached.

- The Secretary, after consultation with affected Councils, shall have the latitude to allocated part of the reserve for newly developing fisheries.

Rationale: This allocation system was designed to provide the same benefits as Management Measure C. It included a much more sophisticated system of controls to restrict the fishery once the reserve was reached and to provide the flexibility needed to allow for fluctuations in abundance and availability. These were intended to provide maximum protection against an unnecessary closure of the fishery.

This measure would have been administratively complex. The complex allocation system was considered to be too unwieldly because of insufficient data and the time lag needed to compile the required catch statistics. It was to be based on a "time/catch and effort table" which effectively allocated the catch by area, time and gear. The available statistics were inadequate to construct this table, particularly for the recreational catch. In the commercial fishery, annual fluctuations in availability by month and area make it difficult to establish guidelines for predicting whether or not restrictive measures would be necessary. Guidelines which allowed sufficient time to compile the needed statistics and still effectively restrict the catch before the reserve was exceeded would frequently result in unnecessary restrictions on the user groups.

Q. In the areas of Brevard, Indian River, St. Lucie, Martin and Palm Beach Counties of Florida, dense concentrations of incompatible gears, particularly commercial hook and line gear and gill-net gear, cause inefficiency in the use of both of these gears. Therefore, optimum use of the resource is not achieved. In order to achieve optimum use, the following gear restrictions are proposed. The following is to be in effect from April 1 to April 15, in the FCZ off of Brevard, Indian River, St. Lucie, Martin and Palm Beach Counties of Florida:

o That commercial net boats be prohibited from fishing for king mackerel in a water depth of more than 60 feet, but less than 110 feet.

- That commercial hook and line boats be prohibited from fishing for king mackerel in a water depth of less than 50 feet. Charter and recreational fishermen are specifically excluded from this restriction.

- That in the overlapping zone where both groups are allowed equal fishing rights, commercial hook and line, charter or recreational boats are required to maintain a reasonable and proper distance from gill-net boats in the process of fishing and that gill-net boats maintain a reasonable and proper distance from commercial hook and line, charter or recreational boats engaged in trolling over a body of king mackerel so as not to disrupt the fishing activities of the hook and line boats by setting nets in the area where troll boats are engaged in fishing.

Rationale: This measure would separate two groups of commercial mackerel fishermen to avoid gear conflicts. The separation is by depth and time. This measure was not proposed because (1) there are overlapping zones in which fishing can take place by both gear types; and (2) the length of the separation in time, although at the peak of the season, is not long enough to allow for different availabilities of mackerel year to year. Because of these factors enforcement would be difficult, conflicts may still occur, and efficient use of both gear may be inhibited. Measure B was adopted as a more flexible alternative. The positive aspects of this measure were incorporated into Section 1 of Measure B.

R. It will be illegal to buy, sell, or process for commercial use, king mackerel under 25 inches fork length.

Rationale: This measure would have slightly increased the abundance of larger fish, slightly decreased commercial catch, and slightly increased the average price per pound. When proposed, this measure did not appear to have any significant negative impacts. Its major benefit was to prevent development of a large commercial effort directed at small fish.

Objections to this measure were raised at public hearings and during a National Marine Fisheries Service review of the plan. Public comment indicated that a bycatch of small king mackerel occurred in gill-net catches of Spanish mackerel and that this measure would cause unavoidable and at times substantial waste. This measure was rejected by NMFS because it discriminates against commercial fishermen when no similar restriction is placed on recreational fishermen who also have a large catch of small king mackerel.

The Councils rejected the measure for the above reasons. Further, they reasoned that if the catch of small fish needed to be reduced in the future, the plan could be amended at that time.

S. Several measures concerning use of purse seines were considered and rejected, these are found in Section 12.3.5.2.

12.3.2 Spanish Mackerel

12.3.2.1 Proposed Measures

A. The Secretary of Commerce may implement measures designed to provide limitations, where appropriate, on any gear or device used in the Spanish mackerel fishery to reduce gear and user group conflicts. The Secretary, after consultation with the affected Councils, may take the following action by regulatory amendment based on the following criteria:

(1) When a conflict arises through expansion of a historical fishery in a traditional fishing area or region, the Secretary shall investigate the causes and extent of the conflict, the economic and sociological impacts of any viable limitations on the expanded fishery or other

users, other solutions to the conflict and other relevant factors. The Secretary, after consultation with the affected Councils and states, may resolve the conflict as fairly as possible by taking one or more of the following actions:

(a) Separate the users or gear by area (fishing zone).

(b) Separate the users or gear by time (day of week).

(c) Assign local quotas to each gear or user group based on the historical catches of each for that local area.

(d) Allow unlimited usage of the gear or device.

(2) When the conflict arises through the introduction of gear or devices into new regions where they have not been historically fished, the Secretary shall investigate the harvesting capacity and efficiency of the new gear or device in the local area, the economic and sociological impacts on users of historical gear, the historical level of stock abundance in the area and the other relevant factors. The Secretary may, after consultation with the affected Councils and states, take one or more of the following actions:

(a) Prohibit use of the gear or device in that geographical area.

(b) Allow only limited use of the gear or device to more fully evaluate its impacts and potentials.

(c) Limit the number of units of the gear or device which can be utilized in that area.

(d) Allow unlimited usage of the gear or device.

(3) When a conflict arises as a result of circumstances in the fishery, other than as described in (1) or (2) above, the Secretary may implement measures designed to obviate such conflicts by measures provided for in (1) and (2) above, or take such other action as may be appropriate and necessary to resolve such conflicts in a manner consistent with the goals and objectives of the plan, the National Standards, the MFCMA and other applicable law.

Rationale: These measures support Management Objective 3 and, to a lesser degree, Objective 1. These measures give the Regional Director and, indirectly the Councils, the ability to provide limitations through regulatory amendments to reduce conflicts where appropriate on any gear or device used in the Spanish mackerel fishery. These measures are identical to those designated for the king mackerel fishery and are discussed under king mackerel Measure A in Section 12.3.1.1. No adverse impacts are anticipated until a specific conflict is addressed. The benefits of having a framework in the plan to deal with gear conflicts which could occur suddenly and require rapid action are clear. Because the Spanish mackerel fishery is much less controversial than king mackerel, this measure is likely to be employed less often than king mackerel Measure A.

B. Size Limit

(1) A 12-inch fork length minimum size limit shall be set on Spanish mackerel in both the commercial and recreational fisheries.

(2) A catch allowance for underized fish will be allowed equal to five percent of the total catch by weight of Spanish mackerel on board a vessel in the Spanish mackerel fishery or any other fishery.

Rationale: This measure supports Management Objectives 1 and 4. It would prevent the harvest of Spanish mackerel below the size required for optimum biological yield. A 12-inch Spanish mackerel is 0.5 years old and weighs approximately 0.5 pounds. Maximum yield per recruit is obtained with an average age at recruitment of 1.0 years, when fishing at $F_{0.1}$. Because age at recruitment is an average and not all fish in a year class become vulnerable at exactly the same age or size, fishing mortality must begin at a slightly younger and smaller size to obtain the required average.

Under the present conditions in the fishery, both the beneficial and negative impacts of this measure are relatively minor because the catch is small. The major benefit of this measure is to prevent the development of a large fishery for small fish. Such a development would have a negative impact on the total yield of the fishery and on the availability of the more desirable, larger fish. The State of Florida already imposes a 12-inch minimum size limit. Ninety-eight percent of the commercial catch and a large proportion of the recreational catch is currently caught in Florida. South Carolina also imposes a 12-inch minimum size.

There appears to be little or no negative economic or social impact of these management measures. The desirability of fish smaller than 12 inches is much less. Sport fishermen generally prefer a larger fish. Such small fish are too small to fillet or cut into steaks, limiting their marketability. The meat yield is low limiting its food value to sport fishermen and other consumers. Fish this small are currently not caught to a significant extent in the commercial fishery. Measure B(2) also prevents waste through the variance allowed since gill nets are not perfectly selective. Fish that are caught and which would not survive release may be retained within the five percent variance.

Alternative percentages for Measure B(2) were rejected because five percent was considered large enough to provide for any incidental harvest and small enough to discourage marketing of small fish.

There will be a slight negative impact on some recreational fishermen who will be prevented from catching smaller fish. This catch is not thought to be large; most occurs within state waters. Release mortality is not expected to be high since it is fairly easy to release Spanish mackerel in the recreational fishery. These fish would soon enter the fishery at legal size.

C. The Regional Director, Southeast Region, NMFS, may institute a bag limit for Spanish mackerel taken by recreational or recreational for hire users and/or a trip limit for commercial users by the regulatory amendment process when supporting data become available and after consultation with the affected Councils.

Rationale: This measure contributes to National Standard 1 and Plan Objective 1, providing an additional mechanism to prevent the catch from exceeding optimum yield. This measure is an alternative to the total closure of the fishery, offering several advantages to fish, fishermen and consumers.

Total closure of the fishery is a necessary part of this FMP, but it is a drastic measure and requires accurate and timely catch data to be effective. At present, delays in collection of recreational catch statistics make it impossible to enforce a closure on the Spanish mackerel fishery within a given year. Catch estimates are not available until the following year. Predicting when to close the fishery in the following year on the basis of one year old data will be difficult at best. Under such conditions, closures imposed too late could result in biological damage to the stocks, while closures too early would be unnecessary regulation on the fishermen.

Closures of the fishery will have substantial adverse effects on fishermen and consumers, particularly some recreational fishermen. Closure will inevitably result in some fishermen being more seriously affected than others because of their location or availability of fish. This is particularly true for recreational fishermen and charter boat operators who fish in the summer in the northern Gulf and along the Carolina coast. A closure late in the fishing year could deny those users an opportunity to fish during the first three months in which Spanish mackerel are available to them.

These negative aspects of closure are acceptable only if the alternative is overharvest and even more severe long-term impacts on all concerned. The intent of Measure E is to prevent overfishing at a lower economic and social cost than a closure and to spread the burden of controlling the catch among many users.

Within this measure a number of options are available to provide a flexible approach to future regulatory needs.

If catch data indicate that optimum yield has been exceeded in a previous year or years, a bag limit could be imposed on recreational fishermen. Data on catch rates and total effort available at the time would be used to calculate a bag limit which would reduce the catch to below OY. This bag limit would remain in force until the following year, when new data became available. At that time, the newer data would be analyzed to determine if the bag limit was effective and if modifications were needed.

So long as a bag limit allows a reasonable opportunity to retain some fish, it appears unlikely that it would result in any significant economic costs to charter or private recreational fisherman. Much of the recreational value to the fish is in the experience of catching rather than in landing many pounds. A bag limit will spread the burden of controlling the total recreational catch among all recreational fishermen. High economic and social costs on local areas which could result from the closures will be eliminated.

Trip limits on commercial fishermen could be used to spread the total catch over a longer period of the fishing year, possibly eliminating any need for a closure. This will reduce any adverse socioeconomic effects on local areas which would have mackerel available to them during potential closure periods. This would benefit the consumers by maintaining a high availability of quality fresh fish. Costs to the fishermen would increase as more trips would be made for the same total catch.

Trip limits could also be useful to slow down the catch rate as OY is approached in order to assure that the catch does not significantly exceed OY. This would protect the stock and long-term benefits from the fishery.

If trip limits are proposed under this measure, the specific proposal will be analyzed to determine if maintaining the flow of fresh fish to consumers, reduction of socioeconomic costs for local areas and biological protection of the stock outweigh any negative aspects, such as increased operating costs imposed on the fisherman and increased cost of government regulation.

Actions under Measure C will reduce the danger of overfishing contributing to Plan Objective 1. If closures were the only measure controlling total catch, problems with data reporting delays could easily result in repeated catches in excess of optimum yield and lead to overfishing and stock decline. The flexible, framework approach under this measure can reduce the degree and frequency of such excess catches, protecting the stocks and long-term benefits to the nation.

As an alternative approach within this measure, strict guidelines and parameters for implementation were considered. These guidelines would have been written into the management measure and regulations. Such parameters for implementation would clarify the intent and better inform the public of when the measure was likely to be implemented and what effect it would have. This approach was rejected in favor of broad wording of the measure because the Council did not feel that they could adequately anticipate all possible situations that might arise in the future. To specify parameters for implementation in advance would severely limit the flexibility of the measure, leaving the probability that loopholes would exist and that adverse situations would develop which could not be addressed other than through plan amendment -- a very slow process.

The interest of the public is protected by the process involved in regulatory amendment. When data become available which indicate a need for action, appropriate regulation will be proposed, its positive and negative impacts analyzed, and public comment requested. Thus, flexibility to respond to a wide variety of problems is retained and, at the same time, an adequate analysis of regulatory impacts is still required.

D. If OY is taken, the fishery for Spanish mackerel will be closed for the remainder of that fishing year.[1]

Rationale: This measure could result in a short-term closure of the fishery. The associated short-term economic and social costs were considered to be small in relation to protection of the stock and must be accepted if long-term economic biological and social yields are to be maximized.

Adverse impacts of this measure could be avoided through application of bag limits or trip limits under Spanish mackerel Measure E.

12.3.2.2 Measures Rejected for Spanish Mackerel

The following management measure was not adopted for Spanish mackerel:

E. When the conflict results in repeated acts of violence, the Secretary shall aid in the prosecution of the perpetrators of the violence, and shall implement as a temporary emergency measure one or more of the options under Measure A(1). Said temporary emergency measure shall remain in effect no more than 45 days (or 90 days).

Rationale: This measure was rejected since its designed use was more adequately outlined and discussed in Measure A which was proposed to accomplish the same purpose.

Other measures were not deemed necessary because there are no indications that the Spanish mackerel fishery is in danger of being fished beyond the best estimate of MSY.

12.3.3 Cobia

12.3.3.1 Proposed Measures

The following measure is proposed for cobia by the Gulf of Mexico and South Atlantic Councils:

A. Possession of cobia less than 33 inches fork length shall be prohibited in the FCZ.

Rationale: This measure supports and implements the chosen OY alternative. It protects the stock from recruitment overfishing, should stabilize the fishery at or near MSY and will increase the present total yield, average size and availability of large, trophy-class fish. For a detailed analysis of these impacts and supporting data, see Sections 12.2.3 and 5.4.3.1.

Although the majority of the stock(s) and total catch occur in the management area, there is some evidence that the extension of this measure into the waters off the mid-Atlantic states may have a beneficial effect on some populations of cobia. The Gulf and South Atlantic Fishery Management Councils will provide the Mid-Atlantic Council and the Secretary with the available data in order that the Mid-Atlantic Council can determine the suitability of this measure for their area of jurisdiction.

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1 No action taken on this measure by the South Atlantic Council.

This measure would interfere with the current fishing activity of those now taking fish smaller than 33 inches. Because the cobia is primarily a sport fish and most sport fishermen desire a large fish when seeking cobia, the negative impacts on user groups of this measure are small. It appears that much of the small cobia are caught incidentally while seeking other species.

There will be some short-term loss of production to the commercial fishery, but potential yield will increase in the long term. This long-term increase in yield is estimated at between 13,000 and 41,600 pounds worth $8,150 over the next five (present value with ten percent discount factors).

This fishery is of the nature of a supplemental catch. The total value of commercial cobia landings has been less than $60,000 per year in the United States and most are believed to be larger than 33 inches. The landings are widely distributed between Texas and Virginia.

12.3.3.2 Measures Rejected for Cobia

The following management measures were rejected for cobia:

B. A bag limit of one cobia per person per day be implemented in the South Atlantic Council area where data support the need for the measure.

Rationale: This measure would have reduced recreational enjoyment of the fishery on those occasions when more than one per day is caught. It would have also had a significant impact on cobia tournaments which are held throughout parts of the regions. The potential benefits in reducing harvest were felt to be unnecessary at this time.

C. Prohibit the sale of cobia.

Rationale: The commercial fishery for cobia is not a major directed fishery and the total commercial catch is small compared to the recreational catch. Thus, this measure would have little beneficial biological impact. It would, however, interfere with the operations of a certain number of fishermen.

12.3.4 Other Species

No management measures were deemed to be necessary for the other species in the fishery. This is because there are no indications that they are being overfished or in need of specific protection. There are no significant problems in the fisheries for these species which warrant regulation at this time.

12.3.5 Purse Seine Regulations

Background: Implementation of a management plan for mackerels will remove historical legal barriers to the use of purse seines. Harvesting king or Spanish mackerel with purse seines has always been legal in the FCZ. However, state regulations, including possession and landing laws, have effectively prohibited use of this gear in the mackerel fishery, both in state waters and in the FCZ. With implementation of a management plan, Federal authority will supercede that of the states and de facto state regulation in the FCZ will no longer be possible. Purse seine harvest of mackerels in the FCZ is expected to begin and increase rapidly after removal of limitations imposed by the states. Therefore, the Councils have considered the need for regulation of this gear.

During development of this plan, the two Councils have differed in their approach to this issue. The Gulf Council elected to allow limited purse seine operations to study its effect and limit any negative impacts should problems develop. The South Atlantic Council originally considered the use of purse seines as inadvisable in this fishery. Consequently, the Council proposed a research program to determine the impacts of purse seines. Commercial use was to be prohibited until better information was available. However, the Council was unable to establish an acceptable rationale for total prohibition of commercial use of the gear and subsequently adopted the approach of the Gulf Council.

Vessels most likely to use purse seines for mackerels are presently part of the large boat, mackerel gill-net fleet (see Section 8.2.1.1.) Several of these vessels presently use purse seines to harvest species other than mackerel. These include several species of herrings, sardines, and jacks. Other types of purse seine vessels may attempt to enter this fishery, but are not expected to be successful. These include some of the smaller menhaden purse seiners, or the small scale bluefin tuna purse seiners. It is unlikely that these vessels could compete successfully with gill-net vessel conversions. This is primarily due to lack of speed. In the present fishery, competition is intense and speed is a major factor in productivity. Many gill-net vessels are capable of speeds between 20 and 30 knots. Purse seine vessels from other fisheries seldom exceed 12 knots.

A study of the economic and social characteristics of potential purse seiners (Centaur, 1981) indicates that the same type of vessel presently used in the large scale, gill-net fleet can harvest mackerels at a lower cost with a purse seine than with a gill net. The study also indicates that purse seine operations are substantially more efficient than gill net or hook and line. It can be concluded that, introduction of purse seine gear offers economic advantages to the commercial fishery but, will increase fishing pressure on the resource and intensify competition between different user groups.

12.3.5.1 <u>Proposed Purse Seine Measures</u>

A. (1) Harvest of king mackerel by purse seine gear will be allowed up to a maximum of 400,000 pounds per year in the area of jurisdiction of the Gulf Council, and 400,000 pounds per year in the area of jurisdiction of the South Atlantic Council. Any purse seine harvest will be counted within the commercial allocation for all net gears.

(2) Harvest of Spanish mackerel by purse seine gear will be allowed up to a maximum of 300,000 pounds per year in the area of jurisdiction of the Gulf Council, and 300,000 pounds in the area of jurisdiction of the South Atlantic Council.

Rationale: Regulation of the use of purse seines to harvest mackerels is needed. Implementation of a FMP will remove legal barriers imposed by state laws and result in almost unlimited purse seining if no action is taken. Both Councils and virtually all users of the resource, including purse seine operators, believe that unrestricted purse seining will result in overfishing and serious socio-economic impacts on all users of the mackerel stocks. A recent study (Centaur, 1981), research by Florida DNR (Moe, 1967; Ingle, 1967) and experience of purse seine operators, are all consistent with the conclusion that control of this gear is necessary if its potential economic benefits are to be realized without overfishing the stock or adverse economic impacts on other user groups. At the same time, the Councils are in a poor position to specify a long-term management strategy for purse seines because there is no history or experience in purse seining for these species. For this reason, the proposed purse seine regulations are considered temporary and will be modified as soon as sufficient information is available.

The purse seine allocations chosen by the Councils are large enough to allow several vessels to operate. This will allow the Councils to observe mackerel purse seining under normal conditions and develop a long-term management approach to this gear. At the same time the amounts are small enough to have little adverse effect on other user groups. If any unexpected adverse impacts develop, the allocation will limit them to a minimum until appropriate amendments in the FMP can be made.

The number of purse seine vessels is not expected to exceed four or five in the first year and is not expected to exceed ten in subequent years. Estimates of purse seine costs and returns (Centaur, 1981), indicate that the allocations for king and Spanish mackerel could be harvested by eight purse seine vessels, and that participation of more than ten vessels would reduce profitability below that of an equivalent gill-net operation. Less than eight vessels are expected in the first year due to conversion costs and the limited number of operators with the necessary combination of capital, experience with the gear, and willingness to take the risk of losses if purse seines do not prove successful.

Purse seine allocations are a small fraction of the present catch and are not expected to have significant adverse impacts on other users. The king mackerel allocation is approximately one-quarter of the average net landings (1975-1977) in the south Atlantic area, and one-seventh of the average Gulf landings. The total is approximately one-tenth of the total commercial harvest. The Spanish mackerel allocation is approximately four percent of the average south Atlantic commercial landings of Spanish mackerel and five percent of Gulf commercial landings.

The allocations are divided between the Gulf and south Atlantic to reduce or eliminate any local effects of purse seine operations. If they were not divided by area, it is probable that the entire allocations would be taken in a short time in the first place where the fish become available. In the case of king mackerel, this would probably occur along the southeast Florida coast. That is the area of most intense fishing effort and greatest conflict between user groups. Harvest of the entire king mackerel allocation in that area would probably decrease the catch rate of other fishermen, and intensify user conflicts, contrary to king mackerel Objective 3.

In the case of Spanish mackerel, the major problem is short-term overloading of processing capacity. The maximum processing capacity is approximately 500,000 pounds per day (Cenfaur, 1981). When fishing conditions are very good, large catches are made, often in two or three days, temporarily absorbing the available processing capacity. At those times, which normally occur once or twice a year, limits are placed on the amount of fish a vessel can sell.

It is expected that the use of purse seines will increase this tendency to overload processing capacity because of the gear's ability to harvest large amounts of fish in a shorter time period than gill nets. The specific amount proposed is considered too small to cause significant overloading of present processing facilities.

An alternative Spanish mackerel allocation of 750,000 pounds in the south Atlantic area was considered and rejected by the South Atlantic Council. This would have increased the total Spanish mackerel allocation to approximately one million pounds. The larger amount could cause a significant increase in frequency and degree to which processing capacity was overloaded, adversely effecting other users. It was considered larger than necessary to allow study of the impact of this gear.

The larger amount Spanish mackerel was considered to conflict with National Standard 4. In the first year or two of the plan very few operators are likely to enter the fishery because there are few operators with the necessary combination of experience, gear, and risk capital to do so. In effect, a large allocation would grant these operators the opportunity to harvest an excessive share of the resource. This excessive share would not be fair and equitable to other users because competition from purse seiners would reduce their catch rates and because increased or overloading of processing capacity will result in longer and more frequent trip limits on them.

The Councils considered less restrictive alternatives which would have limited the number of years during which the allocation would apply. These were rejected for two reasons. First, the Councils could not predict how long a period would be needed to obtain the necessary information for long-term management. Second, unpredictable delays in the approval process for management plan amendments make it impossible to assure that an amendment could be implemented before any specified time limit expired. This could result in unlimited purse seining with negative impacts on the stocks and other users.

B. Observers, under the direction of the National Marine Fisheries Service, must be required on all purse seine vessels while fishing for king or Spanish mackerel during the first three fishing years after this plan is in effect.

Rationale: The Councils consider observers to be the only effective method to monitor purse seine activity in this fishery. There are two major reasons why observers are necessary: (1) to accurately count the total harvest and (2) to obtain an accurate and unbiased report on purse seine activities.

Rapid accounting of purse seine catch is absolutely required to assure that the purse seine allocation is not exceeded. Purse seines have the capability of making very large catches in a very short period of time. It may be possible to harvest the allocations in a few days. The present data collection system cannot provide catch data in less than two weeks and normal reporting delays are on the order of one to two months. Substantial overharvest could result. Observers would be able to provide immediate catch reporting with no delay.

Reliable accounting of the total catch can only be accomplished by observers. Land-based accounting alone will not give acceptable reliability. Because of the characteristics of the gear and the fishery, it will be very easy to transfer the catch from purse seiners to other vessels for transport ashore. In addition, it is probable that purse seine vessels can catch more fish than the carrying capacity of the vessel, requiring other vessels to participate in transporting the catch. Given these factors, accounting for purse seine catches at dockside will be difficult, at best. Because of the controversy surrounding purse seines, there would be serious doubt among other users about the accuracy of purse seine landing statistics taken at dockside.

Because the gear has not been used in this fishery, there may be real problems with its use which cannot be predicted at this time. For example, observations by Florida Department of Natural Resources of experimental purse seining showed that purse seines may become snagged on rocky bottom. Retrieval of the net may cause localized damage to hard bottom communities (Ingle, 1967). This finding was not expected prior to the study. Such information can only be gathered by observers. Other information needs of the Councils in developing a long-term regulatory approach to purse seines are the ability of fishermen to determine species identity and size of fish prior to setting the net, and their ability to release small fish or undesirable species without harm. This can only be determined through on site observation.

Because the gear is so extremely controversial, there will inevitably be many rumors and allegations concerning purse seine operations. An unbiased observer is needed to provide reliable information. This point is more important than it may appear to someone unfamiliar with the fishery. Many fishermen are convinced that any use of purse seines is bad and they are highly suspicious of the motives of purse seine advocates (see FEIS Comments). Conversely, fishermen in favor of purse seines are equally suspicious of the motives of those opposing their use. In this highly emotional atmosphere, exaggerated claims and counter-claims by both sides are expected. Without an unbiased observer aboard it will be impossible to confirm or deny such claims and the Councils would be in no better position to plan long-term management than at present.

The Councils considered and rejected the alternative of requiring observers on a sample of purse seine vessels. From a purely scientific point of view, one hundred percent coverage is not necessary. Statistical analysis of a small sample is, in theory, sufficient for most scientific purposes. However, the Councils must consider more than purely scientific questions. In this case, the Councils considered the highly controversial nature of the gear and concluded that a sample sufficient for scientific validity was not sufficient for management purposes. A controversial act occurring on even one vessel which did not have an observer would seriously damage, probably destroy, the credibility of the information produced by observers and of any actions of the Councils which are based on that information.

The three-year time limit is intended to limit the burden on the fishermen while still providing sufficient time to gather enough data for development of long term management measures. There was, and still is, some concern by the Councils that observers may be needed for a longer period. This measure, as originally proposed, did not specify a time limit (see Rejected Purse Seine Measure E). However, legal advice from General Counsel (D.O.C.) indicated that it was not legally defensible in this case to require observers for an unlimited period of time. Therefore, the Councils, after receiving advice from D.O.C. lawyers and scientists from the National Marine Fisheries Service, propose the three-year limit. This is expected to be sufficient to provide the necessary scientific information. If so, long-term management measures for purse seine use can be incorporated into the plan. If not, the plan may be amended to lengthen the time during which observers will be required.

The Councils expect that observer costs will be shared by National Marine Fisheries Service, Fishery Management Councils, and interested states. NMFS is expected to direct and coordinate observer activities. Observer personnel will be provided by the Southeast Fisheries Center, Southeast Regional Office, and cooperating state agencies. Several states, including Florida, Alabama, and South Carolina, have already indicated interest in supplying some observers. Cooperation is expected from the other states which might be affected.

Cost of the program will be small and well within the existing combined resources of NMFS, Councils and interested states. If no increase in funding is available, a slight decrease in resources devoted to other projects must be expected. This is a high priority effort.

The effort which will be required for this measure can be estimated within a reasonable range. A high estimate of 520 observer days is estimated using data from Centaur (1981). The data indicates that eight vessels would be required for an entire season, consisting of 65 fishing days. This is believed to be an overestimate. Purse seine operators and the Councils believe that the Centaur study substantially underestimates the efficiency of purse seines. A lower and more reasonable estimate of 47 observer days can be estimated based on an average catch of 30,000 pounds per vessel for each possible fishing day and assuming the entire allocation for both species is harvested. A small amount of additional effort will be required to coordinate the program and analyze the resulting data.

12.3.5.2 Purse Seine Measures Rejected

C. Use of purse seines to harvest king or Spanish mackerel in the area of jurisdiction of the South Atlantic Council shall be prohibited except for specified research (see purse seine Measure D).

Rationale: The South Atlantic Council proposed this measure because of their belief that use of purse seines would be detrimental to the fishery and that its use should be prohibited until research showed that it could be used safely.

The measure was disapproved by the Secretary of Commerce for the following reasons. There was not enough information in the plan to demonstrate that purse seines would be harmful to the fishery and that total prohibition was necessary and appropriate. The measure appears to violate National Standard 2, which specifies that regulations be based on the best scientific information available. The measure restricts purse seines more severely in the south Atlantic than in the Gulf, without developing a reason for the difference. This violates National Standard 3. The total prohibition of purse seines was considered an allocation of fishing privilege to users of other gear. With no conservation or other rationale given, this violates National Standard 4. Finally, a total prohibition without clear reasons violates National Standard 5 which requires efficient utilization where practicable.

The South Atlantic Council was unable to develop sufficient reasons to answer the objections of the Secretary of Commerce, and rejected the measure in favor of measures allowing limited use.

D. The lack of documental evidence on the possible positive and/or negative impacts of purse seines has left the Councils in a poor position to evaluate the proper use of this gear. There is presently considerable disagreement between the two Councils on the conclusion to be drawn from the available evidence. Because of this, the Councils wish to obtain additional data in order to resolve this disagreement.

   (1) That, because of the question of the effect of purse seining on the wise conservation of the resources, the Secretary is requested to develop a research program to be carried out in the first generation of the plan to determine the effect of purse seining on the king and Spanish mackerel fisheries to be presented to the Councils for Council concurrence. Further, it is recommended that the research program be limited to a maximum of 400,000 pounds of king mackerel and 400,000 lbs. of Spanish mackerel. The results of this program shall be presented on or before March 31, 1981.

   (2) During the time required for commercial harvest of 400,000 pounds of king mackerel by purse seine, a scientific observer under the direction of the National Marine Fisheries Service shall be assigned to each purse seine vessel in the Gulf of Mexico. This shall be for the purpose of supplying scientific data.

   (3) That, because of the question of the effect of purse seining on the wise conservation of the resource, the Secretary is requested to assess the existing purse seining effort for Spanish mackerel in the FCZ of the Gulf of Mexico for the purpose of determining the effect of purse seining on the Spanish mackerel fishery. A report of the assessment shall be presented to the Gulf Council within one year after implementation of the FMP. Until that time, the purse seine fishery is allocated 225,000 pounds per year in the FCZ of the Gulf of Mexico.

   (4) Until such time as the research program is completed, purse seining for Spanish mackerel will be allowed only under the conditions in D(1) and D(3).

Rationale: This measure requires research by NMFS, and requires observers on commercial purse seine vessels fishing for king mackerel in the Gulf until the first 400,000 pounds has been harvested. Presumably this would be in the first season. The measure also limits commercial purse seining of Spanish mackerel in the Gulf to 225,000 pounds in the first year of the FMP.

The measure was rejected on the basis of comment by the Secretary of Commerce and because a more effective measure was developed to control purse seine use. The Secretary objected to the measure because much of it was research and should not have been included as a management measure. The Councils agreed and placed the research portion of the measure in Section 14.4, Research Requested. Further, the Councils concluded that the one-year limitation on observers and Spanish mackerel catch in the Gulf was insufficient. More stringent requirements for both are included in Purse Seine Measures A and B.

E. Observers, under the direction of the National Marine Fisheries Service, will be required on all purse seine vessels fishing for king or Spanish mackerel. Cost of the observers may be borne by the user.

Rationale: This measure is very similar to proposed purse seine measure B, with the exceptions that vessel operators may pay part of the observer costs and that there is no specified time limit on the observer requirement.

When this measure was proposed, the Councils originally concluded that it was reasonable to expect vessel operators to pay part of the observer costs because they would be benefiting from the increased efficiency and profitability of purse seine gear. No time limit was established because the Councils were uncertain how many seasons of observer coverage would be required before enough data was available to establish long-term purse seine regulations.

A legal review of this measure by the D.O.C. General Counsel's office indicated that there was insufficient information to legally defend an open-ended requirement of observer coverage due to the unique and extreme nature of an observer being required upon a domestic fishing vessel. The legal review further determined that it was probably not possible within MFCMA to charge the vessel operators for observer costs.

The Councils concurred with the legal review and adopted Purse Seine Measure B, which sets a three-year time limit and deletes the option for operators to pay observer costs.

12.3.6 Statistical Reporting Measures

12.3.6.1 Statistical Reporting Measures Adopted

A. The Councils conceptually accept a vessel enumeration system and creel census data system that would provide sufficient information for fishery management. Mechanics of the system are to be developed by National Marine Fisheries Service and the Regulatory Measures Committee.

B. Require a reporting system for all user groups and processors based on statistical sampling whereby it would be mandatory for a selected respondent to provide answers to the sampling questionnaire on a recurring basis that is not of great frequency.

Rationale and Impacts: One of the major problems in this fishery is lack of data needed to estimate MSY and monitor the proposed user group allocations. This greatly increases the risk of overfishing. The present data collection system is inadequate to provide the information required for this FMP. The above measures have been carefully considered in order to minimize costs and burdens on respondents, while obtaining the necessary information. This is achieved using a statistical sampling, rather than a complete census approach. Also, the statistical reporting system specified in this plan will be integrated with those for all plans in the respective Council areas in order to achieve efficiency and standardization.

Reporting Measure A provides a method of identifying both commercial and recreational users and an estimate of recreational catch and effort. It is included in all plans now in development by the Gulf of Mexico and South Atlantic Councils. "Vessel enumeration" refers to a system using Coast Guard and state boat and vessel registration lists to identify, locate, and classify recreational and commercial users. Statistical surveys by mail and/or telephone will further delineate the statistical universe of users and gather data on participation rate and economic characteristics. Creel census samples will be used to obtain data on recreational catch rate combined with data from the vessel enumeration study to estimate total catch and effort.

This measure is required to provide the data needed to implement the proposed allocation system for the recreational sector and to develop catch and effort data needed for MSY determination. This system is considered to be the most cost effective way to provide that data with the least imposition and cost to the users of the resource. Impacts on the users would be limited to the amount of time required to answer the required questions and would be imposed on only a small sample of the users.

The system is still in the process of development and there is little information available on required sample sizes or survey costs. Costs to the government cannot be accurately estimated at this time, although they are expected to be substantial. Costs are tentatively estimated at approximately $80,825 to $81,859 for all coastal pelagic species. Because this system is used for all plans in the Gulf and south Atlantic, the costs per management plan are expected to be small in relation to the value of the fishery.

The proposed measure has cost advantages over other systems. Relying entirely on a creel census system would be accurate but would be prohibitively expensive. Statistical surveys by phone or mail of the entire population of the southeast is expensive and has proven to be highly inaccurate. The vessel enumeration system will greatly reduce costs and the number of samples needed from a statistical survey by reducing the statistical universe of users by two to three orders of magnitude. Combining statistical surveys with a creel census will reduce the required creel census sample. Therefore, the costs of obtaining catch per unit effort and total catch data will be greatly reduced.

Reporting Measure B supports Measure A by requiring a reply from those persons selected for the survey. It also includes processors in the mandatory reporting requirement for that information deemed necessary by NMFS. This information is already being collected on a voluntary basis, but some processors do not report at present. Costs of this measure are included in Measure A.

12.3.6.2 Statistical Reporting Measures Rejected

C. Permits for all users for statistical purposes only.

This measure was considered and rejected because it was unnecessary. Existing boat and vessel registration records can be used to obtain the same information at less cost.

D. For Spanish mackerel - A mandatory trip ticket system for all charter and headboat operators.

This measure was considered and rejected as not cost effective. Sufficient information can be obtained from a sample of operators.

E. Require commercial fishermen to report catch and effort using trip tickets.

Rationale: This measure would provide greatly improved measures of total catch and fishing effort needed to monitor the fishery. It was rejected because funding required to implement the system is not available. The National Marine Fisheries Service is developing a unified approach to data collection in the Southeast Region which will attempt to collect the required data at a lower cost. Approved Measures A and B are consistent with this approach.

F. (1) Require logbook reporting of king mackerel for all charter and headboat operators.

(2) Require logbook reporting of Spanish mackerel for a statistical sample of charter and headboat operators. The sample shall be limited to the minimum necessary for management needs.

Rationale: This measure would provide precise measure of catch and effort and catch per unit effort for a significant portion of the recreational fishery. It was rejected because (1) funding may not be available and (2) it is discriminatory to one user group.

12.4 Trade-offs Between the Beneficial and Adverse Impacts of the Preferred or Optimal Management Options

Optimum yield was selected by trading off the risk of overfishing against the failure to maximize full utilization of the resource. The selected management regime allows exploitation up to the best estimate of MSY based on available data. The preferred management options represent the trade-offs involved in minimizing the adverse impacts on any one user group. Specific discussion of the trade-offs between the beneficial and adverse impacts of specific management options is presented in Section 12.3.

12.5 Specification of Optimum Yield

The optimum yield which will provide the greatest overall benefit to the nation has been determined to be the maximum yield which can be produced on a sustained basis. Optimum yield is specified as follows:

King mackerel - 37 million pounds annually.

This is equal to the current best estimate of MSY for king mackerel based on the adjusted recreational catch estimate for 1975 (see Section 5.4.1.1).

Spanish mackerel - 27 million pounds.

This is equal to the current best estimate of MSY for Spanish mackerel based on the adjusted recreational catch estimate for 1975 (see Section 5.4.2.1).

Cobia - Optimum yield equal to the available amount of cobia of a size equal to or greater than 33 inches fork length.

This amount is estimated to be approximately 1,000,000 pounds for 1981.

The Councils realize that the estimates of MSY used to determine OY and user group catch allocations were to a great degree, based on the best available estimate of present catch. If better landing statistics become available and indicate that the present landing statistics and associated estimates of MSY are in error, then the Councils will reevaluate MSY, OY and user group allocations before actions to severely restrict any part of the coastal migratory pelagic fishery are taken.

12.6 Recommendations by the Councils

12.6.1 Special Recommendations to the Secretary of Commerce

The Councils recommend several areas where special research is needed. These are listed in priority order in FMP Section 14.4.

12.6.2 Special Recommendations to the States

A. In the future, effective and equitable management will require a workable means of differentiating true commercial from true recreational fishermen. This is particularly important in implementing allocations to user groups. Therefore:

The Councils formally recommend to each state in their area that consideration be given to requiring all persons who sell fish to have a commercial license, that the commercial license be of significant dollar value and that severe penalties be levied against any commercial operator purchasing fish from an individual not possessing a commercial license.

B. The Councils recommend that the states implement the management measures proposed in this plan within their territorial jurisdiction, where applicable. The Councils further encourage the states to assist the Secretary in addressing and supporting the research and other special recommendations.

13.0 MEASURES, REQUIREMENTS, CONDITIONS OR RESTRICTIONS SPECIFIED TO ATTAIN MANAGEMENT OBJECTIVES

The following summarizes the management measures which were specified for the coastal migratory pelagic fishery. Specific details and impacts of specified management measures are presented in Section 12.3.

13.1 Permits and Fees

No permits or fees will be required for vessels fishing in the coastal migratory pelagic fishery. However, a statistical reporting system incorporating mandatory reporting of catch by user groups and a vessel enumeration system to determine the vessels fishing the FCZ will be implemented.

13.2 Time and Area Restrictions

Potential time and area restrictions are specified as a contingency measure for resolving gear and user group conflicts in the king and Spanish mackerel fisheries. These are described under Management Measure A in Section 12.3.1.1 (king mackerel) and A in Section 12.3.2.1 (Spanish mackerel). Time and area restrictions are potential tools to be implemented, if appropriate, by the Secretary after consultation with the affected Councils to resolve a specific conflict.

Management Measure B for king mackerel in Section 12.3.1.1, if implemented, will separate hook and line and net vessels in the FCZ off the counties of Indian River and St. Lucie, on the Florida Atlantic coast. This is to resolve an existing gear conflict.

13.3 Catch Limitations

A. Total Allowable Level of Foreign Fishing

The total allowable level of foreign fishing (TALFF) is specified as zero for both the king and Spanish mackerel fisheries. U.S. fishing vessels have the capacity, intent, and are expected to harvest the optimum yield in both these fisheries in 1982 (See Sections 8.2.7, 8.2.8 and 8.5).

B. Types of Catch Limitations

Management Measure C in Section 12.3.1.1 establishes a total annual allowable catch of 37 million pounds in the king mackerel fishery. There is a 28 million pound allocation for the recreational fishery and a nine million pound allocation for the commercial fishery. The commercial allocation is divided into hook and line gears - 3,877,200 pounds, net gears - 5,122,800 pounds. If any of the allocations are exceeded, the fishery will be closed for the remainder of the fishing year.

Management Measure D in Section 12.3.2.1 specifies that the fishery for Spanish mackerel will cease when the OY of 27 million pounds is harvested.

Management Measure E in Section 12.3.1.1 and C in Section 12.3.2.1 establish framework measures for implementing recreational bag limits and commercial trip limits for king and Spanish mackerel, if the need arises. Measure E also provides for a size limit for king mackerel.

Management Measure B in Section 12.3.2.1 sets a 12-inch minimum fork length size limit for Spanish mackerel in both the commercial and recreational fisheries. A catch allowance for undersized fish of five percent of total catch by weight of Spanish mackerel on board a vessel will be allowed.

Management Measure A for cobia in Section 12.3.3.1 sets a minimum size limit of 33 inches fork length.

Limits on purse seine harvest of king and Spanish mackerel are established by Measure A in Section 12.3.4.1.

13.4 Types of Vessels, Gear and Enforcement Devices

Management Measure D in Section 12.3.1.1 sets a minimum mesh size of 4-3/4 inches stretch mesh for king mackerel gill nets.

13.5 State, Local and Other Laws and Policies

Spanish mackerel Managment Measure B sets a 12-inch minimum size limit (commercial and recreational) which is the same as limits imposed by the states of Florida and South Carolina.

King mackerel Management Measure E sets a minimum gill-net mesh size of 4-3/4 inches for directed king mackerel fisheries. This is the same as Florida law.

13.6 Limited Access System

A system of limited access to the coastal migratory pelagic fishery was found not to be appropriate at this time.

13.7 Habitat Preservation, Protection and Restoration

While there are certain areas of habitat important to the coastal migratory pelagic fishery, no specific preservation or restoration measures were found to be necessary in this plan at this time.

13.8 Development of Fishery Resources

There is a specific objective in the plan for Spanish mackerel (number four in Section 12.1) to promote the maximum use of the resource up to the OY estimate.

13.9 Management Costs and Revenues

No sources of revenue, other than fines from violators, have been identified in this plan. Permits are not required from any user group.

The mechanics of enforcement of the measures in this plan have not been finalized at this point. On-site enforcement under the Fishery Management and Conservation Act is the responsibility of the U.S. Coast Guard. It is possible, also that enforcement agreements would be entered into with various states.

Preliminary estimated costs to government for data collection and enforcement of the proposed regulations is $376,303. This estimate includes:

Monitoring and data collection		$ 81,859
Enforcement		
Coast Guard	$184,444	
NMFS	$110,000	
Total		$294,444
Total Annual Costs		$376,303

14.0 SPECIFICATION AND SOURCE OF PERTINENT FISHERY DATA

14.1 General

Certain key data are vital to effective fishery management. Better statistics on catch and effort are needed to provide more precise management information for the coastal pelagic fishery. The type of data specified in this plan to be required from the public has been carefully considered to minimize the burden on respondents while obtaining the necessary information. This will be achieved by using statistical sampling where practical, rather than a complete census approach. Also, the statistical reporting system specified in this plan will be integrated with those for all plans in the respective Council areas in order to achieve efficiency and standardization. The required data elements have been carefully considered so as to require only those for which there is a critical need. In addition to statistical data collection, areas of needed research have been specified in order to encourage appropriate groups to undertake efforts to improve the information base for effectively managing the fishery.

14.2 Domestic and Foreign Harvesters

Reporting requirements for domestic fishermen are discussed in Section 12.3.5.

In addition to the above data reporting provisions, the Councils have recommended that the National Marine Fisheries Service provide the Councils with a draft logbook for distribution to the coastal migratory pelagic recreational fishermen that could be filed on a voluntary basis.

There are currently no foreign fishermen participating in the fishery except for an inconsequential incidental catch. No TALFF (total allowable level of foreign fishing) will be available under this plan. However, foreign fishermen taking species in the managment unit as a bycatch must cooperate in reporting the amount of such catch.

14.3 Processors

Processors are required to report under the provisions in Section 12.3.5. Such reporting will include the duty to cooperate in gathering commercial catch and trip ticket data for those who purchase directly from fishermen.

14.4 Areas of Research Needed to Improve the Management Information Base

Effective management of the coastal migratory pelagic resources will be fostered as improved research information becomes available. The Councils have recommended:

A. That the research needs as they apply to king mackerel be instituted according to the following priority order:

   1. Provide better estimates of recruitment, natural mortality, fishing mortality and standing stock for king mackerel. Information is needed on mortality resulting from the bycatch of king mackerel in the Spanish mackerel fishery. Specific information should include an estimate of total amount caught and distribution of catch by area, season and type of gear. Determining the catch in gill-net gear should be given first priority.

   2. Determine the number of separate stocks of king mackerel, their seasonal distribution and migration patterns and the distribution of fishing effort between stocks.

   3. Determine size distribution of the catch by area.

4. Determine the effect of purse seine use on king mackerel stocks. Research should include size distribution of the catch, bycatch of other species, catch per unit effort, ability of fishermen to determine the size and species composition of the catch prior to pursing the net, and ability to release a school unharmed. If this research results in any harvest of king mackerel, other than normal commercial catches, that harvest should be limited to no more than 400,000 pounds.

5. Conduct migration studies to determine normal king mackerel migration routes, variations in these routes, and the climatic or other factors responsible for these variations.

6. Determine the relation between migration of prey species (i.e., herring), and the migrations of king mackerel.

7. Assess the extent and effect of gill-net fallout.

B. That the research needs as they apply to the Spanish mackerel stock be instituted according to the following priority order:

1. Provide better estimates of recruitment, natural mortality rates, fishing mortality rates, and standing stock.

2. Determine the number of separate stocks, their seasonal distribution, migration patterns and the distribution of fishing effort between stocks.

3. Determine the effect of purse seine use on Spanish mackerel stocks. Research should include size distribution of the catch, bycatch of other species, catch per unit effort, ability of fishermen to determine the size and species composition of the catch prior to pursing the net, and ability to release a school unharmed. If this research results in any harvest of Spanish mackerel, other than normal commercial catches, that harvest should be limited to no more than 400,000 pounds.

4. Conduct migration studies to determine normal and changes in coastal migratory pelagic migration routes and the climatic or other factors responsible for changes in the environmental and habitat conditions which may affect the habitat and availability of stocks.

5. Assess the extent and effect of gill-net fallout.

6. Determine the relation between migration of prey species (i.e., herring), and the migration pattern of the stock.

Better estimates of recruitment, natural mortality, fishing mortality, and size of standing stocks are important to provide more precise esimates of MSY. Knowledge of king mackerel bycatch in the Spanish mackerel fishery is needed because of the possibility that this bycatch may be large enough to adversely affect the directed king mackerel fishery. Determining the number and characteristics of separate stocks (if any) of king and Spanish mackerel is important because of the possibility that separate stocks exist and that some stocks may be fished more heavily than others. Size distribution of the catch and any differences by area will be very important if the Councils consider size limits on king mackerel as a method to limit total harvest. This may require a long-term, on-going sampling program. Migration studies are needed because questions have arisen as to the reasons for king and Spanish mackerel not being as abundant in certain areas during certain years. In particular, fishermen have pointed out that king mackerel became less and less abundant during 1976, 1977, and 1978 in areas of the northern Gulf of Mexico. A better understanding of the cyclic nature of king and Spanish mackerel migrations and the possible relationship to migration of prey species would greatly contribute to their effective management. Research on the extent and effect of gill-net fallout is needed to resolve questions which have been raised as to the number of fish killed but not harvested during gillnetting operations and the effect that this has on the status of the stocks. A research project on this topic has been initiated for king mackerel.

15.0 RELATIONSHIP OF THE RECOMMENDED MEASURES TO EXISTING APPLICABLE LAWS AND POLICIES

15.1 Fishery Management Plans

Existing or anticipated fishery management plans have little effect on the Coastal Pelagic Management Plan. Implemented plans which affect the management area are the Shrimp and Stone Crab Plans in the Gulf and the Surf Clam Plan on the Atlantic Coast. Fishing for, or regulation of stone crabs have no significant impact on coastal pelagics. The Shrimp Plan may effect coastal pelagics through preditor-prey relations. The Shrimp Plan will promote long-term reduction in bycatch of groundfish, a significant food source for mackerels. This may have some beneficial effect on mackerel populations. Plans likely to be implemented in the near future include spiny lobster, Gulf reef fish, and coral. None of these plans is expected to have significant impact on coastal pelagic resources.

Implementation of this FMP will have little impact on other management plans. Harvest of coastal pelagics has little if any impact on species regulated by other FMPs. There is substantial overlap of fishermen and vessels between coastal pelagics and spiny lobster, stone crab, and reef fish. However, this FMP is not expected to result in any displacement of user groups or major changes in abundance of coastal pelagics. Therefore, it is not likely that the FMP will substantially affect fishing activity for other species.

The statistical reporting system proposed in this plan will be implemented as part of the total data collection effort for all plans in the Gulf and south Atlantic regions. This will achieve coordination, minimize costs and keep to a minimum the burden on respondents.

15.2 Treaties or International Agreements

There is no significant foreign participation in the Gulf and south Atlantic coastal pelagic fishery. There are no specific treaties or international agreements applicable to this management unit other than the general governing international fishery agreements. These are general bilateral agreements in which the participating nations agree to abide by the fishing regulations of the other nation when fishing in their waters. Currently there have been no applications for foreign fishing permits for any species in the mangement unit in the Gulf and south Atlantic regions. There is reportedly an occasional but insignificant incidental catch of king mackerel by Japanese longline vessels.

15.3 Federal Laws and Policies

Many federal laws and policies relate to this management unit in a peripheral way. However, there are no applicable federal laws or policies which will significantly constrain any of the measures of this plan. The intent of all data collection efforts under this plan is to maintain the confidentiality of individual responses as specified by the Privacy Act. Porpoises which are protected under the Marine Mammal Protection Act occasionally interfere with catching species in the management unit, and cause certain problems for fishermen; however, the provisions for this plan do not threaten the existence of the porpoise. Section 7 consultations have been conducted to determine if measures in this plan have adverse impacts on any threatened or endangered species as listed under the Endangered Species Act. A Section 7 consultation with the National Marine Fisheries Service concerning sea turtles and marine mammals resulted in a biological opinion that the plan was not likely to jeopardize these species. Consultation with the U.S. Fish and Wildlife Service resulted in a conclusion that the FMP will have no affect on the brown pelican or the West Indian manatee. The plan is in keeping with the Coastal Zone Management Act (see Section 7.3). Other federal laws such as the Marine Protection, Research and Sanctuaries Act may constrain fishing for the species in the management unit to a limited extent; however, there are no adverse affects to management under this plan.

15.4 State and Local Laws and Policies

Florida, and some other states in the absence of federal law, have claimed jurisdiction over the "operations of all fishermen and vessels of this state engaged in the taking of such fishery resources within or without the boundaries of state waters." (Florida State Code, Section 370.02 (1) (a)). Such extended state jurisdiction has been upheld in the courts prior to the federal government's initiation of a management program under the FCMA. The FCMA is assumed to supercede the state code in all waters beyond the state territorial sea to the 200 mile limit coming under federal jurisdiction. In most cases, those state laws and policies not in agreement with this FMP will not adversely impact proposed management measures for the FCZ, nor will they impact overall management of the fishery.

There are two cases where conflicting state laws may impact measures in this plan. Texas prohibits possession of Spanish mackerel smaller than 14 inches fork length. This is not expected to be a severe problem. The State of Florida prohibits possession of foodfish (except tuna) taken with a purse seine both inside and outside state waters. This law will conflict with activity legal under the plan. Florida also prohibits possession of gill nets used for taking of king mackerel which have a hanging depth of more than 200 meshes, 4-3/4 inch stretch mesh in any county along the Atlantic coast, with the exception of Monroe County. This may interfere with gill-net operators fishing in the FCZ. If tested in court, it is likely that the portions of these laws which apply to fishing in the FCZ will be struck down. If this happens, it will become more difficult for the state to enforce these regulations as they apply to state waters.

In the future, effective and equitable management will require a workable means of differentiating true commercial from true recreational fishermen. This is particularly important in implementing allocations to user groups. Therefore, the Councils have recommended that each state give consideration to requiring all persons who sell fish to have a commercial license, that the commercial license be of significant dollar value and that severe penalties be levied against any commercial operator purchasing fish from an individual not possessing a commercial license.

16.0 COUNCIL REVIEW AND MONITORING OF THE PLAN

16.1 General Approach

The Gulf of Mexico and South Atlantic Fishery Management Councils will, after approval and implementation of this plan by the Secretary, maintain a continuing review of the fishery managed under this plan by the following methods:

A. Maintain close liaison with the management and enforcement agencies involved to assess the condition of the stocks and the effectiveness of the management measures and regulations and compliance by the fishermen with the regulations. The state resource agencies, National Marine Fisheries Service (NMFS), and the U.S. Coast Guard are the primary agencies with which especially close liaison will be established for plan monitoring.

B. Maintain close liaison with the members of the Coastal Migratory Pelagic Subpanel of the Council's Fishery Advisory Panel to assess the effectiveness of the management measures (and regulations) and the need for implementation of other measures or revisions of existing measures.

C. Promote research to increase the knowledge of the fishery and resources by the following methods:

   a. Identify the research required for better management of the fishery and resource.

   b. Request the National Marine Fisheries Service (NMFS) to consider these research needs and identify those which they can immediately address and those which will require efforts by other agencies or groups.

   c. Request state and university participation in research under their own programs to fill these data needs.

   d. Provide Council funding for research that cannot be addressed by NMFS, state and university entities.

   e. Assess the effectiveness of the statistical reporting system and recommend changes to NMFS or fund specific one-time surveys for data collection where data gaps exist.

D. Conduct public hearings at appropriate times and locations in the areas where the fishing effort is concentrated to hear testimony on the effectiveness of all aspects of the plan and the changes needed in the plan.

E. Consider by Council and its advisory groups all information gained from the first four activities listed above, and if necessary, prepare amendments to the plan. Hold public hearings on the amendments prior to sending them to the Secretary.

16.2 Specific Monitoring Considerations

A. Status or condition of the stocks.

Maximum sustainable yield will be determined based on best available data. The condition of the stocks will be periodically reviewed to determine if overfishing is occurring. As the statistical reporting system is improved and other research is completed, these additional data will be carefully reviewed to determine if changes in management measures are needed.

B. Catch Limits.

If the catch appears as if it will exceed or has exceeded any of the catch allocations in the plan, the Councils will review the data as of that time to determine whether the excess catch is a result of high abundance of fish, increased local availability, increased effort, or inaccuracies in the historical landings data. If appropriate, recommendations for bag limits or size limits will be forwarded to the Regional Director, NMFS.

If the updated MSY so indicates, the allocations will be changed accordingly by plan amendment.

C. Gear or User Group Conflicts.

If gear or user group conflicts arise, the appropriate Council will investigate the causes and extent of the conflict, potential solutions to the conflict, the economic and social impacts of any proposed limitations on any user group, and other factors as appropriate. Recommendations for appropriate action will be made to the Regional Director, NMFS. Public hearings will be held as appropriate to hear testimony concerning significant conflicts.

D. Harvesting Practices.

Harvesting practices proposed under the plan will be evaluated for their effectiveness and for the additions, deletions or modifications needed. In particular, the results of limited commercial purse seining and the proposed research programs to determine the effects of purse seining of king and Spanish mackerel will be carefully reviewed.

E. Standardization of Management Measures.

The Council will continue to work with the affected states to attempt to standardize regulations for the fishery in the FCZ and state territorial waters, where such standardization will serve a useful purpose.

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FINAL ENVIRONMENTAL IMPACT STATEMENT
FOR THE
COASTAL MIGRATORY PELAGIC RESOURCES (MACKERELS)
FISHERY MANAGEMENT PLAN

PREPARED BY

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Summary Sheet

Environmental Impact Statement for the
Coastal Migratory Pelagic Fishery Management Plan

( ) Draft (X) Final Environmental Statement

Responsible Agencies:

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1. Name of Action (x) Administrative ( ) Legislative

2. Description of Action:

The proposed action will result in management of the coastal migratory pelagic fisheries in the Gulf of Mexico and south Atlantic Fishery Conservation Zone (FCZ). The species involved are king, Spanish, and cero mackerel, little tunny, cobia, dolphin and bluefish. The basic objectives are to manage the fishery to obtain the optimum yield, establish a statistical reporting system for monitoring catch, and minimize gear and user group conflicts. Management measures include mechanisms for preventing gear and user group conflicts, a total allowable catch for king mackerel and Spanish mackerel, certain size limits, and limits on purse seines while their effects are evaluated. Limited mandatory statistical reporting will be required by user groups. The management actions will be implemented under the Magnuson Fishery Conservation and Management Act of 1976.

3. Summary:

a. Impacts

The plan will help prevent maximum sustainable yield from being exceeded for king and Spanish mackerel and will contribute to stock abundance of cobia. Other stocks in the management unit are not in danger of being overfished. There are no significant adverse impacts to the stocks being addressed as a result of the proposed action.

No changes to other aspects of the physical environment are expected as a result of this action.

Minor adverse economic impacts may occur under certain conditions (but will not necessarily occur) to present users of the resource.

Gear and user group conflicts will be minimized.

b. Unavoidable Adverse Impacts

Measures to protect the long-run yield or avoid conflicts in the fishery have a small potential for causing minor economic disruption.

Biological management tools do not exist to currently deal with localized fluctuations in stock availability, which are believed to be due to natural environmental factors.

4. Alternatives:

Alternatives to the proposed action included no regulation, regulating to obtain higher or lower optimum yields, and restricting certain user groups more than others.

5. Comments Requested:

Department of Commerce
Department of the Interior
Department of State
Environmental Protection Agency
State resource agencies:

Texas
Louisiana
Mississippi
Alabama
Florida
Georgia
South Carolina
North Carolina

All fishery management councils
Southeastern Fisheries Association
Louisiana Shrimp Association
American Shrimp Canners Association
Florida League of Anglers
Gulf States Marine Fisheries Commission
Sea Grant Advisory Services:

Texas
Mississippi-Alabama
Florida
Louisiana
Georgia
South Carolina
North Carolina

Sport Fishing Institute
Louisiana Wildlife Federation
Organized Fishermen of Florida
Key West Charter Boat Association
Islamorada Charter Boat Association
National Coalition for Marine Conservation

Coastal Zone Management Offices:

Texas
Louisiana
Alabama
Florida
South Carolina
North Carolina

6. The Draft Fishery Management Plan and Environmental Impact Statement were subjected to a 45-day period of public review beginning February 7 and ending March 24, 1980. During this period, 25 hearings were held and a large number of written comments received by mail. Following rejection of the FMP by the Secretary of Commerce and revision of purse seine restrictions for the south Atlantic region, four more hearings on the FMP were held in June, 1981. Summaries of the comments and a response to each are provided in Appendix I.

The public hearings on the DEIS/FMP were held as follows:

Date	City	Location
February 20, 1980	Ft. Lauderdale, Florida	Broward County Court House
February 21, 1980	Jacksonville Beach, Florida	City Council Chambers
February 26, 1980	Ft. Pierce, Florida	County Civic Center
March 3, 1980	Brunswick, Georgia	County Regional Library
March 4, 1980	Savannah, Georgia	Savannah Science Museum
March 5, 1980	Beaufort, South Carolina	County Council Meeting Room
March 6, 1980	Charleston, South Carolina	Marine Resources Center
March 10, 1980	Hatteras, North Carolina	Hatteras Civic Center
March 11, 1980	Morehead City, North Carolina	Carteret Technical Institute Auditorium
March 12, 1980	Wilmington, North Carolina	Hilton Inn
March 13, 1980	Myrtle Beach, South Carolina	Swamp Fox Motel
March 10, 1980	Marathon, Florida	Marathon High School Cafeteria
March 11, 1980	Fort Myers, Florida	Hall of Fifty States
March 12, 1980	St. Petersburg, Florida	Bayfront Center, Neptune Room
March 13, 1980	Destin, Florida	St. Andrews Episcopal Church
March 10, 1980	Port Isabel, Texas	Port Isabel Community Center
March 11, 1980	Port Aransas, Texas	Port Aransas Community Center
March 12, 1980	Houston, Texas	Shamrock Hilton Hotel
March 18, 1980	Mobile, Alabama	Davidson High School Cafeteria
March 19, 1980	Biloxi, Mississippi	Biloxi Cultural Center (Library)
March 13, 1980	Lake Charles, Louisiana	Downtowner Motor Inn
March 18, 1980	New Orleans, Louisiana	Chamber of Commerce Auditorium
March 19, 1980	Baton Rouge, Louisiana	Knapp Hall, LSU Cooperative Extension Center
March 20, 1980	Houma, Louisiana	Houma City Auditorium (Wing)

Public hearings on the revised FMP were held as follows:

Date	City	Location
June 24, 1981	Charleston, South Carolina	Marine Resources Center
June 24, 1981	Greenville, North Carolina	East Carolina University
June 25, 1981	Savannah, Georgia	Savannah Science Center
June 25, 1981	Palm Beach Gardens, Florida	North County Court House

7. Draft Statement to CEQ: January 25, 1980.

8. Final Statement to CEQ: April 23, 1982.

ENVIRONMENTAL IMPACT STATEMENT
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I. INTRODUCTION

This Final Environmental Impact Statement (FEIS) describes the probable impacts of implementing regulations for the Coastal Migratory Pelagic Resources Fishery Management Plan (FMP). This FMP has been prepared jointly by the Gulf of Mexico and South Atlantic Fishery Management Councils.

The Coastal Migratory Pelagic Resources are those species in the waters of the Gulf of Mexico and in the coastal and fishery conservation zone (FCZ) off the south Atlantic coast as specified below. The area of proposed management is the fishery conservation zone in the jurisdiction of the Gulf and South Atlantic Fishery Management Councils. The management unit consists of the following species:

King mackerel (Scomberomorus cavalla)

Spanish mackerel (Scomberomorus maculatus)

Cobia (Rachycentron canadum)

Species considered to be in the fishery but not in the management unit are:

Cero mackerel (Scomberomorus regalis)

Little tunny (Euthynnus alletteratus)

Dolphin (Coryphaena hippurus)

Bluefish (Pomatomus saltatrix)

These species are closely associated with the species in the management unit and are caught in the fishery. Bluefish is only included in the Gulf of Mexico because a separate Bluefish Management Plan is being prepared for the Atlantic coast.

This FMP has been prepared under the authority of the Magnuson Fishery Conservation and Management Act of 1976 (MFCMA) and the FEIS has been prepared in accordance with the National Environmental Policy Act of 1969 (NEPA).

The fishery management plan provides the basis for the determination of regulations to most effectively manage the fishery and harvest the optimum yield (OY) which will provide the greatest benefit to the nation. The plan considers the needs of the various user groups in the fishing industry, recreational groups, consumers, environmental organizations, and other interested parties.

Much of the background information and analysis used to produce the EIS are contained in the FMP itself. Where appropriate, references are made to the relevant sections of the plan.

The coastal migratory pelagic management unit is important both to commercial and recreational fishermen. All of the species in the management unit are sought after by recreational fishermen including both charterboat and private boat fishermen. King mackerel, Spanish mackerel and bluefish are of major commercial importance. While the other species are caught commercially to some degree, they are relatively unimportant as primary commercial target species.

II. STATEMENT OF THE PROPOSED ACTION

The proposed action is to implement a fishery management plan for coastal migratory pelagic resources establishing a management regime for the Gulf of Mexico and south Atlantic fishery conservation zones. This area extends from North Carolina to Texas.

11.1 Specific Management Objectives

In consideration of the relevant biological, economic, social and ecological factors, management objectives have been specified for the coastal migratory pelagic resources management unit:

King Mackerel

1. Institute management measures necessary to prevent exceeding maximum sustainable yield.

2. Establish a mandatory statistical reporting system for monitoring catch.

3. Minimize gear and user group conflicts.

Spanish Mackerel

1. Institute management measures necessary to prevent exceeding maximum sustainable yield.

2. Establish a mandatory statistical reporting system for monitoring catch.

3. Minimize gear and user group conflicts in the event they arise.

4. Promote the maximum use of the resource up to the OY estimate.

Cobia

1. Institute management measures necessary to increase yield per recruit and average size and prevent overfishing.

11.2 Maximum Sustainable Yield

Values for the maximum sustainable yield (MSY) for species in the management unit are given below. Detailed discussions are presented in Section 5.4 of the attached FMP.

King mackerel - 37 million pounds annually

Spanish mackerel - 27 million pounds annually

Cobia - 1,057,000 pounds annually

11.3 Specification of Optimum Yield

Detailed analysis of the OY values below are given in the attached FMP, Section 12.2.

King mackerel - 37 million pounds annually.

Spanish mackerel - 27 million pounds annually.

Cobia - All cobia equal to or larger than 33 inches fork length which will be harvested by U.S. fishermen.

11.4 Total Allowable Level of Foreign Fishing

The total allowable level of foreign fishing (TALFF) is specified as zero for the king mackerel, Spanish mackerel and cobia fisheries. United States fishing vessels have the capacity, intent, and are expected to harvest the optimum yield for all three of these species. This is explained in detail in Sections 8.2.8 and 13.3 of the attached FMP.

11.5 Management Measures and Statistical Reporting Measures Recommended

The following measures are recommended to the Secretary of Commerce for action:

11.5.1 King Mackerel

A. The Secretary of Commerce may implement measures designed to provide limitations, where appropriate, on any gear or device used in the king mackerel fishery to reduce gear and user group conflicts. The Secretary, after consultation with the affected Councils, may take the following action by regulatory amendment based on the following criteria:

(1) When a conflict arises through expansion of a historical fishery in a traditional fishing area or region, the Secretary shall investigate the causes and extent of the conflict, the economic and sociological impacts of any viable limitations on the expanded fishery or other users, other solutions to the conflict and other relevant factors. The Secretary, after consultation with the affected Councils and states, may resolve the conflict as fairly as possible by taking one or more of the following actions:

(a) Separate the users or gear by area (fishing zone).

(b) Separate the users or gear by time (day of week).

(c) Assign local quotas to each gear or user group based on the historical catches of each for that local area.

(d) Allow unlimited usage of the gear or device.

(2) When the conflict arises through the introduction of gear or devices into new regions where they have not been historically fished, the Secretary shall investigate the harvesting capacity and efficiency of the new gear or device in the local area, the economic and sociological impacts on users of historical gear, the historical level of stock abundance in the area and the other relevant factors. The Secretary may, after consultation with the affected Councils and states, take one or more of the following actions:

(a) Prohibit use of the gear or device in that geographical area.

(b) Allow only limited use of the gear or device to more fully evaluate its impacts and potentials.

(c) Limit the number of units of the gear or device which can be utilized in that area.

(d) Allow unlimited usage of the gear or device.

(3) When a conflict arises as a result of circumstances in the fishery, other than as described in (1) or (2) above, the Secretary may implement measures designed to obviate such conflicts by measures provided for in (1) and (2) above, or take such other action as may be appropriate and necessary to resolve such conflicts in a manner consistent with the goals and objectives of the plan, the National Standards, the MFCMA and other applicable law.

The following management measure addresses a specific gear and user group conflict which has already developed in the FCZ off the coast of Florida between 27° 50' north latitude and 27° 0.6' north latitude.

B. When the Regional Director, Southeast Region, NMFS, determines, based on reliable information, that a conflict, as described in FMP Section 8.2.6, exists or is about to exist, he will take one of the following actions by field order. The time period during which such restrictions shall be enforced will be determined by length of time a direct conflict exists or is expected to exist.

(1) Establish a fishing window within the following points:

(a) Bethel Shoal light (27° 44.3'N, 80° 10.4'W).

(b) A wreck 15 miles southeast of Fort Pierce Inlet (27° 23.5'N, 80° 3.7'W).

(c) Marker WR 16, five miles northeast of Jupiter Inlet (27° 0.6'N, 80° 2.0'W).

(d) 100 fm depth due east of point c (27° 0.6'N, 79° 55.0'W).

(e) 100 fm depth due east of point b (27° 23.5'N, 79° 54.0'W).

(f) 100 fm depth due east of point a (27° 44.3'N, 79° 53.5'W).

The Regional Director may prohibit use of gill-net gear to take king mackerel within the area a-b-e-f, b-c-d-e or a-c-d-f. If additional action is needed, prohibit use of hook and line gear to take king mackerel within a window landward of a line between the points a-b, b-c or a-c.

(2) Establish two fishing zones seaward (east) of state jurisdiction. These zones shall be the waters of the FCZ between 27° 10' north latitude and 27° 50' north latitude divided into two areas along the line of 27° 30' north latitude.

(a) In the first year in which a conflict arises, the use of gill nets for taking of king mackerel shall be prohibited in the area south of 27° 30' north latitude and use of hook and line gear for taking of king mackerel shall be prohibited in the area north of 27° 30' north latitude. In any succeeding year when a conflict develops, the area in which each gear is prohibited may be changed.

(b) When a conflict arises, use of each gear within the zone between 27° 10'N and 27° 50'N may be alternated daily.

(i) On even days of the month, use of gill-net gear to take king mackerel may be prohibited.

(ii) On odd days of the month, use of hook and line gear to take king mackerel may be prohibited.

(c) Close the fishery for king mackerel to all users within the zone between 27° 10'N and 27° 50'N. This measure shall only be imposed if the conflict results in:

(i) Death or serious bodily injury.

(ii) Significant gear loss.

Procedures for evaluating the existence of a conflict:

(1) The following procedures must be employed by the Regional Director in his decision process regarding the existence of a conflict for which a field order is appropriate and prior to the implementation of such a field order.

(a) At such time as the Regional Director is advised by any party that a conflict exists, he must confirm the existence of such a conflict through information supplied him by NMFS, U.S. Coast Guard or other appropriate law enforcement agencies.

(b) In the event that such information is not ascertainable from those law enforcement personnel as provided in (a) above, such confirmation may be made through information supplied by personnel of the state agency with marine fishery management responsibility.

(c) Confer with the Chairmen of the affected Councils, the office of the state agency(s) with the marine fishery management responsibility, and such other persons as the Regional Director deems appropriate, if any.

(2) Restrictions on field orders

(a) No field order may be implemented which results in the exclusive access of any user group or gear type to the fishery during the time the field order is in existence.

(b) A field order may be rescinded by the Regional Director if he finds through application of the same procedures set forth in (1) above that the conflict no longer exists.

(c) No field order may be implemented for a time period greater than five (5) days except under the conditions set forth in Section (e) above.

(d) At such time as the Regional Director submits to the Federal Register a field order for implementation under these provisions, he shall immediately arrange for a fact-finding meeting in the area of the conflict to be convened no later than 72 hours from the time of implementation of the field order. The following shall be advised of such fact-finding meeting:

(1) The Chairment of the affected Councils;

(2) The office of the state agency with fishery management responsibility;

(3) Local media;

(4) Such user group representatives or organizations as may be appropriate and practicable;

(5) Others as deemed appropriate by the Regional Director or as requested by Chairmen of the affected Councils or the state agency.

This fact-finding meeting shall be for the purpose of evaluating the following:

(1) The existence of a conflict needing resolution by the field order;

(2) The appropriate term of the field order, i.e., either greater or less than five (5) days;

(3) Other possible solutions to the conflict other than federal intervention;

(4) Other relevant matters.

(e) In the event it is determined as a result of the fact-finding meeting that the term of the field order should exceed five (5) days, the Regional Director may, after consultation with the Chairmen of the affected Councils and the involved state agency, extend such field order for a period not to exceed 30 days from the date of initial implementation. In the event the Regional Director determines that it is necessary or appropriate for the term of such field order to extend beyond 30 days, such extension may be made after consultation with the Chairmen of the affected Councils and for such period of time as necessary and appropriate to resolve the conflict.

C. A total allowable catch shall be established at 37 million pounds per year.

(1) Annual stock allocations shall be made as follows: 28 million pounds for the recreational fishery and nine million pounds for the commercial fishery.

(2) The commercial allocation shall be divided between hook and line gears and net gears as follows:

Hook and line:	3,877,200 pounds
Net	5,122,800 pounds

(3) If the catch of any user group exceeds its allocation, the Secretary shall close the fishery to that group for the remainder of the fishing year.

(4) Commercial and recreational fishermen defined as follows:

- A commercial fisherman is a person who sells his catch.

- A recreational fisherman is a person who does not sell his catch.

D. The minimum mesh size in the FCZ for all king mackerel gill nets shall be 4-3/4 inches stretched mesh in the Gulf of Mexico and South Atlantic Regional Councils' areas of jurisdiction.

E. (1) The Regional Director, Southeast Region, NMFS, may institute a bag limit for king mackerel taken by recreational or recreational for hire users and/or a trip limit for commercial users by the regulatory amendment process when supporting data becomes available and after consultation with the affected Councils.

(2) The Regional Director, Southeast Region, NMFS, may institute a size limit by the regulatory amendment process when supporting data becomes available and after consultation with the affected Councils.

11.5.2 Spanish Mackerel

A. The Secretary of Commerce may implement measures designed to provide limitations, where appropriate, on any gear or device used in the Spanish mackerel fishery to reduce gear and user group conflicts. The Secretary, after consultation with the affected Councils, may take the following action by regulatory amendment based on the following criteria:

(1) When a conflict arises through expansion of a historical fishery in a traditional fishing area or region, the Secretary shall investigate the causes and extent of the conflict, the

economic and sociological impacts of any viable limitations on the expanded fishery or other users, other solutions to the conflict and other relevant factors. The Secretary, after consultation with the affected Councils and states, may resolve the conflict as fairly as possible by taking one or more of the following actions:

(a) Separate the users or gear by area (fishing zone).

(b) Separate the users or gear by time (day of week).

(c) Assign local quotas to each gear or user group based on the historical catches of each for that local area.

(d) Allow unlimited usage of the gear or device.

(2) When the conflict arises through the introduction of gear or devices into new regions where they have not been historically fished, the Secretary shall investigate the harvesting capacity and efficiency of the new gear or device in the local area, the economic and sociological impacts on users of historical gear, the historical level of stock abundance in the area and the other relevant factors. The Secretary may, after consultation with the affected Councils and states, take one or more of the following actions:

(a) Prohibit use of the gear or device in that geographical area.

(b) Allow only limited use of the gear or device to more fully evaluate its impacts and potentials.

(c) Limit the number of units of the gear or device which can be utilized in that area.

(d) Allow unlimited usage of the gear or device.

(3) When a conflict arises as a result of circumstances in the fishery, other than as described in (1) or (2) above, the Secretary may implement measures designed to obviate such conflicts by measures provided for in (1) and (2) above, or take such other action as may be appropriate and necessary to resolve such conflicts in a manner consistent with the goals and objectives of the plan, the National Standards, the MFCMA and other applicable law.

B. Size Limit

(1) A 12-inch fork length minimum size limit shall be set on Spanish mackerel in both the commercial and recreational fisheries.

(2) A catch allowance for underized fish will be allowed equal to five percent of the total catch by weight of Spanish mackerel on board a vessel in the Spanish mackerel fishery or any other fishery.

C. The Regional Director, Southeast Region, NMFS, may institute a bag limit for Spanish mackerel taken by recreational or recreational for hire users and/or a trip limit for commercial users by the regulatory amendment process when supporting data become available and after consultation with the affected Councils.

D. If OY is taken, the fishery for Spanish mackerel will be closed for the remainder of that fishing year.

11.5.3 Cobia

A. Possession of cobia less than 33 inches fork length shall be prohibited in the FCZ.

11.5.4 Other Species

There are no management measures for other species in the management plan.

11.5.5 Proposed Purse Seine Measures

A. (1) Harvest of king mackerel by purse seine gear will be allowed up to a maximum of 400,000 pounds per year in the area of jurisdiction of the Gulf Council, and 400,000 pounds per year in the area of jurisdiction of the South Atlantic Council. Any purse seine harvest will be counted within the commercial allocation for all net gears.

(2) Harvest of Spanish mackerel by purse seine gear will be allowed up to a maximum of 300,000 pounds per year in the area of jurisdiction of the Gulf Council, and 300,000 pounds in the area of jurisdiction of the South Atlantic Council.

B. Observers, under the direction of the National Marine Fisheries Service, must be required on all purse seine vessels while fishing for king or Spanish mackerel during the first three fishing years after this plan is in effect.

11.5.6 Statistical Reporting System

Accurate and timely fishery data is needed for effective management of the coastal migratory pelagic resources. Therefore, the plan specifies the following provisions with respect to statistical reporting:

1. The Councils conceptually accept a vessel enumeration system and creel census data system that would provide sufficient information for fishery management. Mechanics of the system to be developed by National Marine Fisheries Service and the Regulatory Measures Committee.

2. Require a reporting system for all user groups and processors based on statistical sampling whereby it would be mandatory for a selected respondent to provide answers to the sample questionnaire on a recurring basis that is not of great frequency.

11.6 Description of Environment

Biological Environment

A description of the habitat of coastal pelagic species is included in Section 6.0 in the attached FMP. With the exception of dolphin, the species included in the coastal pelagic FMP inhabit the waters over the continental shelf. The dolphin are oceanic rather than coastal but are included in the fishery because fisheries for dolphin and for coastal pelagic species are intertwined. The five coastal species are not commonly thought of as being estuarine dependent; however, much of their food comes from estuaries. The bluefish is often found in estuaries, but the mackerels ordinarily are found only in larger estuaries where the freshwater dilution is not great.

The bluefish is considered to be a temperate and warm temperate species; whereas, the remaining species in this plan are subtropical and tropical. Two species, bluefish and dolphin, are cosmopolitan in their distribution. King mackerel is found in the western Atlantic and adjacent waters. Cero is confined to the West Indies and Florida. Spanish mackerel is restricted to the Atlantic and Gulf of Mexico coasts of North America and, unlike the king and cero mackerels, does not occur in the West Indies, except for Cuba. The ranges of all three mackerel species overlap in extreme south Florida.

All of these species, except the dolphin, move from one area to another and harvest seasonal abundance of local resources. Many of the prey species of the coastal pelagics are estuarine dependent in that they spend all or a portion of their lives in estuaries. This means that the coastal pelagic species, by virtue of the ultimate source of their food, are to some degree dependent upon estuaries also.

Maximum sustainable yield is a function of the carrying capacity of the environment. Detailed analysis of MSY, present and possible future condition of the stock is contained in Section 5.4 of the attached FMP. Section 5.3 gives the available information on ecological relationships with other species. Section 6.0 comments on the condition of the habitat and possible impacts by man.

Human Environment

The U.S. commercial fisheries for king and Spanish mackerel take place almost entirely within the Gulf of Mexico and south Atlantic regions. Between 1973 and 1977 over 98 percent of U.S. commercial king mackerel landings and approximately 95 percent of U.S. commercial Spanish mackerel landings were in Florida. Roughly five percent of total U.S. bluefish landings take place in the Gulf of Mexico.

The primary commercial user groups for species in the management unit include:

- o The Florida king mackerel hook and line fleet,
- o the Florida king mackerel large boat gill-net fleet,
- o the Florida small boat Spanish mackerel gill-net fleet, and
- o the Florida large boat Spanish mackerel gill-net fleet.

Many gill-net vessels of all sizes are equipped to fish for both king and Spanish mackerel.

Significant secondary commercial user groups include:

- o The southeast Florida small boat gill-net fleet which takes on supplemental catch of king mackerel,
- o the North Carolina charterboat fleet which rigs up for commercial king mackerel fishing in the spring and fall,
- o the Florida haul seine fleet which takes a supplemental catch of bluefish.

The species in the coastal pelagic fishery are highly sought after by recreational fishermen. Harvest of these species provides a significant recreational experience to a broad group of anglers throughout the Gulf of Mexico and south Atlantic regions. The fishery helps support a significant amount of economic activity and associated employment in the businesses which cater to the recreational angler.

In 1975 there were an estimated 6.4 million persons who participated in saltwater recreational fishing in the south Atlantic and Gulf of Mexico regions (see Section 8.2.1.2). Participation by species is estimated as follows:

Species	Total Anglers	Percent of Total Anglers
Bluefish	543,000	8.4
Cobia	24,000	0.4
Dolphin	396,000	6.2
King mackerel	717,000	11.2
Spanish mackerel	779,000	12.1
Little tunny	-	-
Total saltwater anglers in regions	6,428,000	

The attached FMP provides detailed description and analysis of participating user groups (see Sections 8.2.1 and 11.0), landings (Section 8.2.2), fishing areas (Section 8.2.3), vessels and gear (Section 8.2.4), employment (Section 8.2.5), domestic gear and social conflicts (Section 8.2.6), harvest and processing capacity (Sections 8.2.7 and 8.2.8), economic value of the fishery (Section 9.0), and relationships between different sectors of the commercial fishery (Section 10.0).

III. RELATIONSHIP OF THE PROPOSED ACTION TO LAND AND WATER USE PLANS, POLICIES, AND CONTROLS FOR THE AFFECTED AREA

The Coastal Zone Management Act of 1972 (P.L. 92-583) places responsibility for comprehensive land and water management of the coastal zone upon the coastal states. The Act also requires that federal actions directly affecting the coastal zone of a state be consistent (to the maximum extent possible) with the approved state program.

The Coastal Migratory Pelagic Fishery Management Plan has been reviewed by the Offices of Coastal Zone Management for the various states. Each determined that the plan is consistent with Coastal Zone Management Plans in those states (see FEIS Appendix II). This fishery management plan is not anticipated to produce any significant amount of adverse coastal area land development, nor will it adversely affect any habitat protected under coastal zone programs. Coastal zone programs generally promote the encouragement and protection of commercial fishing and recreational boating facilities. The coastal zone programs will help prevent degradation of estuarine areas. The coastal pelagic species can be expected to be detrimentally affected if the productive capabilities of estuaries are greatly degraded.

Offshore oil drilling in the Gulf of Mexico and other sources of oil pollution (ships discharging oil waste) may pose potential danger to the spawning activity of coastal pelagic species, particularly king mackerel. No specific problems have yet been documented. However, the magnitude of recent oil spills such as the IXTOC well blowout make clear the potential for serious adverse impact. This is particularly true for egg and larvae of these species (see FMP Section 6.1.2). Programs which work to prevent oil discharges offshore help prevent development of a potential problem.

While none of the affected states currently have a comprehensive management program for the coastal pelagic species, certain state regulations relate to this management plan (see FMP Sections 7.4, 7.5 and 15.4). Several states prohibit use of purse seines to take food fish inside state waters. Florida prohibits use of purse seines to take food fish or possession of food fish caught by purse seines (except tuna) within or without state waters. Florida has recently passed a law restricting the depth of gill nets to 200 meshes of 4-3/4 inches (approximately 57 foot fishing depth) in any county on the Atlantic coast except Monroe. This was designed to address the gear conflict which is also addressed by this plan. These two Florida laws will conflict with actions in the FCZ which are legal under this plan. South Carolina and Florida have minimum size limits of 12 inches for Spanish mackerel. Texas has a 14-inch size limit for Spanish mackerel. The Councils have recommended to each state that they adopt measures consistent with the FMP. In addition, they have recommended that each state adopt a commercial license of significant dollar value.

IV. PROBABLE IMPACT OF THE PROPOSED ACTION ON THE ENVIRONMENT

IV.1 Overall Impacts

This plan is not expected to have any severe adverse biological or ecological impacts on the species in the management unit. The optimum yield (OY) has been set equal to the best currently available estimate of maximum sustainable yield (MSY) for king and Spanish mackerel. The OY for cobia inherently prevents growth overfishing and makes recruitment overfishing unlikely. The OY's for mackerel permit some increase in the current catch and may result in slight declines in abundance, average size, and catch per unit effort. The catch limits should prevent overfishing of the stock since the best biological estimates available indicate that the stocks have not, to date, been fully exploited (see FMP Section 5.4).

Harvest of mackerels by purse seine is strictly limited by this FMP and will be carefully monitored to prevent any adverse biological impact on the stock. The size limit for Spanish mackerel will help ensure larger average fish sizes and help prevent recruitment overfishing.

There are some indications that cobia may be overfished in certain areas. The size limit will increase average fish size and yield under anticipated fishing effort even if the stock is not presently overfished.

There are no indications that the other species in the fishery are being overfished or will be adversely affected to any significant extent.

The plan will have no significant incremental impacts on stocks not in the management unit either through prey-predator or bycatch relationships. If the king mackerel allocation is reached, there may be some shift of effort to species not in the management unit. The plan is not believed to have any significant incremental impacts on other marine biota, water quality, or benthic habitat. The measures in the plan do not cause any changes in estuarine and wetlands habitats although prevention of degradation of such habitats is important in protecting the stocks in the management unit.

There are not expected to be any severe adverse impacts on present users of the resource as a result of the plan. The plan is designed to protect the stock for future users until more definitive data becomes available while keeping the adverse effects on present users to a minimum. The plan provides for a minimum of disruption to present commercial, recreational for hire, and private recreational fishermen as well as consumers, processors, and recreational fishing industries. There is some possibility that the allocation for king mackerel would be exceeded by one of the allocated user groups and fishing by that user group stopped.

This possibility is most likely for the net fishermen but would only occur occasionally because their annual catch varies greatly, and has exceeded the allocation in the past.

A smaller possibility exists that other user groups would be impacted. Commercial hook and line landings are much less variable than net landings and have never yet exceeded their allocation. Recreational catches may exceed their allocation in some years. Closure could occur for a short period in early summer in some years. Because of the difficulty in quickly obtaining recreational landings data, it is possible that total landings will not be known soon enough to allow closure of the fishery. If this situation occurs, measures in the FMP allow imposition of bag limits and size limits to limit or reduce total catch in the following season.

The management measures for reducing gear conflict have a beneficial impact on affected users by preventing strife and economic waste. They may result in some restriction although it is considered likely that the greater efficiency due to eliminating the conflict outweighs such negative aspects of the restrictions.

Other management measures have only minimal effects on users.- Also, there are no current foreign users of the fishery so the zero allowable level of foreign fishing will have no adverse impact on any foreign nation.

IV.2 Impacts of Specific Measures

IV.2.1 King Mackerel

Management Measure A recommends a framework which allows the Secretary and the Councils to consider and/or resolve any future gear and user group conflicts through regulatory amendment. The regulatory amendment process will provide for public review of environmental impacts of the regulatory measures proposed and their alternatives before any action is taken. Because of the time required by this process and the highly seasonal nature of the fishery, a regulatory amendment cannot normally regulate a conflict until the fishing season one year after the conflict develops. For conflicts where immediate action is needed, it may be necessary for the amendment to be implemented on an emergency basis during the public review period. This would only occur if the conflict is particularly serious, a clear solution is available, and the costs of delay outweigh the need for public review. If necessary, the regulation can be further modified in response to public review.

Gear and user group conflicts can occur suddenly and often require rapid action; prompt and equitable solutions to a developing conflict will contribute to the fair and orderly management of the fishery and efficient use of the resource. No adverse impacts are anticipated unless a specific conflict is addressed. Any negative impact will depend on what action, if any, is taken. If a conflict requiring action does occur, a user group may be restricted somewhat; however, any adverse social and economic impacts are expected to be minimal and more than outweighed by the increased efficiency and prevention of destruction gained by an orderly solution. Impacts of this measure are discussed in detail in the FMP Section 12.3.1.1.

Management Measure B addresses an existing conflict (see Section 8.2.6). It will be implemented only if necessary. It would restrict commercial hook and line users and net users by prohibiting use of each gear in certain areas and times. A detailed analysis of the impacts of this measure are found in the FMP Section 12.3.1.1.

Management Measure C which sets a total catch limit equal to MSY is intended to prevent overexploitation caused by increasing effort. Such overexploitation would cause a long-term decline in yield from the fishery. This measure is designed to ensure the long-term productivity of the stock and its environment. There are certain short-term adverse impacts which are discussed in the FMP Section 12.3.1.1.

The use of the minimum mesh size in Management Measure D will prevent the harvest by gill net of king mackerel below the optimum economic size and waste of fish lost from small mesh gill nets. No adverse impacts are expected. This measure will not require any change from gill-net gear presently in use. This measure is also consistent with current Florida law where nearly all king mackerel gillnetting takes place. No significant additional economic impact is estimated for this measure.

Management Measure E provides a method for rapid response to any future overfishing situation if other measures are ineffective. It also provides a way to restrict the fishery without closing it entirely if it seems likely that the total catch allocation will be exceeded. Until implemented, this measure has no impact of any kind. A more detailed analysis of impacts is found in FMP Section 12.3.1.1.

IV.2.2 Spanish Mackerel

Management Measure A gives the Secretary the ability to reduce conflicts by providing limitations where appropriate on any gear or device used in the Spanish mackerel fishery. These measures are identical to those designated for the king mackerel fishery and, similarly, will provide the same opportunity for public review of environmental impacts of the proposed measures and their alternatives. Having a framework in the plan to deal with gear conflicts is important because they could occur suddenly and require rapid action. No adverse impacts are anticipated unless a specific conflict is addressed. (See FMP Section 12.3.1 and 12.3.2).

If a conflict requiring action does occur a user group may be restricted somewhat; however, any adverse social and economic impacts are expected to be minimal and more than outweighed by the increased efficiency and prevention of destruction gained by an orderly solution.

Management Measure B would prevent the harvest of Spanish mackerel below the size required for optimum biological yield. Under the present conditions in the fishery both the beneficial and negative impact of this measure are relatively minor because few fish smaller than 12 inches are caught. The major benefit of this measure is to prevent the development of a large fishery for small fish. Such a development would have a negative impact on the total yield of the fishery and on the availability of the more desirable larger fish. There appears to be little or no economic or social impact of this management measure (see FMP Section 12.3.2.1).

Management Measure C, a catch limit, has no impacts of any kind until implemented. It provides a method for rapid response to possible overfishing if other proposed measures are ineffective. For a detailed analysis of its potential impacts see FMP Section 12.3.2.1.

Measure D provides for closure of the fishery in any year when optimum yield is exceeded. Under present interpretation of the law, such a closure is required when OY is expressed as a fixed amount. The measure clarifies for the general public the effect of setting a numerical OY for Spanish mackerel. Short-term adverse economic and social impacts may occur if the fishery is closed. Long-term economic and social values are protected. Long-term abundance of the stock and its contribution to the marine ecosystem will be protected. More detail on the effects of this measure may be found in FMP Sections 12.2.2 and 12.3.2.1.

IV.2.3 Cobia

Management Measure A will protect the cobia until the age at maturity and increase yield. A detailed analysis of impacts is found in FMP Section 12.3.3.1.

IV.2.4 Purse Seine Regulations

Purse seine Measure A provides a limit of purse seine harvest of king and Spanish mackerel. The specified amounts are small and are not expected to result in any adverse impacts to the stocks or other user groups. A slight increase in value of the commercial fishery may occur. More detail on the effects of this measure is found in FMP Section 12.3.5.1.

Purse seine Measure B requires observers on any purse seine vessels which begin fishing for mackerels. This measure insures that use of purse seines will not result in excess harvest. Information gained by observers will be used to develop a long-term management approach to purse seines. This protects the long-term benefits of the fishery. For a more detailed analysis of this measure see FMP Section 12.3.5.1.

IV.2.5 Statistical Reporting Measures

The proposed statistical reporting measures are not expected to have any direct impact on the biological or physical environment of the fish stocks concerned. These measures should result in better management by providing better data indirectly improving and protecting the stock and its environment. Some additional costs and inconvenience will be imposed on fishermen, processors and the government.

A detailed analysis of impacts of these measures is found in FMP Section 12.3.6.1.

V. ALTERNATIVES TO THE PROPOSED ACTION

V.1 No Action

The alternative of imposing no regulations on the fishery may result in severe impacts on the stocks, particularly king mackerel, and on users of the resource. This is because of rapidly rising fishing effort and the probability that MSY may be reached or exceeded in the near future. Harvests in excess of MSY will decrease the abundance of the stocks and soon result in decreased harvests and economic losses to the country. At this time it is not possible to accurately predict the degree to which mackerel stocks could be overfished in any given year because of limited available data and uncertainty about the precision of the MSY estimates.

There is a potential for large losses resulting from an alternative of no action. Recent history of a similar fishery, Atlantic mackerel, gives an indication of this potential. Maximum sustainable yield for this stock is estimated at 210,000 to 230,000 mt. During the early 1970s, excess fishing effort greatly reduced the stock size and yield declined. Total present catch from U.S. and Canadian waters is approximately 65,000 mt, less than one third of MSY. The current Atlantic Mackerel FMP limits catches in U.S. waters to 30,000 mt in an attempt to increase spawning stock size and improve recruitment.

In the case of Atlantic mackerel, the drastic reduction in harvest needed to rebuild the stock was accomplished by reducing allowed foreign harvest and was relatively painless for U.S. interests. If similar reductions became necessary for king or Spanish mackerel, U.S. fishermen would bear the entire burden, with serious adverse impacts on sport and commercial fishermen.

Given the present trend in fishing effort in the mackerel fisheries and present condition of those stocks, it is probable that MSY will be exceeded and yield decline in the near future unless total harvest is limited. For the purpose of estimating potential cost of taking no action, it is reasonable to assume losses of five to 25 percent within the next five years, and 20 to 50 percent within the next ten years. These estimates are somewhat arbitrary, but are believed to be conservative. As can be seen from the example of Atlantic mackerel, greater losses are possible. Assuming linearity between economic value and catch, the economic cost of such reductions varies between $5.6 million to $27.9 million annually within the next five years.

The alternative of no action would leave no framework for dealing with both existing and potential gear conflicts. If such conflicts cannot be prevented or readily solved, economic loss, personal hardship, and even violence can result. Lack of catch limits and allocations for king mackerel leaves open the possibility of harvests significantly in excess of MSY with consequent future adverse affects on the stock. Also, the amount of fish available to recreational, recreational for hire, and hook and line commercial fishermen would be significantly reduced with adverse social and economic impacts. Lack of size limits could result in targeting of smaller fish such that total yield could be reduced. Lack of measures to begin resolving the issue of purse seines would exacerbate the controversy that currently exists. No action would also prevent or postpone the development of organized approaches for dealing with the problems and issues in this fishery.

The No Action alternative would result in a small saving of government expenditures. This is estimated at $376,353 annually.

V.2 Alternate OYs

Alternative optimal yields above and below the best current estimate of MSY for the mackerels were considered. Specific points of focus for king mackerel included optimum yield alternatives of 27, 30, 37 (the one chosen and equal to the best estimate of MSY) 45 and 53 million pounds. Spanish mackerel OY alternatives were 13, 20, 27 (the one chosen and equal to the best estimate of MSY) and 49 million pounds. These span the likely range for the true value of MSY, and represent the range of reasonable alternatives. Optimum yields less than the best estimate of MSY were rejected because they would require greater restrictions on allowable catch with resultant adverse economic and social impact on commercial, recreational for hire and private recreational fishermen, consumers and others. These adverse impacts would include reduced employment, economic returns, recreational opportunities, and consumer food supply. OY alternatives above the best estimate of MSY were rejected because of the risk of adverse biological, social and economic impacts in the future if the stock was overfished and availability was reduced for future needs. The chosen optimum yield evenly balances the risk of overfishing against the chance of failing to maximize utilization of the resource. An OY range of 30-37 million pounds for king mackerel was considered but was rejected for administrative reasons. Sufficient data to justify a variable OY were not available, nor was any system available which could be used to calculate an annual OY within the given range.

For cobia, an alternative of OY equal to a fixed number of pounds was considered. It was rejected because the available data was not sufficient to calculate an acceptably accurate numerical estimate. A harvest equal to the "best" numerical estimate would probably result in either substantially over-fishing or underutilizing the stock. An additional problem with this approach is enforcement. The catch of this species is small, scattered among many different users, often not a directed catch, and frequently unreported. The costs of data collection to obtain a numerical estimate of total catch and enforcement needed to prevent harvest beyond a fixed amount would be prohibitive.

V.3 Alternative Management Measures

Alternatives of restricting the catch by certain user groups more heavily in return for greater catches by other groups were rejected because of the more severe adverse economic and social impacts which would result. More detailed catch limitations (i.e., phased in by time and area) would have resulted in much greater administrative and enforcement burdens and would increase the variability of the catch and returns to user groups. Gear limitations to significantly reduce fishing power and effort from the present could unduely cause inefficiency because there is no clear need for reducing effort at this time. Similarly, there is no need for limited access in this fishery at this time.

Only limited purse seining was allowed because of controversial questions regarding their biological impact on the stock. Taking no action on purse seines was considered and rejected because lack of action, in effect, means no restriction. Unregulated purse seining was considered a possible threat to the stock. (See FMP Section 12.3.4.) Alternatives considered included: (1) allowing purse seine use for research use only, (2) allocations for commercial purse seine use only in the Gulf of Mexico, (3) larger allocations to purse seine users, and (4) a one-year limit on observers. These are listed and/or discussed in FMP Section 12.3.4.1 or 12.3.4.2.

Other management measures which were considered but not adopted are listed and discussed in detail in FMP Section 12.3.1.2 for king mackerel, Section 12.3.2.2 for Spanish mackerel, and Section 12.3.3.2 for cobia. Statistical reporting measures considered but not adopted are listed and discussed in FMP Section 12.3.6.2

VI. PROBABLE UNAVOIDABLE ADVERSE IMPACTS

The framework for resolving current and potential gear conflicts (Management Measures A and B for king mackerel, and A for Spanish mackerel) may introduce restrictions on one or more user groups which could limit their economic returns to a certain extent. This will only happen under Measure A if a specific gear conflict occurs. They would be mitigated by the fact that an orderly conduct of the fishery will likely increase efficiency and reduce economic loss.

The total catch limits and allocations (king mackerel Management Measure C and Spanish mackerel Management Measure F) may introduce adverse economic, employment, and other social impacts beyond the baseline case if the allocations are exceeded by one or more user groups. This adverse impact could be mitigated somewhat by fishermen voluntarily switching to other fisheries. Purse seine harvests will slightly decrease catch per unit effort net economic return to other user groups. Detailed analysis of economic losses and potential gains are discussed in Section 12.3.1.1 and 12.3.4.1 of the attached FMP.

Another adverse impact of Measure C (king mackerel) occurs if the hook and line allocation is exceeded and a larger than normal fraction of the catch is sold by recreational fishermen. In that case, the traditional commercial fisherman would be unable to harvest his normal share of the resource. A way to mitigate this would be to require that all persons who sell fish have a commercial license of significant dollar value. Implementing such a measure is not within the authority of the Councils; therefore, the Councils have formally recommended to each state in their area that such a measure be considered.

VII. RELATIONSHIPS BETWEEN LOCAL SHORT-TERM USES AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The major objective of the plan is to protect the resource and assure long-term productivity. The plan is designed to allow for the instigation of management measures necessary to prevent harvesting king and Spanish mackerel beyond the levels of maximum sustainable yield. Bluefish, little tunny, cero mackerel and dolphin do not appear to be in any immediate danger of being overfished, and specific conservation measures for them have not been found to be necessary (see Section 5.4). Available data indicate that cobia may be overfished. A size limit is proposed which will contribute to long-term productivity with only minimal adverse short-term effects. Monitoring and data gathering measures have been instituted and support given to research efforts in order to increase the information base for use in enhancing long-term productivity. The harvest levels to be allowed by the plan are believed to be sustainable on a long-term basis based on the best scientific information currently available.

VIII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

There are minimal irreversible or irretrievable commitments of resources resulting from the implementation of this management plan. The plan is designed to protect the coastal migratory pelagic resources and preserve the long-term yield from the fishery. There is a short-term commitment of necessary public funds for monitoring and obtaining information for managing the resource. These are discussed in Section 13.9 of the attached FMP. The plan in no way significantly curtails potential uses of the environment and resources except for the potential catch limits allocated to various user groups.

Biological Resources - After considering the best information currently available, the Councils believe that the plan will not result in any irretrievable loss to aquatic flora or fauna populations. The plan will prevent taking of the species in the management unit beyond the levels which are sustainable on a year after year basis. The plan has a negligible impact on other plant and animal populations in the area of concern.

Land Resources - There are no discernible changes in the commitment of land resources as a result of implementation of the plan. Any changes brought about by the plan will neither increase nor decrease the amount of land committed or the manner of its use.

Water and Air Resources - There are no irreversible or irretrievable commitments of water or air resources due to the plan. Water or air quality should not be impacted to a measurable extent by this plan.

Manpower, Materials, and Energy Resources - There will be an increase in labor expended for the monitoring of the plan and for obtaining information for management purposes. Beyond this, the current plan should not result in an increase in labor associated with harvesting, processing, and other activities associated with the resource.

A small amount of material and energy resources will be expended in monitoring and obtaining information for the plan (see FMP Sections 12.3.5, 13.9, and 16.0). The plan does not significantly change material and energy usage in fish harvesting, processing, and other potentially impacted activities. The plan limits mackerel purse seining while its positive and negative effects are studied. Purse seining could potentially reduce the amount of labor, material, and energy resources consumed in the harvest of king and Spanish mackerel. However, its high efficiency requires a cautious approach.

Other Natural Resources - There are no other natural resources potentially impacted by the plan to any discernible extent.

Cultural Resources - While the plan imposes a more complete management regime on the fishery than had previously been utilized, the plan is designed to result in a minimum of disruption on the social structure of the users of the resource and their communities.

IX. OTHER INTERESTS AND CONSIDERATIONS OF FEDERAL POLICY OFFSETTING ADVERSE ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION

The proposed management plan complements certain other federal policy interests. By protecting the resource and allowing exploitation up to the best estimate of MSY, the plan contributes to necessary food production and recreational opportunities. The plan also minimizes economic dislocation in the areas of concern. There is no Indian treaty fishing or significant foreign involvement in fishing for the species in the management unit.

X. CONSULTATION AND COORDINATION WITH OTHERS

During the development of the plan, the plan development team repeatedly contacted representatives of the National Marine Fisheries Service, state natural resource agencies, university researchers, and officials of coastal zone planning agencies. Information was frequently solicited from potentially affected fishermen. Several meetings were held with the Coastal Migratory Pelagic Subpanel of the Councils' Fishery Advisory Panel.

Section 7 consultations have been conducted to determine if measures in this plan have adverse impacts on any threatened or endangered species as listed under the Endangered Species Act. A Section 7 consultation with the National Marine Fisheries Service concerning sea turtles and marine mammals resulted in a biological opinion that the plan was not likely to jeopardize these species. Consultation with the U.S. Fish and Wildlife Service resulted in a conclusion that the FMP will have no affect on the brown pelican or the West Indian manatee.

XI. LIST OF PREPARERS

The EIS and the FMP were prepared by a multidisciplinary team. Many people contributed to each section. The following list gives the major workers and the areas to which they made significant contributions.

Bradly S. Ingram, MBA.
Applicable Experience: Economic impact analysis, market research - statistical analysis and sampling.
Contributions: General coordination of FMP and EIS, FMP Sections 8.0, 9.0, 10.0, 11.0, 12.0, 13.0; EIS Sections III - VII.

Sandford B. Fain, MCP, Planning Theory.
Applicable Experience: Program development and evaluation, policy analysis, statistics.
Contributions: FMP Sections 7.0, 8.0, 9.0; EIS Section III.

Carl H. Silsbee, MS, Economic Systems Engineering.
Applicable Experience: Decision analysis, economic analysis.
Contributions: FMP Section 11.0; EIS Sections VII - IX, II-6.

Mark E. Chittenden, Jr. PhD, Aquatic Biology.
Applicable Experience: Fishery population dynamics.
Contributions: Yield per recruit analysis of mackerels - FMP Section 5.4.

Fred J. Prochaska, PhD, Economics.
Applicable Experience: Cost and return analysis, sport and commercial fishery economics.
Contributions: FMP Sections 8.0, 9.0; EIS Section IV.

James C. Cato, PhD, Food and Resource Economics.
Applicable Experience: Fishery economic analysis.
Contributions: FMP Sections 8.0, 9.0; EIS Section IV.

Joan A. Browder, PhD, Environmental Engineering.
Applicable Experience: Systems ecology, fishery economics, wetland ecology.
Contributions: FMP Sections 5.0, 6.0; EIS Sections III - VII.

J. Connor Davis, MS, Marine Fishery Biology.
Applicable Experience: Population dynamics and fishery management.
Contributions: General editing FMP and EIS; FMP Sections 5.0 and 12.0.

10.0 DESCRIPTION OF THE BUSINESS, MARKETS, AND ORGANIZATIONS ASSOCIATED WITH THE FISHERY

10.1 Relationship Among Harvesting, Brokering, and Processing Sectors

Historically, king and Spanish mackerel have been sold by fishermen to local fish dealers. These primary wholesalers in turn sell to fresh fish markets and restaurants, freezer companies, and secondary wholesalers. The relatively recent organization of several fishermen's cooperatives and corportions has modified the market structure for king mackerel by eliminating the primary wholesale level in some instances. The industry structure and markets for king and Spanish mackerel are separately described below.

10.1.1 King Mackerel Industry Structure and Markets

Commercial fishermen have traditionally had a rather close relationship with the fish houses. The fish houses and fishermen generally have operated under unwritten agreements in which the wholesaler provides a guaranteed market for the catch and boat services such as free docking facilities and ice, fuel, and fishing equipment for a fee. In exchange, the fishermen agree to sell their catch to particular fish houses. There is some evidence that these relationships are decreasing in importance.

There are approximately 30 fish houses in Florida that purchase king mackerel from commercial fishermen. Three are located in Collier County (Florida west coast), and the remaining fish houses are divided about equally between the Keys and the east coast of Florida. While fishermen are guaranteed a market for their catch, the price they receive is not guaranteed. Fish houses pack the fish in ice, find a buyer and generally arrange and pay for shipping. The fish are transported by truck, usually by independent firms.

Because of concern for the low prices received for their catches, several groups of fishermen have organized cooperatives in order to bypass the fish house and sell directly to the secondary wholesaler. The fishermen organizations have had a significant effect on dockside prices. These organizations are discussed in Section 10.2.

In past years almost all gillnet-caught king mackerel sold has been passed through five secondary wholesalers. Firms in Miami, Palm Beach, St. Petersburg, and Jacksonville handle most of the secondary distribution. Several new firms reportedly have entered the market.

In instances where fish houses cannot process any more fish either because the facility is temporarily overloaded or the market is saturated, fishermen are informed in advance which species of fish will not be accepted. In some instances catch limits will be set for each fisherman. In the Florida Keys where truck loads are limited to 15,000 pounds of iced fish, the availability of trucking facilities may also limit the catches that fish houses will handle.

The major markets for king mackerel are Puerto Rico, New York, Florida, Canada and Venezuela. King mackerel is marketed in several product forms including gutted and iced fresh fish, frozen whole or in steaks, smoked, and as a canned smoked paste.

An estimated 75 percent of the catch from the Florida's southwest coast and Keys are marketed frozen to Puerto Rico. This is primarily the gill-net catch. The remaining portion of the catch is sold fresh primarily through Fulton's Fish Market in New York. On the east coast of Florida, approximately 65 percent is marketed fresh. The local Florida market is attributed largely to the Miami Cuban population (Austin, et al., 1978). This is primarily the hook and line catch.

10.1.2 Spanish Mackerel Industry Structure and Markets

The arrangement between Spanish mackerel fishermen and fish houses is similar to that for the king mackerel fishery (see Section 10.1.1). The major primary and secondary wholesalers are the same as those dealing in king mackerel.

There are sizable markets for both fresh and frozen Spanish mackerel. Traditionally it has been an important product in the fresh fish market. Geographically the major market for fresh Spanish mackerel is the southeast, including Florida.

The market for frozen Spanish mackerel fillets has seen recent expansion. A large majority, possibly as much as 90 percent, are now sold in frozen form, most going to institutions. One large cafeteria chain is purchasing as much as five million pounds of frozen Spanish mackerel yearly or nearly 50 percent of total annual landings.

Product forms are determined in part by the size of the fish. Fish over one and one quarter pounds are preferable for fillets. Some companies ship whole frozen fish three pounds or greater to Puerto Rico.

Although the demand is increasing, the record production of Spanish mackerel recently has sometimes exceeded expected demand. For example, record high harvest in the 1975-76 winter-spring season was not fully absorbed by the market. At the end of 1977, some freezer companies and a cafeteria chain still had stocks of 1976 landings.

There are three major markets for Spanish mackerel. By far the most important market outlet is to approximately 15-20 cafeteria chains in the southeast that purchase frozen Spanish mackerel fillets. It is estimated that about 75 percent of Spanish mackerel landings are sold to cafeteria chains. The second largest outlet is to retailers who service home consumers. Products sold to retailers consist primarily of fresh and frozen fillets and whole drawn, the latter being both fresh and frozen.

The third market outlet consists of two major user groups, i.e., for animal feeding in zoos, aquariums, etc., and for bait by both commercial and recreational fishermen.

The Spanish mackerel sold to these outlets consists primarily of the smaller sized fish that have limited acceptance in the restaurant and retail outlets.

10.2 Fishery Cooperatives or Associations

Two fishermen's cooperatives have been identified in the coastal migratory pelagic fishery. Their offices and facilities are located in (1) the Port Salerno-Sebastian area, and (2) Key West.

The formation of cooperatives results from two or more firms desiring to increase competition and/or to take advantage of consolidated purchasing of supplies. Increased competition takes place through the addition of one or more buyers in the market bidding on supplies or through the cooperative returning part of the marketing spread to its members. The advantage of consolidated purchase enables a cooperative to benefit from quantity discounts offered by sellers for materials. Through these means, cooperatives can operate both as buyers and sellers for their members.

King mackerel fishermen are the predominant members in both cooperatives. The Florida Fishermen's Association in Port Salerno-Sebastian is are made up of hook and line king mackerel fishermen.

In Key West another cooperative was recently formed by five king mackerel net fishermen. The new corporation sells directly to a secondary wholesaler in Miami. It provides docking facilities, boat

FEIS APPENDIX I

SUMMARY OF PUBLIC COMMENT

MSY/OY

Comment: MSY and OY are not valid estimates:

a) Estimates are too large because recreational catches are overestimated;
b) Estimates are too low because present catch is underestimated;
c) Estimates are too large because catch data is too old. More recently, catches have declined.

Response: The only estimates of recreational catch available when MSY and OY values were estimated were based on telephone surveys and are generally considered to overestimate the actual harvest. Before including these estimates in the MSY analysis, they were reduced by 62 percent. The amount of reduction was based on a comparison with local surveys where catch was measured by onsite interviews. (See FMP Section 5.4.1). These local surveys were the only documented data which could be used to adjust the available catch estimate.

A survey or recreational catch for the year 1979 was published after public hearings on the FMP/DEIS. It indicates that recent recreational catches may be less than estimated in the FMP. Problems with this study's methodology make it only slightly more reliable than previous estimates (see FMP Section 8.2.1.2). Improvements in the methodology used during 1980 should result in reliable estimates of recreational catch. These will be incorporated into the MSY analysis during the monitoring process (see FMP Section 16.2).

No supporting evidence is available to indicate that recreational catch data was underestimated.

Mackerels are migratory, availability and catches in a given area have historically varied from year to year. Much of this variability appears related to water temperatures or other environmental fluctuations. There is no documented evidence for a sustained decline in catch over the entire range of the stocks. King mackerel commercial landings declined in 1978 and 1979 in Florida, but recovered in 1980. Landing trends will be closely monitored to determine if this was the result of changes in availability or abundance.

Comment: King mackerel catch rates in many areas are declining.

Response: Total catch of king mackerel is near MSY. Rapid increases in effort in recent years has brought little increase in catch and a decline in catch rates. This does not necessarily mean that the stocks are threatened or declining. In some areas declines in total catch have occurred. It is not possible to determine whether this is due to declining overall abundance or declining availability.

Comment: The relation between the adult spawning population and recruitment of young fish should be considered in MSY.

Response: No data is available to estimate the relation. When or if such data becomes available, it will be included in the MSY analysis. Use of the $F_{0.1}$ concept in the MSY analysis (FMP Section 5.4) is a conservative approach to estimating sustainable yield. This concept results in a higher standing stock and is intended to provide some insurance against recruitment failure.

Comment: MSY and OY estimates should be made separately for the Gulf of Mexico and Atlantic.

Response: Tagging studies show that there is substantial seasonal migration of king mackerel between the Gulf and south Atlantic. Therefore MSY estimates must include both areas.

Comment: King mackerel are underutilized in Louisiana and should be managed separately.

Response: There is no reason to believe that the population of mackerel in Louisiana is not part of the same stock as in the rest of the Gulf of Mexico, or should be managed in a different manner.

Comment: The Councils should consider the Mexican fisheries for mackerels; they may be the same stocks.

Response: Tagging studies indicate a small degree of interchange between Mexico and U.S. waters. At this time insufficient data is available to determine the number of stocks involved. In monitoring the plan, the Councils will carefully consider the possibility of fisheries in Mexico affecting those in the U.S. and promote research to determine stock distribution.

Comment: Allow no foreign fishing in the FCZ.

Response: No surplus has been declared for any species in the management unit and no foreign fishing will be allowed.

Comment: A one year delay in plan implementation is requested in order to gather better data.

Response: Several problems exist in the fishery which need attention. These include gear and user group conflicts and a total harvest which is rapidly approaching MSY. The Councils consider rapid implementation of the FMP as necessary to protect the fishery.

Comment: MSY/OY and management measures for Spanish mackerel should be considered temporary subject to more detailed study and stock analysis.

Response: The FMP clearly states the uncertainty of the MSY analysis for Spanish mackerel. OY was based on the best data available. Management measures were designed to allow considerable flexibility to respond to changing conditions in the fishery. Monitoring procedures allow new data and new management measures to be incorporated in the plan on a timely basis.

Gear and User Group Conflicts

Comment: Gill nets should be prohibited in areas where they have not been traditionally used.

Response: Arbitrary prohibition of any gear simply because it has not been used before is contrary to the National Standards. If gill nets are used to catch mackerels in new areas and conflicts result, those conflicts can be addressed in king mackerel Measure A or Spanish mackerel Measure A.

Comment: Large gill-net vessels should be kept out of the waters off North Carolina.

Response: If a conflict develops in this area between gill-net fishermen and other users, it can be addressed through king mackerel or Spanish mackerel Measures A. At present no serious conflict exists and no action is recommended by the Councils.

Comment: Use of new types of gear to take king mackerel should be prohibited.

Response: Such a total prohibition is contrary to the National Standards.

Comment: Use of gill nets to take king mackerel should be prohibited from Cape Canaveral to Palm Beach.

Response: Gill nets have been used to take king mackerel in this area for many years (see FMP Exhibit 8-10), without serious conflict. The recent conflict between hook and line fishermen and fishermen on large power roller gill-net vessels is addressed in king mackerel Measure B. Total prohibition of gill nets in this area was considered discriminatory and contrary to National Standard 4.

Fort Pierce Option

Comment: Opposed to king mackerel Measure B, Fort Pierce gear conflict:

a) Hook and line fishermen cannot use much of the area where they are allowed;
b) Hook and line fishermen need the northern area every year;
c) The measure would put some fish houses out of business, they need both groups to survive;
d) Too difficult to enforce;
e) The measure does not cover all of the area of conflict.

Response: Measure B, as presented for public comment included only Section B(2)a of the present measure. The Councils recognize substantial problems pointed out in public testimony. Measure B was modified in response to comment in order to make it more flexible and provide more options for action by the Regional Director. As a field order, no action need be taken until the problem recurs. Regulations can be implemented quickly and changed, or removed, quickly in response to changing conditions. Negative impacts indicated by comments a, b, and c, above, can be reduced to a minimum by choosing the best option allowed under Measure B to address specific situations as they arise. Enforcement of this measure will require substantial effort, this has been considered in the Regulatory Analysis and FMP. The area affected by king mackerel Measure B covers the major area of conflict on the southeast Florida coast. Conflicts arising in other areas can be addressed within king mackerel Management Measure A.

Comment: Recommend a north/south separation line off Fort Pierce at the 85 foot depth contour.

Response: This recommendation was incorporated into king mackerel Measure B(1).

Comment: Recommend alternating use of each gear between the northern and southern halves of the area with a 1,000-foot neutral zone in between.

Response: This recommendation was partially adopted as king mackerel Measure B(2)b.

Catch Allocations

Comment: The plan favors:

a) Recreational fishermen;
b) Commercial fishermen.

Response: The Councils have been as fair as possible to all users. Access to the resource has been extended to all groups in proportion to their historical catch levels. Likewise some restrictions have been placed on all groups.

Comment: Available data is too poor to support amounts for allocation.

Response: Recorded commercial landings are considered to be relatively accurate for king mackerel because of the nature of the fishery. Estimates of recreational landings are less reliable but the best presently available. However, present data collection efforts will improve as the FMP is implemented. Better estimates of recreational catch will be used to modify the allocation as they become available.

Comment: Ban all sale of king mackerel and make it exclusively a gamefish.

Response: This suggestion was rejected because it would severely impact commercial fishermen as well as some members of the recreational fishery. In effect, it unfairly excludes commercial fishermen from access to a common property resource.

Comment: Allocation is unenforceable.

Response: Some enforcement problems are expected at first. However, improving catch data and increased speed of data collection which will result from mandatory reporting, will provide an adequate basis to monitor and enforce the allocations.

Comment: There is no effective way to limit the recreational catch.

Response: The plan provides for closure of the fishery to any user group if it exceeds its allocation. If slow data collection makes it difficult to close the recreational fishery, bag limits and size limits can be imposed to restrict recreational harvest.

Comment: Sale of fish caught by recreational fishermen will be counted against the commercial hook and line allocation, unfairly reducing the allowable catch of full-time commercial hook and line fishermen.

Response: Landings data used to compute the hook and line allocation include fish sold by recreational fishermen. Therefore, it is fair to count such sales against the allocation. If, in the future, the percentage of catch which is sold by recreational fishermen increases, the allocation can be modified accordingly. Mandatory reporting is expected to provide adequate information to make any necessary adjustment.

Comment: Opposed to the allocation amounts:

a) Present allocation not fair and equitable;
b) Recommend 1:1 division between recreation and commercial;
c) Recommend total commercial allocation be more than 50 percent of the total;
d) Recommend a hook and line allocation larger than the net allocation;
e) Recommend reduction in net allocation;
f) Recommend regional allocation;
g) Recommend zero allocation to nets.

Response: The allocation is a fair and equitable division of the available harvest based on the best estimates of the percent of total harvest presently taken by each user group. The small allocation purse seine catch in the Gulf was subtracted from the allocation for all types of nets on the premise that present users of other types of nets were most likely to experiment with purse seine use.

Other recommended divisions of the total allowable harvest would unfairly reduce catch by some users, while often providing additional allocation to other users which could not be utilized by them due to the present distribution of fishing effort and availability of fish.

Regional allocations were considered but not adopted due to highly variable availability and insufficient data with which to determine a regional allocation.

Comment: If purse seines are allowed, prohibit use of spotter airplanes.

Response: Purse seines are allowed with a small allocation. Further restriction of efficiency was considered unnecessary and unfair.

Comment: Concern that the entire allocation could be taken in one area leaving no allowable catch for other areas.

Response: The designated fishing year, July 1 to June 30, in combination with the migratory habits of king mackerel assure that fishermen in all areas will have the opportunity to harvest in each year.

25-inch Limit for Sale of King Mackerel

Comment: Opposed to the limit because it would result in waste of a bycatch of small king mackerel presently taken in Spanish mackerel gill nets. In some areas this bycatch may be 50 percent or more of the catch.

Response: Public comment indicated that large incidental catches are taken in the Gulf. Therefore, the Gulf Council deleted this measure from its area of jurisdiction. Such incidental catch in the south Atlantic appears to be small and the measure was retained for that area. The measure was subsequently rejected by the Department of Commerce as discriminatory to commercial fishermen. (See FMP Section 12.3.1.2.)

Comment: King mackerel caught on hook and line are often too damaged to release.

Response: While some mortality of released fish will occur, the loss was expected to be small.

Comment: The measure does not protect the large spawning fish.

Response: The measure was not intended to protect spawners, but to maximize the catch of larger, more valuable fish, by limiting the harvest of small fish. Such a limit would help maintain, and possibly increase, the abundance and catch of large fish; indirectly protecting the spawning population.

Comment: The measure is unfairly applied only to commercial fishermen.

Response: The Secretary of Commerce agreed and rejected the measure on that basis and because there appeas to be little biological benefit gained from restriction only on sale.

Comment: Recommend a 12-inch size limit for king mackerel, equal to that for Spanish mackerel.

Response: No benefit would result from a size limit as small as 12 inches. Very few king mackerel less than 12 inches are caught.

Minimum Mesh Size for King Mackerel Gill Nets Limited to 4-3/4 Inches

Comment: Recommend a larger mesh because 4-3/4 inch mesh catches fish smaller than 25 inches.

Response: The recommended mesh size does result in some harvest of fish smaller than 25 inches, however, the amount is small. Length frequency data from 1969 and 1977 indicated that the gill-net catch of fish smaller than 25 inches was less than one percent. Limited data from two areas in 1979 indicated that the catch was approximately four percent. Increasing the mesh size would substantially reduce the efficiency of gill-net vessels and their catch of larger, more desirable fish.

Purse Seine Restrictions

Prohibtion of commercial purse seining for mackerel in the south Atlantic, an allocation for purse seine fishing in the Gulf of Mexico, and a study of purse seine activity were proposed in the FMP and DEIS. Following public hearings in March, 1980, these measures were recommended to the Secretary of Commerce for implementation. The Secretary rejected the FMP on the basis that total prohibition of commercial use of purse seines in the south Atlantic was contrary to the National Standards. The South Atlantic then adopted limited allocations of mackerels for purse seines. The Gulf Council modified its proposed allocation slightly to be consistent with the South Atlantic Council. This is now listed as purse seine Measure A. Public comment on this measure was obtained during public hearings held in June, 1981.

The Secretary commented that research should not be a required management measure. The Councils agreed and modified the measure. Observer requirements for commercial vessels were expanded and are listed in purse seine Measure B. The research portion of the measure was changed to a research request and is included in FMP Section 14.4. The original measure reviewed in public hearings in 1980 is listed as purse seine Measure D.

Comment: All purse seining for mackerels should be prohibited as too efficient and a danger to the stocks.

Response: Purse seines are highly efficient and must be carefully controlled. Purse seining allocations, as proposed, account for approximately two percent of MSY and OY for both species. This will have no significant adverse impact on the stock.

Comment: Use of purse seines to harvest mackerels should be banned until proven safe.

Response: In the absence of any information to suggest that very limited use of purse seines would be detrimental to the stocks, total prohibition of this efficient gear is contrary to National Standard 5. This Standard specifies that management measures shall promote efficiency where practicable. The limited allowable harvest will help provide the data to determine a safe level of purse seine harvest.

Comment: Use of purse seines should be limited to the last fraction of the net allocation if it is not going to be taken in other types of nets.

Response: In practice, it would be impossible to determine the existence of a surplus in the net allocation early enough in the season to allow purse seine operator to gear up, travel to the fishing grounds and harvest any remaining excess.

Comment: Recommend that the purse seine study be done by vessels which do not presently fish for king mackerel.

Response: The study was intended to gather data under conditions as close as possible to those which would prevail in a commercial purse seine fishery. It was expected that vessels which might be used for commercial purse seining would be some of those presently operating as king mackerel gillnetters. National Marine Fisheries personnel would have supervised all operations to ensure that the information produced by the study is accurate and unbiased.

Since this comment was made, the measure has been modified. It is unlikely that sufficient funds are available to charter commercial vessels for purse seine research. The need for such research is less because observers will be present on all purse seine vessels.

Comment: Catch limit for the study is too large.

Response: The catch limit was considered the minimum necessary to draw a meaningful conclusion from the study. It is approximately one percent of OY and is not expected to significantly affect other user groups or the stock.

Comment: The Councils should rely on research conducted by the Florida Department of Natural Resources.

Response: Written reports by FDNR on experimental purse seining were reviewed and an observer who participated in the reseach was contacted. These studies are valuable, but do not give all the information need by the Councils. Both written and verbal reports indicate that, in almost all cases, the bycatch of other species is small. In cases where the bycatch was significant, this could usually be determined before the set was made. These studies did not supply other needed information, including the ability of fishermen to determine the size of fish before capture, or if a school can be released from the net unharmed.

Comment: The Councils should consider what has happened in other fisheries where purse seines have been used.

Response: The experience in other purse seine fisheries has been reviewed. There is no known fishery which could be used as a reliable predictor of the impact of the use of purse seines on the king or Spanish mackerel stocks. Unlimited use of purse seines has resulted in overfishing of some species but not in others. Many, but not all, purse seine fisheries where effort or total catch are limited have been highly successful.

Comment: Allow use of purse seines as an efficient method of capture, thereby reducing fuel consumption and prices.

Response: Use of purse seines could probably result in decreased fuel use. However, may other factors must be considered. The study and commercial allocation in intended to limit use of purse seines to a reasonable amount, while data are gathered which will allow the Councils to make a final decision.

Comment: Recommend an extension of the study deadline to assure collection of adequate data.

Response: The deadline was removed from the research. Observers will be required on commercial vessels until sufficient information is available to develop long-term management for purse seining.

Comment: What happens after March 31, 1981?

Response: The deadline was deleted, see purse seine Measures A and B.

Comment: Is the 400,000 pound limit for research subtracted from any user group allocation?

Response: No, as research, this amount is not counted against OY.

Bag Limits and Size Limits for King Mackerel by Regulatory Amendment

Comment: Recommend that the wording of these measures and the similar measure for Spanish mackerel be more specific.

Response: The wording was changed to clarify who shall initiate the action. The range of action is intentionally left broad in order to give maximum flexibility in protecting the stock while preventing total closure of the fishery.

Comment: Opposed to any bag limits, size limits or trip limits.

Response: These measures will be used to slow fishing mortality and prevent exceeding OY. The alternative requires total closure of the fishery when OY is reached.

Comment: Opposed to uniform bag or size limits in all areas of the FCZ if separate stocks exist.

Response: The best available data is not sufficient to define different stocks, if they exist.

Comment: Recommend that a recreational bag limit on king mackerel be implemented immediately:

a) Unspecified number;
b) Three fish per day per person;
c) Five fish per day per person;
d) Eight fish per day per person.

Response: A bag limit is not necessary at this time. When needed, it can be implemented through regulatory amendment much more quickly than plan amendment, while still allowing for public review.

Comment: Recommend that a recreational bag limit on king mackerel be imposed if the states do not adopt conservation measures proposed by the Councils.

Response: This can be accomplished through regulatory amendment, if needed.

Comment: Recommend a bag limit of ten king mackerel per person in all user groups.

Response: This recommendation would effectively prohibit a full-time commercial fishery for king mackerel. This would severely and unfairly impact commercial user groups.

Comment: A bag limit is unenforceable.

Response: A bag limit is the most easily enforced measure available to the Council.

12-inch Limit for Spanish Mackerel

Comment: Undersized fish caught on hook and line will die when released.

Response: Tagging studies show that Spanish mackerel can be caught by hook and line and released with little mortality. Some loss will result from this measure, but the benefits are expected to outweigh losses.

Comment: Undersized mackerel should be allowed for use as bait.

Response: Unlimited allowance for use as bait would greatly increase difficulty of enforcement. There are several alternative baits available, including balao and little tunny. A small amount of undersized Spanish mackerel will be available from the bycatch allowance provided.

Comment: Opposed to size limit for recreational fishermen.

Response: Recreational fishermen harvest a large fraction of the total catch. To exclude them from this regulation would be discriminatory, increase difficulty of enforcement and decrease its biological benefit.

Comment: Recommend that tourists be excluded from this measure.

Response: Such an exception would make the measure unenforceable.

Comment: To whom does the five percent bycatch allowance apply.

Response: To all vessels catching Spanish mackerel, either directly, or as an incidental catch.

Size Limit for Cobia

Comment: Opposed because cobia are difficult to release.

Response: Cobia can be released with little or no injury by cutting the line near the hook. Some loss will result from this measure, however, the benefits of a size limit are substantial and will exceed the expected losses.

Comment: Opposed to a limit on recreational fishermen.

Response: Most cobia are caught by recreational fishermen. Excluding them from this restriction would make it ineffective.

Comment: Recommend prohibition on sale of cobia.

Response: Such a prohibition would have little effect on total catch of cobia because most commercial landings are incidental catches.

Comment: Recommend a bag limit for cobia.

Response: A bag limit would be ineffective in reducing fishing mortality or increasing yield from the available recruitment.

Statistical Reporting

Comment: Better definitions of commercial and recreational fishermen are needed.

Response: The definitions are used only as a basis to allocating OY. They correspond to the way in which statistics were collected to set the allocations.

Comment: Mandatory reporting by charter boats is unfair.

Response: The Councils agreed with this comment and deleted the measure.

Comment: If all charter captains must report, then all private recreational fishermen should have to report.

Response: It is economically impossible to require reporting by all private recreational fishermen. Adequate data can be obtained from a statistical sample.

Comment: Opposed to the concept of mandatory reporting.

Response: The most serious problem in fishery management in the southeast is lack of good fishery statistics. Mandatory reporting is considered necessary for cost effective collection of statistics.

Comment: Mandatory reporting is not fair and equitable to recreational fishermen.

Response: Reporting is mandatory for all user groups. Recreational fishermen will be the least affected of any user group because only a small sample will be required to report at any one time.

Comment: Recreational statistics could be collected from fishing clubs.

Response: Records from clubs have been and will continue to be very valuable. However, estimates of total catch, effort and economic value cannot be obtained from clubs because they are not a representative sample of all fishermen.

Comment: Reported recreational catch cannot be verified.

Response: By combining creel census or onsite interviews with mail or telephone surveys, recreational statistics can be estimated and verified.

Comment: Obtain complete records of commercial and recreational catches to the extent practicable.

Response: This is the purpose of the statistical reporting measures.

Comment: Recreational catch of king mackerel can be estimated from commercial landings because most is sold.

Response: While a significant fraction of recreational catches may be sold, it often does not enter the normal commercial market chain and is not recorded. Recorded commercial landings in areas of extremely high recreational fishing effort and catch are often very low, and are not a useable index of recreational catch.

Comment: Recommend reporting be done by dealers instead of fishermen.

Response: Dealers reporting similar to that which has been done in the past will be required. However, some information can only be collected from fishermen.

Comment: Recommend mandatory vessel registration.

Response: Vessel registration was considered and rejected by the Councils as redundant and not cost effective. All vessels used in the FCZ are presently registered, either under state or federal jurisdiction. The vessel enumeration system makes use of these existing registration files.

Comment: Recommend mandatory fishing license for recreational and commercial fishermen.

Response: This was considered and rejected by the Councils as unnecessary at this time.

Comment: Cost of enforcing mandatory reporting is not estimated in the FMP.

Response: Enforcement of reporting requirements is not expected to require more effort than can be supplied by enforcement agents already funded, or within the enforcement budget estimated for the rest of the FMP.

General Comments on Nets

Comment: All use of nets should be banned:

a) For all species in the management unit;
b) For king mackerel.

Response: Such a total prohibition would be contradictory to National Standard 4 by not being fair and equitable and by allocating an excessive share of the resource to the recreational user groups. In the case of king mackerel and bluefish, only a small fraction of the total harvest is taken by nets. Such a total prohibition would have little effect on conservation of the stock and would have severe economic impacts on the commercial user group.

Comment: Limit use of gill nets for catching king mackerel:

a) To 45 foot depth or less;
b) To 100 foot depth or greater;
c) Within ten miles of shore;
d) Ban use of spotter airplanes.

Response: The Councils have recommended a restriction on the total catch of nets. Other area, time or gear restrictions were considered unnecessary and unreasonable restrictions of efficiency. If social or economic conflicts develop in any area, they can be addressed through king mackerel Measure A.

Comment: The bycatch of small king mackerel in Spanish mackerel nets should be investigated.

Response: The Councils agree and have requested such a study as the highest priority research needed for this FMP.

Other Comments

Comment: Recommend a 600-day waiting period before any regulations.

Response: There are substantial problems in this fishery which have been identified by the Councils. These problems require that regulations be implemented as soon as possible.

Comment: Include cero mackerel and bluefish in the management unit.

Response: At the present time no regulations are needed for these species. They can be added to the management unit when regulation is needed.

Comment: Include sea trout and red drum in the management unit.

Response: The stocks and fisheries for these species are almost entirely within state waters and are not subject to regulation under the MFCMA.

Comment: Impose a limit of ten dolphin per person.

Response: There is no evidence that dolphin stock are or may become overfished in the near future; therefore, there is no need for such a limit.

Comment: Restrict use of mehaden purse seines because of a bycatch of mackerel and affect on preditor-prey relationships.

Response: There is no evidence that harvest of menhaden adversely affects mackerels through preditor-prey relations. It has been well documented in many areas that the bycatch of other species in menhaden purse seines is very small.

Comment: Recommend no harvest of Spanish mackerel during spawning season.

Response: There is no evidence that such a prohibition would benefit the stock.

Comment: Recommend price controls or controls on mackerel landings to limit price fluctuations.

Response: Limiting price fluctuation is not an objective of this FMP.

Comment: Recommend habitat protection and protection of young fish.

Response: The proposed size limits provide protection for young fish. Habitat protection for these species is approached on a broader scope than one management plan. The Councils review and monitor many public and private activities which may affect fishery resources in the FCZ.

Comment: Artifical reefs should be protected.

Response: Construction of artificial reefs is promoted by the Gulf Council through its reef fish plan.

Comment: Research on fallout of king mackerel from gill nets should get a low priority.

Response: The Councils agree and have reduced the priority assigned to this research.

Comment: Protect prey species from harvest.

Response: There is adequate data available which shows large surpluses in some bait species. Present exploitation of bait species should not adversely affect this management unit.

Comment: Spawning areas should be closed during spawning season.

Response: Species in this management unit spawn over very large areas during a wide period of time. This type of closure would have little or no beneficial effect and would have substantial adverse impacts on users in the northern half of the management area.

Comment: Under what conditions would regulations proposed by this plan be extended into the mid-Atlantic region?

Response: The Councils chose not to extend management of mackerels and cobia into the mid-Atlantic region because catches in that area were too small to affect OY. Should catches increase enough to become a significant fraction of the total catch, the area of management will be extended by plan amendment process. All Councils concerned and the public will be consulted to determine the minimum necessary extension. Without knowing if, when, or where, such increases in catch may occur, it is impossible to specify precise conditions.

Comment: Opposed to any use of regulatory amendment or field orders as giving too much power to the Secretary of Commerce.

Response: Measures including field order or regulatory amendments are carefully specified to limit the authority of the Secretary to the minimum required. In addition, regulatory amendments allow almost as much public input as do plan amendments, but are much faster to implement. If the delegated power is used contrary to Council's intent, the plan can be amended to further limit or remove that power.

Comment: Initiate studies to determine stocks.

Response: This has been recommended (see FMP Section 14.0).

FEIS APPENDIX II

WRITTEN COMMENTS

United States Department of the Interior

FISH AND WILDLIFE SERVICE
15 NORTH LAURA STREET
JACKSONVILLE, FLORIDA 32202

July 9, 1980

Mr. J. Connor Davis
Gulf of Mexico Fishery
Management Council
5401 W. Kennedy Boulevard
Tampa, Florida 33609

Dear Mr. Davis:

This responds to your letter of June 13, 1980, concerning the Coastal Migratory Pelagic Species Fishery Plan and its impacts on the endangered West Indian manatee and brown pelican (Log No. 4-1-80-1-218).

We have reviewed the plan and concur with your "no effect" decision. Since the plan proposes management in the Fishery Conservation Zone (FCZ) which extends from nine miles off the west coast of Florida and Texas and three miles offshore to 200 miles offshore elsewhere, manatees would not likely be found within this zone. We also agree with your determination that pelicans would not be affected directly or indirectly through their food supply since species taken in the fishery are not normally prey species of the pelican.

Several species of endangered and threatened sea turtles may occur in the FCZ and the National Marine Fisheries Service should be contacted since they have jurisdiction over sea turtles in the marine environment.

This letter does not constitute a Biological Opinion of the Fish and Wildlife Service pursuant to Section 7 of the Endangered Species Act. It is a response to your request for our concurrence that the plans will not affect listed species. Should this plan be modified so that listed species might be affected, you should initiate consultation with the Fish and Wildlife Service.

Thank you for your interest and concern for conservation of endangered species.

Sincerely,

Lynn P. Childers

Lynn P. Childers
Acting Area Manager

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Science and Technology
Washington, D.C. 20230

January 25, 1980

Dear Reviewer:

In accordance with the provisions of Section 102(2)(C) of the National Environmental Policy Act of 1969, we are enclosing for your review and consideration the draft environmental impact statement/fishery management plan prepared by the Gulf of Mexico and South Atlantic Fishery Management Councils in cooperation with the National Marine Fisheries Service of the National Oceanic and Atmospheric Administration on the Coastal Migratory Pelagic Resources (Mackerel) Fishery.

Any written comments or questions you may have should be submitted to the contact person identified below by March 17, 1980. Also, one copy of your comments should be sent to me in Room 3425, U.S. Department of Commerce, Washington, D.C. 20230.

<u>CONTACT PERSON</u>

Mr. Wayne E. Swingle, Executive Director
Gulf of Mexico Fishery Management Council
Lincoln Center, Suite 881
5401 West Kennedy Boulevard
Tampa, Florida 33609
Telephone: 813/228-2815

Thank you for your cooperation in this matter.

Sincerely,

Sidney R. Galler

Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

Enclosure

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Washington, D.C. 20235

F/MM:KH

MAY 8 1980

RECEIVED
MAY 12 1980
FISHERY MANAGEMENT COUNCIL

Mr. Robert Jones
Chairman, Gulf of Mexico Fishery
Management Council
Lincoln Center, Suite 881
5401 West Kennedy Boulevard
Tampa, Florida 33609

Dear ~~Mr. Jones~~: Bob,

Enclosed is the result of the National Marine Fisheries Service's Endangered Species Act Section 7 consultation concerning the possible impacts of the Fishery Management Plan for Coastal Migratory Pelagic Resources on threatened and endangered species of sea turtles and marine mammals.

It is my biological opinion that the identified activity is not likely to jeopardize the continued existence of threatened or endangered species of sea turtles or marine mammals or result in the destruction or adverse modification of habitat that may be critical to those species (enclosure).

I remain concerned over our responsibilities for safeguarding sea turtles that may be caught incidentally during fishing. At the present time, a sea turtle recovery plan is being developed by our Southeast Region. The recovery plan, when implemented, should aid in the recovery of these species. Therefore, although it is premature for the National Marine Fisheries Service to suggest management measures to aid in the recovery of the sea turtles, I will expect the Council's assistance in implementing measures recommended in the recovery plan.

Please feel free to contact me if you have any questions concerning this determination.

Sincerely yours,

Terry

Terry L. Leitzell
Assistant Administrator
for Fisheries

Enclosure

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32201

RECEIVED
MAR 20 1980
FISHERY MANAGEMENT COUNCIL

SAJEN-EE

17 March 1980

Gulf of Mexico Fishery Management Council
Lincoln Center, Suite 881
5401 West Kennedy Boulevard
Tampa, Florida 33609

Dear Sirs:

This office has reviewed the Draft Fishery Management Plan for the Coastal Migratory Pelagic Resources for the Gulf of Mexico and South Atlantic Coast.

We have no comments on the draft statements. Thank you for affording us an opportunity for review.

Sincerely,

J. A. Barlett, Jr.

FOR JAMES L. GARLAND
Chief, Engineering Division

CF: National Marine Fisheries Service
Southeast Region
9450 Koger Boulevard
St. Petersburg, Florida 33702

SADPD-R

HQDA (DAEN-CWR-P)

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
U.S. COAST GUARD (G-OLE-4/31
WASHINGTON, DC 20593
PHONE: (202 755-1155

16476

RECEIVED
MAR 19 1980
FISHERY MANAGEMENT COUNCIL

Mr. William G. Gordon
Director, Office of Resource
Conservation and Management
National Marine Fisheries Service
Washington, DC 20235

Dear Mr. Gordon:

This letter is in reply to your letter of February 19, 1980 requesting comments on the Draft Environmental Impact Statement and Fishery Management Plan (DEIS/FMP) for the Coastal Migratory Pelagic Resources dated January, 1980. The plan has been reviewed and the following comments are submitted for your consideration:

In §12.0 of the DFMP and section §.1 of the proposed regulations, it is not clear that the plan applies only to the FCZ within the geographic boundaries of the South Atlantic and Gulf of Mexico Fishery Management Councils.

In §.2 of the proposed regulations, the definition of a Vessel of the United States should be changed to read:

"(1) any vessel documented under the laws of the United States;

(2) any vessel numbered under a federal or state system under the Federal Boat Safety Act of 1971; and

(3) any vessel not powered by machinery which is owned by a United States national and which operates out of a port within the United States."

Definitions for commercial and recreational fishing should be included in §.2 of the proposed regulations. Section 12.3.1.1.C.(4) of the DFMP defines commercial and recreational fishermen; however, there is no analogous definition in the proposed regulations. This is particularly important as there are quotas for commercial and recreational fishing in the regulations.

In §.3(b), the phrase "and South Atlantic Ocean," should be added at the end of the sentence to reflect the fact that South Atlantic coastal states are also affected by these regulations.

The word "visual" should be added between "following" and "signals" in the second sentence of §.8(b) to better explain how the signals will be transmitted.

In §.20(b)(2), the notice should be published in the Federal Register vice National Register.

In §.20(c)(3), the five percent allowance of undersized Spanish mackerel is enforceable only as a catch is being offloaded at the dock; however, the size limitations of §.24(b) prohibit the vessel from having undersized fish on board, a direct conflict. It is recommended that this conflict be resolved by adding the word "gillnet" in front of the word "vessel" in §.20(c)(3) and revising §.24(b) to read, "It shall be illegal for any vessel other than a gillnet vessel to buy, sell, possess or process Spanish mackerel under 12 inches fork length." This will reduce waste and comply with the intent of §.12,3,2.1.B. of the DFMP.

The opportunity to comment on the DEIS/FMP is greatly appreciated. If there are further questions regarding this matter please feel free to contact LT Bill Chappell of my staff at (202) 755-1155.

Sincerely,

R. H. Overton

R. H. OVERTON III
Captain, U.S. Coast Guard
Chief, Operational Law Enforcement
Division

United States Department of the Interior

OFFICE OF THE SECRETARY

Southeast Region / Suite 1412 / Atlanta, Ga. 30303
Richard B. Russell Federal Building
75 Spring Street, S. W.

RECEIVED
MAR 27 1980
FISHERY MANAGEMENT COUNCIL

ER- 80/154 March 24, 1980

Mr. Wayne E. Swingle
Executive Director
Gulf of Mexico Fishery Management Council
Lincoln Center, Suite 881
5401 West Kennedy Boulevard
Tampa, Florida 33609

Dear Mr. Swingle:

We have reviewed the draft environmental statement and fishery management plan for Coastal Migratory Pelagic Resources (Mackerels) as requested in Deputy Assistant Secretary Sidney R. Galler's letter of January 25, 1980.

General Comments

Generally the document appears to be well written and to adequately address the various alternatives.

Specific Comments

Pages 6 and 7 of Summary

The document does not clearly show where the 400,000 pounds of king mackerel are to be allocated. Since it is not to be allocated against the commercial catch, the document should show whether it will be allocated against the recreational catch or not counted.

If the study on purse seining in the Gulf is not implemented by March 31, 1981, will it be considered at a later date?

Better definitions of a commercial and a recreational fisherman should be included.

There may be great difficulty in establishing a bag limit for a recreational fisherman when, by his own option, he can say he plans to sell his catch.

Thank you for the opportunity to review and comment on the draft environmental statement and fishery management plan.

Sincerely yours,

James H. Lee

James H. Lee
Regional Environmental Officer

cc:
Deputy Assistant Secretary for
Environmental Affairs, DOC, Washington

Connors

United States Department of the Interior

OFFICE OF THE SECRETARY

Southeast Region / Suite 1412 / Atlanta, Ga. 30303
Richard B. Russell Federal Building
75 Spring Street, S. W.

RECEIVED
MAR 31 1980
FISHERY MANAGEMENT COUNCIL

March 27, 1980

ER-80/154

Mr. Wayne E. Swingle
Executive Director
Gulf of Mexico Fishery
 Management Council
Lincoln Center, Suite 881
5401 West Kennedy Boulevard
Tampa, Florida 33609

Dear Mr. Swingle:

This is a follow-up letter to supplement the comments sent to you on March 24, 1980. The following comments are related to offshore oil and gas activities.

General Comments

The document conveys a general impression of concern that increased outer continental shelf (OCS) petroleum activities in the South Texas area may adversely impact king mackerel stocks. Clarification of some items leading to this conclusion would be helpful.

Specific Comments

Section 5.1.1.2, Page 5.3.

It is stated that large fish are caught off Louisiana and Texas coasts in winter.

Finucane, et al* (1979) (p. 31-32) state:
"Thus, within the Gulf of Mexico, the king mackerel seasonally migrates northwesterly during the spring and summer and southeasterly during the fall, except for the large individuals off Louisiana which apparently do not migrate."

This item should be addressed and, if it is unsupportable, it still should be mentioned. If it cannot be rejected, the section should include a thorough discussion of the implications (e.g. separate stock).

Section 5.1.1.9, larvae. Page 5.7.

Subsection b) creates the distinct impression that king mackerel do not spawn offshore of Louisiana. It is unclear if this "absence" reflects real absence of larvae or absence of sampling. We are not familiar with any comprehensive egg/larvae sampling programs offshore Louisiana; if any have occurred, they should be documented in this section.

Further, if king mackerel do indeed overwinter offshore Louisiana and are non-migratory, can it be assumed that these fish spawn there also? The entire situation concerning king mackerel offshore Louisiana needs to be addressed in detail.

Section 6.0. Page 6.1.

In view of the considerations expressed in the previous comments, we suggest this section address whatever ramifications become apparent and their significance. For example, if spawning does occur off Louisiana, its significance in relation to the magnitude of spawning off Texas, should be discussed.

Further, it would follow that whatever effects OCS oil and gas activities potentially would have on South Texas king mackerel spawning areas has and/or is occurring offshore Louisiana.

Since king mackerel has a protracted spawning range and duration, it is not clear why this species is potentially more susceptible to adverse effects than other species with pelagic eggs and larvae.

In the paragraphs dealing with effects of oil pollution, we suggest Struhsaker's 1977** paper be included in the discussion.

In summary, we suggest that the apparent omission of the Louisiana king mackerel situation could alter the conclusions substantially, and recommend that this topic be analyzed in the Plan.

Sincerely yours,

James H. Lee

James H. Lee
Regional Environmental Officer

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*Finucane, J. H., L. A. Collins, L. E. Barger and J. D. McEachran. Environmental Studies of the South Texas OCS. "Schthyoplankton/Mackerel Eggs and Larvae". NOAA Final Report to BLM under IA AA550-IA7-21 during calendar year 1977., 1979.

**Struhsaker, J. W. "Effects of benezene (a toxic component of petroleum) on spawning Pacific herring, _Clupea harengus pallasi_". _Fishery Bulletin_ 75(1): 43-49, 1977.

cc: Deputy Assistant Secretary for Environmental Affairs,
DOC, Washington

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Duval Building
9450 Koger Boulevard
St. Petersburg, FL 33702

April 14, 1980 F/SER7:JTB

TO: Wayne Swingle, Executive Director
Gulf of Mexico Fishery Management Council

FROM: Jack T. Brawner
Chief, Fisheries Management Division

SUBJECT: Comments on the Draft Fishery Management Plan for Coastal Migratory Pelagics Resources (FMP)

The attached memorandum from Roland Smith to Bill Stevenson provides NMFS comments of a critical and substantive nature with respect to the above subject FMP. We have additional comments of a technical and/or editorial nature that we will provide you for your perusal.

Attachment

cc:
F/SER, William H. Stevenson
F/CM, William G. Gordon

FLM OE-110

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Washington, D.C. 20235

F/CM6:DL

APR 14 1983

F/SER7
~~F/SER6~~
CC: F/SER-SJ

TO: F/SER - William H. Stevenson

FROM: F/CM - Roland F. Smith

SUBJECT: Comments on the Draft Fishery Management Plan for Coastal Migratory Pelagic Resources (FMP)

I attach the National Marine Fisheries Service's informal comments on the draft FMP, environmental impact statement/draft regulatory analysis, and draft proposed regulations, for Coastal Migratory Pelagic Resources. We have also attached comments received from the U.S. Coast Guard.

The NMFS comments are divided into two categories; critical issues and substantive issues. Critical issues are those which may affect the approvability of the FMP, and substantive issues are those which would strengthen the FMP. All comments should be communicated to the Gulf of Mexico and South Atlantic Fishery Management Councils for consideration in converting the document into final form.

We understand the NOAA Regional Counsel will provide a legal review of the FMP which will be available to the joint management committee at its meeting on April 15 and 16.

Based on our review of the FMP and requested revisions, it may be necessary to hold additional public hearings. After the FMP is revised, the NOAA Regional Counsel should be consulted to determine whether or not additional public hearings will be needed.

Attachments

Comments of the National Marine Fisheries Service (NMFS) on the

Draft Fishery Management Plan for the

Coastal Migratory Pelagic Resources (Mackerels)

CRITICAL ISSUES

1. Management Measure D. Management Measure D specifies that "It will be illegal to buy, sell, or process for commercial use, king mackerel under 25 inches fork length." The FMP states "This measure will have minimum effect on the total yield, but will increase the abundance of larger fish and decrease the possibility of overfishing." During development of the FMP, the Council concluded that this management measure would have a minimum adverse impact on the commercial sector, whereas, if instituted as a possession law it would have a substantial adverse impact on recreational fishermen.

We conclude that the measure, as written, does not have a sufficient basis and, if implemented, would be difficult to enforce. Also, we note that information obtained at the public hearings indicates this measure would have a substantial adverse impact on the commercial sector, i.e., commercial hook and line and commercial king and Spanish mackerel netters. We recommend that this management measure be eliminated. If the measure is retained, it should be restructured as a possession law or in some other way that would have a lesser effect on commercial fishing.

2. Regulatory amendment process. It is our understanding that the Councils generally favor the "regulatory amendment" as a means of instituting changes, as opposed to (1) "field orders" which require less time, and (2) the "plan amendment" which requires a much longer period. We understand further that the principal reason the Councils favor the regulatory amendment is that it provides additional opportunities for the general public to participate in the decisionmaking process.

Because the regulatory amendment is of limited responsiveness in terms of immediacy in resolving gear conflicts within a given fishing season, we recommend that this process be fully described in the FMP. The draft FMP implies that the regulatory amendment process will provide "prompt" solution to a potential conflict (page 12-8). We are concerned that expectations of timeliness on the part of the users and general public will be greater than the Councils and NMFS can fulfill.

3. Provision for closure. The FMP establishes total allowable annual catches (i.e., 37 million pounds of king mackerel and 27 million pounds of Spanish mackerel) and allocations of king mackerel to the recreational fishery, the commercial hook and line fishery, and the commercial net fishery.

The language of the FMP is clear that the implementation by the Secretary is intended to: (1) limit the mackerel catches to the specified optimum yield; and (2) control the amount of king mackerel caught by each of the three identified groups receiving allocations to maintain the relative proportion of the resource to each group as well as introducing a degree of flexibility into the regulatory regime by considering certain factors (Section 12.3.1.1.C.(3)) prior to a closure decision. However, the FMP also states the Secretary should consider these factors and make a decision on closure "if the catch exceeds the allocation." Such a constraint is inconsistent with the Council's intent that the relative share of each user group be maintained. We recommend that the Secretary be authorized to initiate the closure process in advance of the time when the Secretary has reason to believe that an allocation or a total annual catch will be exceeded. This process should be initiated sufficiently in advance to allow for the decision to be made and appropriate action to be taken. "Initiate" used in this context, means to consider the identified factors and consult with the Council prior to making a decision. The FMP establishes a closure mechanism because of "the potential for depletion of the resource through exceeding OY" (page 12-11). Once a decision is made to affect a closure to safeguard either an annual catch limit or the share of a specific user group, it is necessary to have a mechanism to implement such closure in a timely manner to achieve the Council's intended purpose. Therefore, we recommend that the Secretary be authorized to implement closures by field order. You may wish to include an explanation of what the Councils intend the Secretary to do in the event an allocation is exceeded by any user group. In addition, you may want to clarify the effect of exceeding the optimum yield.

4. Purse seines. The Councils propose in the draft FMP to prohibit purse seines in the South Atlantic fishery conservation zone (FCZ) and allow purse seines in the Gulf of Mexico FCZ, under a limitation of 400,000 pounds of king mackerel in a research program. This restriction is to be imposed in spite of "the lack of documental evidence on the possible and/or negative impacts of purse seines . . . " (page 12-14). The imposition of such restrictions through Federal regulations, in the absence of such vital information, is inconsistent with the Fishery Conservation and Management Act of 1976, as amended.

We recognize that the possible use of purse seines in this fishery is a highly emotional issue. Nevertheless, we request that the Councils readdress this issue and reach a common agreement on the matter of regulating and monitoring the use of purse seines in the fishery.

SUBSTANTIVE ISSUES

1. Definitions.

A. Overfishing. The term "overfishing" is used in several sections of the FMP (12.1, 12.2, 12.3). It is not sufficiently clear whether the meaning is the level of fishing that reduces the spawning stock size to a critical point or, a level that allows fish to be harvested at a less than optimal size or age.

B. The discussion of whether cobia do or do not spawn at age one is inconsistent and should be clarified.

2. Length of the FMP. We urge the Council to consider reducing the length of the final FMP to provide a more usable public document. There is presently much detail provided that could be summarized, shifted to the appendix, or placed in a separate source document. Also, the cost of publication in the Federal Register now is $372 per page and will be increased to $408 on October 1, 1980.

3. MSY - OY - DAH - TALFF. Section 12.1 lists objectives for king and Spanish mackerel as "to prevent exceeding MSY." Since MSY is a long-term average, and, in this FMP MSY is set equal to OY, the Council should consider whether OY is the more appropriate term.

Sections 12.2.1 and 12.2.2 and the following Sections appear to make the flat statement that OY equals some point in the range of MSY. This is acceptable; however, the social and economic reasons allowing this equality are not presented. Perhaps this is because the mackerels and cobia are highly recreational fisheries and not over-exploited commercially. If this is so, then the FMP should state this. In the equation MSY = OY = DAH + TALFF, DAH is adequately described in Section 8. The weak portion in determining a zero TALFF is the assessment and specification that MSY = OY.

4. Draft proposed regulations. The draft proposed regulations (prepared by NMFS) need to be substantially revised. NMFS, with assistance from NOAA General Counsel, will make the necessary revisions.

5. Addressing the fishery throughout its range. The plan as presently structured does not address mackerels and cobia in the Mid-Atlantic region. We understand that only a small portion of the total stocks are harvested in that region. However, we would suggest that it would be prudent to extend the plan to the Mid-Atlantic, especially in light of that Council's apparent acceptance of the management system.

Smith

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
U.S. COAST GUARD (G-OLE-4/3
WASHINGTON, DC 20593
PHONE: (202 755-1155

16476

MAR 17 1980

Mr. William G. Gordon
Director, Office of Resource
Conservation and Management
National Marine Fisheries Service
Washington, DC 20235

Dear Mr. Gordon:

This letter is in reply to your letter of February 19, 1980 requesting comments on the Draft Environmental Impact Statement and Fishery Management Plan (DEIS/FMP) for the Coastal Migratory Pelagic Resources dated January, 1980. The plan has been reviewed and the following comments are submitted for your consideration:

In §12.0 of the DFMP and section §.1 of the proposed regulations, it is not clear that the plan applies only to the FCZ within the geographic boundaries of the South Atlantic and Gulf of Mexico Fishery Management Councils.

In §.2 of the proposed regulations, the definition of a Vessel of the United States should be changed to read:

"(1) any vessel documented under the laws of the United States;

(2) any vessel numbered under a federal or state system under the Federal Boat Safety Act of 1971; and

(3) any vessel not powered by machinery which is owned by a United States national and which operates out of a port within the United States."

Definitions for commercial and recreational fishing should be included in §.2 of the proposed regulations. Section 12.3.1.1.C.(4) of the DFMP defines commercial and recreational fishermen; however, there is no analogous definition in the proposed regulations. This is particularly important as there are quotas for commercial and recreational fishing in the regulations.

In §.3(b), the phrase "and South Atlantic Ocean," should be added at the end of the sentence to reflect the fact that South Atlantic coastal states are also affected by these regulations.

The word "visual" should be added between "following" and "signals" in the second sentence of §.8(b) to better explain how the signals will be transmitted.

3-19-80
F/CM

SPEED LIMIT 55
It's a law we

North Carolina Department of Natural Resources & Community Development
James B. Hunt, Jr., Governor
Howard N. Lee, Secretary

DIVISION OF MARINE FISHERIES
Connell E. Purvis
Director
Box 769 Morehead City 2855
Telephone 919 726-7021

March 17 1970

MAR 20 1980

Dr. Jackson Davis
South Atlantic Fishery Management Council
Southpark Building
#1 Southpark Circle
Charleston, South Carolina 29407

Dear Jack

Enclosed are summary king mackerel statistics for 1977-79 for North Carolina, including distance from shore. Detailed monthly data for 1979 are included.

I have a general comment on the plan. There have been many comments on the large numbers of sport fishermen affected, compared to a relatively few commercial fishermen. Commercial fishermen, however, are the same as farmers in that a small number of producers provide food for large numbers of consumers. Our economic system provides those consumers, often far removed from the site of production, with a wide choice in the marketplace. For seafood products, the marketplace includes at least specialty seafood markets, grocery stores and restaurants. Undue restriction of commercial fishing operations in favor of recreational fishing may well affect the rights of very large numbers of consumers to choices in the market. The ultimate economic rights of those consumers who may well outnumber the sport fishermen and who have no means to catch king mackerel must be considered in questions of allocation of the catch between commercial and recreational fishermen.

Sincerely yours

Michael W. Street, Chief
Fisheries Management Section

ms

Enclosures

MID-ATLANTIC FISHERY MANAGEMENT COUNCIL

ROOM 2115 FEDERAL BUILDING
NORTH & NEW STREETS
DOVER, DELAWARE 19901

TELEPHONE: 302-674-2331

DAVID H. HART
Chairman
ELIOTT GOLDMAN
Vice Chairman

JOHN C. BRYSON, P
Executive Director

17 March 1980

Mr. Wayne E. Swingle, Executive Director
Gulf of Mexico Fishery Management Council
Lincoln Center, Suite 881
5401 West Kennedy Boulevard
Tampa, Florida 33609

RE: Coastal Migratory Pelagic Resources Fishery Management Plan

Dear Wayne:

The following are the comments of the Mid-Atlantic Fishery Management Council on the January 1980 draft of the subject FMP as approved by the Council at its March 12-14, 1980, meeting.

The Plan should be revised to clarify the relationship between it and the Bluefish FMP being prepared by the Mid-Atlantic Council. It is our understanding that as a result of the discussion you use in the Coastal Migratory Pelagic Resources FMP on bluefish the fact that there is no need for an FMP for bluefish relates only to the Gulf of Mexico. We further understand that the South Atlantic Fishery Management Council agrees that a plan is needed for bluefish in the Atlantic Ocean. The proposed management unit of our Bluefish FMP is all bluefish in US waters in the Atlantic Ocean. You agreed with this approach in your letter of June 8, 1979. Therefore, we believe that the Coastal Migratory Pelagic Resource FMP should be revised accordingly.

We also believe that the FMP should be revised to clarify the specific conditions under which Mid-Atlantic fisheries would become regulated by this

FMP. In Section 12.0 (page 12-1) the FMP states "Should a fishery develop which does have a significant impact on these stocks and is in the FCZ beyond the area in which management measures will be applied, the Secretary shall, after consultation with the Councils, extend the area affected by management measures." We believe that the FMP should include specific criteria so that "significant impact" may be known in advance or, if criteria cannot be developed at this time, the FMP should clearly indicate that its geographical coverage will not be extended without a plan amendment. This seems to be the only way to insure adequate public input into any decision to extend the geographical coverage of the FMP beyond the South Atlantic and Gulf FCZ.

Our above comments concerning the expansion of geographical coverage also apply to the development of regulations for species other than king mackerel, Spanish mackerel, and cobia. Section 12.2.4 (page 12-6) states that "Optimum yield was not specified for the other species because of lack of data to estimate MSY. When sufficient data become available to estimate MSY and/or OY for other species in the fishery, and the need arises for management measures, the Council will develop such estimates. At that time, these species will be added to the management unit by the Regulatory Amendment process." While we are aware of the time and effort necessary to prepare a full plan amendment, we do not believe that MSY, OY, and regulations should be developed and imposed without the public review process required by a plan amendment. Therefore, we recommened that Section 12.2.4 be revised by deleting "...by the Regulatory Amendment process." and adding in lieu thereof "by plan amendment."

In addition, we do not understand how you will apply your definitions of commercial and recreational fishermen to the several quotas established in the plan.

Sincerely,

John C Bryson

John C. Bryson,

Executive Director

cc: Ernest Premetz

MID-ATLANTIC FISHERY MANAGEMENT COUNCIL

ROOM 2115 FEDERAL BUILDING
NORTH & NEW STREETS
DOVER, DELAWARE 19901

TELEPHONE: 302-674-2331

DAVID H. HART
Chairman
ELIOTT GOLDMAN
Vice Chairman

JOHN C. BRYSON, P.E.
Executive Director

RECEIVED
APR 3 1980
GULF FISHERY MANAGEMENT COUNCIL

March 31, 1980

Mr. Wayne E. Swingle
Gulf of Mexico Fishery Management Council
Lincoln Center, Suite 881
5401 West Kennedy Boulevard
Tampa, Florida 33609

Dear Wayne:

This is a follow up to my letter of March 17 concerning the Coastal Migratory Pelagic Resources Fishery Management Plan. Our staff has gone over the plan and come up with some things you might want to consider with respect to the hearing draft of the Coast Pelagic Plan. I hope these comments will be of some help to you

In developing our bluefish management plan we have learned a few things that may be useful. Spawning now appears to take place in other than the Atlantic so the likelihood of the Gulf population being separate from the Atlantic is much greater. Because of this believed separation, we do have an MSY calculation for bluefish in the Atlantic which the Natural Marine Fisheries Service has given us. This might change your discussion in sections 5.1.4.9 (b) and 5.4.5.1. Section 5.3.4 (a) deal with the north Atlantic. It might be useful to add any data from the Gulf population which you may have. This might further show the difference in the two groups.

Wilk's 1977 paper has also been of great value to us concerning bluefish but his table of catches which you use on page 8-5 has several errors. I have enclosed our updated version. In working with commercial catch statistics, we have not found an area in the Atlantic where bluefish are a major contributor to total landings. You seem to have found otherwise by your discussion in sections 8.1 and 8.2.4, which for bluefish, appear to apply only to the Atlantic area. We would be interested to kno any differences in the Gulf where commercial landings seemed relatively insignificant.

Table 8.4 on page 8.10 shows the percent of total anglers but we are not sure what is meant by total. Perhaps this could be clarified.

In the cobia discussions there are a few questions. The Chesapeake Bay plays an important role in this fishery. You might want to expand on this in section 6.1.2 as this area is very fragile. The MSY information seems the same to us as that which is available for bluefish. In addition, most of the background material appears to have come from the Atlantic area. If the Gulf has a different stock, as you seem to believe, is an MSY based on Atlantic data applicable? In light of this we think the cobia OY needs to be identified in section 8.2.8.3 as being for the management unit area only and this whole discussion needs to be added in section 12.5.

The 33" cobia size limit could cause problems in the Mid-Atlantic area as you recognize in sections 5.1.6.5 and 5.1.6.6. On the other hand, the 33" size limit cobia just allows females to have reached maturity. It seems to us that it is more important to increase abundance than it is to increase yield per recruit. A bag limit would appear to be the much better option as anglers would still return the small ones so the ones they keep could be big. This would not interfere with their enjoyment and would seem to be a much faster method of insuring stock rebuilding. This method has been very successful with bluefin tuna. We are curious why you believe in section 12.2.3 the mortality of released fish increases with size. Is there any information available to support this?

We would be interested to know how you will arrive at the statistical sample for reporting from the different segments of the fishery which is discussed in section 12.3.5.1. Our experience has been that full reporting by all commercial segments of the fishery provides better information with little effort since they are all keeping records anyway. In addition, all the recreational vessels for hire have to be registered so they, can be sampled effectively.

These are just some of our thoughts. Please let us know if we can be of any further help along these lines. We did notice two typos which you might have already seen - page 7-7 line five from the bottom seeding is probably seeking and page 8-21 Exhibit 8-11 1971 Florida (west) is 510 pounds, not 410.

Best of luck with your efforts.

Sincerely,

John C Bryson

John C. Bryson

JCB:JMM:lad

cc: Mr. Ernest Premetz

Table II-1. Commercial Landings of Bluefish by State, 1880 - 1974
(in thousands of pounds)
A dash (-) indicates information not available.
An asterisk (*) indicates less than 500 lbs. caught.

Year	ME	NH	MA	RI	CT	NY	NJ	DE	MD	VA	NC	SC	CA	FL East Coast	FL West Coast	AL	MS	LA	TX	Total
1880	-	-	-	-	-	3000	3635	46	10	1546	600	200	5	25	44	-	-	-	-	9111
1887	-	-	-	-	-	2853	4789	-	383	1286	761	158	7	-	-	-	73	13	7	10380
1888	-	-	-	-	-	3454	4661	-	576	2111	847	151	6	-	246	-	78	15	6	12151
1889	-	-	-	-	-	5027	8565	-	-	-	1078	110	-	5	364	58	90	13	24	15334
1890	-	-	-	-	-	5740	9291	-	460	1472	1539	100	-	7	420	56	96	13	26	19220
1891	-	-	-	-	-	5509	7228	-	516	1842	-	-	-	-	-	-	-	-	-	15093
1897	-	-	-	-	-	11146	5164	-	187	1505	1910	40	-	46	265	204	33	4	30	20534
1901	-	-	-	-	-	9351	6110	-	100	755	-	-	-	-	-	-	-	-	-	16316
1902	-	-	-	-	-	-	-	-	-	-	1049	1	-	82	350	21	12	*	16	1531
1904	-	-	-	-	-	11414	2723	-	91	567	-	-	-	-	-	-	-	-	-	14795
1908	-	-	-	-	-	3191	1850	-	14	242	1258	7	-	580	372	5	18	3	10	7550
1918	-	-	-	-	-	-	-	-	-	-	323	3	5	561	271	-	-	-	-	1163
1920	-	-	-	-	-	-	-	-	74	178	-	-	-	-	-	-	-	-	-	252
1921	-	-	-	-	-	1083	2243	1	-	-	-	-	-	-	-	-	-	-	-	3327
1923	-	-	-	-	-	-	-	-	-	-	897	7	-	1101	418	4	6	-	1	2434
1925	-	-	-	-	-	-	-	-	58	157	-	-	-	-	-	-	-	-	-	215
1926	-	-	-	-	-	262	628	10	-	-	-	-	-	-	-	-	-	-	-	900
1927	-	-	-	-	-	-	-	-	-	-	852	13	-	772	620	46	30	6	1	2340
1928	-	-	-	-	-	-	-	-	-	-	754	4	50	599	390	31	27	-	1	1856
1929	-	-	50	73	219	773	2960	30	212	510	631	-	28	609	513	103	16	*	1	6728
1930	-	-	210	243	251	880	2962	31	268	230	843	*	1	400	753	21	19	-	*	7112
1931	-	-	191	121	407	671	2535	71	473	343	676	2	-	566	642	35	18	-	3	6754
1932	1	-	226	134	285	913	3844	10	360	551	687	4	-	907	515	12	5	-	2	8456
1933	-	-	430	194	296	1132	2115	5	119	648	-	-	-	-	-	-	-	-	-	4975
1934	-	-	-	-	-	-	-	-	329	936	1766	3	-	1445	489	29	-	-	-	4997
1935	-	-	91	144	118	1002	1960	14	313	340	-	-	-	-	-	-	-	-	-	3985
1936	-	-	-	-	-	-	-	-	129	317	2028	10	-	3176	608	72	-	-	-	6340
1937	-	-	46	140	33	858	1484	6	81	528	1657	30	-	2870	709	28	-	-	-	8470
1938	-	-	71	39	10	250	1038	3	51	303	1849	43	-	3628	852	21	-	-	-	8158
1939	-	-	10	15	8	219	682	-	57	83	1009	6	-	2383	768	23	-	-	-	5263
1940	-	-	26	15	-	25	105	-	4	15	448	4	-	1366	597	24	-	-	-	2629
1941	-	-	-	-		-	-	-	16	22	-	0	-	-	-	-	-	-	-	38
1942	-	-	10	2	-	45	167	-	63	43	-	-	-	-	-	-	-	-	-	330
1943	-	-	30	3	7	122	148	-	-	-	-	-	-	-	-	-	-	-	-	310
1944	-	-	4	19	13	91	114	-	99	47	-	-	-	-	-	-	-	-	-	387
1945	-	-	3	11	11	105	265	-	102	121	627	11	-	1274	557	31	1	-	-	3119
1946	-	-	1	4	6	105	-	-	73	203	-	-	-	-	-	-	-	-	-	392
1947	-	-	2	14	10	116	399	*	138	254	-		-	-	-	-	-	-	-	933
1948	-	-	2	17	21	241	611	5	131	272	-	-	-	-	-	6	*	1	-	1307
1949	-	-	25	25	10	251	1055	63	87	305	-	-	-	-	564	5	2	5	2	2399

Table II-1. (continued)

Year	ME	NH	MA	RI	CT	NY	NJ	DE	MD	VA	NC	SC	GA	FL East Coast	FL West Coast	AL	MS	LA	TX	Total
1950	–	–	61	56	20	127	1296	21	106	311	1272	10	–	990	408	4	1	3	*	4688
1951	–	–	28	37	54	191	1100	5	85	179	926	12	–	1431	594	26	*	–	–	4668
1952	–	–	1	48	90	208	1439	1	111	144	737	11	–	1115	917	24	4	–	*	4850
1953	–	–	30	80	56	163	1139	2	46	175	542	7	–	1104	968	10	4	–	*	4326
1954	–	–	31	91	24	402	1261	2	89	185	323	8	–	804	1229	5	–	–	*	4354
1955	178	–	37	31	32	469	1015	3	63	220	435	39	–	1013	672	15	2	–	*	4224
1956	–	–	19	48	13	371	1019	3	101	224	633	53	–	771	780	6	3	–	*	4044
1957	–	–	25	59	19	438	916	5	93	193	816	71	*	1107	1092	5	4	–	2	4845
1958	–	–	3	10	2	116	91	6	32	156	437	3	–	845	1438	103	10	*	*	3252
1959	–	–	5	20	6	262	376	4	30	183	740	1	–	1284	900	11	2	*	–	3824
1960	–	–	15	34	5	414	443	1	10	130	615	*	–	1090	718	1	4	–	–	3480
1961	–	–	18	49	11	505	462	–	19	294	752	1	*	979	624	4	18	–	–	3736
1962	–	–	34	110	31	758	1092	8	64	524	955	5	–	1393	944	1	4	–	–	5923
1963	–	–	47	82	52	697	823	21	42	632	813	114	*	1362	889	4	5	–	–	5583
1964	–	–	42	90	60	675	541	–	6	395	515	316	–	1202	779	11	15	–	–	4647
1965	–	–	143	108	60	1036	870	–	7	205	704	84	–	855	859	5	72	–	–	5008
1966	–	–	127	72	56	933	1008	1	17	242	821	158	1	1353	584	9	102	–	–	5484
1967	–	–	70	79	62	550	502	–	18	120	888	48	–	1346	513	4	79	–	–	4279
1968	–	–	87	81	62	577	765	*	141	241	872	24	–	1910	556	4	83	–	–	5403
1969	–	–	150	124	83	1119	680	–	54	223	871	5	–	2080	529	31	25	–	–	5978
1970	–	–	169	323	85	1602	1064	–	69	646	496	8	–	2046	650	21	21	–	–	7200
1971	–	2	272	271	83	1211	979	–	141	611	578	13	–	1625	510	13	10	*	–	6319
1972	–	–	372	311	49	1003	812	1	59	1216	1168	–	–	1876	511	22	14	*	–	7414
1973	59	–	556	278	96	1412	888	3	276	2905	2008	3	–	1583	493	27	10	*	–	10597
1974	30	–	390	267	89	1067	1003	6	559	3137	2183	*	–	1272	501	9	16	11	–	10540
1975	12	–	549	381	15	890	1281	15	277	3284	1975	2	*	1021	436	7	75	12	–	10233
1976	*	–	450	242	23	600	1281	12	504	4167	1356	1	*	1380	528	2	66	2	–	10614
1977	*	*	504	245	13	986	1398	32	524	3169	2331	10	*	1373	–	–	–	–	–	11320

From: Wilk, 1977, with corrections and updating to years from 1966 to the present from Fishery Statistics of the US.

COASTAL AREA BOARD
POST OFFICE BOX 755
DAPHNE, ALABAMA 36526
205--626-1880

EXECUTIVE DIRECTOR
E. BRUCE TRICKEY

PLEASE ADDRESS REPLY TO: P.O. Box 755

June 3, 1981

Mr. Wayne E. Swingle
Executive Director
Gulf of Mexico Fishery
Management Council
Lincoln Center, Suite 881
5401 W. Kennedy Blvd.
Tampa, Florida 33609

Dear Mr. Swingle:

Thank you for the opportunity to comment on the fishery management plan for coastal migratory pelagic resources in the Gulf of Mexico. We have reviewed the Gulf of Mexico Fishery Management Plan and have found it to be consistent with the Alabama Coastal Area Management Plan.

Sincerely,

E. Bruce Trickey
Executive Director

EBT:BAD

State of Louisiana

FRANK A. ASHBY, JR.
SECRETARY

JAMES M. HUTCHISON
DEPUTY SECRETARY

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF STATE LANDS

MICHAEL BOURGEOIS
DIRECTOR

April 28, 1981

Mr. Wayne E. Swingle
Executive Director
Gulf of Mexico Fishery Management Council
Lincoln Center, Suite 881
5401 W. Kennedy Blvd.
Tampa, Florida 33609

RE: C810382 - Coastal Use Consistency
Gulf of Mexico Fishery Management Council
Plan for Coastal Migratory Pelagic Resources (Mackerel)
Gulf of Mexico

Dear Mr. Swingle:

We have reviewed the "Fishery Management Plan, Final Environmental Impact Statement, Regulatory Analysis for the Coastal Pelagic Resources (Mackerels) September, 1980", and, in view of the fact that the proposed plan will have little effect on Louisiana's coastal resources, we find it consistent with Louisiana's Coastal Zone Management Program.

However, the portion of this management plan concerning the status of Louisiana's Coastal Zone Management Program is in error since it reports that Louisiana's Program is "in progress". Louisiana's Coastal Zone Management Program was officially approved by the Office of Coastal Zone Management on September 20, 1980. Therefore, Louisiana's Program status should have been listed as "near completion" in the aforementioned F.E.I.S.

We appreciate the opportunity to comment in this matter.

Sincerely,

Joel L. Lindsey

JOEL L. LINDSEY
CMS/DNR ADMINISTRATOR

JLL/mw

WILLIAM WINTER
Governor

MISSISSIPPI DEPARTMENT OF WILDLIFE CONSERVATION

Bureau of Marine Resources
P. O. Drawer 959
Long Beach, MS 39560
(601) 864-4602
Enforcement Division - 374-3205

April 30, 1981

GULF OF MEXICO
RECEIVED
MAY 04 1981
FISHERY MANAGEMENT COUNCIL

Mr. Wayne Swingle
Executive Director
Gulf of Mexico Fishery Management Council
Lincoln Center, Suite 881
5401 West Kennedy Boulevard
Tampa, FL 33609

Dear Wayne:

The Bureau of Marine Resources has received the Fishery Management Plan and Final Environmental Impact Statement for Coastal Migratory Pelagic Resources (Mackerels). Staff members involved with implementation of the state's coastal program have reviewed the plan and determined that it is consistent with this program.

Sincerely,

Rick

Richard L. Leard, Ph.D.
Bureau Director

RLL:DHW:mac

Key West Charter Boatmen's Association, Inc.

P.O. BOX 2522 KEY WEST, FLORIDA 33040

RECEIVED
MAR 31 1980
FISHERY MANAGEMENT COUNCIL

March 27, 1980

Connor

Mr. Wayne E. Swingle
Gulf of Mexico Fishery Management Council
Lincoln Center, Suite 881
5401 W. Kennedy Blvd.
Tampa, Florida 33609

Dear Sir:

The enclosed letter was written to the National Marine Fisheries Service concerning the netting of kingfish. The Key West Charter Boatmen's Association is sending this letter to you for your records and would like to ask for your support in restricting net fishing of kingfish to a 45 feet depth or less. This is a compromise solution to a very serious problem. If you have any questions concerning this matter, please do not hesitate to ask.

Respectfully,
THE KEY WEST CHARTER BOATMEN'S ASSOC.

Roger Push

Roger Push
President

RP/bp
Enclosure

Key West Charter Boatmen's Association, Inc.

P.O. BOX 2522

KEY WEST, FLORIDA 33040

March 27, 1980

Dear Sir,

The Key West Charter Boatmen's Association believes that the net fishing of kingfish is severely depleting our kingfish stocks. In just a few years, our kingfish grounds in the Gulf of Mexico North and West of Key West have been totally decimated. The only productive area left for hook and line, charter and recreational boats in the Key West area is the deep water reefs south and southwest of Key West. This area has always been left alone by the netfishermen due to the depth of the water (ranges 50-130 ft.) and the rugged bottom and swift currents. That is until this year! This year the kingfish netters production was very low in their traditional areas of the Gulf of Mexico, so they fished the deep water reefs off Key West. In order to do this, they tied two shallow water nets together and set them around the schools of kingfish in the deep reefs. The catches were astronomical, and so was the waste and slaughter. One boat, The Solemn Judge lost two thirds of his net because the weight of the fish combined with the strong currents and reef bottom ripped it apart. In the one third of the net that he retrieved, it was reported he caught over 23,000 pounds. It is estimated that twice that much (46,000 lbs.) was lost! Dead and rotting, tangled in the net on the bottom!

This tremendous waste and slaughter occurred mainly because of the geography of the area. The bottom is rough and jagged and the currents are swift. The water is deep and drops off quickly. Net fishermen have traditionally fished in the shallow flat sandy areas of less than 50 foot depth. They should not be allowed to fish deep reefs - only more waste and destruction will occur.

After the netfishermen set their nets, the kingfish schools left the area and the sharks moved in to feed on the dead fish. Our catches dropped dramatically and so did those of the hook and line vessels.

The Charter Association does not desire to put the net fishermen out of business, only to limit the areas they are allowed to fish. We feel that they should be limited to a net depth of <u>45</u> feet or less. They have traditionally fished with nets of this size and are required to do so by Florida law in every County except Monroe. This year the Florida Legislature will include Monroe County in this law, and we urge the Council to pass a Federal Regulation with the same restrictions as Florida. If this is done, you will separate two different user groups - net fishermen inside 45 foot depth and all others outside the 45 foot depth - and will stop incidents such as the following from occurring again:

This past February, the charter fleet and the hook and line fleet were fishing a school of kingfish southwest of Key West. Around midday, three net fishing boats from other areas (Solemn Judge, Tampa, Fla, Two Boy, Port Salerno, and the Lady Lynn, Ft. Pierce) came into the area. These three vessels deliberately ran the Charter boats and hook and line fishermen out of the area so they could set their nets. The Charter boat Jolly Roger II, Linda D II, and Shark III were forced to break their fishing circles or be rammed on our port side. One vessel, the Jolly Roger II, had to throw his vessel in reverse and back over his lines to avoid a collision. This incident was reported to the U. S. Coast Guard. They said they had no jurisdiction and referred us to the National Marine Fisheries Service Law Enforcement Division. We contacted Mr. Charles Fress in St. Petersburg. He informed us there was little he could do and to relay our story to the Fish Councils. It seems strange to us that a boat has to be rammed before something can be done. If there is no law or controls, then matters will soom be settled in other ways. We hope it does not come to that. We are law-abiding people and are asking for your help.

The Key West Charter Boat Association believes that incidents such as those described above can be eliminated if the Management Councils pass a law prohibiting king fish nets over 45 feet deep. The Council will separate two conflicting user groups and at the same time leave an area for the kingfish schools to replenish their stocks for future generations.

Sincerely yours,
KEY WEST CHARTER BOATMEN'S ASSOC.,INC.

Roger Push

Roger Push
President

RP/bp

Connor

Concerned Fishermen of Florida

Non—Profit Corporation

Dedicated to Sound Fisheries Management

P.O. Box 3024

Fort Pierce, Florida 33450

March 2, 1980

RECEIVED MAR 17 1980 FISHERY MANAGEMENT COUNCIL

RECEIVED MAR 6 1980 SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL CHARLESTON, S.C. 29407

Secretary
South Atlantic Management Council
1 Southpark Circle
Suite 306
Charleston, South Carolina 29407

To whom it may concern:

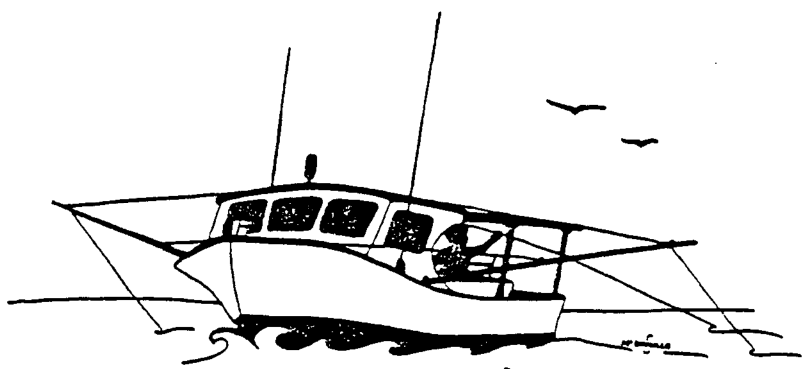
Enclosed is a copy of my statement to the management Council at their public hearing in Ft. Pierce on the king mackerel management plan.

Chairman O. B. Lee requested I send such a copy to you so that all members of the council might receive a copy.

Thank You

Roger R. Farlow

Roger R. Farlow
President



Concerned Fishermen of Florida

Non—Profit Corporation

Dedicated to Sound Fisheries Management

P.O. Box 3024

Fort Pierce, Florida 33450

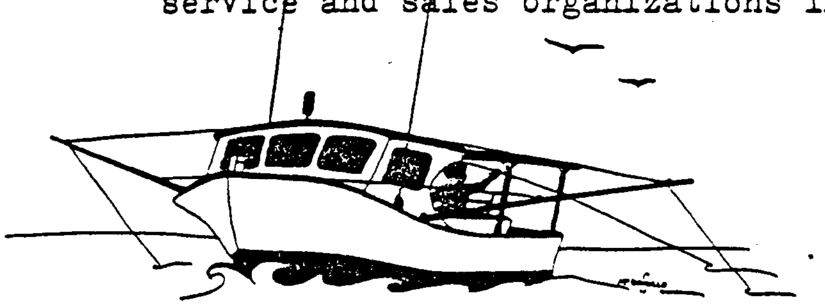
My name is Roger Farlow, I am president of the Concerned Fishermen of Florida, whose membership is composed mostly of hook and line kingfishermen. Our organization was formed specifically for the purpose of resolving the gear conflict between the hook and line and net kingfishermen. This conflict was precipitated in the Ft. Pierce area in February, 1978 as a result of the introduction of kingfish nets into an area that has historically been fished only by hook and line.

Of great concern to us is the proposed gear separation regulation in the king mackerel management plan. As it now reads it would be an absolute disaster to all hook and line kingfishermen since we depend almost one hundred percent on king mackerel during the winter season. We must be able to follow the fish whereever they appear. Our prime kingfish area is the norteast grounds off Ft. Pierce which would be off limits to us every other year under the proposed regulation. If the present season is any indication, a gear conflict no longer exists, since we have practically no kingfish in the Ft. Pierce area.

We would like to recommend again that the Council ban king mackerel net fishing in the area from West Palm Beach to Cape Canaveral under paragraph (2) (a) page 5 of the king mackerel plan which allows the Secretary to prohibit use of a gear in a geographical area when a conflict arises through the introduction of a gear into new regions where they have not been historically fished. Such a regulation would allow the fish an area of refuge so that eventually the stock might be rebuilt.

The only area on the east coast where any amount of kingfish have appeared this winter is Jupiter where the natural conditions of deep water, rocky bottom and strong tides have prevented the nets from setting the fish and running them off as they have done in other areas of the state.

We believe the management councils should consider whether it is better to have a fleet of overly efficient large boats fishing a few months each year and depleting each area they fish so that they must range farther and farther afield in order to support themselves, or a large fleet of small boats, fishing year round, producing a quality product and supporting a variety of service and sales organizations in the local economy.



effects. I submit that by no stretch of the imagination can gill nets or purse seines be deemed to be compatible with those objectives..

There are those supporters of the FMP who mistakenly argue that there is no scientific proof that nets are harmful to the king mackerel populations as required by the "standards." Actually the pertinent standard, the second, reads: "Conservation and management measures shall be based on the best scientific information available," -- INFORMATION, not proof! As a matter of fact, there is very little in the way of proof of anything under the surface of the water due to the limited knowledge of the yet comparatively embryonic science of marine biology. Since the FMP undoubtedly reflects the "best scientific information available," the statements contained on pages 5-43 to 5-48 are significant..

"Present condition of the stock(s) of king mackerel cannot be conclusively established. The data available to assess present condition is somewhat contradictory." (pp 5-43)

"Effort and total catch are rising rapidly and may exceed MSY in the future if no measures are taken to control harvest." (pp 5-43)

"They (data) do show clearly the decline in catch and CPUE in 1977 and 1978 reported by many recreational fishermen in the northern Gulf of Mexico. The causes of this decline are not known. . . It seems likely that such a dramatic decline in abundance would have been accompanied by reduced landings in the winter fisheries in South Florida, both commercial and recreational. This does not seem to be the case, although landing statistics and other documentation are lacking."

"If either of the upper bound estimates is correct, then the stock is not presently in any danger of being overfished and present levels of fishing pressure are not significantly affecting the abundance of the stock. If one of the lower bound estimates of MSY is correct, then the stock is overfished and is declining. If our 'best' estimate is correct, the stock is not now overfished, but increasing fishing pressure in recent years may have caused some decline in abundance." (pp 5-46)

"Interpretation of the future condition of the stock on the basis of MSY estimates should be very conservative." (pp 5-48)

On examining the lengthy formulas and computations contained in the FMP (pp 5-35 to 45) where virtually every figure or character in the formulas reflects an imprecise estimate or assumption based upon other equally imprecise estimates or assumptions, it is readily apparent that the margin for error is so great as to make the MSY no better than a not too well-educated guess. The great disparity between upper and lower estimates indicates that MSY estimates should be very conservative indeed. Even if MSY is assumed to be reasonably accurate, it is based substantially on 1975 data and recreational fishing pressure is increasing by an estimated 9.5% per year according to the FMP (pp 5-46) or some 57% since 1975. It is therefore likely that MSY has already been exceeded.

Obviously, the "best scientific information available" is imprecise to say the least, so it is essential to consider the experience of knowledgeable fishermen as well. Reports, interviews, testimony before various bodies and over 100 responses to my own written survey, covering virtually all of the fishing ports and docks from the Georgia to Alabama borders, indicate that knowledgeable hook and line, charter, head boat, and recreational fishermen report essentially the same experiences, which are summarized as follows:

a. Whereas king mackerel, until five or six years ago appeared simultaneously in several areas along Florida's coast, in huge schools stretching as much as 10 or 12 miles in length, today they are, when found (except for one location off Key West) in small scattered schools in only a fraction of their former areas. In many areas of former seasonal abundance, the king is a rarity. These reports appear to tie in pretty well with the following statements contained in the FMP: (i) "The mackerels and bluefish have in common the formation of gigantic schools." (pp 5-1); (ii) "Commercial catches have been expanding rapidly since 1974. This has been primarily in response to the great expansion of the power roller gill-net fleet." (pp 5-46) That explains why commercial catches have held up. The roller rigs began netting outside the bar in the Fort Pierce-Stuart area for the first time in February of 1978 and found an abundance of kings that no longer exists. In 1980 the netters intruded for the first time on the last large concentration of kings in Florida waters at the end of the bar out of Key West. If they follow the pattern and netting continues, by this time in 1982 there will be no known large concentration of kings in Florida waters.

b. When a strike is made, hook and line fishermen (commercial or recreational) are unable to catch kings in that area for a matter of days, weeks, or the season.

c. The more alarming fact is that in the 1979-80 season, the size of the fish has declined dramatically (which, according to scientific theory, indicates that the fish stocks are in trouble).

d. That one more season of gill netting by about 30 gill netters will pretty well clean out the Fort Pierce area kings and will deprive the 300 commercial hook and line fishermen of their livelihood (the hook and line commercial Spanish mackerel fishermen are long since gone). The charter boat and head boat fleets are in trouble (in some areas they are already gone) because their mainstay (king mackerel) is in such short supply or gone altogether. And many resident recreational fishermen are giving up as are tourists who came to some areas for the excellent runs of kings that no longer occur. The enclosed chart which I prepared from 16 years of daily records of one capable hook and line commercial fisherman reveal the trend. It is particularly significant to note that his catches never declined two years in a row until the 1978 season when the large roller net boats crossed the bar in the Fort Pierce area.

e. In the 1979-80 season, the only concentration of king remaining in Florida waters was located in an area at the end of the bar out of Key West which had never before been netted. The recreational and commercial hook and line fishermen were doing very well until the spotter planes and net boats arrived and made their strikes. That ended the hook and line fishing for the next three weeks. However, following those strikes, kings appeared off Naples for the first time in 6 or 7 years. Some enthused that the king had returned to the West Coast, as the netters pursued them up the coast towards St. Petersburg. It would appear that a more logical conclusion might be that the survivors of the Key West strikes fled northward along the Gulf side. Now that netters have found a way to strike the last remaining area of concentration, they will return next season and the next and that after that it won't matter because there won't be enough kings to worry about. If they follow the pattern, we may see a somewhat smaller run along the West Coast next year, a substantially smaller run the following year, and thereafter virtually nothing.

f. The irony of this situation is that not only are these few short-sighted men going to drive the 300 hook and line commercial fishermen out of business, but themselves as well.

g. While it is obvious that the legislature did not consider the economics and sociological considerations to warrant major emphasis in the Act, they are factors to be considered. It is undeniable that tourism is a major industry in Florida's economy and that major elements of Florida's tourism are boating, diving, and fishing. As a result, boat manufacture, marina operation, charter boat, head boat, and recreational fishing (resident and tourist) plus all the support industries are seriously affected by the quality of fishing in Florida's waters. Based on the Bell report and MSY allocations, the net value of the netters is inconsequential compared to the recreational and commercial hook and line king fishery.

There has been propaganda disseminated in Florida to the effect that if the gill nets are outlawed, the price of fish would go up as a result of the shortage. However, it is obvious from the FMP that such would not be the case. "About 65 percent of Florida's East Coast production has in recent years gone to the New York market iced in boxes in whole form. About 75 percent of king mackerel from the Florida Keys and the Florida West Coast has gone to Puerto Rico." (pp 8-46) Obviously, there is a substantial margin above domestic demand.

2. <u>SERIOUS RISK OF DEATH OR BODILY INJURY INHERENT IN FMP</u>

So serious is the risk that the South Atlantic Council deemed it necessary to set a special hearing on the so-called "Fort Pierce Options" "as a means of preventing significant loss of gear, or death or serious injury in the king mackerel fishery in this specific geographical area."

FMP and "Options" fail to address the issue, propose alternatives that guarantee that the 300 or so commercial hook and line king fishermen will be deprived of their livelihood, naively assumes that this is the only area to be affected and that the gill netters are inclined to be concerned about the future of the fishery.

To begin with, it is approached on a conditional basis of <u>if</u> a conflict arises. Anyone at all familiar with the Fort Pierce fishery knows that the conflict began the day the first strike was made outside the bar and will continue until the nets are prohibited, the kingfish are gone, or someone is killed.

The options: separate users by areas, by day of the week, or close the area to all fishing are in fact no options at all. A gentlemen's agreement as to areas was tried and worked until the netters had cleaned out their area and then they went outside the bar. Alternate days of the week simply means that hook and liners are deprived of their livelihood and what is left of the kingfish are being given to the netters, for once a strike is made, the fish are not going to be biting in that area for a matter of days or weeks. Furthermore, there is no adequate means of enforcement. The Coast Guard and NMFS and DNR can't stop the drug and illegal alien traffic. How are they going to police this situation to prevent death or bodily injury? They aren't!

Anyone who thinks that they can work with the netters on a reasonable compromise basis is naive indeed. To illustrate, a copy of an article from Florida Sportsman magazine is enclosed. But the degree of their concern for the other fellow and the fishery is expressed by their planned actions reported to me at the hearing. Since the kings are now reduced to small and scattered schools too small for current netting practices, the netters are now readying drift gill nets of extreme length which are expected to be set this fall to drift for a period of time and then hauled. Thus they will be able to pick up those scattered fish remaining, plus any other species that may be present. Even sailfish are likely to become entangled in the nets and either be killed or, if able to escape, be so spooked as to abandon which has heretofore been the sailfish capital of the world. Ultimately, it means the end of Florida's hook and line fishery and disaster for Florida's economy, but in the meantime, if you think there is conflict now, wait until this winter when the drift nets are set!

This so-called gear conflict is addressed as though it is a Fort Pierce phenomenon. Wait until the Key Westers realize what is happening to them this winter when the net boats descend upon them at the end of the bar! Heretofore there were several tremendous schools of kings in the Key West area, so when the net boats intruded, the hook and liners retreated to one of the other hot spots. But now there is nowhere else to go. This is the last remaining large concentration.

3. WHY EXPERIMENT WITH PURSE SEINES?

Purse seines have been prohibited in Florida for years as too destructive a device for taking food fish. Now, to reintroduce them even experimentally by way of the FMP is incredible.

THE FLORIDA LEAGUE OF ANGLERS RECOMMENDATIONS FOR AMENDMENT OF FMP are fully compliant with the letter and intent of the 1976 Act, consistent with the seven national standards, and warranted by the facts confronting this fishery.

1. Delete all provisions in the plan permitting nets and restrict the catching or taking of king mackerel to hook and line only, thus eliminating all conflicts in the fishery.

2. In conjunction with (1) above, impose a possession limit of 5 king mackerel per person, except for duly licensed commercial hook and line fishermen, seafood processors, wholesalers, retailers, restaurants, or taxidermists.

3. Set forth as policy the objective of increasing abundance of the species and accordingly develop a system for monitoring the catch and stocks of king mackerel with a view to adjusting limits or other regulations so as to accomplish that objective.

4. Provide on board and dockside catch audit or survey, beginning early this fall, of all Spanish mackerel netting and to the extent practicable the hook and line catch as well, to determine the number of undersize king mackerel taken in the Spanish mackerel fishery. FLA will be happy to recruit volunteer help for this in order to hold costs to a minimum.

5. Impose a limit of 10 dolphin per person.

6. Specify that the Spanish mackerel plan is a temporary one, pending the

outcome of studies and analysis of stock. The reason for this recommendation is the apprehension, based on available information, that due to the fact that most of the Spanish mackerel in the state are concentrated in the Stuart-Hobe Sound area, they are particularly vulnerable to stock overfishing. We know that fish abundance throughout the balance of the state has declined and to the point of non-existence in some areas.

7. Initiate studies to determine stocks, complete record of commercial landings and recreational to the extent practicable.

Let me assure you that FLA's interest in this matter, and as a matter of fact the reason for this organization's existence is the very sincere alarm at the obvious decline in abundance of virtually all marine fish and especially king mackerel. This alarm is based, not upon sketchy and imprecise scientific theories, but on actual experience of knowledgeable and, in some cases, the most expert recreational fishermen in the country who know the area they fish like the back of their hand and who have witnessed the decline for as many as 30 years or more. Let me also assure you that we are not opposing commercial fishermen, only certain destructive gear which imperil the fishery. Our objective is to restore former abundance to the extent possible. We recognize that all users must cooperate in order that all may enjoy the ocean's bounty and have therefore recommended the king mackerel limit when nets are prohibited.

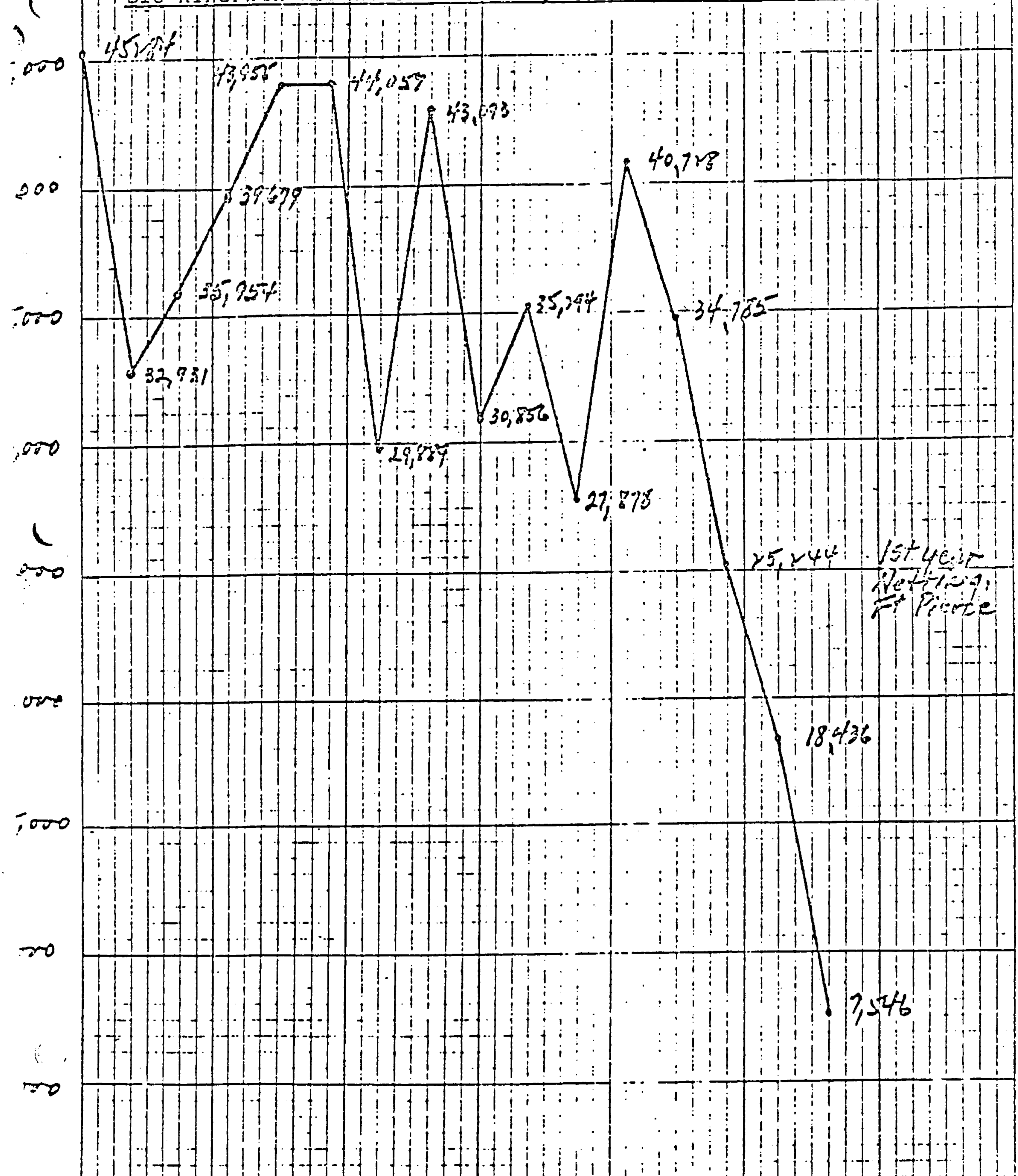
Mr. Secretary, the plain fact is that netting of king mackerel is incompatible with both recreational and commercial hook and line fishing. Prohibit netting and there is no conflict in this fishery and no risk of death or bodily injury. We urgently request that you not wait until someone is seriously injured or killed, or until the abundance of king mackerel has been so depleted that they are beyond recovery, that you prohibit all netting in this fishery and that the plan be amended to include the FLA's recommendations.

Yours very truly,

R.A. Franzen
215 Coconut Palm Road, Boca Raton, FLorida 33432

RAF:pl
enclosure

ONE COMMERCIAL HOOK AND LINE FISHERMAN'S CATCH OF KING MACKEREL, FROM HIS DAILY RECORDS FOR 16 SEASONS. SEASON COMPRISED OF FOUR BIG KINGFISH MONTHS OF DECEMBER, JANUARY, FEBRUARY, AND MARCH.



RECEIVED
March 21, 1980
APR 7 1980
SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL
CHARLESTON, S.C. 29407

TO: South Atlantic Council Members

I am writing this letter in regards to the Mackeral Management Plan to express my concern of the proposed lines of division.

This plan would put me out of the fishing industry completely. Under normal conditions, all handline fishing is done north of Sebastian Inlet, approximately from November 1st to December 21st; from January 1st till the middle of February north of Ft. Pierce Inlet to Vero Beach, and up till the use of the gill nets, from February 15th to the end of the winter season, east and souteast of Ft. Pierce Inlet. As you can see, this plan would completely stop me from making a living at all, every other year.

I do not have total statewide landing figures of king mackeral, but can state without a doubt that the East Coast landings are down for the 1980 season to a dangerous level. My total catch for February was 700 lbs., prior to the use of gill nets, this was considered only a fair catch for one day. January was also the poorest catch record to my knowledge, with a total catch of only a little over 3,000 lbs. by mostly all of the handline boats.

The conditions that exist on the historic East Coast Florida kingfish grounds were predicted when the large scale netting of kingfish started only 3 years ago. These predictions were based on past experience by longtime commercial handliners from what happened on the West Coast of Florida, which is the almost total lack of kingfish for the last 5 years.

Please, when considering these facts and the landing statistics, don't assume the fish have moved north. The larger landings in the Carolinas is easily explained by the fact that a large number of Florida handline boats are fishing these areas in the summer for the first time. In the summer of 1979, there was a fair size fleet in the Carolinas for the first time and the summer of 1980 there will be many more due to the fact that our incomes are greatly being affected by the lack of kingfish in Florida waters.

Your help is <u>needed</u>. There is a problem in Florida and only the Management Council can solve it.

Sincerely,

Robert Thomas

Robert Thomas
3335 - 2nd Street
Vero Beach, Florida

South Atlantic Fishery Management Council
1 South Park Circle,
Suit 306

Lee Tompkins
8200 Ft Walton Ave
Ft Pierce Fla. 334
March 16 1980

Dear Management Council:

Enclose are my catch records for hook and line kingmac
For what we call the winter run, being from Dec 1 to Mar
The Area from which these fish were captured. Is fro
ten miles North of Sebastian inlet to ten miles south
Ft Pierce inlet. I started commercial fishing in 1973
working on a lobster and spanish mackerel boat. Marc
1974 I started hook-and-line king fishing. In March 1975
I didnt fish much because I purchased a new boat. ~~[illegible]~~
~~[illegible]~~ ~~[illegible]~~. The number of pounds of fish captured for
the early part of this period is much less then the average. Because it takes years to learn this type of fishi

March 1974 1878 lb

Dec. 1974 - 5462 Lbs	Jan. 75 - 4462 lbs	Feb 75 - 2145 Lbs	New boat Mar 75 - 863 Lbs
Dec 1975 - 3238 lbs	Jan 76 - 4183 lbs	Feb 76 - 4903 lbs	Mar 76 - 3593
Dec 1976 - 5687 lbs	Jan 77 - 3179 lbs	Feb 77 - 7644 lbs	Mar 77 - 5089
Dec 1977 - 5669 lbs	Jan 78 - 14,691 lbs	Setur Nets Set Feb 78 - 2302 lbs	Mar 78 - 0
Dec 1978 - 3605 lbs	Jan 79 - 2,945 lbs	Betor Nets Set Feb 79 - 1242 lbs	Mar 79 - 0
Dec 1979 - 800 lbs	Jan 80 - 3903	Feb 80 - 0	Mar 80 - 0

Totals

1974 - 1975	12,932 Lbs
1975 - 1976	15,917 Lbs
1976 - 1977	21,599 Lbs
1977 - 1978	22,662 Lbs
1978 - 1979	7792 Lbs
1979 - 1980	4,703 Lbs

Note for 2½ Mo. Betor Nets

Fishery Management Plan

1. I support the C.F.F. Stand.

2. I'm against the permitting of purse seining of king mackerel, because it changes their migratory patterns and devastate the stocks.

3. I'm against the management proposal on page five part B.

4. Please keep statistics on recreational fishermen who sell all or part of their catch separate from full time commercial fishermen.

5. We catch only a small percentage of each school or group of fish. But it [illegible] fish as a school. Therefore we can fish each year and not over fish the stocks which was done in the past.
I believe the minimum [illegible] [illegible] just under 25 in. in length.

[illegible]

MAUMUS F. CLAVERIE, JR.
ATTORNEY AT LAW
THIRD FLOOR - 830 UNION STREET
NEW ORLEANS, LA. 70112
TELEPHONE (504) 524-5416

March 24, 1980

Mr. Robert Jones, Chairman
Gulf Fishery Management Council
Suite 881
5401 West Kennedy Boulevard
Tampa, Florida 33609

Re: Coastal Migratory Pelegic Resources
Draft EIS/FMP

Dear Mr. Jones:

This is written comment as invited in the Notice in the Federal Register, page 9303, February 12, 1980.

At the public hearing in New Orleans, we learned that no information concerning the sociological impact on recreational fisheries of a mandatory reporting system has been considered, either by the Council or in the EIS.

In view of the repeated statements on the record in Panel hearings and public hearings that a mandatory reporting system is contrary to the recreational aspects of recreational fishing, it is suggested that the EIS would be inadequate if this subject were not fully explored.

Sincerely,

Maumus F. Claverie, Jr.

MFCjr/kj
cc: Chairman, South Atlantic
Fishery Management Council

2200 16th STREET NORTH
P.O. BOX 3842
ST. PETERSBURG, FL 33731
(813) 822-4616

2468 S.R. 580
CLEARWATER, FL 33515
(813) 796-1031

9021 OAKHURST ROAD, SUITE
P.O. BOX 3037
SEMINOLE, FL 33542
(813) 596-1511

BENNETT WALLACE WELCH & GREEN INSURANCE, INC.

IN REPLY REFER TO: St. Petersburg

RECEIVED
MAR 18 1980
FISHERY MANAGEMENT COUNCIL

March 17, 1980

Gulf of Mexico Fishery Management Council
Lincoln Center
Suite 881
5401 West Kennedy Boulevard
Tampa, Florida 33609

Gentlemen:

I attended the Public Hearing at the Bayfront Center in St. Petersburg this past week and wish to commend the Council for attempting to do something about the obviously poor situation we have particularly as it affects the availability of Kingfish and Mackerel. As Mr. Green set the tenor of the meeting in the beginning stating that he did not wish to have input from anyone who could not directly give him facts and details which the committee could use in their deliberations, I did not choose to speak. My observations which I might have wanted to make were based purely on personal experience and not on any basis of statistics.

I am desirous of using this form of communication to state to you some personal observations which were denied at the meeting. I was born and raised in St. Petersburg and have fished all my life in the salt waters both coast wise and off shore. Up until 1976-77, I spent the majority of my recreational fishing time fishing for Mackerel starting about this time of the year through the cold weather in the Fall and Kingfish on their migratory runs in the Spring and Fall. We always seemed to have a good supply of Mackerel from March on through whenever cold weather sent them southward. About 5 years ago this supply of both Kingfish and Mackerel began to decline, and I,along with a number of others who were at the meeting, have not boated one single Kingfish since that time. We obviously are not commercial fishermen but have obtained a certain degree of skill in catching these fish through our many years of experience. If they had been here, I am sure we would have gotten our share. The point of my message is that there just aren't any fish. I don't know why there aren't any fish, and I am sure there are a number of factors contributing to this. I do know that there are not any fish and if we don't move to take some drastic action quickly, Im afraid there will never be any fish.

Gulf of Mexico Fishery Management Council 3/17/80

I am greatly suspect of over-fishing through modern methods of netting and spotter aircraft. I do not believe that these fish can stand that kind of pressure and would strongly urge the committee to consider abandoning all netting of these fish for a period of time to lets see if the population can make a come back on its own. This will not deny the commercial fishermen. They can still catch these fish by hook and line as can the sports fisherman, and we may well all get a crack at some fish in the future. If this doesn't seem to be doing the trick over a two or three year period of time, then I would suggest strongly that we completely close the season for whatever period of time it takes this fish to make a come-back and then open it for hook and line only once again to see if we can hold our own.

Mr. Green who seemed to Chair the Committee this past week, made a statement which I can almost quote, " this committee is not in a position to make any recommendations which would affect someone's livelihood from this fishery". This may be slightly off but it is the message I got when I left that meeting, and Mr. Green repeated it several times. If this committee has been formed to help draft a management plan, then I think, if they cannot make such recommendations, we better get rid of this committee and find one who can. Some drastic action is going to have to be taken by people of authority. If it is not done, all of the commercial and sports fishing interests might as well write off the Mackerel and Kingfishing. It is not going to exist any longer.

I wish you much success in your deliberations. I hope that you will make some quick recommendations to help our situation out here on the West Coast of Florida. Much testimony was taken this week which backs up what I have to say. Many of the fishermen in the audience expressed the same sort of sentiments as I, and I think their opinions should be taken to heart even though they don't represent hard factual evidence. The time for study is over, the time for action is now.

Yours very truly,

John I. Welch

John I. Welch, CPCU

cc: Congressman C.W. Bill Young
2453 Rayburn Building
Washington, D.C. 20515

JIW/nc

THE UNIVERSITY OF TEXAS
MARINE SCIENCE INSTITUTE
Port Aransas Marine Laboratory

March 14, 1980

RECEIVED
MAR 18 1980
FISHERY MANAGEMENT COUNCIL

Port Aransas, Texas 78373
Phone 512 749–6711

Mr. Wayne E. Swingle, Executive Director
Gulf of Mexico Fishery Management Council
Lincoln Center, Suite 881
5401 West Kennedy Boulevard
Tampa, Florida 33609

Dear Mr. Swingle:

The comments below are with reference to a January 25, 1980 request for a review of the draft, "FISHERY MANAGEMENT PLAN FOR THE COASTAL MIGRATORY PELAGIC RESOURCES (MACKERELS)", prepared for The Gulf of Mexico and South Atlantic Fishery Management Councils.

I find that the plan is quite good insofar as available information and currently planned research can be collated. However, it would be valuable to all concerned if there were a brief introductory summary outlining the inadequacies of currently available data. The stories I hear on the quantity and quality of Gulf fisheries data are at great variance, depending on whether I am talking to management people in the front office, the fishermen themselves, fisheries scientists, etc. Quite obviously data could always be better, but I believe that a consolidated statement of how much better and why would be in order and most appreciated.

You might also note that there has been considerable objection to the von Bertalanffy growth model (page 5-1) as used in the yield formulas (e.g., pages 5-35, 36). A recent paper on the subject should at least be noted in a final draft; it is:

Roff, D.A. 1980. A motion for the retirement of the von Bertalanffy function. Can. J. Fish. Aquat. Sci. 37: 127-129.

I wish you the best of success with the management plan and its execution.

Sincerely,

Donald E. Wohlschlag

Donald E. Wohlschlag
Professor

DEW:hg

cc: Dr. Sidney R. Galler

— TERREBONNE BANK & TRUST —
COMPANY

BERNARD B (Brody) SAXON JR.

Act P.L. 94-265

Gentlemen:

I object to the proposed Fishery Management Plan that would permit the "trapping" via nets of Spanish & King Mackerel and Cobia game fish. A net size of 4¾" stretched could begin with monofilament of proportion at least 50% smaller. This could result in the trapping of many other species not intended or permitted.

At the very least, I suggest the net dimension be 4¾" at rest before stretching to guarantee the safeguarding of the smaller species of the proposed harvest group and other non commercially harvestable game fish.

In principal, I am against the trapping of fish via gill nets, traps etc because of the indiscriminate destruction of non related species and the depletion of sportsfishing and charter boat (professional) hook and line fishermen. Your assistance in defeating the proposed act or at least raising the mesh size would be appreciated

POST OFFICE BOX 5036 HOUMA, LOUISIANA 70361 AREA CODE 504-876-7800

Brody Saxon

JEFFERSON ROD AND GUN CLUB
P. O. BOX 23362
HARAHAN, LA. 70123

March 18, 1980

GULF
RECEIVED
MAR 24 1980
FISHERY MANAGEMENT COUNCIL

Gulf of Mexico Fishery Management Council
Lincoln Center, Suite 881
5401 West Kennedy Blvd.
Tampa, Florida 33609

Re: Cobia, Spanish and King Mackerel Public Hearing, New Orleans La.

Dear Members of the Council;

After reading this draft the members of the Jefferson Rod & Gun Club disagree with the council on several points.

In the introduction of this draft the council said they were mandated by the Fishery Conservation and Management act of 1976. This implies that something has to be done. Even if nothing is wrong with the species affected. This law provides that any fishery management plan must be consistent with national standards. We feel that Louisiana's waters are better than the national standards because of the great Mississippi River washing nutrients into the Gulf of Mexico attracting many thousands of bait fish which is the major food for larger species. We feel the council has no way to measure correctly the total allowable catch of 37 million pounds. And if the catch exceeds the allocation the secretary has the power to close the recreational or commercial fishing. Bag limits for fish in Louisiana's waters is impractical

JEFFERSON ROD AND GUN CLUB
P. O. Box 23362
HARAHAN, LA. 70123

with the many varieties of fish that congregate around the oil rigs. Drift fishing is very popular in La. for a variety of fish and trying to release a large king mackerel can be very dangerous. This draft has a framework for instituting bag limits, fishing zones and what days to fish. This will limit the available days for the charter boat business. This draft also calls for enlarging commercial fishermen reporting. That is more paper work for the local fishermen. Our members are against the Total Allowable Level of Foreign Fishing. We want no Foreign fishing in U. S. waters. Keep these boats out and we may not need this propose management. After this draft becomes law the council will expect Louisiana Wildlife and Fisheries Comm. to enforce this law. We feel Louisiana Wildlife & Fisheries Comm. is doing a fine job managing the fish and wildlife of the state and they should be the controlling body for all management plans for the Gulf of Mexico.

Very truly yours,

Robert F. Hereford

President
Jefferson Rod & Gun Club

Copy: Mavor
Mackeal Mgmt Committee
Staff

July 3, 1981

GULF OF MEXICO
RECEIVED
JUL 13 1981
FISHERY MANAGEMENT COUNCIL

Mr. David Gould, Executive Director
South Atlantic Fishery Management Council
1 Southpark Circle, Suite 306
Charleston, S.C. 29407

Dear Mr. Gould:

I write this letter as a last effort to inform the South Atlantic Fishery Management Council that I object to any allocation for Purse Seines for the taking of King and Spanish Mackerel. I write this letter in my official capacity as a member of the King and Spanish Mackerel Advisory Sub-Panel, as the State Director, Port Salerno Chapter, Organized Fishermen Of Florida and as a Commercial Fisherman who is concerned about the stocks of the Mackerels.

The purse seine is not a selective type of gear, contrary to what I have heard at advisory sub panel meetings. The purse seine has a stretch mesh of between one and two inches it will catch under size kings and spanish mackerel to small for the eatable market, thus, these small fish will be sold for bait (lobster, crab etc.). Must the SAFMC permit the distruction of these small fish because you do not have enough foresight to say NO to purse seining? Listen to the advisory sub-panel, listen to the people at the public hearings, don't listen to a few commercial fishermen who already use purse seines (for bait) who have the attitude to get rich quick with little effort ruining the stocks of mackerels and then move on to other species and put their fellow fishermen out of business.

I have been told, at advisory sub-panel meetings, that we must use the best available information to arrive at a decision. It seems like the best available information at this point is to listen to the people, we are trying to tell you something, "Don't allow Purse Seining of the Mackerels".

Let me give you some educated facts. Both the king and spanish mackerels must swim to breathe. If they are surrounded with a purse seine then dried up enough to tell if the fish are small, they will start dying before the net can be opened up to let the fish swim free the vast majority will be dead if not all. Dump dead fish! Absolutel absurd, if the small fish are landed and placed on the bait market then this is absolutely a waste of a valuable food fish, if the small fish are placed on the food market it will cause the price of the fish to drop to the fishermen, rest assure, the price will not drop to the consumer.

More facts; the introduction of purse seines into the mackerel fishery will cause a vast conflict of gear, much larger than the so called "Ft. Pierce Option". The commercial hook and liners, the gill netters and the recreational fishermen will more than likely take up arms against the purse seiners. More facts; the purse seines will cause social problems within the fishing communities. There will be heated discussions, fights, destruction of gear or perhaps worse. The purse seines will cause families to split, to fight among themselves. All this is not what I alone think this is what I hear around the fishhouses, on the streets, at meetings etc. this is what I have been told by some very serious people.

The quotas that have been set for purse seines can not be regulated or enforced the purse seiners will find a way to land fish after the quota has been reached. For example; the purse seiners operating on the East Coast of Florida working under a state bait permit has repeatedly landed food fish, only two arrest have been made - one appealed to his conviction and the case was thrown out of court, the other was fined fifty dollars but he managed to weigh up three thousand five hundred dollars worth of fish. If the Federal Government can't stop the illegal landing of DRUGS then how can it stop the illegal landing of FISH. If a vast effort is made to police the purse seiners then that effort should be made towards stoping the drugs and not allow purse seines period.

If the South Atlantic and Gulf Councils and The National Marine Fisheries Service want to find out for themselves what purse seines are capable of doing then I suggest again, a study be made using an unbias vessel and unbias captain to make the study with NMFS personnel and DNR personnel aboard, (I attended a meeting in St. Petersburg with the NMFS when they were proposing to make a purse seine study. The study at that time had to many flaws and loopholes in it). At this time if there is no money to make a study then things should stay statu quo ante, no new gear introduced into the mackerel fishery.

This thing is affecting and will affect too many people to be handled in the way it is being handled. The councils and the NMFS is listening to too few people. It appears that the purse seine issue is going to blow wide open and create a big bag of worms. In the proposed mackerel plan it states; "reduce gear and user group conflicts" this will certainly not be done if purse seines are introduced into the fishery.

If the purse seine issue is not handled properly (an above board study) then I must feel that the time I have spent attending AP meetings has been waisted, I must feel the reinbursements I have received attending these meetings was a waste of tax payers money, I must feel the time spent attending public hearings was a waste of my time, most of all I must feel the time lost from my fishing (income) attending the above meetings was wasted which can never be recovered.

I want to have faith in the Fishery Councils to manage the stocks of fish properly I do not want to loose that faith because I must go to war to defend my right to pursue my vocation and to defend the fish.

It has taken me four (4) hours to compose this letter, have I wasted my time?

Very sincerely,

Tom Groover
P.O. Box 627
Port Salerno, Fla. 33492

cc: Mr. Harold Allen, NMFS
Hon. Junnita Kreps, USDC-NOAA
Sen. "Skip" Bafalis
Mrs. Peggy Stamey, SAFMC
Mr. Wayne Swindgle, GFMC
Dr. Elton Gissendanner, FDNR

287 7800
Day or Nite

Anchor REAL ESTATE

320 SOUTH FEDERAL HIGHWAY STUART, FLORIDA 33494

CAPT. W. R. LAUGHON, U.S.N. Ret.

REALTOR

June 29, 1981

U.S. DEPT. OF COMMERCE
OFFICE OF THE
SECRETARY
EXECUTIVE SECRETARIAT
JUL 6 11 12 AM '81

Secretary of the
Department of Commerce
Washington, D.C. 20260

Dear Mr. Secretary,

This is in regard to a recent announcement which indicated that it is planned to open the way to purse seining of Kingfish and Spanish Mackerel.

I live in Stuart, Florida where mackerel fishing until three years ago was as good as anywhere in the United States. At that point, however, roller rigs with their spotting planes assembled off the St. Lucie Inlet and took all of the mackerel in a week or two. It was so disheartening to see the tails of thousands of mackerel rise out of the water, over the roller and into the hold of the net boats. While we still had more sailfish then than any other place in the United States, the elimination of my favorite food fish, Spanish Mackerel, was the major reason why I sold my two charterboats, ANCHOR and ANCHOR TOO. Both Mackerel and Kingfish become more scarce each winter. When purse seining commences in our area, sport fishermen as well as food fishermen may as well sell their boats and give up.

I understand that it is the intent of the Federal Fisheries Law to maintain and conserve American Fisheries for domestic, commercial and recreational use. I implore you to do something about it.

Sincerely

Bill Laughon

W. R. Laughon, Capt. U.S.N. Ret.

NATIONAL MARINE FISHERIES SERVICE
JUL 9 1981
CORRESPONDENCE [illegible]

WRL: jem

REGULATORY IMPACT REVIEW (RIR)

OF THE

FISHERY MANAGEMENT PLAN

FOR THE

COASTAL MIGRATORY PELAGIC RESOURCES (MACKERELS)

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

SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL
1 SOUTHPARK CIRCLE, SUITE 306
CHARLESTON, SOUTH CAROLINA 29407
(803) 571-4366

NATIONAL MARINE FISHERIES SERVICE
9450 KOGER BOULEVARD
ST. PETERSBURG, FLORIDA 33702
(813) 893-3141

CONTENTS

SUMMARY

The coastal migratory pelagic (mackerel) fishery of the Gulf of Mexico and south Atlantic is of importance to recreational and commercial fishermen, the businesses directly serving them, and the regional economies. The maximum sustainable yield (MSY) of the migratory pelagic management unit in the Gulf and south Atlantic FCZ is 65 million pounds. This estimate includes stocks of king mackerel, Spanish mackerel, and cobia.

The recreational fishery occurs both inshore (within three miles of shore) and offshore for Spanish and king mackerel, respectively. Recreational surveys indicated that in 1975, anglers caught 33.1 million pounds and in 1979, 15 million pounds. The poor nature of recreational catch statistics makes it difficult to say if indeed catches have been declining over time. However, expenditures related to recreational fishing have been constantly increasing over time; in 1980, the value of sales related to the management unit was an estimated $103 million with an associated 2,840 person-years of employment.

The commercial fishery for king mackerel is conducted offshore while the Spanish mackerel fishery occurs in both zones. Commercial landings of king mackerel have peaked at 10.5 million pounds in 1974, and Spanish mackerel commercial landings have peaked at 18.0 million pounds in 1976. The value of the commercial fishery increased steadily; in 1980, the dockside value of the king and Spanish mackerel fisheries was $8.5 million and its contribution to the Gross National Product in excess of $20 million.

The increasing level of effort in both fisheries may have contributed to a decline in the relative abundance of stocks of both mackerel species. Cobia stocks in particular are overfished. In addition, intense conflicts exist between recreational and commercial users of the mackerel stocks, and between commercial users employing different gears.

The alternative of taking no action would result in stock declines and adverse economic impacts. The management measures proposed by the Councils are responsive to the problems in the fishery and represent the most cost-effective approach to prevent overfishing. Rejected management measures were generally more costly to implement, more burdensome to user groups, and less responsive to the conservation of the resource.

Benefits that will accrue from implementation of the proposed measures come from the prevention of overfishing. The benefits, in terms of pounds of fish, is the difference between the optimum yield (OY) specified in the plan and the amount caught after overfishing occurs; in monetary terms, the benefits are the difference between the contribution to the Gross National Product (GNP) with OY and the contribution to GNP associated with the catch after overfishing occurs. The expected benefits range from $5.6 million to $27.9 million annually over the next five years. Empirical data indicate that the level of fishing effort by commercial and recreational fishermen is increasing rapidly and mackerel stocks and catch will decline if effort increases. Therefore, implementation of the FMP is vital for protecting the resource from decline.

Annual costs for development and implementation of the plan are estimated at $412,271. The RIR indicates that the adopted measures minimize the burden on the public and address the problems in the fishery in a cost-effective manner. The proposed action is not a major rule requiring the preparation of a Regulatory Impact Analysis.

I. INTRODUCTION

Executive Order 12291 "Federal Regulation" established guidelines for promulgating new regulations and reviewing existing regulations. Under these guidelines each agency, to the extent permitted by law, is expected to comply with the following requirements: (1) administrative decisions shall be based on adequate information concerning the need for and consequences of proposed government action; (2) regulatory action shall not be undertaken unless the potential benefit to society for the regulation outweigh the potential costs to society; (3) regulatory objectives shall be chosen to maximize the net benefits to society; (4) among alternative approaches to any given regulatory objective, the alternative involving the least net cost to society shall be chosen; and (5) agencies shall set priorities regularly with the aim of maximizing the aggregate net benefit to society, taking into account the condition of the particular industries affected by regulations, the condition of the national economy, and other regulatory actions contemplated for the future.

In compliance with Executive Order 12291, the Department of Commerce (DOC) and the National Oceanic and Atmospheric Administration (NOAA) require the preparation of a Regulatory Impact Review (RIR) for all regulatory actions which either implement a new fishery management plan or significantly amend an existing plan, or may be significant in that they effect important DOC/NOAA policy concerns and are the object of public interest.

The RIR is part of the process of developing and reviewing fishery management plan and is prepared by the Regional Fishery Management Councils with the assistance of the National Marine Fisheries Service (NMFS), as necessary. The RIR provides a comprehensive review of the level and incidence of impact associated with the proposed or final regulatory actions. The analysis also provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve problems. The purpose of the analysis is to ensure that the regulatory agency or Council systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost effective way.

The RIR also will serve as the basis for determining whether the proposed regulations implementing the fishery management plan or amendment are major/nonmajor under Executive Order 12291, and whether or not the proposed regulations will have a significant economic impact on a substantial number of small entities under the Regulatory Flexibility Act (P.L. 96-354).

A. Background of RIR

This RIR is based on the most recent commercial and recreational migratory pelagic (mackerel) information. The RIR was initiated after Secretarial review of the plan. The RIR supersedes the previous Draft Regulatory Analysis for this plan which lacked many provisions and review requirements contained in Executive Order 12291.

B. Background of the Coastal Migratory Pelagic FMP

The Gulf of Mexico and South Atlantic Fishery Management Councils, established by the Magnuson Fishery Conservation and Management Act (16 U.S.C. 1801 et seq.), are responsible for preparing management plans for the fishery resources in the fishery conservation zone (FCZ) of the Gulf of Mexico and south Atlantic. The Gulf and South Atlantic Councils, recognizing that mackerel stocks constitute a valuable fishery, developed a fishery management plan (FMP) to address and overcome problems in the fishery.

C. Problem Identification

The Councils recognized and addressed four basic current or potential problems in the coastal migratory pelagic fishery. They include:

1. Current and accurate biological and economic data needed as a basis for management decisions are not available. The incomplete and at times inaccurate data is particularly true for the recreational fishery which accounts for the majority of the king mackerel catch.

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

3. Rapidly increasing fishing effort for king mackerel could soon result in overfishing if no action is taken. Because of the limited mackerel resource and the increasing fishing effort, competition is intense between all user groups. The mackerels are highly sought as gamefish and as food fish.

4. Cobia are presently harvested at a size below that necessary for maximum yield and may be overfished in some areas beyond the area for management. The available evidence indicates that cobia stocks have suffered a decline and that yield could be increased by increasing the average size at harvest.

D. Specific Objectives of the FMP

The goal of the fishery management plan for the coastal migratory pelagic resource is to determine the optimum yield within the U.S. fishery conservation zone and to provide management measures to achieve MFCMA objectives and the National Standards for fishery management plans. The specific objectives of the management unit are as follows:

King Mackerel

1. Institute management measures necessary to prevent exceeding MSY.

2. Establish a mandatory statistical reporting system for monitoring catch.

3. Minimize gear and user group conflicts.

Spanish Mackerel

1. Institute management measures necessary to prevent exceeding MSY.

2. Establish a mandatory statistical reporting system for monitoring catch.

3. Minimize gear and user group conflicts in the event they arise.

4. Promote the maximum use of the resource up to the OY estimate.

Cobia

1. Institute management measures necessary to increase yield per recruit and average size and to prevent overfishing.

E. Achievement of Stated Objectives

The Gulf and South Atlantic Councils adopted a MSY estimate of 37 million pounds for king mackerel, 27 million pounds for Spanish mackerel, and all cobia equal to or larger than 33 inches in length from the tip of the head to the center of the tail (fork length).

The Councils have recommended an OY for each separate fish species above equal to their respective MSY estimates with the following measures to prevent overfishing:

KING MACKEREL PROPOSED MEASURES

MEASURE A - FUTURE CONFLICTS

A. The Secretary of Commerce may implement measures designed to provide limitations, where appropriate, on any gear or device used in the king mackerel fishery to reduce gear and user group conflicts. The Secretary, after consultation with the affected Councils, may take the following action by regulatory amendment based on the following criteria:

(1) When a conflict arises through expansion of a historical fishery in a traditional fishing area or region, the Secretary shall investigate the causes and extent of the conflict, the economic and sociological impacts of any viable limitations on the expanded fishery or other users, other solutions to the conflict and other relevant factors. The Secretary, after consultation with the affected Councils and states, may resolve the conflict as fairly as possible by taking one or more of the following actions:

(a) Separate the users or gear by area (fishing zone).

(b) Separate the users or gear by time (day of week).

(c) Assign local quotas to each gear or user group based on the historical catches of each for that local area.

(d) Allow unlimited usage of the gear or device.

(2) When the conflict arises through the introduction of gear or devices into new regions where they have not been historically fished, the Secretary shall investigate the harvesting capacity and efficiency of the new gear or device in the local area, the economic and sociological impacts on users of historical gear, the historical level of stock abundance in the area and the other relevant factors. The Secretary may, after consultation with the affected Councils and states, take one or more of the following actions:

(a) Prohibit use of the gear or device in that geographical area.

(b) Allow only limited use of the gear or device to more fully evaluate its impacts and potentials.

(c) Limit the number of units of the gear or device which can be utilized in that area.

(d) Allow unlimited usage of the gear or device.

(3) When a conflict arises as a result of circumstances in the fishery, other than as described in (1) or (2) above, the Secretary may implement measures designed to obviate such conflicts by measures provided for in (1) and (2) above, or take such other action as may be appropriate and necessary to resolve such conflicts in a manner consistent with the goals and objectives of the plan, the National Standards, the MFCMA and other applicable law.

FORT PIERCE OPTION

B. When the Regional Director, Southeast Region, NMFS, determines, based on reliable information, that a conflict, as described in FMP Section 8.2.6, exists or is about to exist, he will take one of the following actions by field order. The time period during which such restrictions shall be enforced will be determined by length of time a direct conflict exists or is expected to exist.

(1) Establish a fishing window within the following points:

(a) Bethel Shoal light (27° 44.3'N, 80° 10.4'W).

(b) A wreck 15 miles southeast of Fort Pierce Inlet (27° 23.5'N, 80° 3.7'W).

(c) Marker WR 16, five miles northeast of Jupiter Inlet (27° 0.6'N, 80° 2.0'W).

(d) 100 fm depth due east of point c (27° 0.6'N, 79° 55.0'W).

(e) 100 fm depth due east of point b (27° 23.5'N, 79° 54.0'W).

(f) 100 fm depth due east of point a (27° 44.3'N, 79° 53.5'W).

The Regional Director may prohibit use of gill-net gear to take king mackerel within the area a-b-e-f, b-c-d-e or a-c-d-f. If additional action is needed, prohibit use of hook and line gear to take king mackerel within a window landward of a line between the points a-b, b-c or a-c.

(2) Establish two fishing zones seaward (east) of state jurisdiction. These zones shall be the waters of the FCZ between 27° 10' north latitude and 27° 50' north latitude divided into two areas along the line of 27° 30' north latitude.

(a) In the first year in which a conflict arises, the use of gill nets for taking of king mackerel shall be prohibited in the area south of 27° 30' north latitude and use of hook and line gear for taking of king mackerel shall be prohibited in the area north of 27° 30' north latitude. <u>In any succeeding year when a conflict develops, the area in which each gear is prohibited may be changed.</u>

(b) When a conflict arises, use of each gear within the zone between 27° 10'N and 27° 50'N may be alternated daily.

(i) On even days of the month, use of gill-net gear to take king mackerel may be prohibited.

(ii) On odd days of the month, use of hook and line gear to take king mackerel may be prohibited.

(c) Close the fishery for king mackerel to all users within the zone between 27° 10'N and 27° 50'N. This measure shall only be imposed if the conflict results in:

(i) Death or serious bodily injury.

(ii) Significant gear loss.

Procedures for evaluating the existence of a conflict:

(1) The following procedures must be employed by the Regional Director in his decision process regarding the existence of a conflict for which a field order is appropriate and prior to the implementation of such a field order.

(a) At such time as the Regional Director is advised by any party that a conflict exists, he must confirm the existence of such a conflict through information supplied him by NMFS, U.S. Coast Guard or other appropriate law enforcement agencies.

(b) In the event that such information is not ascertainable from those law enforcement personnel as provided in (a) above, such confirmation may be made through information supplied by personnel of the state agency with marine fishery management responsibility.

(c) Confer with the Chairmen of the affected Councils, the office of the state agency(s) with the marine fishery management responsibility, and such other persons as the Regional Director deems appropriate, if any.

(2) Restrictions on field orders

(a) No field order may be implemented which results in the exclusive access of any user group or gear type to the fishery during the time the field order is in existence.

(b) A field order may be rescinded by the Regional Director if he finds through application of the same procedures set forth in (1) above that the conflict no longer exists.

(c) No field order may be implemented for a time period greater than five (5) days except under the conditions set forth in Section (e) above.

(d) At such time as the Regional Director submits to the Federal Register a field order for implementation under these provisions, he shall immediately arrange for a fact-finding meeting in the area of the conflict to be convened no later than 72 hours from the time of implementation of the field order. The following shall be advised of such fact-finding meeting:

(1) The Chairmen of the affected Councils;

(2) The office of the state agency with fishery management responsibility;

(3) Local media;

(4) Such user group representatives or organizations as may be appropriate and practicable;

(5) Others as deemed appropriate by the Regional Director or as requested by Chairmen of the affected Councils or the state agency.

This fact-finding meeting shall be for the purpose of evaluating the following:

(1) The existence of a conflict needing resolution by the field order;

(2) The appropriate term of the field order, i.e., either greater or less than five (5) days;

(3) Other possible solutions to the conflict other than federal intervention;

(4) Other relevant matters.

(e) In the event it is determined as a result of the fact-finding meeting that the term of the field order should exceed five (5) days, the Regional Director may, after consultation with the Chairmen of the affected Councils and the involved state agency, extend such field order for a period not to exceed 30 days from the date of initial implementation. In the event the Regional Director determines that it is necessary or appropriate for the term of such field order to extend beyond 30 days, such extension may be made after consultation with the Chairmen of the affected Councils and for such period of time as necessary and appropriate to resolve the conflict.

ALLOCATIONS

C. A total allowable catch shall be established at 37 million pounds per year.

(1) Annual stock allocations shall be made as follows: 28 million pounds for the recreational fishery and nine million pounds for the commercial fishery.

(2) The commercial allocation shall be divided between hook and line gears and net gears as follows:

Hook and line:	3,877,200 pounds
Nets	5,122,800 pounds

(3) If the catch of any user group exceeds its allocation, the Secretary shall close the fishery to that group for the remainder of the fishing year.

(4) Commercial and recreational fishermen defined as follows:

- A commercial fisherman is a person who sells his catch.

- A recreational fisherman is a person who does not sell his catch.

MINIMUM MESH SIZE

D. The minimum mesh size in the FCZ for all king mackerel gill nets shall be 4-3/4 inches stretched mesh in the Gulf of Mexico and South Atlantic Regional Councils' areas of jurisdiction.

BAG, TRIP AND SIZE LIMITS

E. (1) The Regional Director, Southeast Region, NMFS, may institute a bag limit for king mackerel taken by recreational or recreational for hire users and/or a trip limit for commercial users by the regulatory amendment process when supporting data becomes available and after consultation with the affected Councils.

(2) The Regional Director, Southeast Region, NMFS, may institute a size limit by the regulatory amendment process when supporting data becomes available and after consultation with the affected Councils.

SPANISH MACKEREL PROPOSED MEASURES

MEASURE A - FUTURE CONFLICTS

A. The Secretary of Commerce may implement measures designed to provide limitations, where appropriate, on any gear or device used in the Spanish mackerel fishery to reduce gear and user group conflicts. The Secretary, after consultation with the affected Councils, may take the following action by regulatory amendment based on the following criteria:

(1) When a conflict arises through expansion of a historical fishery in a traditional fishing area or region, the Secretary shall investigate the causes and extent of the conflict, the economic and sociological impacts of any viable limitations on the expanded fishery or other users, other solutions to the conflict and other relevant factors. The Secretary, after consultation with the affected Councils and states, may resolve the conflict as fairly as possible by taking one or more of the following actions:

(a) Separate the users or gear by area (fishing zone).

(b) Separate the users or gear by time (day of week).

(c) Assign local quotas to each gear or user group based on the historical catches of each for that local area.

(d) Allow unlimited usage of the gear or device.

(2) When the conflict arises through the introduction of gear or devices into new regions where they have not been historically fished, the Secretary shall investigate the harvesting capacity and efficiency of the new gear or device in the local area, the economic and sociological impacts on users of historical gear, the historical level of stock abundance in the area and the other relevant factors. The Secretary may, after consultation with the affected Councils and states, take one or more of the following actions:

(a) Prohibit use of the gear or device in that geographical area.

(b) Allow only limited use of the gear or device to more fully evaluate its impacts and potentials.

(c) Limit the number of units of the gear or device which can be utilized in that area.

(d) Allow unlimited usage of the gear or device.

(3) When a conflict arises as a result of circumstances in the fishery, other than as described in (1) or (2) above, the Secretary may implement measures designed to obviate such conflicts by measures provided for in (1) and (2) above, or take such other action as may be appropriate and necessary to resolve such conflicts in a manner consistent with the goals and objectives of the plan, the National Standards, the MFCMA and other applicable law.

SIZE LIMIT

B. Size Limit

(1) A 12-inch fork length minimum size limit shall be set on Spanish mackerel in both the commercial and recreational fisheries.

(2) A catch allowance for underized fish will be allowed equal to five percent of the total catch by weight of Spanish mackerel on board a vessel in the Spanish mackerel fishery or any other fishery.

BAG LIMITS, TRIP LIMITS

C. The Regional Director, Southeast Region, NMFS, may institute a bag limit for Spanish mackerel taken by recreational or recreational for hire users and/or a trip limit for commercial users by the regulatory amendment process when supporting data become available and after consultation with the affected Councils.

FISHERY CLOSURE

D. If OY is taken, the fishery for Spanish mackerel will be closed for the remainder of that fishing year.

COBIA PROPOSED MEASURES

The following measure is proposed for cobia by the Gulf of Mexico and South Atlantic Councils:

A. Possession of cobia less than 33 inches fork length shall be prohibited in the FCZ.

PROPOSED PURSE SEINE MEASURES

A. (1) Harvest of king mackerel by purse seine gear will be allowed up to a maximum of 400,000 pounds per year in the area of jurisdiction of the Gulf Council, and 400,000 pounds per year in the area of jurisdiction of the South Atlantic Council. Any purse seine harvest will be counted within the commercial allocation for all net gears.

A. (2) Harvest of Spanish mackerel by purse seine gear will be allowed up to a maximum of 300,000 pounds per year in the area of jurisdiction of the Gulf Council, and 300,000 pounds in the area of jurisdiction of the South Atlantic Council.

B. Observers, under the direction of the National Marine Fisheries Service, must be required on all purse seine vessels while fishing for king or Spanish mackerel during the first three fishing years after this plan is in effect.

STATISTICAL REPORTING MEASURES

A. The Councils conceptually accept a vessel enumeration system and creel census data system that would provide sufficient information for fishery management. Mechanics of the system are to be developed by National Marine Fisheries Service and the Regulatory Measures Committee.

B. Require a reporting system for all user groups and processors based on statistical sampling whereby it would be mandatory for a selected respondent to provide answers to the sampling questionnaire on a recurring basis that is not of great frequency.

Alternative Management Measures

Management measures considered and not adopted by the Councils are discussed under Section IV(B), Regulatory Impacts - Alternative Management Measures.

II. ANALYSIS OF PREVIOUS YEAR'S FMP

Not applicable since no PMP or FMP is now in effect for coastal migratory pelagics.

III. METHODOLOGY

A. Procedural Framework

The procedure used in estimating the economic impacts will include a systematic discussion of both adopted and rejected management measures. Each management measure to the extent possible, will be analyzed with regard to its effect on:

(1) Changes in price - price flexibilities will be used where appropriate.

(2) Changes in supply - effects on production and marketing costs and related changes throughout the distribution system.

(3) Changes in employment - total number of jobs affected.

(4) Distribution of income, benefits or costs - universe of affected fishermen, income distribution, reporting burden, and other effects on vessels, crewshares, processors, and user groups.

(5) Productivity - relative to altering output, investment, and technology.

(6) International implications - effect on foreign fishing or foreign markets.

(7) Market structure - changes in the size, number or locations of firms.

(8) Government - administration, data collection, and enforcement costs.

After all measures are examined, impacts under the above categories will be summarized.

B. Data Base

Most data used in this RIR are contained in the FMP.

IV. REGULATORY IMPACTS

Management measures considered and currently in effect in the Gulf and South Atlantic states or through the NMFS are reported in the FMP. Management performance under the measures in effect will serve as the basis for estimating the added economic impact of new or different measures. The impacts of the proposed management measures are summarized in Table 1.

A. Proposed Management Measures

1. King Mackerel

A. No adverse economic impacts are anticipated or can be quantified until a specific conflict is addressed. Any negative impacts will depend on what action, if any, is taken. The measure requires the Regional Director and the relevant Council to investigate the causes and extent of the conflict, the economic and sociological impacts of any viable limitations on the expanded fishery or other users. Given the fact that the economic effects of any action will be evaluated,

Table 1. Summary of Economic Impacts of the Proposed Management Measures

Proposed Management Measure	Price	Supply	Employment	Revenues	Productivity	International Impact	Market Structure	Government Costs	Recreational Participation
King Mackerel									
A.	0	0	0	0	Potential small increase if gear conflict is avoided.	0	0	1	0
B.	0	0	0	0	Potential small increase if gear conflict is avoided.	0	0	1	0
C.	Possible increase in exceptionally good year.	Holds supply to 9 million pounds. Possibility that this level would be below future unreglated supply in occasional years.	0	Possible opportunity loss of - $1.24 million to gill-net fleet.	Potential to reduce gill-net productivity if allocation is reached.	0	May serve to maintain a less concentrate harvesting sector	1	Holds recreational catch to 28 million pounds.
D.	0	0	0	0	0	0	0	1	0
E.	0	0	0	0	Prevents overfishing[2]	0	0	1	0

[1] Total enforcement cost is $294,444 annually.

[2] Prevention of overfishing results in benefits between $5.6 million and $27.9 million plus achievement of OY/MSY every year.

Table 1. (contd.) Summary of Economic Impacts of the Proposed Management Measures

Proposed Management Measure	Price	Supply	Employment	Revenues	Productivity	International Impact	Market Structure	Government Costs	Recreational Participation
Spanish Mackerel									
A.	0	0	0	0	Potential small increase if gear conflict is avoided.	0	0	1	0
B.	Insignificant positive impact.	0	0	0	0	0	0	1	0
C.	0	0	0	0	Prevents overfishing[2]	0	0	1	0
D.	Increase	Decrease	Decrease	Decrease	Prevents overfishing[2]	0	0	1	Prevents overfishing[2]
Cobia									
A.	0	Increase by 27,300 pounds	0	Increase by $8,150	Increase	0	0	1	Fish below siz limit must be released[2]
Purse Seine									
A.	0	Possible increase.	Possible increase.	Possible increase.	Uncertain for industry.	0	May centralize.	1	CPUE decline
B.	0	0	0	0	0	0	0	0	

Table 1. (contd.) Summary of Economic Impacts of the Proposed Management Measures

Proposed Management Measure	Price	Supply	Employment	Revenues	Productivity	International Impact	Market Structure	Government Costs	Recreational Participation
Statistical Reporting									
A.	0	0	0	0	0	0	0	$76,691	1,259 hours reporting burden
B.	0	0	0	0	1,240 hours reporting burden	0	0	$5,168	0

It is likely that the benefits associated with the resolution of a conflict will outweigh any detrimental impacts. Possible impacts, although unlikely, may include short-term unemployment resulting from the closure of a fishery, reduced productivity due to gear restrictions and reduced landings resulting from area closures. Because the measure requires that potential economic and sociological impacts be investigated before actions are taken, it can be anticipated that solutions that minimize or cause no changes in supply, prices, employment, revenues and income will result. In fact, having the framework to deal with potential gear conflicts will, in all likelihood, contribute to productivity in the long run by preventing economic disruption. The costs of enforcement for this measure, and all other proposed measures as a whole, are stated at the end of this section.

B. No adverse economic effects are anticipated or can be quantified until a conflict develops and one or more methods are chosen to address it. By the nature of this field order, action must be taken. Without this measure, unresolved conflicts will lead to economic loss through reduced efficiency, catches and revenue on the part of diverse commercial user groups, including for-hire recreational operations; social benefits enjoyed by recreational fishermen would also be reduced. This measure will minimize adverse economic effects, if any, on such user groups who will all be subject to restrictions imposed under the field order. Hook and line boats may be restricted to deeper water where they have traditionally fished and can operate easily, and net boats may be restricted to shallower water where they have traditionally fished and can operate safely. The affected area accounts for 400,713 pounds of commercial landings ($304,542) during the most affected time period (January-February), and approximately $840,000 in revenue to local charter/headboats. Part of this, or all, may be affected by a possible conflict and a resulting field order, and depending on which option is chosen.

C. This measure addressed issues in the fishery (2) and (3) and attempts to achieve Objective 1 under king mackerel. Because of the intense competition for the resource and the large amount of capital invested by various user groups, the resource is allocated among them. The allocations are based on the average percentage of total landings contributed by each group. Therefore, the probability of any group exceeding their allocation in any one year, at the expense of another group, is low.

The allocation attempts to prevent overfishing of the resource while maintaining the historic distribution of catch among user groups. Any closure of the fishery to a specific group or locality may cause short-term adverse economic effects. However, these possible losses are the short-term sacrifice necessary to prevent overfishing and decreases in catch in future years.

The commercial fishing sector would be the least affected from any local or general closure of the fishery. This user group is highly mobile with respect to fishing area, and can also target other species for revenue during the year. The handline segment's largest annual catch to date (1975) is only 80 percent of its proposed allocation. Hypothetical catches in excess of the allocation should be regarded as opportunity costs, i.e., foregone revenue in an alternative enterprise which cannot be engaged in, in this case. The opportunity cost concept can be applied to the gill-net segment as well, in which the proposed allotment was exceeded in 1974 and possibly 1977. The estimate for the difference in catch in 1974 (1.63 million pounds) would be $1.24 million using the 1980 average price of $0.76 per pound of kingfish. This estimate can be considered the maximum potential opportunity cost to this group.

The recreational fishing sector would be more seriously affected in the king mackerel fishery if a closure affecting this group should occur. Altogether this sector accounted for $54.7 million of expenditures and 1,590 person-years of employment in 1980. Recreational-for-hire fishermen would experience an actual drop in revenue and income, unless they redirect sport fishermen to other species, as they are paid on a daily basis rather than a per pound basis. Recreationists in private boats would be restricted to fish for other species. A closure would also affect complementary firms supporting the recreational sector. The magnitude of these effects would vary with the extent and duration of the closure, as recreational participation varies in the management area by time of year. A closure of the fishery would likely take place at the end of a fishing year, during April, May and June. Such timing would mainly affect the fishery in the northern south Atlantic and norther Gulf areas. Prorating the number of charter/headboats and private boats in North and South Carolina, the Florida panhandle, Alabama, Mississippi, and Louisiana (east of Mississippi River), to recreational revenue/sales for the Gulf and south Atlantic in 1980, approximately \$6.2 million and 180 man-years of employment may be affected by closing off the last half of their season.

D. No adverse economic impacts are expected as a result of this proposed management measure. The restriction on mesh size will not require any alteration to the gill nets currently used in the fishery and is consistent with existing Florida law. Nearly all king mackerel gillnetting takes place in waters off the coast of Florida, and the measure is compatible with the current practices in the fishery. Thus, no regulatory or economic burden is placed on industry. This measure also prevents use of net with mesh smaller than 4-3/4 inches which results in harvest of smaller mackerel and in waste through the "fall-out" of larger individuals caught in the net.

E. These proposed measures are intended to prevent overfishing and would be implemented only if data inciated that other management measures already in effect had been ineffective in preventing overfishing.

These measures have no impact of any kind until implemented. No estimate of short- or long-term impacts can be precisely stated until one or more restrictions are proposed. If implemented, short-term adverse economic impacts on the users would occur in order to maintain long-term productivity of the resource. Trip limit restrictions would impact the commercial sector most severely, while bag and/or size limits on the recreational sector would reduce mortality but not short run participation in the fishery. These measures would have substantially less impact than a closure of the fishery. A closure of the fishery would jeopardize both the commercial and recreational revenue/sales cited above, employment, and disrupt markets for mackerel. Monetary estimates are difficult to quantify but would exceed \$8.9 million.

2. Spanish Mackerel

A. No adverse economic impacts are anticipated or can be quantified until a specific conflict is addressed. Any negative impacts will depend on what action, if any, is taken. The measure requires the Regional Director and the relevant Council to investigate the causes and extent of the conflict, the economic and sociological impacts of any viable limitations on the expanded fishery or other users. Given the fact that the economic effects of any action will be evaluated it is likely that the benefits associated with the resolution of a conflict will outweigh any detrimental impacts. Possible impacts, although unlikely, may include short-term unemployment resulting from the closure of a fishery, reduced productivity due to gear restrictions and reduced landings resulting from area closures. Because the measure requires that potential economic and sociological impacts be investigated before actions are taken, it can be anticipated that solutions that minimize or cause no changes in supply, prices, employment, revenues and income will result. In fact, having the framework to deal with potential gear conflicts will, in all likelihood, contribute to productivity in the long run by preventing economic disruption. The costs of enforcement for this measure, and all other proposed measures as a whole, are stated at the end of this section. Since the Spanish mackerel fishery is less contentious with respect to user competition, this measure is less likely to be enacted.

B. Little or no negative economic impact can be anticipated as a result of this measure due to the small level of catch of less than twelve-inch Spanish mackerel. The State of Florida (which accounts for over 95 percent of the commercial catch) currently has a twelve-inch minimum size limit. Fish under this size are not particularly desirable because they cannot be filleted or cut into steaks. Thus, they have a limited food value which results in larger fish receiving a higher price per pound. Because of this price differential, commercial fishermen actively attempt to target the schools of larger fish currently.

This measure does not appear to significantly affect the recreational fishery as sportfishermen generally prefer a large fish. The catch of small Spanish mackerel by recreational fishermen is not thought to be large, and releasing undersized fish is fairly easy in the recreational fishery. Thus, no new economic or regulatory burdens are placed on industry or the sportfishing public.

C. This proposed measure is intended to prevent overfishing and would be implemented only if data inciated that other management measures already in effect had been ineffective in preventing overfishing.

This measure has no impact of any kind until implemented. No estimate of short- or long-term impacts can be precisely stated until one or more restrictions are proposed. If implemented, short-term adverse economic impacts on the users would occur in order to maintain long-term productivity of the resource. Trip limit restrictions would impact the commercial sector most severely, while bag and/or size limits on the recreational sector would reduce mortality but not short run participation in the fishery. These measures would have substantially less impact than a closure of the fishery. A closure of the fishery would jeopardize both the commercial and recreational revenue/sales cited above, employment, and disrupt markets for mackerel. Monetary estimates are difficult to quantify but would exceed $5 million.

D. Any closure of the fishery would be carefully considered in light of such factors as an abnormally high abundance of fish, increased local availability, increased effort, inaccuracies in the historical landings data and other factors which may show that there is a minimal positive biological impact associated with closure.

A closure would cause short-term adverse economic effects on commercial and recreational fisheries. Although these effects may be decreased through the extent fishermen can redirect their efforts to other species, these possible losses are the short-term sacrifice necessary to prevent overfishing and decreases in catch in future years. Overfishing would jeopardize the commercial and recreational values of $3.1 million and $48.4 million, respectively, in 1980 and employment opportunities in excess of 1,250 person-years.

3. <u>Proposed Cobia Measures</u>

A 33-inch fork length restriction is expected to have a minimal impact on commercial harvesters of cobia; it is not a prime target species and is usually a bycatch. Commercial catch is expected to increase approximately in proportion to the expected increase in total yield. This increase is expected at 10-32 percent (21 percent average); since this species is long-lived and has several year classes at one time in the fishery, this yield increase would be the total expected after five years. Average cobia landings between 1967 and 1977 were 130,000 pounds; average price in the fishery was $0.40 in May, 1981; using yield increases of 3.2 percent, 3.7, 4.2, 4.2, and 4.2 for a five-year period (to account for compounding) and a ten percent discount factor, the present value of increased revenue over five years is $8,150. This will be widely distributed among many fishermen from several states.

Recreational fishermen in the Gulf and south Atlantic landed an estimated 900,000 pounds of cobia in 1970, or about 119,000 fish (see Section 8.0 of the FMP); the 1979 NMFS recreational survey contained no cobia information. While this measure will decrease recreational catches in the short-term while the stock replenishes itself, no measurable negative economic impacts can be anticipated because the fishery is so small. Cobia make up only 1.6 percent, at most the total catch of charter vessels in the fishery (Section 8.2.1.2 of the FMP). In local areas of the northwestern Gulf, however, cobia tournaments are important for about one month out of an eight-month season, representing approximately $3 million in revenues to charter/headboats.

4. Purse Seine Measures

A. This measure to allow limited use of purse seine gear in the mackerel fisheries would under various assumptions cause economic effects ranging from increased total industry revenue to significantly reduced catch per unit effort (CPUE) for all other users. A survey (Centaur Associates, 1981) has shown that at least 75 percent of firms which would employ purse seines would come from the existing net boat fleet. Therefore, most of the differential in catch and revenue would remain in the existing industry; however, since purse seines are more efficient gear than gill nets, the catch and revenue may be reallocated among industry members.

This measure to limit a purse seine fishery is necessary because when a FMP is implemented for the mackerel fishery it is the position of the Councils that state regulations will not be applicable in the FCZ. In such a situation the introduction of a new gear may have substantial and adverse impacts on all other users, especially a purse seine which is much more efficient than existing gear in the fishery. To comply with the national standards of the Magnuson Act and yet recognize the economic and social concerns in the fishery, this measure limiting purse seine use is proposed.

In the situation that the total allocation for net gears is not attained by 800,000 pounds or more, then purse seine operations for kingfish in the Gulf and south Atlantic would increase industry catch and revenue up to a maximum of 800,000 pounds and $608,000 annually. However, because of their greater efficiency, purse seine gear would negatively affect the CPUE for other users by 5.6 percent each (Table 2). Assuming linearity between catch, effort, and costs, other user groups will either expend 5.6 percent more effort and cost to catch the same amount or earn 5.6 percent less revenue. The monetary impacts are listed in Table 3.

Under the same circumstances for Spanish mackerel and its OY/MSY, purse seine operations would increase industry catch and revenue up to a maximum of 600,000 pounds and $156,000 annually. Effects on CPUE of other user groups and monetary impacts are listed in Tables 2 and 3. For both mackerels, increased landings would not depress the per unit price of all mackerel because of the essentially zero price flexibility estimates (Centaur, 1981, p. 204). The price of purse seine caught fish would be similar to that caught by hook and line because of comparable quality. The size of purse seine caught fish may be smaller which would decrease per unit price; however, until purse seine operations begin, the size question is unsubstantiated.

In the situation that the kingfish net gear allocation will be attained, then purse seine operations harvesting the maximum allowable will decrease CPUE of all other net boats 14 to 28 percent (Centaur, 1981; p. 212). Total industry catch and revenue would remain constant, but it would be allocated on a more skewed distribution. Individual gill-net boats would experience a 14 to 28 percent decline in CPUE and revenue at the expense of fewer purse seine operations. The two other user groups for kingfish (Table 2) would experience declines in CPUE comparable to the above situation. Monetary impacts in this example are listed in Table 3.

In a situation where OY/MSY may be attained somewhere between its estimate and 800,000 pounds (600,000 for Spanish mackerel) below it, then the impacts on user groups would vary between zero to 28 percent for kingfish and zero to 1.9 percent for Spanish mackerel. The likelihood of attaining the OY/MSY estimate is conditional on extenuating factors discussed for proposed measure 2.D.

Table 2. Decrease in catch per unit effort for king and Spanish mackerels from allocation taken by purse seine fleet.

User Group	Type of allocation[1]	Fishery: King[2]	Spanish[3]
Large scale net	General	5.6 percent[4]	1.9 percent[4]
	Specific	28.0 percent[4]	
Small scale net	General		1.9 percent
Hook and line	General	5.6 percent	
Recreational	General	5.6 percent	1.9 percent

1 Type of allocation refers to whether the purse seine allocation is made under conditions where the OY/MSY will not be attained overall (General), or where the OY/MSY will be attained and the allocation will be taken from that allowed all net gears (Specific).

2 A 800,000-pound allocation in the Gulf and south Atlantic.

3 A 600,000-pound allocation in the Gulf and south Atlantic.

4 This estimate is approximately twice the probable percentage since any decrease in gill-net catch will be more than offset by a corresponding increase in purse seine catch, 75 percent of which accrues to converted large-scale gill netters.

Source: Centaur Associates, 1981; Exhibit 8-1, and discussion, p. 211.

Table 3. Monetary impacts to king and Spanish mackerel user groups from allocation taken by purse seine fleet.

User Group	No. of Units	Revenue/Sales[1]: Increase	Decrease	OR Increased Costs
Purse seine fleet[1]	13	$764,000	-	$52,000
Large scale gill net[1] (General allocation)	70		$132,358	117,285
Small scale gill net[2]	153[4]		46,525	9,972
Hook and line[3]	171[5]		85,576	37,701
Recreational[1]				
Charter/headboat	1,082		1.3 million	-
Private boat owners	90,000		2.8 million	-
TOTAL		$764,000	$4.4 million	$216,958

1 Includes operations from king and Spanish mackerel; see text for recreational discussion.

2 Operations from Spanish mackerel only.

3 Operations from king mackerel only.

4 Includes 130 full-time vessels and 23 part-time.

5 Includes 105 full-time vessels and 66 part-time

Source: Centaur Associates, 1981.

The cost of this measure will be borne by the National Marine Fisheries Service with help from the Councils and interested states. No additional funding should be required as the level of effort necessary to provide observers is expected to be small, and is well within the current capability of the agencies involved. The range of possible observer days is expected to be 47 - 520, with the lower end of the range being much more likely (see FMP Section 12.3.5.1).

5. Statistical Reporting Measures

A. Recreational data will be collected through surveys and interview techniques. A one-question addition to state vessel registration forms to identify the universe of boaters can be accomplished with almost no additional cost. The surveys for boat owners would be conducted annually and for nonboat owners once every three years. The cost for every recreational contact will be about the same as contacts under NMFS National Survey, or $8.75. Based on a 90,000 boat universe targeting the management unit and a five percent (random) sample, annual costs for this segment are $39,375. Based on a 353,540 shore fishermen universe and a three percent (random) sample, total cost of this segment is $92,801. Since this would be an every-three-year survey, annual cost based on a capital recovery factor, three years at ten percent would be $37,316. Total annual recreational costs are $76,691. Although these data collection costs appear substantial, they would decline for each existing FMP as other plans are implemented. Reporting burden is 1,259 hours based on five minutes per fisherman.

B. Data from commercial and recreational-for-hire fishermen will be gathered primarily through existing NMFS reporting efforts. Some additional samplying of these user groups will be necessary to estimate fishing effort. The economic impact to industry of additional reporting on randomly selected fishermen is mainly one of lost time. Per vessel costs to the government for printing, distribution, collection, data processing, and publication is expected to be $20 to $25. Reporting would take place annually at intervals specified by NMFS and its statistical reporting division. Based on a universe of 394 full- and part-time commercial operators and a 25 percent sample, annual costs for this segment are $1,970 to $2,463. Based on a universe of 1,082 charter/headboat operators and a ten percent sample, annual costs for this segment are $2,164 to $2,705. Total annual costs for this effort are $4,134 to $5,168. The reporting burden is 1,240 hours based on six hours per year per respondent.

Reporting Measure B supports Measure A by requiring a reply from those persons selected for the survey. It also includes processors in the mandatory reporting requirement for that information deemed necessary by NMFS. This information is already being collected on a voluntary basis, but some processors do not report at present. Costs of this measure are included in Measure A.

B. ALTERNATIVE MANAGEMENT MEASURES

The incremental impact that would have been associated with the adoption of the alternative management measures or the impact of not adopting them is described in this section. The impacts of the alternative management measure are summarized in Table 4.

Alternative Management Measures Considered for King Mackerel

Alternative Measure F would have placed a minimum size of four pounds on all king mackerel for both commercial and recreational fishermen. This measure was aimed at preventing harvest of king mackerel below the size corresponding to a maximum economic yield. Rejection of Alternative Measure F also results in not placing a minimum weight on the recreational sector. It was rejected because: (1) the survival rate of king mackerel released by recreational fishermen is low, (2) severe economic impacts would be likely, and (3) small king mackerel are specifically targeted by recreational participants. Undersized recreational catch has been reported as high as 79.5 percent in some localities (northwest Florida in 1978 based on data from NMFS, Panama City Laboratory), and it is believed that such a restriction would significantly curtail several recreational fisheries. Recreational catch of these small king mackerel is greatest in northwest Florida and detrimental economic impacts could be expected to be most severe in this region. Angler reaction and thus the economic impact are impossible to quantify; however, the adverse economic impacts are believed to significantly outweigh any potential positive impacts.

Alternative Measure G which would limit the recreational catch to five king mackerel per day for each fisherman was considered and not proposed. This measure would have unnecessarily restricted the catch of recreational fishermen whether or not the recreational allocation was reached. This measure would decrease the total catch of recreational fishermen by an amount which cannot be calculated with available data. However, it is likely that it would have a detrimental affect on participation in the fishery and would thus reduce the level of economic expenditures associated with the recreational king mackerel fishery. Total annual expenditures for the purchase of goods, charterboat fees and general tourism associated with the recreational king mackerel fishery for the region was estimated at $55 million for 1980 (see Section 9.1.2 of the plan). Any reduction of recreational participation in the fishery can be expected to affect this level of expenditures; however, the extent of the impact cannot be precisely stated.

Alternative Measure H would require a minimum mesh size of five to 5-1/2 inches for the king mackerel gill-net fleet. This measure would increase the average size of captured king mackerel by increasing the mesh size used in the gill-net fleets. The motive of such a measure would be to increase the average size of captured fish and reduce the catch of fish less than 25 inches. However, current nets with a 4-3/4 inch mesh size will only be landing an estimated 24,157 pounds of undersized fish in 1980 or 0.47 percent of the total catch. Although no data is available on average fish size and escapement rates for different gill-net mesh sizes, it is most likely that landings and, thus, revenue of the gill-net fleet would be substantially reduced. In addition, a change in the mesh size will require a major refitting effort by the 33-vessel fleet. Typically, each net averages 1,500 x 80 feet (Section 8.2.6.1 of this plan) and has an estimated replacement cost of $15,000. If this measure were imposed on the fleet, an initial outlay of $495,000 ($15,000 x 33) would be required by the entire fleet before the 1982 season.

Alternative Measure I would establish a procedure for regulating length and height limitations on nets used in the king mackerel fishery should a king mackerel net fishery expand into an area not historically fished. This measure was not proposed in lieu of Proposed Measure A. Measure A is more completely defined, more expedient and provides greater flexibility in dealing with new and unexpected problems which may arise. No economic impacts can be anticipated until a specific issue is addressed. However, the impacts which can be anticipated as the result of dealing with a specific issue would be equal to or slightly greater with this measure than under Proposed Measure A. This is due to the fact that Measure A provides greater flexibility in dealing with conflicts which may arise.

Alternative Measure J which would require permits for all vessels fishing in the FCZ was considered and not proposed. This measure was discussed as a possible method to facilitate data collection in the fishery. A statistical reporting system based on mandatory trip tickets for commercial, party and charter boats and a vessel enumeration system for private boats based on the existing state registration lists was substituted for this measure. A vessel permit system, assuming a $10 permit fee (a typical charge necessary to cover administrative expenses of permits) would cost the commercial fleet $14,760 and the estimated 90,000 private recreational boats targeting the species an additional $900,000. The mandatory permit system was thus considered too expensive for the marginal increase in data derived and would have imposed an unnecessary regulation on the fishery.

Alternative Measure K would have prohibited the use of purse gill nets with the intent that this issue be specifically discussed at public hearings. The direct economic impacts of this regulation would be nonexistent at this time as there are not any king mackerel purse gillnetters known to be operating in

Table 4. Summary of Economic Impacts of the Alternative Management Measures

Alternative Management Measure	Price	Supply	Employment	Revenues	Productivity	International Impact	Market Structure	Government Costs	Recreational Participation
King Mackerel									
F.	Slight positive impact.	King mackerel supply reduced.	0	Slight reduction.	0	0	0	1	Extensive reduction of recreational catch-concentrated in several regions.
G.	0	0	0	0	0	0	0	1	Extensive reduction in recreational catch.
H.	0	Reduction in landings by the gill-net fleet.	0	0	Productivity reduced and $495,000 additional investment required.	0	0	1	0
I.	0	0	0	0	Potential small increase.	0	0	1	0
J.	0	0	0	0	License fees would cost fleet $14,760.	0	0	1	License fees would cost recreational boat fishermen $900,000.
K.	0	0	0	0	Slight potential to hold back productivity at future date.	0	0	1	0
L.	Slight positive impact on king mackerel.	Possible reduction.	0	Possible reduction.	Slight reduction.	0	0	1	0
M.	0	Possible interruptions in supply of king mackerel.	0	Possibility that economic returns would be reduced.	Productivity reduced.	0	0	1	0

Table 4. (contd.) Summary of Economic Impacts of the Alternative Management Measures

Alternative Management Measure	Price	Supply	Employment	Revenues	Productivity	International Impact	Market Structure	Government Costs	Recreational Participation
N.	0	0	0	Revenues to harvesting sector reduced.	Probable reduction in productivity.	0	May act to discourage entry into hook and line fishery.	1	0
O.	0	0	0	0	Possible increases in productivity.	0	0	Increased enforcement and legal expenses would be incurred if conflicts developed.	0
P.	0	Potential for reduced supply if MSY is exceeded.	Increased risk of closure may result in unemployment.	Possible loss of revenue due to increased risk of closing fishery.	Potential to reduce gill-net productivity if allocation is reached.	0	May serve to lessen concentration in harvesting sector.	1	Holds recreational catch to 28 million.
Q.	Possible slight increase.	Uncertain	Uncertain	Possible loss.	Uncertain	0	0	1	0
R.	0	Slight reduction.	0	Slight reduction.	0	0	0	1	0
Spanish Mackerel									
E.	0	0	0	0	Possible increased productivity.	0	0	Increased enforcement and legal expenses would be incurred if conflicts developed.	0

Table 4. (contd.) Summary of Economic Impacts of the Alternative Management Measures

Alternative Management Measure	Price	Supply	Employment	Revenues	Productivity	International Impact	Market Structure	Government Costs	Recreational Participation
Cobia									
B.	0	0	0	0	0	0	0	1	Significantly reduced recreational catch.
C.	0	Reduced by 130,000 pounds.	0	Revenues reduced by $52,000.	0	0	0	1	0
Purse Seine									
C.	0	0	0	0	May limit future productivity.	0	0	0	0
D.	Same effect in Gulf as Proposed Measure A and B.							1	
Statistical Reporting									
C.	Same effect as rejected King Mackerel Measure J.								
D.	0	0	0	0	3,246 hours reporting.	0	0	$16,230 - $20,100	0
E.	0	0	0	0	1,576 hours reporting.	0	0	$7,880 - $9,850	0
F.	0	0	0	0	649 - 1,298 hours	0	0	$2,164 - $27,050	0

[1] Total annual enforcement cost of $294,444.

the Gulf and south Atlantic FCZ at this time. Potential positive benefits include a reduction in "fallout" of dead fish from gill nets which is alleged to occur. This measure was not proposed at this time because a study is currently underway which will assess the impact of a gill-net "fallout" problem. The data provided by this project will be used for an evaluation of all the alternative forms of this gear type and, if necessary, regulations proposed at a future date.

Alternative Measure L would establish a 25-inch minimum size limit for the commercial fishery and no size limit for the recreational fishery. Alternative Measure L was rejected because it is discriminatory to one user group without adequate justification.

Alternative Measure M proposed to restrict the use of spotter aircraft in the king mackerel fishery. Spotter aircraft are used predominantly by large gill-net boats to locate large schools of king mackerel. This measure would significantly reduce the economic efficiency of the gill-net fleet and would most likely increase the variability of the catch. Although specific projections of the dollar impact of the measure cannot be made, there is general agreement that the regulation would adversely affect the gill-net economic returns by causing higher costs and would cause interruptions in the supplies of fish to consumers.

Alternative Measure N which was not adopted, would have restricted the number of lines and hooks used in the king mackerel fishery. The measure was not considered to be necessary because catch limitations to prevent the harvest from exceeding MSY have been adopted. It was also rejected because of the adverse economic effect on the user groups using this gear type. It is impossible to suggest the specific economic loss to the hook and line fleet without specifying the number of hooks to be allowed. However, it is safe in assuming that a significant restriction on the number of lines permitted in the fishery would reduce the revenue, efficiency and productivity of the fishery.

Alternative Measure O would have allowed the Secretary to aid in the prosecution of persons involved in conflicts in which there was a history of violence. The measure was felt to be unnecessary in light of the extensive framework established in Proposed Measure A which deals with conflicts between gear and user groups.

Alternative Measure P allocates eight million pounds to the commerical fishery, 25 million pounds to the recreational fishery and maintains the remaining four million pounds of the optimum yield in a reserve to be allocated on a regional basis to the fishery if the initial limits are exceeded. The rejected measure also required that the reserve be allocated in accordance with the contribution to total catch that each specific fishery made in the previous five years. In addition, P places a personal limitation of three fish per day on the recreational fishery, a 10,000 per day limit on all gill-net vessels and a 400 pound per day limit on all vessels in the hook and line fishery if it appears that the respective allocation will be reached. This allocation system was not adopted in lieu of Proposed Measure C which is believed to provide the same benefits and not require as complex an administrative framework. The similar adopted measure also provides a more sophisticated system of controls to restrict the fishery once the reserve is reached and the flexibility needed to allow for fluctuations in abundance and availability. There are two basic economic impacts that could be expected had Alternative Measure P been adopted. First, because the allocation system mandated is so extensive catch data with a shorter time lag in reporting would be needed. Collection and analysis of data this frequently could be expected to cost substantially more than the proposed reporting system. Measure C allows for the consideration of whether or not the excess catch is a result of a high abundance of fish, increased local availability, increased effort, inaccuracies in the historical landings data and the degree of biological impact of closing the fishery. The more efficient and simpler Measure C provides for certainty on the part of user groups and thus higher economic returns.

Alternative Measure Q would separate two groups of commercial mackerel fishermen to avoid gear conflicts. The separation is by depth and time. This measure was not proposed because (1) there are overlapping zones in which fishing can take place by both gear types; and (2) the length of the separation in time, although at the peak of the season, is not long enough to allow for different availabilities of mackerel year to year. Because of these factors enforcement would be difficult, conflicts may still occur, and efficient use of both gear may be inhibited.

Alternative Measure R would make illegal the buying, selling, or processing for commercial use, king mackerel under 25-inches fork length. This measure would have prevented fishermen from marketing a small (but unquantifiable at this time) amount of king mackerel under 25 inches. Since small individuals are regularly caught when striking a net for king mackerel, and for Spanish mackerel at times, the result would be waste of a protein resource. No restrictions were contemplated for recreational fishermen and thus the measure is also discriminatory on industry.

Alternative Measures for Spanish Mackerel

Alternative Measure E provided that the Secretary would aid in the prosecution of perpetrators of violence in fisheries having gear or user group conflicts. The measure also gives the Secretary emergency powers to separate users by gear or assign local quotas. This measure was not adopted since its designated goal was more effectively achieved by Proposed Measure A. The only economic impacts which could be anticipated are slightly increased enforcement costs and additional legal fees. The extent of these expenses would be totally dependent on the characteristics and extent of any future conflicts.

Alternative Management Measures for Cobia

Alternative Measure B would have provided a bag limit of one cobia per person per day in the South Atlantic Council area where data supported the need for protection. This measure would have reduced recreational enjoyment of the fishery and could slightly reduce participation in the fishery. However, any economic impact could be expected to be minimal as only 0.4 percent of saltwater anglers in the region are estimated to land cobia in a given year. The primary negative economic impact of this measure would most likely have been localized in communities which hold cobia tournaments yearly. Specific dollar values for the impact cannot be estimated as no data are available on expenditures for cobia fishermen or on the potential reaction of anglers to cobia bag limits.

Alternative Measure C is aimed at prohibiting the sale of all cobia. Cobia is not a targeted species of any commercial fleet and is only caught incidental to other species. Total commercial cobia catch is typically only ten percent of the total cobia catch. This measure would have little beneficial biological impact while depriving the commerical fleet of a supplementary source of revenue. If adopted, Measure C would have deprived the commercial fleet of $52,000 in revenue based on 130,000 pounds average landings and $0.40 per pound. This revenue loss would be concentrated among fishermen along both coasts of Florida.

Alternative Management Measures for Purse Seines

Alternative Measure C prohibits the use of purse seines to harvest king or Spanish mackerel in the area of jurisdiction of the South Atlantic Council except for specified research. This measure limits technological change by the industry. Prohibition of purse seine gear would not have altered the status quo in the industry since purse seines were either little or not used at all. Since there was no documentation to support a total prohibition, this measure was rejected.

Alternative Measure D recommends a research program on the use of purse seines in taking king and Spanish mackerel; until the research is completed, purse seine operations would be limited to 400,000 pounds annually of king mackerel and Spanish mackerel (an additional 250,000 pounds for an existing commercial fishery) in the Gulf of Mexico and observers would be required on board. This measure was rejected because the one-year limitation on catch and observer participation was not sufficient for proper management of the resource or fishery.

Alternative Statistical Reporting Measures

Alternative Measure C would require permits for all users for statistical purposes only. The measure was rejected as an unnecessary burden on industry and the public. Its cost ($914,760) is discussed in King Mackerel Alternative Measure J.

Alternative Measure D would require a mandatory trip ticket system for charter/headboat operators targeting Spanish mackerel. Assuming 75 percent of the 1,082 charter/headboats in the fishery target Spanish mackerel, and an annual per unit cost of $20 to $25 for data collection, collation, and publication, total costs would be $16,230 to $20,000. The reporting burden at 0.5 hour per month for an eight-month season would be 3,246 hours. The measure was rejected because sufficient information can be obtained from a sample of operators.

Alternative Measure E requires commercial fishermen to report catch and effort data using trip tickets. With 100 percent reporting and an annual per unit cost of $20 to $25, total cost would be $7,880 to $9,850. The measure was rejected because sufficient information can be obtained from a sample of operators. Reporting burden, 0.5 hour per month per operator for eight months, would be 1,576 hours.

Alternative Measure F requires logbook reporting for all charter/headboat operators, or a limited sample necessary to obtain sufficient data. Costs to government and reporting burden would be the same for this group of operators as in Proposed Measure B. This measure was rejected because it discriminates use of a survey instrument on one user group.

C. COMPARISON OF THE IMPACTS OF THE PROPOSED AND ALTERNATIVE MANAGEMENT MEASURES

1. Proposed Measures

The benefits of this FMP derive from maintenance of a high level of yield, preventing a decline in yield and loss of economic value to the nation. Fishing effort is rapidly increasing and will soon result in a decline in yield from the fishery unless total harvest is limited. (See FMP Section 5.4.) However, it is not possible to calculate the degree to which mackerel stocks could be overfished in any given year and corresponding benefits from regulation because of the limited data available and uncertainty about the precision of the MSY estimate.

A reasonable approach to estimating benefits from regulation is to compare the costs of the plan to the range of potential benefits. Recent history of a similar fishery, Atlantic mackerel, gives an indication of potential losses which could occur if no action is taken. Maximum sustainable yield for this stock is estimated at 210,000 to 230,000 mt. During the early 1970s, excess fishing effort greatly reduced the stock size and yield declined. Total present catch from U.S. and Canadian waters is approximately 65,000 mt, less than one third of MSY. The current Atlantic Mackerel FMP limits catches in U.S. waters to 30,000 mt in an attempt to increase spawning stock size and improve recruitment.

In the case of Atlantic mackerel, the drastic reduction in harvest needed to rebuild the stock was accomplished by reducing allowed foreign harvest and was relatively painless for U.S. interests. If similar reductions became necessary for king or Spanish mackerel, U.S. fishermen would bear the entire burden, with serious adverse impacts on sport and commercial fishermen.

Given the present trend in fishing effort in the king and Spanish mackerel fisheries and present condition of those stocks, it is probable that MSY will be exceeded and yield decline in the near future unless total harvest is limited. For the purpose of estimating potential benefits from the plan, it is reasonable to assume losses of five to 25 percent within the next five years, and 20 to 50 percent within the next ten years, if no action is taken. These estimates are somewhat arbitrary, but are believed to be conservative. As can be seen from the example of Atlantic mackerel, greater losses are possible. Thus, annual benefits assuming linearity between economic value/expenditures (commercial and recreational sectors) and catch vary between $5.6 million to $27.9 million during the next five years derived from this FMP through prevention of overfishing.

Direct monetary benefits include the potential increase in annual revenue of up to $608,000 for king mackerel and $156,000 for Spanish mackerel by purse seine vessel operators, and $8,150 (present value) over five years for increased cobia landings.

A summation of the direct annual costs to private industry and government is approximately #376,303, all of which is attributable to the government. If and only if large scale gill net boats convert to purse seines, industry will face potential costs of up to $216,958 or a potential $4.4 million in lost revenue/sales for commercial and recreational users (Table 3). The potential lost revenue/sales comes almost entirely from the recreational sector ($4.1 million). This impact is probably greatly overstated. In the absence of more reliable information the impact was estimated by assuming a linear relationship between decreases in CPUE and total revenue/sales. However, it is unlikely that a small change in CPUE (1.9 to 5.6 percent) will have any impact on recreational fishing effort. The motives for fishing are not solely to catch fish with many fishermen fishing because of the general recreational benefits.

Annual costs to government are classified as following:

Monitoring and data collection		$ 81,859
Enforcement		
Coast Guard	$184,444	
NMFS	$110,000	
Total		$294,444
Total annual costs		$376,303

The costs to develop this FMP amount to $306,204. The Gulf Council is the lead Council for this plan and has assumed most of the costs for meetings, office/staff, and actual FMP contractual arrangements. For the purposes of this RIR, a 20-year life is given to the FMP process and structure. Its annual cost based on a ten percent capital recovery factor is therefore $35,968.

2. Alternative Measures

Benefits from the alternative measures are less than those cited for the proposed measures with regard to overfishing. This is due to the inflexibility and imposition of more burdens on industry and the public from alternative measures. It is not possible to cite a quantitative estimate of lesser benefits with the alternatives, but only to point out qualitative differences.

A summation of the direct annual costs to private industry and government is approximately $1.9 million, of which $429,980 is attributable to government (see Alternative Measures for Enforcement and Statistical Collection); $1.4 is attributable to industry and the public from license fees, mandatory gear, and prohibition of sale of cobia. FMP developmental costs would be incurred as well.

3. Summary

In summary, annual benefits from the proposed measures range from $5.6 million to $27.9 million from prevention of overfishing, and a potential $762,000 in increased revenue to purse seine operators. Annual costs of the proposed measure are $412,271, of which $376,303 are direct annual costs for statistical collection, monitoring, and enforcement, and $35,968 for development of the FMP.

Annual benefits from the alternative measures are significantly below those estimated for the proposed measures; however, because of limited data, no quantitative estimate is possible. The alternative measures are more rigid, inflexible, and burdensome regulations and thus benefits would be less. Annual costs of the alternative measures are $1.9 million, most of which is imposed on private industry and the sportfishing public.

D. Paperwork Reduction Act (44 U.S.C. 350 et seq.)

The proposed management measures will not increase the reporting burden for commercial and recreational fishermen and processors. The major change will be a change from a voluntary to a mandatory reporting system. Data will be collected on a random basis which minimizes the reporting burden on the fishermen and costs to the federal government.

E. Regulatory Flexibility Act (5 U.S.C. 601 et seq.)

The proposed management measures result in both positive (and possible negative) economic impacts to the small businesses associated with the mackerel fishery. Virtually all the businesses associated with the mackerel fishery are classified as small businesses, and will consequently receive most of the economic gains resulting from the proposed measures; conversely, most businesses will be affected from negative economic impacts, if any. The benefits to the fishery, and regional and national economies, as well as the number of fishermen affected by the proposed management measures is discussed in Sections IV. A and C (including Table 3).

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