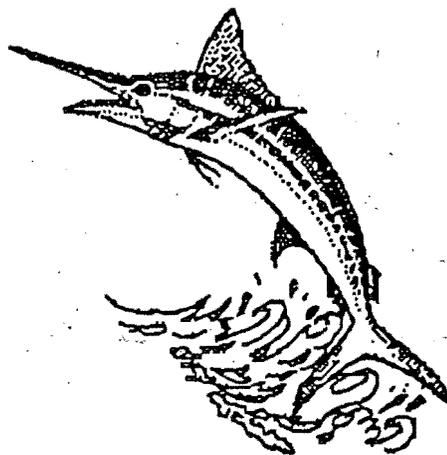


**FISHERY MANAGEMENT PLAN,
FINAL ENVIRONMENTAL IMPACT STATEMENT,
REGULATORY IMPACT REVIEW, AND
INITIAL REGULATORY FLEXIBILITY ANALYSIS**

**FOR THE
ATLANTIC BILLFISHES**



**PREPARED BY THE
SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL
IN COOPERATION WITH
CARIBBEAN FISHERY MANAGEMENT COUNCIL
MID-ATLANTIC FISHERY MANAGEMENT COUNCIL
NEW ENGLAND FISHERY MANAGEMENT COUNCIL
GULF OF MEXICO FISHERY MANAGEMENT COUNCIL**

MARCH 1988

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1.0 PREFACE

This consolidated document contains all elements of the Fishery Management Plan (FMP), Final Environmental Impact Statement (FEIS), Regulatory Impact Review (RIR), and Initial Regulatory Flexibility Analysis (IRFA). The detailed scientific, technical, and other supportive documentation on which the management regime proposed for the billfish fishery is based can be found in the source document for Atlantic billfishes, which is available for review at the following locations:

New England Fishery Management Council
Suntaug Office Park, 5 Broadway (Route 1)
Saugus, Massachusetts 01906

Mid-Atlantic Fishery Management Council
Federal Building, Room 2115
300 South New Street
Dover, Delaware 19901-6790

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

Gulf of Mexico Fishery Management Council
Lincoln Center, Suite 881
5401 West Kennedy Boulevard
Tampa, Florida 33609

Caribbean Fishery Management Council
Suite 1108, Banco de Ponce Building
Hato Rey, Puerto Rico 00918-2577

National Marine Fisheries Service
Northeast Regional Office
14 Elm Street
Gloucester, Massachusetts 01930

National Marine Fisheries Service
Northeast Fisheries Center
Woods Hole, Massachusetts 02543

National Marine Fisheries Service
Southeast Regional Office
Duval Building
9450 Koger Boulevard
St. Petersburg, Florida 33702

National Marine Fisheries Service
Southeast Fisheries Center
75 Virginia Beach Drive
Miami, Florida 33149

National Marine Fisheries Service
Washington, DC 20235

ABBREVIATIONS AND DEFINITIONS USED IN THIS DOCUMENT

CFR	Code of Federal Regulations
DAH	Domestic annual harvest
EEZ	Exclusive Economic Zone - an area extending from the seaward boundary of the states' territorial seas to 200 nautical miles from the baseline from which the territorial sea is measured.
FMP	Fishery Management Plan
ICCAT	International Commission for the Conservation of Atlantic Tunas
MFCMA	Magnuson Fishery Conservation and Management Act
MSY	Maximum sustainable yield - the largest quantity of fish that can be harvested annually from a resource without reducing its long-term productive potential
mt	metric tons - 2204.5 pounds
NMFS	National Marine Fisheries Service
OY	Optimum Yield - a kind of total annual catch target; that quantity of fish that 1) will produce the greatest benefit to the nation (with reference to food production and recreational opportunities); and 2) is prescribed on the basis of MSY as modified by relevant economic, social, or ecological factors.
Overfishing	effort above the level which is optimal to produce MSY resulting in catches below MSY
PMP	Preliminary Management Plan - prepared by the Secretary of Commerce to manage the harvest by foreign fishermen in the EEZ until an FMP has been prepared by a Regional Fishery Management Council
RIR	Regulatory Impact Review - assessment of the economic impacts of proposed management measures and alternatives considered in an FMP
SCRS	Standing Committee on Research and Statistics of ICCAT
Secretary	Secretary of Commerce
TALFF	Total Allowable Level of Foreign Fishing - only that portion of optimum yield which will not be harvested by U.S. fishermen

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2.0 FINAL ENVIRONMENTAL IMPACT STATEMENT

() Draft

(X) Final Environmental Statement

Responsible Agencies

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Name of Action: (X) Administrative

() Legislative

Abstract:

The proposed action will result in management of the billfish fishery in the Exclusive Economic Zone (EEZ) of the South Atlantic, Gulf of Mexico, Caribbean, Mid-Atlantic, and New England Councils. The species regulated are the sailfish, Istiophorus platypterus; the white marlin, Tetrapturus albidus; the blue marlin, Makaira nigricans, and the longbill spearfish, Tetrapturus pfluegeri. The objectives are to: 1) maintain the highest availability of billfishes to the U.S. recreational fishery; 2) optimize the social and economic benefits to the nation by reserving the billfish resource for its traditional use which on the continental U.S. is almost entirely a recreational fishery. In the Caribbean, the fishery is both a recreational and small-scale handline fishery where billfishes are used as food; 3) increase understanding of the condition of the billfish stocks and the billfish fishery. Optimum yield for billfishes is the greatest number of billfish that can be caught by the recreational fishery in the EEZ, consistent with the provisions of this fishery management plan, considering the biological limitations of the stock and the unavoidable incidental catches in other fisheries. Management measures proposed include a prohibition on the sale of billfish; a prohibition on possession by commercial longline and drift net vessels; minimum size limits; reporting requirements; permits for foreign vessels; and time and area restrictions on foreigners with a bycatch of billfish. The management actions will be implemented under the Magnuson Fishery Conservation and Management Act of 1976 (16 U.S.C. 1801, et seq.).

Comments requested by:

FINAL ENVIRONMENTAL IMPACT STATEMENT

This integrated document contains all elements of the Fishery Management Plan (FMP), Regulatory Impact Review (RIR), and Final Environmental Impact Statement (FEIS), and Initial Regulatory Flexibility Analysis (IRFA). The table of contents for the FEIS elements is provided separately to aid the reviewer in referencing corresponding sections of the FMP.

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List of Preparers

The FMP, RIR, IRFA, and FEIS were prepared by the South Atlantic, New England, Mid-Atlantic, Gulf of Mexico, and Caribbean Fishery Management Councils with principal input from South Atlantic Council Staff. Early drafts were prepared using the Preliminary Management Plan for Billfishes and Sharks as a starting point. The scientific and statistical committees, the advisory panels and the technical staff of each of the five Councils involved reviewed the plan and provided suggestions and corrections.

Earlier drafts of the plan were prepared principally by Jackson Davis, Deborah Canavan and Barbara Anderson of the South Atlantic Council staff. Much of the information contained in those drafts has been incorporated into this document. The present draft was prepared principally by the following South Atlantic Council staff:

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 Gregg T. Waugh, Fishery Biologist
 Roger Pugliese, Fishery Biologist
 Jane DiCosimo, Technical Support Specialist
 Andrea L. Ingrassia, Secretary
 Lisa Cogswell, Secretary

List of Agencies, Organizations, and Persons To Whom Copies of the Statement Are Sent

Atlantic States Marine Fisheries Commission
 U.S. Army Corps of Engineers
 U.S. Department of Commerce
 Office of Coastal Zone Management
 U.S. Department of the Interior
 Bureau of Land Management
 Fish and Wildlife Service
 National Park Service
 U.S. Department of State
 U.S. Department of Agriculture
 U.S. Department of Transportation
 Coast Guard
 U.S. Department of Energy
 U.S. Environmental Protection Agency
 Regions I, II, III, IV, VI
 Center for Environmental Education
 Conservation Council of Angling Clubs
 Embassy of Japan
 Embassy of Spain
 Federation of Japan Tuna Fisheries Co-operative Association
 Fisheries Agency of the Government of Japan
 Fishery Management Councils
 Florida League of Anglers
 Gulf & South Atlantic Fisheries Development Foundation
 Gulf States Marine Fisheries Commission
 Japan Tuna Association
 Marine Advisory Agents
 Marine Mammal Commission
 Mid-Atlantic Fisheries Development Foundation
 National Coalition for Marine Conservation
 North Carolina Fisheries Association Inc.
 Organized Fishermen of Florida
 Sea Grant Advisory Services (5 Council Area)
 Southeastern Fisheries Association
 Sportfishing Institute
 State Coastal Zone Management Agencies (5 Council Area)
 State Resource Agencies
 Rhode Island New Hampshire Georgia Texas
 Maine Florida South Carolina Louisiana
 North Carolina Virginia Maryland Alabama
 Pennsylvania Connecticut Massachusetts Mississippi
 Delaware New Jersey New York Puerto Rico
 Virgin Islands

Stuart Sailfish Club

Draft Statement to EPA: September 18, 1987

Final Statement to EPA:

3.0 SUMMARY

This document is a combined fishery management plan (FMP), regulatory impact review (RIR), final environmental impact statement (FEIS) and initial regulatory flexibility analysis (IRFA) for Atlantic billfishes. The FEIS, RIR and IRFA describe the probable consequences of each of the proposed management measures and alternatives considered. The FMP was prepared under the authority of the Magnuson Fishery Conservation and Management Act of 1976 as amended, the RIR in accordance with the requirements of Executive Order 12291, the FEIS in accordance with the National Environmental Policy Act of 1969, and the IRFA in accordance with the Regulatory Flexibility Act.

The Billfish Fishery Management Plan was prepared jointly by the South Atlantic, New England, Mid-Atlantic, Gulf of Mexico, and Caribbean Fishery Management Councils. It establishes a management regime for Atlantic billfishes throughout the Atlantic, Gulf and Caribbean Exclusive Economic Zones (EEZ) of the U.S. The species addressed by this plan are the sailfish, Istiophorus platypterus; the white marlin, Tetrapturus albidus; the blue marlin, Makaira nigricans; and the longbill spearfish, Tetrapturus pfluegeri. When approved and implemented by the Secretary of Commerce, this FMP will incorporate the billfish-related aspects of the Preliminary Fishery Management Plan (PMP) for Atlantic Billfishes and Sharks which is currently in effect. Atlantic sharks will remain governed by the PMP until a fishery management plan is developed for them.

The objectives of the plan are to:

- A. Maintain the highest availability of billfishes to the U.S. recreational fishery by implementing conservation measures that will reduce fishing mortality.
- B. Optimize the social and economic benefits to the nation by reserving the billfish resource for its traditional use which on the continental U.S. is almost entirely a recreational fishery. In the Caribbean, the fishery is both a recreational and small-scale handline fishery where billfishes are used as food.
- C. Increase understanding of the condition of the billfish stocks and the billfish fishery.

Optimum yield in the billfish fishery is defined as the greatest number of billfish that can be caught by the recreational fishery in the EEZ, consistent with the provisions of this fishery management plan, considering the biological limitations of the stock and the unavoidable incidental catches in other fisheries.

On the basis of data presented in this plan and in the Source Document, it is concluded that the greatest overall benefit to the nation will result from reserving to the extent possible, billfish occurring in the EEZ to the U.S. recreational fishery. Consequently, only traditional recreational fishing gear (i.e., rod and reel) may be used in a directed fishery for billfishes in the Atlantic and Gulf EEZs. To ensure that a commercial market for billfishes does not develop, thus thwarting the objectives of this plan, the sale of all species in the management unit (i.e., from the same stock) is

prohibited. This measure applies to imports as well as billfishes caught by domestic vessels fishing outside the EEZ. In Puerto Rico, where billfishes have traditionally been used for food, the use of handlines in the small-scale fishery will continue. Billfish of any size taken in this fishery may be sold only in Puerto Rico. However, to ensure that the exemption is confined to the artisanal fishery, a maximum of 100 billfish may be landed annually under this exemption in addition to permitting and monitoring requirements. This is the only exception to the prohibition on sale.

Billfish are also an incidental bycatch of domestic pelagic longline fisheries. With the expansion of the swordfish fishery into more southern waters, and the rapidly growing domestic tuna fishery, the incidental catch of billfishes has increased markedly. To ensure that all live billfishes caught incidentally by these fisheries are released, retention by commercial longline vessels is prohibited. Therefore, all billfish caught by domestic longliners must be released by cutting the line near the hook, without removing the fish from the water.

The U.S. recreational fishery currently releases approximately 50 percent of its catch. However, to ensure that most billfishes are released so that they may remain available to the recreational fishery, minimum size limits are imposed for each species (except spearfish). Size limits are based on weight, but are expressed in lower jaw fork length. The minimum sizes are 57 inches (30 pounds) for sailfish, 62 inches (50 pounds) for white marlin, and 86 inches (200 pounds) for blue marlin, and are based on reducing angler retention by 30 percent, 50 percent and 50 percent respectively. This measure will allow competitive fishing tournaments and retention of trophy size fish to continue while still significantly reducing this source of billfish mortality.

No permits or fees will be required for domestic vessels engaged in the fishery. Domestic catch and effort information necessary for monitoring the impacts of the plan and the status of the billfish resource will be collected by statistically sampling participants in the fishery. Mandatory reporting of billfish catch and effort will be required of all billfish tournaments selected by NMFS. Commercial longline fisheries will be sampled by use of logbooks and onboard observers.

All billfish taken on foreign longline gear must be released in a manner which will ensure maximum probability of survival. However, there has been a high mortality of billfishes taken on foreign longline gear (only 40 percent were released alive from March 1978 to March 1979) and significant bycatches of billfish by the foreign longline fishery occur during those months when domestic recreational activity is most intense. For these reasons and in order to provide for the highest availability of billfishes to the U.S. fishery, the area closures specified in the PMP will be continued.

Foreign fishing vessels having permits to operate longlines or other gear likely to catch billfishes within the Exclusive Economic Zone will be required to carry observers and keep daily records of the total number of billfish caught and the number released alive.

Although this management plan attempts to maximize the number of billfishes available to U.S. recreational fishermen by reducing fishing mortality on billfish within the EEZ, it is

recognized that effective biological management must treat billfish stocks throughout their range. Therefore implementation of an international management plan for billfishes is recommended to complement the management initiatives undertaken within the EEZ.

4.0 THE FISHERY MANAGEMENT UNIT

Sailfish, Istiophorus platypterus in the west Atlantic Ocean; white marlin, Tetrapturus albidus in the North Atlantic Ocean; blue marlin, Makaira nigricans in the North Atlantic Ocean; and the longbill spearfish, Tetrapturus pfluegeri in the entire Atlantic Ocean comprise the management unit of this plan. These species are interrelated from the standpoint of both biology and the fishery. This plan establishes a management regime for these interrelated stocks throughout that portion of their range which is in the Atlantic, Gulf of Mexico, and Caribbean Exclusive Economic Zones of the U.S. and recommends establishment of a complementary international management program applicable to the entire range of the stocks.

Unit stocks of billfishes are not contained within the EEZ. Consequently, the long-term biological productivity of billfish resources is dependent on management through international agreements. Despite the presumed stock structure, mark-recapture data indicate that most billfish do not make trans-Atlantic or trans-equatorial migrations. Thus, the impact of management measures within the EEZ will be largely on these relatively resident fish and not diluted stock-wide. In view of this, the significant social and economic value of the domestic billfish fishery, and the competition for the available resource within the EEZ, management to achieve the optimum yield from the fishery within the EEZ is desirable. This management regime should complement any biological management initiatives undertaken through international arrangements. In addition, management measures contained in this plan will provide some protection to the stocks and may encourage other nations to undertake management.

The plan primarily addresses the two marlins and the sailfish. There is no domestic directed fishery for the longbill spearfish and available data suggest this species is scarce within the U.S. EEZ. However, it is occasionally taken in the recreational fishery for marlins and sailfish and is therefore included in the management unit.

5.0 PROBLEMS IN THE FISHERY

The principal problems in the fishery which the management plan will address are:

- A. There is intense competition for the available resource between the recreational fishery for billfish and other fisheries that have a bycatch of billfish.
- B. There is a developing commercial market for billfish and an increasing value for the product, thus encouraging directed fishing and/or increased retention of incidentally caught billfish. This situation jeopardizes the economically valuable, traditional

recreational fishery and threatens to undermine the conservation ethic developed by this user group.

- C. There is a rapidly expanding domestic tuna longline fishery which has a higher billfish bycatch than the historical swordfish fishery.
- D. The current statistical and scientific data base is inadequate for stock assessment and is likely to remain so for the foreseeable future. A long term biologically sound management regime, either domestic or international, will not be possible until an adequate and accurate data base is available.

6.0 MANAGEMENT OBJECTIVES

The following management objectives have been developed for the billfish fishery in the Atlantic, Gulf of Mexico, and Caribbean EEZs:

- A. Maintain the highest availability of billfishes to the U.S. recreational fishery by implementing conservation measures that will reduce fishing mortality.
- B. Optimize the social and economic benefits to the nation by reserving the billfish resource for its traditional use, which on the continental U.S. is almost entirely a recreational fishery. In the Caribbean, the fishery is both a recreational and small-scale handline fishery where billfishes are used as food.
- C. Increase understanding of the condition of billfish stocks and the billfish fishery.

7.0 DESCRIPTION OF THE FISHERY

7.1 Description Of The Stocks

7.1.1 Distribution

The marlins and sailfish are widely distributed over the Atlantic Ocean (including the Gulf of Mexico and the Caribbean Sea) from about 35° South latitude to 45° North latitude. All three species are migratory and, as a result, there are marked variations in their seasonal and geographic abundance within the U.S. Exclusive Economic Zone.

The sailfish is primarily an inshore species, with the densest concentrations of adults occurring over the continental shelf and/or near land masses. This species is available year-round off the lower east coast of Florida and the Florida Keys, but is found in greater numbers during winter. In summer, sailfish are also abundant within the EEZ in the northern and northeastern Gulf of Mexico and along the Atlantic coast of the U.S. from northeast Florida to Cape Hatteras, North Carolina. In Puerto Rico and the Virgin Islands they are caught during October through April.

Tagging results indicate considerable movement of sailfish between the Florida Keys and the Miami-Stuart area and some interchange between the Gulf of Mexico and the Atlantic.

Although most recaptures of sailfish tagged off southeast Florida have been near the release site, recaptures have been recorded off Cuba, Cozumel, Venezuela, the Dominican Republic and North Carolina. Of the more than 500 recaptures, no trans-Atlantic or trans-equatorial movement has been recorded.

The marlins are more oceanic in habitat than is the sailfish, ranging from coastal waters to well beyond the continental shelf of the U.S. Both species are also more highly migratory and occupy the surface waters within both the Atlantic and Gulf Exclusive Economic Zones during the warm months of the year only. The white marlin reaches higher latitudes during the warm season than does the blue marlin, and congregates in coastal areas in much greater numbers. Along the Atlantic coast of the U.S., white marlin are seasonally abundant from Cape Hatteras, North Carolina to Cape Cod, Massachusetts, while the blue marlin is not common north of Delaware Bay. In the Caribbean, both species are present throughout the year.

White marlin appear to concentrate off Venezuela during winter. In spring, some of these fish move northward to their summer feeding grounds in the northern Gulf of Mexico or in the Mid-Atlantic Bight. In fall, they move offshore and back to the Caribbean. In more than 300 recaptures of tagged white marlin, no trans-Atlantic or trans-equatorial movements have been recorded.

Blue marlin appear to be concentrated in the Caribbean area year round. In summer, some of these fish move northward along the east coast of the U.S. There is some interchange between the Gulf of Mexico and the Atlantic. Only three of twenty-seven (11%) recaptures showed trans-Atlantic movement. Since these fish were over 300 pounds, it has been hypothesized that only large, mature females make these long migrations.

7.1.2 Life History Features

7.1.2.1 Age and Growth

There are conflicting data on the growth and longevity of the Atlantic sailfish. Length-frequency curves indicate that growth is fairly rapid and the life span of the species is short (3-4 years). However, analysis of rings in dorsal fin spines suggests longevity of about 10 years. One tagged sailfish was recaptured after almost 11 years at large. Age determinations are not available for blue and white marlins, but tag returns indicate somewhat greater longevity for these species. A tagged white marlin was recaptured after almost 12 years at large. Females of all three species attain greater lengths and weights than males and are heavier than males at comparable lengths. The size disparity between the sexes may be due to differential growth rates and/or differential mortality.

7.1.2.2 Maturity

Female sailfish reach maturity at about 30 to 40 pounds (13-18 kg) body weight. Males reach maturity at about 22 pounds (10 kg). Size at maturity for female blue marlin is between 103

and 135 pounds (47-61 kg) and for males between 76 and 97 pounds (35-44 kg). Female white marlin reach maturity at about 44 pounds (20 kg) body weight.

7.1.2.3 Spawning Seasons and Areas

The spawning period for blue marlin in the North Atlantic appears to be fairly protracted. Spawning populations have been identified between April and September in waters with temperatures between 79° and 84°F (26° and 29°C). White marlin in the western North Atlantic spawn during April and May throughout the Caribbean, Gulf of Mexico, and in the Straits of Florida. Sailfish spawn off the lower east coast of Florida from mid-May through September.

7.1.2.4 Food and Feeding

Billfishes are opportunistic feeders, feeding primarily on fish and squid. The species composition of their diet appears to vary geographically.

7.1.2.5 Mortality

Total annual mortality for western Atlantic sailfish estimated from a variety of methods ranges between 41 percent and 50 percent. This is equivalent to an instantaneous rate $Z = 0.52 - 0.69$. Natural mortality is estimated to be $M = 0.34$. For white marlin, the annual total mortality rate was estimated to be 42 percent with 95 percent confidence limits of 16 percent and 59 percent ($Z = 0.55 \pm 0.36$). No estimates of mortality for Atlantic blue marlin are available because few tags have been returned and age structure is unknown.

7.1.3 Stock Structure

As a working hypothesis, both blue marlin and white marlin are divided into two stocks, one in the North Atlantic and one in the south Atlantic. Sailfish are presumed to consist of an eastern Atlantic and a western Atlantic stock. Spearfish are presumed to consist of a single Atlantic-wide stock.

Available data on stock structure of the marlins provide no conclusive evidence for single Atlantic-wide stocks or separate North and south Atlantic stocks or a more complex stock structure. The distribution of catch rates in the Japanese longline fishery shows two distinct seasonal concentrations of both blue and white marlin in the North and south Atlantic Ocean. The location and seasonality of these concentrations suggest two stocks of these species in the Atlantic. Limited evidence from larval distributions and tagging experiments also support the hypothesis of separate North and south Atlantic stocks. However, the catch data show some continuity between the two areas during some months of the year suggesting that intermixing is occurring. The extent of this intermixing is unknown.

Tagging data present a somewhat different picture. Of more than 300 recaptures of tagged white marlin, no trans-Atlantic or trans-equatorial movements have been recorded. Further,

tagging data suggests that this population moves in a relatively limited area within the western North Atlantic which includes the Caribbean Sea, the Gulf of Mexico and off the east coast of the U.S.

Although tagging data for blue marlin are much more limited, they too suggest that blue marlin move between the Caribbean, the Gulf of Mexico and the east coast of the U.S. Three trans-Atlantic tag recaptures indicate that at least some mixing occurs between the western and eastern North Atlantic but appears to be limited only to large mature females.

Analysis of longline data for information on the stock structure of Atlantic sailfish and longbill spearfish had been hampered by the lumping of the two species together in catch records. Using data from Japanese research cruises, this problem has been at least partly resolved. Japanese longline data indicate there is a fairly even distribution of catch rates of sailfish in the western Atlantic along the Brazilian coast and extending up into the Caribbean during several months of the year. These catch rates suggest that there may be considerable mixing between North and South Atlantic Oceans. The coastal nature of sailfish suggests that there is a possibility of two separate stocks of sailfish in the Atlantic Ocean, one on the eastern side and one on the western side. A sizeable concentration of sailfish occurs in the eastern Atlantic off the coast of West Africa. Tagging data again suggests a much more limited movement of sailfish found off the U.S. Atlantic and Gulf coasts. While sailfish apparently move between the Gulf and Atlantic and along the east coast of Florida, there have been relatively few recaptures even from the Caribbean, and trans-Atlantic or trans-equatorial movement is unknown. As with the marlins, a conclusive statement on the stock structure of this species cannot be made.

7.1.4 Abundance and Present Condition

The most recent stock assessment for blue marlin was conducted in 1979 and was based upon historical catch and effort data from the Japanese high seas longline fishery. The production model results based on these data indicated that over-exploitation may have occurred during the early to mid 1970's, but that fishing effort in 1978-80 appears to have been below the level associated with MSY.

However, since billfish are a relatively uncommon incidental catch in the Japanese longline fishery, any assessment based on such data may not reflect the actual status of the resource. Even assuming that catch and effort data for non-targeted species adequately reflects abundance, deficiencies in these data and lack of basic biological parameters for these species largely preclude any meaningful assessments. Therefore, present condition of the resource is not known. This situation is not expected to change in the foreseeable future.

The blue marlin stock may be beginning a recovery from excessive catches and effort of the 1960's and mid-70's. Total fishing effort for blue marlin declined substantially after 1977. Some increase may have occurred in waters adjacent to the U.S. Catch per unit effort (CPUE) and total catch by recreational fishermen in the Gulf of Mexico have increased since 1977. Total catch has

increased from an average of 244 for the period 1977-78 to 299 for the period 1979-80. In 1983, 307 blue marlin were caught by recreational fishermen in the Gulf of Mexico and increased to 347 in 1984, to 458 in 1985 and declined slightly to 443 in 1986 (as reported by the NMFS survey on big game fishing in the Gulf of Mexico). Although the increase has been attributed to a reduction in Japanese catch in the Gulf, some could also be the result of a general increase in abundance or increase in recreational effort or effective effort.

In the three years 1977-79 the white marlin catch in the North Atlantic averaged approximately one half of the average of the previous 10 years. Since 1979 reported landings have been higher, but still below the 1967-1976 average. Japanese CPUE indices have declined substantially over the period 1962-80. The present status of the stock is unknown, but the declining trend and low CPUE levels are cause for concern.

The same problems cited above for blue marlin assessment exist to an even greater extent for white marlin. The data are not available to enable a stock assessment for white marlin, nor are they likely to be in the foreseeable future.

The status of sailfish stocks is unclear, but the most recent analysis indicates that western Atlantic sailfish are only moderately exploited. From the standpoint of maximum yield per recruit, sailfish appear to be somewhat underfished.

7.1.5 Estimates of Maximum Sustainable Yield (MSY)

MSY is estimated to be 2400 to 2500 mt (approximately 20,040 to 20,875 fish) for the North Atlantic stock of blue marlin, and 2100 mt (approximately 115,400 fish) for the whole Atlantic stock of sailfish/spearfish. MSY of white marlin cannot be estimated by standard techniques because no production model fits the currently available data. The average white marlin catch for the period 1967-1977 was 1000 mt. This number, the approximate equivalent of 44,050 fish, is used as a proxy for the white marlin MSY pending improvements in the data base that will allow production modeling.

These estimates of MSY should be considered provisional. Definitive determinations of the status of billfish stocks using production model analysis has been hampered by shortcomings in the data and in some of the production model assumptions. It has not been possible to corroborate any production model results with other traditional population dynamics techniques due to lack of data on age, growth and mortality of the species.

At the 1979 and 1980 meetings of the Standing Committee on Research and Statistics of ICCAT, MSY values were accepted as approximately 3000 mt for blue marlin and 2000 mt for white marlin. The downward revision of the estimate for blue marlin and the inability to develop an estimate for white marlin are the results of an ICCAT sponsored International Billfish Workshop held in June 1981. The purpose of the workshop was to thoroughly review the catch data base upon which assessment analyses are made, review biological data on billfishes, and review current research.

Catch and effort statistics were thoroughly revised as a result of the workshop. This revision has accounted for some marked changes in the data base from ICCAT/1980 to ICCAT/1981 catch statistics. An example of such a change can be seen in the catches for Cuba. In 1980 ICCAT reported catches from the period 1961-78 for blue marlin as 7,340 mt and white marlin as 4,911 mt for a total of 12,251 mt. In 1981, these catches were revised to 4,598 mt of blue marlin, 2,070 mt of white marlin for a total of 6,668 mt. Because of changes of this magnitude and other changes, the stock assessment analyses do show considerable changes from these previous years. It was also emphasized at the workshop that the data base is still provisional and that further improvements will follow the 1981 SCRS meeting.

Nominal catches (mt) from 1975-1985 of blue and white marlin in the North Atlantic and sailfish/spearfish in the West Atlantic reported by ICCAT were:

	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>
Blue Marlin	1924	1243	1171	848	775	936	1082	1474	959	1089	1126
White Marlin	1084	1047	499	426	479	505	778	652	1377	703	782
Sailfish/ Spearfish	426	529	677	708	661	639	577	773	627	808	799

7.1.6 Probable Future Condition of the Stocks

Considering the number of countries currently participating in the fishery both inside and outside of national jurisdictions, the probable future condition of the stocks cannot be definitely assessed without knowing the long range intentions of these countries with regard to their high seas operations and coastal fisheries. However, a rapidly developing U.S. yellowfin tuna fishery in the Gulf of Mexico (estimated fleet size of 250 longline vessels in 1986) and a greatly increased U.S. swordfish longline fleet in the Caribbean (approximately 60 vessels in 1986-87) suggest that effort on these species may be increasing very rapidly. In addition, considering the increasing world demand for protein, accompanied by increasing prices for fresh tuna and billfish in domestic and world markets, sustained or increasing fishing effort is likely. Given the current status of blue and white marlin stocks, further increases in effort are not likely to produce increases in yield and could result in recruitment overfishing and depletion of the stocks. At the very least, increasing effort will lead to reduced availability to the recreational fishery.

7.1.7 Marine Mammal/Endangered Species Interactions

The Endangered Species Act of 1973 (16 U.S.C. Sec. 668dd(c)) names animals endangered or threatened throughout their range and makes it a crime to harm or kill them. There are six endangered whales and six endangered or threatened sea turtles that inhabit, at some time in their life cycle, the waters under consideration in this plan. Direct or incidental taking of these species is prohibited during commercial fishing operations. Since the billfish fishery is mainly a

recreational rod and reel fishery, there is no direct contact with these turtles or whales. However, turtles may be caught incidentally by longlines. Observer data from Japanese longliners indicate that twelve turtles and no marine mammals were caught during 1979 in the Gulf of Mexico. Seventeen turtles and five marine mammals were caught in the Atlantic during the same period. Mortality ranged from 10-50 percent. In 1985, observer data indicates that Japanese longliners caught six turtles and no marine mammals in the Atlantic (since 1982 the Japanese have not fished in the Gulf of Mexico). In 1986 the catch of turtles declined to five while the catch of marine mammals increased to two. The West Indian manatee (Trichechus manatus) and the eastern brown pelican (Pelicanus occidentalis) also occur in the management area and are listed as endangered or threatened species.

The actions proposed in this plan are not likely to jeopardize the continued existence of any endangered or threatened species or result in modification of critical habitat. The Section 7 consultation was initiated and a biological assessment prepared and submitted. The biological assessment concluded that the proposed management measures would not affect endangered/threatened species.

7.2 Habitat

7.2.1 Determinants of Distribution

Water temperature appears to be a major factor influencing the distribution of billfishes. They are generally found in waters with surface temperatures above 70°F (21°C).

Major currents also play an important role in the distribution and migration of billfishes. Concentrations of sailfish, white marlin and blue marlin are found within or near the Gulf Stream, which flows in a northeasterly direction along the Atlantic coast of the U.S. at varying distances from shore. In the northeastern Gulf of Mexico, billfishes are abundant in and around the Loop Current. The northward extent of their migration into the Gulf appears to be related to the northward extent of the current's penetrations. The Loop Current exits the Gulf of Mexico through the Straits of Florida where it becomes known as the Florida Current. Concentrations of sailfish occur within the Florida Current, especially during winter. The northward migration of white marlin from wintering areas off northern South America occurs in association with the Antilles Current, which flows on the north side of the Caribbean Island chain.

Localized occurrence of blue and white marlin is influenced by bottom topography. Steep drop-offs, submarine canyons, and shoals, when located in areas with suitable water conditions, often harbor feeding concentrations of these species. Along the Atlantic coast of the United States, important topographical features of this nature include the Five Fathom Bank off southern New Jersey; the Cigar southeast of the Virginia Capes; the Jack Spot off Maryland; Hudson Canyon, southeast of New York City; Wilmington, Baltimore and Washington Canyons off the Delmarva Peninsula; and Norfolk Canyon off the Virginia Capes. DeSoto Canyon in the northeastern Gulf

of Mexico and drop-offs in the Bahamas, Puerto Rico and the Virgin Islands also attract feeding concentrations of marlins.

7.2.2 Habitat Areas of Particular Concern

There are no habitat areas of particular concern in the sense that the term is generally applied (e.g., estuarine nurseries in the case of estuarine dependent species). The billfishes are highly migratory, oceanic species whose habitat and environmental requirements during early stages of their life cycles are not well known. Billfish spawning grounds are at or near the surface of oceanic waters relatively far from coastal sources of pollution. Offshore pollutants, such as oil spills, may be deleterious to the young stages. Billfish can also be influenced by subsurface and substrate pollutants, such as heavy metals, pesticides and radionuclides, through the food chain. Billfish living on or near canyons of the continental shelf may be affected by pollutants carried through direct ocean dumping.

7.2.3 Habitat Statement

As required under Sec. 303(a)(7) amended by P.L. 99-659, 1986, fishery management plans must contain readily available information regarding the significance of habitat to the fisheries and an assessment as to the effects which changes to that habitat may have upon the fishery.

Recognizing that all species are dependent on the quantity and environmental quality of their essential habitats, it is the policy of the South Atlantic Fishery Management Council to: Protect, restore and develop habitats upon which commercial and recreational marine fisheries depend, to increase their extent and to improve their productive capacity for the benefit of present and future generations. (For purposes of this policy, habitat is defined to include all those things physical, chemical and biological that are necessary to the productivity of the species being managed.) The policy objectives are: 1) To protect the current quantity, environmental quality and productive capacity of habitats supporting important commercial and recreational fisheries. (This objective will be accomplished through the recommendation of no loss or environmental degradation of existing habitat.) 2) Restore and rehabilitate the productive capacity of habitats which have already been degraded. 3) Create and develop productive habitats where increased fishery production will benefit society. The Council shall assume an aggressive role in the protection and enhancement of habitats important to marine and anadromous fish. It shall actively enter Federal decision-making processes where proposed actions may otherwise compromise the productivity of fishery resources of concern to the Council.

7.2.3.1 Significance of Habitat to the Fisheries

The habitat for the billfishes in the management unit is the oceanic pelagic waters of the Atlantic Ocean. Blue and white marlin, sailfish and spearfish venture into coastal waters only occasionally, usually in areas such as the Caribbean Islands where there is little continental shelf or

in southeast Florida, where the shelf is very narrow and the Gulf Stream is in close proximity to shore. Because of their oceanic nature, the specific habitat interactions of these species are not well known.

Sailfish are most common along continental margins, being the least oceanic of the billfishes. Recreational fisheries for sailfish are concentrated off the southeast Florida coast. While some are taken year round, they are most abundant from late fall through early spring.

Sailfish concentrate during strong winter cold fronts, particularly in the area from Fort Pierce to Palm Beach, where occasionally individual anglers may catch several dozen in a single day. These winter concentrations appear to be related to strong winds out of the northern quadrant which affect circulation and current boundary conditions.

In summer, sailfish are more dispersed, being caught at least as far north as Cape Hatteras. However, north of Florida they are relatively uncommon; generally caught when trolling for other species. This distributional shift is presumably related to temperature.

Sailfish, to a greater extent than the marlins or spearfish, do consume a significant amount (approximately 30%) of estuarine dependent fish, particularly clupeids and mullet. However, the opportunistic nature of all the billfishes would presumably moderate the impact of a reduction in availability of any particular prey species.

White marlin are generally more oceanic than sailfish and more common at higher latitudes. Like all oceanic pelagics they are often associated with current boundaries, upwellings, thermal fronts and other oceanic features that act to concentrate nutrients or food. Fisheries thus are concentrated in such areas.

Blue marlin are more oceanic yet. These fish, like most large pelagic predators are associated with oceanic features that concentrate food, although they also appear to concentrate seasonally for spawning. Naturally, recreational fisheries tend to concentrate in those areas.

Little is known about spearfish. There are no directed recreational or commercial fisheries for them, and they are rarely caught, even incidentally, by U.S. vessels. They are apparently found more commonly in waters seaward of the EEZ.

7.2.3.2 Effect of Changes to the Habitat

The habitat of all the billfishes is the water column itself. Because of their oceanic nature, changes to the habitat of sufficient magnitude to directly impact the billfish fishery are relatively unlikely. However, oil spills, ocean dumping, OTEC projects (Offshore Thermal Energy Conversion), and the general degradation of the oceanic environment may impact the survival of larvae and possibly adults (either directly or through the food chain). The effects of sub-lethal concentrations of chemical and other pollutants on these species is not known, but their oceanic distribution suggests a requirement for extremely high water quality. Any degradation of this water quality can be expected to impact their survival which would obviously impact the fishery.

7.2.3.3 Waste Disposal and Ocean Dumping

Waste disposal is defined here as the "intentional release of wastes to the marine environment through direct dumping..." (OTA-0-334, 1987). The western Atlantic Ocean including the state territorial seas and the exclusive economic zone off the eastern United States and Gulf of Mexico have been historically and continues to be used for disposal of wastes including but not limited to; dredged material, sewerage sludge, chemical waste, plastic waste, and radioactive material.

A. Dredge Material: Approximately 149.3 million wet metric tons of dredge material is disposed of in the estuaries, the territorial seas and in areas of the exclusive economic zone associated with the North Atlantic, South Atlantic and Gulf of Mexico. Approximately 18.6% of the total amount (27.8 million wet metric tons) is presently disposed of in the EEZ in the area of jurisdiction of this FMP. The composition of the dredge material varies between areas with some dredge materials being contaminated with heavy metals and organic chemicals originating from industrial and municipal discharges and non-point pollution. The Corps of Engineers classifies only a small portion of the total dredge material to be contaminated but presently has no specific numerical criteria to define such contamination (OTA-0-334, 1987).

B. Ocean Dumping of Municipal Sewerage Sludge: The dumping of sewerage sludge into the marine environment has been occurring for many years. The majority of this activity however has occurred in coastal waters in designated dump sites off the Northeastern States. The dumping of sewerage sludge in US coastal and open ocean waters has risen substantially from 2.5 million wet metric tons in 1958 to 6.6 million wet metric tons in 1985 (OTA-O-334, 1987). Sewerage sludge disposed in the North Atlantic area originates from nine sewerage authorities in New York and New Jersey with most of the material being dumped at a 12-Mile Sewerage Dump Site located in the New York Bight. In the next few years the dumping of all sewerage sludge is to be directed to a Deep Water Municipal Sewerage Sludge Site located 106 miles offshore just off the continental shelf (OTA-O-334, 1987). Most sludge that is presently disposed at sea is and will continue to be contaminated with microorganisms, metals and organic chemicals. These and other toxic chemicals do contribute to the degradation of water quality in the North Atlantic, South Atlantic and Gulf of Mexico. Open ocean environments are generally considered more resistant to degradation from pollutants due to the dispersal, transport and diffusion of wastes yet there are problems in quantifying and limited research addressing the impacts of such activities on oceanic pelagics such as billfish. "Despite these problems of documentation, a strong overall case can be established that waste disposal activities are contributing significantly to substantial declines in the quality of marine waters and harming marine organisms, and in some cases having effects on humans" (OTA-O-334, 1987).

C. Industrial Wastes: The disposal of industrial wastes in US coastal and open ocean waters has declined substantially in the last decade going from a high of 4.6 million wet metric tons in 1973 to approximately 200,000 wet metric tons in 1985 (OTA-O-334,1987). The majority of

this disposal is accomplished at the Deep Water Industrial Waste Site located 10 miles from the Deep Water Municipal Sludge Site cited previously that is located 106 miles offshore in the North Atlantic. In addition to this site two other sites have received significant amounts of industrial waste since 1977; the New York Bight Acid Waste Disposal Site and the Pharmaceutical Waste Site off Puerto Rico (discontinued in 1981). Three industrial firms are presently dumping acid and alkaline wastes into the two marine industrial waste sites located in the North Atlantic. Allied Chemical dumped approximately 30,000 metric tons of hydrochloric acid originating from fluorocarbon refrigerants and polymer manufacturing in the New York Bight Acid Waste Site during 1986. Composition of this waste was as follows 30% Hydrochloric acid, 1 to 2.5% fluoride, suspended solids and total organic carbon at 10 ppm, petroleum hydrocarbon in 1 to 10 ppm range, chromium, nickel and zinc in < 0.01 to 3 ppm range, and Arsenic, cadmium, copper, lead, and mercury in, 0.01 ppm to 1 ppm, with a pH range < 1.0. Presently 10% of the waste in 1984 and 6% of the waste in 1985 was sold as hydrochloric acid and not dumped as waste. DuPont-Edge Moor has been dumping iron and other acidic metal chlorides from titanium dioxide production in the Deepwater Industrial Waste Site since 1968 with approximately 50,000 metric tons being disposed of at the site in 1986. The composition of this waste included; chromium at the level of 100's of ppm, zinc and lead at levels of 10's of ppm, copper and nickel in the 1 to 10 ppm range and cadmium at the level of 0.001 ppm, with a pH range of 0.1 to 1.0. Permits held by this company contain provisions for the cessation of ocean dumping and the development of feasible alternatives. DuPont-Grasselli dumped approximately 110,000 metric tons of sodium sulfate from agricultural chemical production into the Deepwater Industrial Waste Site in 1986. The composition of this waste included; low level molecular organics in the 10's to 100's ppm range, 10% sodium sulfate, chromium, copper, nickel, lead in the range of 0.01 to 0.1 ppm, and cadmium in the 0.001 ppm range, with a pH of 10 to 12.5. The impact of disposal at sea is not viewed as significant as the direct point source discharge of industrial waste into the coastal marine environment. Acid and alkaline wastes when disposed at sea will neutralize within one to four hours once in contact with ocean water. Permits for ocean dumping of acids and alkalines are considered on a case by case basis and must comply with the Ocean Dumping Criteria of the Marine Protection, Research and Sanctuaries Act (OTA-O-334, 1987)

7.2.4 Habitat Preservation, Protection and Restoration Recommendations

- A. Research be encouraged that would quantify the impacts of ocean disposal of dredge materials, industrial waste and sewerage sludge on oceanic pelagics such as billfish.
- B. The disposal of contaminated sewerage sludge, industrial waste and contaminated dredge material that would degrade the environmental quality of the marine environment utilized by billfish be prohibited.

7.3 Fishery Management Jurisdiction, Laws, and Policies

7.3.1 Federal

The U.S. Department of Commerce, acting on the basis of a fishery management plan developed by the Regional Fishery Management Councils pursuant to the Magnuson Fishery Conservation and Management Act of 1976 (16 U.S.C. 1801 et seq.), has authority to manage the billfish stocks under consideration in this plan in the U.S. EEZ. When approved and implemented by the Secretary of Commerce, this fishery management plan will supersede those aspects of the PMP for Atlantic Billfishes and Sharks which relate to blue marlin, white marlin, sailfish and spearfish. The regulations requiring that all billfishes taken on foreign longline gear within the EEZ be released, that foreign longline fishermen maintain accurate catch and effort records of their bycatch of billfish and the area closures are adopted from the PMP. Implementation of this plan will not affect the shark related aspects of the PMP.

The Coastal Zone Management Act of 1972 (16 U.S.C. 1451) establishes a national policy placing responsibility for comprehensive land and water management of the coastal zone upon the coastal states. Federal actions directly affecting a state's coastal zone must be consistent (to the maximum extent possible) with approved state coastal zone management plans. Fifteen eastern coastal states and two U.S. territories have programs approved by the Secretary of Commerce: Maine, Massachusetts, Rhode Island, New Jersey, Connecticut, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, Florida, Alabama, Louisiana, Mississippi, Puerto Rico, and the Virgin Islands. Copies of this plan have been submitted to states with coastal zone management programs with a determination of consistency.

The Marine Protection, Research, and Sanctuaries Act of 1972 (16 U.S.C. 1431-1434) authorizes the Secretary of Commerce to designate as marine sanctuaries those areas of ocean waters within U.S. jurisdiction which he determines to be necessary for the purpose of preserving or restoring their conservation, recreational, ecological, or esthetic values. Four such sanctuaries are established within the management area:

- A. The USS Monitor Marine Sanctuary off North Carolina is designated on National Ocean Survey charts as a "protected area". Fishing is prohibited in this area.
- B. Gray's Reef National Marine Sanctuary is located approximately 18 nautical miles off Sapelo Island, Georgia. Regulations governing the Sanctuary require permits for certain fishing activities, including bottom trawling and dredging and wire trap fishing.
- C. Key Largo Coral Reef National Marine Sanctuary is located adjacent to the John Pennakamp Coral Reef State Park of Key Largo, Florida. Hook and line fishing is permitted in the Sanctuary.
- D. The Looe Key Coral Reef National Marine Sanctuary off Big Pine Key, Florida, prohibits the use of wire fish traps in the Sanctuary.

Details on sanctuary regulations may be obtained from the Director, Sanctuary Programs Office, Office of Coastal Zone Management, NOAA, 1825 Connecticut Ave, N.W., Washington, DC. 20235.

7.3.2 State

The coastal states have regulatory jurisdiction and authority in their territorial seas. This normally does not affect the billfish fishery with the exception of the Florida Gulf coast, to some extent the coast of Texas where state authority extends to 9 miles, and the Caribbean where the 100 fathom contour comes within a mile of the shoreline in some places.

Six states, Delaware, Florida, Massachusetts, Texas, Louisiana and Virginia, have laws regulating the utilization or taking of billfishes. Delaware prohibits the sale of sailfish, blue marlin and white marlin; Florida prohibits the sale of sailfish and imposes a bag limit of two sailfish per angler per day; Massachusetts, Texas, Louisiana and Virginia prohibit the sale of marlin.

7.3.3 Other Coastal Nations

Unit stocks of billfish are not contained within the EEZ. MSY for the marlins was estimated under the assumption of North Atlantic stocks and MSY for sailfish/spearfish was estimated under the assumption of a single Atlantic-wide stock. Those coastal nations whose territorial seas and/or economic zones are within the hypothesized range of the stocks have management authority over the stocks within their zones.

Two countries are known to have laws regarding fishing for billfishes within their fishing zones. Mexico prohibits the use of pelagic longline gear in its Gulf economic zone. The sport fishery for billfish is regulated through a permit system. U.S. sport fishermen departing from U.S. ports may fish in the Cuban fishing zone subject to permitting procedures established by the Cuban government in 1978 and during a fishing season which extends from April 1 through September 30.

7.3.4 International

The International Commission for the Conservation of Atlantic Tunas (ICCAT), of which the United States is a party, is authorized to recommend to its contracting parties measures to ensure the maintenance of stocks of tunas and tuna-like fishes, including billfishes, at levels which will permit the maximum sustainable catch.

The PMP recommended development and implementation of an international plan for management of billfishes under the auspices of an international organization such as ICCAT. This FMP reiterates that recommendation. ICCAT has, to date, made no management recommendations concerning billfishes. However, the actions described in this FMP to manage billfish stocks within the EEZ are intended to complement any management initiatives undertaken by ICCAT and

are a step toward the conservation of these stocks and establishment of an international management regime.

7.4 Description of Fishing Activities

7.4.1 Domestic Fishery

7.4.1.1 History of Exploitation

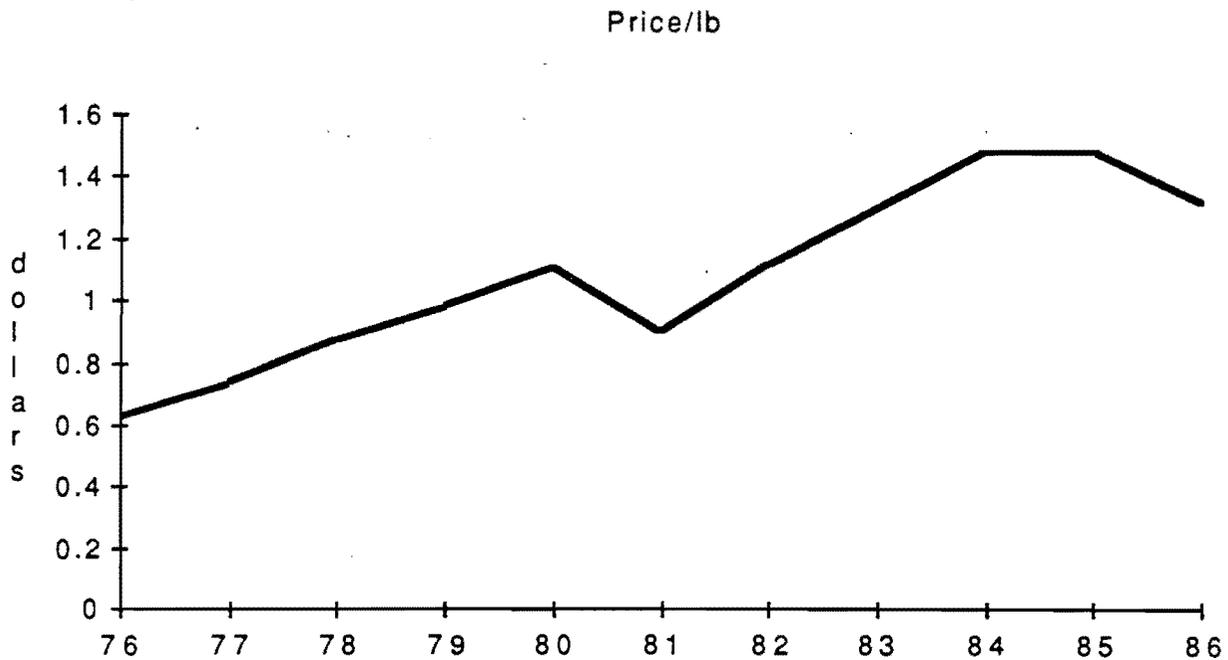
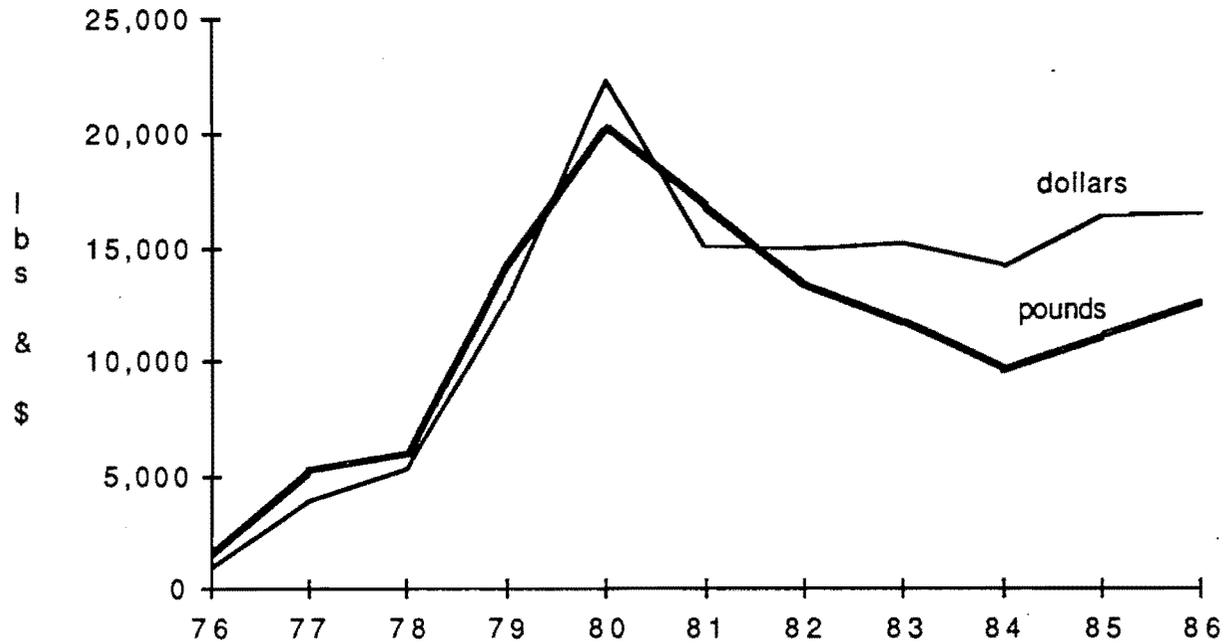
Billfishes have been taken by U.S. recreational fishermen since the early 1900's. However, until the early 1950's the fishery was concentrated in only a few areas along the Atlantic and Gulf Coasts. Expansion in both the number of anglers and the fishing grounds has been rapid since then, largely as a result of improvements in offshore sport fishing vessels and equipment.

7.4.1.2 Participating User Groups

Most U.S. catches of billfish are by recreational fishermen fishing from charter and private boats. Approximately 19,000 of these boats participated in the billfish fishery during the 12-month period from May 1, 1977 to April 30, 1978.

There is a small harpoon fishery for white marlin in the waters off southern New England. This is essentially a recreational fishery although often the fish are sold. There is no other directed, domestic commercial fishery for billfishes, although they are captured incidental to domestic swordfish and tuna longlining activities. Because billfishes constitute a source of food in Puerto Rico and to some degree in the Virgin Islands, billfish catches are not, strictly speaking, a purely recreational activity. It is very difficult to establish the number of sales by the persons who catch the fish. At present there is no commercial activity geared towards catching billfish but there are small-scale fishermen, who while seeking other species, catch billfish and sell them. Most billfish caught in Puerto Rico are caught by recreational fishermen, but many of these fish enter the food market. It is difficult to say what percentage of billfish are caught by recreational and small-scale fishermen in the U.S. Virgin Islands. In 1985 there were 11,000 pounds of billfish reported sold in Puerto Rico (Figure 1). Most of this is believed to have been caught by recreational fishermen.

The billfish bycatch in the domestic swordfish/tuna longline fishery is not known. However, in 21 observer trips a total of 137 billfish were recorded in 160 sets (Table 1), or 0.86 billfish per set. Although the distribution of observer effort is heavily weighted to the southern region (15 trips in the Gulf of Mexico, 2 in the south Atlantic, 2 in the Caribbean and 2 on the Grand Banks) and thus may not be representative of the entire fishery, a rough estimate of the present billfish bycatch can be made. If, on average, there are 0.86 billfish caught per longline set, and out of 625 permitted swordfish vessels, we assume there are 500 active longliners each making 100 sets per year, then 43,000 billfish will be caught by this fleet annually. By species this breaks down as follows: 18,189 (42.3%) blue marlin; 18,834 (43.8%) white marlin; 4,687 (10.9%) sailfish; and 1,247 (2.9%) spearfish.



	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Weight(lbs)	1,500	5,250	6,000	14,228	20,250	16,756	13,330	11,669	9,562	11,077	12,597
Value(\$)	\$905	\$3,892	\$5,360	\$12,751	\$22,410	\$15,080	\$14,930	\$15,170	\$14,152	\$16,394	\$16,549
Price(\$/lb)	0.63	0.74	0.88	0.99	1.11	0.90	1.12	1.30	1.48	1.48	1.31

Figure 1. Blue marlin commercial landings for Puerto Rico, 1976 - 1986.
(Source: Fisheries Research Laboratory, Statistics Program, CODREMAR, DNR, Puerto Rico)

Table 1. Summary of billfish, swordfish, tuna and sharks caught and recorded by observers on 21 domestic longline trips from 1985-1

Observe Code	Date	Trip Sets/ (Days) Trip	Area	Total Hooks	Gear		SWF	Tuna	Sharks	BIM	WhM	SAIL	SPEAR	Total Billfish	
					Length (miles)										
1985	FAB1	5/30-6/3	5	5	Northern Gulf	1,810	198	24	72	67	3	6	1	0	10
	ARB1	7/4-7/12	9	7	South Atlantic	1,841	157	71	7	25	4	0	7	0	11
	RRT1	7/26-8/6	12	11	Grand Banks	5,200	338	101	72	91	0	3	0	0	3
	ERG1	9/4-9/8	8	5	South Atlantic	1,152	98	17	11	15	1	0	3	0	4
	KCC1	9/6-9/21	16	14	Grand Banks	14,350	413	448	6	79	0	0	0	0	0
	WGD1	9/13-9/17	5	4	Northern Gulf	3,450	152	4	101	2	6	8	2	0	16
	WHG1	10/4-10-9	6	7	Northern Gulf	2,702	122	15	74	9	1	2	0	0	3
	WGD2	10/24-11/6	13	6	Northern Gulf	2,148	77	7	75	3	1	6	0	0	7
	WHQ2	11/5-11/8	4	4	Northern Gulf	1,399	80	4	80	4	5	3	0	0	8
	WHG3	11/13-11/16	4	4	Northern Gulf	1,428	78	1	215	10	4	2	0	0	6
	WGD3	12/4-12/10	7	5	Northern Gulf	1,720	61	5	112	17	1	2	0	0	3
1986	WHG4	1/12-1/19	8	8	Northern Gulf	2,655	138	20	39	5	2	2	0	2	6
	OEM1	1/17-2/3	18	14	Caribbean	3,534	367	120	18	19	1	3	0	2	6
	RAO1	2/4-3/1	26	19	Caribbean	8,870	684	216	74	28	22	3	0	0	25
1987	DEG1	6/25-6/27	3	3	Northern Gulf	2,200	42	2	33	21	0	0	0	0	0
	FLL1	6/28-7/7	10	10	Northern Gulf	6,000	305	3	148	14	1	5	0	0	6
	DEG2	7/7-7/9	3	3	Northern Gulf	1,800	36	1	22	18	1	3	0	0	4
	DTG1	7/21-7/30	10	10	Northern Gulf	5,500	170	6	163	22	0	5	1	0	6
	FLL2	8/16-8/24	9	9	Northern Gulf	5,220	210	3	56	15	1	2	1	0	4
	DTG2	8/20-8/23	4	6	Northern Gulf	3,275	66	2	6	2	1	2	0	0	3
	DTG3	9/9-9/16	8	6	Northern Gulf	2,400	102	4	12	6	3	3	0	0	6

(Source: Domestic longline observer program, SEFC, NMFS)

In the Gulf of Mexico, observer records indicate that 0.98 billfish are caught per set. These trips primarily targeted yellowfin tuna. As the longline fleet continues to shift effort to tunas, the billfish bycatch can be expected to increase. Presently (1988), it is estimated that there are 250 longliners fishing in the Gulf of Mexico. Assuming that the average vessel makes 100 sets per year (a conservative estimate), then 24,500 billfish would be caught in the Gulf of Mexico annually, with the following species composition: 8,355 blue marlin; 14,210 white marlin; 1,397 sailfish; and 564 spearfish. By comparison, the recreational fishery here caught 1,573 marlin in 1983 (the last year for which total catch is available) of which 446 were blue marlin and 1,127 were white marlin (Table 2).

7.4.1.3 Interactions Among Domestic User Groups

The tremendous reduction in foreign fishing effort in the U.S. EEZ has all but eliminated earlier problems of competition and gear conflicts. However, as the foreign fleet declined the domestic fleet grew proportionately. Presently there are estimated to be 250 longline vessels fishing in the Gulf of Mexico for yellowfin tuna (NMFS). There were approximately 625 swordfish permits issued in 1987, this number having increased each year since 1984 when permits first became mandatory.

Unlike foreign longliners fishing in the EEZ, domestic boats are not required to carry observers or release billfish. Until 1984, virtually all U.S. longline vessels targeted swordfish. Swordfish are nocturnal and fishing was done at night. Since billfish are diurnal feeders, the billfish bycatch was small (averaging less than 2 percent of the swordfish catch in numbers). As the swordfish fishery expanded into more southern waters, particularly the Caribbean, the billfish bycatch appears to have increased. Table 1 presents a summary of 21 observer trips taken aboard domestic longline vessels. Although only two trips were taken in the Caribbean, the billfish bycatch observed was 5 percent of the swordfish catch on one trip and 12 percent on the other (overall, 9.2 percent). More importantly, though, since 1984, effort has become increasingly directed at yellowfin and bigeye tuna. Yellowfin feed during the day while bigeye are believed to feed both day and night. As effort on tuna increased, so did the billfish bycatch. In 15 observer trips in the northern Gulf of Mexico, most of which were directed at yellowfin tuna, a total of 88 billfish and 1,208 tuna were caught. Thus, billfish represent 7.3 percent of the tuna catch in numbers. While the ex-vessel price of billfish is low (\$0.60 - \$1.00 per pound) compared to tuna and swordfish, billfish still represent a saleable product and an increasing number are being landed. Table 3 shows the reported marlin landings for the Gulf of Mexico since 1982. It can be seen that marlin landings increased 1400 percent between 1982 and 1986 and 149 percent from 1985 to 1986. As the potential to supply the market increased, so did demand and price. The price in Puerto Rico has increased steadily since 1976 and by 1985 had already exceeded \$1.50 per pound (Figure 1). There is great concern among recreational fishermen that these species, which have historically had little commercial value, will rapidly become established as food fish. Once

Table 2. Gulf of Mexico commercial landings (lbs) of marlin and tuna 1982-1987.

<u>Species</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987¹</u>
Blue Marlin	0	537	1,870	11,600	21,400	3,900
White Marlin	0	0	8,998	20,600	67,000	8,400
Uncl. Marlin	9,407	2,631	11,066	25,200	53,300	2,200
Total Marlin	9,407	3,168	21,934	57,400	141,700	14,500
Yellowfin Tuna	57,092	153,257	776,145	3,257,100	6,394,200	1,162,100

¹ Includes January through August only.

Table 3. Gulf of Mexico commercial landings (lb) of marlin and tuna 1982-1987.

Species	1982	1983	1984	1985	1986	1987¹
Blue Marlin	0	537	1,870	11,600	21,400	3,900
White Marlin	0	0	8,998	20,600	67,000	8,400
Uncl. Marlin	9,407	2,631	11,066	25,200	53,300	2,200
Total Marlin	9,407	3,168	21,934	57,400	141,700	14,500
Yellowfin Tuna	57,092	153,257	776,145	3,257,100	6,394,200	1,162,100

¹ Includes January through August only.

demand becomes widespread, price will increase and longline vessels will begin targeting them. Unless this situation is controlled now, it will be impossible for the objectives of this FMP to be realized.

Pelagic drift gill net fisheries also have a bycatch of billfish. Some swordfish longliners began experimenting in the early 1980's with large mesh (14-20 inch stretch mesh) pelagic drift nets similar to those used off California for swordfish and thresher sharks. These nets are approximately one mile long and 90 feet deep. If deployed in waters frequented by billfish, a billfish bycatch is inevitable. Little documentation of the fishing characteristics or bycatch of this gear is available, though, because few observer trips were ever made onboard vessels employing these nets. However, it is believed that fewer than 10 boats fishing in the New England area, where billfish generally are not abundant, have ever used this gear. In the few observed sets, no billfish were taken by these nets.

Recently drift gill nets have been employed for king mackerel off the southeast Florida coast. These nets are between 1,200 and 5,000 yards long, 50 feet deep and have a 5 inch stretch mesh. In 1987 it was estimated that 419 sailfish were caught in this fishery (13 boats), all of which were discarded dead.

7.4.1.4 Description of Vessels and Gear Employed

Sport fishing for marlins and sailfish is done with rod and reel. The boats used in the U.S. sport fishery for billfishes range from 16 to more than 65 feet in length and the method of power ranges from outboard engines to large diesels. Marlin fishing, as opposed to sailfish fishing, generally requires a large (greater than 25 feet in length), inboard, usually diesel-powered vessel because of the distance that has to be travelled to reach suitable fishing grounds, as many as 75 to 100 miles from shore off many areas on the Atlantic and Gulf coasts. The use of smaller outboard powered boats (in the 16 to 25 foot range) in the fishery is particularly evident off the southeast coast of Florida from Key West to Ft. Pierce and in the northern Gulf of Mexico and the Caribbean where productive billfish fishing waters are only a few miles from shore. The development of small, fast, sea worthy fishing boats (20-30 feet in length) and reliable high-powered outboard engines has made even the offshore fishing grounds accessible to a great many anglers.

7.4.1.5 Fishing Seasons and Areas

The U.S. recreational fishery for billfishes is conducted from every state along the Atlantic and Gulf coasts from Massachusetts southward, as well as from Puerto Rico and the Virgin Islands. Anglers from the U.S. also fish extensively in foreign waters, particularly offshore of the Bahamas, Venezuela, Mexico, Dominican Republic and British Virgin Islands.

The fishery is, for the most part, a seasonal one, which coincides with the months of highest availability of billfishes within the EEZ. Off the Atlantic and Gulf coasts of the U.S., recreational activity is most intense from April through October, except off the lower east coast of

Florida. In this area, fishing for sailfish is a year-round activity, although the peak season runs from November through April. In the Caribbean EEZ, fishing for billfish is a year-round activity with seasonal peaks for each species.

7.4.1.6 Amount of Catches

In 1983, NMFS attempted to determine the total catch of billfishes by U.S. recreational fishermen. This is the most recent year for which a complete census is available. A previous study conducted from May 1, 1977, to April 30, 1978, is believed to have had methodological problems which may have caused catches to have been overestimated. Unfortunately, the 1983 survey did not attempt to document either sailfish or spearfish catches, and as a result these data are incomplete.

Estimates of the catch of marlins, including numbers boated and released, by U.S. recreational fishermen in 1983 are presented in Table 2. Approximately 35 percent of blue marlin and 61 percent of white marlin taken by the U.S. fishery were released in 1983. In 1986, 32 percent of blue marlin, 45 percent of white marlin and 87 percent of sailfish recorded in the NMFS recreational billfish survey were released. The survival rate of released fish is unknown but is believed to be significant according to recreational fishermen and others knowledgeable about the fishery. Acoustical tracking experiments conducted off the southeast coast of Florida indicate that the mortality of sailfish taken by rod and reel, tagged and released, is quite low. Seven out of eight tracked sailfish survived.

Recreational catches of billfishes have been difficult to document with a desirable degree of accuracy. The special characteristics of the recreational fishery for billfish necessitate the design of a survey specific to this fishery to obtain reliable catch and effort information. These characteristics are:

- A. billfish are a relatively rare species of fish in comparison with other species sought by marine anglers, and
- B. the incidence of billfish fishermen in the total population is relatively low.

The accuracy of recreational catch data is unknown. While the 1983 census was perhaps reasonably accurate for blue and white marlin, sailfish landings are grossly underestimated. In addition, far fewer blue and white marlin were recorded in this study than were estimated in the 1977-1978 study.

Reported commercial landings of billfishes by U.S. longline boats for 1986 are shown in Table 4. These figures are believed to greatly underestimate actual landings. In addition many billfishes are believed to be caught and released by longliners. Survival rate of these released fish is unknown. The number of swordfish permits issued has increased every year. In 1987 there were approximately 625 swordfish permits issued. Further it is estimated that 250 U.S. longliners are fishing for yellowfin tuna in the Gulf of Mexico (most hold swordfish permits).

Table 4. 1986 longline landings and value of swordfish, tuna and billfishes* (in lbs and \$).

Area	Swordfish		Tuna		Billfish	
	Dressed Weight	Value	Whole Weight	Value	Whole Weight	Value
NE & MA	3,720,750	\$9,332,214	1,818,370	\$5,358,043	14,000	\$8,400
South Atlantic	1,385,909	\$3,869,183	672,913	\$1,061,819	36,218	\$20,685
Gulf of Mexico	598,500	\$1,617,855	6,734,981	\$9,637,893	141,400	\$89,082
Caribbean	1,902,750	\$5,258,335	287,863	\$541,811	12,597	\$16,549
Total	7,607,909	\$20,077,587	9,514,127	\$16,599,566	204,215	\$134,716
% of Combined Landings	43.9%	54.5%	54.9%	45.1%	1.2%	0.4%

*Caribbean billfish landings include handline and rod and reel
(Source: SEFC, NMFS)

This expansion of the U.S. longline fleet, particularly in southern waters (Gulf of Mexico and Caribbean Sea) is assumed to have resulted in a considerable increase in billfish mortality.

7.4.1.7 Amount of Effort

Approximately 102,919 hours of effort were expended in the recreational marlin fishery in 1983. Assuming 3.5 anglers per boat and 6 hours fished per day, the billfish fishery is estimated to have generated over 60,000 days of recreation in 1983.

The catch and effort estimates resulting from the specialized billfish survey indicate that the time spent fishing for a billfish is large compared to the number of fish caught. The 1977-78 survey estimated that there were 298,797 days fished for billfish. In that time, a total of 6,745 blue marlin were caught (44 boat days to catch one blue marlin); 15,650 white marlin were caught (19 days to catch a white marlin); and 60,007 sailfish were caught (5 days to catch one sailfish). Using 1983 data, assuming 6 hours of fishing per day, it took approximately 20 boat days on the east coast to catch a blue marlin, 14 days in the Gulf of Mexico, and 4 days in the Caribbean; it took 3 days to catch a white marlin on the east coast, 6 days in the Gulf of Mexico and 97 days in the Caribbean.

In 1986, it took, on average, approximately 28 days to catch a blue marlin on the U.S. east coast, 11 days in the Gulf of Mexico, and 4 days in the Caribbean; it took 17 days to catch a white marlin on the east coast (no samples were available north of North Carolina), 10 days in the Gulf of Mexico, and 208 days in the Caribbean. On the Florida east coast, it took just under 6 days to catch a sailfish.

7.4.1.8 Vessel Safety

Amendment by P.L. 99-659 to the Magnuson Act requires that a fishery management plan, must consider and may provide for, temporary adjustments, after consultation with the Coast Guard and persons utilizing the fishery regarding access to the fishery for vessels otherwise prevented from harvesting because of weather or other ocean conditions affecting the safety of the vessels.

No vessel will be forced to participate in the fishery under adverse weather or ocean conditions as a result of the imposition of the management regulations set forth in this fishery management plan, therefore, no management adjustments for fishery access will be provided.

A. Fishery access and weather related safety: There are no fishery conditions or management measures or regulations contained in this FMP that would result in the loss of harvesting opportunity because of the crew and vessel safety effects of adverse weather or ocean conditions. There have been no concerns raised by the Coast Guard or by persons using the fishery, that the proposed management measures directly or indirectly pose a hazard to crew or vessel safety under adverse weather or ocean conditions.

B. No Impact Determination: Vessel safety has not been identified as a relevant or significant issue in the billfish fishery or in the management measures set forth.

C. Adjustments: There are no procedures for making management adjustments in the plan because no person will be precluded from a fair or equitable harvesting opportunity by the management measures set forth.

D. Coast Guard Evaluation: No vessel safety issues, whether pertinent to fishery access and weather-related vessel safety or to other significant or relevant safety issues have been identified by the Coast Guard.

E. Procedures: There are no procedures proposed to monitor, evaluate and report on the effect of management measures on vessel or crew safety, under adverse weather or ocean conditions.

F. Other Safety Issues: There have been no significant and relevant safety issues raised by fishery users, other public or the Coast Guard, therefore, there are no social or economic implications resulting.

7.4.2 Foreign Fishery

7.4.2.1 Participating User Groups

The foreign commercial fishery for billfishes in the Atlantic Ocean is conducted by those nations that maintain longline fleets. The fishing effort of the Atlantic longlining fleet is principally directed at tuna; however, billfishes frequently occur in the same areas and depths as some species of tuna. Consequently, the incidental bycatch of billfishes is sometimes significant. These fishes are retained by the longline fleet and frequently command prices comparable to tunas on world markets.

Those nations currently longlining in the Atlantic are Japan, Korea (ROK), Taiwan, Spain, Cuba, Brazil, the U.S.S.R., Venezuela, Panama and Grenada. Of these, only Japan has historically fished within 200 miles of the U.S. mainland.

7.4.2.2 Vessels and Fishing Gear

A typical piece of gear fished by a longlining vessel consists of a horizontal mainline which may stretch for 60 to 70 miles and from which branch lines with baited hooks (as many as 2,000 per set) are hung vertically. The gear is set and hauled approximately once every 24 hours.

7.4.2.3 Fishing Seasons and Areas

The foreign longline fishery operates throughout the range of the Atlantic billfishes. The main concentration of longline fishing effort within 200 miles of the U.S. has historically been in the northern Gulf of Mexico in spring and summer and off the eastern U.S. coast from late summer through fall. The longline fishery in the Gulf of Mexico EEZ has changed in recent years. Prior to 1973, the fishery was conducted in the summer and the tuna catch was almost entirely

yellowfin tuna. In 1973, the Japanese began catching giant bluefin tuna, a more valuable fish, and the pattern of catch and effort began to change. After 1976, the primary period of effort in this fishery shifted to winter and early spring, the time of greatest availability of bluefin tuna. Catch and effort for yellowfin tuna declined. In 1982 the Japanese were precluded from fishing for bluefin tuna in the Gulf pursuant to ICCAT management recommendations that severely limited bluefin tuna fishing. As a result of considerable opposition from U.S. recreational fishermen, the Japanese voluntarily ceased fishing operations entirely in the Gulf of Mexico in 1982.

7.4.2.4 Catch and Effort

Prior to 1966, almost all of the billfish catch by longliners in the Atlantic Ocean was taken by the Japanese. Since 1970, Japan has been responsible for approximately 19 percent of the total longline catch of billfishes in the Atlantic. Japanese longline effort in the Atlantic diminished considerably in the late 1960's. However, the entry of other foreign longliners into the fishery has more than made up for the decrease in Japanese effort. In recent years, most longline catches of billfish in the Atlantic Ocean have been by Korean, Taiwanese, Cuban and Japanese longlining vessels. From a historical perspective, approximately six percent of the total Atlantic billfish catch by foreign vessels (Japan, South Korea, Taiwan, etc.) has been taken within 200 miles of U.S. continental shores.

Total effort and landings of billfish by the Japanese in the Atlantic have decreased, particularly in the EEZ in recent years. During the years 1964 through 1969, an average of 3 percent of Japanese fishing effort in the Atlantic and 5 percent of billfish catch were within 200 miles of the U.S. coast. In the period 1970-77, an average of 11 percent of total Atlantic fishing effort and 28 percent of the total Atlantic billfish catch occurred within 200 miles of the U.S. In 1984 and 1985 the Japanese caught less than one percent of the total Atlantic billfish catch in the U.S. EEZ.

A Preliminary Management Plan for Atlantic Billfishes and Sharks was implemented on January 17, 1978, by the U.S. Department of Commerce. The PMP determined that there was no surplus of billfishes available for foreign fishing within the EEZ. Consequently, it required that all billfishes taken by foreign fisheries be released without removing them from the water.

Data from the foreign fishery observer program indicate that the Japanese longlining fleet fished approximately 7.5 million hooks within the EEZ from March 20, 1978 to March 19, 1979. Approximately 5,300 billfish were hooked on foreign longlining gear within this period, only 40 percent of which were alive when released.

In recent years, effort has been reduced dramatically in the EEZ. In 1986, for example, 272 white marlin and 37 blue marlin were recorded by U.S. observers (100% coverage). Of those 54 percent of the white marlin and 57 percent of the blue marlin were dead. In 1986 only three Japanese longline vessels fished in the EEZ. The Japanese have agreed not to fish in the Gulf of Mexico and have not done so since 1982.

7.4.3 Interactions Between Domestic and Foreign Participants in the Fishery

7.4.3.1 Competition for the Available Stocks

The U.S. sport fishery for billfishes is seasonal in most areas. Both blue and white marlin stocks in the North Atlantic make extensive seasonal migrations and are available to U.S. fishermen off their shores for only part of the year. The longline fishery, however, is highly mobile and moves seasonally in response to the migrations of target species of tuna. Sport fishermen frequently state that when longliners have been fishing within the EEZ during seasons of peak billfish abundance, sport fishing for billfishes is poor for some time afterwards.

The PMP for Atlantic billfishes and sharks stated the problem between foreign fishing and the domestic fishery as follows:

"United States fishermen believe that the billfish incidental catch of foreign longline vessels adversely affects U.S. catch rates. Sport fishermen state that they have frequently observed a decrease in their catch after longliners have been fishing near them. The decrease reportedly lasts for some time (weeks or months) after the departure of the longline vessels. This belief is supported by NMFS catch statistics in the Gulf of Mexico (Pristas 1978, 1979, 1980, and 1981). The U.S. catch rates for marlins have increased dramatically since 1978, when the Japanese voluntarily ceased tuna fishing in the Gulf during the summer. Average U.S. catch per unit effort (CPUE) for white marlin increased 77 percent, from 1977-1978 to 1979-1980 (Gulf of Mexico Fishery Management Council, Atlantic Billfish Fishery Management Plan). Blue marlin CPUE increased about 33 percent over the same period. An analysis of NMFS catch statistics for the Gulf of Mexico from 1978 through 1981 demonstrated a very large and abrupt increase in U.S. catch rate and total catch which corresponded with the termination of the Japanese fishery and incidental catch of marlins (Connor Davis, Gulf of Mexico Fishery Management Council, 1982, personal communication). Based on this limited information, it is assumed that, of the billfishes that could have been hooked in the EEZ by foreign longliners, following their former fishing practices, some could be hooked during a fishing season by domestic fishermen whether the change of foreign fishing operations was voluntary or mandatory."

With the reduction of foreign fishing in the EEZ in recent years and the area closures implemented through the PMP, competition and/or conflicts between foreign longliners and U.S. recreational fishermen have all but ceased.

7.4.3.2 Gear Conflicts

There are numerous areas along the Atlantic and Gulf coasts of the U.S. where U.S. sport fishermen have come into direct contact with Japanese longliners. Some of these are in the Gulf of Mexico off Port Aransas, Texas and the Mississippi Delta; off Cape Hatteras, North Carolina; and off New Jersey and Maryland. U.S. fishermen have reportedly destroyed longline gear, although there is no record of U.S. sport fishing gear being damaged by foreign fishermen. Conflicts between foreign commercial and U.S. sport fishermen reached a peak in the late 1960's and prompted private negotiations between representatives of the Japanese fishing industry and the

U.S. sport fishing industry. These negotiations resulted in an informal understanding between the two parties that Japanese vessels would restrict their fishing to areas other than those where U.S. sport fishermen fished for billfishes, and that U.S. fishermen would be discouraged from destroying Japanese longline gear.

In addition to the conflicts between Japanese longliners and U.S. sport fishermen, there are problems with U.S. longline fishermen. U.S. longline fishermen are unable to detect Japanese longlines because of the ineffective radar reflectors employed by the Japanese. Japanese fishermen rarely use their radars while on the fishing grounds; thus, they frequently do not detect longlines set by U.S. fishermen and marked with radar reflectors. Thus, tangled lines, lost time and lost or damaged gear are frequent. On several occasions U.S. fishermen have left the fishing grounds to the Japanese after sustaining significant gear damage. This issue is more fully considered in the Swordfish FMP. Again, the greatly reduced Japanese effort in the EEZ has eliminated most gear conflicts.

7.5 Description of the Economic Characteristics of the Fishery

7.5.1 Domestic Harvesting Sector

Expenditures by the participants in the recreational billfish fishery are estimated to have been approximately \$100 million in 1977-1978. The total economic value of the fishery is even larger, and has certainly increased since then. Expenditures by billfish fishermen increase the buying and spending power of those sectors of local and regional economies which supply goods and services to the recreational fishing community. This increased buying power has indirect impacts on wages and profits both within and outside of the communities in which the original expenditures occurred.

Although a comparable figure of total economic value of the commercial fishery is not available, the present (1986) ex-vessel value of billfish to the commercial longline fishery is estimated to be \$134,716. Thus, billfish represent far less than one percent of the catch by value for longliners (Table 4). While these figures do not reflect a common denominator and thus cannot be directly compared, they provide some indication of the considerable difference in relative value of these species to the two user groups.

7.5.2 Domestic Processing Sector

Domestic interest in billfishes is recreational and many of the fish hooked are released back into the ocean without being boated. However, some billfish caught in the recreational fishery occasionally enter commercial channels in the U.S. mainland. As demand has increased, this practice has presumably become more widespread.

Some billfish have historically entered commercial markets as smoked fish. A relatively small harpoon fishery for white marlin has historically taken several hundred fish annually in the southern New England area. These fish are often sold as smoked product. Recreationally caught

marlin have often entered commercial markets in Florida as well, where they are sold as a smoked product. Recently fresh marlin has become increasingly popular. Marlin for this market are believed to come primarily from the longline bycatch, although some recreationally caught fish are also sold.

In Puerto Rico and to a lesser extent in the Virgin Islands, billfishes are utilized as food and frequently command a high price. Consequently, billfish caught both by recreational and small-scale fishermen in the Caribbean are sold in local markets. In 1978, approximately 7,500 pounds of blue marlin were landed and processed by fishermen in Puerto Rico. In 1985 11,000 pounds were reported landed, however, this is known to be an underestimate of actual landings. The ex-vessel value in 1985 was approximately \$1.50 per pound (Figure 1). Additional fish are processed (often by smoking) in the Virgin Islands. However, there is no separate processing industry in the islands.

One additional commercial trade in billfishes is the mounting and sale of bills, tails, and whole fishes by taxidermy facilities. The number of billfishes being processed each year by taxidermists is unknown. The three largest taxidermists reportedly mount a total of approximately 1,000 sailfish per year.

7.6 Social Characteristics of the Fishery

The social benefits generated as a result of the billfish fishery are difficult to quantify. However, it is clear that the value of the fishery to the nation is, to a large extent, dependent on the esthetic benefits derived from the recreational experience. Participants in this fishery are willing to spend large sums of money (per boat day of fishing and per fish caught) and time in the fishery even though the catch per unit of effort is extremely low in comparison with that in other marine recreational fisheries.

Data from the NMFS survey indicate that, except in the Caribbean, 1 blue marlin is caught for every 10-30 boat days, depending on the area, 1 white marlin for every 3 to 17 boat days and 1 sailfish for every 5-6 boat days (on the Florida east coast). Even so, the recreational fishery devoted nearly 291,000 boat days to the fishery in 1977 at an average cost estimated at \$350 per boat day. Approximately \$1,300 (or \$22 per pound) was spent for every billfish landed. In 1983, in the Mid-Atlantic region alone, 2,552 boats fished for marlin and tuna on 21,276 boat days. Total expenditures for marlin and tuna fishing for these trips was over \$40 million. Approximately \$7,400 was spent for each billfish landed.

It appears that participation in the billfish fishery is dependent not only on catching a fish, but also on the expectations of catching a fish. Any increase in the availability of these fishes in times and areas when recreational fishing occurs should enhance these expectations and consequently, the social benefits derived from the fishery. Presumably, this would also apply to the Caribbean small-scale fishermen.

While it is extremely difficult to determine the actual value of catching a billfish to a recreational fisherman, it is clear that their recreational value far exceeds their commercial value. At \$1.00 per pound, the average white marlin is worth less than \$50 commercially. Regardless of how one calculates the recreational value of that same fish, its value will be many times higher than this (based on 1981 dollars and 1979 data, the compensation value cited in the PMP was \$500).

8.0 CAPACITY DESCRIPTORS

8.1 Optimum Yield (OY)

8.1.1 Specification of Optimum Yield

Optimum yield for billfishes is the greatest number of billfish that can be caught by the recreational fishery in the EEZ, consistent with the provisions of this fishery management plan, considering the biological limitations of the stock and the unavoidable incidental catches in other fisheries.

Optimum yield in this fishery cannot be quantified. The optimum yield is the greatest number of billfish that the recreational fishery can catch at the maximum population level that can be established. Even then, the term "yield" is inappropriate because the maximum benefits to society from this fishery are derived from the experience of catching a billfish, not from their harvest. The present population levels are unknown, the present level of catch is not known, the stock size is unknown, the stock structure is not known, and the maximum potential population size is not known. Thus it is impossible to define a numerical OY.

8.1.2 Economic, Social and Ecological Considerations

The billfish fishery is essentially unique among U.S. fisheries in that the recreational experience is the basis of the value, not the food value or a combination of food and recreational value as would be the case in more typical fisheries. In fact a large proportion of the anglers seem to enhance the value of the recreational experience by releasing rather than retaining their catches. Therefore OY actually would be more meaningfully expressed in terms of high population density of fish rather than in the more conventional terms of yield from the stocks. It is the intent of this FMP to encourage the release of the maximum number of billfishes so that the population density is maintained at the highest possible level. It is the intent of the FMP to minimize the harvest, thereby maximizing population density while still allowing traditional, competitive fishing tournaments to be held.

The higher the availability of billfishes within the EEZ, the greater the likelihood that U.S. anglers will catch a billfish. Any increase in the likelihood of success should have a substantial, positive impact on the socio-economic values of the fishery. Thus, the optimum yield will result from reserving to the U.S. recreational fishery the most billfish possible occurring in the EEZ at any given time.

The U.S. fishery for billfish has been historically and is currently almost entirely recreational. There is no directed U.S. commercial fishery for billfish. However, in the Caribbean Islands billfish taken by the recreational fishery and occasionally by the small-scale, handline fishery are often used as food, although many fish are tagged and released as well.

The recreational billfish fishery plays a significant role in the economic and social well being of a great many people. The fishery was estimated in 1978 to provide more than one million days of recreation for approximately 66,000 people and generate direct expenditures of approximately \$100 million, approximately \$1,300 per fish caught or \$22 per pound. It was estimated that in 1983 in the Mid-Atlantic region alone, over \$40 million was spent in the recreational billfish/tuna fishery. By comparison, in 1986 there were 204,215 pounds of marlin worth \$134,716 sold commercially. The commercial (food) value of the fish is clearly minute compared to these values. In Puerto Rico, the ex-vessel value of blue marlin, the billfish most commonly entering commercial markets, presently is approximately \$1.50 per pound. Smoked marlin retails for about \$8.00-10.00 per pound, but the yield is quite small relative to total weight.

From these social and economic considerations, it is concluded that the greatest overall benefit to the nation will result from reserving billfishes for the recreational fishery. A commercial fishery for billfishes in the EEZ would compete with the recreational fishery, a fishery which yields far greater benefits, depends on a high availability of fish, and has the capacity and intent to make use of all billfishes that can be expected to be available in the EEZ.

Catching a billfish is an uncommon or "rare event" in the terminology of survey statisticians. In other words, the time spent actually fishing for a billfish is disproportionately large compared to the number of fish caught. It takes approximately 10-30 boat days to catch a blue marlin, 10-20 boat days to catch a white marlin, and 5-6 boat days to catch a sailfish. The level of stock abundance required to maintain current catch rates is significantly higher than the level of the current catch. In the northern Gulf of Mexico in 1986, only 74 percent of the billfish raised (i.e., attracted to the bait) were hooked and only 46 percent were boated.

The billfish stocks being dealt with occur throughout the North Atlantic and possibly throughout the entire Atlantic. The harvest from these stocks occurs in international waters and within the fishing zones (economic zones, etc.) of several countries by fishermen who are beyond the control of this plan. Indeed, U.S. fishermen account for less than one fourth of the removals from the marlin stocks. MSY is a function of the total range of each stock and thus must take into account all fishing. Therefore, in arriving at optimum yield for the billfish fishery, MSY cannot be viewed in the same light that it would have been if the entire stock had been within the jurisdiction of the plan.

Social and economic factors lead to focusing on high availability to the fishery or high population density, rather than on fish removed from the water. The greatest benefit to the U.S. will result from increasing the availability of fish to recreational anglers to the extent possible in

view of the inadvertent mortality in other fisheries and the harvest extracted by other users of the stocks who fish outside of U.S. jurisdiction.

8.1.3 Alternatives Considered

The following alternative strategies for determining the optimum yield for the U.S. billfish fishery were considered.

- A. OY is that quantity of fish that will provide for a high quality recreational fishery. High quality is related to a reasonably high catch rate (presumably higher than that which currently exists in the fishery) and to a reasonable expectation of catching a trophy size fish.

This alternative has the advantage of stressing the fact that the major value of this fishery lies in the high quality recreation experienced by the participants. However, inability to describe and quantify an appropriate level of quality led to setting aside this concept. Objective criteria could not be established which would allow measurement of degree of quality of the fishery.

- B. OY is that quantity of fish which will provide for a high participation rate in the recreational fishery.

This option focuses on a combination of the esthetic benefits accruing to the participants and the economic benefits accruing to the recreational fishing industry and to the various associated industries. As with the first option, lack of quantitative criteria for determining an appropriate level of participation led to setting aside this option. Additionally, it was recognized that in seeking an appropriate trade-off between participation rate and quality of fishing, managers can only prevent participation from exceeding a certain level. They cannot force participation up to a stipulated level.

- C. OY is equal to 4,945 blue marlin, 14,458 white marlin, and 60,042 sailfish/spearfish. This is the estimated catch in 1977-78 for sailfish/spearfish and 20 percent reductions from recent catches for the marlins in the EEZ. It includes releases by both foreign longlines and U.S. recreational fishermen.

Statement of OY as some target number of fish to be caught is not realistic at this time because the data base is extremely weak. In addition, since the objective of the FMP is to maximize the population available to the recreational fishery, and since we do not know if these are the maximum levels that can be made available, the numerical OY's are inappropriate. Further, these are estimated catches, not yields. Many of these fish are released, at least some of which are recaptured.

In the absence of a numeric OY, foreign bycatch is controlled by maintaining the measures already implemented and/or approved in the PMP and by prohibiting imports. Domestic catch (kill) is controlled by prohibiting commercial possession and sale, and by size limits for recreational possession.

Of additional concern regarding a numeric statement of OY is the unknown relationship between number of fish caught and the overall value to the nation of the fishery. The basis of the value is the recreational experience, not the fish itself. Many anglers seem to enhance the value of their recreation by releasing their catches of billfish.

To the extent that these fish can be caught again, or that they perpetuate the population, the value of the fishery is enhanced. There is, however, no firm basis for quantifying the extent of such "recycling." Thus it is uncertain whether released fish should be included in a numeric OY or excluded from it. Because of these weaknesses in the information base, the Councils decided against a numeric OY at this time but might quantitatively designate it at some future time if the questions can be resolved.

8.1.4 Future MSYs and Optimum Yields

Although MSY values are based on the best available data, they are believed to be uncertain at best. The critical information necessary to refine these estimates is lacking and is not expected to be available in the immediate future. A numerical OY cannot be calculated at least until MSY values are available. Until then, a qualitative OY statement must suffice.

8.2 Expected Domestic Annual Harvest (DAH)

The expected domestic annual harvest cannot be accurately estimated because of uncertainties in the data base. However, one estimate of DAH is the estimated U.S. landings submitted by NMFS to ICCAT for 1985 which was 188 mt of blue marlin, 143 mt of white marlin, and 308 mt of sailfish. In 1983, it was estimated that the recreational fishery caught 2,347 blue marlin of which 834 (35.5 percent) were released, and 7,761 white marlin of which 4,519 (58.2 percent) were released. Catches have probably increased since then.

Following implementation of the measures proposed in this FMP, recreational landings are expected to decrease by 50 percent for blue and white marlin and 30 percent for sailfish (see Section 9.2 for a discussion of the derivation of these values).

8.3 Total Allowable Level of Foreign Fishing (TALFF)

There are no billfishes in the EEZ in excess of the quantity needed to support the domestic fishery. Consequently no TALFF will be declared. As is pointed out in Section 8.1.2, the quality of the domestic fishery is dependent upon the density of the fish population. Therefore, the U.S. will realize the greatest overall benefits by reserving for domestic use the billfishes which occur in the EEZ.

Most billfish are taken for recreational purposes and there is very little processing involved. Thus, processing capacity is not a factor in determining TALFF.

9.0 MANAGEMENT REGIME AND REGULATORY IMPACT REVIEW

9.1 Introduction

This section lists the proposed and alternative management measures as they apply to the five Councils; provides an estimate of the economic, biological and sociological impacts of those measures, and presents Councils' rationale for proposing certain measures and not proposing the alternatives. Because the major thrust of the proposed management regime is to prevent certain otherwise inevitable events from occurring, the benefits cannot be evaluated in a traditional, quantitative RIR analysis. For this reason this section presents the costs, benefits and analysis of impacts of the management measures in a more qualitative sense. Nevertheless, to ensure the adequacy of the RIR, a more traditional economic analysis and Regulatory Flexibility Analysis is presented in Appendix I. That analysis, by necessity, uses data that may not be accurate or may not be reflective of the billfish fishery over its entire range. For example, tag recapture rates are used to estimate the number of additional billfish that would be made available as a result of measures contained in this plan. However, it is generally believed that tag shedding, tag-related mortality and underreporting of recaptures all result in a considerable underestimate of the actual recapture rate. Further, while other ways of valuing the recreational fishery have been suggested (e.g., compensation necessary to not go fishing, reduced participation resulting from decline in fishing success), only marginal value (i.e., willingness to pay for one extra fish) is used in assessing increased value to the recreational fishery as per NMFS recommendations. The Councils do not believe that the value of these fish to the recreational fishery can be expressed by this single value.

The marginal values used in the RIR were derived from an economic survey of the big game fishery in New Jersey, those being the only ones available, and it is not known whether these values are representative of the fishery throughout its range, or even if they are accurate for New Jersey. Further, the marginal values were derived from a survey question which was not appropriate to the billfish fishery. That is, "considering the amount of fish caught on a typical trip, how much extra would you be willing to pay in trip costs to catch one more fish of the following species?" Catching an additional blue marlin per trip is such an unrealistic scenario that the answer cannot possibly be meaningful. The population would have to increase at least 20 times before an additional blue marlin could be caught per trip because the vast majority of trips do not catch any blue marlin. An alternative way of phrasing a question to estimate marginal value that would be more appropriate to a rare event fishery such as the billfish fishery might be, "how much extra would you be willing to pay in trip costs to double your chances of catching a fish of the following species (or to increase your fishing success rate by 100%)." If phrased this way the response, more appropriately, would be tied to the trip rather than the catch, but could be equated to a marginal value per fish.

Beyond these reservations, the most important shortcoming of this approach is that it fails to capture and evaluate the most essential element of this management plan which is to implement

measures before the fishery begins to decline. If these preemptive steps are not taken and the commercial fishery is allowed to develop at the expense of the recreational fishery to the point that participation begins to decline, then the net loss to society certainly cannot be expressed merely by the "willingness to pay for an additional fish". A decline in availability of fish will ultimately mean a decline in recreational participation (and number of tournaments, vessels, etc.) because the recreational fishery is directed specifically at these species. The cancellation of even 10 percent of the billfish tournaments would represent a loss of at least \$2 million annually in entry fees alone. A decline in availability to the commercial fishery (because measures in this plan will make them "unavailable" to the commercial fishery), on the other hand will not have a similar impact because billfish are only an insignificant bycatch of fisheries directed at other species (swordfish and tuna). Thus, evaluating the benefits of the plan requires speculation as to what will occur in the future if these measures are not implemented, and the present trends allowed to continue. The analysis in Appendix I attempts only to evaluate the impacts of the management measures on the fishery as it exists today, using available data.

While the increase in fishing mortality or harvest necessary to effect a collapse in the recreational fishery is unknown, in the closely related recreational swordfish fishery, such a collapse occurred long before the resource itself collapsed (possibly even before MSY was reached). The recreational swordfish fishery flourished for perhaps five years (1977-81) when catch rates were reasonably high (approximately four to six nights to catch a swordfish). As the commercial longline fishery expanded, recreational catch rates declined and within five years the recreational fishery was completely eliminated (catch rates dropped to approximately one fish for eight nights of fishing). This FMP attempts to prevent a similar occurrence in the much more valuable recreational billfish fishery.

The problems in the fishery (Section 5) and the management objectives (Section 6) are included in this section by reference. This section and Appendix I thus fulfill the requirements of Executive Order 12291.

9.1.1 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 benefits 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 plans 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 serves as the basis for determining whether the proposed regulations implementing the fishery management plan or amendment are major/non-major 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).

9.1.2 Regulatory Flexibility Act

The purpose of the Regulatory Flexibility Act (RFA) is to relieve small businesses, small organizations, and small governmental entities from burdensome regulations and record keeping requirements.

9.1.3 Paperwork Reduction Act

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

9.1.4 Small Business Administration

The Small Business Administration (SBA) defines a small business in the commercial fishing activity, classified and found in the Standard Industrial Classification Code, Major Group, Hunting, Fishing and Trapping (SIC 09), as a firm with receipts up to \$2.0 million annually.

SBA defines a small business in the charter boat activity to be in the SIC 7999 code, Amusement and Recreational Services, not elsewhere classified as a firm with receipts up to \$3.5 million per year.

9.2 Proposed Management Measures

The following management measures have been agreed upon by all five Councils and form the basis for managing the billfish resource within the U.S. EEZ. It is the Councils' intent that the proposed management measures apply to fish caught inside or outside the EEZ and possessed from the seaward boundary of the EEZ to shore.

- o Management measure #1: The sale of all billfish from the management unit is prohibited ("no sale provision"), with one exception (see management measure #5). The management units are: blue and white marlin from the North Atlantic Ocean, sailfish from the west Atlantic and spearfish from the entire Atlantic.
- o Management measure #2: Only billfish (i.e., blue marlin, white marlin, sailfish and spearfish) exceeding the following minimum sizes and having been captured by recreational fishermen using conventional rod and reel may be retained:
 - blue marlin: 86 inches from tip of lower jaw to fork of tail
 - white marlin: 62 inches from tip of lower jaw to fork of tail
 - sailfish: 57 inches from tip of lower jaw to fork of tail
 - spearfish: no minimum size

These minimum sizes apply to all billfish taken from the management unit.

- o Management measure #3: Possession of billfish aboard commercial longline and pelagic drift net vessels is prohibited. This measure applies to all billfish taken from the management unit.
- o Management measure #4: Data reporting requirements: a) Mandatory logbooks aboard swordfish and tuna longline vessels, b) Onboard observers, c) Mandatory tournament reporting for those tournaments selected by NMFS, and d) Develop a methodology to estimate total catch and effort in the recreational fishery.
- o Management Measure #5: The small-scale handline fishery in Puerto Rico will be exempt from the prohibition on sale. Billfish taken by this fishery are also exempt from minimum size requirements.
- o Foreign fishing management measures: All measures presently implemented and/or approved but held in reserve through the PMP are adopted in their entirety into this FMP. No additional management measures that apply to foreign fishing are proposed in this FMP. These measures and their rationale can be found in the PMP for Atlantic Billfishes and Sharks and in 50 CFR Section 611.61. Briefly, these measures are: (1) no foreign longlining in the Atlantic EEZ out to 100 miles from Cape Lookout north to U.S./Canada boundary from June 1 to November 30; (2) all billfishes must be released at the surface of

the water by cutting the line without removing the fish from the water; 3) reporting requirements; and (4) time and area restrictions in Gulf of Mexico and Atlantic EEZ from Key West to Cape Lookout are approved but not implemented.

9.2.1 Management Measure #1: No Sale Provision

Rationale: The no sale provision is for the express purpose of preventing a commercial market for these species from developing, thus preventing the primary objective of the FMP from being realized. Historically billfish have had little commercial value in the continental U.S., entering local commercial markets in very limited quantities generally only as a smoked product. Recently, with the increased demand for fresh fish, and an increasing potential supply resulting from the expansion of the U.S. swordfish and tuna longline fleets, billfish landings have increased. Table 5 shows the reported commercial landings from 1979-86. A clear trend in increased landings and value can be seen. Figure 1 shows the reported billfish landings for Puerto Rico. Although landings appear to increase through 1980 and then decrease, this is at least in part due to the 1981 - 1986 landings not having been adjusted for under reporting whereas earlier landings were corrected for this. More importantly is the trend in price per pound. In the last ten years, the price in Puerto Rico has increased more than 300 percent. A similar trend has been seen in all Council areas. Recent wholesale prices for marlin were reportedly \$2.25 per pound (July 1987) in the New England area. With the increasing trend in value and the ability of the U.S. longline fleet to increase their landings, it is inevitable that many billfish that previously would not have been caught commercially or if caught would have been released, will now be retained for sale. In addition, some recreational fishermen sell their catch. When marlin were worth \$0.50 per pound, they may not have been worth retaining. At present prices (\$1.00 - \$1.50) more recreational fishermen would be willing to retain fish they might have previously released. These activities, if continued unabated, will prevent the primary objective of this FMP from being realized. The no sale provision in conjunction with the prohibition on retention by commercial fishing vessels and the minimum size restrictions will maximize the availability of the resource to the recreational fishery, thus moving towards OY.

The Councils recognize that only a small percentage of the stock of any of the billfishes is contained within the EEZ and thus subject to these management measures. The intention of this plan, however, is to maximize the availability of billfish for the largely non-consumptive use of the recreational fishery within the jurisdictional constraints prescribed by the Magnuson Act as amended. The Councils can only exercise the authority permitted them under the law.

Any regulation that reduces mortality will obviously promote conservation. This measure is designed to reduce mortality resulting from both commercial and recreational fishing activity. It will reduce recreational fishing mortality by encouraging recreational fishermen to release their catch unless of trophy size so that these fish may again be available to others. Although it is estimated that 41 percent of the billfish caught by domestic longline vessels are dead when brought

Table 5. Commercial billfish landings (in lbs and \$), 1979-1986.

	Gulf		Atlantic		Caribbean		Total	
	lbs	\$	lbs	\$	lbs	\$	lbs	\$
1979	0	\$0	24,771	\$9,112	14,228	\$12,751	38,999	\$21,863
1980	*	\$0	26,896	\$17,877	20,250	\$22,410	47,146	\$40,287
1981	*	\$0	51,346	\$21,346	16,756	\$15,080	68,102	\$36,426
1982	9,407	\$4,090	38,372	\$15,494	13,330	\$14,930	61,109	\$34,514
1983	3,168	\$2,690	35,372	\$20,726	11,669	\$15,170	50,209	\$38,586
1984	21,934	\$13,304	121,618	\$66,442	9,562	\$14,152	153,114	\$93,898
1985	55,755	\$35,153	105,012	\$59,407	11,077	\$16,394	171,844	\$110,954
1986	141,400	\$89,082	50,218	\$29,085	12,597	\$16,549	204,215	\$134,716

*Confidential landings not included in totals.
 (Source: NEFC and SEFC, NMFS)

alongside (Table 6), this measure (in conjunction with the possession prohibition) will ensure that the other 59 percent that are alive will be released. It should be noted that the percent of live billfish reported by observers on domestic longliners is much higher than on foreign longliners. From 1982 to 1986, observers aboard Japanese longliners in the EEZ recorded 1451 billfish, of which 949 or 65.4 percent were dead (Table 7).

No Sale Provision to Apply to Imports: The intent of the no sale provision is to prevent a commercial fishery from developing so that the availability of billfishes to the recreational fishery is maximized. If the prohibition on sale merely redirects the commercial effort on these fish from domestic to foreign vessels, nothing will have been accomplished. The FMP is not intended to prevent foreign vessels from pursuing their present fishing activities. Rather, the effect of extending the scope of this regulation is to remove the incentive for foreign vessels to increase their billfish landings to fill the market void that will be created by prohibiting domestic vessels from selling billfish. If the market is filled with fish taken from the same stock by foreign vessels, then billfish mortality will continue to increase and the number of billfish available to the recreational fishery will continue to decrease. Further, without the measure applying to fish from the entire stock, a U.S. vessel could offload its billfish catch in one of the Caribbean Islands or in the Bahamas and ship the fish back into the U.S. as imports, something that will almost certainly occur if the U.S. market develops and the price increases significantly.

The Councils believe that prohibiting the sale of a species of fish is a legal action under the Magnuson Act if the intent is for conservation of the resource. Since the Councils intent is to manage billfish as a recreational fishery, conservation of the resource, in this context, requires maintaining the population at the highest possible level. Allowing the development and expansion of the commercial harvest from these stocks would be inconsistent with these objectives. Clearly, since these measures impact foreign and domestic fishermen equally, the Councils are not trying to secure a marketing advantage for domestic fishermen, eliminate competition or manipulate the market place or the price.

Further, if imports are not prohibited, U.S. longliners will perceive this measure as neither fair nor equitable since foreign vessels fishing alongside them (outside the EEZ) may not only retain all the billfishes they catch, but also sell them in the U.S. to markets denied our own fishermen.

The question is largely academic anyway since at the present time there are virtually no billfish being imported into the U.S. from the stocks being managed by this FMP. Table 8 lists all billfish imports since 1984. Only 2,300 pounds of billfish from Antigua would have been affected by this measure. Two hundred pounds of billfish from Costa Rica might have been from the management unit and thus affected by this measure. The remaining 434,300 pounds of imported billfish came from Ecuador and are presumably from the Pacific Ocean.

Therefore, to achieve the objectives of this FMP, to permit dockside enforcement, to prevent additional markets from encouraging expanded foreign fishing effort on billfish stocks,

**Table 6. Billfish catches recorded by observers on 21 domestic longline trips,
Mar 1985 - Sep 1987.**

Area	Blue Marlin		White Marlin		Spearfish		Sailfish		All Billfish	
	Dead	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead	Alive
Atlantic (4 Trips)	1 20%	4 80%	0 0%	3 100%	0 0%	0 0%	6 60%	4 40%	7 39%	11 61%
Caribbean (2 Trips)	5 22%	18 78%	0 0%	4 100%	0 0%	0 0%	0 0%	0 0%	5 23%	22 77%
Gulf (15 Trips)	10 33%	20 67%	28 55%	23 45%	0 0%	2 100%	4 80%	1 20%	42 48%	46 52%
Total (21 Trips)	16 28%	42 72%	28 48%	30 52%	0 0%	2 100%	10 67%	5 33%	52 41%	76 59%

(Source: Domestic Longline Observer Program, SEFC, NMFS.)

Table 7. Summary of foreign longline observer data on billfish, 1982-1986*.

Year Days Fished	Condition	Blue Marlin		White Marlin		Spearfish		Sailfish		Unc. Billfish		All Billfish	
		No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
1982 917	Alive	18	51%	43	20%	5	23%	1	33%	6	55%	73	26%
	Dead	17	49%	170	80%	17	77%	2	67%	5	45%	211	74%
	Total	35		213		22		3		11		284	
1983 303	Alive	4	67%	36	31%	1	100%	0	-	0	-	41	34%
	Dead	2	33%	79	69%	0	0%	0	-	0	-	81	66%
	Total	6		115		1		0		0		122	
1984 340	Alive	16	53%	66	27%	2	67%	0	0%	3	43%	87	30%
	Dead	14	47%	182	73%	1	33%	1	100%	4	57%	202	70%
	Total	30		248		3		1		7		289	
1985 595	Alive	43	45%	118	34%	1	20%	2	100%	0	-	164	36%
	Dead	53	55%	234	66%	4	80%	0	0%	0	-	291	64%
	Total	96		352		5		2		0		455	
1986 399	Alive	16	43%	125	46%	1	33%	2	40%	2	50%	146	45%
	Dead	21	57%	147	54%	2	67%	3	60%	2	50%	175	55%
	Total	37		272		3		5		4		321	
Totals 2553	Alive	97	48%	388	32%	10	29%	5	45%	11	50%	511	35%
	Dead	107	52%	812	68%	24	71%	6	55%	11	50%	960	65%
	Total	204		1200		34		11		22		1471	

* Does not include billfish whose condition was unknown
(Source: NMFS foreign observer program)

Table 8. Billfish imports by country for 1984-87.

1984

No Billfish imports recorded

1985

No Billfish imports recorded

1986

<u>Weekly Report</u>	<u>1000's lb</u>	<u>Origin</u>
6/18/86	4.7	Ecuador
8/13/86	0.5	Ecuador
11/5/86	0.4	Ecuador
11/12/86	1.6 (fillets)	Ecuador
12/10/86	0.7	Ecuador
1986 Total	=7.9	

1987

<u>Weekly Report</u>	<u>1000's lb</u>	<u>Origin</u>
1/7/87	1.6	Ecuador
2/4/87	3.6	Ecuador
2/25/87	1.6	Ecuador
5/6/87	3.3	Ecuador
5/13/87	5.3	Ecuador
5/20/87	26.6	Ecuador
6/24/87	10.9	Ecuador
7/1/87	8.3	Ecuador
7/8/87	8.4	Ecuador
7/15/87	13.2	Ecuador
7/22/87	15.3	Ecuador
7/29/87	9.6	Ecuador
8/5/87	4.7	Ecuador
8/12/87	8.4	Ecuador
8/19/87	28.0	Ecuador
8/26/87	24.8	Ecuador
9/2/87	18.2	Ecuador
9/9/87	5.5	Ecuador
9/16/87	11.1	Ecuador
9/23/87	8.0	Ecuador
	0.2	Costa Rica
9/30/87	22.6	Ecuador
10/7/87	24.9	Ecuador
10/14/87	18.2	Ecuador
10/21/87	26.0	Ecuador
10/28/87	30.4	Ecuador
11/4/87	23.6	Ecuador
11/12/87	37.4	Ecuador
11/18/87	22.3	Ecuador
11/25/87	4.0	Ecuador
	1.0	Antigua
12/2/87	2.7	Ecuador
12/9/87	5.8	Ecuador
12/16/87	1.3	Antigua
1987 Totals	Ecuador = 434.3	
	Antigua = 2.3	
	Costa Rica = 0.2	

1987 Grand Total = 436.8

(Source: Rodney C. Dalton, NMFS-SERO from NMFS Fishery Market News Reports, 1984-1987)

and to remove the inequity between domestic and foreign commercial fishermen, billfish taken from the presumed stock (i.e., blue and white marlin from the North Atlantic, sailfish from the west Atlantic and spearfish from the entire Atlantic) may not be sold in the U.S. Billfish originating elsewhere must carry a paper trail specifying when and where caught, by what vessel, port of offloading, etc.

The importation of billfish parts for taxidermy purposes would constitute sale, trade or barter and would thus be prohibited unless they came from a different stock of fish and carried a paper trail so specifying.

Commercial fish dealers having frozen or processed billfish in storage will be given a 90 day grace period following publication of the final rule in the *Federal Register*, in which to sell or otherwise dispose of these fish.

Impacts: In 1986 there were 7,607,909 pounds (dressed weight) of swordfish, and 9,514,127 pounds (whole weight) of tuna landed by U.S. longliners (Table 4). In contrast 204,215 pounds of billfishes were landed. The total value of the billfish catch was \$134,716 or 0.4 percent of the total value of the combined tuna and swordfish catch (\$36,677,153). Clearly, billfish represent an insignificant amount of the total income from longlining.

In 1987 there were approximately 625 commercial swordfish permits issued. Not all of these permits are issued to longliners, but the great majority are. If we assume that there are conservatively 500 active longliners, and that reported billfish landings came only from longliners and that the bycatch is evenly distributed among vessels, then the impact on the domestic longline fishery of the no sale provision would be an annual loss of approximately $\$134,716/500$ vessels = \$269 per vessel.

In southern New England, there is a small, seasonal (late summer) harpoon fishery for white marlin. Accurate landings figures for this fishery are not available but together the harpoon and rod and reel fishery is believed to take 250-500 fish annually. If we assume an average weight of 80 pounds each (personal communication, Everett Poole, Poole's Fish Market, Martha's Vineyard) then the annual catch is between 20,000 and 40,000 pounds. These fish are worth approximately \$1.50 per pound, thus their value would be \$30,000 to \$60,000. Participants in the harpoon fishery are primarily quasi-recreational fishermen (i.e., recreational fishermen who sell their catch). The number of boats participating in this fishery is not known, but is believed to be several hundred. However, the majority of the harpoon landings reportedly come from fewer than twelve boats (probably fewer than six). Unlike in the Caribbean artisanal fishery, these fish represent a significant amount of income for few if any of the participants.

The recreational billfish fishery was estimated to have generated at least \$100 million in expenditures in 1977-78. In the Mid-Atlantic states alone, it was estimated that boat owners spent over \$40 million in 1983 for marlin and tuna fishing and an additional \$2 million was spent on charter fees. It has been estimated that it may cost \$10,000 on average to catch a blue marlin. Although total economic activity associated with recreational fishing certainly cannot be directly

compared to ex-vessel commercial value, these values are cited to indicate that there are probably order of magnitude differences in value of the resource to the two user groups.

In an economic survey of big game fishing in New Jersey it was estimated that the average charter boat trip in 1986 for marlin/tuna cost \$922. The average entry fee per angler for marlin/tuna tournaments was \$1,254. This is in addition to per trip expenses of approximately \$300 and seasonal operating expenses of approximately \$5,000 per boat. If the average tournament fee is representative of billfish tournaments generally, then the average tournament with 25 boats entered, having two anglers per boat, would generate approximately \$68,000 in entry fees. There are more than 300 billfish tournaments listed in the NMFS file. If these tournaments are held annually, they would generate at least \$20 million in entry fees alone.

Although estimating the value of a billfish to the recreational fishery is perhaps impossible, it is clear that participants in this fishery are willing to spend very large amounts of money in pursuit of these species. While it is impossible to know how many more billfish will be available to the recreational fishery because of this management measure, how much additional benefit will accrue to society by this increase or at what point the recreational fishery would decline or collapse without this measure, it is clear that the value of the billfish resource to the recreational fishery is several orders of magnitude greater than it is to the commercial fishery. In this sense, the very small impact on the commercial sector would seem far outweighed by the potential benefits to the recreational sector.

Extending the scope of this regulation to fish caught outside the EEZ by foreign vessels will have virtually no additional impact because in 1987, at most, only 2,500 pounds of billfish from the management unit were imported into the U.S. (2,300 lb from Antigua and 200 lb from Costa Rica) (Table 8). The only other country that exported billfish to the U.S. in 1987 was Ecuador. These imports would be permitted but would have to carry a paper trail certifying that they were not caught in the North Atlantic Ocean, and specifying where, when and by what vessel they were caught. While this requirement would represent a small inconvenience, the economic impact would be negligible.

No other less burdensome alternative could preclude a commercial market from developing for these species, minimize commercial fishing mortality and minimize the potential for a decline or collapse of the recreational fishery.

9.2.2 Management Measure #2: Minimum Sizes

Rationale: The intent of this management measure is to significantly reduce billfish mortality in the recreational fishery. The more billfish that are released alive, the greater will be their availability to be caught again by the recreational fishery, thus helping accomplish the plan's principal objective. A complete ban on retention would presumably make even more fish available to the recreational fishery, but would not allow one of the more traditional recreational activities associated with billfish fishing and that is competitive fishing tournaments. It is estimated that over

\$20 million are spent by billfish anglers annually just on tournament entry fees. It would make little sense to reserve these fish for the recreational fishery and then promulgate management measures that precluded one of the most socially and economically important recreational uses of the resource. Thus, this measure represents a compromise that serves a resource conservation objective, accommodates the objectives of the plan and optimizes the social and economic benefits to the nation by permitting the small mortality necessary for fishing tournaments, one of the more economically important activities associated with billfish fishing.

Cumulative percent size frequency distributions for blue marlin, white marlin and sailfish retained in the recreational fishery are shown in Table 9. Sailfish size frequency distributions for each year 1970-74 and 1983-86 are shown in Figure 2. Size frequency distributions for blue and white marlin for 1983-86 are shown in Figure 3.

From Table 9 any desired percent reduction in mortality can be related to a particular size. In other words, the percentage of the catch that was that size and under is the percentage that mortality would be reduced if that was the minimum size for possession. The intent was to find a management measure that would minimize mortality while still allowing traditional, competitive fishing tournaments to continue and allow for trophy and/or world record fish to be legally landed and weighed. It was also felt that reductions should reflect the general status of the stocks. In other words, the species most in need of management should have the greatest reduction in mortality. Thus, 50 percent reductions were selected for blue and white marlin. For sailfish, whose population is generally considered to be in the best condition, a 30 percent reduction was selected. These reductions were then referred to Table 9 for the appropriate minimum sizes. Although minimum sizes were calculated from weight frequency distributions and thus initially expressed in pounds, they were subsequently converted to lower jaw-fork length. Minimum sizes are thus expressed only in length, and to be retained, fish must equal or exceed the minimum length for that species, regardless of its weight. For blue marlin, 50 percent reduction equates to 195 pounds. This was rounded to 200 pounds for calculating the minimum length. The actual reduction in mortality would therefore be slightly higher than 50 percent. For sailfish and white marlin, the size equating to the desired percent reductions were rounded to the nearest five pounds before converting to lower jaw-fork length. The conversions from weight to length were calculated from the regression equations shown on Table 10. For both these species, the rounding procedure resulted in somewhat less of a reduction in mortality than the target levels. The minimum sizes expressed in lower jaw-fork length are:

- blue marlin: 86 inches (equivalent to 200 pounds whole weight)
- white marlin: 62 inches (equivalent to 50 pounds whole weight)
- sailfish: 57 inches (equivalent to 30 pounds whole weight)

Possession would be legal only if the fish exceeded the minimum length measurement for that species (Figure 4).

Table 9. Percent of catch by weight for blue marlin, white marlin and sailfish.

Percent of Catch	Blue Marlin ¹ (pounds)	White Marlin ¹ (pounds)	Sailfish ² (pounds)
5	86	40.0	12.0
10	105	42.0	20.0
15	117	43.7	25.0
20	129	45.0	28.5
25	142	46.8	30.0
30	151	48.0	32.0
35	160	49.0	33.5
40	171	50.0	35.0
45	181	50.7	36.5
50	195	52.1	38.0
55	208	53.2	39.0
60	220	54.5	40.5
65	240	56.0	42.0
70	257	57.2	43.5
75	287	59.0	45.5
80	320	61.8	48.0
85	360	64.2	51.0
90	422	66.5	55.0
95	520	78.5	60.0

¹ Data is from 1986 NMFS recreational billfish survey, and is based on a sample size of 476 blue marlin and 270 white marlin.

² Data provided by Ed Irby, Florida Department of Natural Resources from surveys conducted in 1970 to 1980. Sample size was 1151.

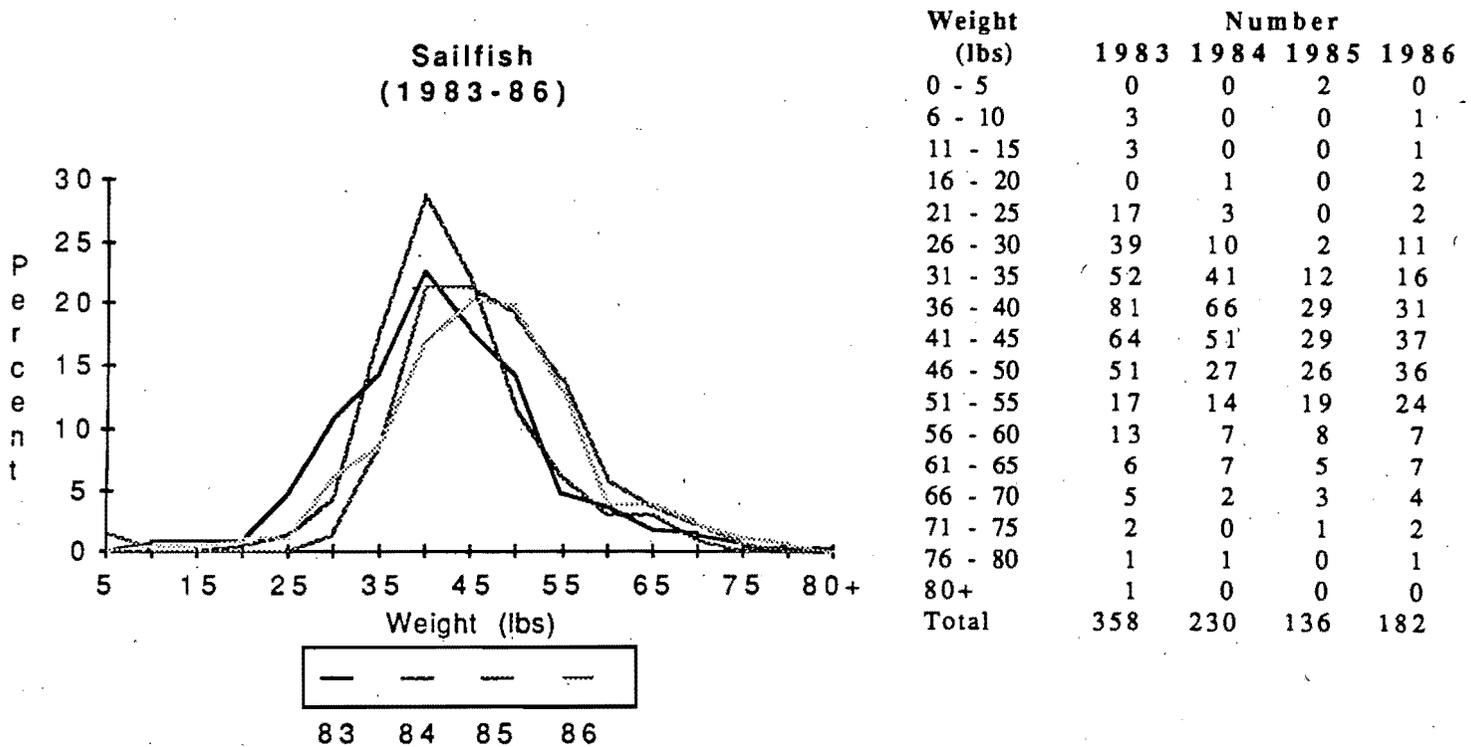
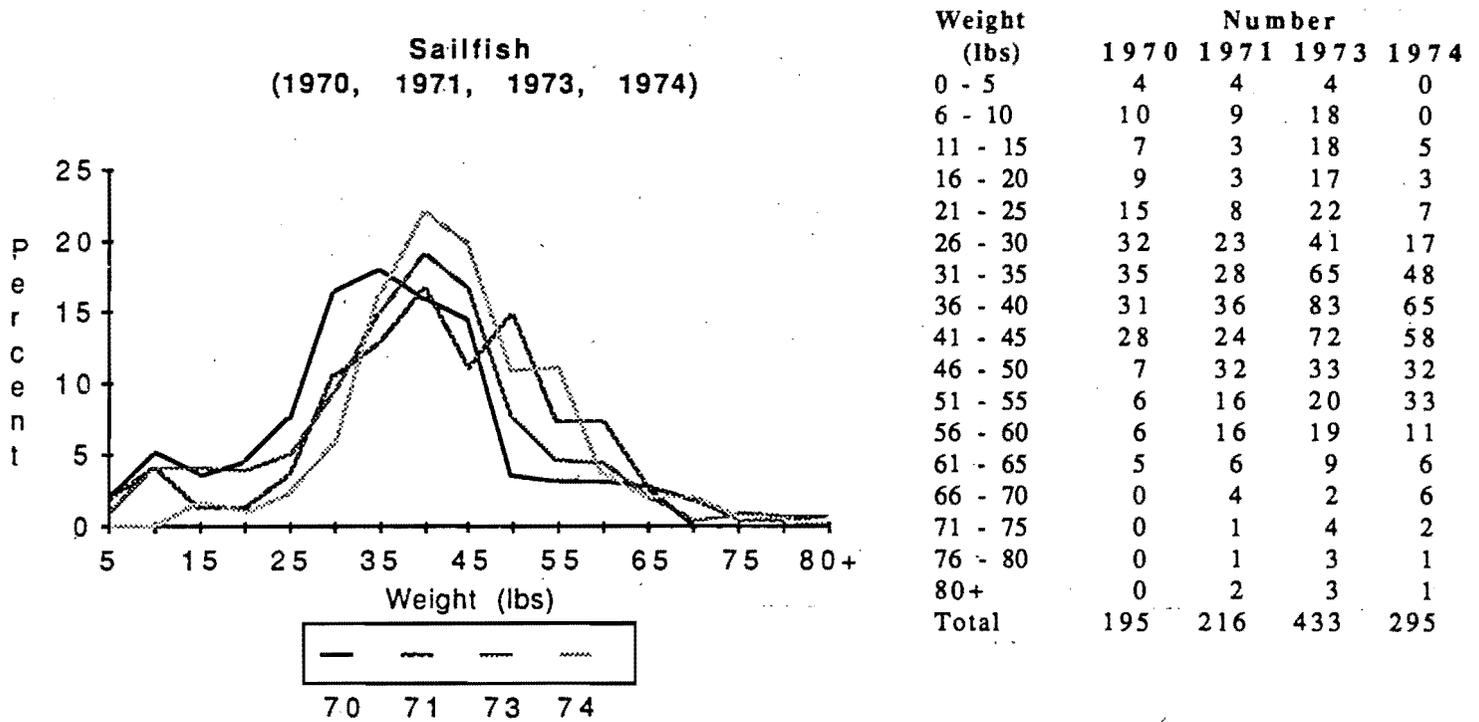
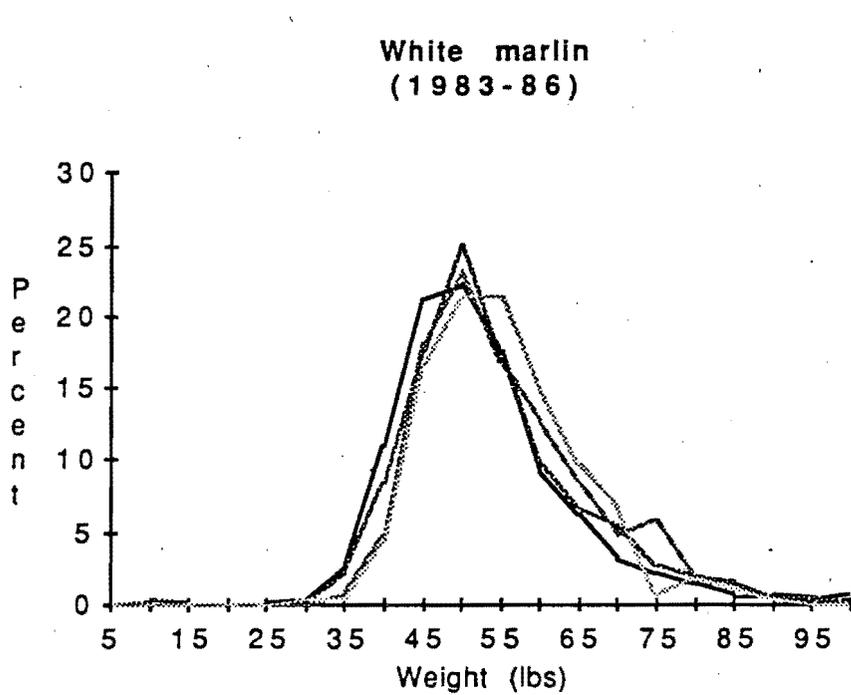


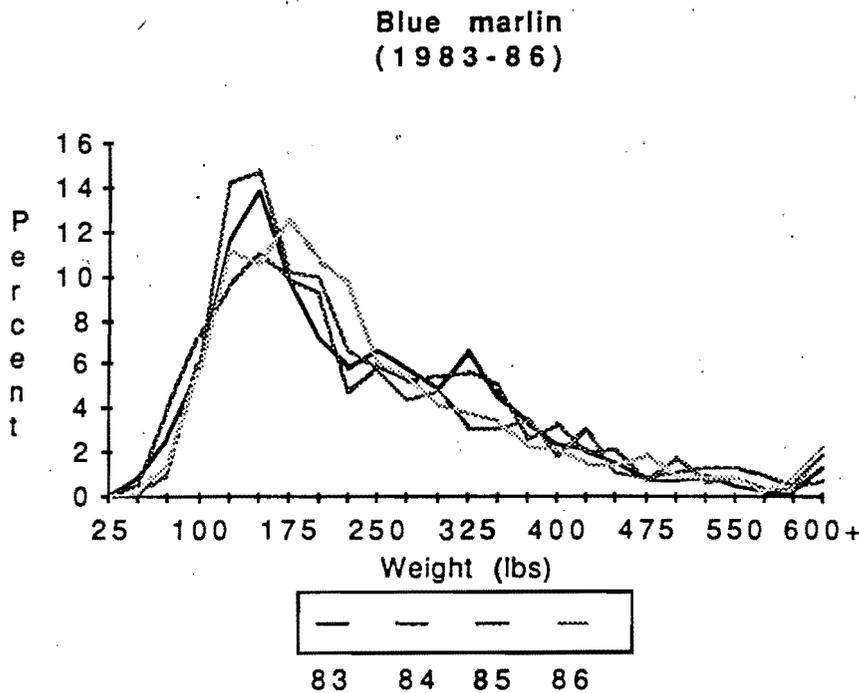
Figure 2. Annual size frequency distributions of sailfish caught and retained by recreational fishermen, 1970-74, and 1983-86.

(Source: E. Irby, Florida Dept. Natl. Res. (1970-74); NMFS, SEFC, Miami, FL (1983-86))



**White marlin
(1983-86)**

Weight (lbs)	Number			
	1983	1984	1985	1986
0-5	0	0	0	0
6-10	0	0	1	0
11-15	0	0	0	0
16-20	0	0	0	0
21-25	1	0	0	0
26-30	4	2	0	1
31-35	25	19	3	1
36-40	103	67	17	12
41-45	201	139	65	45
46-50	210	199	83	58
51-55	166	138	60	58
56-60	87	78	45	40
61-65	58	52	30	26
66-70	29	43	17	18
71-75	20	21	21	2
76-80	13	14	7	5
81-85	5	12	5	3
86-90	6	4	1	1
91-95	4	0	2	0
95+	9	3	0	0
Total	941	791	357	276



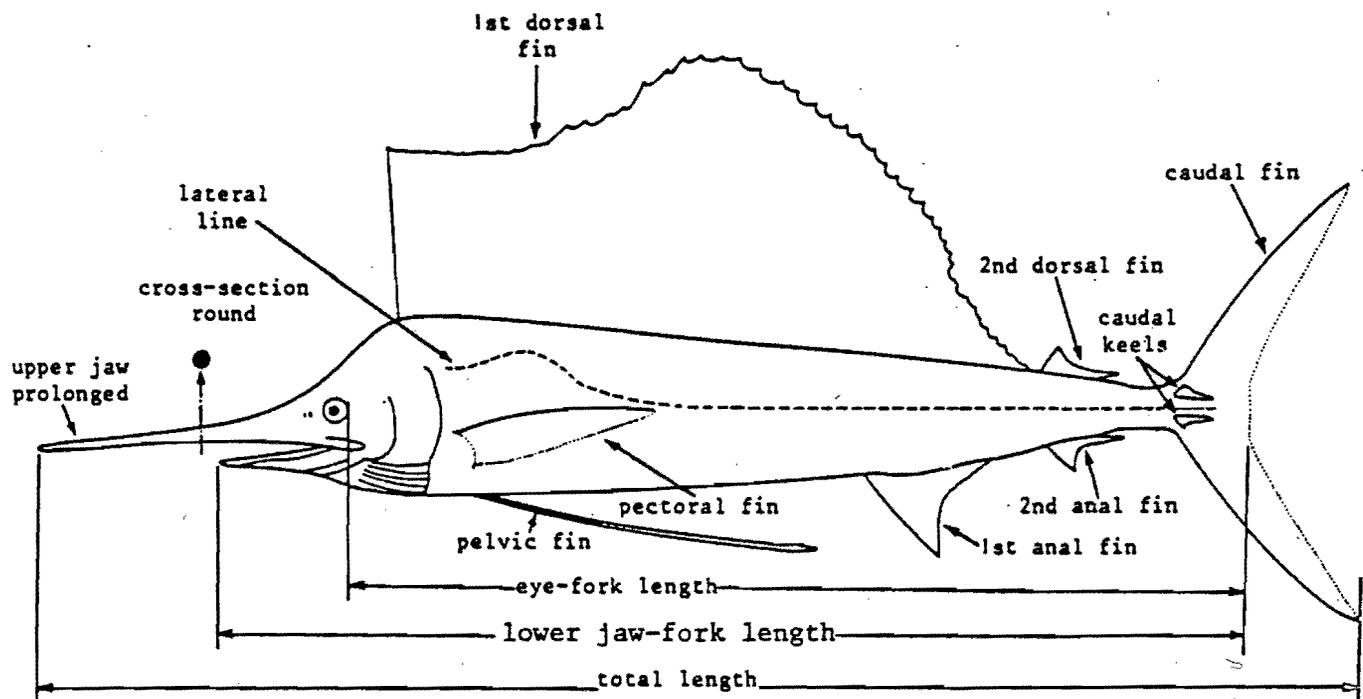
**Blue marlin
(1983-86)**

Weight (lbs)	Number			
	1983	1984	1985	1986
0-25	0	0	0	0
26-50	8	4	1	1
51-75	25	31	7	7
76-100	52	56	41	27
101-125	107	73	97	53
126-150	128	84	101	50
151-175	91	75	70	60
176-200	66	70	68	51
201-225	53	36	45	46
226-250	61	45	39	29
251-275	53	40	30	26
276-300	45	42	33	20
301-325	61	43	21	18
326-350	41	38	21	16
351-375	31	20	24	11
376-400	22	25	12	10
401-425	19	15	21	7
426-450	14	16	7	7
451-475	7	6	5	9
476-500	7	8	12	4
501-525	9	10	4	4
526-550	4	10	6	4
551-575	1	7	2	1
576-600	2	3	3	4
601-600+	12	6	13	11
Total	919	763	683	476

Figure 3. Annual size frequency distributions of blue and white marlin caught and retained by recreational fishermen, 1983-86.

(Source: NMFS, SEFC, Miami, FL)

FIGURE 4. Length measurements referred to in FMP.



Fortuitously, these minimum sizes are all at or above the reported size at maturity. Also, all are less than existing world records for all line classes, 6 kilogram (12 lb) test and greater for all species.

These minimum sizes are considered to be the most restrictive possible that will still allow tournament fishing.

Impacts: The impacts of this specific measure will be limited to the recreational fishery, and associated industries. The most obvious impact of this measure will be that approximately 50 percent of the recreational catch of blue and white marlin and 30 percent of the catch of sailfish that would otherwise have been retained will now be released. While clearly this will have a positive impact on the resource, it may have a negative impact on the charter and taxidermy industries.

Charter boats generally release all billfish unless the angler intends to have the catch mounted. Although the major taxidermists now have the technology to create a replica out of fiberglass, and do not need anything other than length, girth and estimated weight to make a mount, many taxidermists still use the bill and other parts of the fish. Because it is believed that many anglers want at least some part of their mounted fish to be real, it is expected that, at least initially, there may be a reduced demand for mounted fish. The actual impact realized by the taxidermy industry is impossible to predict. However, based on information provided by one of the major marine taxidermists, the theoretical maximum impact can be estimated. Based on his 1986-87 records, he stated that 14 percent of the sailfish he mounted from north of Daytona Beach, Florida, and 22 percent from Palm Beach south were under the proposed minimum size. For white marlin, 67 percent in the north and 62 percent in the south were under the proposed minimum size. For blue marlin, 48 percent in the north and 72 percent in the south were less than the proposed minimum size. It is not possible from these figures to assess the actual impact, but this taxidermist estimates that one third to one half of his business is billfish and of this, one half is sailfish and the other half consists of blue and white marlin. If we assume that this is representative of marine taxidermists generally, then between 33 percent and 50 percent of their revenue is from billfish mounts. Of this, half, or 16.5 percent to 25 percent, is from sailfish mounts and half from blue and white marlin. For sailfish, the straight average of the northern and southern areas' percentage less than the minimum size is 18 percent. Therefore, the range of potentially lost business due to the minimum size for sailfish is between 3 percent and 4.5 percent of their overall revenue (18% of 16.5% to 18% of 25%). For blue and white marlin, the simple mean percent less than the minimum sizes are 60 percent and 64.5 percent respectively. Thus, if revenue from marlin mounts are evenly divided between blue and white marlin, then the overall mean percent under the minimum size would be 62.3 percent and the maximum percentage of lost revenue would be between 10.3 percent and 15.6 percent. Summing all billfish, the maximum loss would be between 13.3 percent and 20.1 percent of total revenue (actually it would be somewhat less than this because the cost of a mount is directly related to fish size. Smaller fish are less costly to mount). However, there are several factors that will tend to ameliorate these impacts.

First, while most taxidermists presently use the bill and other parts of the real fish if available, they all agreed that fiberglass facsimile mounts could be made from available molds. Thus, theoretically, all billfish under the minimum size could be provided to the angler as facsimile mounts. Realistically, this is as unlikely as is the other extreme scenario in which no billfish under the minimum size are mounted. The actual impact will be between 0 percent and 20 percent of total taxidermy revenue, but exactly where within this range cannot be predicted. The acceptability of facsimile mounts will be at least in part determined by the industry's ability to promote them and educate the angling public. It has been suggested that an affidavit, signed by the vessel captain, attesting to the catch and certifying its length, would ultimately replace the need for the actual carcass as an incentive to have the fish mounted. To whatever extent this is accepted by the angling public, the impact on the industry would be reduced proportionately.

Further, the management plan is expected to increase the availability of billfishes to recreational fishermen thus increasing the number of billfish caught and presumably the number mounted. Additionally, the minimum sizes should, over time, result in an increase in mean size, thus decreasing the present percentages of undersized fish in the catch. These factors, while not quantifiable, further reduce the impacts on the taxidermy industry.

Charter boats generally receive some percentage of the cost of the mount as a commission so they may also be impacted to some extent should the demand for mounts decrease as a result of the minimum sizes. There are no data available from which to predict the actual amount of impact. The number of charter boats that received commissions for having had fish under the proposed minimum sizes mounted is unknown, the dependence of charter boats on this source of revenue is unknown, and the number of lost mount commission cannot be predicted.

It is unlikely that people will stop chartering boats for billfishing because of minimum size regulations. Most anglers either release their catch, keep it for mounting or retain the fish to take pictures. None of these activities will be precluded by minimum sizes. Pictures will have to be taken at sea, while the fish is still alive unless it is above the minimum size. More boats are beginning to carry video cameras to record the entire experience from hook-up to release. It is anticipated that this practice will become more common with the implementation of this measure.

Some tournaments will have to change their format. The Councils consider this a benefit of this measure. Already, total kill tournaments are disappearing in many areas. Partial kill tournaments in which only fish above a minimum size are counted, are becoming increasingly common. No decline in participation rates have been reported as a result of these modified formats. This measure will merely reinforce this trend.

A recent study by East Carolina University funded by the South Atlantic Fishery Management Council suggested that the number of fish landed in a tournament is of little importance as long as the competitive aspect of fishing can be retained and a winner declared. Minimum sizes will have very little impact on the tournament format other than to reduce the number of fish that are entered into competition. It is not anticipated that any billfish tournaments

will be cancelled because of this management measure. The economic activity generated by billfish tournaments is substantial, but is not directly related to the number of fish brought to the dock. There should be no adverse economic impacts on tournaments as a result of this measure.

The Councils recognize that it is difficult to measure a live fish as large as a marlin alongside the boat to determine if it exceeds the minimum size, and that, especially for blue marlin, doing so may be quite dangerous. However, based on advice from the SAFMC Advisory Panel, it was felt that experienced billfish anglers and captains would have little difficulty in estimating the size of these fish quite accurately. Since it is the intent of this plan to encourage the release of all billfishes not needed for tournament competition or of trophy size, and since tournament anglers would generally have no difficulty estimating fish size and trophy fish would be substantially in excess of the minimum sizes, this is not expected to be a major problem. All possible alternatives were considered, and although this problem was recognized, it was not considered sufficiently serious to outweigh the benefits of this management measure.

9.2.3 Management Measure #3: No Possession By Longliners & Drift Net Vessels

Rationale: This measure is intended to maximize the release of live billfish by those commercial vessels that would routinely catch them in the course of their commercial fishing operation. Since the objective of this plan is to maximize the availability of billfishes to the recreational fishery, any measure which results in the release of live billfish will help accomplish that objective.

Approximately 59 percent of the billfish caught by longliners are alive. If possession were legal, there would be no way to ensure that only dead billfish were retained. Thus, it must be assumed that allowing commercial possession would result in at least some additional mortality.

A recreational fisherman generally does not catch a billfish, so most trips he will not have the option of retaining one. Longliners on the other hand, fish so much gear that they would almost certainly catch at least one billfish, which if legal, they would retain. By allowing longliners to possess even one billfish the Councils felt that this would virtually assure that each vessel would retain one per trip. With at least 500 longline vessels in the swordfish fishery, if each vessel takes even 10 trips per year, there would be 5,000 billfishes retained. If longliners were permitted one of each species, even assuming only blue and white marlin would be caught, they could potentially retain 10,000 billfishes annually. By comparison, the recreational fishery in 1983 (the most recent year for which complete data are available) kept a total of 4,755 blue and white marlin. Considering the extremely great value that these 5,000 (or 10,000) fish represent to the recreational fishery, it is considered an inefficient use of the resource and an unnecessary source of additional mortality.

Impacts: Since the sale of billfishes is prohibited, there is very little additional impact associated with this measure. It may be perceived by commercial fishermen as inequitable that recreational fisherman can retain any number of billfish above the minimum size while longliners

cannot retain any. However, so few recreational trips ever result in the capture of even one fish above the minimum size that multiple captures are extremely unlikely. In contrast, commercial longliners with their much greater fishing power will very often catch fish above the minimum size. It is not the individual that is being discriminated against, it is the gear itself. Everyone is given the same opportunity to catch and retain these fish with rod and reel. Considering the great value of these fish to the recreational fishery, allowing commercial longline vessels to retain them, thus reducing, even if only marginally, their availability to the recreational fishery, is considered inconsistent with the plan's objectives.

While it is recognized that there will be some waste associated with this and other management measures, it was felt that this was unavoidable, and that the positive impact on the recreational fishery outweighed the slight negative impact on the commercial fishery.

The maximum number of swordfish/tuna vessels using drift nets never exceeded six to ten. While the number of vessels presently using this gear is not known, it is believed to be less than 6. The number of billfish taken by these vessels is not known, but because use of these nets generally has been limited to the New England area where billfish are not common, it is not believed to be many. A small number of observer trips taken aboard drift net vessels in 1984 did not observe any billfish caught by these nets. Thus the impact of this measure is expected to be negligible.

King mackerel drift gill net vessels were estimated to have caught 419 sailfish in 1987. All of these fish were discarded because it is illegal to sell sailfish in the state of Florida. Thus, this measure will have no additional impact on these fishermen.

9.2.4 Management Measure #4: Data Reporting Requirements

Data reporting requirements consist of a recommendation for the continuation of the existing logbook requirement and voluntary observer program as specified in the swordfish FMP and mandatory reporting of catch and effort data for recreational fishing tournaments. This latter program is the only new data reporting requirement specified by this plan.

9.2.4.1 Logbooks

Rationale: Logbooks are the only way to collect billfish bycatch data from the swordfish and tuna longline fishery. Information on catch, effort, species composition, and percent alive and dead are necessary to estimate this source of mortality and for evaluating the effectiveness of the management regime. Since possession will be illegal, this information can only be obtained at sea from logbooks or by observers.

Impacts: Since mandatory logbooks are already required by the swordfish FMP, there will be no additional impact. This plan will require the same information already being collected through the swordfish plan. If a statistically valid sampling design is developed by NMFS that is acceptable to the Councils, this will suffice in lieu of 100 percent coverage.

9.2.4.2 Observers

Rationale: Logbooks may not provide accurate information on billfish bycatch because of the concern of the commercial fishery that this information may be used to further restrict their fishing activity. To ensure the validity of the information recorded in the logbooks, to collect biological information, and to determine the fishing characteristics of particular gear and fishing methods, will require onboard observers. This information may ultimately suggest fishing methods or gear types that reduce the billfish bycatch. If so, this would provide a way of reducing incidental fishing mortality, thereby further helping to achieve the plan's objectives.

The cost of an observer program is high and policy regarding mandatory placement of observers aboard domestic vessels remains uncertain. Until such time as mandatory observer coverage can be accomplished, a voluntary program, as is already approved in the swordfish FMP, will suffice. The level of coverage should be sufficient to at least obtain a statistically valid estimate of the total billfish bycatch (by species) in the longline fishery and to validate logbooks.

Impacts: Since this program is already contained in the swordfish FMP there are no additional impacts.

9.2.4.3 Mandatory Tournament Reporting

Rationale: It is believed that most recreational effort and landings of billfish are during fishing tournaments. If this is true, then mandatory tournament reporting may provide an inexpensive way to estimate total catch and effort for the recreational fishery. Since total catch and effort is the most fundamental piece of fisheries data, and since to date, this most basic information has not been available, mandatory tournament reporting will be required. At a minimum, these data should include number of boats, number of anglers, total number of hours fished, number and weight of each species landed and or number and estimated weight of each species released (if a no kill or partial no kill tournament), and description of any specific rules that might have affected the results (e.g., line test restrictions, minimum entry weights, bait restrictions, etc.).

In the Gulf of Mexico, many tournaments voluntarily provide their catch and effort data to NMFS. Since the Councils do not want to disrupt this voluntary system, tournament reporting will be mandatory only for those tournaments selected by NMFS. However, it is the Councils' intent that coverage be 100 percent.

Impacts: The Councils recognize that mandatory reporting is burdensome. However, the importance of acquiring reliable catch and effort data for monitoring the status of the resource and fishery and for evaluating the management regime override this concern. Since these data are already recorded by virtually every billfish tournament, this measure will merely require that the data be transcribed or photocopied and mailed to NMFS. There are approximately 315 tournaments listed in the NMFS billfish tournament file. If this regulation requires 2 man-hours to transcribe the results onto forms to be provided by NMFS, there will be a total of 630 man-hours

involved. If the transcriber is paid \$5 per hour, the cost associated with this requirement will be \$3,150 per year. However, this reporting is expected to reduce the need for NMFS tournament samplers to be present at tournaments and should result in a net savings. The cost per tournament, \$10, is negligible.

9.2.4.4 Develop a Methodology to Estimate Total Recreational Catch and Effort

Rationale: The present recreational billfish survey conducted annually by NMFS is not designed to allow an estimate of total billfish catch and effort. These data, then, while useful for comparing CPUE among years do not provide estimates of total catch, level of participation, total effort, indicators of the economic value of the fishery, etc. This information is needed for stock assessment and for monitoring the effectiveness of this FMP. The mechanics of the system will be developed by NMFS in consultation with the Councils. Developing and implementing a program to estimate recreational catch and effort is not, strictly speaking, a management measure nor is it merely a recommendation. Rather, it should be interpreted as a charge to the NMFS. The Councils strongly recommend that a methodology similar to that developed by the State of New Jersey, which is being successfully used by the SEFC to estimate these parameters for the Mid-Atlantic states, be adopted in other areas, pending the outcome of the pilot program initiated by NMFS for the Southeast region.

Impacts: Until the system is designed, it is obviously impossible to estimate the costs involved. However, it is quite possible that the tournament reporting system, combined with the survey procedure recommended above will allow the necessary data to be collected for the same or less cost than the present NMFS tournament sampling program. Therefore, until the details of the program are available we will assume that there will be no additional cost associated with this data collection program.

9.2.5 Management Measure #5: Puerto Rican Handline Exemption

Rationale: A traditional, artisanal handline fishery in Puerto Rico has a small bycatch of billfishes, primarily blue marlin. The capture of a billfish in this small-scale fishery is a rare, but fortuitous event for the few artisanal fishermen in Puerto Rico. There are an estimated 26 such fishermen in Puerto Rico (personal communication Graciela Garcia-Moliner, CODREMAR, Mayaguez, Puerto Rico). Their actual billfish catch is not known, but is believed to range between one and three billfish per fisherman per year. Although the existence or extent of this fishery has never been documented, it has been under discussion for at least 5 years. Since this measure provides the only exemption to the no sale provision, greatly complicating enforcement, and providing a potential loophole through which illegally harvested billfish may enter commercial markets, the following restrictions are placed on this exemption:

- A. Only fish caught on handlines having fewer than six hooks may be retained for sale.

- B. A vessel retaining billfish for sale may not have a fishing rod and reel aboard.
- C. A maximum of 100 billfish per year can be landed and sold under this exemption.
- D. Fish taken under this exemption can be sold only in Puerto Rico.
- E. All existing handline fishermen in Puerto Rico wishing to retain billfish for sale must obtain a permit.
- F. The Caribbean Fishery Management Council in cooperation with the Government of Puerto Rico is to develop and implement a method of tracking billfish landed under this exemption.
- G. All billfish landed under this exemption must carry a paper trail with the permit number of the exempted fisherman.
- H. If more than 100 billfish per year are landed under this exemption, it will be considered evidence that fish are being sold illegally and the Councils will consider removing the exemption by Regulatory Amendment.
- I. This exemption will not be in effect until the permitting and tracking systems are operative (implementation of exemption pending approval by the five involved Councils).

During public hearings, testimony was received asserting the existence of a similar artisanal fishery in the U.S. Virgin Islands. This was the first time the Councils had heard reference to this fishery, and are thus reluctant to extend the exemption solely on the basis of unsubstantiated public testimony. The Councils will reconsider an exemption for this fishery if and when its existence is documented and its size and landings quantified.

Impacts: In Puerto Rico, recreationally caught billfish are commonly sold. In 1985 there were 11,077 pounds of billfish reported landed in Puerto Rico worth \$16,394. Some of these were sold by the artisanal handline fishery which would be exempt from this regulation. If we assume that there are 100 recreational fishing boats in Puerto Rico that accounted for this catch, then the impact would be, at most, a loss of \$164 per vessel annually. Considering the cost of maintenance, fuel, bait, fishing tackle, etc. this cannot represent a significant loss of income.

Until the Caribbean Council and/or Puerto Rican government develops the permitting and tracking system for the artisanal fishery, the cost of the program cannot be estimated. However, if the fishery is limited to 25-30 boats, and fewer than 100 fish, the cost should be modest.

9.2.6 Foreign Measures

As previously mentioned, no additional measures pertaining to foreign fishing are contained in this plan beyond those already approved through the PMP. It should be noted, however, that the Gulf closure approved in the PMP is to be held in reserve (as is presently the case) as long as the voluntary agreement by the Japanese tuna fishermen not to fish in the Gulf of Mexico is continued. Should the need for the Gulf closure arise, it would be implemented by Notice Action. Should this or any other aspect of this voluntary agreement be significantly altered,

the Councils would reconsider their position and take further action as warranted, presumably by Regulatory Amendment.

9.3 Alternatives Considered and Rejected

9.3.1 Foreign Measures

Over the ten years during which this plan evolved, many of the earlier management measures proposed pertained to regulating foreign fishing. Since these measures were first considered, foreign longlining in the EEZ has ceased in the Gulf of Mexico, Caribbean and South Atlantic region (south of Cape Lookout). Since 1982, the Japanese tuna fishermen have voluntarily agreed not to longline in the Gulf of Mexico and have expressed their intent not to fish in the Caribbean EEZ. In 1985 and 1986, only ten vessel permits were requested by Japan to fish for tunas within the EEZ, but at no time were there more than three vessels inside our EEZ. Considering this circumstance, the previous effort limiting formulas and phase out formulas considered by the Councils are, for the time being, moot.

9.3.2 Domestic Measures

9.3.2.1 Reject "No Sale" Provision

Rationale: Over the recent history of the development of this plan, this has been the single most contentious issue among the Councils.

It has always been recognized that a prohibition on the sale of billfish would be the most direct and effective means of preventing a commercial fishery from developing, and hence was the most effective measure to accomplish the principal objective of the plan. However, the following concerns were raised prompting the consideration of this alternative:

- A. The legality of prohibiting the sale of billfishes was uncertain.
- B. The measure was considered an excessively burdensome means to achieve the objectives of the plan.
- C. The benefits could not be quantified and thus one could never establish that the benefits outweigh the costs.
- D. It was not justified biologically.
- E. It was inequitable since U.S. vessels fishing alongside foreign vessels (outside the EEZ) could not retain and sell these fish, but foreign vessels could.
- F. It was wasteful because many billfish are dead when brought alongside; allowing their retention and sale would not impact the stock or the recreational fishery.
- G. Releasing fish will just make them available to foreign boats.

Most of these objections are discussed under the rationale for the no sale provision, so they will be discussed only briefly here.

- A. Legal opinion was recently received from both the Northeast and Southeast NOAA regional attorneys that the no sale provision is both legal and appropriate. Thus the Councils rejected this argument.
- B. An analysis of present commercial billfish landings and value indicated that the revenue from the sale of billfish is insignificant to commercial longliners, New England quasi-commercial/recreational harpooners and Caribbean recreational fishermen. The only fishermen to whom a no sale provision was thought to be possibly burdensome was the small-scale handline fishermen in Puerto Rico, and they have been exempted from this provision. The Councils therefore rejected this contention.
- C. The benefits cannot be quantified, but the generally poor understanding of the status of the stocks, the biology of the species, their population dynamics or stock structure, preclude quantifying the impacts of any management measure. While we cannot quantify the effects of this or other management measures, we do know that prohibiting sale is the most direct and effective means for preventing a commercial market and fishery from developing.
- The costs of implementing a no sale provision are considered very small. The negative impact on the longline and quasi-recreational fishery is insignificant and the cost of enforcement is very low because all enforcement can be dockside and/or at fish houses, greatly reducing costs.
- Our inability to quantify benefits is a shortcoming of the available scientific and economic data. The Councils do not believe that a resource or fishery should be jeopardized because of poor data.
- D. This measure or any other proposed management measure cannot be justified biologically because we do not have sufficient knowledge of the status, population dynamics or biology of the resource. We do know that any reduction in mortality will increase, however slightly, the population size and thus availability to the recreational fishery.
- The basis for the concern that this and other management measures could not be justified biologically was the extremely low tag recapture rate. An analysis done by NMFS-SEFC indicated that the probability of recapturing a tagged billfish was very low. These data have been questioned, however, citing tag shedding, tag-related mortality, non-reporting, etc. as reasons for the extremely low return rate. While these concerns were discussed at length, the benefits, however uncertain, were considered to outweigh the slight costs. This argument was therefore rejected.
- E. The inequity created by foreign vessels being able to retain and sell their billfish catch while U.S. vessels are prohibited from doing so is addressed, at least in part, by the measure prohibiting sale of imports. The Magnuson Act limits the scope of

the Council's authority and regulations promulgated through this management plan are constrained by these limitations. However, by prohibiting sale of all billfish from the stock, whether caught by foreign or domestic vessels, we will at least reduce this inequity. This is all the Councils' authority will allow.

- F. Concern over discards is not unique to this particular measure. Measures in the PMP require the Japanese to release all billfish and swordfish, whether dead or alive, when fishing in our zone; regulations promulgated as a result of ICCAT recommendations which impose incidental catch quotas for bluefin tuna result in considerable discarding in the Gulf of Mexico; and size limits for any species and many closed season restrictions result in discards. However, without a means of verifying that fish retained were in fact dead when brought alongside, it is assumed that all billfish, including those that are alive, would be retained if they could be sold. The relatively small economic loss to the commercial fishery resulting from this regulation is outweighed by the decreased mortality and increased availability to the recreational sector that will result from the release of live billfish.

While recognizing the discard problem, the Councils rejected this argument since it was felt that the potential benefits outweighed the relatively small costs.

- G. Encouraging the release of billfish through this or any other provision, does make those fish available to more than just domestic recreational fishermen. Foreign vessels may receive some of the benefits of our conservation efforts. However, as stated above, the Councils are limited in their authority, and can impose resource conservation measures only within their jurisdiction. Concurrent with this domestic effort, the Councils are encouraging international cooperation in reducing fishing mortality on the stock outside of our jurisdiction.

The Councils rejected this argument because they felt that failure to take conservation measures would serve neither the domestic fishery nor the stock. If some benefits of domestic constraint are realized by foreign vessels, then this is still preferable to no benefits accruing to anyone.

In summary, the alternative of allowing the sale of billfish, even if in conjunction with very restrictive possession limits, was rejected because this would reduce the ability of the plan to achieve its objectives. While we cannot quantify the benefits of the no sale provision or this alternative, it is clear that the less the incentive to retain live fish, the more the plan's objectives are accomplished. Since rejecting the no sale provision will allow possession and commercial marketing, it will encourage retention and increase mortality. For this reason, this measure was rejected in favor of the no sale provision which was considered more likely to accomplish the plan's objectives.

9.3.2.2 Reject Puerto Rican Handline Exemption

The Puerto Rican handline exemption was supported by all five Councils throughout the development of the plan. However, numerous attempts were made to obtain data documenting the number of participants and total billfish catches in this fishery without success. Because of this, the exemption was reconsidered, but ultimately accepted because the Councils felt that it would be unfair to disadvantage the few subsistence fishermen because of the inability of others to document their fishery. Therefore this alternative was rejected.

9.3.2.3 Bag Limits

Bag limits were considered as a mechanism to restrict recreational fishing mortality. The NMFS recreational billfish survey data base was accessed and analyzed to determine the impact of various bag limits. It was found that catching even a single billfish was a sufficiently rare event that a daily bag limit of even one fish per boat would have a negligible impact, reducing retention of blue marlin by only 7 percent, of white marlin by 15 percent and of sailfish by 9 percent. Even a limit of one fish per boat per year would decrease retention by only 39 percent for blue marlin, 43 percent for white marlin and 33 percent for sailfish.

To reduce mortality as much as size limits would require annual bag limits of less than one fish per person (the rates given above are per boat). This alternative was rejected because it would preclude traditional format tournament fishing, severely impact charter boats, would be extremely expensive to implement, and difficult and expensive to enforce. The alternative, minimum sizes, was considered far more practical, cost effective, less burdensome and more easily fine-tuned to obtain any desired reduction in mortality.

9.3.2.4 Alternative Minimum Sizes

Several alternative minimum sizes were considered, including:

- a) Minimum sizes to be based on size at maturity.
- b) Minimum sizes to be determined separately for each Council area based on size distribution of billfish in that area.
- c) Minimum sizes to be arbitrary based on input from Advisory Panel.

Basing the minimum size on size at maturation was considered because this approach provides an objective biological criterion. The published sizes at maturation are:

blue marlin:	males	76 - 97 lb
	females	103 - 135 lb
white marlin:	females	44 - 59 lb
sailfish:	males:	22 lb
	females:	30 - 40 lb

Since recruitment is not known to be a problem for any of these species, and the size at maturation, especially for blue marlin is so small, this alternative was rejected as not providing a sufficient reduction in mortality for blue marlin and perhaps white marlin as well.

Non-uniform size limits were considered because fish size varies markedly by geographic area. This is most pronounced for blue marlin, where, for example, the average size in the Caribbean in 1986 was 183 pounds while the average size in the Gulf of Mexico was 250 pounds and on the U.S. East Coast it was 281 pounds.

Non-uniform size limits were ultimately rejected because they were considered too difficult to enforce and unnecessary because, in general, the biggest size differences were at the extreme end of the range, where fish were large and uncommon. The differences in average size in the major fishing areas were relatively small. Since the size limits were weighted by abundance, it was felt that the overall sizes thus calculated would largely reflect the size distribution in the major fishing areas. This measure would require that enforcement personnel determine where the fish was caught before a case could be established, thus greatly inhibiting dockside enforcement. For these reasons, this alternative was rejected.

Other minimum sizes were proposed and rejected because they did not accomplish the objectives of the plan as well as the approved minimum sizes (in general, the alternative sizes proposed were so small as to have no impact on reducing mortality).

9.3.2.5 Allow Limited Commercial Retention

Several variations were proposed including one billfish per trip, one billfish of each species per trip, and unlimited possession above the minimum size. All were rejected for the same reason, that is, that none achieved the objectives of the plan as well as the preferred alternative. If sale is prohibited, then possession is considered unnecessary and inconsistent with the plan's objectives since at least some of the retained billfish could have been released alive. The objective of the plan is to reserve as many billfish as possible for the recreational fishery. Allowing commercial retention of even a limited number of fish reduces the plans ability to achieve that objective.

9.3.2.6 Separate Management Regime for New England Area

Rationale: Throughout the development of the billfish management plan the New England Council has been opposed to the prohibition on sale and other provisions of the plan. They felt that many measures, in particular the no sale provision, were excessively burdensome, indefensible and could not be justified relative to the benefits derived. Since all elements contained in the management plan had to be approved by all five Atlantic Coast Councils before the plan could be submitted, the Councils were at an impasse. In an effort to find a solution to this dilemma, the New England Council suggested an alternative management regime that would apply only to their area.

In essence this regime would have allowed retention and sale of one billfish of each species per trip for both recreational and commercial fishermen in the New England area. This alternative was rejected by the other Councils because it was probably in violation of the National Standards (which requires that management measures shall not discriminate between residents of different states), impossible to enforce, and inappropriate to achieve the objectives of the plan. This alternative became moot when the New England Council adopted the no sale provision as their preferred alternative.

9.3.2.7 Prohibit All Possession

This alternative was suggested as a way of eliminating the perceived inequity between allowing recreational possession and a total prohibition on commercial possession. Although this alternative would further decrease mortality by requiring all billfish to be released, it would severely restrict the traditional recreational activity of competitive fishing tournaments. Since the resource is being reserved for the recreational sector, it would be counter productive to deny this sector one of its principal uses of the resource. To the extent that this alternative restricted tournaments, it would reduce the social and economic benefits that accrue from the recreational use of the resource. The preferred alternative attempts to balance stock conservation considerations against the social and economic benefits derived from the consumptive use of the resource thereby maximizing returns to society.

9.3.2.8 Recreational Possession Limits in Combination With Size Limits

A possession limit in combination with size limits was proposed. However, it was shown that to further reduce mortality it would be much easier and less burdensome to merely increase the minimum size than to add another regulation. Nevertheless, the Councils are aware that both white marlin and sailfish may occasionally be available in relatively dense concentrations. At these times, multiple captures above the size limit are not uncommon, and the potential for multiple retentions would be eliminated by a bag limit. In addition, a bag limit of one fish of each species per boat would be consistent with state regulations in Massachusetts and Florida (proposed). While the Councils support this measure in principle, available data suggest that a bag limit of one fish per boat per day in conjunction with size limits would only reduce mortality an additional 3.7 percent for blue marlin and 7.6 percent for white marlin. However the Councils recognize that retention patterns may change following implementation of this FMP, and will thus reconsider bag limits in the first amendment to the plan.

9.3.2.9 Prohibit Drift Entanglement Nets

This measure was submitted twice under the swordfish FMP. It was rejected on both occasions by the Secretary of Commerce citing insufficient data to justify prohibition of the gear. There is no additional data on the fishery characteristics of the gear or incidental catch and no

indication that its use has become more widespread. Therefore, it is pointless to resubmit the same measure through the billfish FMP. However, the Councils remain very concerned about the use of this gear anywhere billfishes or threatened or endangered species might be encountered, and intend to monitor this situation very closely.

9.3.2.10 Designate Billfishes As Gamefish

This measure was discussed at great length during plan development. It was ultimately rejected because it was determined that the no sale provision accomplished the same thing and therefore this measure would be redundant.

9.3.2.11 All Tournaments Will Be "No Kill" Tournaments

The main reason for landing billfish in tournaments is to record their weight. Many tournaments have successfully adopted release or partial release formats suggesting that this alternative may be viable. Since most recreationally caught marlin are believed to be caught in tournaments, this alternative could have a significant impact on reducing billfish mortality. The Councils ultimately rejected this alternative, though, because they felt it would be very disruptive to the many tournaments whose scoring requires that fish be landed and weighed. There is little point in reserving billfish for recreational fishermen and then imposing a regulation that might preclude one of their most important recreational uses. The Councils therefore rejected this alternative as being unnecessarily burdensome at this time. However, the Councils strongly recommend that all tournaments adopt the no kill format, and if the present trend towards no kill tournaments does not continue, the Councils will reconsider this alternative in the first amendment but in no case later than 2 years after implementation of the plan.

9.4 No Action Alternative

The results of no action would be the loss of benefits that would accrue from the proposed actions. The proposed management regime serves largely to prevent the development and expansion of the commercial market and fishery for billfishes. Thus, it is not possible to know what the ultimate loss of benefits will be if this plan is not implemented and the commercial fishery allowed to develop. However, due to the relative scarcity of billfishes, it is unlikely that this action will preclude the development of a significant commercial fishery whose value could ever approach the value of the recreational fishery. Even if the commercial fishery could increase its production by 1000 percent (relative to 1986), it would still be worth only \$1.44 million ex-vessel at present prices. Even at this level, billfish would still represent less than four percent of the combined value of the tuna and swordfish catch. However, at this level of fishing intensity, it must be assumed that the recreational fishery would all but collapse (as happened to the recreational swordfish fishery). The billfish fishery by comparison is conservatively estimated to be worth at least \$100 million per year in total economic activity.

Short of a total collapse, and in the absence of actual data, we must assume that the growth of a commercial fishery will be at the expense of the recreational fishery and roughly proportional (at least beyond some threshold). The precise nature of the relationship is unknown and further analysis would be purely conjectural, and is therefore not presented. The substantial differential between the commercial value of a billfish sold for food and its recreational value would argue strongly, that almost regardless of the exact nature of the relationship between increased commercial harvest and decreased recreational activity, the no action alternative involves a considerable loss of benefits.

There are biological benefits to the stock in the form of reduced mortality that will also result from the proposed management regime. Although these cannot be quantified, they would be lost as a result of no action.

9.5 Benefit/Cost Analysis

Potential benefits must be weighed against the likely costs. However, because of extreme limitations in the available economic and sociological data on billfish and the recreational billfish fishery, the benefits cannot be readily quantified. It will therefore be necessary to compare costs which can be quantified against a qualitative assessment of benefits.

The primary costs of the FMP are:

Sunk Costs:

Plan development costs amounted to approximately: \$559,437, South Atlantic; \$163,603 as of 8/82, Gulf of Mexico; \$_____, Mid-Atlantic; \$_____, New England; \$_____, Caribbean.

Annual Costs

- o Annual plan administration (includes one Inter-Council Committee meeting annually to evaluate FMP) - \$15,000
- o Data collection and analysis - \$5,000
- o Enforcement - \$175,000

9.6 Recommendations to Other Governmental Entities

A. The Councils urge the states to implement the management measures proposed in this plan, where appropriate, within their jurisdiction.

Rationale: Having different regulations in the EEZ and the territorial seas would be confusing and cause problems in enforcement.

B. The Councils strongly recommend that an international plan for management of billfishes be implemented under the auspices of an international organization such as the International Commission for the Conservation of Atlantic Tunas (ICCAT).

Rationale: Billfish range well beyond the EEZ of the U.S. where they are harvested by foreign longline tuna fisheries and by recreational fisheries of other nations. The availability of billfishes within the EEZ as well as the long-term productivity of these resources will depend on

effective management of the stocks throughout their range. International management should complement, not replace, management by the U.S. in the EEZ.

C. The Councils urge all U.S. anglers to release billfishes which are not needed for tournament competition or as trophies. In addition, the Council recommends that released fish be tagged under the auspices of the National Marine Fisheries Service cooperative game fish tagging program.

Rationale: This recommendation is for the purpose of conserving the stocks and improving the information base. This information is needed for age and growth studies and to help define stock structure.

D. The Councils strongly urge that fishing tournament directors make advance arrangements for the useful disposition of any billfish brought to the dock for tournament competition. Donation to public institutions, prisons, schools, etc. for use as food is strongly recommended.

The Councils further recommend that all billfish tournaments adopt the release format. This was not adopted as a management measure at this time because of the potential for disrupting existing tournaments which would result in lost economic benefits to local communities. However, should the present trend towards "no kill" tournaments not continue, the Councils will reconsider this measure in the future.

Rationale: The Councils' desire is to minimize billfish mortality and eliminate waste of the resource to the greatest extent possible.

9.7 Summary of Regulatory Impacts of Proposed Measures

The benefits of this FMP derive from protection and enhancement of the recreational fishery, which has been determined to be the best use of the billfish resource. Although reliable statistics documenting the value of this fishery are not available, its value is at least \$100 million annually, as well as substantial intangible recreational and social benefits. As described in the No Action Alternative (Section 9.4), continuing lack of management of the domestic fishery will allow expansion of commercial billfish harvest, adversely affecting the recreational fishery and decreasing the net value to the nation of the billfish resource. In addition, limitations on billfish mortality from all domestic users contributes to rebuilding the stocks. Increasing abundance will increase recreational catch rates which will lead to increasing value returned to the nation from the resource.

The proposed measures will:

1. Prohibit the sale of billfishes taken from the management unit.
2. Prohibit the possession of billfishes aboard longline and drift net vessels in the EEZ.

3. Impose minimum sizes for recreational possession as follows:
 - blue marlin: 86 inches lower jaw-fork length
 - white marlin: 62 inches lower jaw-fork length
 - sailfish: 57 inches lower jaw-fork length
4. Require mandatory tournament reporting and support continuation of mandatory logbooks aboard longline vessels.
5. Exempt the Puerto Rican artisanal handline fishery.

Measures 1-3 are designed to reduce billfish mortality and to maximize billfish availability to the recreational fishery. Measure 4 is designed to collect necessary statistics for monitoring the effectiveness of the management regime and to increase our understanding of the fishery and the resource. Measure 5 will allow the small-scale, Puerto Rican handline fishery to continue to sell the few billfish they take as a bycatch.

Costs to implement this FMP include increased data collection costs, estimated at \$3,150 for tournament reporting. Logbooks are already required through the swordfish FMP and will not involve additional expense. The NMFS recreational billfish sampling program will have to be modified. However, it is not anticipated that there will be any additional cost associated with the modified program.

The commercial longline fishery will lose an estimated \$134,716 in billfish sales as a result of the prohibition on sale. This is estimated to represent 0.4 percent of their total gross income.

Enforcement costs are estimated to be \$175,000. Enforcement can take place at fish houses or dockside. Size limits will also be enforced dockside. Since most billfish are taken during tournaments, enforcement of this regulation can concentrate on these events, further simplifying enforcement.

There may be some initial negative impact on taxidermy businesses because fish under the minimum size cannot be retained. Based on information provided by a taxidermist, the maximum loss resulting from this measure would be between 13 and 20 percent of total revenue, if no fish under the minimum size are mounted. However, it is expected that replica fiberglass mounts which require only a length measurement to construct will become widely accepted within a short time. The additional availability of billfishes to the recreational fishery, resulting in increased catches may offset the reduction in demand for mounts that is expected to result from the minimum size regulation. It is impossible to quantify these impacts, but they are not expected to be significant.

9.8 Regulatory Flexibility Act (5 U.S.C. 601 et seq.)

The proposed management measures result in positive economic impacts for small American business entities associated with the billfish fishery. Virtually all the domestic business associated with the billfish fishery are classified as small businesses, and will consequently receive all of the economic gains resulting from the proposed measures. The benefits to the domestic

fishery, and regional and national economies, as well as the number of fishermen affected by the proposed measures is discussed above and in Sections 9.2, 9.4, and Appendix I of this plan.

10.0 RESEARCH NEEDS

10.1 Short-term Research and Data Needs

The most critical short-term data needs are:

1. Determine survival rate of the released billfish.
2. Determine the total recreational catch of each species of billfish.
3. Determine the bycatch of billfish in directed swordfish and tuna longline fisheries.
4. Determine mortality of billfish caught recreationally as well as on longlines.
5. Develop and implement a program to assess the recreational value of billfish fishing.
6. Determine total landings, stock-wide.

10.2 Long-term Research Needs

The most critical long-term research needs are:

1. Determine stock structure.
2. Determine stock status of each species of billfish.
3. Determine age, growth, natural and fishing mortality rates for each species.
4. Investigate ways of reducing billfish bycatch in the longline fishery through time/area closures or through changes in gear or fishing methods.

11.0 MONITORING PROCEDURES

The South Atlantic Council, in cooperation with the New England, Mid-Atlantic, Gulf of Mexico and Caribbean Fishery Management Councils, will review and monitor the plan on a continuing basis to assess the effectiveness of the management measures in attaining the objectives of this plan. Performance monitoring will be conducted by each of the five Councils concerned in its area of jurisdiction, in consultation with appropriate research, management and enforcement agencies and its Advisory Panel and Scientific and Statistical Committee. Public hearings may be conducted, as necessary, to receive public opinion on the effectiveness of the FMP and to determine the need for revisions. Any changes in foreign fishing effort or practices will be evaluated and may require additions to the regulatory regime.

It is hoped that analysis of logbook and observer data may suggest gear or fishing practices which reduce the incidental catch or mortality of billfishes. If so, the Councils would consider modifying the management regime accordingly.

12.0 REFERENCES

All references are included in the source document (Preface).

APPENDIX I

ECONOMIC ANALYSIS AND SUPPLEMENT

TO DRAFT RIR AND IRFA

Economic Analysis and Supplement to the Draft RIR and IRFA for the Fishery Management Plan
for Atlantic Billfishes

1.0 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 outweighs 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 regulatory priorities with the aim of maximizing the aggregate net benefit to society, taking into account the condition of the particular industries affected by regulations, and 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 (FMP) or significantly amend an existing plan, or may be significant in that they reflect important DOC/NOAA policy concerns and are the object of public interest.

The RIR is part of the process of preparing and reviewing fishery management plans. 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 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 serves as the basis for determining whether the proposed regulations implementing the fishery management plan or amendment are major/non-major 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).

The purpose of the Regulatory Flexibility Act is to relieve small businesses, small organizations, and small governmental entities from burdensome regulations and recordkeeping requirements. Since small businesses will be affected by the regulations to be promulgated under the FMP, this document also serves as the Regulatory Flexibility Analysis (RFA) for the FMP. In addition to analyses conducted for the RIR, the RFA provides an estimate of the number of small

businesses affected, a description of the small businesses affected and a discussion of the nature and size of impacts.

The Small Business Administration (SBA) defines a small business in the commercial fishing activity, classified and found in the Standard Industrial Classification Code, Major Group, Hunting, Fishing and Trapping (SIC 09), as a firm with receipts up to \$2.0 million annually. SBA defines a small business in the charter boat activity to be in the SIC 7999 code, Amusement and Recreational Services, not elsewhere classified as a firm with receipts up to \$3.5 million per year.

2.0 PROBLEMS IN THE BILLFISH FISHERY

Problems in the fishery which the management plan addresses are:

1. There is intense competition for the available resource between the recreational fishery for billfish and other fisheries that have a bycatch of billfish.
2. There is a developing commercial market for billfish and an increasing value for the product, thus encouraging directed fishing and/or increased retention of incidentally caught billfish. This situation jeopardizes the economically valuable, traditional recreational fishery and threatens to undermine the conservation ethic developed by this user group.
3. There is a rapidly expanding domestic tuna longline fishery which has a higher billfish bycatch than the historical swordfish fishery.
4. The current statistical and scientific data base is inadequate for stock assessment and is likely to remain so for the foreseeable future. A long term biologically sound management regime, either domestic or international, will not be possible until an adequate and accurate data base is available.

3.0 OBJECTIVES

The following management objectives have been developed for the billfish fishery in the Atlantic, Gulf of Mexico, and Caribbean EEZs:

1. Maintain the highest availability of billfishes to the U.S. recreational fishery.
2. Optimize the social and economic benefits to the nation by reserving the billfish resource for its traditional use, which on the continental U.S. is almost entirely a recreational fishery. In the Caribbean, the fishery is both a recreational and small scale handline fishery where billfishes are used as a source of food.
3. Increase understanding of the condition of billfish stocks and the billfish fishery.

4.0 LISTING OF MANAGEMENT MEASURES CONSIDERED

4.1 Accepted Management Measures

The following management measures form the basis for managing the billfish resource within the U.S. EEZ. The proposed measures apply to the entire management unit:

1. The sale of all billfish is prohibited ("no sale provision") except those from the traditional handline fishery in Puerto Rico.
2. Possession of billfish aboard commercial longline vessels is prohibited.
3. Only billfish (i.e., blue marlin, white marlin, sailfish, and spearfish) having been captured by recreational fishermen using conventional rod and reel may be retained in possession.
4. Only billfish (i.e., blue marlin, white marlin, sailfish, and spearfish) exceeding the following minimum sizes may be retained in possession:

blue marlin:	86 inches from tip of lower jaw to fork of tail
white marlin:	62 inches from tip of lower jaw to fork of tail
sailfish:	57 inches from tip of lower jaw to fork of tail
spearfish:	no minimum size

5. Mandatory reporting of catch and effort data for recreational fishing tournaments.

Foreign fishing management measures: All measures presently implemented and/or approved but held in reserve through the PMP are adopted in their entirety into this FMP. No additional management measures that apply to foreign fishing are proposed in this FMP. These measures and their rationale can be found in the PMP for Atlantic Billfishes and Sharks and in 50 CFR Section 611.61. They will not be discussed further in this FMP.

4.2 Management Measures Considered and Rejected

- 1a-5a No action was considered as an alternative to each specific management measure considered.
- 1b. Prohibit sale of all billfish, from the management unit, including those from the traditional handline fishery in Puerto Rico.
- 2b. Prohibit all possession of billfish from the management area.
- 3b. Prohibit possession of billfish from the management area by recreational fishermen in excess of certain limits (i.e., recreational bag limit).
- 3c. Prohibit possession of billfish from the management area during tournaments by participants in the tournament. (i.e., establish that all tournaments would be "no kill" tournaments).

- 4b. Only billfish exceeding a minimum size based on size at sexual maturity may be retained in possession.
- 4c. Only billfish exceeding a minimum size in each council area based on the average size distribution of billfish caught in that area may be retained (non-uniform, size limits).

5.0 ANALYSIS OF BENEFITS AND COSTS

5.1 Methodology and Data

5.1.1. Methodology

Three of the five proposed management measures are likely to have larger economic effects on fishermen. These are (in abbreviated fashion): 1) the no-sale provision, 2) minimum size limits and retention of fish caught by rod and reel, and 3) the no-possession provision applying to long-liners and drift netters.

One effect common to these three proposed measures is that fishing mortality will be reduced, hence stocks are expected to rebuild in the future. Another effect common to proposed management measures one and three is to reallocate the incidental commercial harvest to the recreational fishery. As a portion of the incidental commercial harvest that is returned will be live fish, the stock available for recreational harvest will increase. Average size of fish caught may also increase in the future; however, the analysis below does not incorporate this possibility directly.

As the stock rebuilds in the future, the probability of catching a billfish will increase. Thus, the quality of the fishing experience is increased. For purposes of estimating the effects of this quality improvement in the recreational fishery, the improvement is modeled as an outward shift (increase) in recreational demand (see Huppert, 1983)¹. Such treatment of quality improvement is not only consistent with, and predicted by demand theory, there is also evidence available from survey data suggesting that these shifts will take place. One can then estimate the change in consumer surplus resulting from this demand shift.

The 1986 survey by Brown and Ofiera of New Jersey's big game fishermen posed the following question to vessel owners/operators (and solicited responses by species, including blue and white marlin):

"Considering the amount of fish caught on a typical trip, how much extra would you be willing to pay in trip costs to catch one more fish of the following species?"

Responses to these questions yielded average values of \$170 for white marlin; \$365 for blue marlin. It should be noted that the values solicited for an additional fish represent values net of other benefits associated with a fishing trip as those benefits are already being realized and paid for. In addition, the demand for trips is employed as it is in this "market" that economic benefits

¹Huppert, Daniel D., 1983. NMFS Guidelines on Economic Valuation of Marine Recreational Fishing. Technical Memorandum, NOAA-TM-NMFS-SWFC-12. 35 p.

are realized, and the question in the New Jersey survey links fishing quality and trip costs. In valuing additional fish made available to the recreational sector by reduced commercial harvests (from no sale and no commercial crew personal use), these survey responses are used as shown below in figure 1 (for the blue marlin). Once these values are generated, they must be adjusted by the probability of catching one more fish per trip. That probability should rise over time as stocks rebuild toward a new bio-economic equilibrium in the fishery.

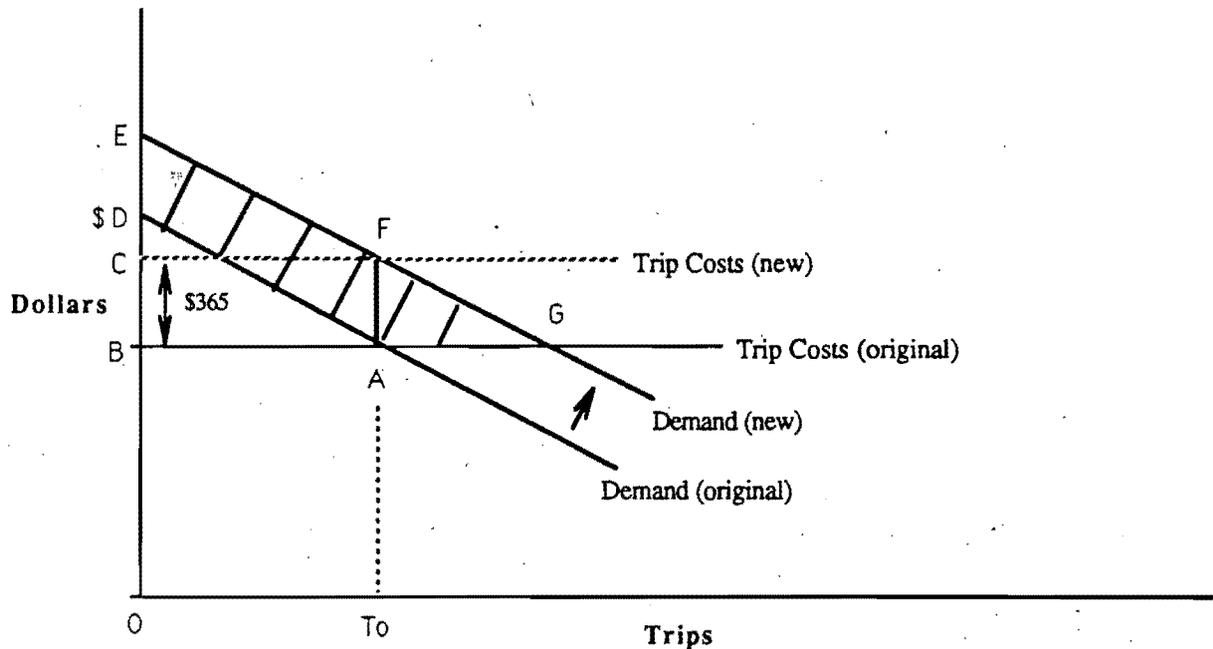


Figure 1. Schematic of Model Used to Value Increased Recreational Catch for a Representative Trip

Trip costs (or the supply function) for billfish trips is assumed to be perfectly elastic (given at least some excess capacity, and the ease with which recreational vessels can switch fisheries). Consumer surplus under the original demand function is area ABD, and is defined as consumer benefits in excess of payment for the good or service (payment = area OBAT).

As posed in the New Jersey survey, the question asks what the vessel operator would pay in additional trip costs for one more fish, i.e., for a higher quality fishing experience. This is modeled as an increase in demand to intersect the (hypothetically higher) trip cost function. The amount of the vertical shift is the \$365 response. Thus, the change in consumer surplus is the area under the new demand curve, but above the original one, or area ADEFG. This area can be approximated by treating area ADEF as a rectangle of dimension (\$365) (average number of trips), and adding the area of the triangle AFG. To estimate the triangle AFG, we either must know or

assume a value for the own-price elasticity of demand for trips. This elasticity is defined as the percent change in quantity demanded divided by the percent change in price, or

$$n = \frac{\% \Delta Q}{\% \Delta P}$$

We can estimate the $\% \Delta P$ (the percent change in trip costs) from the New Jersey survey data. As there is no known estimate for billfish own-price demand elasticity, we assume a base value of 1. We can then compute $\% \Delta Q$, the length of AG in the triangle AFG. At this point we can estimate the area between the two demand curves, or the change in consumer surplus.

Once this area is estimated, it must be adjusted by the probability of catching one more fish per trip. It is reasonable to assume that this probability is quite low soon after regulations are imposed, but rises as the cumulative live returns of fish to the stock increase, and as reproduction from those returns also add to the stock. Thus we trace out over a finite time period what we think is a reasonable bound for this probability. This probability times the change in consumer surplus gives the expected value of catching one more fish per trip. To estimate the value for the entire fishery, we multiply by the total number of trips. From these increased annual recreational values, we subtract annual losses to commercial fishermen imposed by the no-sale and no-possession regulations.

The model used to value commercial losses is as follows:

NO - POSSESSION

NO - SALE

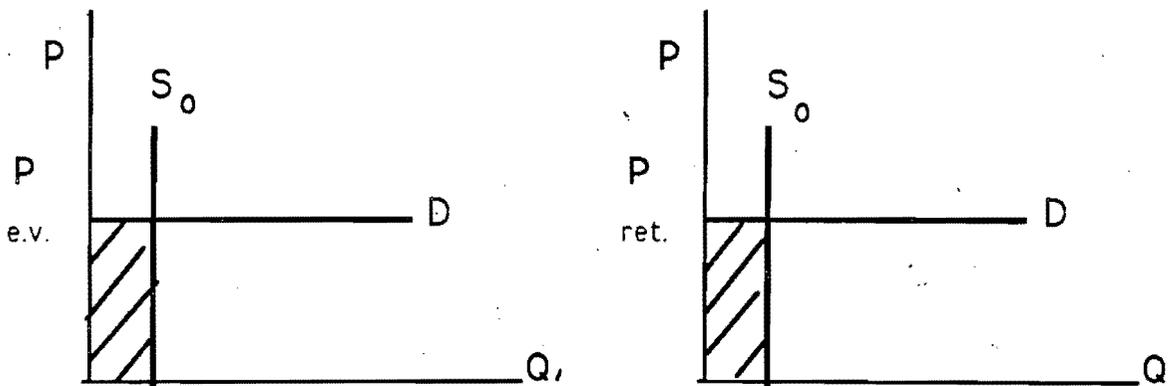


Figure 2. Schematic of Model Used to Value Effects of Regulation on Commercial Fishery

Since catch of billfish by commercial fishermen are incidental catches, there is no reason to believe that the no-sale provision, or the no-possession provision will in any way affect commercial effort. Thus whatever has been caught is illustrated as an inelastic (vertical) supply function. We are also assuming a perfectly elastic demand curve (i.e., consumers have perfect

**Valued at one-half the imputed wage of \$39.40 per hour for land travel time for private vessel fishermen, and also applied to paying customers of charter. Captain's (and mate, if any) presumed to be included in trip price charged customers. One-third the imputed wage applied to time spent traveling on water to fishing site (water travel time was approximately three times the land travel time).

Willingness to pay additional trip costs for one more fish (average):

Willingness to pay

White marlin	\$170
Blue marlin	\$365

These data, together with assumed values for own-price demand elasticity, were used to generate the amount of consumer surplus created by the demand shift. For the base case (assuming the demand elasticity = 1), the following are the estimated consumer surpluses:

	<u>White Marlin</u>	<u>Blue Marlin</u>
Private trip	\$1314	\$2978
Charter trip	\$1288	\$2856

The computation for the white marlin private trip is illustrated below in Figure 3.

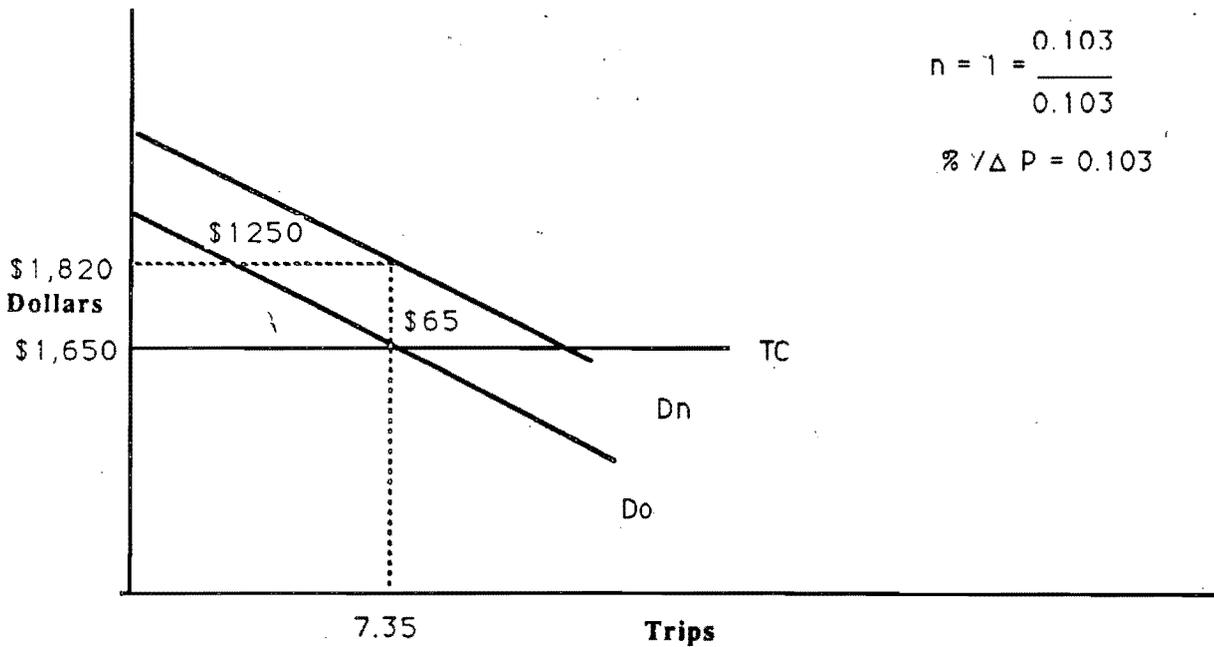


Figure 3. Estimation of Consumer Surplus for a White Marlin, Private Vessel Trip

$$\begin{aligned} \text{Area} &= [170(7.35) + 1/2\{(.103)(7.35)(170)\}] (P) \\ &= [1250 + 65] (P) \end{aligned}$$

Expected Value = \$1314 (probability of catching one more fish per trip)

5.1.3 Stock Enhancement From Live Releases From:

5.1.3.1 No Sale, No Retention Regulations

The impact of the no sale, no longline retention regulations will be to reduce the present commercial longline landings to zero. Total reported marlin landings in 1986 was 204,215 pounds. Mean weight was assumed to be 264 pounds for blue marlin and 50 pounds for white marlin (Billfish Source Document).

Based on 21 observer trips, the observed marlin species composition was: 49% Blue Marlin; 51% White Marlin. Assuming these proportions are representative of the total landings, then:

$$\begin{aligned} \text{Total Number of Marlin} &= 204,215 + (.49)(264) + (.51)(50) \\ &= 1319 \text{ marlin; of which } 646 \text{ are blue marlin} \\ &\qquad\qquad\qquad \text{and } 673 \text{ are white marlin} \end{aligned}$$

From observer data, 72% of the blue marlin and 52% of the white marlin caught by longliners are alive.

Therefore, of 646 blue marlin caught and sold, 72% = 465 would be released alive each year with the no sale and no longline possession regulations. Likewise, of 673 white marlin released, 52% = 350 would be released alive each year following implementation of the plan.

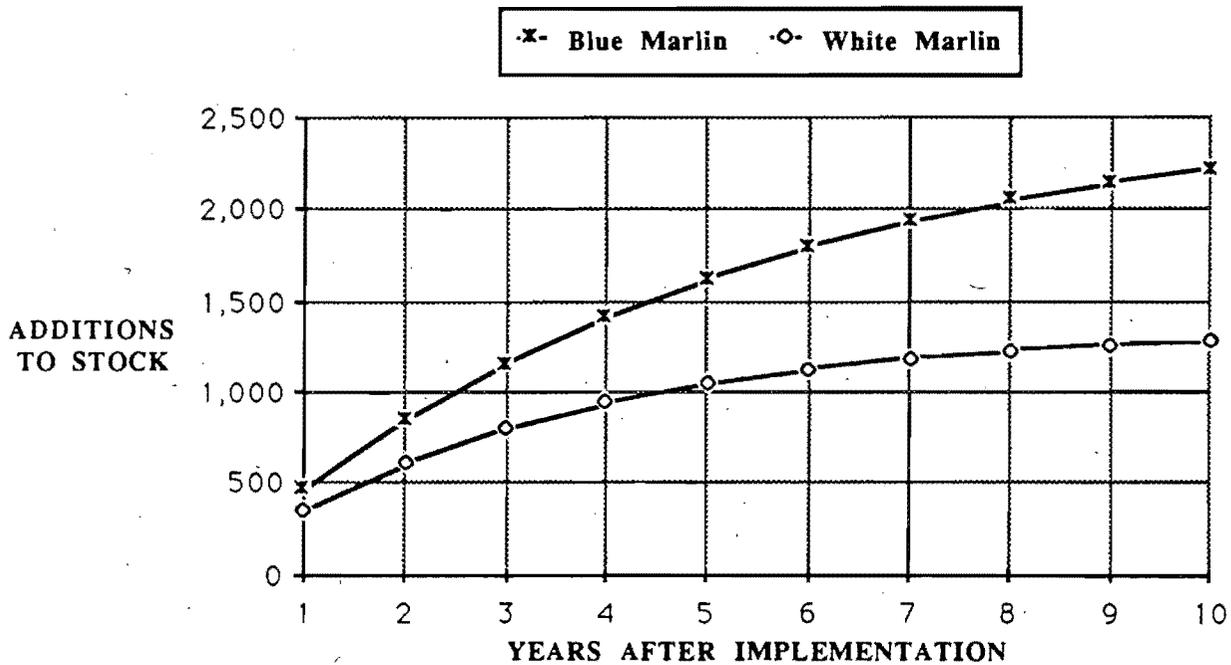
Since both blue and white marlin are relatively long lived, the annual additions accrue over time, decremented by natural mortality. Natural mortality rates for these species are not known, so we assumed values of $M=0.2$ for blue marlin and $M=0.3$ for white marlin, and assumed that additions to the stock will continue to accrue for ten years after which equilibrium is reached at a new level equal to the original population size plus the cumulative additions remaining alive in the population in year 10. These values are shown in Table 1 and Figure 4.

5.1.3.2 Minimum Sizes (see Table 2)

Estimates of the number of live additions to the population that will result from minimum size regulations, were derived from total recreational billfish landings. Two estimates of recreational landings were used - Hamm and Slater, 1979, Survey of the Recreational Billfish and Shark Fisheries; and NMFS 1983, Oceanic Pelagics Program Summary.

Table 1. Additions to Stock From No Sale, No Possession Regulations

Years After Implementation	No. Blue Marlin	Cumulative No. of Blue Marlin	No. White Marlin	Cumulative No. of White Marlin
1	465	465	350	350
2	381	846	259	609
3	312	1158	192	801
4	255	1413	142	943
5	209	1622	105	1048
6	171	1793	78	1126
7	140	1933	58	1184
8	115	2048	43	1227
9	94	2142	32	1259
10	77	2219	24	1283

**Figure 4. Additions to Blue and White Marlin Stocks From No Sale, No Possession Provisions.**

The minimum sizes specified in the management plan were derived from size frequency data and are calculated to reduce retention by 50 percent for blue and white marlin and by 30 percent for sailfish.

Hamm and Slater estimated:

2,452 blue marlin were caught and retained

4,787 white marlin were caught and retained

15,699 sailfish were caught and retained

Of these, the number of fish that will be released with the minimum size regulations are:

$(2,452) \times (.5) = 1,226$ blue marlin

$(4,787 \times (.5)) = 2,394$ white marlin

$(15,699) \times (.3) = 4,710$ sailfish

Using the 1983 estimates:

1,513 blue marlin were caught and retained $\times (.5) = 757$ released

3,242 white marlin were caught and retained $\times (.5) = 1,621$ released

no estimate for sailfish caught

Table 2. Projected Additions to Billfish Stocks Resulting From the Imposition of Minimum Sizes

Years After Implementation	BLUE MARLIN (M=0.2)		1983 Census		WHITE MARLIN (M=0.3)		1983 Census		SAILFISH (M=0.34)	
	1977 Survey Annual	Cum.	Annual	Cum.	1977 Survey Annual	Cum.	Annual	Cum.	1977 Survey Annual	Cum.
1	1,226	1,226	757	757	2,394	2,394	1,621	1,621	4,710	4,710
2	1,004	2,230	620	1,377	1,774	4,168	1,201	2,822	3,352	8,062
3	822	3,052	507	1,884	1,314	5,482	890	3,712	2,386	10,448
4	673	3,725	415	2,299	973	6,455	659	4,371	1,698	12,146
5	551	4,276	340	2,639	721	7,176	488	4,859	1,209	13,355
6	451	4,727	278	2,917	534	7,710	362	5,221	860	14,215
7	369	5,096	228	3,145	396	8,106	268	5,489	612	14,827
8	302	5,398	187	3,332	293	8,399	199	5,688	436	15,263
9	248	5,646	153	3,485	217	8,616	147	5,835	310	15,573
10	203	5,849	125	3,610	161	8,777	109	5,944	221	15,794

These numbers were decremented each year for estimated natural mortality rates of $M=0.2$ for blue marlin; $M=0.3$ for white marlin; and $M=0.34$ for sailfish (from Source Document). All fish released by the recreational fishery were assumed to be alive. Resulting additions and cumulative additions to the population are shown in Table 2. Estimated cumulative additions remaining alive in the population after each year up to year ten are shown in Figures 5, 6, and 7.

Because the population has been incremented by the live releases discussed above, the probability of catching a fish will increase. The lower bound on this probability was calculated by assuming the present tag-recapture rate of 1% for blue marlin and 2% for white marlin, and applying these rates to the additions to stock for each year to estimate the number of anticipated recaptures. To simplify the calculation of gains to the recreational fishery, for each species, a weighted average consumer surplus value of charter and private trips (weighted by the proportion

of trips taken by each category) was used and multiplied by the number of anticipated recaptures for that species.

Tag recaptures are believed to be unrealistically low, and not representative of the actual increased probability of catching an additional fish. Thus, to calculate an upper bound on the probability of catching an additional fish, we assumed that the increase would be linear and increase as the stock size increased up to year ten. For blue marlin we assumed a probability in

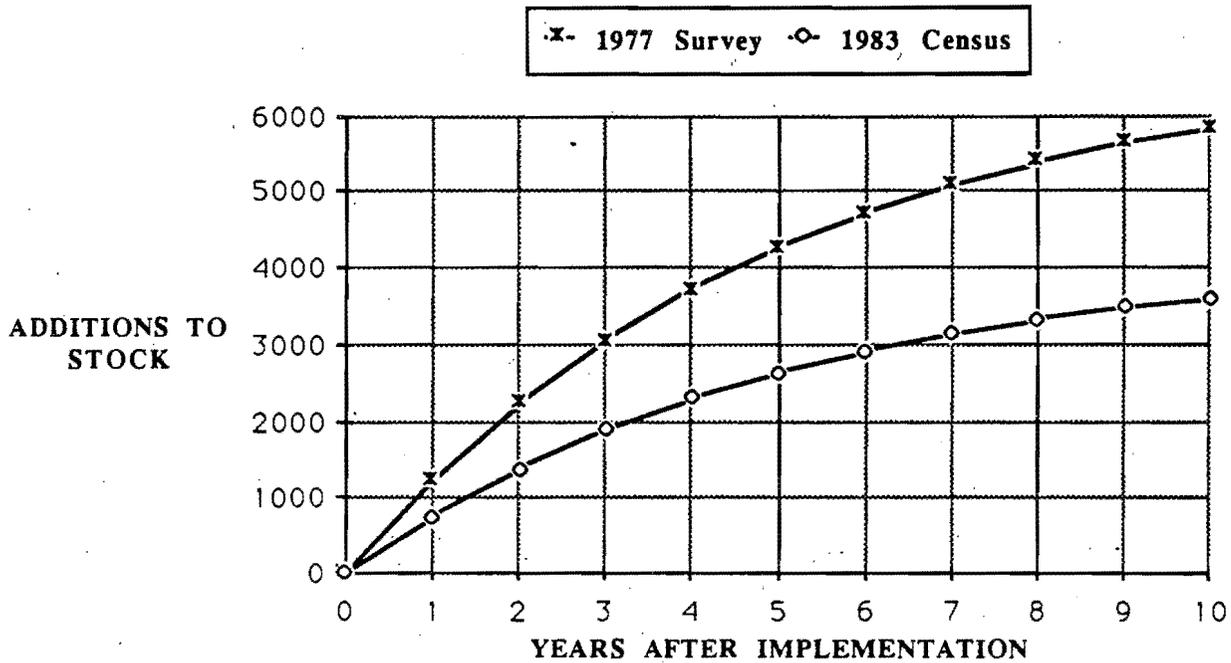


Figure 5. Additions to Blue Marlin Stock from Minimum Sizes

year one of 0.001 which increased (by .001 per year) up to 0.01 in year ten. For white marlin we assumed an initial increase in the probability of recapture of 0.002, increasing linearly to 0.02 in year ten.

These probabilities, and estimated trips, are the final pieces of information necessary to evaluate the economic effects of the proposed major regulations. The number of charter boats that could potentially fish for billfish is unclear. Hamm and Slater (1979, p.87) state that out of all respondents reporting days fished information, 8.5 percent were charter boats. If charter boats reported days fished information in the same proportion as private vessels, then 8.5 percent of the

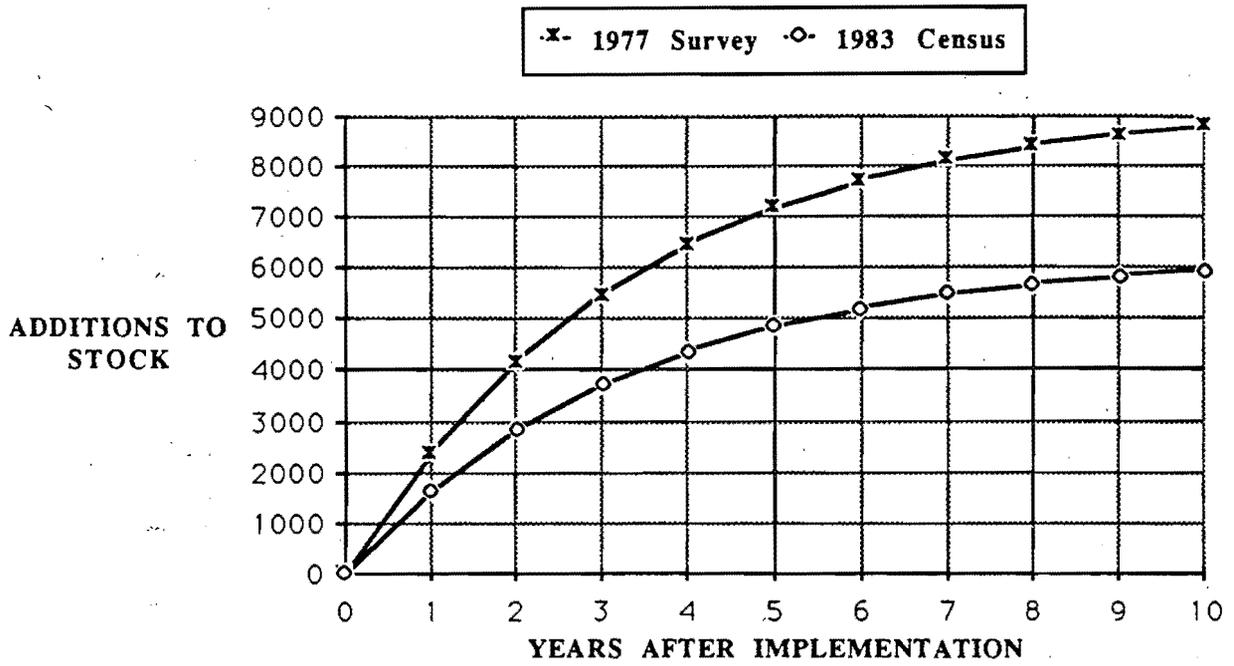


Figure 6. Additions to White Marlin Stock from Minimum Sizes

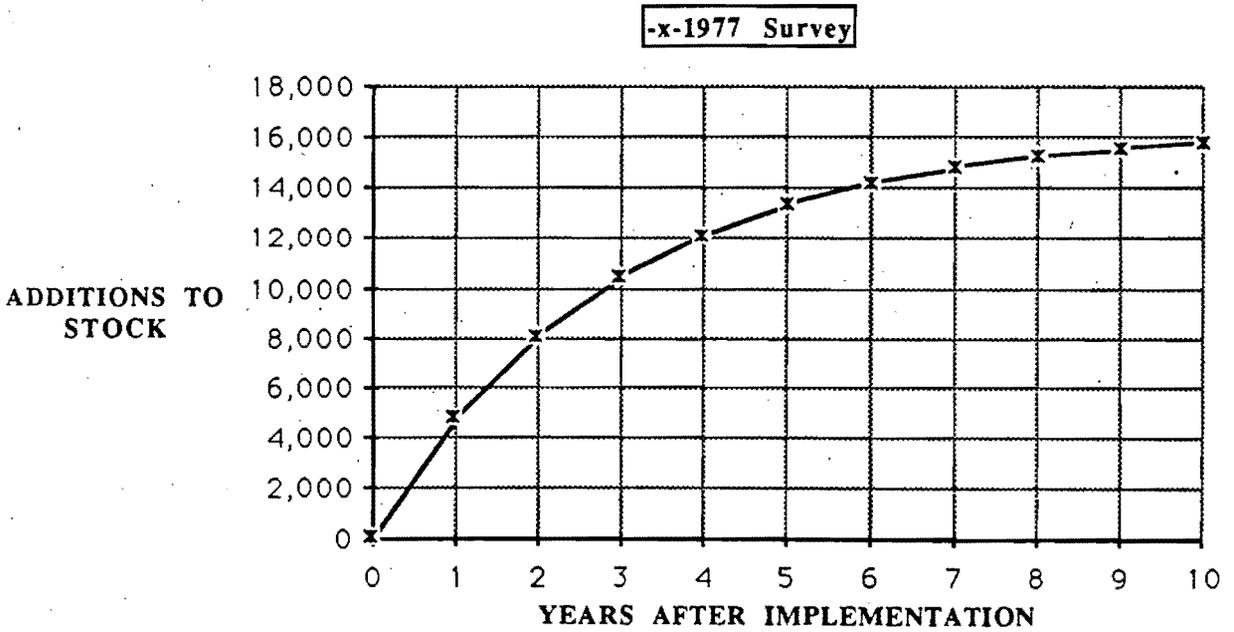


Figure 7. Additions to Sailfish Stock from Minimum Sizes

estimated number of vessels fishing for billfish were charter boats or, using the most conservative estimate in Hamm and Slater (1979, p.78), there could have been 1,477 charter boats involved in the billfish fishery. These boats were reported to account for 18.7 percent of the total days fished or 55,875 days fished for billfish; each day fished represented one trip. Subtracting an estimated 55,875 charter trips from total trips of 296,100 yields an estimated total private vessel trips of 240,225. Charter and private trips are allocated between blue and white marlin as 30 percent blue marlin; 70 percent white marlin. This differs from the blue marlin catch as a percent of total marlins caught (23 percent, from Table 3 in text) in that the success rate of blue-targeted trips is likely to be lower than white-targeted trips. Therefore, the trip summary is as follows:

	<u>Blue Marlin</u>	<u>White Marlin</u>	<u>Total</u>
Number charter	16,763	39,112	55,875
Number private	72,068	168,157	240,225

5.2 Analysis of Accepted Management Measures

5.2.1 Prohibition on Sale of Billfish

Using the methodology detailed above, estimates of annual gains to recreational fishermen and losses to commercial fishermen were generated for the first 10 years after implementation of the plan. Recreational gains were generated for private and charter vessels, for blue and white marlin separately, then aggregated for minimum and maximum estimates of additions to stock. Base own-price recreational demand elasticity was assumed to be one: simulations of .5 and 1.5 were also tested, with results not greatly different from 1. Maximum and minimum estimates correspond to higher or lower estimates of the probability of catching one more fish per trip, as explained earlier.

Computation of net present value for blue marlin charter trips for one year, for example, is
 [Value of change in Consumer Surplus] [Probability of catching one more fish] [Estimated number of blue marlin charter trips]

For 1 year, using the initial maximum probability of .001, the computation is: [\$2,856] [.001] [16,763] = \$47,875. By year 10, this value rises to \$478,751 because the probability of catching one more fish has risen to 0.01 under the assumed maximum probability bound.

Annual losses to commercial fishermen are deducted from recreational gains, and the net gain discounted over the 10-year period. Commercial losses are computed as follows:

Using consumer level values discussed above and average weights of 264 pounds for blue marlin and 50 pounds for white marlin, the loss in consumer level value is \$232,000 per year for blue marlin and \$332,000 per year for white marlin or a total loss of \$564,000 per year. It is reasonable to assume that these fish would be retained for personal use by the crews of the vessels historically selling fish. The total ex-vessel value of billfish reported landed in 1986 was \$134,716 and is an estimate of the annual personal use value. Over 10 years, at a 10 percent discount rate,

the present value would be \$827,698. The net annual loss in societal value would be \$429,284 = \$564,000 - \$134,716.

The present value of recreational gains minus commercial losses, each year over 10 years are shown in Table 3. Thus, over 10 years, the range of net present value is:

Net Present Value
 Minimum Estimate = - \$2.67 million
 Maximum Estimate = + \$18.71 million

Table 3. Net Gains and Losses From No Sale Provision at Two Probability Levels of Catching an Additional Fish

YEAR	RECREATIONAL GAINS		COMMERCIAL LOSSES \$\$	NET GAINS		NET DISCOUNTED AT 10%	
	MINIMUM \$\$	MAXIMUM \$\$		MINIMUM \$\$	MAXIMUM \$\$	MINIMUM \$\$	MAXIMUM \$\$
1	23,826	490,245	500,000	-476,174	-9,755	-432,842	-8,867
2	39,156	1,338,753	500,000	-460,844	838,753	-380,657	692,810
3	56,148	2,143,898	500,000	-443,852	1,643,898	-333,333	1,234,567
4	65,937	2,949,597	500,000	-434,063	2,449,597	-296,465	1,673,075
5	74,433	3,755,074	500,000	-425,567	3,255,074	-264,277	2,021,401
6	82,929	4,559,259	500,000	-417,071	4,059,255	-235,228	2,289,420
7	87,177	5,364,567	500,000	-412,823	4,864,567	-211,778	2,495,523
8	91,425	6,169,713	500,000	-408,575	5,669,713	-189,425	2,647,756
9	94,380	6,975,411	500,000	-405,620	6,475,411	-171,983	2,745,574
10	98,628	8,051,627	500,000	-401,372	7,551,627	-154,930	2,914,928
TOTALS						-2,670,918	18,706,187

5.2.2 Minimum Sizes

A similar procedure for estimating recreational gains to minimum size limits could be employed as that used to estimate gains under the no-sale provision of #1. However, retention of fish is not a necessary condition for a successful recreational trip. Those released will also improve the probability of catching fish in the future. The estimated additions to the stock will exceed those resulting from the no-sale provision by 1.6 to 2.6 times for blue marlin; and by 4.6 to 6.8 times for white marlin. Since there are no commercial losses associated with this measure, the impacts will result in large net gains at both minimum and maximum probabilities of increased catches. Table 4 shows the net gains each year over 10 years at the minimum levels of probability of recapture (i.e., 1% for blue marlin; 2% for white marlin; and 1% for sailfish). Calculations are based on cumulative additions to the stock as shown in Table 2, and weighted mean values of an additional fish for charter and private boats as discussed previously. Values for sailfish consumer surplus are assumed to be the same as those for white marlin. Over the 10 year period, the minimum estimate of net present value is between \$2.0 and \$2.6 million. At the higher level of probability of recapture, net present value would exceed the maximum estimate discussed under

management measure #1. Therefore, since demand is not likely to be reduced by the minimum size limits, and significant future gains will result, the effect of this policy will be positive and will likely exceed, by a considerable amount, the gains under the no-sale provision. If average size of fish caught begins increasing over time, recreational demand could shift outward even more.

Table 4. Net Gains From Minimum Size Provision at Lowest Level of Probability of Recapture. Two Estimates of Recreational Marlin Catches were Used (1977 and 1983).

Year	NET GAINS		NET DISCOUNTED AT 10%	
	1983 Data	1977 Data	1983 Data	1977 Data
	\$	\$	\$	\$
1	125,787	158,295	114,340	143,890
2	218,511	277,062	180,490	228,853
3	286,299	368,307	215,011	276,599
4	336,909	432,585	230,109	295,456
5	375,513	486,519	233,194	302,128
6	403,773	521,613	227,728	294,190
7	425,199	551,535	218,127	282,937
8	442,746	574,623	206,762	268,349
9	456,414	589,584	193,520	249,984
10	464,541	602,252	179,313	232,855
Totals			\$1,998,594	\$2,575,241

5.2.3 No Possession

The effect of this measure would be to prohibit commercial longliners from retaining billfish for personal use in addition to eliminating the sale of fish caught from longliners. Considered in conjunction with management measure 1, and assuming that fish historically sold by vessels other than longline would be released, then this measure would, like measure 1, result in live addition to stock. These stock additions have been shown in previous tables and graphs. Considered above, this measure would cost the commercial fishery about \$.6 million per year, with recreational gains as computed under measure 1. The net present values under the probability ranges (for 10 years) would be the following:

Minimum Estimate = - \$3.27 million

Maximum Estimate = + \$18.2 million

5.2.4 Data Reporting Requirements

This management measure has no direct effect on the societal value of billfish as it does not affect the catch, landings, or distribution of catch and landings among user groups. It does have an implementation cost of \$1,700 per year for the Federal costs of data collection as well as a respondent cost of \$350 per year for 100 burden hours of reporting (per Rod Dalton personal communication, January 19, 1988). Enforcement costs are assumed to be negligible. The present value of perpetual implementation costs is \$20,500.

5.2.5 Exemption for Puerto Rican Handline Fishery

The extent of the Puerto Rican handline fishery is not well documented. The reported average Caribbean sales of 23 blue marlin and 16 white marlin in 1985-86 was assumed to be caught by the handline fishery in the analysis of management measures 1 and 2. Banning possession and subsequent sales of these fish by handline boats would represent an incremental loss in consumer level value of \$21,000 per year (present value of perpetual loss equal to \$210,000) beyond the loss discussed in the analysis of management measures above.

5.3 Rejected Management Measures

1a-5a. No action alternative.

Concern over recent increases in incidental commercial catches, and potential losses of value in the recreational sector were major motivations for this plan. The estimated gains to society under measure 1 above of -\$2.67 million to +\$18.71 million is one estimate of costs of "no action".

- 1b. Prohibit sale of all billfish from the management unit, including those from the traditional handline fishery in Puerto Rico.

This measure was considered as an alternative to accepted 1 and 5 above, the difference being that exception to the no-sale provision was made for the small Puerto Rican fishery. These effects were judged insignificant compared to the values associated with accepted measure 1 above, and the small costs associated with accepted measure 5.

- 2b. Prohibit all possession of billfish from the management unit.

This measure, above, would cost commercial fishermen about \$.6 million per year, with gains similar to those reported under accepted measures 1-3 above. The partial effect of no recreational retention was judged to be small compared to 1 and 3 above, as many recreationally caught fish are returned anyway.

- 3b. Prohibit possession of billfish from the management area by recreational fishermen in excess of certain limits (i.e., recreational bag limit).

The effect of this management measure would be similar to accepted management measure 2 with the addition of an increase in recreational catch release and subsequent recaptures. The size of the increase depends on the increase in recreational releases (i.e., the reduction in retained recreational catch).

- 3c. Prohibit possession of billfish from the management area during tournaments by participants in the tournaments (i.e., establish that all tournaments would be "no kill" tournaments).

See the discussion for 3b.

- 4b. Only billfish exceeding a minimum size based on size at sexual maturity may be retained in possession.

The effects of this management measure would be similar to those for accepted management measure 2. The size limits in management measure 2 are smaller than size at sexual maturity, resulting in a larger increase in recreational releases and thus increase in recreational use value than would larger size limits. If this management measure were implemented alone, smaller size limits would result in a larger retained catch to be sold with a correspondingly smaller loss in consumer level value. On balance, smaller size limits will cause a smaller loss in societal value, the amounts depending on the proportional reduction in catch.

- 4c. Only billfish exceeding a minimum size in each Council area based on the average size distribution of billfish caught in that area may be retained (non-uniform size limits).

See the discussion for 4b. There may be additional enforcement costs as well as "leakages" into bordering areas with smaller size limits.

6.0 IMPACT ON BUSINESSES

The FMP notes that there were approximately 625 swordfish permits issued in 1987. Assuming that those permittees that catch, and sell, swordfish could also catch and sell billfish, then an estimate of the businesses involved is the number of permit holders. Although there are no data, it may be reasonable to assume that most of the permit holders would qualify as small businesses under the Small Business Administration guidelines. The extent of the impact on commercial vessels would be the change in ex-vessel value. This ranges from no change under the no action alternatives to an annual loss of ex-vessel receipts that averaged \$116,000 over the 1985-86 years. The per business annual loss estimate is thus \$186 or a capitalized revenue loss of \$1,860. There are a number of ancillary small businesses that could be affected by the FMP's management measures, including seafood processors and distributors, taxidermists, docks and marinas, boatyards, fishing equipment manufacturers, etc. Data are not readily available to estimate the extent of impacts on these ancillary businesses.

Increasing demand by recreational fishermen due to expected and subsequently, realized increases in catch rather suggest increases in sales by firms supplying this sector. However, these increased sales are transfers from consumers, and are not (if the supply functions are perfectly elastic) increases in producers' or consumers' surplus, which are what we want to measure. If, on the other hand, long-run supplies are less than perfectly elastic, producers' surpluses will be generated, as shown in Figure 8 below. New producers' surplus generated by the demand shift is area P1P2BCA. However, P1P2BA of that is lost consumer surplus, hence is a transfer and should not be counted as a net gain to society. Only triangle BCA would--that part of producers' surplus not transferred from consumers--represent net gains to society (and accruing to suppliers

of imports to recreational fishermen). While we suspect this supply function to be relatively elastic (flat), we do not have estimates of its elasticity. Yet this area is likely to be small relative to changes in consumers surplus from the demand shifts discussed above under methodology.

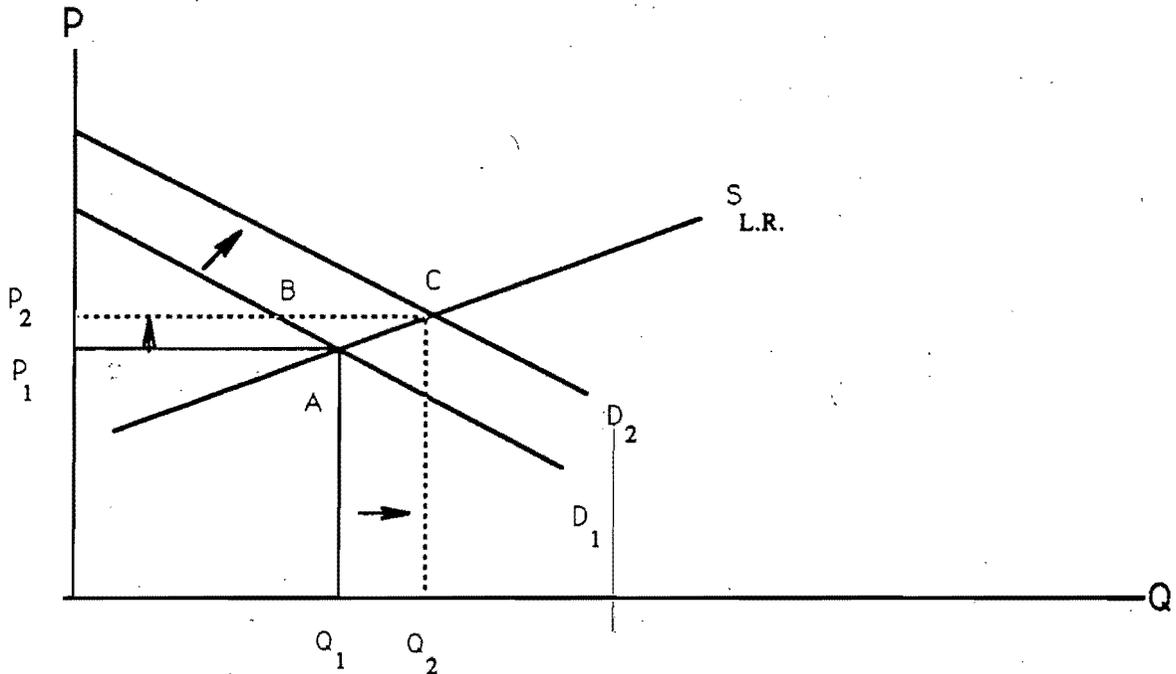


Figure 8.

7.0 SUMMARY

The cumulative effect of the proposed management measures may be as high as \$36 million in net gain (present value over the first 10 years). The FMP makes a strong contribution to the objectives, and the accepted management measures are superior to the no action alternative.

APPENDIX II

RESPONSE TO COMMENTS

**FEIS BILLFISH
SUMMARY OF PUBLIC HEARINGS**

A total of 25 public hearings were held on the Billfish Plan between September 28 and October 21, 1987 at selected sites along the east coast, Gulf of Mexico, and in the Caribbean area. The public hearing dates and locations by Council area were:

SOUTH ATLANTIC COUNCIL

Key West, FL	9/28/87
Morehead City, NC	9/28/87
Ft. Lauderdale, FL	9/29/87
Manteo, NC	9/29/87
Jacksonville, FL	9/30/87
Charleston, SC	9/30/87
Savannah, GA	10/1/87

GULF OF MEXICO COUNCIL

Panama City, FL	10/12/87
Mobile, AL	10/13/87
Biloxi, MS	10/14/87
New Orleans, LA	10/15/87
Houston, TX	10/19/87
Port Aransas, TX	10/20/87
Port Isabel, TX	10/21/87

CARIBBEAN COUNCIL

St. Croix, USVI	10/14/87
St. Thomas, USVI	10/15/87
Hato Rey, PR	10/20/87
Lajas, PR	10/21/87

MID-ATLANTIC COUNCIL

Virginia Beach, VA	10/12/87
Salisbury, MD	10/13/87
Wall, NJ	10/15/87
Ronkonkoma, NY	10/20/87

NEW ENGLAND COUNCIL

Hyannis, MA	9/28/87
Portsmouth, NH	9/30/87
Galilee, RI	10/1/87

The following comments (by major category) were received either from attendees at the public hearings or from letters to the Councils.

MINIMUM SIZE LIMITS

COMMENTS: Fish for mounting should be exempted because:

- Smaller fish are preferred for mounts
- Public will not accept replica mounts
- Real fish are needed to make molds for replicas
- Most people mount their first fish regardless of size
- Would have a very large economic impact on the taxidermy industry
- Would have a very large economic impact on the charter boat industry
- Quality of mounts will suffer if fish is not available

RESPONSE: Most comments relative to exemptions to the minimum size for mounting have been received from either those in the taxidermy business or from charter boat captains and mates. There has been little comment from the general public, or from sport fishing organizations. The Councils believe that conservation of the billfish resource requires that all sources of mortality be minimized, and that all user groups must share the burden of management to ensure the continuation of a viable recreational fishery. The Councils have heard considerable testimony from representatives of the taxidermy industry, and have concluded that it is not essential to have any part of the actual fish to make a mount. Although testimony was conflicting, it appears that the master mold can be used to make 50 plugs, and that each plug can be used to make a new mold from which approximately 100 mounts can be made. Thus, killing the fish is unnecessary and an extremely wasteful use of such a valuable resource. Allowing an exemption for the taxidermy industry will reduce the effectiveness of the management plan and provide a loophole which will make enforcement impossible.

The Councils also feel that there are many factors that will ameliorate the impacts on the taxidermy industry. First, availability of billfish to the recreational fishery should increase as a result of this management plan making more fish available to be mounted. Second, the mean size should increase over time which will increase the proportion of fish that can legally be retained. Further, since replica mounts are technologically possible, there is nothing to preclude any fish from being mounted, regardless of its size. It is anticipated that the an affidavit signed by the captain certifying the capture and attesting to the length, girth and estimated weight will be provided to the angler so that an accurate replica mount can be made. With a vigorous advertising and education campaign by the industry, an approach such as this may make replica mounts entirely acceptable. In any case, the Councils feel that the management plan is needed to ensure the continuation of the recreational billfish fishery without which the taxidermy and charter boat industries will suffer considerably more.

COMMENTS: Size limits are unnecessary
 Minimum sizes are too big
 Minimum sizes are too small
 Should have different minimum sizes for different areas
 Should have a tolerance limit for minimum sizes

RESPONSE: One objective of the management plan is to reduce billfish mortality caused by the recreational fishery. Minimum sizes do this by restricting legal retention to fish above a minimum size. The minimum sizes specified in the FMP will reduce recreational mortality by 50 percent, 50 percent, and 30 percent for blue marlin, white marlin and sailfish respectively. The Councils believe reducing recreational billfish mortality is essential for conservation of the resource. A tolerance limit is functionally the same as lowering the minimum size which will reduce the effectiveness of this measure. If a fisherman is not certain that the fish is above the minimum size, the fish should be released.

The Councils considered different minimum sizes for different areas, because size distributions vary by area. However, for ease of enforcement and uniformity of regulations throughout the range of the species, this option was rejected in favor of uniform minimum sizes. It is because uniform sizes are being used that the minimum size will seem to small in some areas and too big in others. On average though, the impact should be to reduce mortality by the above percentages.

COMMENTS: Minimum sizes will increase discards of dead fish
 Blue marlin come up dead or die after release

RESPONSE: The Councils are unaware of any evidence that suggests that discards will increase because of minimum sizes. Data from observers aboard U.S. longline vessels indicates that 76 percent of blue marlin are alive when brought alongside. Some of these fish will certainly die shortly after release, but most are believed to survive. There is no reason to believe that mortality of recreationally caught fish is higher than longline caught fish. While some percentage of the fish caught and released in the recreational fishery will probably not survive, there is no reason to believe that this percentage will be so high as to eliminate the benefits of this measure.

The effectiveness of the management plan requires that a significant percentage of recreationally and commercially caught and released billfish survive. While there is presently no reason to believe that this is not true, the plan recognizes that research on the survival of released billfish is a very high priority. Should this research determine that most billfish do not survive being caught, a different management regime would be initiated through plan amendment.

COMMENTS: For blue marlin, minimum size protects the wrong fish - i.e., should be protecting spawning females not small males.

RESPONSE: While it is true that few blue marlin over 200 pounds are males, the population of fish under 200 pounds is composed of both males and females and it is the fish under 200 pounds that will be impacted by the management plan. Since there is no evidence of recruitment overfishing, there is presently no biological reason to selectively protect large females. Any reduction in mortality of fish under 200 pounds will increase the number of fish over 200 pounds, and will increase the spawning potential of the stock. The minimum size will not increase fishing mortality on large females.

COMMENTS: Small fish are needed for science

RESPONSE: The plan is not intended to reduce the availability of fish needed for scientific research. The Magnuson Act already contains provision for scientific research, and specific exemptions need not be explicit in the plan.

COMMENTS: Impossible to measure a live billfish accurately
Fish will be killed in the process of measuring it

RESPONSE: The Councils recognize that measuring live billfish can be difficult. However, it is anticipated that measuring a billfish will be done quickly by either laying a marked line alongside the fish or by sliding a clip attached to the proper length line over the fishing leader. A brightly colored float on the other end of the line will allow a very quick determination of whether the fish is of legal size. This procedure should not harm the fish and will delay its release by no more than a minute or two. Further, only those fish that are very close to the minimum size will need to be measured. If a fish is not clearly above the minimum size, the difficulty in measuring it should discourage retention of the fish, a situation that the Councils consider desirable. Ultimately the Councils hope to reduce billfish retention to as near zero as possible.

COMMENTS: Should have bag limits in lieu of minimum sizes
Should issue big game-type tags for retention of billfish in lieu of size limits

RESPONSE: The Councils have considered daily and annual bag limits in lieu of minimum sizes as a mechanism to reduce mortality. However, as discussed in the plan, retention of more than one billfish per day is so infrequent that a bag limit will do very little to reduce mortality. Even an annual bag limit of one fish per boat will not reduce mortality as much as the target reductions of 50 percent for blue and white marlin. This, combined with the difficulty and expense involved in administering such a program caused the Councils to reject this alternative in favor of size limits.

COMMENTS: Should have bag limits in addition to minimum sizes

RESPONSE: Data presently available indicates that bag limits in addition to size limits would only reduce mortality by a very small additional amount. For blue marlin, a bag limit of 1 fish per boat per day in conjunction with size limits would only reduce mortality an additional 3.7 percent. For white marlin, a bag limit of 1 fish per boat per day would decrease mortality only an additional 7.6 percent. The Councils felt that further decreases in mortality could be more easily accomplished by increasing the minimum sizes rather than adding another regulation should this be shown to be necessary. However, the Councils recognize that multiple catches of white marlin and sailfish above the minimum sizes are not infrequent. Although present data indicates that multiple retentions are infrequent, the Councils are concerned that retention patterns may change as a result of this management plan, and will be carefully monitoring this following implementation. The Councils will reconsider bag limits in the first amendment to the plan.

COMMENTS: Minimum size should apply only to tournaments (i.e., professional fishermen)

RESPONSE: The Councils believe that the burden of management should be shared by all user groups. Further, since the intent of the minimum size regulation is to reduce mortality by a specified amount, if the regulation were to apply only to tournaments then the desired reduction would not be achieved, and minimum sizes would have to be increased considerably. The size necessary to achieve the desired reduction could be determined only if it were known what percent of the total billfish catch is taken in tournaments, and this information is not available. Further, a regulation that applied only to tournaments would greatly complicate enforcement.

COMMENTS: Recreational fishermen should not be allowed to possess any billfish

RESPONSE: While it is true that this measure would further reduce mortality and perhaps create greater equity between recreational and commercial user groups, the Councils feel that this measure would be excessively restrictive, severely impacting tournaments and taxidermy businesses, thereby reducing the overall benefits derived from the resource.

COMMENTS: Fish under the minimum size would be world records in some line categories

RESPONSE: While this is true for very light line categories (e.g., less than 12 lb test for blue marlin), the Councils do not consider this to be sufficient justification to change the management regime.

COMMENTS: Minimum size should be expressed in length rather than weight

RESPONSE: The considerable testimony received during the public comment period establishing the difficulty and uncertainty of estimating the weight of a live billfish, the problem of weight loss

from the time of capture to the time of weighing, and the difficulty of establishing a violation if there is no scale available, convinced the Councils to adopt this recommendation.

COMMERCIAL RESTRICTIONS

COMMENTS:

- No sale provision discriminates against the commercial fishery
- No evidence that the billfish stocks need management
- Potentially more valuable commercial fishery is not being allowed to develop
- No documentation that a commercial market will reduce availability to recreational fishery
- Fishery should be managed for MSY

RESPONSE: The Councils have concluded that the greatest overall benefit to the nation will result from reserving billfish, to the extent possible, for the recreational fishery. The available data suggests that the economic value of the recreational fishery is several orders of magnitude greater than the commercial fishery. The traditional fishery is almost entirely recreational, there is presently no directed commercial fishery, and the incidental catch of billfishes in the longline fishery represents an insignificant source of income. In light of this, the Councils feel that prohibiting the sale of these species will not have a significant impact on the commercial fishery. Even if the commercial fishery were to increase production an order of magnitude (1000%), the value to the longline fishery would be less than four percent of the combined tuna and swordfish catch. At these levels, it can be assumed that the recreational fishery would be severely impacted or eliminated. Without the no sale provision, the commercial market will continue to develop, thwarting the objectives of the management plan.

COMMENTS: No sale provision is unfair to consumers

RESPONSE: Considering the value of a live billfish to the recreational fishery, the Councils believe that utilizing these species for food is a very inefficient use of the resource. There are many species of fish that can be readily substituted for billfish as a food, but there are no other species that can substitute for billfish as game fish.

COMMENTS:

- Regulations will result in dead discards
- Some bycatch allowance should be given to longliners since fish will be dead anyway

RESPONSE: The Councils recognize that the prohibition on sale and possession of billfish by commercial longline vessels will result in dead discards. However, there is no way to ensure that live billfish are released unless the prohibition applies to all fish. The Councils recognize that this

is a waste of a valuable resource and have identified as a research priority, investigating ways of reducing the incidental catch of billfish.

COMMENTS: Releasing fish will only make them available to foreign fisheries

RESPONSE: The vast majority of billfish tagged in the EEZ that have been recaptured, have been recaptured in the EEZ. Thus, most of the benefits of this management measure should accrue to the U.S. recreational fishery.

COMMENTS: Released fish do not survive

RESPONSE: The survival rate of released billfish is not known but is believed to be high. However, since the effectiveness of the plan is contingent on the veracity of this belief, determining the survival rate of released billfish is a high priority research item.

COMMENTS: Should be an exemption for the New England harpoon fishery

New England harpoon fishery is a traditional fishery

RESPONSE: The New England harpoon fishery is a quasi-commercial fishery participated in by recreational fishermen who sell their catch. These people are believed to derive an insignificant amount of income from this activity. Since the fish are far more valuable to the charter boat industry and the recreational rod and reel fishery, this is not considered an efficient use of the resource. In contrast, the artisanal handline fishery in Puerto Rico is not a directed fishery and while incidental catches of billfish are relatively rare, they represent a significant contribution to the income of these fishermen.

COMMENTS: Violates National Standard #4 - fairness and equity

RESPONSE: National Standard #4 states that conservation and management measures shall not discriminate between residents of different states, and that fishing privileges shall be allocated among various U.S. fishermen such that these allocations are fair and equitable to all such fishermen, reasonably calculated to promote conservation, and carried out in such a manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.

The management measures contained in the FMP are for the express purpose of reducing fishing mortality, and thus promoting conservation to the extent possible, considering the limitations of U.S. jurisdiction over the stock. Since the commercial harvest is very small and takes billfish only incidental to tunas and swordfish, the management measures restricting commercial possession and sale will have an insignificant impact on these fishermen. In contrast, while insignificant to the commercial sector, these landings have the potential of significantly impacting recreational billfish fishing. Since it is believed that reserving these fish for the recreational fishery will optimize the social and economic benefits to the nation, the Councils do not believe that these measures are unfair. Rather, the measures in the FMP will, increase the

availability of billfish and therefore the opportunity for everyone to catch billfish in a non-commercial manner.

COMMENTS: Marlin bycatch will not be reduced unless tuna fishery is controlled
Unrestricted longlining must be controlled

RESPONSE: It is believed that the management measures contained in the FMP will reduce billfish mortality. While controlling the longline fishery would undoubtedly reduce the marlin bycatch, it would be at the expense of the very valuable commercial tuna and swordfish fisheries. The Councils do not have authority under the Magnuson Fishery Conservation and Management Act to regulate tuna fisheries.

IMPORTS

COMMENTS: Import restrictions are unjustified
Councils have no authority to prohibit imports
Import restrictions would be justified only if billfish were endangered species
Import restrictions violate international trade practices
Import restrictions are contrary to U.S. policy encouraging free trade
FMP violates GATT and other international agreements to which U.S. is a party
Magnuson Act does not authorize regulation of trade and markets
Magnuson Act does not authorize the Councils to prohibit the sale of fish that are legally caught

RESPONSE: The intent of the plan is to prohibit the sale of billfish from the same stock as those fish found in the U.S. EEZ. The Councils are not attempting to control the market place, prohibit imports or interfere with foreign trade. What the Councils are trying to do is to increase the availability of billfish to the recreational fishery. To accomplish this, it is essential that the commercialization of the billfish resource be prevented. The FMP does this by prohibiting the sale of these fish in the U.S. The Councils believe that prohibiting the sale of a species of fish is a legal action under the Magnuson Act if the intent is for conservation of the resource. Since the Councils intent is to manage billfish as a recreational fishery, conservation of the resource, in this context, requires maintaining the population at the highest possible level. Allowing the development and expansion of the commercial harvest from these stocks would be inconsistent with these objectives. Clearly, since these measures impact foreign and domestic fishermen equally, the Councils are not trying to secure a marketing advantage for domestic fishermen, eliminate competition or manipulate the marketplace or the price. Further, the question is academic since at

the present time there are essentially no billfish being imported into the U.S. from the stocks being managed by this plan.

PUERTO RICAN HANDLINE EXEMPTION

COMMENTS: Exemption creates a loophole that will allow illegal fish to be sold
 Enforcement will be impossible
 Should have a way of containing artisanal fishery
 There is no artisanal fishery
 There should be no exemption
 There should be a cap of no more than 30 billfish annually

RESPONSE: The Councils have been told of the existence of an artisanal fishery in Puerto Rico for at least five years. The Councils do not want to disadvantage the few legitimate artisanal fishermen for whom the few billfish they catch may contribute significantly to their income. Nonetheless, the Councils recognize that this exemption will create a loophole and complicate enforcement. To address these concerns, there will be a cap on landings, permitting requirements for these fishermen, and tracking and monitoring provisions.

COMMENTS: Should have an exemption for Virgin Islands artisanal fishery

RESPONSE: While the Councils have been told of the existence of an artisanal fishery in Puerto Rico for several years, an artisanal fishery in the Virgin Islands was not mentioned until the plan went to public hearings. The Councils will reconsider an exemption for this fishery if and when its existence is documented and its size and landings quantified.

REPORTING REQUIREMENTS

COMMENTS: Need mandatory observers aboard longliners

RESPONSE: The Councils previously requested mandatory observers through the swordfish FMP, and the request was disapproved. Until such time as NOAA-NMFS develops a domestic observer policy, mandatory observer coverage will not be approved.

COMMENTS: Mandatory tournament reporting is unnecessary since voluntary system is working
 Mandatory tournament reporting will discourage participation
 It will be expensive to enforce
 Quality of data will deteriorate
 No one will serve as tournament director

Will force tournament directors to become either law enforcement agents or co-conspirators

RESPONSE: The intent of this measure is to determine total landings from this major user group. Tournament results provided voluntarily do not provide uniform data or complete coverage. Billfish tournaments often generate considerable amounts of money for their organizers and for the local economy which more than offsets the small inconvenience involved in providing basic catch and effort data. While there is reasonably good voluntary coverage in the Gulf of Mexico, in other areas there is no voluntary reporting, so the question of data quality is moot. It is unlikely that any tournaments will be cancelled because of the small effort involved in providing these data. Tournament directors will only be documenting tournament results and would certainly not be liable if someone lands an undersize fish.

MISCELLANEOUS

COMMENTS: All recreational and commercial boats should be licensed

RESPONSE: All commercial swordfish vessels are required to have a permit. Requiring all recreational boats that might catch a billfish to have a license would be tantamount to a saltwater fishing license, and is beyond the scope of this management plan.

COMMENTS: Drift gill nets should be prohibited in waters known to contain large populations of billfish

RESPONSE: The fishing characteristics of drift gill nets used for king mackerel off the southeast coast of Florida have been documented by onboard observers, and the South Atlantic and Gulf Councils are preparing an amendment to the Coastal Migratory Pelagics plan to ban this gear (although not necessarily because of their billfish bycatch). A request by the five involved Councils to place observers aboard pelagic drift gill net vessels in 1983 was denied by the Secretary. Thus, there is insufficient information available to evaluate the impact of this gear on billfish.

COMMENTS: Certain areas of the Gulf of Mexico should be declared sanctuaries

RESPONSE: There is presently no data to suggest what areas should be so designated, why such an action is necessary, or what benefits would accrue from this. The migratory nature of billfish would suggest that such action would be ineffective.

COMMENTS: Stainless steel hooks and multiple hook rigs should be prohibited
 Use of live bait should be prohibited
 Sale of live bait should be prohibited where sailfish are migrating

RESPONSE: Use of live bait has been shown to be very effective in catching sailfish. Unfortunately, fish caught on live bait are often hooked deeply, and are probably less likely to survive than fish caught trolling. However, stainless steel hooks, multiple hook rigs and live bait are all used for other species in addition to billfish. Enforcement of such a prohibition would be impossible.

COMMENTS: All tournaments should be "no kill"

RESPONSE: The Councils have considered this measure but have decided not to implement it at this time. However, the Councils intend to reconsider this measure within two years of implementation of this plan.

COMMENTS: Billfish should be designated as gamefish

RESPONSE: The Councils considered this measure but ultimately rejected it because it was believed that the no sale provision accomplished the same thing.

COMMENTS: Reserving the entire fishery for the recreational group is not justified by the data presented

RESPONSE: Quantitative data to determine what the impact of present trends in the fishery will be are not available. However, based on qualitative data, the Councils have concluded that it is in the best interest of the nation to reserve the resource for recreational use.

COMMENTS: The plan is not in the national interest but serves only a few elite fishermen

RESPONSE: The plan is intended to benefit recreational fishermen. While offshore fishing is less accessible than inshore fishing and undoubtedly has fewer participants, it is certainly not limited to a few elite fishermen. In 1986 in New Jersey alone there were more than 600 private boats carrying an average of 5 people per trip on 11,443 offshore big game fishing trips. In addition, there were 3,281 charter trips taken with, presumably, at least four fishermen per trip. While comparable data is not available for other states, it is clear that participation is not limited to a few elite fishermen.

COMMENTS: Reserving billfish for the recreational fishery sets a precedent that may be used to restrict recreational fishing for other species
 Reserving billfish for the recreational fishery sets a precedent that may be used to restrict commercial fishing for other species
 Swordfish and tuna should be reserved for commercial fishermen

RESPONSE: The management regime for each species of fish should be developed on a case by case basis considering the particular characteristics of the species and the fisheries involved in their harvest. Billfish are probably unique in that they are not subject to a directed commercial fishery, have historically had little or no use as food in the U.S., and are probably the most desirable and valuable of all game fish. An appropriate management regime for these species would not necessarily be appropriate for any other species.

COMMENTS: An increased catch of tuna may increase availability of billfish by reducing competition for food

RESPONSE: It is certainly possible that reducing the tuna population may allow closely competing species such as billfish to increase their population size. Whether or not this occurs is beyond the control of this plan since it contains no regulations pertaining to tuna.

COMMENTS: An increase in the catch of billfish may result in an increase in reproduction and availability

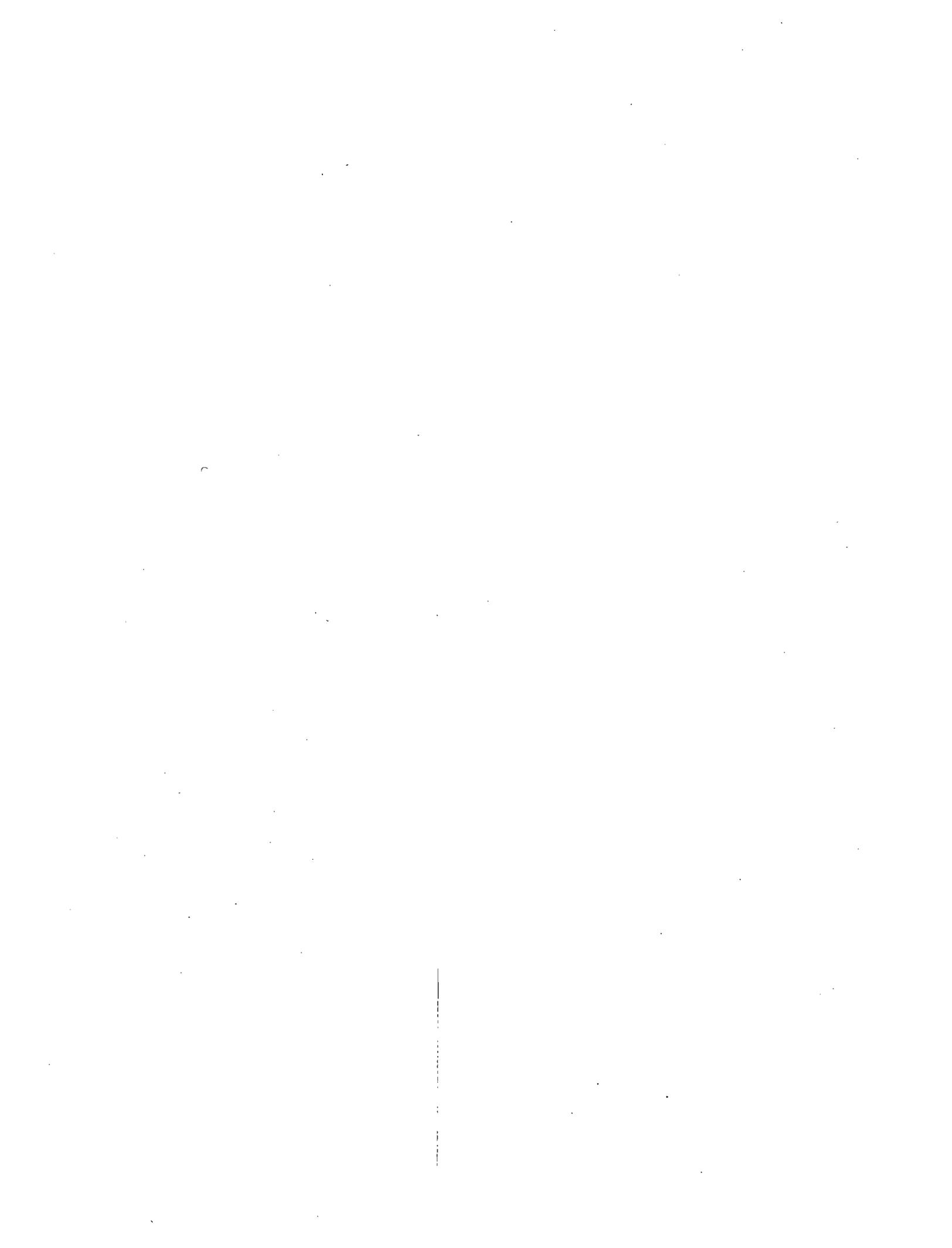
RESPONSE: Reproductive potential of the stock is related to adult biomass which will be reduced if catches increase. While the actual stock-recruitment relationship is unknown, at present population levels, it is very unlikely that recruitment will be inversely related to stock size. The opposite is far more likely to be true.

COMMENTS: Time and area restrictions in the PMP should be removed because they have no conservation justification and U.S. fishermen are not subject to the same regulations

RESPONSE: Time and area restrictions in the PMP apply only to foreign vessels fishing for tunas in the EEZ. These measures were implemented to reduce gear conflicts between U.S. and foreign vessels. The potential for gear conflicts in these areas is, if anything, even greater now than when the area closures were implemented.

APPENDIX III

COAST GUARD EVALUATION



U.S. Department
of Transportation

United States
Coast Guard



Commandant
United States Coast Guard

Washington, D.C. 20593-0001
Staff Symbol: G-OLE
Phone: (202)267-1890

16207.2

Mr. Austin R. Magill
Acting Chief, Fishery Management
Coordination Division
National Marine Fisheries Service
Washington, D.C. 20235

OCT 21 1987



Dear Mr. Magill:

I have reviewed the draft Fishery Management Plan for Atlantic Billfishes (FMP) and associated documents. The draft FMP contains management measures that should have little effect on at-sea enforcement requirements; enforcement of this FMP will be accomplished coincidentally with enforcement of the regulations for commercial swordfish vessels. I have no objection to its approval. I would like to comment, however, on some elements of the FMP and the proposed regulations.

The FMP does not address the incidental catch of billfish by trawl fisheries. In the 1985 Atlantic Billfish and Sharks Preliminary Management Plan, these catches were shown to be insignificant. This analysis was based on the directed and joint venture squid fisheries in 1983 and 1984. Since that time, mackerel joint ventures have grown tremendously. I suggest the FMP briefly address this issue and lay to rest concerns by recreational users that the trawl fisheries take significant numbers of billfish.

The FMP does not clearly define data reporting requirements. In particular, the information that must be submitted by longline vessels and the reporting period are not specified. The FMP does state, in the discussion of the impacts of this measure, that the plan "...will require the same information already being collected through the swordfish plan." I suggest this comment be moved into the description of the management measure so that data requirements are clearly defined.

On page 57, the FMP briefly discusses the limited data available on drift entanglement nets. The Councils may wish to investigate the high seas squid driftnet fisheries in the North Pacific Ocean for more information on this fishing method. Recent boardings of these vessels have shown significant incidental catches of swordfish and tuna, and there is growing evidence that these nets trap significant numbers of marine mammals. Available information may help the Councils evaluate use of such nets in the North Atlantic.

The discussion of enforcement costs on page 61 is incomplete. I agree with the rationale that there will be little additional cost for at-sea enforcement. Boarding officers will have to confirm billfish are not retained by swordfish vessels, but the FMP does not establish a requirement for--nor should the Councils expect--an increase in boardings. There is, however, a

cost associated with dockside enforcement and that cost should be defined. To achieve compliance with the "no sale" provision may initially require a significant dockside effort.

I would also like to suggest several revisions to the draft regulations. To begin, section 644.1(b) states these regulations restrict vessels fishing for swordfish; in fact, the regulations impose restrictions on all commercial and recreational fishing. The regulations do not just restrict swordfish vessels.

One issue that must be clarified is the definition of "management unit". This term is used throughout the regulations, yet is not defined in section 644.2. On page 6 of the draft FMP, "management unit" is defined as four billfish species, without any reference to specific geographic areas. In sections 644.20 and 644.21, the term "management unit" includes only those billfish from specific geographic areas. This imprecision creates confusion in the prohibition section of the regulations. Section 644.4(a)(3) prohibits possession of billfish from the management unit. This causes two problems: first, the management unit term is not defined, and second, an authorized officer must prove that any retained billfish came from that (undefined) unit. Similar problems are caused by subparagraphs (a)(2), (a)(4), (a)(5), and (a)(6).

As a solution, I recommend the term "management unit" be removed from the regulations wherever it occurs. Enforcement of the prohibitions is simplified by this single change: authorized officers no longer have to prove that billfish came from any particular subset. The next step is to revise the regulations to allow the sale, possession, and import of billfish from stocks of fish that the FMP does not intend to regulate--for example, sailfish from the East Atlantic. The burden of proof that such fish are being sold or imported should rest on the dealer, not the enforcement officer. This can be accomplished by the following changes to sections 644.20 and 644.21:

"644.20 Prohibitions on the sale of billfishes

The sale of blue and white marlin from the North Atlantic, sailfish from the West Atlantic, and spearfish from the entire Atlantic is prohibited. All billfish from other areas that are sold must be accompanied by documented proof of origin. It will be a rebuttable presumption that any billfish sold without such documentation have been taken from prohibited areas.

644.21 Prohibition on imports

Blue and white marlin from the North Atlantic, sailfish from the West Atlantic and spearfish from the entire Atlantic may not be imported into the U.S. Any billfish imported from other areas must be accompanied by documented proof of origin. It will be a rebuttable presumption that any billfish imported without such documentation have been imported from prohibited areas."

Another term that should be more clearly defined is "gill net." The definition of gill net, drift net, and drift entanglement net is so broad that it would include fixed demersal gillnets used to catch groundfish in New England. This could become a problem in the future if such nets are prohibited.

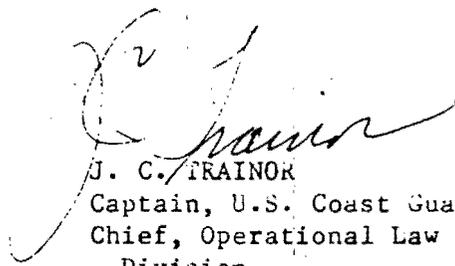
Section 644.4(a)(1) prohibits violations of the reporting requirements in sections 644.25 and 644.27. These sections are vague and contain discussions of the value of logbooks and tournament reporting. I recommend that 644.25 be amended as follows: "Logbooks are required for all swordfish and tuna longline vessels. They will be maintained and submitted as specified in 50 CFR 630.5(c)." Section 644.27 should be revised to clearly state what data organizers of billfish tournaments must submit.

The section on minimum sizes (644.23) could be improved by including the drawing on page 46 of the FMP.

Section 644.24 prohibits the possession of all billfish aboard longline and drift gill net vessels. It does not match the current prohibition section (644.(a)(3)), which only prohibits possession of billfish from the management unit. If the term "management unit" is deleted as recommended above, section 644.24 need not be changed. This section also overlooks possession of billfish on other commercial vessels--trawlers, harpoon vessels, etc.

Thank you for the opportunity to comment on this draft FMP. If there are any questions, please contact Lieutenant Commander Tom Nies (267-1155).

Sincerely,



J. C. TRAINOR
Captain, U.S. Coast Guard
Chief, Operational Law Enforcement
Division
By direction of the Commandant



APPENDIX IV

PROPOSED REGULATIONS

Billing Code: 3510-22

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 644

[Docket No. _____]

Atlantic Billfishes

AGENCY: National Marine Fisheries Service (NMFS), NOAA,
Commerce.

ACTION: Proposed rule.

SUMMARY: NOAA issues this proposed rule to implement the Fishery Management Plan for Atlantic Billfishes (FMP). This rule would (1) prohibit the sale in the United States of blue marlin, white marlin, sailfish, and spearfish caught in specified portions of the Atlantic Ocean, (2) establish minimum sizes for possession of billfish, (3) prohibit possession of billfish by pelagic longline and drift net vessels, (4) restrict the retention of billfish to those caught by rod and reel, and (5) require catch and effort reports from billfish tournaments. The intended effect of this rule is to reduce fishing mortality on billfish, maintain the highest availability of billfish to the U.S. recreational fishery, optimize the social and economic benefits to the nation by reserving the billfish resource for the U.S. recreational fishery, and increase understanding of the condition of the billfish stock and the billfish fishery.

DATE: Comments must be received on or before [Insert date 45 days after date of publication in the FEDERAL REGISTER].

ADDRESSES: Comments on the proposed regulations and requests for copies of the fishery management plan, draft regulatory

impact review, draft environmental impact statement, and initial regulatory flexibility analysis should be sent to: Rodney C. Dalton, Southeast Region, National Marine Fisheries Service, 9450 Koger Boulevard, St. Petersburg, FL 33702.

Comments on the information collection requirements should be sent to the Office of Information and Regulatory Affairs of OMB, Washington, DC 20503, Attention: Desk Officer for NOAA.

FOR FURTHER INFORMATION CONTACT: Rodney C. Dalton, 813-893-3722.

SUPPLEMENTARY INFORMATION: The FMP was prepared jointly by the South Atlantic, New England, Mid-Atlantic, Gulf of Mexico, and Caribbean Fishery Management Councils. A notice of availability of the FMP was published in the FEDERAL REGISTER on [insert date of publication and citation]. This proposed rule implements the FMP. It establishes a management regime for Atlantic billfishes throughout the Atlantic, Gulf, and Caribbean exclusive economic zones (EEZs) of the U.S. The species addressed by this plan are sailfish, Istiophorus platypterus; white marlin, Tetrapturus albidus; blue marlin, Makaira nigricans; and longbill spearfish, Tetrapturus pfluegeri.

The directed fishery for billfish in the U.S. is almost entirely recreational, using conventional rod and reel. There is a small-scale, traditional handline troll fishery in the vicinity of Puerto Rico that has a small catch of billfish. There is a small, regional harpoon fishery for white marlin off southern New England. In addition,

longliners, both domestic and foreign, have an incidental catch of billfish.

Optimum yield in the billfish fishery is defined in the FMP as the greatest number of billfish that can be caught by the recreational fishery in the EEZ, consistent with the provisions of the FMP, considering the biological limitations of the stocks and the unavoidable incidental catches in other fisheries.

The principal problems in the billfish fishery which the FMP addresses are:

1. There is competition for the available resource between the recreational fishery and other fisheries that have a bycatch of billfish.
2. There is a developing market for billfish and an increasing value for the product, thus encouraging directed fishing for billfish and increased retention of incidentally caught billfish. This situation seriously jeopardizes the economically valuable, traditional recreational fishery and threatens to undermine the conservation ethic developed by this user group.
3. There is a rapidly expanding domestic tuna longline fishery which has a higher billfish bycatch than the historical swordfish fishery. This increasing supply increases the likelihood of the commercial market expanding, further reducing availability to the recreational fishery.
4. The current statistical data base is inadequate for stock assessment. A long-term, biologically sound management regime, either domestic or international, will not be

possible until an adequate and accurate data base is available.

The objectives of the FMP are to:

1. Maintain the highest availability of billfish to the U.S. recreational fishery by implementing conservation measures that will reduce fishing mortality.
2. Optimize the social and economic benefits to the nation by reserving the billfish resource for its traditional use, which in the continental U.S. is almost entirely a recreational fishery. In the Caribbean, the fishery is both a recreational and small-scale handline fishery where billfishes are used as food.
3. Increase understanding of the condition of the billfish stocks and the billfish fishery.

On the basis of data presented in the FMP and in the Source Document, it is concluded that the greatest overall benefit to the nation will result from reserving, to the extent possible, billfish occurring in the EEZ for the U.S. recreational fishery. Consequently, only traditional recreational fishing gear (i.e., rod and reel) may be used in a directed fishery for billfish in the Atlantic, Gulf, and Caribbean EEZs.

To ensure that a commercial market for billfish does not develop, thus thwarting the objectives of the FMP, the sale of a billfish harvested from its management unit is prohibited. This measure applies to an import as well as to a billfish caught by a domestic vessel fishing outside the EEZ. The Councils approved an exception to this prohibition

of sale for the limited bycatch of the small-scale handline fishery in Puerto Rico.

However, the exception for the Puerto Rican handline fishery will not be implemented until the Caribbean Council, in cooperation with the government of Puerto Rico, develops and implements a permitting and tracking system approved by the five involved Councils. A maximum of 100 billfish per year may be landed and sold under this exception. Fish thus excepted may be sold only in Puerto Rico.

The U.S. recreational billfish fishery currently releases approximately 50 percent of its catch. However, to ensure that most billfishes are released so that they may remain available to the recreational fishery, minimum size limits are imposed for each species (except spearfish whose rarity in the fishery makes this unnecessary). These size limits are 57 inches lower jaw-fork length (LJFL) for sailfish, 62 inches LJFL for white marlin, and 86 inches LJFL for blue marlin, and are based on reducing angler retention beyond its present level by an additional 30 percent, 50 percent, and 50 percent, respectively. This measure will allow competitive fishing tournaments to continue while still significantly reducing this source of billfish mortality.

To ensure that the maximum number of billfish are made available to the recreational fishery, retention of billfish by commercial longline and drift net (gill or entanglement net) vessels is prohibited. All billfish caught by domestic longliners must be released by cutting the line near the hook without removing the fish from the water.

No permits or fees will be required for vessels engaged in the recreational fishery. Domestic catch and effort information necessary for monitoring the impacts of the plan and the status of the billfish resource will be collected by requiring selected billfish tournaments to report catch and effort. Mandatory tournament reporting may provide an inexpensive way to estimate total catch and effort in the recreational fishery as these data are maintained by virtually every billfish tournament. Commercial longline fisheries will be sampled by use of logbooks and the voluntary observer program as are already implemented through the swordfish fishery management plan. Unless these data collection activities implemented through the swordfish plan cease, no further data collection is required through this FMP.

All measures that apply to billfishes in the Preliminary Fishery Management Plan for Billfish and Sharks (1978) and amendments to that plan (1982 and 1983) are adopted in their entirety into this plan. These include the requirement that all foreign vessels carry a U.S. observer, the prohibition on retention of billfish, and seasonal closures to avoid gear conflicts.

Although this management plan attempts to maximize the number of billfish available to U.S. recreational fishermen by reducing fishing mortality on billfish within the EEZ, it is recognized that effective biological management must treat billfish stocks throughout their range. Therefore, implementation of an international management plan for

billfish is recommended to complement the management initiatives undertaken within the EEZ.

Classification

Section 304(a)(1)(D)(ii) of the Magnuson Act, as amended by P.L. 99-659, requires the Secretary of Commerce (Secretary) to publish regulations proposed by the Council within 15 days of receipt. At this time the Secretary has not determined that the FMP this rule would implement is consistent with the national standards, other provisions of the Magnuson Act, and other applicable law. The Secretary, in making that determination, will take into account the data, views, and comments received during the comment period.

The Councils prepared a draft environmental impact statement for this FMP; a notice of availability was published on September 25, 1987 (52 FR 36096).

The Under Secretary, NOAA, determined that this proposed rule is not a "major rule" requiring a regulatory impact analysis under Executive Order 12291. This proposed rule, if adopted, is not likely to result in an annual effect on the economy of \$100 million or more; a major increase in costs or prices for consumers, individual industries, Federal, State, or local government agencies, or geographic regions; or a significant adverse effect on competition, employment, investment, productivity, innovation, or the ability of United States-based enterprises to compete with foreign-based enterprises in domestic or export markets.

The Councils prepared a draft regulatory impact review (RIR) which concludes that this rule will have the following economic effects. Management measure #1 (no sale) will

result in a net present value (summed over 10 years at a 10 percent discount rate) of between - \$2.67 million and + \$18.71 million depending on the actual increase in the probability of catching an additional billfish. Management measure #2 (minimum sizes) will result in a net present value (summed over 10 years at a 10 percent discount rate) of at least \$2.0 million and possibly more than \$18 million. Management measure #3 (no possession by longline and drift net vessels) has an estimated cost to the commercial fishery of \$0.6 million per year and will result in recreational gains in addition to those computed under management measure #1. Management measure #4 (data reporting requirements) will have an estimated cost of \$1,550 per year. The present value of perpetual implementation costs is \$15,500. Enforcement costs are estimated at \$175,000 annually. A copy of the draft RIR may be obtained from NMFS (see ADDRESSES).

This proposed rule is exempt from the procedures of Executive Order 12291 under section 8(a)(2) of that order. It is being reported to the Director, Office of Management and Budget, with an explanation of why it is not possible to follow procedures of that order.

The Councils prepared an initial regulatory flexibility analysis (RFA) as part of the draft RIR which concludes that this proposed rule, if adopted, would have significant effects on small entities. There were 625 swordfish permits issued in 1987. Thus, potentially this many "small businesses" may be impacted. The extent of impact ranges from no change under the no action alternative to an estimated per business annual loss of \$186 or a capitalized

revenue loss of \$1,860. There are an unknown number of charter boats that may be impacted either positively, through increased demand for charters, or negatively, through loss of commissions for mounts as a result of minimum size restrictions. An unknown number of taxidermists may be impacted by these management measures. Data provided by a single taxidermist suggest a maximum potential loss of between 13 and 20 percent of total revenue if no fish under the minimum sizes are mounted. There are a number of ancillary businesses that could be affected by the FMP's management measures, including seafood processors and distributors, docks and marinas, boatyards, fishing equipment manufacturers, etc. Data are not readily available to estimate the extent of impacts on these ancillary businesses. A copy of the initial RFA may be obtained from NMFS (see ADDRESSES).

This proposed rule contains a collection of information requirement subject to the Paperwork Reduction Act. A request to collect this information has been submitted to the Office of Management and Budget (OMB) for approval.

The Assistant Administrator for Fisheries, NOAA, determined that this proposed rule will be implemented in a manner that is consistent to the maximum extent practicable with the approved coastal zone management programs of the States in the five-Council area. This determination has been submitted for review by the responsible State agencies under Section 307 of the Coastal Zone Management Act.

List of Subjects in 50 CFR Part 644

Fisheries, Fishing, Reporting and recordkeeping requirements.

Dated:

For the reasons set forth in the preamble, 50 CFR is proposed to be amended by adding a new Part 644 to read as follows:

PART 644 -- ATLANTIC BILLFISHES

Subpart A - General Provisions

Sec.

- 644.1 Purpose and scope.
- 644.2 Definitions.
- 644.3 Relation to other laws.
- 644.4 Permits and fees. [Reserved]
- 644.5 Reporting requirements.
- 644.6 Vessel identification. [Reserved]
- 644.7 Prohibitions.
- 644.8 Facilitation of enforcement.
- 644.9 Penalties.

Subpart B - Management Measures

- 644.20 Fishing year.
- 644.21 Size limits.
- 644.22 Gear limitations.
- 644.23 Incidental catch restrictions.

644.24 Restrictions on sale.

644.25 Specifically authorized activities.

Authority: 16 U.S.C. 1801 et seq.

Subpart A - General Provisions

§644.1 Purpose and scope.

(a) The purpose of this part is to implement the Fishery Management Plan for Atlantic Billfishes prepared jointly by the South Atlantic, New England, Mid-Atlantic, Gulf of Mexico, and Caribbean Fishery Management Councils.

(b) This part regulates fishing for billfish by persons fishing on vessels of the United States shoreward of the outer boundary of the EEZ in the Atlantic Ocean (including the Gulf of Mexico and the Caribbean Sea), and certain activities relating thereto.

(c) Regulations governing fishing in the EEZ by vessels other than vessels of the United States are published at 50 CFR Part 611, Subpart A, and §§611.60 and 611.61.

§644.2 Definitions.

In addition to the definitions in the Magnuson Act, and unless the context requires otherwise, the terms used in this part have the following meanings:

Authorized officer means--

(a) Any commissioned, warrant, or petty officer of the U.S. Coast Guard;

(b) Any special agent of the National Marine Fisheries Service;

(c) Any officer designated by the head of any Federal or State agency which has entered into an agreement with the

Secretary of Commerce and the Commandant of the U. S. Coast Guard to enforce the provisions of the Magnuson Act; or

(d) Any Coast Guard personnel accompanying and acting under the direction of any person described in paragraph (a) of this definition.

Billfish means sailfish, Istiophorus platypterus; white marlin, Tetrapturus albidus; blue marlin, Makaira nigricans, and longbill spearfish, Tetrapturus pfluegeri.

Billfish tournament means any fishing competition involving billfish in which participants must register or otherwise enter or in which a prize or award is offered for catching billfish.

Center Director means the Center Director, Southeast Fisheries Center, National Marine Fisheries Service, 75 Virginia Beach Drive, Miami, FL 33149; telephone 305-361-5761, or a designee.

Councils means the following Regional Fishery Management Councils:

(a) South Atlantic Fishery Management Council, Southpark Building, Suite 306, 1 Southpark Circle, Charleston, SC 29407-4699;

(b) New England Fishery Management Council, Suntaug Office Park, 5 Broadway, Saugus, MA 01906;

(c) Mid-Atlantic Fishery Management Council, Federal Building, Room 2115, North and New Streets, Dover, DE 19901;

(d) Gulf of Mexico Fishery Management Council, 5401 W. Kennedy Boulevard, Suite 881, Tampa, FL 33609;

(e) Caribbean Fishery Management Council, Suite 1108, Banco de Ponce Building, Hato Rey, PR 00918.

Drift net, sometimes called a drift entanglement net, or drift gill net, means a flat, unmoored net suspended vertically in the water that entangles the head or other body parts of fish that attempt to pass through the meshes.

Exclusive economic zone (EEZ) means the zone established by Presidential Proclamation 5030, dated March 10, 1983, and is that area adjacent to the United States which, except where modified to accommodate international boundaries, encompasses all waters from the seaward boundary of each of the coastal States to a line on which each point is 200 nautical miles from the baseline from which the territorial sea of the United States is measured.

Eye-fork length means the straight-line measurement from the eye to the fork of the caudal fin, as shown in Figure 1.

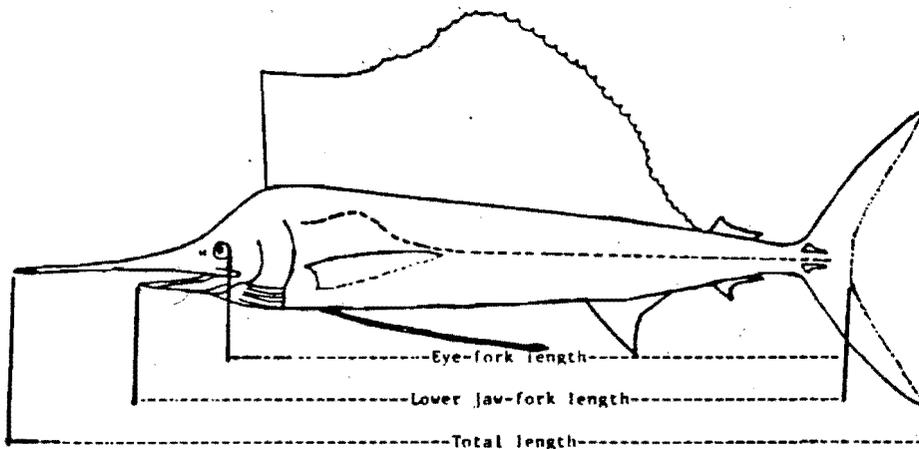


Figure 1. Bluefish length measurements.

Fishing means any activity, other than scientific research conducted by a scientific research vessel, which involves--

- (a) The catching, taking, or harvesting of fish;
- (b) The attempted catching, taking, or harvesting of fish;
- (c) Any other activity which can reasonably be expected to result in the catching, taking, or harvesting of fish; or
- (d) Any operations at sea in support of, or in preparation for, any activity described in paragraph (a), (b), or (c) of this definition.

Fishing vessel means any vessel, boat, ship, or other craft which is used for, equipped to be used for, or of a type which is normally used for--

- (a) Fishing; or
- (b) Aiding or assisting one or more vessels at sea in the performance of any activity relating to fishing, including, but not limited to, preparation, supply, storage, refrigeration, transportation, or processing.

Lower jaw-fork length means the straight-line measurement from the tip of the lower jaw to the fork of the caudal fin, as shown in Figure 1.

Magnuson Act means the Magnuson Fishery Conservation and Management Act, as amended (16 U.S.C. 1801 et seq.).

NMES means the National Marine Fisheries Service.

Operator, with respect to any vessel, means the master or other individual on board and in charge of that vessel.

Owner, with respect to any vessel, means--

- (a) Any person who owns that vessel in whole or in part;
- (b) Any charterer of the vessel, whether bareboat, time, or voyage;
- (c) Any person who acts in the capacity of a charterer, including, but not limited to, parties to a management agreement, operating agreement, or other similar arrangement that bestows control over the destination, function, or operation of the vessel; or
- (d) Any agent designated as such by any person described in paragraphs (a), (b), or (c) of this definition.

Pelagic longline means a type of fishing gear consisting of a length of line suspended horizontally in the water column above the bottom from lines attached to surface floats and to which gangions (leaders) and hooks are attached.

Person means any individual (whether or not a citizen or national of the United States), corporation, partnership, association, or other entity (whether or not organized or existing under the laws of any State), and any Federal, State, local, or foreign government or any entity of any such government.

Regional Director means the Director, Southeast Region, NMFS, 9450 Koger Boulevard, St. Petersburg, FL 33702; telephone, 813-893-3141, or a designee.

Rod and reel means a hand-held (includes rod holder) fishing rod with a manually or electrically operated reel attached.

Secretary means the Secretary of Commerce or a designee.

State means each of the several States, the District of Columbia, and Commonwealth of Puerto Rico, American Samoa, the Virgin Islands, Guam, and any other Commonwealth, territory, or possession of the United States.

Total length means the straight-line measurement from the tip of the upper jaw to the plane of the more extended tip of the caudal fin when in its natural position, as shown in Figure 1.

U.S.-harvested fish means fish caught, taken, or harvested by vessels of the United States within any foreign or domestic fishery regulated under the Magnuson Act.

Vessel of the United States means--

- (a) Any vessel documented under Chapter 121 of Title 46, United States Code;
- (b) Any vessel numbered under Chapter 123 of Title 46, United States Code, and measuring less than five net tons;
- (c) Any vessel numbered under Chapter 123 of Title 46, United States Code, and used exclusively for pleasure; and
- (d) Any vessel not equipped with propulsion machinery of any kind and used exclusively for pleasure.

§644.3 Relation to other laws.

Persons affected by these regulations should be aware that other Federal and State statutes and regulations may apply to their activities. Certain responsibilities relating to enforcement and data collection may be performed by authorized State personnel under a State/Federal agreement for data collection and a tripartite agreement among the State, the U.S. Coast Guard, and the Secretary for enforcement.

§644.4 Permits and fees. [Reserved]

§644.5 Reporting requirements.

A person conducting a billfish tournament at a port in an Atlantic, Gulf of Mexico, or Caribbean State and who is selected by the Center Director must maintain and submit a fishing record on forms available from the Center Director for each day of fishing in the tournament. Forms must be submitted so as to be received by the Center Director within 10 days of the conclusion of the tournament and must be accompanied by a copy of the tournament rules.

(a) The following information must be included on the form:

- (1) Tournament name;
- (2) Recorder's name and telephone number;
- (3) Date for which the information is recorded;
- (4) Hours fished (time from first line in the water to last line out of the water);
- (5) Name of each vessel fishing that day; and
- (6) For each vessel listed, the species of each billfish boated or released;
- (7) The weight and length of each billfish landed;
- (8) The name, address, and signature of the tournament director; and
- (9) The date signed.

(b) In addition to the information required to be reported by paragraph (a) of this section, the following information is desired but is not mandatory:

(1) Prevailing weather conditions on the day reported, such as wind speed and direction, and sea height and direction; and

(2) Whether a tag was attached before the billfish was released.

§644.6 Vessel identification. [Reserved]

§644.7 Prohibitions.

(a) It is unlawful for any person to do any of the following:

(1) Falsify or fail to report information required to be submitted or reported, as specified in §644.5;

(2) Possess a billfish less than the minimum size limit specified in §644.21(a);

(3) Fail to release a billfish in the manner specified §§644.21(b) and 644.23;

(4) Retain a billfish harvested by gear other than rod and reel or by a vessel with a pelagic longline or drift net aboard;

(5) Purchase, barter, trade, or sell a billfish harvested from its management unit, as specified in §644.24(a);

(6) Falsify information submitted in accordance with §644.24(b);

(7) Possess, have custody or control of, ship, transport, offer for sale, sell, purchase, import, land, or export any billfish or parts thereof taken or retained in violation of the Magnuson Act, this part, or any other regulation under the Magnuson Act;

(8) Fail to comply immediately with enforcement and boarding procedures specified in §644.8;

(9) Refuse to permit an authorized officer to board a fishing vessel subject to such person's control for purposes of conducting any search or inspection in connection with the enforcement of the Magnuson Act, this part, or any other regulation or permit issued under the Magnuson Act;

(10) Forcibly assault, resist, oppose, impede, intimidate, threaten, or interfere with any authorized officer in the conduct of any search or inspection described in paragraph (a) (9) of this section;

(11) Interfere with, obstruct, delay or prevent by any means a lawful investigation or search in the process of enforcing this part;

(12) Interfere with, obstruct, delay or prevent in any manner the seizure of illegally taken billfish or the disposition of such billfish through the sale of the billfish;

(13) Resist a lawful arrest for any act prohibited by this part;

(14) Interfere with, delay, or prevent, by any means, the apprehension or arrest of another person, knowing that such other person has committed any act prohibited by this part; or

(15) Transfer directly or indirectly, or attempt to so transfer, any U.S.-harvested billfish to any foreign fishing vessel, while such vessel is in the EEZ.

(b) It is unlawful to violate any other provision of this part, the Magnuson Act, or any regulation or permit issued under the Magnuson Act.

§644.8 Facilitation of enforcement.

(a) General. The operator of, or any other person aboard, any fishing vessel subject to this part must immediately comply with instructions and signals issued by an authorized officer to stop the vessel and with instructions to facilitate safe boarding and inspection of the vessel, its gear, equipment, fishing record (where applicable), and catch for purposes of enforcing the Magnuson Act and this part.

(b) Communications.

(1) Upon being approached by a U.S. Coast Guard vessel or aircraft, or other vessel or aircraft with an authorized officer aboard, the operator of a fishing vessel must be alert for communications conveying enforcement instructions.

(2) If the size of the vessel and the wind, sea, and visibility conditions allow, loudhailer is the preferred method for communicating between vessels. If use of a loudhailer is not practicable, and for communications with an aircraft, VHF-FM or high frequency radiotelephone will be employed. Hand signals, placards, or voice may be employed by an authorized officer and message blocks may be dropped from an aircraft.

(3) If other communications are not practicable, visual signals may be transmitted by flashing light directed at the vessel signaled. Coast Guard units will normally use the flashing light signal "L" as the signal to stop instantly.

(4) Failure of a vessel's operator to stop his vessel when directed to do so by an authorized officer using loudhailer, radiotelephone, flashing light signal, or other means constitutes prima facie evidence of the offense of refusal to allow an authorized officer to board.

(5) The operator of a vessel who does not understand a signal from an enforcement unit and who is unable to obtain clarification by loudhailer or radiotelephone must consider the signal to be a command to stop the vessel instantly.

(c) Boarding. The operator of a vessel directed to stop must--

(1) Guard Channel 16, VHF-FM, if so equipped;

(2) Stop immediately and lay to or maneuver in such a way as to allow the authorized officer and his party to come aboard;

(3) Except for those vessels with a freeboard of four feet or less, provide a safe ladder, if needed, for the authorized officer and his party to come aboard;

(4) When necessary to facilitate the boarding or when requested by an authorized officer, provide a manrope or safety line, and illumination for the ladder; and

(5) Take such other actions as necessary to facilitate boarding and to ensure the safety of the authorized officer and the boarding party.

(d) Signals. The following signals, extracted from the International Code of Signals, may be sent by flashing light by an enforcement unit when conditions do not allow communications by loudhailer or radiotelephone. Knowledge of these signals by vessel operators is not required. However,

knowledge of these signals and appropriate action by a vessel operator may preclude the necessity of sending the signal "L" and the necessity for the vessel to stop instantly.

(1) "AA" repeated (.- .-)¹ is the call to an unknown station. The operator of the signaled vessel should respond by identifying the vessel by radiotelephone or by illuminating the vessel's identification.

(2) "RY-CY" (.-. --- -.-. ---) means "you should proceed at slow speed, a boat is coming to you." This signal is normally employed when conditions allow an enforcement boarding without the necessity of the vessel being boarded coming to a complete stop, or, in some cases, without retrieval of fishing gear which may be in the water.

(3) "SQ3" (... ---. ---) means "you should stop or heave to; I am going to board you."

(4) "L" (.-..) means "you should stop your vessel instantly."

¹ Period (.) means a short flash of light; dash (-) means a long flash of light.

§644.9 Penalties.

Any person or fishing vessel found to be in violation of this part, the Magnuson Act, or any other regulation issued under the Magnuson Act is subject to the civil and criminal penalty provisions and forfeiture provisions of the Magnuson Act, and to 15 CFR Part 904 (Civil Procedures), and other applicable law.

Subpart B - Management Measures

§644.20 Fishing year.

The fishing year is January 1 through December 31.

§644.21 Size limits.

(a) The following minimum size limits, in terms of lower jaw-fork length, apply for the possession of billfish:

- (1) Blue marlin - 86 in.
- (2) White marlin - 62 in.
- (3) Sailfish - 57 in.
- (4) Longbill spearfish - no minimum size.

(b) A billfish under the minimum size limit must be released in a manner that will ensure maximum probability of survival.

(c) The following approximations of the minimum size limits for blue marlin, white marlin, and sailfish, in terms of eye-fork length, total length, and whole, live weight, are provided for the convenience of fishermen. These approximations may not be substituted for the minimum body length limits.

	Eye-fork length (in.)	Lower jaw- fork length (in.)	Total length(in.)	Whole, live weight (lbs)
Blue marlin	75	86	110	200
White marlin	53	62	81	50
Sailfish	49	57	76	30

§644.22 Gear limitations.

a) The retention of a billfish harvested by gear other than rod and reel is prohibited.

(b) The retention of a billfish by a vessel with a pelagic longline or drift net aboard is prohibited.

§644.23 Incidental catch restrictions.

A billfish harvested by gear other than rod and reel must be released in a manner that will ensure maximum

probability of survival. A billfish caught by a pelagic longline must be released by cutting the line near the hook without removing the fish from the water.

§644.24 Restrictions on sale.

(a) A billfish harvested from the management unit for each species may not be purchased, bartered, traded, or sold in any State. Management units are as follows:

(1) For blue marlin and white marlin, the waters of the North Atlantic Ocean (including the Gulf of Mexico and the Caribbean Sea) north of 5°N. latitude;

(2) For sailfish, the waters of the North and South Atlantic Oceans (including the Gulf of Mexico and the Caribbean Sea) west of 30°W. longitude; and

(3) For longbill spearfish, the waters of the entire North and South Atlantic Oceans (including the Gulf of Mexico and the Caribbean Sea).

(b) A billfish will be presumed to have been harvested from its management unit unless it is accompanied by documentation that it was harvested from another area. Such documentation must contain the information listed below. This information is in addition to the marking requirements specified in 50 CFR Part 246, applicable to containers or packages of fish or wildlife that are imported, exported, or transported in interstate commerce.

(1) Name and home port of vessel catching the billfish;

(2) Date and location (latitude and longitude to the nearest 1°) where caught, by species;

(3) Port of offloading;

(4) A statement attesting to the truth of the information, signed by a responsible official of the exporting firm.

§644.25 Specifically authorized activities.

The Secretary may authorize, for the acquisition of information and data, activities otherwise prohibited by these regulations.

