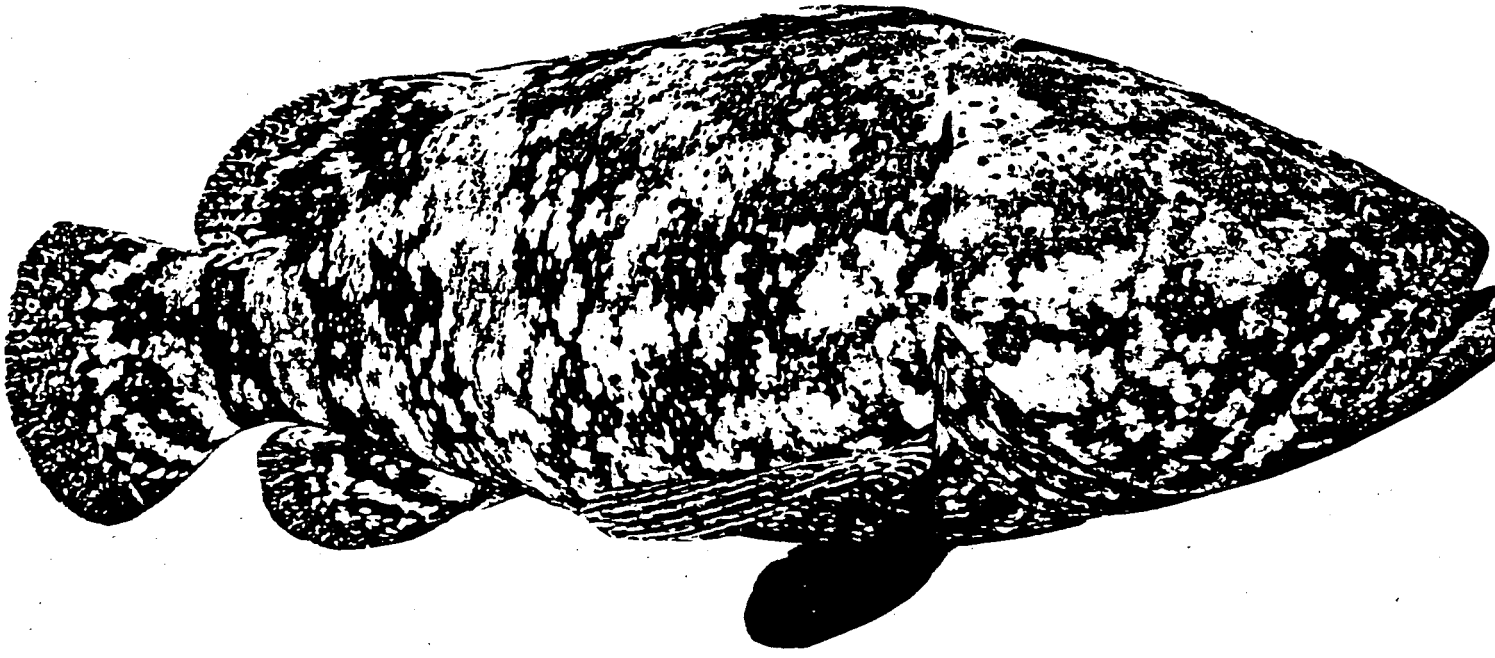
JEWFISH

AMENDMENT NUMBER 2,
REGULATORY IMPACT REVIEW,
INITIAL REGULATORY FLEXIBILITY ANALYSIS AND
ENVIRONMENTAL ASSESSMENT

FOR THE

FISHERY MANAGEMENT PLAN FOR THE
SNAPPER GROUPER FISHERY OF THE SOUTH ATLANTIC REGION



JULY 1990

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Prepared By The

South Atlantic Fishery Management Council

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I. INTRODUCTION

A. Background

The Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region was prepared by the South Atlantic Fishery Management Council and implemented by the Secretary of Commerce on August 31, 1983 [48 Federal Register 39463]. The Fishery Management Plan was prepared to prevent growth overfishing in thirteen species in the complex and to establish a procedure for preventing overfishing in other species. The Fishery Management Plan established a four inch trawl mesh size to achieve a twelve inch minimum size for vermilion snapper. Yield per recruit analyses indicated that a 12 inch minimum size would increase yield by 34% and maximize yield per recruit, thereby minimizing growth overfishing.

Amendment 1 was implemented by the Secretary effective January 12, 1989 [54 Federal Register 1720] and prohibits use of trawl gear to harvest fish in the directed snapper grouper fishery south of Cape Hatteras, North Carolina (35°15' N. Latitude) and north of Cape Canaveral, Florida (Vehicle Assembly Building, 28°35.1' N. Latitude). A vessel with trawl gear and more than 200 pounds of fish in the snapper grouper fishery (as listed in Section 646.2 of the regulations) on board is defined as a directed fishery. The amendment also establishes a rebuttable presumption that a vessel with fish in the snapper grouper fishery (as listed in Section 646.2 of the regulations) on board harvested its catch of such fish in the Exclusive Economic Zone.

Currently, jewfish may not be harvested by any type of gear within 21 Special Management Zones established under provisions of the snapper grouper fishery management plan. These zones exist off of South Carolina, Georgia and Florida.

The South Atlantic Council, at its February/March 1990 meeting, voted to develop Amendment 2 to the Snapper Grouper Fishery Management Plan to prohibit harvest and possession of jewfish in the South Atlantic Exclusive Economic Zone. Given concern that jewfish would be further depleted prior to implementation of Amendment 2 and the enforcement problems resulting from a lack of prohibition in the South Atlantic (i.e. Florida cannot enforce its prohibition effectively without a prohibition in federal waters), the Council voted to request the Secretary of Commerce to prohibit the harvest or possession of jewfish in the South Atlantic Exclusive Economic Zone by emergency action. The Secretary of Commerce implemented the emergency rule on May 2, 1990. In addition, this amendment contains a definition of overfishing for jewfish and for other species in the management unit to meet the requirements of the new 602 regulations.

Some of the information presented in this document is taken from Amendment 2 to the Gulf Reef Fish Fishery Management Plan prepared by the Gulf Council (GMFMC, 1990). Jewfish populations in the Gulf and South Atlantic are assumed to be similar. The similarity of information in this amendment with the information in the Gulf's amendment should assist in the review of this amendment.

B. FMP Objectives

The management objectives of the Snapper Grouper Fishery Management Plan are:

1. Prevent recruitment overfishing in all species and prevent growth overfishing of each species except where growth overfishing is justified by social and economic considerations. Method of achieving objective: Minimum sizes will control growth overfishing and prevent recruitment overfishing. The Secretary is authorized to take whatever emergency action is necessary in the unlikely event of recruitment overfishing.

2. Collect the necessary data to monitor the fisheries. Method of achieving objective: Authorize data collection and analysis to monitor the status of the fishery.

3. Promote orderly utilization of the resource. Method of achieving objective: Restrictions on fish traps and prohibitions on poisons, explosives and spearing jewfish.

C. Problems Requiring Plan Amendment 2

The South Atlantic Council began working on Amendment 2 based on letters and other input from the public and based on actions taken by the Gulf of Mexico Fishery Management Council. The Gulf Council's Reef Fish Advisory Panel first recommended that jewfish populations be protected by a complete prohibition on its harvest and possession at their April 1989 meeting during review of the Gulf Council's Reef Fish Amendment 1 which contained a proposal for a jewfish 50-inch size limit. The Gulf Council maintained its position after reviewing the Advisory Panel's comments since other fishermen presented testimony to the Council in support of the proposed size limit while maintaining that jewfish did not need total protection.

After Gulf Reef Fish Amendment 1 was submitted for Secretarial approval, the Gulf Council was contacted by an Advisory Panel member, a commercial jewfish fisherman, who reported that available stocks of jewfish were much more depleted than had been reported previously. The approval letter implementing Gulf Reef Fish Amendment 1 recommended the Gulf Council reconsider a prohibition on the harvest of jewfish given that Florida was proceeding with a complete prohibition on the harvest and possession of jewfish. Furthermore, since the Gulf Council announced it would be readdressing the question of total protection for jewfish, numerous letters have been received and virtually all were in agreement that jewfish was indeed seriously overfished and in need of total protection. Many of these letters were from divers and dive boat operators who cite personal observations concerning the continuing decline of jewfish. At the request of the Gulf Council, the Secretary of Commerce implemented an emergency rule prohibiting the harvest and possession of jewfish in the Gulf of Mexico EEZ on March 2, 1990.

The South Atlantic Council has also received a number of letters from knowledgeable fishermen requesting that the Council take action to prohibit the harvest and possession of jewfish. Therefore, the Council voted to develop Amendment #2 to address the severely overfished status

of jewfish and to address the problem of incompatible regulations in Florida where jewfish harvest is now prohibited in State waters.

D. Optimum Yield

Optimum yield is any harvest level for jewfish which maintains, or is expected to maintain, over time, a survival rate of biomass into the stock of spawning age to achieve at least a 40% spawning stock biomass per recruit (SSBR) population level, relative to the SSBR that would occur with no fishing. The threshold level is 30%; below this level, no harvest or possession of jewfish is allowed.

Alternatives Considered and Rejected:

Alternative 1. Status quo (Snapper Grouper Plan, SAFMC 1983b). Optimum yield for jewfish is all jewfish harvested by U.S. fishermen utilizing lawful gear. Historically powerheads have been prohibited in Florida where all recorded landings of jewfish occur (jewfish are included in grouper landings in North Carolina and Georgia and no jewfish are reported from South Carolina). Therefore, the numerical estimate of OY is equal to the most recent (1981) recorded catch of 19,000 pounds.

This definition was rejected because it is no longer appropriate. Landings have been below 19,000 pounds since this level was specified. Current thought is to specify optimum yield in terms of spawning stock biomass.

Alternative 2. Gulf Reef Fish Amendment 1. Optimum yield is any harvest level for jewfish which maintains, or is expected to maintain, over time, a survival rate of biomass into the stock of spawning age to achieve at least a 20% spawning stock biomass per recruit (SSBR) population level, relative to the SSBR that would occur with no fishing.

This alternative tracks the Gulf Reef Fish Amendment 1. The 20% SSBR level was discussed at the recent NMFS overfishing workshop. The workshop conclusion was that generally it is probably better to use at least a SSBR of 30% for groupers because this roughly corresponds to $F_{0.1}$. This alternative was rejected by the South Atlantic Council as not being sufficiently conservative.

Alternative 3. Optimum yield is any harvest level for jewfish which maintains, or is expected to maintain, over time, a survival rate of biomass into the stock of spawning age to achieve at least a 30% spawning stock biomass per recruit (SSBR) population level, relative to the SSBR that would occur with no fishing. The threshold level is 20%; below this level, no harvest or possession of jewfish is allowed.

This alternative is based on the Gulf Reef Fish Amendment 1 but specifies a 30% SSBR level as a goal, more along the lines of the recommendation from the NMFS overfishing workshop. In

addition, a threshold level is specified at 20% which means that there will be no retention of jewfish if the SSBR is below this level. The 20% level may be low given the conclusions of the NMFS overfishing workshop and was rejected by the Council.

Alternative 4. Optimum yield is any harvest level for jewfish which maintains, or is expected to maintain, over time, a survival rate of biomass into the stock of spawning age to achieve at least a 50% spawning stock biomass per recruit (SSBR) population level, relative to the SSBR that would occur with no fishing. The threshold level is 40%; below this level, no harvest or possession of jewfish is allowed.

This alternative represents the most conservative of the five considered. Given the much higher aesthetic value of jewfish to nonconsumptive users, the Council considered this alternative but concluded that this would be managing too conservatively.

E. Overfishing

The **overfishing definition for jewfish** is as follows:

1. Jewfish are overfished when the stock is below the level of 40% of the spawning stock biomass per recruit that would occur in the absence of fishing.
2. When jewfish are overfished, overfishing is defined as harvesting at a rate that is not consistent with a program that has been established to rebuild the stock or stock complex to the 40% spawning stock biomass per recruit level.
3. When jewfish are not overfished, overfishing is defined as a harvesting rate that, if continued, would lead to a state of the stock or stock complex that would not at least allow a harvest of OY on a continuing basis.
4. The threshold level is 30% SSBR; below this level, no harvest or possession of jewfish is allowed.

Overfishing for all other species in the management unit is defined as follows:

1. A snapper grouper stock or stock complex is overfished when it is below the level of 30% of the spawning stock biomass per recruit that would occur in the absence of fishing.
2. When a snapper grouper stock or stock complex is overfished, overfishing is defined as harvesting at a rate that is not consistent with a program that has been established to rebuild the stock or stock complex to the 30% spawning stock biomass per recruit level.
3. When a snapper grouper stock or stock complex is not overfished, overfishing is defined as a harvesting rate that, if continued, would lead to a state of the stock or stock complex that would not at least allow a harvest of OY on a continuing basis.

Alternatives Considered and Rejected:

Alternative 1. Status quo (Snapper Grouper Plan, SAFMC 1983b). Growth overfishing: The harvesting of a fish stock to the point that the harvest is less than the maximum possible (by weight). Growth overfishing can be controlled by limiting fishing mortality on all size fish (e.g. time/area closures or quotas) and/or by reducing the range of sizes that are liable to capture (impose minimum sizes). Growth overfishing is defined in the Snapper Grouper Fishery Management Plan as an existing combination of fishing pressure (F) and age liable to capture such that an increase in age liable to capture (minimum sizes) or a decrease in fishing pressure will significantly increase yield per recruit (YPR). Growth overfishing is an established scientific definition measured by yield per recruit analyses but is not considered to be "overfishing" in the context of National Standard One of the Magnuson Act. Recruitment overfishing: The harvesting of a stock to the point that reproduction by the remaining brood stock is inadequate to produce as many fish as the habitat can support. Recruitment overfishing is an established scientific definition that is not measured by yield per recruit analyses. Recruitment overfishing is considered to be overfishing in the context of National Standard One of the Magnuson Act.

This alternative was rejected because the NMFS Southeast Fisheries Center advised that these levels of overfishing could not be measured and therefore would not meet the criteria specified in the regulations.

Alternative 2. Gulf Reef Fish Amendment 1.

1. A reef fish stock or stock complex is overfished when it is below the level of 20% of the spawning stock biomass per recruit that would occur in the absence of fishing.
2. When a reef fish stock or stock complex is overfished, overfishing is defined as harvesting at a rate that is not consistent with a program that has been established to rebuild the stock or stock complex to the 20% spawning stock biomass per recruit level.
3. When a reef fish stock or stock complex is not overfished, overfishing is defined as a harvesting rate that, if continued, would lead to a state of the stock or stock complex that would not at least allow a harvest of OY on a continuing basis.

This alternative was rejected because it was concluded that it is probably better to use at least a SSBR of 30% for groupers because this roughly corresponds to $F_{0.1}$.

Alternative 3.

1. A reef fish stock or stock complex is overfished when it is below the level of 30% of the spawning stock biomass per recruit that would occur in the absence of fishing.
2. When a reef fish stock or stock complex is overfished, overfishing is defined as harvesting at a rate that is not consistent with a program that has been established to rebuild the stock or stock complex to the 30% spawning stock biomass per recruit level.
3. When a reef fish stock or stock complex is not overfished, overfishing is defined as a harvesting rate that, if continued, would lead to a state of the stock or stock complex that

would not at least allow a harvest of OY on a continuing basis.

4. The threshold level is 20% SSBR.

This alternative was rejected because the Council wanted to be more conservative.

Alternative 4.

1. A reef fish stock or stock complex is overfished when it is below the level of 50% of the spawning stock biomass per recruit that would occur in the absence of fishing.
2. When a reef fish stock or stock complex is overfished, overfishing is defined as harvesting at a rate that is not consistent with a program that has been established to rebuild the stock or stock complex to the 50% spawning stock biomass per recruit level.
3. When a reef fish stock or stock complex is not overfished, overfishing is defined as a harvesting rate that, if continued, would lead to a state of the stock or stock complex that would not at least allow a harvest of OY on a continuing basis.
4. The threshold level is 40% SSBR.

This alternative was rejected as being too conservative at this time.

II. DESCRIPTION OF FISHERY AND UTILIZATION PATTERNS

A. Commercial Fishery

Little information exists on the history of jewfish fishing. However, it appears that jewfish, historically, have been harvested only as an incidental species, initially in the red snapper fishery and later in the combination grouper/snapper fishery in the Gulf of Mexico and South Atlantic. A small directed diving fishery has existed using spearguns and powerheads.

Gulf of Mexico

From 1964 through 1969 snapper boats operating out of Alabama landed 53 to 70% of the entire Gulf of Mexico harvest (Swingle, 1976). Even as late as the latter 1970s jewfish was such a low priced fish that only a few fishermen bothered to land them (D. DeMaria, SAFMC Snapper Grouper Advisory Panel, personal communication). Although annual commercial landings of jewfish in the mid 1960s occasionally exceeded 200,000 pounds, most were caught incidental to the snapper fishery operating off Yucatan, Mexico. In 1979 only 37,000 pounds of jewfish were harvested in domestic waters and commanded a dockside price of approximately 40 cents per pound (Table 1). However, in 1987 jewfish landings totaled 101,000 pounds--a threefold increase--with a dockside price ranging from 60 to 90 cents per pound. As is typical in other fisheries, landings apparently have increased in response to increasing market value. Jewfish is a highly valued delicacy in the Florida Keys and the South Florida metropolitan areas which are probably the primary markets for jewfish today. Reportedly, most jewfish sold commercially, at least in the Key West area, are sold directly to restaurants and are not recorded by the NMFS

landings data collection system (D. DeMaria, personal communication). Even so, reported landings in the four most southern Florida counties (Monroe, Collier, Charlotte and Lee Counties) accounted for 78% of the total Gulf landings and the entire West Florida landings accounted for 99% of the Gulf total (Tables 1 and 2). With the exception of the South and Southwest Florida areas, jewfish appear to be an incidental harvest to the reef fish fishery.

Commercial landing trends of jewfish are difficult to interpret prior to 1979 because for about 20 years a particular dealer in Southwest Florida grossly inflated his reported landings. For example, in the years from 1979-1984, the period for which landings are available by dealer, this particular dealer's reported landings were up to five times greater than the entire remainder of West Florida landings. Since this dealer was never a major processor of reef fish, the best "adjustment" is to simply delete the dealer's landings from the data files. Therefore, all data reported in this amendment for West Florida have been adjusted to reflect total reported landings, excluding those of the dealer discussed above.

The reported landings of jewfish for the entire Gulf appear to have been increasing slightly through the years, although some decline in harvest after 1985 can be observed. Ex-vessel values have increased even more than landings. Average ex-vessel price per pound for the Gulf increased from 39 cents in 1979 to 74 cents in 1987 (Table 1). The average dockside price paid for the entire 1979-1987 period was 58 cents per pound.

Ex-vessel prices apparently varied among different geographical areas, but no statistical tests can be presented to determine the significance of these differences. On average, prices were highest in Monroe County and lowest in the Alabama through Texas areas. Differences in prices could be due to variations in quality of the product or to differing strength in demand. The established market in the Keys could account for a relatively stronger demand in these areas than in others.

Landings and prices also vary from month to month (Table 3). On average, peak landings occur in the months of August and September. These peak landings practically coincide with spawning activities of jewfish. December and January usually record the lowest landings. Variations in prices do not seem to correlate inversely with variations in landings, possibly indicating that price variations are driven primarily by seasonal changes in demand.

Most of the commercial jewfish harvest is taken from federal waters (Table 4). The primary gear category used to harvest jewfish is the hand line which includes bandit rigs and hydraulic and electric reels as well as the more traditional hand line (Table 5). Speargun and longline gear types have been taking increasing amounts of jewfish since 1979. The trawl gear category reportedly takes a small but significant proportion of the harvest. Some of the harvested fish attributed to trawl gear may have been caught by hand line gear aboard shrimp vessels while at anchor.

South Atlantic

Jewfish landings for Dade, Broward and Monroe Counties in Florida and the rest of Florida was recently provided (Table 6, Figure 1) to the South Atlantic Snapper Grouper Plan

Development Team by the SEFC (Jim Bohnsack, NMFS SEFC, memorandum dated December 1, 1989). This information shows that after increasing for several years, landings have declined since the mid 1970s. This data supports the numerous letters, phone calls and public input that the Council has received concerning the declining status of jewfish.

Landings in Broward County (Florida east coast) were never very large but catches were recorded for most of the 1960s (Table 6). From 1970 through 1984 there were no recorded landings, possibly indicating a reduction in numbers or availability of jewfish. Landings in Broward County increased from 147 pounds in 1985 to 2,059 pounds in 1988, the highest landings ever recorded for this County.

Dade County landings averaged about 2,200 pounds during the 1960s but declined during the 1970s to an average of about 900 pounds (Table 6). Landings during the 1980s (at least through 1988) have been less than 500 pounds. This supports the reported declines in jewfish abundance.

Total Florida landings, and Florida east coast and Georgia landings and value are shown in Table 7. Comparing data from NMFS that were included in the Snapper Grouper Source Document (SAFMC, 1983a) with data from the NMFS accumulative monthly landings indicates some of the problems in understanding trends in landings over time. Landings for the South Atlantic have decreased from 68,000 pounds worth $8,160 in 1968 to 17,911 pounds worth $18,307 in 1987. Ex-vessel price per pound has increased from 12 cents per pound in 1968 to $1.02 per pound in 1987.

In the original Snapper Grouper plan, the number of divers engaged in commercial spearfishing for deepwater species numbered about 50 in 1982 for North Carolina through the Florida Keys (Nelson Waite, Advisory Panel, Commercial Diver, West Palm Beach, Florida; personal communication; SAFMC Snapper Grouper Source Document, 1983a). During development of the original plan, input from fishermen in the South Atlantic indicated that none derived a significant portion of their income from jewfish.

B. Recreational Fishery

Gulf of Mexico

Estimates of recreational landings of jewfish are available only since 1979 (Table 8) through the MRFSS, however since jewfish is a relatively rare species the MRFSS sampling protocol does not provide precise estimates. Therefore the varying estimates of harvest among years, fishing areas, and fishing modes, are difficult to interpret for apparent trends.

The recreational sector apparently has been a strong participant in the jewfish fishery harvesting about 3,000 fish weighing around 192,000 pounds in 1987 (Table 8). In total weight of fish landed, the recreational sector accounts for a greater percentage (relative to the commercial sector) of jewfish harvest for the 1979-1987 period (Tables 1 and 8). There are, however, certain problems with the accuracy of this percentage share. Through the 1979-1987 period, reported

recreational harvests varied widely probably because the MRFSS survey intercepted a limited number of jewfish in its dockside survey. It is likely, though, that recreational participation in the fishery is significant and possibly has increased in the last few years.

Recreational jewfish harvests occur primarily off Florida and Louisiana and are virtually nonexistent off other Gulf states. Florida accounts for most of the jewfish recreational harvest. It is not clear from available information as to whether recreational catches are predominantly in state or federal waters (Table 8). The possibility that recreational catches from state and federal waters are about the same cannot be discounted. The private/rental mode of fishing appears to dominate other fishing modes in the harvest of jewfish. As with the commercial sector of the fishery, harvest by spearguns is probably the primary gear targeted toward jewfish, with capture by other gear representing largely an incidental harvest.

Comments have been received from the recreational fishing public suggesting that one of the best recreational uses of jewfish is for non-consumptive exploitation where divers are provided opportunities to observe and photograph these impressively large fish rather than to harvest them.

South Atlantic

Estimates of recreational catch from the South Atlantic are not available. In the 10 years of Marine Recreational Fishing Statistical Survey (MRFSS) sampling on the Atlantic side, less than 12 jewfish have been intercepted (John Witzig, NMFS MRFSS, personal communication). Estimates of harvest levels based on this small number of intercepts would not be accurate; however, the general conclusion that recreational catches are and have been extremely small is supported by this information.

C. Status of the Stock

1. Distribution

The jewfish (*Epinephelus itajara*) is found on both Atlantic and Pacific sides of Central America (Smith, 1971). In the Atlantic, jewfish occur from Brazil throughout the Caribbean, Gulf of Mexico, Bermuda, the Bahamas and Florida (Bohlke and Chaplin, 1968; Smith, 1971; Hoese and Moore, 1977; Robins and Ray, 1986).

Gulf of Mexico

In the Gulf of Mexico, jewfish appear to be most abundant off Southwest Florida and the Florida Keys, although Hoese and Moore (1977) reported that jewfish "... is the most common large inshore grouper off Texas from April through October." However, the MRFSS has sampled only two jewfish outside of Florida, one in 1979 and another in 1984; the NMFS headboat survey which has operated in the Gulf since 1986 has observed no jewfish outside of the Southwest Florida area and the Texas Parks and Wildlife surveys (Osburn et al., 1988) of sport-boat fishermen in Texas reports harvest of jewfish only by private-boat anglers in the 1983-1984

Territorial Sea high-use weekday and the 1985-1986 EEZ low-use weekend fishing categories where jewfish accounted for just 0.65 and 2.00% of the total harvest of "Other Species", respectively. If jewfish, at one time, were relatively common in the northwestern Gulf, they do not appear to be so today.

South Atlantic

In the South Atlantic, jewfish are more abundant off the Florida east coast. Spawning aggregations have been observed in the past off Palm Beach, Florida but do not occur anymore (W. Parks, Fisherman, testimony to the Florida Marine Fisheries Commission). The occurrence of jewfish north of Florida is rare and the States of Georgia and South Carolina requested (and regulations have been implemented) jewfish be protected within Special Management Zones around their artificial reefs.

2. Reproduction

Jewfish are suspected to be protogynous hermaphrodites (born female and changing to male later in life), similar to other groupers. Smith (1971) found evidence of ova remnants in the gonad of a six foot male collected near Bimini, Bahamas. The size or age of sexual transition is unknown and it is possible that some males pass through an immature female stage and mature only as males (L. Bullock, FMRI, FDNR, personal communication). Also, many of the larger fish taken commercially have been females. The ongoing Florida Department of Natural Resources (FDNR) study of jewfish has found no transitional fish among those sampled from the commercial fishery. Thus, it is not conclusive whether jewfish are indeed protogynous hermaphrodites or gonochoristic (sexes separate).

In the eastern Gulf of Mexico, females with ripe ova have been found during July through October with August to mid-October apparently the period of peak reproductive activity (D. DeMaria, SAFMC Snapper Grouper Advisory Panel, personal communication). Spawning aggregations of jewfish have been observed in waters as shallow as 30-40 feet.

In the FDNR study, female jewfish sexually matured at about 50-inches total length (105 pounds in weight). The youngest sexually mature female sampled was ten years of age, assuming one annulus per year. No specific information on fecundity exists. The smallest mature male was 43-inches total length, and the youngest sexually mature male was about five years old (L. Bullock, FMRI, FDNR, preliminary unpublished data).

3. Growth & Food Habits

Jewfish are long-lived and can attain a size of 700 pounds (Smith, 1971). Age and growth data collected by FDNR on 449 jewfish (see Figures 2, 3 and 4) were used to develop a von Bertalanffy growth equation (L. Bullock, FMRI, FDNR, preliminary unpublished data) as follows:

$L_t = 2011 * (1 - e^{0.119 * (t + 0.841)})$, where

length is in millimeters (2,011 mm = 79.2 inches).

Morphometric equations developed for jewfish with the FDNR data (Lew Bullock, personal communication) include weight-length,

$W_{kg} = 3.9 * 10^{-8} * SL^{2.965}$, and

standard length-total length,

$TL_{mm} = 1.176 * SL_{mm} + 32.446$,

where W is gutted weight, SL is standard length and TL is total length. Gutted weight to whole weight conversions were made by multiplying gutted weights by 1.18 to obtain whole weights (NMFS, ESO commercial landings documentation).

Randall (1968) found fishes, hawksbill turtle, crabs, slipper lobster and most often spiny lobster in the stomachs of jewfish. Smith (1971) reported a large proportion of the jewfish's prey were crustaceans.

4. Spawning Stock Biomass Per Recruit

The above growth equations and an estimate of total mortality from the age distribution in Figure 3 provided the material essential for a relative assessment of spawning stock biomass per recruit (SSBR) for the jewfish resource. Total mortality was estimated to be 0.85 for fish older than age 11. Natural mortality was assumed to equal 0.15, as in the Gulf Reef Fish Amendment 1 for other groupers, with fishing mortality equal to 0.70. These mortality estimates indicate that approximately 60% of the remaining jewfish population die each year. Size at entry into the fishery was assumed to occur at 20 inches total length.

It appears that uncontrolled fishing (the condition that existed prior to implementation of Gulf Reef Fish Amendment 1), if allowed to continue, would result in an estimated SSBR level of 0.2% of the potential SSBR with no fishing. Under the 50-inch size limit established by Gulf Reef Fish Amendment 1, the projected equilibrium SSBR level would be 11% or less, depending on the mortality rate of undersize fish. If as much as 50% of the released undersize fish die, the equilibrium SSBR level would be only 1.3%. Given the difficulty in harvesting jewfish, it is very likely that undersize release mortalities are indeed very high. A logbook survey of recreational anglers fishing around oil rigs off Louisiana (Stanley and Wilson, unpublished manuscript) found no record of jewfish being harvested after a one and a half year study and they concluded it was probably due to the difficulty in landing hooked fish. In addition, divers have reported observing many jewfish hooked, speared or injured by powerheads that were in poor health or dying (letters on file with the Gulf Council). The jewfish resource is probably already severely overfished or in the process of becoming severely overfished under existing fishing conditions throughout its range in the Gulf of Mexico.

The status of the jewfish resource in the South Atlantic is unknown but is probably similar to or more overfished than the resource in the Gulf of Mexico given the reported disappearance of spawning aggregations off the Florida east coast.

III. ALTERNATIVE MANAGEMENT OPTIONS

A. Proposed Option: Prohibit the Harvest or Possession of Jewfish.

Ecological Impacts: A prohibition on the harvest of jewfish would provide virtually complete protection for the species in waters off Florida since Florida has prohibited the harvest or possession of jewfish in state waters. Jewfish off the other Gulf states will be protected in federal waters only through the Secretary's emergency action and the Gulf Council's Reef Fish Amendment 1. Jewfish off the other South Atlantic States will be protected in federal waters only but harvest north of Florida is limited and the majority of harvest is probably from the EEZ. It is the Council's intent that possession, sale or offering for sale of jewfish during a closure (i.e. when harvest or possession is prohibited) is prohibited.

Most fishermen familiar with the jewfish fishery agree the species is substantially overfished and in need of total protection. The current conditions in the fishery, if allowed to continue, would drive the jewfish resource to such low levels that the species eventually may be considered to be threatened or endangered. The jewfish is the largest of western North American groupers, reaching weights of up to 700 pounds and are top predators in the food chain. They are slow growing, very territorial and easily harvested, all of which are life history characteristics that make jewfish stocks susceptible to overfishing or to other sources of non-natural mortality. Available SSBR analyses indicate the jewfish resource is significantly overfished and may be less than 1%, whereas the Council's goal is at least a 40% SSBR level.

Socioeconomic Impacts: Direct effects of this measure would be reductions in ex-vessel revenues to the commercial sector and losses in consumer benefits in the recreational sector. These short-term losses from both sectors are not expected to be significant as the fishery for jewfish is relatively small.

Consumers of jewfish will also experience short-term losses in benefits because there will be no legal commercial sale of jewfish. Demand for snappers is thought to be somewhat inflexible (see price flexibility discussion in RIR that follows). This means that a unit decrease in the quantity available tends to bring about a less than proportional price increase. If jewfish demand is price-inflexible (even for large changes in quantity supplied) then the proposed prohibition on harvest will entail some welfare losses to consumers but the losses will be smaller than if demand were relatively price-flexible. Charter fishing boat operators would be adversely impacted by this measure, particularly those who do not cater to catch-and-release fishing.

Enhancement of non-consumptive use may in fact increase the total benefit society derives from the jewfish resource although this would entail losses to some user groups and gains to others.

Current biological information appears to indicate that the jewfish resource is not likely to support sustained harvest at present levels of fishing mortality. As the stock is considered to be overfished, this measure will likely result in enhancing the long run benefits derived from the stock. When and how this benefit will be shared by present and future participants in the fishery is not readily determinable, particularly since the period of time necessary for the closure to be effective cannot be predicted.

B. Alternative Option Considered and Rejected

Alternative 1. Establish a 50-inch minimum size limit, as was implemented in Amendment 1 to the Gulf Reef Fish FMP.

Ecological Impacts: Establishment of a 50-inch minimum size limit would provide some protection to immature fish but none to mature spawning fish when they are most susceptible to harvest. Anecdotal reports from recreational and commercial divers indicate that the status quo measure would be insufficient to rebuild the jewfish stocks to former levels of abundance. The jewfish is of such large size that only a few fishermen are successful at harvesting them efficiently enough to prevent waste of fish that are mortally wounded but not harvested. Potential SSBR levels with the 50-inch minimum size limit may be from 1 to 11%, significantly less than the Council's goal of 40% SSBR.

Socioeconomic Impacts: The long run effects of this alternative measure are closely linked with the biological status of the stock. The ecological analysis pointed out that the size limit measure is not adequate to restore the stock to its previous level of abundance, specifically in terms of SSBR level targeted by the Council. The economic implication of this is that some of the long run benefits from a more restrictive management of the stock will be foregone by adopting this measure. If jewfish presently being harvested are mostly longer than the 50-inch minimum size, then it is possible that harvesters would not be impacted by this measure in the short run.

Alternative 2. No action.

Ecological Impacts: The jewfish resource would continue to decline below the current SSBR level of less than 1%. Ultimately, the jewfish resource would be driven to such low levels that the species may become threatened or endangered. The biological benefits anticipated with actions taken by the Secretary of Commerce, Gulf of Mexico Fishery Management Council and the State of Florida would not be fully realized.

Socioeconomic Impact: The benefit derived from non-consumptive use of jewfish would decrease. There would be some small economic value earned by commercial fishermen selling their catch but this ultimately would decrease as the resource continued to decline. The potential socioeconomic benefits detailed in the discussion that follows would not be fully realized.

IV. REGULATORY IMPACT REVIEW AND INITIAL REGULATORY FLEXIBILITY ANALYSIS

A. Introduction

This is a Regulatory Impact Review (RIR) and Initial Regulatory Flexibility Analysis (RFA) which analyzes expected impacts resulting from the proposed closure of the fishery for jewfish in the South Atlantic. The RIR describes changes in appropriate consumer and producer welfare of user groups that are expected to result from the proposed prohibition on harvest or possession of jewfish (hereafter called closure). The RFA serves as a basis for determining whether the proposed regulations would have a significant economic impact on a substantial number of small entities. In accordance with the Regulatory Flexibility Act, the RFA enables regulators to relieve, to the greatest extent possible, small entities of burdensome regulations and recordkeeping requirements.

B. Problems, Objectives and Management Measures

Problems in the fishery as well as the objectives and measures considered in this Amendment have been outlined in previous sections.

C. Impacts of Management Measures

Proposed Option: Prohibition of Harvest or Possession of Jewfish

Impacts on Commercial Harvesters And Other Commercial Interests

Closure of this fishery translates in the short-term to benefits foregone by both commercial and recreational sectors. Based on the 1979-1987 average catch and 1987 price for jewfish, the commercial harvest sector would forego annual revenues amounting to approximately $17,390. Loss of revenue to commercial harvesters may actually be less than this because at least some of recorded landings are probably attributable to recreational anglers who sold their catch.

The actual benefit forgone by commercial harvesters is the amount of profit attributable to jewfish revenues. Although we do not have specific information on producer's margins, if 20% is an appropriate profit margin for commercial harvesters, then roughly $3,478 in annual benefit will be foregone by producers. This is a rough estimate of loss of annual producer benefit as a result of

the closure.

The commercial jewfish fishery currently supports a small number of fishermen. Hand lines account for most of the reported catches, probably as bycatch in other segments of the snapper grouper fishery. Longlines, spearguns and trawls are the other gear types used in the commercial harvest of jewfish. The directed fishery consists primarily of speargun (including powerheads) users.

Some reductions in revenues to the for-hire fishing sector can be expected from the closure of the jewfish fishery, but there is not enough data to approximate the profit losses to this sector. If reported observations that jewfish anglers rarely keep the jewfish they catch are indicative of the majority of jewfish anglers, it is possible that closure of the fishery would hardly impinge on the revenues of the for-hire sector since catch and release can still be practiced by customers of for-hire vessels.

Impacts on Consumers

Average ex-vessel nominal price for jewfish in the South Atlantic has increased considerably within the past 10 years, from 41 cents per pound in 1977 to $1.02 per pound in 1987 (NMFS Accumulated Landings File). Part of this increase is due to general price inflation. Deflating these prices by the producer price index for unprocessed finfish reveals that price for jewfish has increased by about 20 cents per pound over the 1977-1987 period. Quantities of jewfish landed in the South Atlantic have fluxuated over the ten year period so there is no way to know whether price increases are a result of increases in demand or decreases in quantity supplied.

Using an index of ex-vessel demand for grouper in the Gulf of Mexico as a reasonable proxy for demand for jewfish where it is consumed in south Florida (Keithly and Prochaska, 1985), closure of the fishery could increase price by as much as 46% (using a price flexibility of 0.46 as estimated by Keithly and Prochaska). This is especially true because both State waters in Florida and the Gulf of Mexico have already been closed to the taking of jewfish and this will probably decrease the quantity of jewfish supplied considerably. If demand for jewfish is similar to demand for groupers in the Gulf as estimated by Keithly and Prochaska, then the decrease in supply resulting from the proposed closure will result in a theoretical price increase that is less than proportionally large. This means that consumers will have to bear some welfare losses from the proposed closure and the related prohibition of sale of jewfish but these losses will be smaller than if demand were price-flexible. Moreover, because the quantities and magnitudes of value and price changes are rather small, losses will also be correspondingly small.

Impacts on Recreational Fishermen Who Catch Jewfish

The extent of the recreational fishery for jewfish in the South Atlantic is not known precisely but it is believed that there is less recreational catch than in the Gulf of Mexico. North Carolina is not expected to have any recreational catch given the total lack of presence of any commercial catch. South Carolina recreational fisheries staff indicated that there has not been a confirmed

recreational landing of a jewfish in the last 20 years (D. Cupka, personal communication). Jewfish are rarely caught by offshore anglers in Georgia; the existing men's Georgia Saltwater Gamefish Record of 124 pounds was set in 1977 and constitutes the only entry ever submitted for this species in either the men's or women's records division (D. Harris, personal communication). Florida recreational landings are expected to be rare.

Using a very limited sample of recreational catch of jewfish for the period 1985-1987, it was estimated in Gulf Reef Fish Amendment 1 that the 50-inch size limit would substantially impact the recreational catch of jewfish, with the reduction amounting to as much as 92% of total recreational catch of jewfish. If the years 1979 through 1987 were used, a 61% reduction in recreational catch would occur (see Table 9). In the Gulf Council deliberations leading to the formulation of measures adopted for Gulf Reef Fish Amendment 1, the 1985-1987 period was chosen to reflect current conditions in the fast changing reef fish fishery. With indications that the recreational fishery for jewfish had increased in recent years (several letters to the Gulf Council by fishermen), there was good reason to believe the 1985-1987 period would be reflective of the current recreational fishery. However, the MRFSS survey which is the primary basis for data pertaining to recreational catches, has consistently recorded only a very limited number of jewfish catches; therefore, the 1979-1987 period would be preferred from a statistical standpoint. Without a compelling reason to choose one period over the other, the 61 to 92% is taken as a range of reduction in recreational catch due to the 50-inch size limit. Thus, closure of the fishery can be expected to reduce recreational catch by a range of 8 to 39% over the size limit reduction.

Using methods similar to those employed in Gulf Reef Fish Amendment 1, Table 10 (based on Milon's 1989 Gulf mackerel study) presents the welfare losses resulting from an 8 to 39% reduction in recreational catch. Since it is virtually impossible to approximate the number of anglers targeting jewfish and the average trip each angler takes, only the losses per angler per trip are presented in this table. These losses are very rough approximations. Welfare loss per angler would range from $0.43 to $1.54 per trip. Although no data can be presented, it is believed that anglers affected by the closure would be relatively few.

Potential Benefits To Non-consumptive Users From The Proposed Closure

Benefit losses to the entire recreational sector may be mitigated by the fact that the jewfish fishery also attracts non-consumptive exploitation, such as viewing or photographing. Closure of the fishery would significantly enhance this non-consumptive use as more and ultimately bigger fish would be available to divers for observation. Recent studies have attempted to quantify non-consumptive values. These are usually either existence or non-consumptive use values.

Existence values for land and aquatic animal have been estimated in several studies (Boyle and Bishop, 1985; Hageman, 1985). The existence value is based on the relative benefit associated with the survival of an animal species regardless of whether the person ascribing the value has the opportunity to use or encounter that species in any way.

Non-consumptive use value differs somewhat from existence value. Non-consumptive use value measures the benefit from unit increases in abundance to the people who actually undertake to view and/or photograph the species in question.

A recent study estimated the non-consumptive use value of whales viewed from whale-watching excursions (Day, 1987). Day's estimates of annual individual benefits to non-consumptive users of whales range from $21-$23 via travel cost and contingent valuation models respectively. These translate into aggregate capitalized (over time) values of between $66 million and $118 million in New England alone depending on low and high visitation scenarios. Although there are obvious differences between marine mammals and fish, these value estimates may be applicable to viewing jewfish because they both involve viewing large, docile species that are rarely encountered. Also, for both whale watching and viewing jewfish, the non-consumptive value accrues to dedicated user groups.

Accepting, for illustrative purposes, the applicability of Days's whale-watching value estimates to viewing jewfish, some rough estimates of annual aggregate benefit from increases in jewfish abundance can be made. Focussing on the Key West area of Florida alone, at present only a relatively small number of charter dive trips encounter jewfish. When jewfish arrive on a shallow wreck, these fish tend to stay in that location for a short period of time either until they are removed or move to other areas (D. DeMaria, personal communication).

When a jewfish does show up on a wreck, however, charter dive companies will attempt to dive where the jewfish is thought to frequent in order provide their clients with the rare opportunity to view these large fish. Given present low levels of abundance, probably 50-100 individuals on charter and private dive trips actually encounter jewfish based on the low numbers of jewfish available for viewing in recent years off Key West, Florida (Bob Holston, personal communication). This means that in a given year, non-consumptive use benefit would be approximately $1,100 to $2,200 annually by applying the mid-point of Day's use value estimates to estimating jewfish non-consumptive use value. This is non-consumptive use value alone (consumer surplus) and does not include other benefits from existence value or producer benefits from profits in the for-hire dive sector.

If the proposed measures result in an increase in jewfish abundance, then increased benefits from non-consumptive use in the Key West area may result and these can be estimated. For instance there are presently eight dive shops that book charter dives in Key West. These charters include as many as 30-40 clients on a dive. If each dive shop operation is similar to one that provided information for this estimate, then each operation takes about 5,000 individual divers on trips during an average year. For purposes of illustration, it was assumed that half of these charter dives would be able to view jewfish if numbers of jewfish increased significantly. Estimated annual benefits from large charter operations are described below.

In addition, there are some smaller charter operations independent of dive shops that take fewer than six clients on dives in the Key West area. The number of smaller charters is thought to be nine. There are probably 200 days in the average year with weather suitable for charter diving

via smaller dive charters off Key West. With increased abundance of jewfish, perhaps as many as half of these dives might involve viewing jewfish. The annual non-consumptive value for small scale charter firms are also described below:

Dive Shop Charter*

8	x	5,000	x	.50	x	$22	=	$440,000
(# dive shops)		(# clients/ year)		(% able to see jewfish on a dive)		(avg. value/diver)		(annual estimated non-consumptive benefit)

Small Charter**

9	x	4	x	100	x	$22	=	$79,200
(# small charters)		(avg.# clients)		(# dives/year that view jewfish)		(avg. value/diver)		(annual estimated non-consumptive benefit)

* number of charter company based on phone book commercial listings; number of dive clients per year based on a phone conversation with Bob Holston, of Florida Association of Dive Operators.
** number of small charters, number of clients and dives per year as per Don DeMaria.

From the illustration above, one can begin to look at the potential gains from increasing the availability of jewfish to divers. The scenario described above pertains to Key West alone and benefits would most likely be greater if jewfish became abundant enough to be available to divers in other locations on the East Coast. Benefits described are for charter dive operations alone. Private divers will also benefit from increased jewfish abundance.

Some may find the estimation of potential benefits above to seem higher than would be expected. Yet the diving public's enthusiasm for viewing jewfish can be measured, in part, by the fact that during the two rounds of public hearings on the original Snapper Grouper management plan, the diving community actively supported a prohibition on taking jewfish. The value of jewfish to divers is also seen through the recent attraction associated with viewing jewfish at dive sites in the Caymen Islands. Apparently viewing has become an important activity for dive operations in the Caymen Islands (D. DeMaria, personal communication).

Given the magnitude of potential benefit from non-consumptive use of jewfish, it is conceivable that even if these potential benefits were heavily discounted (because they may not occur in the immediate future), they may still outweigh foregone producer and consumer surplus from commercial and recreational consumptive exploitation. The crudeness of the estimated benefits above, however, does not allow rigorous analysis of benefit streams.

Potential Gains To Commercial Interests

If the condition of the jewfish stock is improved by the proposed closure, it is possible that commercial interests that feature non-consumptive use of the jewfish resource could expand considerably. These would be charter dive operations and charter fishing operations that cater to catch and release fishing. Estimates of these potential economic gains to the commercial sector are not presently available.

Decreased Enforcement Costs And Increased Enforcement Effectiveness

Under present conditions, jewfish harvest and possession is prohibited in State waters in Florida and in Federal waters in the Gulf of Mexico. Without a prohibition in South Atlantic waters, a significant loophole in management of jewfish is present. This loophole complicates enforcement and increases enforcement costs because violators can attempt to claim that jewfish were harvested in the South Atlantic. Complementary regulations have been proven to allow less expensive enforcement techniques to be effective. By plugging the loophole in jewfish management, enforcement expenditures can decrease or be used in other needed areas and management efforts to protect the jewfish resource will be bolstered.

Analysis Of Alternatives Considered and Rejected

Alternative 1. No Action.

The South Atlantic Snapper Grouper Fishery Management Plan, implemented in 1983, included a management measure to prohibit the spearing of jewfish in the EEZ; however, this measure was not approved. The original Snapper Grouper plan also contained a provision for establishment of Special Management Zones around artificial reefs. Harvest or possession of jewfish is currently prohibited in Special Management Zones in South Carolina, Georgia and off Ft. Pierce, Florida. Florida has, as of February 1, 1990, prohibited the harvest or possession of jewfish completely.

Reported commercial landings of jewfish in the South Atlantic decreased from 68,000 pounds worth $8,160 in 1968 to 17,911 pounds worth $18,307 in 1987. Based on data from the Gulf of Mexico, recreational harvests for the 1979-1987 period have sharply fluctuated, with the average number of fish caught equal to about 8,000 that was equivalent to about 306,000 pounds.

No Action will probably mean that present low levels of jewfish abundance will continue into the future. If the South Atlantic remains open to jewfish harvest when the Gulf and Florida state waters are closed and this provides a viable loophole for enforcement, then recovery in other areas may be slower than it would have been otherwise.

The probable outcome of not taking action is that what are identified above as short term losses of the proposed measure will not actually be lost. Yet the considerable long term gains to the non-consumptive use sector may be forfeited as well. According to the analysis of costs and benefits of the proposed temporary prohibition on the harvest of jewfish, no action could amount

to a net loss of aggregate benefit.

Alternative 2. Establishment of a 50-Inch Minimum Size Limit.

Under the 50-inch size limit, initial percentage reduction in both commercial and recreational harvests are expected to be substantial relative to the case of no regulation. However, it has been contended by some fishermen that this measure is not sufficient to protect the dwindling jewfish stock. This claim appears to be supported by the SSBR analysis which indicated that at best only 11% SSBR level will be attained under the 50-inch minimum size limit measure. Stock depletion is then unlikely to be prevented by establishment of a 50-inch minimum size limit. Under this situation, economic benefit from the fishery will eventually disappear. From testimony of fishermen targeting this species and the SSBR assessment, the long-term condition of diminishing economic benefit from the fishery will occur in the near future under current management. Along this line, certain benefits relative to the proposed option, for example, will be foregone by maintaining the status quo.

Initial Regulatory Flexibility Analysis

The exact number of commercial fishermen that will be impacted by the proposed closure is not known but thought to be quite small according to SAFMC Advisory Panel members and others knowledgeable of south Florida fisheries. According to Advisory Panel members, those few who will be affected are mostly commercial divers. No one presently harvesting jewfish in South Atlantic waters attended the May 7-14, 1990 jewfish/wreckfish public hearings.

In recent years, roughly $17,000 in ex-vessel revenue has been generated annually from the commercial harvest of jewfish in the South Atlantic. This revenue is divided among the small number of commercial harvesters and available evidence indicates that none of the harvesters depends on jewfish revenue for a significant percentage of his annual income.

For-hire operators focussing on consumptive use of the jewfish resource will also be impacted to some degree. The number of individual firms that count on jewfish for a significant portion of their for-hire trips is not known but assumed to be small or non-existent. The extent to which these firms can make up possible losses by engaging in non-consumptive use of jewfish (such as catch and release fishing) is not known.

Given the above findings, it is not believed that the closure will have a significant economic impact on a substantial number of small entities. If the jewfish resource is able to return to former levels of abundance, benefits may accrue to both consumptive and non-consumptive users. Estimates of potential increased benefits to non-consumptive users are estimated in the Regulatory Impact Review.

V. HABITAT CONCERNS

The habitat section for the fishery management plan was updated as part of Amendment 1. Additional information on jewfish is shown below.

Adult and juvenile jewfish inhabit shallow waters and reside around bottom features which provide cover and protection (e.g. shipwrecks, reefs, ledges, piers, bridges and mangrove lined shores) (Godcharles, personal communication; Hoese and Moore, 1977; Robins and Ray, 1986; Smith, 1971; Thompson and Munro, 1978). Juveniles have been found along bulkheads and bridges (Springer and Woodburn, 1960) and in upland canals in Tampa Bay (Lindall et al., 1975). The preferred habitat of adults is the high-relief ledges and wrecks further offshore (Smith, 1976). The habitat preferences of jewfish make them easily accessible to fishermen, and especially vulnerable to spearfishermen. Furthermore, their narrow habitat preference causes this species to be highly susceptible to hypothermia (Gilmore et al., 1978) and red tide (Smith, 1976) induced mortalities. Large numbers of these fish are reported to aggregate around isolated reefs, rock ledges and wrecks in 150 foot depths and less on the southwest and southeast Florida shelf during the spawning season (P. Colin and D. DeMaria, personal communication). Indeed, aggregations up to 24 fish in depths as shallow as 15 feet have been observed in Hobe Sound, Florida (W. Parks, personal communication).

"The jewfish's ecological role in Georgia's offshore live bottom communities is also unknown and subject to conjecture. Based on diver observations, however, it has been suggested that jewfish may slow sandwave inundation of low-relief or isolated outcrops that have been established as residences by this species. Besides maintaining an open substrate for invertebrates, these outcrops also support related live bottom fisheries, including scamp, black sea bass, snapper and other reeffish. In light of the low occurrence of live bottoms off Georgia, this type of function could be important in maintaining some of the state's offshore live bottoms" (D. Harris, personal communication).

VI. VESSEL SAFETY CONSIDERATIONS

Amendment by P.L. 99-659 to the Magnuson Act requires that a fishery management plan or amendment 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 management regulations set forth in this amendment to the Snapper Grouper Fishery Management Plan. Therefore, no management adjustments for fishery access will be provided.

There are no fishery conditions, management measures or regulations contained in this amendment that would result in the loss of harvesting opportunity because of crew and vessel safety effects of adverse weather or ocean conditions. No concerns have been raised by the people engaged in the fishery or the Coast Guard that the proposed management measures directly or indirectly pose a hazard to crew or vessel safety under adverse weather or ocean conditions. Therefore, there are no procedures for making management adjustments in the amendment due to vessel safety problems because no person will be precluded from a fair or equitable harvesting opportunity by the management measures set forth.

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

VII. COASTAL ZONE CONSISTENCY

Section 307(c)(1) of the Federal Coastal Zone Management Act of 1972 requires that all federal activities which directly affect the coastal zone be consistent with approved State coastal zone management programs to the maximum extent practicable. The proposed changes in federal regulations governing snappers and groupers in the EEZ of the South Atlantic will make federal regulations more consistent with existing State of Florida regulations and are necessary to maintain the health of the jewfish resource.

While it is the goal of the Council to have complementary management measures with those of the states, federal and state administrative procedures vary and regulatory changes are unlikely to be fully instituted at the same time. Based upon the assessment of this amendment's impacts in previous sections, the Council has concluded that this amendment is an improvement to the federal management measures for the jewfish fishery.

This amendment is consistent with the Coastal Zone Management Program of the States of Florida, South Carolina and North Carolina to the maximum extent possible; Georgia does not participate in the Coastal Zone Management Program.

This determination has been submitted to the responsible state agencies under Section 307 of the Coastal Zone Management Act administering approved Coastal Zone Management Programs in the states of Florida, South Carolina and North Carolina.

VIII. ENDANGERED SPECIES AND MARINE MAMMAL ACTS

The proposed actions have no anticipated impact on threatened or endangered species or on marine mammals. A Section 7 consultation was conducted for the original FMP, and it was determined the FMP was not likely to jeopardize the continued existence of threatened or endangered animals or result in the destruction or adverse modification of habitat that may be

critical to those species; this amendment proposes no changes to the FMP relative to species included in the Endangered Species Act or the Marine Mammal Act.

IX. PAPERWORK REDUCTION ACT

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

The Council proposes, through this amendment, to establish no additional permit or data collection programs; therefore, no reporting burden on the public or cost to the government will be incurred through this amendment.

X. FEDERALISM

No federalism issues have been identified relative to the actions proposed in this amendment and associated regulations. The affected states have been closely involved in developing the proposed management measures and the principal state officials responsible for fisheries management in their respective states have not expressed federalism related opposition to adoption of this amendment.

XI. NATIONAL ENVIRONMENTAL POLICY ACT -- ENVIRONMENTAL ASSESSMENT

The discussion of the need for this amendment, proposed actions and alternatives and their environmental impacts are contained in Section III of this amendment.

The proposed amendment is not a major action having significant impact on the quality of the marine or human environment of the South Atlantic. The proposed action is an adjustment of the original regulations of the FMP to protect the jewfish resource from depletion. The proposed action should not result in impacts significantly different in context or intensity from those described in the Environmental Impact Statement (EIS) published with the initial regulations implementing the approved FMP. The preparation of a formal EIS is not required for this amendment by Section 102(2)(c)(c) of the National Environmental Policy Act or its implementation regulations. For a discussion of the need for this amendment, please refer to Sections I and III.

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

Both the short- and long-term benefits of more compatible regulations and reductions in jewfish mortality will protect the resource from further depletion, better achieve the objectives of the FMP and lessen the environmental impacts of the fishery. Overall, the benefits to the nation resulting from implementation of this amendment are greater than management costs incurred.

Finding of No Significant Environmental Impact (FONSI)

Having reviewed the environmental assessment and the available information relating to the proposed actions, I have determined that there will be no significant environmental impact resulting from the proposed actions.

Approved: _____

Assistant Administrator for Fisheries Date

RESPONSIBLE AGENCY:

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LIST OF AGENCIES AND PERSONS CONSULTED:

In addition to comments received during development of the original Snapper Grouper Fishery Management Plan and public hearings, comments were solicited from the following governmental bodies for the South Atlantic Council's emergency request:

Florida Marine Fisheries Commission
Georgia Department of Natural Resources
South Carolina Wildlife and Marine Resources
North Carolina Department of Natural Resources and Community Development
National Marine Fisheries Service

Comments are solicited from the following on Amendment 2:

Atlantic Coast Conservation Association
Atlantic States Marine Fisheries Commission
Snapper Grouper Advisory Panel
Scientific and Statistical Committee
North Carolina Coastal Zone Management Program
South Carolina Coastal Zone Management Program
Florida Coastal Zone Management Program
Florida Department of Natural Resources
Florida Marine Fisheries Commission
Georgia Department of Natural Resources
South Carolina Wildlife and Marine Resources
North Carolina Department of Natural Resources and Community Development

National Marine Fisheries Service
- Southeast Region
- Southeast Center
United States Coast Guard
U.S. Environmental Protection Agency, Region IV
Center for Environmental Education
Conservation Council of Angling Clubs
Fishery Management Councils
Florida League of Anglers
South Atlantic Fisheries Development Foundation
Marine Advisory Agents
National Coalition for Marine Conservation
North Carolina Fisheries Association Inc.
Organized Fishermen of Florida
Southeastern Fisheries Association
Sportfishing Institute

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Antonio B. Lamberte, Economist, Gulf of Mexico Fishery Management Council

LOCATION AND DATES OF PUBLIC HEARINGS

May 7, 1990 — Holiday Inn Beachside, 1111 N. Roosevelt Blvd., Key West, Florida
May 8, 1990 — Sheraton at Brickell Point, 495 Brickell Ave., Miami, Florida
May 9, 1990 — Holiday Inn Oceanfront, 1617 N. First St., Jacksonville Beach, Florida
May 10, 1990 — Hyatt Regency, Two West Bay St., Savannah, Georgia
May 11, 1990 — Holiday Inn, 1706 Lumina Ave., Wrightsville Beach, North Carolina
May 14, 1990 — South Carolina Wildlife & Marine Resources Center, Fort Johnson Road, Charleston, South Carolina

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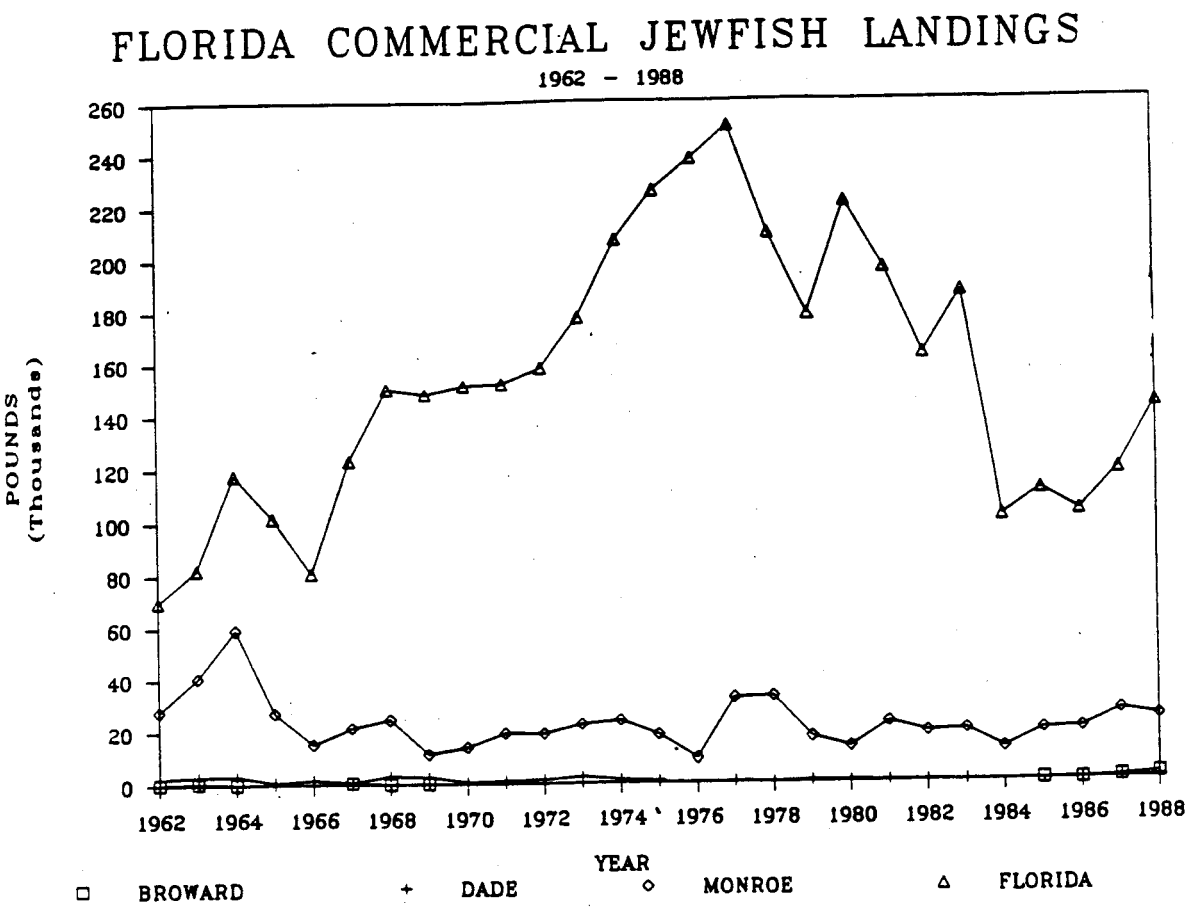
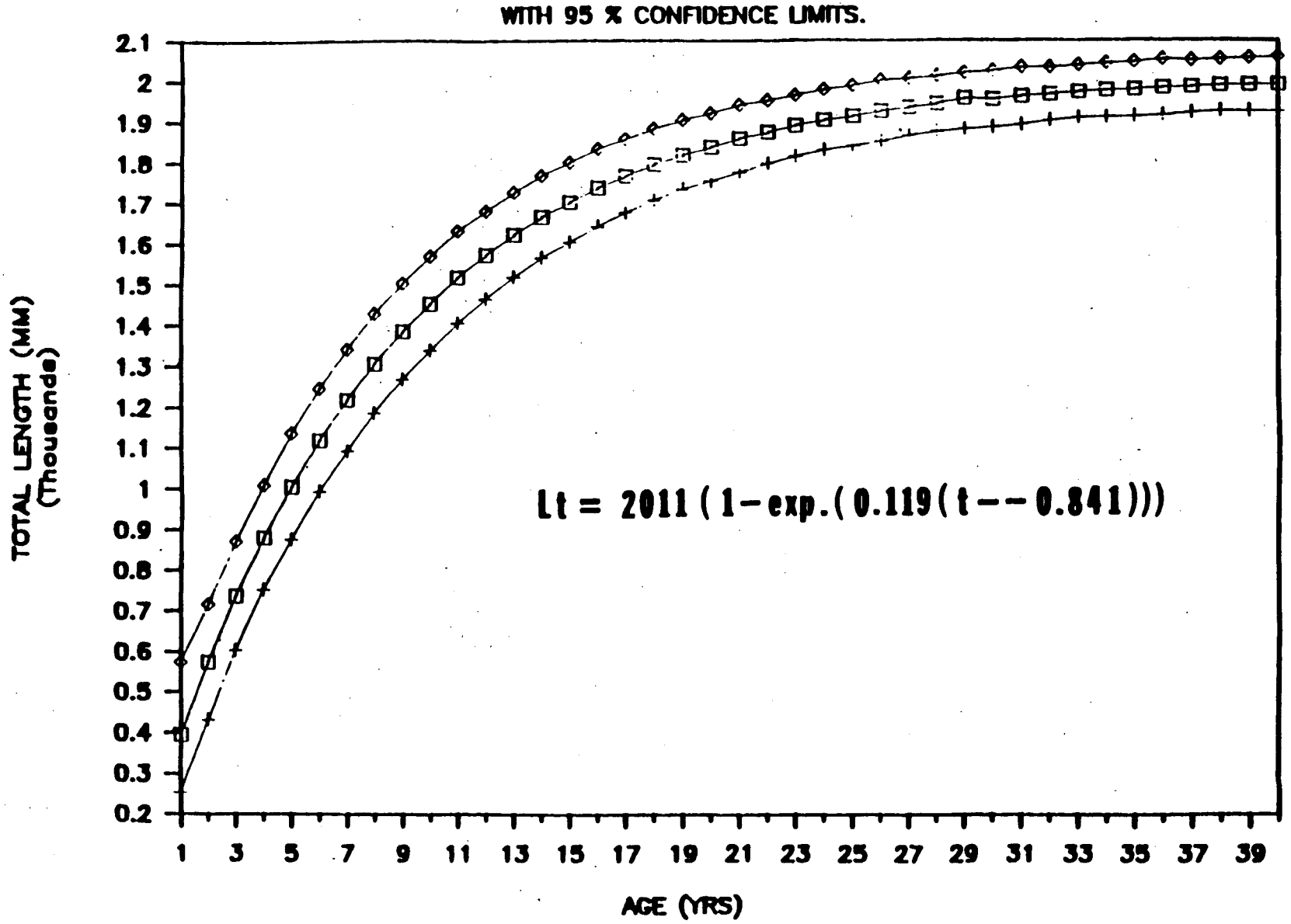


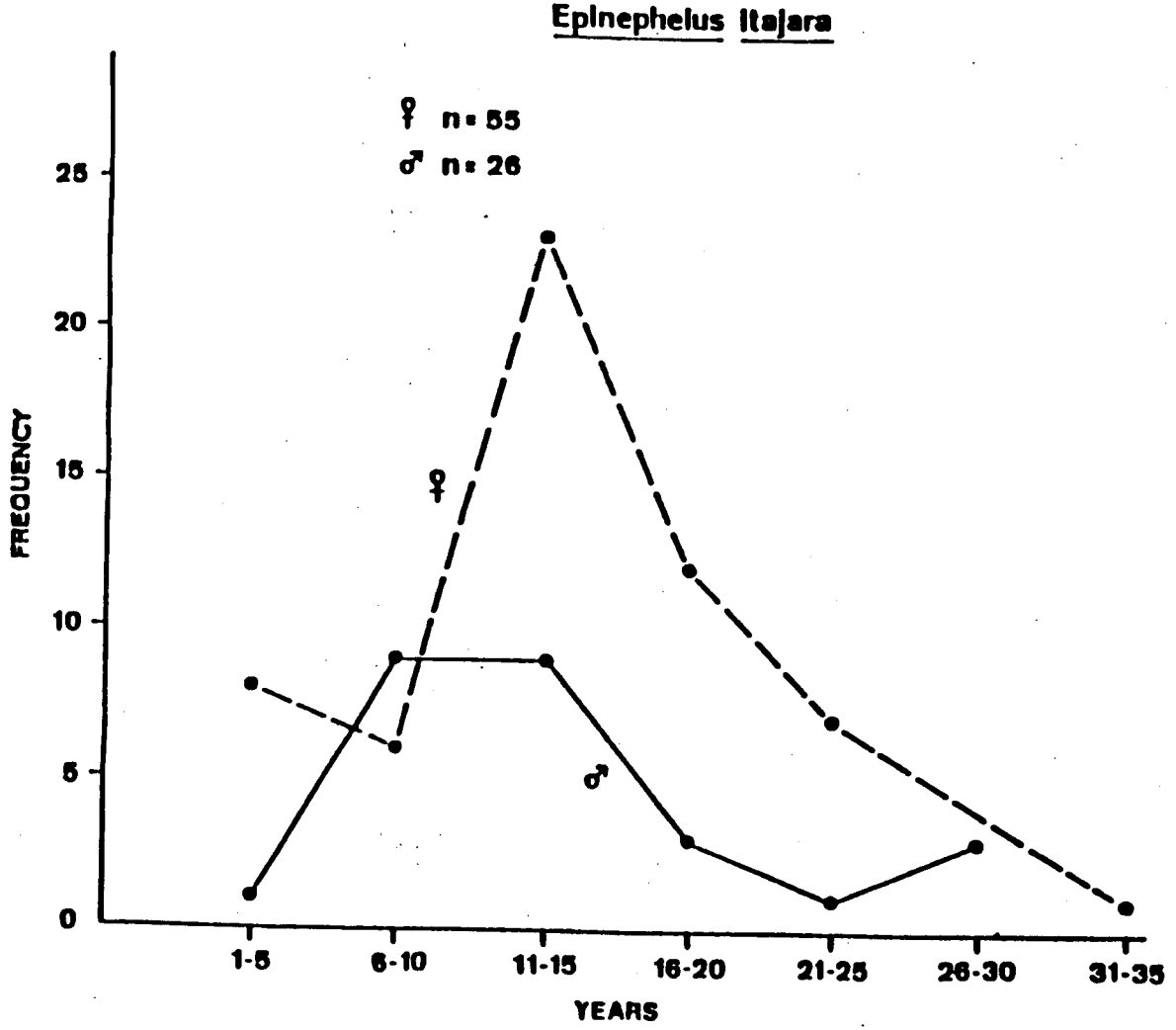
Figure 1. Florida commercial jewfish landings. Provided by Jim Bohnsack, NMFS SEFC.

FIGURE 2. PREDICTED GROWTH CURVE FOR E.ITAJARA



Provided by Lew Bullock, Florida Marine Research Institute, Florida Department of Natural Resources.

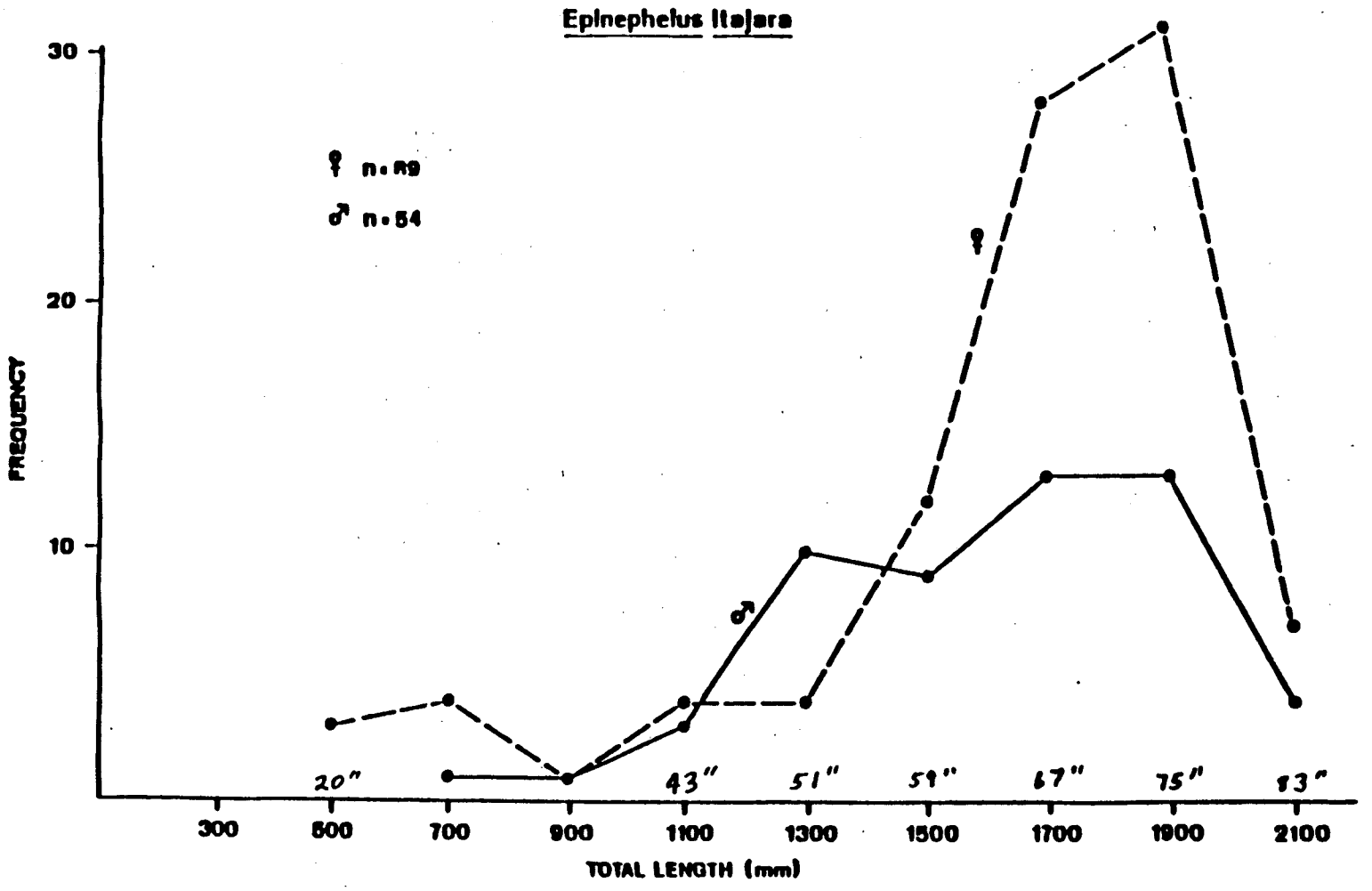
FIGURE 3. AGE DISTRIBUTION FOR JEWFISH BY SEX.



Note: This age distribution is probably not representative of the entire population because the majority of samples came from large, reproductively-active individuals in summer aggregations.

Provided by Lew Bullock, Florida Marine Research Institute, Florida Department of Natural Resources.

FIGURE 4. SIZE DISTRIBUTION FOR JEWFISH BY SEX.



Provided by Lew Bullock, Florida Marine Research Institute, Florida Department of Natural Resources.

TABLE 1

(GULF DATA ONLY)

Commercial JEWFISH landings and value data by geographic region -- 1_S.FL = Monroe County; 2_SW.FL = Charlotte, Collier, and Lee Counties; 3_W.FL = Hillsborough, Manatee, Pasco, Pinellas, and Sarasota Counties; 4_NW.FL = Bay, Citrus, Dixie, Escambia, Franklin, Gulf, Hernando, Jefferson, Levy, Okaloosa, Santa Rosa, Taylor, Wakulla, and Walton Counties; 5_AL-TX = Alabama, Louisiana, Mississippi, and Texas. Pounds and value calculations represent totals for each combination of region and year whereas price/lb is an average value.

Geographic Region	Category	Year									Year Totals
		79	80	81	82	83	84	85	86	87	
1_S.FL	Pounds	19964	15764	26800	22008	22939	14521	22632	22978	26246	193853
	Value,$	7297	5767	11242	8913	9348	6893	16660	26226	23979	116325
	Price/lb,$	0.45	0.43	0.48	0.49	0.51	0.56	0.83	1.10	0.92	0.66
2_SW.FL	Pounds	4495	12440	8844	15955	28050	32292	60784	70004	52851	285714
	Value,$	1214	4131	3538	6534	12728	14718	26999	39945	31126	140933
	Price/lb,$	0.33	0.39	0.43	0.44	0.50	0.51	0.53	0.56	0.61	0.51
3_W.FL	Pounds	8189	12074	17117	10901	16891	22865	23812	15628	19730	147207
	Value,$	1973	3762	6682	4214	7218	13460	16765	11112	15517	80703
	Price/lb,$	0.30	0.35	0.45	0.46	0.52	0.65	0.91	0.73	0.76	0.59
4_NW.FL	Pounds	1458	1315	2189	1030	735	696	126	342	713	8605
	Value,$	403	617	909	528	324	1033	41	237	615	4707
	Price/lb,$	0.43	0.54	0.51	0.63	0.57	1.30	0.30	0.69	0.79	0.60
5_AL-TX	Pounds	2690	2887	6062	14101	14327	7240	13176	873	1581	62937
	Value,$	876	1011	2425	6987	5331	2771	5349	564	995	26309
	Price/lb,$	0.33	0.32	0.38	0.50	0.45	0.30	0.49	0.64	0.64	0.43
Gulf Total	Pounds	36797	44478	61012	63995	82942	77614	120531	109825	101121	698315
	Value,$	11763	15288	24796	27176	34949	38875	65814	78084	72232	368977
	Price/lb,$	0.39	0.40	0.45	0.48	0.51	0.55	0.70	0.76	0.74	0.58

Lee County, Florida landings were adjusted for known false reporting by deleting a particular dealer's records.

TABLE 2

(GULF DATA ONLY)

Commercial JEWFISH landings and value data by state for 1979-1987. Alabama, Mississippi, Louisiana, and Texas data were combined to protect confidentiality of statistics (i.e., to assure that at least 3 different fish dealers were represented in each cell of the table.

State Group	Category	Years									All Years
		79	80	81	82	83	84	85	86	87	
AL,MS,LA,TX	Pounds	2690	2887	6062	14101	14327	7240	13176	873	1170	62526
	Value,$	876	1011	2425	6987	5331	2771	5349	564	683	25997
	Price/lb,$	0.33	0.32	0.38	0.50	0.45	0.30	0.49	0.64	0.63	0.42
W. Florida	Pounds	34107	41591	54950	49894	68615	70374	107355	108952	99951	635789
	Value,$	10887	14277	22371	20189	29618	36104	60465	77520	71549	342980
	Price/lb,$	0.40	0.40	0.46	0.47	0.51	0.58	0.71	0.76	0.75	0.59
Gulf Total	Pounds	36797	44478	61012	63995	82942	77614	120531	109825	101121	698315
	Value,$	11763	15288	24796	27176	34949	38875	65814	78084	72232	368977
	Price/lb,$	0.39	0.40	0.45	0.48	0.51	0.55	0.70	0.76	0.74	0.58

Lee County, Florida landings were adjusted for known false reporting by deleting a particular dealer's records.

TABLE 3

(GULF DATA ONLY)

Commercial JEWFISH monthly landings and value data for all Gulf states combined, 1979-1987. Data from NMFS landings data files.

Months	Category	Years									All Years
		79	80	81	82	83	84	85	86	87	
Jan	Pounds	2126	2397	5759	6846	7148	2572	3682	4992	3559	39081
	Value,$	610	840	2154	2999	3839	1159	2423	2832	2270	19126
	Price/lb,$	0.34	0.41	0.40	0.47	0.53	0.57	0.84	0.64	0.68	0.56
Feb	Pounds	3872	2443	13669	5057	3508	3528	12774	8417	8614	61881
	Value,$	1311	880	5923	1980	1904	2243	7314	6365	5656	33576
	Price/lb,$	0.41	0.43	0.47	0.50	0.52	0.60	0.79	0.95	0.60	0.62
Mar	Pounds	4635	3020	6926	4074	2107	4079	8482	7231	6857	47411
	Value,$	1256	981	2912	1674	966	2041	6239	4824	4642	25535
	Price/lb,$	0.29	0.39	0.50	0.50	0.57	0.57	0.82	0.82	0.82	0.61
Apr	Pounds	3693	2892	5723	4772	5075	8466	12693	11612	8274	63201
	Value,$	1291	838	2364	1994	2485	4865	6358	7984	6494	34673
	Price/lb,$	0.54	0.35	0.47	0.48	0.56	0.60	0.60	0.69	0.83	0.59
May	Pounds	4583	4190	4153	4956	5166	5937	12003	11000	12514	64503
	Value,$	1589	1400	1429	2152	2243	2623	6348	7205	10229	35218
	Price/lb,$	0.39	0.36	0.43	0.51	0.51	0.51	0.73	0.73	0.79	0.58
Jun	Pounds	2745	7991	5678	4429	9411	6177	12746	10920	8173	68271
	Value,$	814	2630	2148	1993	3780	2616	6252	8315	5192	33740
	Price/lb,$	0.37	0.41	0.46	0.49	0.46	0.55	0.56	0.84	0.65	0.55
Jul	Pounds	2634	6727	5004	6667	13335	6443	11277	8825	12919	73831
	Value,$	930	2049	2130	2634	5075	2989	5836	6654	8740	37037
	Price/lb,$	0.43	0.38	0.45	0.42	0.50	0.55	0.62	0.73	0.65	0.54
Aug	Pounds	4625	3435	3158	11667	11933	10160	19255	14672	18868	97773
	Value,$	1486	1264	1265	4877	4426	5252	9641	14296	12219	5472-
	Price/lb,$	0.39	0.41	0.44	0.45	0.47	0.56	0.56	0.97	0.75	0.5
Sep	Pounds	2549	4362	2497	6186	12099	8668	19067	14685	8459	785
	Value,$	823	1729	963	3115	4906	4251	10969	9308	6396	42460
	Price/lb,$	0.43	0.42	0.44	0.51	0.50	0.50	0.80	0.79	0.81	0.62
Oct	Pounds	2117	3100	1616	3452	6914	11941	2839	7396	2950	42325
	Value,$	680	1183	639	1605	2670	6079	1535	4442	2204	21037
	Price/lb,$	0.36	0.38	0.44	0.51	0.48	0.48	0.79	0.70	0.74	0.54
Nov	Pounds	1488	2028	3154	3493	3480	4780	3620	7598	3147	32788
	Value,$	482	739	1405	1261	1342	2395	1862	4338	2270	16094
	Price/lb,$	0.34	0.42	0.48	0.44	0.47	0.58	0.63	0.60	0.75	0.55
Dec	Pounds	1730	1893	3674	2394	2767	4863	2094	2477	6787	28679
	Value,$	491	755	1464	892	1313	2362	1037	1521	5920	15755
	Price/lb,$	0.36	0.46	0.44	0.42	0.54	0.57	0.65	0.61	0.82	0.55
Year Total	Pounds	36797	44478	61012	63995	82942	77614	120531	109825	101121	698315
	Value,$	11763	15288	24796	27176	34949	38875	65814	78084	72232	368977
	Price/lb,$	0.39	0.40	0.45	0.48	0.51	0.55	0.70	0.76	0.74	0.58

Lee County, Florida landings were adjusted for known false reporting by deleting a particular dealer's records.

TABLE 4

(GULF DATA ONLY)

Percentage distribution of commercial JEWFISH landings by year and distance from shore. Data from NMFS General Canvas Files.

State group	Distance from shore	YEAR									All Years
		79	80	81	82	83	84	85	86	87	
AL,MS,LA,TX	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0
	0 - 3 nm.	0.0	0.0	0.0	0.0	0.0	0.0	16.4	0.0	0.0	3.6
	3 - 12 nm.	0.0	25.3	8.0	3.9	0.1	4.1	0.0	100.0	0.0	4.4
	12 - 200 nm.	100.0	74.7	92.0	96.1	99.9	95.9	83.6	0.0	97.9	92.0
	All Distances	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
W. Florida	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
	0 - 3 nm.	77.4	4.2	3.3	3.2	0.8	1.9	0.1	4.0	7.6	12.6
	3 - 12 nm.	8.3	3.6	6.7	4.1	12.0	16.4	9.8	9.7	14.2	8.5
	12 - 200 nm.	14.4	92.1	90.0	92.8	87.2	81.7	90.2	86.3	77.8	78.9
	All Distances	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Gulf Total	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
	0 - 3 nm.	76.3	4.2	3.2	2.9	0.7	1.8	1.7	4.0	7.5	12.3
	3 - 12 nm.	8.1	3.8	6.7	4.0	11.2	15.6	8.8	10.5	14.0	8.3
	12 - 200 nm.	15.5	92.0	90.1	93.0	88.0	82.6	89.5	85.6	78.0	79.4
	All Distances	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

TABLE 5

(GULF DATA ONLY)

Percentage distribution of commercial JEWFISH landings by year and fishing gear type. Data from NMFS General Canvas Files.

State group	Gear type	YEAR									All
		79	80	81	82	83	84	85	86	87	Years
AL,MS,LA,TX	Unk./Misc.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0
	Trawl	0.0	25.3	8.0	1.6	4.9	3.4	0.2	75.6	0.0	4.6
	Handline	100.0	74.7	92.0	91.8	95.1	96.6	99.8	24.4	97.9	93.9
	Longline/Buoy	0.0	0.0	0.0	6.6	0.0	0.0	0.0	0.0	0.0	1.5
	All Gear	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
W. Florida	Unk./Misc.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
	Trawl	7.3	1.1	1.3	0.8	1.0	0.7	0.1	1.8	1.7	1.9
	Handline	87.2	87.8	81.1	69.8	64.4	67.6	39.7	40.4	39.1	69.0
	Longline/Buoy	0.0	7.1	11.2	21.1	26.2	20.7	31.4	20.0	14.5	15.7
	Speargun	5.4	4.1	6.4	8.3	8.4	11.1	28.8	37.8	44.3	13.5
	All Gear	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Gulf Total	Unk./Misc.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
	Trawl	7.2	1.3	1.5	0.9	1.2	0.8	0.1	2.4	1.7	2.0
	Handline	87.4	87.6	81.3	71.3	66.4	69.5	45.6	40.2	39.7	70.0
	Longline/Buoy	0.0	7.0	10.9	20.1	24.5	19.3	28.3	19.8	14.4	15.1
	Speargun	5.4	4.1	6.2	7.7	7.8	10.4	26.0	37.5	43.8	13.0
	All Gear	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 6. Commercial landings (pounds) of jewfish.

YEAR	BROWARD COUNTY	DADE COUNTY	MONROE COUNTY	FLORIDA TOTAL
1962	300	2,400	27,700	69,900
1963	600	3,100	40,800	82,200
1964	100	3,200	59,200	117,900
1965		900	27,200	101,500
1966		1,700	15,200	80,600
1967	400	800	21,300	123,200
1968	100	3,000	24,400	150,000
1969	100	2,600	11,300	148,000
1970		700	14,000	151,600
1971		1,100	19,100	152,200
1972		1,400	19,000	158,300
1973		2,400	22,300	177,300
1974		1,100	23,800	207,100
1975		800	18,300	226,000
1976			9,000	238,100
1977		233	32,065	250,573
1978		38	32,646	209,434
1979		525	16,919	178,135
1980		512	13,359	221,298
1981		238	22,712	195,811
1982		289	18,651	162,967
1983		100	19,440	186,834
1984			12,306	100,817
1985	147		19,180	110,906
1986	46	0	19,471	102,416
1987	708	0	26,193	117,809
1988	2,059	408	23,823	143,310
TOTAL	4,560	27,543	609,365	4,164,210

From Dr. Jim Bohnsack, NMFS/SEFC.
1962-1976 Data Source: GCLS files on B7800; 6-6-89.
1977-1988 Data Source: Accumulative Monthly Landings, NMFS/SEFC, Miami.
1986-1988 Data Source: Florida Trip Ticket data files.

Table 7. Jewfish commercial landings and value information for 1967-1987.

	NMFS ACCUMULATIVE MONTHLY LANDINGS						SNAPPER GROUPER SOURCE DOCUMENT (1983)			
YEAR	GEORGIA		FLORIDA EAST COAST		SOUTH ATLANTIC		FLORIDA EAST COAST		SOUTH ATLANTIC	
	POUNDS	DOLLARS	POUNDS	DOLLARS	POUNDS	DOLLARS	POUNDS	DOLLARS	POUNDS	DOLLARS
1967							71,000		71,000	
1968							68,000	$8,160	68,000	$8,160
1969							54,000	$8,200	54,000	$8,200
1970							31,000	$4,666	31,000	$4,666
1971							17,000	$2,205	17,000	$2,205
1972							23,000	$3,871	23,000	$3,871
1973							35,000	$8,455	35,000	$8,455
1974							66,000	$18,600	66,000	$18,600
1975							56,000	$15,799	56,000	$15,799
1976							59,000	$19,671	59,000	$19,671
1977			50,803	$20,708	50,803	$20,708	72,000	$29,610	72,000	$29,610
1978			17,185	$8,156	17,185	$8,156	39,000	$8,156	39,000	$8,156
1979			18,064	$10,166	18,064	$10,166	29,000	$10,166	29,000	$10,166
1980			19,423	$11,059	19,423	$11,059	23,000	$12,789	23,000	$12,789
1981	1,154	$695	12,397	$8,678	13,551	$9,373	19,000	$12,664	19,000	$12,664
1982	177	$94	6,131	$4,449	6,308	$4,543				
1983			12,293	$8,304	12,293	$8,304				
1984	191	$114	11,440	$9,687	11,631	$9,801				
1985	548	$729	9,367	$8,452	9,915	$9,181				
1986			10,492	$9,877	10,492	$9,877				
1987			17,911	$18,307	17,911	$18,307				
1988										

TABLE 8

(GULF DATA ONLY)

Percentage distribution, in numbers of fish, of recreational reef fish landed (A+B1) by species, state, fishing area, and fishing mode by in the Gulf of Mexico, 1979-1987. Data are from the NMFS Marine Recreational Fishery Statistics Survey; the Texas data do not include charter/party or private/rental boat modes in 1982-1984 nor any modes for 1986-1987 and the party boat mode is not included for any state during 1986-1987.

		Recreational harvest (A+B1), 1979-1987									
		79	80	81	82	83	84	85	86	87	79-87
State	Alabama	0	0	0	0	0	0.0	0	0	0	0.0
	Florida	77.9	90.4	100.0	86.3	0	0	100.0	10.9	97.8	80.5
	Louisiana	0	9.6	0	13.7	0	100.0	0	89.1	2.2	18.2
	Mississippi	0	0	0	0	0	0	0	0	0	0
	Texas	22.1	0	0	0	0	0.0	0	0	0	1.2
Area fished	State waters	100.0	44.2	100.0	93.1	0	0.0	0.0	0	37.5	52.3
	Federal waters	0	45.1	0	6.9	0	0	100.0	100.0	62.5	41.6
	Unknown	0	10.7	0	0	0	100.0	0	0	0	6.2
Fishing mode	Shore	22.1	0	0	0	0	0.0	0	0	0	1.2
	Party/charter	0	35.4	0	0	0	100.0	0	0.0	39.7	13.9
	Private/rental	77.9	64.6	100.0	100.0	0	0.0	100.0	100.0	60.3	84.9
Total Harvest Estimates:											
Total Number of fish (A+B1)		3823	16904	14330	10175	0*	2456	10651	7963	3039	69341
Total Pounds of fish (A+B1)		187089	662993	0*	1173528	0	226324	277072	38000	192472	2570389

* No jewfish were intercepted during the dockside sampling component of MRFSS during 1983 and during 1981 although catches of jewfish were intercepted none were measured for length or weight.

TABLE 9

(GULF DATA ONLY)

Size frequency of jewfish measured on the MRFSS intercept surveys for the years 1979 through 1987.

Length Class (inches TL)	Number of Fish	Weight Class (Pounds)	Number of Fish
10	1	1	1
16	1	3	1
17	1	4	2
20	1	11	1
26	1	12	1
30	1	14	1
32	2	20	1
33	1	21	2
34	1	22	2
37	1	23	1
41	1	26	1
48	1	30	1
49	1	49	1
51	1	51	1
53	2	57	1
58	1	62	2
59	1	70	1
60	1	92	1
62	1	110	1
		125	1
		144	1
		242	1
Totals	21		26

TABLE 10

(GULF DATA ONLY)

Per Trip Loss in Consumer Surplus to an Angler due to the Closure of the Jewfish Fishery

Reduction	Low	High
8 percent	$0.43	$0.86
39 percent	$0.77	$1.54

Note: The method and basic information used in calculating these numbers are similar to those found in Amendment 1 to the Reef Fish FMP.