5/18/94

AMENDMENT NUMBER 7

TO

THE FISHERY MANAGEMENT PLAN

FOR THE

SHRIMP FISHERY OF THE GULF OF MEXICO

UNITED STATES WATERS

INCLUDES ENVIRONMENTAL ASSESSMENT

WITH

REGULATORY IMPACT REVIEW

MAY 1994

GULF OF MEXICO FISHERY MANAGEMENT COUNCIL
LINCOLN CENTER, SUITE 331
5401 WEST KENNEDY BOULEVARD
TAMPA, FLORIDA 33609
813-228-2815

This is a publication of the Gulf of Mexico pursuant to National Oceanic and Atmospheric Administration Award No. NA47FC0005

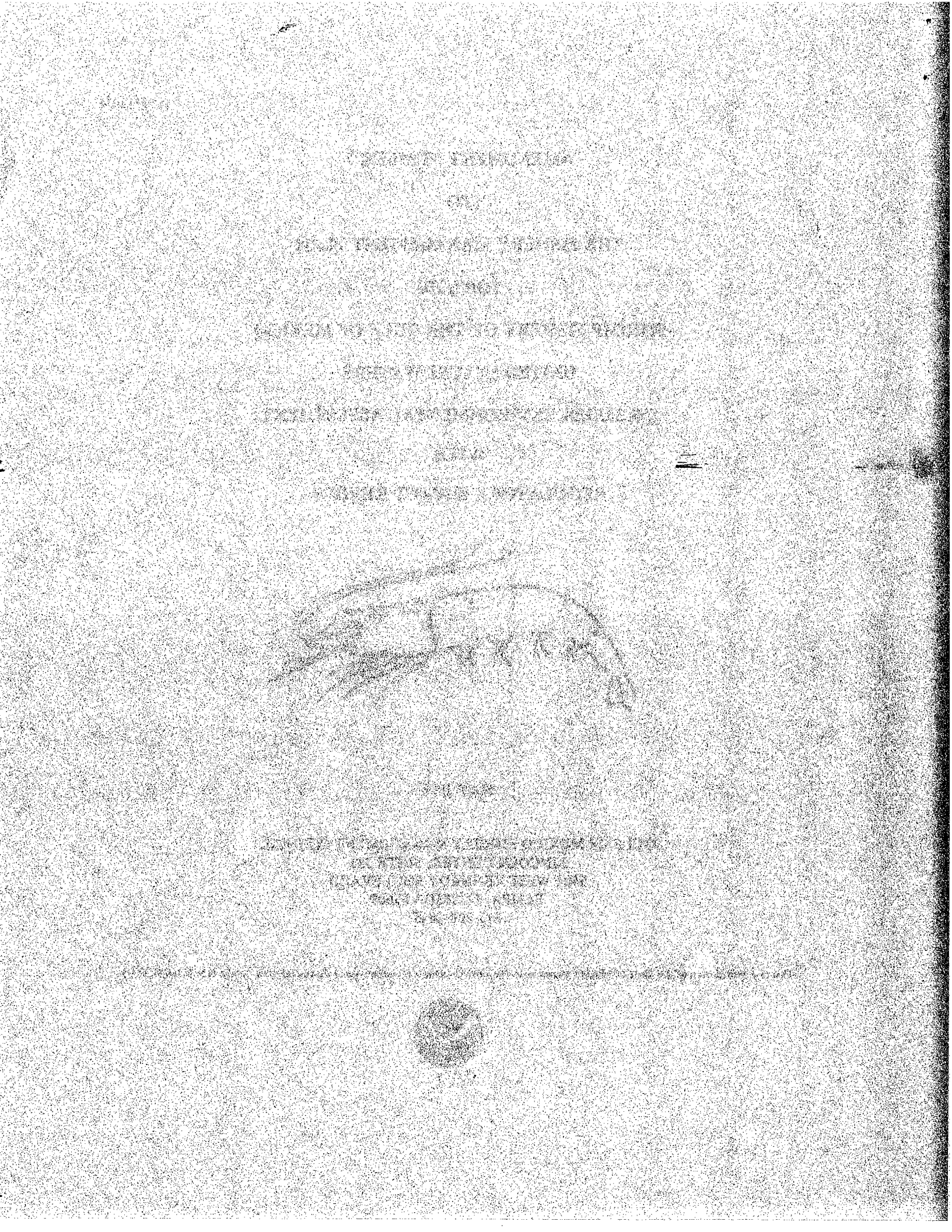

TABLE OF CONTENTS

SUMMARY

This amendment will provide a definition of overfishing for white shrimp and provides for remedial action to restore the stock if overfishing should occur. It provides for revising the overfishing indices for brown, white, and pink shrimp when new data become available. A total allowable level of foreign fishing for royal red shrimp is to be terminated to allow a higher level of catch by the domestic fleet. A revised definition of overfishing and a procedure for updating maximum sustainable yield (MSY) for royal red shrimp is provided.

Environmental and economic impacts are evaluated.

I. INTRODUCTION

A fishery management plan for the shrimp fishery in the Gulf of Mexico (FMP) was prepared by the Gulf of Mexico Fishery Management Council and was implemented as federal regulation on May 15, 1981. The principal thrust of the plan was to enhance yield in volume and value by deferring harvest of small shrimp to provide for growth. This was achieved by establishing a cooperative Tortugas Shrimp Sanctuary with the state of Florida to close to shrimp trawling an area where small pink shrimp comprise the majority of the population most of the time. A cooperative 45-day seasonal closure was established with the state of Texas to protect small brown shrimp emigrating from bay nursery areas. An area of Florida Bay was zoned seasonally for either shrimp or stone crab fishing to avoid gear conflict.

Amendment No. 1 provided the Regional Director of the National Marine Fisheries Service (NMFS) with the authority after conferring with the Council to adjust by regulatory amendment the size of the Tortugas Sanctuary or extent of the Texas closure or to eliminate either closure for one year.

Amendment No. 2 updated catch and economic data in the FMP, and Amendment No. 3 resolved another shrimp-stone crab gear conflict on the west central Florida coast.

Amendment No. 4, partially approved in 1988, identified problems which developed in the fishery and revised the objectives of the FMP accordingly. The annual review process for the Tortugas Sanctuary was simplified, and the Council and Regional Director review for the Texas closure was extended to February 1st. Disapproved was a provision that white shrimp taken in the Exclusive Economic Zone (EEZ) were to be landed in accord with a state's size possession regulations to provide consistency and facility of enforcement with the state of Louisiana. This latter action was to have been implemented at such time when Louisiana provided for an incidental catch of undersized white shrimp in the fishery for seabobs. This proposed action was disapproved with the recommendation that it be resubmitted under the expedited 60-day Secretarial review schedule after Louisiana provided for a bycatch of undersized white shrimp in the directed fishery for seabobs. This resubmission was made in February of 1990 and applied to white shrimp taken in the EEZ and landed in Louisiana. It was approved and implemented in May of 1990.

In July 1989 NMFS published revised guidelines for fishery management plans that interpretatively address the Magnuson Act national standards (50 CFR Part 602). These guidelines require each FMP to include a scientifically measurable definition of overfishing and an action plan to arrest overfishing should it occur.

In 1990 Texas revised the period of its seasonal closure in Gulf waters from June 1 to July 15 to May 15 to July 15. The FMP did not have enough flexibility to adjust the cooperative closure of federal waters to accommodate this change.

Amendment 5 in 1991 defined overfishing for Gulf brown, pink and royal red shrimp and provided for measures to restore overfished stocks if overfishing should occur. Action on white shrimp was deferred, and seabobs and rock shrimp were deleted from the management unit. The duration of the seasonal closure to shrimping off Texas was adjusted to conform with recent changes in state regulations.

Amendment 6 eliminated the annual reports and reviews of the Tortugas Shrimp Sanctuary in favor of monitoring and an annual stock assessment. Three seasonally opened areas within the sanctuary continued to open seasonally, without need for annual action. A proposed definition of overfishing of white shrimp was rejected by NMFS as not being based on the best available data.

II. DESCRIPTION AND CONDITION OF THE FISHERY

The shrimp fishery in the Gulf of Mexico is regulated by the federal government and the states of Texas, Louisiana, Mississippi, Alabama, and Florida. Federal waters extend from 3 to 200 nautical miles from the coastline in the Gulf of Mexico, except off Florida and Texas where the state waters extend to 9 nautical miles.

U.S. commercial landings of Gulf shrimp averaged 256 million pounds (live weight) during the period 1985 to 1989. Landings in 1990 were 249 million pounds up 8 percent from 228 million pounds in 1988. The ex-vessel value of landings was $399 million.

Supply cannot meet the demand and imports have made up the difference. In 1990 imports of shrimp comprised 579 million pounds (tail weight) (NMFS statistics).

Gulf shrimp abundance continues to be the result of recruitment, largely controlled by environmental driving forces. In recent years the development of a strong inshore (bay) fishery for juvenile shrimp, whose growth potential has not been reached, has resulted in lower recruitment to the offshore fishery and lessened the potential for increasing yield by deferring harvest in offshore waters. Both the states of Louisiana and Texas where much of the inshore fishery occurs are currently developing and implementing plans to address this issue.

There are an estimated 6,200 vessels over 5 net tons in the Gulf fishery, most of which probably fish in the EEZ. Another 12,000 boats less than 5 net tons fish primarily in state and inside waters.

The Tortugas pink shrimp fishery was stable with annual production of about 10 million pounds until 1985. Since then, recruitment has declined, and production has been reduced to about six million pounds. The cause of the decline in recruitment is not known but is believed to be related to environmental changes in the Everglades nursery area.

Royal red shrimp are found in deep water where production costs are high. Markets for this species are very poor, and there has been little production in recent years. Annual landings of less than 275,000 pounds were recorded in past years, but the fishery declined to less than 100,000 pounds per year during the 1980s. In 1993 landings approached 300,000 pounds.

Since recruitment overfishing has not been observed in any of the three major Gulf of Mexico shrimp fisheries, lowest recent parent stock number values for each species are used as the limit beyond which overfishing could occur with present environmental conditions. Parent stock is defined for brown shrimp as the number of age 7+ (months) shrimp during the November - February time frame, with a level of 125 millions shrimp set as the lower limit.

Pink shrimp parent stock is defined as the number 5+ (months) shrimp during the July - June period, with a level of 100 million shrimp set as the lower limit.

White shrimp parent stock is to be defined as the number of age 7+ (months) shrimp during the May-August time frame, with a level of 330 million shrimp set as the lower limit.

The parent number for each of the three major shrimp species was above the overfishing index level during 1992. Brown and white shrimp parent levels were well above the overfishing index, while pink shrimp parent stock estimates were closer to the index.

Besides the three major shrimp species, only royal red shrimp is also contained within the management unit of the FMP. Overfishing was defined for this species as fishing greater than optimal yield (OY)

as defined in the FMP. OY was set at MSY (maximum sustainable yield), which was estimated to be 392,000 pounds of tails at a level of 1,290 days fished. During 1993, approximately 300,000 pounds of royal red shrimp were caught in the Gulf of Mexico. This value is under the overfishing index level set for this shrimp species.

While requirements to modify trawl gear, through the use of Turtle Excluder Devices (TEDs), and trawling procedures, through the use of timed tows, have caused social and economic disruptions in the fishery, their impacts have lessened over time as fishermen have adjusted to them. These disruptions manifested themselves in angry public meetings, channel blockades, and poor compliance with the regulations imposing the conservation measures required under the Endangered Species Act. Compliance with the regulations, however, has steadily improved as fishermen have learned to use TEDs more efficiently. There still remain some instances of disruption probably in part to do with localized clogging of TEDs with bottom debris and marine grasses, and other economic stresses due to imports and falling ex-vessel shrimp prices.

Studies conducted by NMFS involving observers on cooperating shrimp trawlers showed that shrimp loss from properly installed TEDs averaged about 10 percent in 1989, but only about 1 percent in 1990 (Renaud, et. al., 1990; Renaud, et. at., 1991). The difference between the two years was explained as being at least partially due to fishermen gaining experience with the TEDs, and advances in the gear (NMFS, 1991). NMFS concluded that while TEDs did reduce the individual fisherman's efficiency somewhat, there was no overall reduction in shrimp catch. This was because the fishery is so over capitalized. Shrimp escaping one fisherman would be caught by another one (NMFS, 1991).

III. ISSUES TO BE ADDRESSED

1. Compliance with 602 Guidelines which require a definition of "overfishing" and measures to restore overfished stocks for white shrimp.

2. Provision to update overfishing index levels when new data become available.

3. Elimination of a total allowable level of foreign fishing (TALFF) for royal red shrimp.

4. Procedure to allow development of the fishery for royal red shrimp without overfishing the stock.

IV. PURPOSE AND NEED

Problems in the Fishery

In the current FMP as amended, the Council has identified the following problems associated with the fishery and the present management regime and has prepared the plan objectives where possible to address and alleviate them.

1. Conflict among user groups as to area and size at which shrimp are to be harvested.
2. Discard of shrimp through the wasteful practice of culling.
3. The continuing decline in the quality and quantity of estuarine and associated inland habitats.
4. Conflicts with other fisheries such as gear conflict with the stone crab fishery in southern Florida, the groundfish fishery of the north central Gulf, and the Gulf's reef fish fishery.
5. Incidental capture of sea turtles.
6. Loss of gear and trawling grounds due to man-made obstructions.

7. Partial lack of basic data needed for management.
8. Increasing catch of small shrimp in inshore waters.
9. Pulse fishing resulting from seasonal closures.

10. Loss of access to productive shrimp fishing grounds off Mexico.
11. Possible loss of shrimp to Mexico through transboundary migration.
12. Competition in shrimp sizes targeted by management with prevalent sizes produced by foreign mariculture operations.
13. Inconsistency in some state and federal regulations.
14. Excessive fishing effort employed in the fishery.
15. Limited enforcement capabilities.

Specific Management Objectives

The following are the specific management objectives of the existing FMP as amended.

1. Optimize the yield from shrimp recruited to the fishery.
2. Encourage habitat protection measures to prevent undue loss of shrimp habitat.
3. Coordinate the development of shrimp management measures by the Gulf of Mexico Fishery Management Council with the shrimp management programs of the several states, where feasible.
4. Promote consistency with the Endangered Species Act and the Marine Mammal Protection Act.
5. Minimize the incidental capture of finfish by shrimpers, when appropriate.
6. Minimize conflicts between shrimp and stone crab fishermen.
7. Minimize adverse effects of obstructions to shrimp trawling.
8. Provide for a statistical reporting system.

Need For The Proposed Action

1. Overfishing of Gulf white shrimp is defined, and measures to restore overfished stocks are added. Implementation of Section 602 guidelines requires that each fishery management plan must define and contain measures to prevent overfishing. The other species in the management unit are in compliance, and this action will also include white shrimp.

2. Overfishing indices for the brown, white, and pink shrimp species are set at the minimum known levels of parents during spawning season from which the stock was able to recover. This amendment provides for setting these indices at lower safe levels as they are identified.

3. A TALFF reserve for royal red shrimp is eliminated to allow the domestic fleet to obtain OY.

4. MSY for royal red shrimp is crude due to limited data, and the fishery is capped at that level.

V. ACTION ALTERNATIVES

ACTION 1. DEFINITION AND PREVENTION OF OVERFISHING WHITE SHRIMP.

1a. Preferred Alternative:

(1) Section 6.2.1.1. is revised as follows (to include white shrimp):

6.2.1.1 Overfishing Brown, White, and Pink Shrimp

The rationale and the definition of overfishing shrimp were developed at two shrimp overfishing workshops (Klima, Nance, Martinez, and Leary, 1990 and the Shrimp Stock Assessment Panel, 1993). A minimum level of parent stock (e.g. Nance, Klima, and Czapla, 1989) was deemed by the participants to provide the best definition of overfishing for these three species. Recruitment for these species is often a reflection of environmental driving forces and, therefore, is not the best indicator of overfishing.

The number of parents, sexually mature shrimp for each month during the spawning period for that species, was calculated by means of a virtual population analysis (VPA), (Ricker, 1975), (Nichols, 1984). A VPA uses catch by age, instantaneous rate of natural mortality, and instantaneous rate of fishing mortality to estimate numbers of shrimp at different ages. The indices for the parent stock varies among the species because different ages and time periods were used in the calculations. For example, the index for brown shrimp represents the number of seven month or older shrimp over a four month period while that for pink shrimp represents the number of 5+ month old shrimp over a 12 month period.

CRITERIA USED TO DETERMINE NUMBER OF INDIVIDUALS IN THE SPAWNING STOCK

SPECIES	TIME FRAME OF MAX. SPAWNING	AGE OF PARENTS	NATURAL MORTALITY
Brown Shrimp	Nov - Feb	>7 months	.275
White Shrimp	May - Aug	>7 months	.275
Pink Shrimp	July - June	>5 months	.300

Discussion: Action to implement a definition of overfishing of brown, pink, and royal red shrimp was implemented in Amendment 5. Action on white shrimp was deferred to determine if it would be more appropriate to remove this species from the management unit of the FMP. Since 1980 production of white shrimp in the U.S. Gulf has ranged from a low of about 42 million pounds to a high of 73 million pounds. It is the second most important shrimp species (behind the brown shrimp) in the U.S. Gulf. From 57 to 62 percent of the landings by volume and 43 to 58 percent of the value come from state waters depending on the year. However, in 1986 about 28 million pounds of white shrimp valued at 100 million dollars came from federal waters.

The fishery extends to about 20 fathoms with almost 90 percent of the landings from less than 10 fathoms (Osborn, et. al., 1969). White shrimp are heavily fished throughout their range. Brown shrimp extend to waters deeper than the fishery, while pink shrimp inhabit extensive areas of untrawlable bottom.

Some Gulf states have minimum size limits to discourage growth overfishing, and Louisiana and Texas seasonally close a portion of Gulf waters to protect small overwintering white shrimp. The only management measure for this species in the FMP provides that there are to be no size restrictions on shrimp taken in the EEZ except that white shrimp transported into Louisiana must conform with that state's minimum size restriction.

White shrimp is the first Gulf shrimp species for which significant curve fits have been observed in the stock recruitment relationship through time; however, factors unrelated to fishing could be generating the relationship (Nance, Klima, and Czapla, 1989).

NMFS currently monitors the status of the stocks and provides an annual report of the level of parent stocks with respect to the index. The Stock Assessment Fishery Evaluation report is another means of monitoring the condition of the shrimp stocks to ensure that the most current and best scientific information is used to manage the resource.

(2) Section 6.2.1.1.3 is added as follows:

6.2.1.1.3 White shrimp recruitment overfishing is indicated when parent stock level is reduced below 330 million shrimp (Figure 3). Parent stock for white shrimp is defined as the number of age 7+ (months) shrimp during the period May through August.

Discussion: In Amendment 6 to the Shrimp FMP the Council proposed an overfishing index for white shrimp of 300 million parents at age 5+ months during the period of April through August. The Council proposed this index because the stocks had fallen below this level in 1961 and 1962 and subsequently rebounded. NMFS rejected this proposal; however, because it was not based on the best scientific information, that being the 1990 report of the Shrimp Overfishing Workshop. The Council reconvened the workshop participants in 1993 and requested a review of the methodology for defining overfishing for the three Penaeus species.

The second workshop again determined that number of parents, based on a VPA analysis (Nichols 1984), is the preferred index to establish the definition of overfishing for the three Penaeus species. A statistically significant parent stock-recruitment relationship is not apparent for any of these three shrimp species. The statistically poor relationship between parents and recruits comes from the variable effects of the environment of the survival of the young shrimp stages from spawning until entrance into the fishery. This variability in survival of young shrimp stages clouds the stock-recruitment relationship and makes it difficult to quantify the underlying association between parents and recruits. The parent number provides a measure of reproductive potential, but not reproductive success. Maintaining adequate reproductive potential should be considered in defining overfishing; therefore, a partial stock index was chosen.

Other index types such as recruitment and catch-per-unit-effort (CPUE) were discussed, but it was felt that they did not provide as good an index as parent number. Recruitment is the measure of reproductive reality, but the values are greatly influenced by environmental conditions. CPUE is a measure of abundance, but its usefulness was limited since only nominal and not standardized effort is presently available for the calculations.

The workshop participants discussed in detail the minimum age of parenthood and the length of the spawning period for the three species. The 4-month spawning period of November through February for brown shrimp and the 12-month spawning period for pink shrimp were retained from the earlier workshop. The index levels for brown and pink shrimp remain unchanged at 125 million and 100 million parents respectively (Figures 1 and 2). Since white shrimp postlarvae are usually not caught along the beaches of the U.S. Gulf of Mexico until mid-May, with most found during the June through July period (Baxter and Renfro, 1967), the spawning period for white shrimp was changed from the five month period of April through August to the four month period of May through August.

Age values for brown and pink shrimp selected during the first workshop were retained by the second workshop.

Since the Council was having a difficult time understanding why ≥age 7 months were selected by the first workshop for brown shrimp and ≥age 5 months was selected for white shrimp, a comparison of white shrimp abundance at ≥age 5 months and at ≥age 7 months, during the selected spawning periods, was made during the second workshop. **Figure** 3 depicts the differences between the two parent groups. Although, as expected with two more months of natural and fishing mortality, the ≥age 7 months levels are smaller than the ≥age 5 months levels, the trends are very similar. It appears from the data that either parent group could be used to predict the recruitment during the following year with equal success. With no apparent loss in predictability and to avoid further possible confusion, ≥age 7 months was selected as the new parent age for white shrimp.

Biologically, this change should not interfere with the purpose of the overfishing definition (to alert the Council that parent numbers have been reduced below a level that may not sustain recruitment), unless the age 5 and age 6 month old white shrimp parents have a spawning potential that greatly exceeds the potential exhibited by the ≥age 7 month white shrimp. The workshop had no data to support either argument.

It should be pointed out that parent levels for white shrimp are still higher than those shown for brown shrimp **(Figure 4)**. This may perplex some individuals, but it should be remembered that some shrimp species simply have a greater reproductive potential than other shrimp species. For example, Penn and Caputi (1985) observed that tiger prawn (Penaeus esculentus) recruitment was impacted when spawning stock was reduced to about 40 percent of the virgin size. Yet, banana prawn (~~P.~~ merquiensis) spawning stock size has been reduced to well below 10 percent of the virgin level without apparently affecting subsequent recruitment (Somers, personal communication). It has been hypothesized that more white shrimp males are needed because they mate during spawning while fewer brown and pink males are needed because they mate during molt.

Since there is no indication of recruitment overfishing for white shrimp, a minimum of 330 million shrimp was proposed at the second workshop as the lower limit for parent stock in the white shrimp fishery in the Gulf of Mexico. This value is slightly lower than the 1973 level of parent stock, which is the lowest observed value since the mid-1960's **(Figure 5)**. Although the nominal figure is a change from the 600 million shrimp number suggested at the first workshop, the source of this change is based on using parents ≥age 7, not on the same ≥age 5 month parents as in the previous recommendations. Thus, the change is in index scale, not in the substance of the recommendation. As during the first workshop, the minimum was set above the three yearly low points (1960 through 1962). It was concluded by the group that since present white shrimp nominal fishing intensity is twice the levels found in 1960 **(Figure 6)**, recruitment overfishing may occur if these early 1960's parent levels were reached with current effort levels.

1b. **Rejected Alternative:** Remove white shrimp from the management unit of the FMP and delete the specification that white shrimp taken in the EEZ and transported to Louisiana must conform to that state's minimum size restriction.

Discussion: White shrimp would be retained in the fishery description of the FMP for data collection purposes. If recruitment overfishing is observed on white shrimp, management responsibility would lie with the states to manage fishing in their territorial waters and fishing elsewhere by their registered vessels. Further, Louisiana may continue to enforce its minimum size limit only for white shrimp taken in its waters and on Louisiana vessels fishing in the EEZ. (Recent action by the Supreme Court in Southeastern Fisheries Association v. Robert Martinez regarding Spanish mackerel trip limits, however, may not allow a state to regulate its own vessels in the EEZ.) There would be no effect on the seasonal Texas closure for brown shrimp.

A justification for removing white shrimp from the FMP would be that over the past decade a majority (57 to 62 percent) of this species was harvested in state-controlled waters; however, 1986 landings from federal Gulf waters were valued at $100 million, a significant fishery with a value greater than the combined total Gulf commercial fisheries for reef fish and coastal pelagics for the same period. The SSC has pointed out that the majority of brown shrimp by number are also taken in state waters, and removal of white shrimp may be a poor management precedent.

If overfishing did occur and the states were unwilling or unable to adopt measures to allow recovery of the stocks, there would be a severe economic loss to the fishery in the event of a collapse. This would of course affect the participants and could change the environment of the coastal ecosystem.

1c. **Rejected Alternative:** No action: (No change)

Discussion: White shrimp would remain in the management unit of the FMP, but no provisions are made for preventing overfishing or restoring overfished stocks. This option would be in violation of 50 CFR Part 602, Guidelines for FMPs.

ACTION 2. ACTION TO BE TAKEN IF OVERFISHING IS INDICATED

2a. Preferred Alternative:

Section 6.2.1.1.4 - Is revised as follows to include white shrimp and to provide for adjusting index levels as new data become available:

Section 6.2.1.1.4 - Action to be taken if recruitment overfishing on brown, white, or pink shrimp should occur. If parent stock levels are reduced below the specified index level for a species, NMFS will advise the Council and closely monitor the stock.

If the parent numbers for brown, white, or pink shrimp fall below the current index level for a particular year and recover the following year, the Council may after consultation with its Stock Assessment Panel and Scientific and Statistical Committee lower the index by Notice Action. The new index may be no lower than the recent low level from which the stock recovered.

If parent numbers remain below the index for a second consecutive year, the Council will convene the Stock Assessment Panel for an evaluation and will request implementation of any of the following actions deemed appropriate to become effective in the third year.

If fishing effort needs to be reduced, there are multiple options such as reducing fishing effort at the start of the season, reducing fishing effort at the end of the season, or some combination of both, area and seasonal closures, gear restrictions, trip limits, or quotas. This action would be accomplished by regulatory amendment and would include public review, a Regulatory Impact Review , and an Environmental Assessment. Every consideration will be given to implementing a recovery program for the subject species without unnecessarily restricting the fisheries for other species.

Discussion: Any effort reduction program in federal waters must necessarily be coordinated with adjacent state fishery management agencies. A cooperative program would be more effective and would reduce any impact of a shift of fishing effort to the adjacent waters.

It was the conclusion of the workshop that the parent index levels used in defining recruitment overfishing for brown, white and pink shrimp, are based upon the best scientific information. VPA analysis was used since this method provides the fullest use of this 32-year data base. However, the question remains as to whether or not recruitment overfishing will occur if these selected overfishing levels are exceeded during a particular season. It was the recommendation of the group that the Council provide a mechanism to allow the overfishing index level to change as new data become available.

Changes in this section add white shrimp to the species to be addressed for remedial action if the index level is attained and would provide for reduction of the index of all these species when appropriate.

The index levels recommended by the workshop panel is the lowest number of parents for that species in recent years from which the stock recovered naturally. The stock may be able to recover from lower levels, but this has not been demonstrated. This proposed action would allow a reduction of the index for a species after it has been demonstrated that it has recovered from a lower level of parents. A revision upward of the overfishing indices is not proposed because each stock has already demonstrated natural recovery from the index judged to be a safe minimum level by the panel.

2b. Rejected Alternative: No Action, Status Quo

If parent stock levels are reduced below the specified index level for a species, NMFS will advise the Council and closely monitor the stock.

If parent stock for the species remains below the index for a second consecutive year, the Council will implement any of the following actions deemed appropriate to become effective in the third year.

If fishing effort needs to be reduced, there are multiple options such as reducing fishing effort at the start of the season, reducing fishing effort at the end of the season, or some combination of both, area and seasonal closures, gear restrictions, trip limits or quotas. This action would be accomplished by regulatory amendment and would include a Regulatory Impact Review and an Environmental Assessment.

Discussion: The current plan makes no provision for reducing index level when the stock has demonstrated its ability to recover naturally from a lower level. An index which is too high could result in unnecessary regulation of a fishery.

ACTION 3. TOTAL ALLOWABLE LEVEL OF FOREIGN FISHING (TALFF) FOR ROYAL RED SHRIMP

3a. Rejected Alternative - No Change

The original FMP provides:

Section 7.2 Royal Red Shrimp

It is generally believed that royal red shrimp are not being harvested at their OY level of 392,000 pounds of tails annually. Annual reported commercial catch has never exceeded 270,000 pounds of tails (1963-1975); expected domestic harvest for 1980 and 1981 are 246,000 and 260,000 pounds or tails. A foreign TALFF of some 146,000 pounds in 1980 and 132,000 pounds in 1981 is, therefore, estimated to be available. Catch trends should be reinvestigated, however, as new data become available.

Further domestic development of this fishery is hampered by the great depth at which the resource exists and the specialized gear required to fish it, high production costs, and shrinkage of the produce during processing.

Discussion: Originally, the Magnuson Act required that the expected domestic harvest be subtracted from OY and the amount not expected to be harvested was to be available as TALFF. There has been no foreign fishing for royal red shrimp, but this provision for TALFF has been perpetuated in the regulations. Thus, the domestic vessels are prevented from taking the OY.

3.b Preferred Alternative to Delete the TALFF

Section 7.2 of the FMP is amended:

7.2 Royal Red Shrimp

There has been no history of catch of royal red shrimp by foreign vessels in the U.S. Gulf of Mexico. Domestic vessels have the capacity and intent to harvest OY, which is set at MSY; therefore, the domestic annual harvest may be expected to be equal to OY. There is no TALFF for royal red shrimp.

Discussion: The number of vessels fishing for this species and landings have recently increased to the level that the domestic production is approaching OY (Table 1). A reserved TALFF would prevent the vessels from taking OY. No foreign vessels have participated in the fishery; so there would be no effect on them. TALFF should be eliminated to allow harvest by domestic vessels.

ACTION 4. OVERFISHING DEFINITION FOR ROYAL RED SHRIMP

4a. Rejected Alternative - no change. Section 6.2.2 from Amendment 5 provides:

6.2.2 Royal Red Shrimp

Overfishing royal red shrimp is defined as fishing in excess of OY. Royal red shrimp differ from brown, white, and pink shrimp in that they are not estuarine dependent, but exist in a relatively constant environment in the deeper waters of the Gulf (100 to 300 fathoms). They are not an annual crop but are harvested from grounds believed to contain at least five year classes. Thus, they conform more closely to a classical Schaefer-type fishery. For this reason, the optimum yield of royal red shrimp should be the total pounds of royal red shrimp which can be harvested without biologically overfishing this resource.

Historically, the annual MSY was estimated to be 392 thousand pounds of tails at a level of 1290 days fished. OY was set at MSY. Fishing will close when OY is reached. Currently, royal red shrimp continue to be an underexploited resource due to low demand and high cost of production.

Discussion: There is no change proposed in the management of this species from the original FMP. Recent landings are shown in Table 1. Production has been low because of the higher costs of fishing in deeper water and a soft market for this species. In 1993 the fishery expanded somewhat with the entrance of several additional vessels from Alabama.

4b. Preferred Alternative: Revised Overfishing Definition for Royal Red Shrimp. Section 6.2.2. is revised as follows:

6.2.2 Royal Red Shrimp

Overfishing royal red shrimp is redefined as exceeding MSY by ten percent or more in a fishing year. Fishing will close for the remainder of the fishing year when MSY plus ten percent is reached. If MSY is exceeded, but not by more than ten percent, NMFS will advise the Council and closely monitor the catch and effort expended. If MSY is exceeded the second consecutive year, the Council will convene its stock assessment panel to consider the changes in catch and effort and determine if the MSY should be revised.

A change in MSY, recommended by the Stock Assessment Panel, approved by the Scientific and Statistical Committee, and adopted by the Council may be implemented by Notice Action.

Discussion: Royal red shrimp differ from brown, white, and pink shrimp in that they are not estuarine dependent, but exist in a relatively constant environment in the deeper waters of the Gulf (100 to 300 fathoms). They are not an annual crop but are harvested from grounds believed to contain at least five year classes. Thus, they conform more closely to a classical Schaefer-type fishery. For this reason, the optimum yield of royal red shrimp should be the total pounds of royal red shrimp which can be harvested without biologically overfishing this resource. MSY is an estimate of the largest average catch that can be sustained in a fishery. Harvest levels may be expected to range above and below the average. MSY is calculated from catch and effort data; however, there has been little effort expended on royal red shrimp in the 1980s because of poor markets. The value per pound is lower than that for brown, white, and pink shrimp; and royal reds cost more to harvest. The data from which to calculate MSY for royal red shrimp are sparse, and MSY is imperfect. The original FMP gave a range of point estimates of MSY for this species of from 352,000 pounds (tails) at 1020 days fished to 650,000 pounds at 4,240 days fished, depending on variations of a parameter measuring how the stock reacts to increasing fishing effort and overfishing. The MSY predicted was 392,000 pounds at 1,290 days fished, and that remains in effect. Currently, a total allowable catch is set at that level, and the fishery closes. A total allowable catch of MSY plus 10 percent is proposed as a conservative level of production with the flexibility to revise it if better data are developed. This species differs from other managed Gulf species because 5 year classes exist on the fishing grounds between 100 and 300 fathoms, and maturity does not occur until age 3 years; thus it is more vulnerable to overfishing. This alternative would allow the fishery to operate near MSY without overfishing the stock.

Table 1

ROYAL RED SHRIMP U.S. GULF

POUNDS	YEAR
0	60
0	61
4,925	62
6,245	63
4,591	64
17,045	65
23,475	66
37,706	67
72,866	68
271,292	69
40,867	70
64,081	71
36,645	72
230,794	73
226,871	74
122,607	75
164,213	76
150,705	77
108,994	78
154,410	79
180,974	80
100,407	81
59,220	82
77,518	83
79,627	84
36	85
20,617	86
76,475	87
66,485	88
74,173	89
91,406	90
89,190	91
134,239	92
300,000	93 (preliminary)

VI. REGULATORY IMPACT REVIEW AND INITIAL REGULATORY FLEXIBILITY ANALYSIS

Introduction

The National Marine Fisheries Service (NMFS) requires a Regulatory Impact Review (RIR) for all regulatory actions that are of public interest. The RIR does three things: 1) it provides a comprehensive review of the level and incidence of impacts associated with a proposed or final regulatory action, 2) it provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problem, and 3) it ensures 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 also serves as the basis for determining whether any proposed set of regulations is a "significant regulatory action" under certain criteria provided in Executive Order 12866 and whether such proposed set of regulations will have a significant economic impact on a substantial number of small entities in compliance with the Regulatory Flexibility Act of 1980 (RFA).

This RIR analyzes the probable impacts on fishery participants of the proposed plan amendment to the Fishery Management Plan for the shrimp fishery of the Gulf of Mexico (FMP).

Problems and Objectives

The general problems in the shrimp fishery and the specific objectives for resolving those problems are found in the FMP, as amended, and are restated in Section IV of this amendment document. The issues addressed in this amendment are enumerated in Section III and the need for the proposed action is outlined in Section IV of the amendment document.

White shrimp and royal red shrimp are the two species in the shrimp FMP that are dealt with in this amendment. There are four actions that are designed to address the four major issues surrounding these two shrimp species. In the case of white shrimp, a need exists to provide for an overfishing definition and corresponding actions to address overfishing should it occur. Such action is necessitated by the "602 Guidelines." A white shrimp overfishing definition was previously submitted for Secretarial approval, but was turned down because it was considered to be not based on the best available information. By virtue of such disapproval, the required action to take once overfishing for white shrimp occurs was rendered moot. The first two actions under this amendment will address these two issues.

In the case of royal red shrimp, there is a need to address the provision for total allowable level of foreign fishing (TALFF). TALFF for royal red shrimp was provided for when the FMP was first implemented in 1981 mainly based on the historical domestic catch that was estimated to be much lower than the estimated MSY/OY of 392,000 pounds. Domestic catches in subsequent years even showed to be lower than in years before the implementation of the shrimp FMP. However, the most recent estimate of domestic harvest of this species is approaching the MSY level so that the provision for TALFF needs to be modified to accommodate domestic harvest. In addition to re-examining the TALFF provision, there exists the need to also re-examine the MSY itself for this species. For royal red shrimp, the MSY, OY, and overfishing definitions are interrelated; that is, OY is equated to MSY, and fishing above OY is considered overfishing. The original FMP estimated MSY for royal red to range from 352,000 pounds at effort level of 1,020 days to 650,000 pounds at effort level of 4,240 days. These estimates were generated using a generalized stock production model and varying the parameter reflecting the stock's reaction to increasing effort and overfishing. A mid-level estimate of 392,000 pounds at effort level of 1,290 days was chosen for the MSY for this species. Considering the current level of effort as partly indicated by the a relatively high catch, there

appears the need to modify MSY for this species. The last two actions in this amendment will address the FMP provisions for TALFF and MSY for this species.

Methodology and Framework for Analysis

The basic approach adopted in this RIR is an assessment of management measures from the standpoint of determining the resulting changes in costs and benefits to the nation. Considering that the major actions in this plan amendment have more relevance to the harvest sector of the shrimp fishery, the net effects are stated in terms of changes to producer surplus or net profits to the harvest sector,

Ideally, all these changes in costs and benefits need to be accounted for in assessing the net economic benefit from management of shrimp. The RIR attempts to determine these changes to the extent possible, albeit in a very qualitative manner.

Management Measures

The full discussions of the proposed management alternatives are set down in Section V of the amendment text. There are four sets of management actions considered corresponding to the four issues mentioned above. These are summarized or described below .

Economic Analysis of Impacts of All Measures

A. Action 1. Definition of Overfishing White Shrimp

Preferred Alternative 1a: White shrimp recruitment overfishing is indicated when parent stock is reduced below 330 million shrimp. Parent stock for white shrimp is defined as the number of age 7+ (months) shrimp during the period May through August.

Rejected Alternative 1b: Remove white shrimp from the management unit of the FMP and delete the specification that white shrimp taken in the EEZ and transported to Louisiana must conform to that state's minimum size restriction.

Rejected Alternative 1c: Status quo: no action.

In a previous decision, the Council opted to retain white shrimp in the management unit, and as a consequence of that decision, an overfishing definition for white shrimp is required pursuant to the "602 Guidelines." In view of the foregoing, the two rejected alternatives would not be in reality viable alternatives. In this regard the bulk of the ensuing discussion will focus on the effects of the preferred alternative, although some discussions will be devoted to the consequences (aside from the mentioned effects) of choosing either of the rejected alternatives.

It may be recalled that the previously proposed overfishing index for white shrimp was disapproved by NMFS. This index was set at 400 million parent shrimp aged 5 or more months from April through August. In a previous workshop (Klima et al., 1990), the shrimp stock assessment panel recommended an overfishing index of 600 million parent shrimp. In the most recent workshop (SSAP, 1993), the shrimp stock assessment panel recommended an overfishing index of 330 million parent shrimp. As noted in the panel's report, this recommendation does not differ in substance from the previous one, with the difference in number mainly attributed to a change in scale, i.e., from using parent shrimp aged 5 or months from April through August to parent shrimp aged 7 or months from May through August. In a sense, the preferred alternative for an overfishing index for white shrimp is the same as the index recommended by the panel and does not differ in substance with the panel's previous recommendation.

Although an overfishing definition does not have direct impacts on resource users, it nevertheless serves as a benchmark for restrictive measures to be imposed on the fishery. Implicit then in the definition of overfishing is the short-term and long-term effects of management measures to be adopted. It may be expected that the short-term effects will be negative and the long-term effects positive. The short-term effects depend on the restrictiveness of the measures imposed while the long-term effects depend on the effectiveness of such measures to maintain a sustainable fishery over the long run. Naturally, the restrictiveness of the measures imposed will be directly related to the severity of the occurrence of overfishing.

To gain further insight into the potential short-term costs of this measure, there must be at least an estimate of the probability of the parent stock falling below the chosen overfishing index. Currently, this information is not available, but some general likelihood levels may be deduced from the estimated level and pattern of change of the white shrimp parent stock (see Figure 5). In the last five years, the parent stock has remained well above the proposed overfishing index. In fact, the stock shows increases in the last three years. The 1991 level almost approximates the highest level reached in 1987. Relatively apparent in this situation is that the overfishing index is very unlikely to be reached in the near future. Hence, it is quite safe to state that in the foreseeable future the measure will not likely adversely impact the shrimp industry, particularly that segment of the industry targeting white shrimp.

Since there is no information regarding future projections for the level of parent stock for white shrimp, the implications of this definition in the medium- and long-term are not determinable. It may be noted that for three years in the past (1960, 1961, 1962) white shrimp parent stock fell below the 330 million shrimp index for overfishing, but the stock was able to rebound in succeeding years. If this situation ever occurs and a management change is effected to reduce fishing effort and catch below the potentials for the period, it will be extremely difficult to measure the costs and benefits of the measure because of the observed possibility of the stock to recover by itself. That is, the recovery of the stock may be due either to the measures imposed or to some other causes like changes in environmental factors conducive to stock recovery. In the previous case, the measures imposed would generate long-term positive effects while in the latter, the short-run costs of the measures would be carried over to the future. Worth noting, however, in this regard is the conclusion arrived at by the shrimp stock assessment panel that recruitment overfishing may occur if the parent stock fall to the low levels in the early 1960s because the present nominal fishing intensity for white shrimp is twice those of the early 1960s. This conclusion leads us to infer that the panel recommended overfishing index, which is also the preferred alternative, could prompt the adoption of management measures that would help restore the stock to higher productive levels. In this way, the long-term effect of the preferred overfishing index would be positive.

Deletion of white shrimp from the management unit (Rejected Alternative 1b) implies that management of the species is left to individual states. However, states have effective management control only with respect to shrimp harvest in state waters. In the absence of federal regulations, harvest in EEZ may be effectively controlled only if all states adopt similar regulations with respect to the harvest of white shrimp in the EEZ. With the deletion of white shrimp from the management unit, the Louisiana count laws currently enhanced by Federal regulations may not be effectively enforced.

White shrimp may be subject to recruitment overfishing, and being an annual stock needs to be monitored on a yearly basis. This annual monitoring of the stock is currently undertaken by NMFS and will be continued even if white shrimp is deleted from the management unit. However, if there is a threat of recruitment overfishing, the Council or NMFS may not be able to do much, except to aid the various Gulf states in developing appropriate regulatory measures to address the overfishing problem. If there is a white shrimp management plan developed and approved by all Gulf states, the process of addressing the overfishing problem for white shrimp may be simplified.

Over the past decade 57 percent to 62 percent of total pounds of white shrimp landings has been harvested in state waters. About similar ratio holds when pounds landed are converted to ex-vessel values. In absolute terms however, the volume and value of white shrimp landings harvested in the EEZ are relatively large. Over the past

decade, white shrimp harvested in the EEZ have never fallen below 10 million pounds or $40 million in ex-vessel values. In the peak year of 1986, slightly below 30 million pounds were harvested in the EEZ, and these were valued at about $100 million in 1986 prices. These numbers are larger than some of the fisheries currently managed by the Federal agencies. The deletion of white shrimp would thus mean the Federal agencies losing direct management control over a very important fishery.

The impacts of this option on the fishery participants depend on the management measures that will be adopted and effectively implemented by the states. In the absence of a management plan for white shrimp, these impacts cannot be appropriately assessed.

Maintaining the status quo (Rejected Alternative 1c) may be generally interpreted to mean no regulations imposed to arrest "overfishing." While this could enable a more stable shrimp fishery due to less regulatory interference, one may note that regulations are only one of the many sources of instability in the fishery. In the case of shrimp, stability of the stock may be deemed to be one major factor in defining the stability of the fishery, and a healthy stock assures the long-term viability of the fishery, at least from the harvest standpoint. Such long-term viability may be jeopardized if overfishing is allowed to occur. Thus, while the status quo tends to minimize short-term industry losses due to regulations, the future benefits may be sacrificed in the process.

If overfishing occurs according to the preferred alternative, the nature and magnitude of impacts on the fishery participants due to management actions would depend partly on the type of restrictions imposed and partly on the specific conditions chosen to trigger the imposition of restrictive measures. These impacts will be explored under Action B below.

B. Action 2. Action to be Taken if Overfishing is Indicated

Preferred Alternative 2a: If parent stock for the species (white shrimp) remains below the index for a second consecutive year, the Council will implement appropriate regulatory measures to become effective in the third year, including fishing effort reduction, area/seasonal closures, gear restrictions, trip limit, or quotas.

If the parent numbers for brown, white, or pink shrimp fall below the current index level for a particular year and recover the following year, the Council may after consultation with its Stock Assessment Panel and Scientific and Statistical Committee lower the index by Notice Action. The new index may be no lower than the recent low level from which the stock recovered.

Rejected Alternative 2b: Status quo: no action.

The first section of Preferred Alternative 2a pertains only to white shrimp with respect to the action that will be taken should overfishing occurs. The nature of the action to be taken as specified in this alternative is the same as that for brown and pink shrimp as currently stipulated in the FMP, as amended. The second section of Preferred Alternative 2a, on the other hand, applies to brown, white, and pink shrimp, and it relates to the action to be taken if the parent number for any of the three species falls below the overfishing index for a particular year but subsequently recovers the following year.

Within the context of the previous discussion on the likelihood of overfishing to occur and the two-consecutive-year requirement for overfishing to occur before a management change is enacted, Preferred Alternative 2a is expected to have no immediate impacts on the fishery participants. Once management action is necessitated however, the Council is faced with the decision to balance the short-term adverse impacts of such action on resource users with the long-term status of the stock and the industry.

In the Gulf shrimp fishery, white shrimp is second only to brown shrimp in terms of volume and ex-vessel value generated. This implies that a more restrictive regulation on this segment of the Gulf shrimp fishery would likely result in large short-term losses to the entire shrimp industry. Given the relatively unknown behavior of the parent stock below the overfishing index, the tradeoff between short-term and long-term impacts is not straightforward. If two consecutive years of the parent stocks falling below the index indicate an actual decline in shrimp stocks, restrictive measures on the third year could arrest this decline. While the measures would negatively impact the resource users in the short run, the long-term status of the stock would be protected and the long-term viability of the industry would be enhanced. On the other hand, if the stock could rebound in the third year without regulations, imposing restrictions would result in some current benefits forgone by fishery participants without necessarily generating future benefits. Noting that stock assessment scientists have determined the proposed overfishing index provides adequate protection to the stock, restrictive measures imposed within the context of the proposed overfishing index may be expected to generate future benefits. In actuality, the tradeoff between short- and long-term impacts would depend on the type of management actions adopted.

Among the possible management measures, only direct methods of reducing fishing effort have the potential to maintain or enhance the profitability of the shrimp industry. Measures other than effective effort limitation could preserve the long-term viability of the stocks but may not protect the long-term economic viability of the fishery. Worth mentioning in this regard is a recently completed study of an ITQ system for the shrimp fishery (Griffin et al., 1992). The study described the Gulf shrimp fishery as less than ideal for an ITQ system, but delineated certain pre-conditions for adopting the system as a management tool for the fishery.

Potentially affected by any management measure adopted to prevent overfishing are many fishermen dependent on the shrimp fishery. There is currently no accurate count of the number of vessels and boats engaged in the shrimp fishery. The absence of a full census of boats and vessels in the shrimp fishery has led to differing views regarding the level of and direction of change in the total number of fishing crafts shrimping in the Gulf. Members of the industry claimed that the number of offshore shrimping vessels throughout the Gulf had decreased dramatically during the decade of the 1980s. NMFS has been maintaining two sets of files on vessels and boats in the shrimp fishery, namely, the vessel operating units file (VOUF) and shore and boat data (SBD). Both data sets are not current and contain information on fishing crafts only up to 1989. For 1989, VOUF lists 6,205 vessels (greater than 5 net tons) while SBD lists 9,676 boats (5 net tons or less) as comprising the shrimp fleet in the Gulf (Snell, pers. comm., 1992). State license records indicate different vessel and boat numbers (see Griffin et al., 1992). Although mainly those targeting white shrimp would be directly affected by any restrictive measures adopted under the overfishing rule as proposed in this amendment, all these fishing crafts may experience adverse impacts.

Preferred Alternative 2a basically acts to cushion any possible adverse short-term impacts on the participants of brown, pink and white shrimp fisheries by adjusting the overfishing index using the most recent data available. With this type of adjustment the likelihood of the parent stock for any of these three species to fall below the overfishing index for two consecutive years is reduced. In a sense then, this alternative has the tendency to render less likely the introduction of restrictive measures for white shrimp and similar provision for the other species less likely. The long-term effects of this alternative is not known.

Monitoring the parent stock for determining an overfishing condition entails certain costs at least to the administering agency. This cost, however, may be regarded as minimal considering that the necessary research investment cost, in terms of data needed and analytical capability, has already been incurred. The data necessary to assess the white shrimp stock relative to the overfishing index are part of the general information routinely collected by the National Marine Fisheries Service.

C. Action 3. Total Allowable Level of Foreign Fishing (TALFF) for Royal Red Shrimp

Rejected Alternative 3a: Status quo: no change.

Preferred Alternative 3b: Delete the TALFF for Royal Red Shrimp.

MSY for royal red shrimp was set at 392,000 pounds when the shrimp FMP was implemented in 1981. OY has been set equal to MSY. Concomitant with the determination of MSY/OY, a TALFF was set at 146,000 pounds in 1980 and 132,000 pounds in 1981. These TALFFs were estimated based on the historical domestic catch of royal red shrimp which was well below OY and has been below OY ever since. However, the 1993 preliminary estimate of domestic catch of 300,000 is the highest ever to be recorded since the 1960s, and certainly is very close to OY. Whether this high catch level can be sustained in the future is not known, but it does point out the possibility that there is enough domestic capacity to harvest practically the entire OY for royal red shrimp.

It has been reported that royal red shrimp commands an exvessel price of about $1 to $1.65 less than brown or white shrimp. In addition, fishing cost for this species is relatively higher than for other species mainly due to the distance from shore and depth at which this species is caught. Relative to other shrimp species then, vessel profitability for fishing royal red shrimp is low. This could be one major reason for the historically low catches for this species. The recent increase in catch of this species is possibly due to an increase in effort than an increase in profitability in this fishery. Reports have it that only few vessels have been targeting royal red shrimp, but more recently some vessels have entered the fishery. All these vessels are operating out of some ports in Alabama.

Alternative 3a may be generally interpreted to mean that TALFF is maintained at its 1981 level. Alternatively, it may be taken to mean that TALFF is retained but has to be modified to reflect increases in domestic catch capacity. A limiting case of the latter is that TALFF is reduced practically to zero so that it would be equivalent to the second alternative of deleting TALFF entirely. Except at this limiting case, maintaining the status quo means that a certain portion of OY could not be harvested by the domestic shrimp vessels, and this readily translates into forgone revenues for the mentioned six or so vessels. Since there has been no foreign fishing for this shrimp resource, part of OY would be left unharvested so that not only the domestic fleet but also the entire royal red shrimp fishery would be forgoing revenues. Whether such forgone revenues in turn translate to forgone profits depends on the estimated MSY and the corresponding revenue and production cost at that level.

Royal red shrimp are deemed to conform more closely to a classical Schaefer-type fishery, since they are not an annual crop and are harvested from grounds believed to contain at least five-year classes (Shrimp FMP, 1981). The current MSY of 392,000 pounds was estimated using the Schaefer model. In addition, the shrimp market in general is dominated by imports so that shrimp price may be considered to be relatively fixed over a wide range of production levels. Thus, in a fishery like this the economically efficient activity (also known as maximum economic yield or MEY) is in general at a level of harvest below MSY. In general, MEY is MSY adjusted for economic factors, and it is the level of production at which marginal revenue equals marginal cost in such a way that above it any increases in cost outweigh increases in revenue and below it any increases in revenue exceeds increases in cost. In the present case, such MEY level takes into account both the mentioned relatively low revenue level and high production cost specific to the royal red shrimp fishery. Given this condition, maintaining the status quo (inclusive of the absence of foreign fishing) offers a good chance of a level of harvest approximating MEY so that in this sense, the mentioned forgone revenue under the status quo may not translate into forgone profits. It is worth noting, however, that this conclusion depends to a great extent on the assumption that the MSY estimated in 1981 still holds true in present times. If the more recent higher catches are reflective of a higher MSY for the fishery, then there is a good likelihood that the mentioned forgone revenue would result to forgone profits. But then the mentioned conclusion will hold true again if MSY is subsequently revised upwards. Of course, there remains the major issue of whether the provision of a TALFF is an efficient way of forcing the fishery to operate at the MEY level.

Alternative 3b would allocate all of the royal red shrimp OY to the domestic fleet. Based on the discussion above, this option would tend to enable the domestic fleet to realize as much revenue as possible from the resource. The impact on foreign vessels is nil mainly because to date there has been no foreign fishing for this species. The absence of any foreign fishing for royal red could be due to a variety of reasons, such for example as lack of knowledge of the existence of TALFF and the low profitability of the fishery itself. As alluded to earlier, the

presence of TALFF that is not taken could force the fishery to operate at the MEY level so that in this sense its deletion may not result in an increase in profitability to the shrimp fishery. However, the absence of foreign fishing for royal red shrimp may be deemed indicative of less or no net benefits from allocating a portion of OY to foreign fishing. In addition, allocating the entire OY to the domestic fleet means that the full benefits of such allocation accrue to the U.S. while a foreign allocation may transfer some of the benefits from the fishery to a participating foreign country. While the presence of TALFF may have an economic rationale in the sense of the net benefit from the resource being maximized, such situation may occur only when domestic capacity is not sufficient to harvest the resource up to a level of MEY. In the case of royal red shrimp, the most recent catch statistics indicate the adequacy of domestic capacity to take the allowable harvest, possibly even beyond MEY. In sum, the alternative to delete TALFF for royal red shrimp may be expected to result in net benefits to the domestic fishery without adversely impacting the foreign fishing vessels so long as a provision is in place to let the fishery operate at the MEY level. Undoubtedly, such provision may be practicable only if MEY itself is estimated for a given level of MSY.

D. Action 4. Overfishing Definition for Royal Red Shrimp

Rejected Alternative 4a: Status quo: no change.

Preferred Alternative 4b: Overfishing for royal red shrimp is defined as exceeding MSY by ten percent or more in a fishing year.

Currently, overfishing for royal red shrimp occurs when fishing is in excess of OY, which latter is equated to MSY. As mentioned in various instances, the original FMP estimated an MSY range of 352,000 to 650,000 pounds using a generalized stock production (GSP) model. One estimate (392,000 pounds) within this range in which the GSP model is equivalent to the Schaefer model was chosen as the appropriate MSY for the species. Such estimation used catch and effort data from 1963 through 1976. Since the FMP's implementation in 1981, MSY for royal red shrimp has not been re-estimated so that it cannot be ascertained whether this MSY is still appropriate for the species today.

Catches of royal red shrimp in the 1980s were low compared to those in middle to late 1970s, but they picked up in 1992, and in 1993 catches reached a record level. If catches in the last two years reflect an increase in abundance and/or an increase in fishing effort, there is some possibility that current MSY (assuming no TALFF) would be reached. Under Alternative 4a, the fishery will be closed once MSY is reached while under Alternative 4b, the fishery will be left open until harvests equal to or exceed ten percent of MSY. This condition for fishery closure will remain the same whether or not MSY for the fishery is revised.

In terms of short-term impacts, more revenues would accrue to the fishery participants under Alternative 4b while an equivalent amount would be forgone under Alternative 4a. The discussion in Section C above shows that the possibility that such revenue change would translate to profit changes for the shrimp vessels may be realized only if harvest level is at MEY, and in general this level is below the MSY level for the royal red shrimp fishery. Given the general relationship between MEY and MSY, the status quo may generate higher net profit to the fishery than the alternative measure. The nature of the long-term effects would be similar to the short-term effects.

Private and Public Costs

The preparation, implementation, enforcement and monitoring of this or any Federal action involves the expenditure of public and private resources which can be expressed as costs associated with the regulations. Costs associated with this specific action include:

Council costs of document preparation, meetings, public hearings, and information dissemination	$ 10,000
NMFS administrative costs of document preparation, meetings and review	$ 3,000
Law enforcement costs	$ none
Public burden associated with permits	$ none
NMFS costs associated with permits	$ none
TOTAL	$13,000

The Council and Federal costs of document preparation are based on staff time, travel, printing and any other relevant items where funds were expended directly for this specific action. There are no other costs associated with this amendment.

Summary of Regulatory Impacts

Action 1, which provides for an overfishing definition for white shrimp to ensure sufficient biological protection to the respective stocks, would have no short-term social and economic impacts on resource users. It mainly serves to fulfill the requirement for an overfishing definition pursuant to 602 regulations. The long-term impacts of this action cannot be determined due to lack of information particularly on the future levels of parent stock for white shrimp. It may only be noted that the level of overfishing index as currently proposed has been deemed by the stock assessment scientists to be the most appropriate to ensure a long-term viability of the stock and the fishery. Both sections of the preferred alternative under Action 2 are also expected to have no immediate on fishery participants. Among the potential management measures to adopt once overfishing occurs, only the direct effort limitation alternative is deemed to enhance the economic viability of the fishery. Other measures, however, may protect the long-term status of the stock. Action 3 has direct effects on domestic shrimp vessels but none on the foreign vessels. The status quo alternative has the potential to allow the fishery to operate at the MEY level, but there appears to be no economic rationale for the provision of TALFF, since the domestic fishery has the capacity to operate at the MEY or higher level. While deletion of TALFF may result in an increase in revenues to the domestic fleet without a compensating reduction in foreign vessels revenues, there is no assurance that such revenue increase would result in profit increase since the domestic fishery may not operate at the MEY level. Action 4 has direct effects on the fishery participants, with the status quo being adjudged to be more economically beneficial than the alternative measure.

Determination of a Significant Regulatory Action

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

enterprises to compete with foreign-based enterprises in domestic or export markets. Actions 1 and 2 have the potential to have a $100 million effect per year on the economy. However, impacts of such magnitude, if ever they arise, may only come from separate specific measures enacted under the overfishing action. Adoption of such specific measures, however, are currently deemed to be remote. Actions 3 and 4 affect only a specific segment of the shrimp fishery -- the royal red shrimp fishery. Considering its small size, impacts on this segment of the shrimp fishery are not expected to amount to $100 million or more annually. None of the measures is expected to cause an increase in the price of shrimp to consumers. In addition, cost increases to the shrimp industry and the federal government are not likely to be effected by any of the proposed measures. Competition and innovation as well as employment and investment are unlikely to be adversely impacted by any of the measures proposed. The domestic shrimp industry is currently faced with strong competition from foreign suppliers. The measures under Actions 1 and 2 have the potential of affecting the relative competitive status of the domestic shrimp industry but only with respect to future changes under these actions. Action 3, on the other hand, is expected in principle to increase the competitive status of the domestic fishery as well as enhance employment in this fishery if the TALFF is eliminated. It may be noted, however, that at present there is no foreign fishing for royal red shrimp. Any of the alternatives under Action 4 is not expected to result in any adverse impacts on the domestic fishery, since the alternatives are either to allow the same or higher potential harvest from the fishery.

On balance, therefore, this regulation if enacted is deemed not to constitute a "significant regulatory action" under any of the mentioned criteria.

Determination of a Need for an Initial Regulatory Flexibility Analysis

Introduction

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. The category of small entities likely to be affected by the proposed plan amendment is that of commercial and for-hire businesses currently engaged in the shrimp fishery. The impacts of the proposed action on these entities have been discussed above. The following discussion of impacts focuses specifically on the consequences of the proposed action on the mentioned business entities. An Initial Regulatory Flexibility Analysis (IRFA) is conducted to primarily determine whether the proposed action would have a "significant economic impact on a substantial number of small entities." In addition to analyses conducted for the Regulatory Impact Review (RIR), the IRFA provides an estimate of the number of small businesses affected, a description of the small businesses affected, and a discussion of the nature and size of the impacts.

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

In general, a "substantial number" of small entities is more than 20 percent of those small entities engaged in the fishery (NMFS, 1992). In 1989, a total of 6,205 vessels and 9,676 boats were recorded in the vessel operating units file of NMFS as comprising the shrimping fleet in the U.S. Gulf of Mexico. State licenses reveal varying numbers of vessels and boats. It is highly possible that more than 20 percent of this shrimping fleet harvest white shrimp. In addition, about 6 vessels have been identified as fishing for royal red shrimp in the most recent year. The Small Business Administration (SBA) defines a small business in the commercial fishing activity as a firm with receipts of up to $2.0 million annually. Many of the current participants of the shrimp fishery readily fall within such definition of small business. Since the proposed action will affect practically all the current white shrimp and royal red shrimp harvesters, the "substantial number" criterion will be met.

Economic impacts on small business entities are considered to be "significant" if the proposed action would result in any of the following: a) reduction in annual gross revenues by more than 5 percent; b) increase in total costs of production by more than 5 percent as a result of an increase in compliance costs; c) compliance costs as a percent of sales for small entities are at least 10 percent higher than compliance costs as a percent of sales for large entities; d) capital costs of compliance represent a significant portion of capital available to small entities, considering

internal cash flow and external financing capabilities; or e) as a rule of thumb, 2 percent of small business entities being forced to cease business operations (NMFS, 1992).

Each of the proposed measures under Actions 1 and 2 does not directly affect the gross revenues or production costs of the shrimp harvest industry although later specific measures, particularly under the overfishing action, may result in substantial reduction in gross revenues or increase in production costs. However, some measures under Actions 3 and 4 are bound to increase the gross revenues of domestic shrimp vessels fishing for royal red. In particular, deletion of TALFF would mean that an additional 132,000 pounds of royal red shrimp would be available to the domestic fleet. This amount is about 51 percent above the estimated domestic harvest of 260,000 pounds. While gross revenues to royal red shrimpers would substantially increase, such increase is significantly less than 5 percent relative to the gross revenues of all shrimpers. This latter percentage increase in revenue is the more relevant figure because the royal red shrimp fishery cannot be effectively considered a fishery separate from the Gulfwide shrimp fishery due to the possibility that shrimpers can switch between species with minor gear modification. By themselves, the measures under Actions 1 through 4 do not demand a significant increase in compliance or capital costs. None of the proposed measures is bound to directly result in forcing any small businesses to cease operation.

From the foregoing it can be concluded that the proposed regulation would not have a significant economic impact on a substantial number of small business entities. Therefore, an IRFA is not required.

VII. ENVIRONMENTAL CONSEQUENCES

Human Environment: There would be little socioeconomic or environmental impact unless overfishing should occur and the stock began to decline. At that time the Council would consider a range of management actions to reduce fishing mortality and the economic and environmental impact of each such option. Specific measures for a recovery program cannot be proposed now without more specific information on the species that is "overfished" and possible caused. The area affected, seasonality, and needed coordination by one or more states would be very different depending on the species. Adoption of the overfishing definition at this time has no socioeconomic or environmental effect.

Establishment of a procedure to decrease the overfishing index levels for brown, white, and pink shrimp when appropriate decreases the possibility of unnecessary disrupting the social and economic status of the human shrimp fishing community while maintaining the integrity of the shrimp stocks.

Elimination of a reserved TALFF and redefinition of overfishing enhances opportunity for domestic production of royal red shrimp thus increases the value of the catch. (See Regulatory Impact Review).

Physical Environment

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

Fishery Resources

The proposed action is intended to protect shrimp stocks from recruitment overfishing while enhancing yield from stocks recruited to the fishery.

Bycatch of other species of fish and invertebrates in shrimp trawls is recognized as a problem in the shrimp fishery. The Council has stated its intent to reduce the bycatch of red snapper, estimated to be about 12.4 million fish in the early 1980s, by 50 percent. The Southeast Fishery Center (Nichols, et. al., 1990) has estimated the total annual trawl bycatch of finfish in the U.S. Gulf to be about 400 million pounds. The ecological impacts of this kill and discard have not been fully analyzed. The 1990 reauthorization of the Magnuson Act charges the NMFS with developing a plan to reduce shrimp trawl

bycatch, but measures to restrict the shrimp fishery for this purpose may not be implemented as federal regulation before 1994.

Effect on Endangered Species and Marine Mammals

Listed and protected species under the Endangered Species Act (ESA) and governed by the jurisdiction of NMFS that occur in the Gulf of Mexico include:

WHALES:
(1) the (endangered) northern right whale - Eubalaena glacialis
(2) the (endangered) humpback whale - Megaptera novaeangliae
(3) the (endangered) fin whale - Balaenoptera physalus
(4) the (endangered) sei whale - Balaenoptera borealis
(5) the (endangered) sperm whale - Physeter macrocephalus
(6) the (endangered) blue whale - Balaenoptera musculus

SEA TURTLES:
(7) the (endangered) Kemp's ridley turtle - Lepidochelys kempii
(8) the (endangered) leatherback turtle - Dermochelys coriacea
(9) the (endangered) hawksbill turtle - Eretmochelys imbricata
(10) the (endangered/threatened) green turtle - Chelonia mydas
(11) the (threatened) loggerhead turtle - Caretta caretta

Green turtles in U.S. waters are listed as threatened except for the Florida breeding population that is listed as endangered.

FISH:
(12) the (endangered) shortnose sturgeon - Acipenser brevirostrum

NMFS has determined that shrimp trawling activities would adversely affect only sea turtles. Two major sources of information led to this conclusion. First, during periods of high nearshore shrimp trawling, large numbers of dead sea turtles washed up on the beach. Public outcry over the number of dead sea turtles led to the organization of more and larger stranding networks. Information from these networks led to more data on the locations of where and when the dead sea turtles washed ashore. Second, NMFS obtained information from shrimp fishermen on the incidental catch of turtles while trawling for shrimp in the Canaveral ship channel in Florida. In 1978, NMFS conducted trawl surveys in this area and caught large numbers of sea turtles. Based on an increased amount of data on the incidental take of sea turtles in shrimp trawls and subsequent evaluation of this information, NMFS assessed the magnitude of the take of sea turtles within the shrimp fishery. In 1987, using data collected by observers aboard commercial trawlers from 1973 through 1984, NMFS estimated that approximately 48,000 turtles were captured annually, and 11,000 of these turtles drowned in the trawls.

On June 29, 1987, NMFS issued final regulations (52 FR 24244) under the ESA to conserve endangered and threatened sea turtles. In offshore waters, these regulations required all shrimp trawlers 25 feet and longer to use turtle excluder devices (TEDs) in shrimp trawls and smaller trawlers to use 90-minute tow times. TEDs may be used instead of tow-times.

Implementation of these TED regulations was contentious. Several lawsuits were filed by different entities over the TED regulations. These lawsuits, associated agency responses, and Congress, delayed full implementation of the TED regulations to May 1, 1989, for offshore waters and May 1, 1990, for inshore waters. TEDs are required in offshore waters and 90-minute tow times may be used in inshore waters.

Vessels, less than 25 feet, may use the tow-time option in offshore waters. Larger vessels may use either the TEDs or tow-time options in inshore waters.

The National Academy of Sciences (NAS) (1990) reviewed the information on the incidental take of sea turtles in shrimp trawls and the biology of sea turtles and concluded that all life stages of sea turtles are susceptible to human-induced mortality. The most important human-associated source of mortality for juveniles, subadults, and breeders in coastal waters is the incidental capture in shrimp trawls. This source accounted for more than the combined totals for other sources, such as other fisheries, dredging, oil and gas platform removals, collisions, and other human-related factors. Annual estimated mortality from incidental captures in shrimp trawls lies between 5,000 to 50,000 loggerheads, 500 to 5,000 Kemp's ridleys, and varying amounts of other species. The actual kill of sea turtles may be four times greater than the NMFS estimate.

In 1992, NMFS evaluated shrimp trawling under current TED regulations in the southeastern United States. NMFS concluded that current TED regulations, assuming 100 percent compliance, have resulted in a 67 percent reduction in sea turtle mortalities by shrimp trawlers in U.S. waters. However, under current regulations, an estimated 23,376 turtles are captured annually by shrimp trawlers and 4,360 turtles drown. Based on the above study by NAS, these estimates may understate true mortality by a factor of four (Henwood, et al., 1991).

In December, 1992, NMFS amended the sea turtle conservation measures and the interim final rule currently in effect. As of December 1, 1992, this final rule requires shrimp trawlers to comply with sea turtule conservation measures throughout the year in all areas. Where limited tow-times may be used as an alternative to TEDs, tows must be limited to 55 minutes or less from April 1 through October 31; at other times of the year tows must be limited to no more than 75 minutes. As of January 1, 1993, shrimp trawlers under 25 feet (7.6 meters (m)) in offshore waters can no longer use limited tow-times as an alternative to using TEDs. Also, as of January 1, 1993 , all shrimp trawlers in inshore waters must use TEDs, except those equipped with a single net with a headrope length of less than 35 feet (10.7 m) and a footrope length of less than 44 feet (13.4 m), which may use the tow-time alternative until December 1, 1994. This final rule also makes various other technical corrections and minor changes to the sea turtle conservation measures. This rule also exempted trawlers from the TED regulations (50 CFR Part 227.72(B)(3)) if 90 percent by weight of all shrimp offloaded from that trawler is royal red shrimp.

In 1980, a Section 7 Consultation on the Shrimp FMP was initially conducted with the U.S. Fish and Wildlife Service. The BO indicated that the management actions to be implemented through this plan were not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. The BO was based on an evaluation of the FMP, the Environmental Impact Statement, and other data available at that time.

Since then, NMFS has conducted Section 7 Consultations on: (1) modifications to the closure of federal waters off Texas (1986) and the Tortugas Shrimp Sanctuary from 1988 through 1991; (2) Amendment 4 (1990); (3) Amendment 5 (1990); (4) the shrimp fishery (1991); and (5) Amendment 6 and the shrimp fishery (1992). Generally, these consultations resulted in opinions that management actions were not likely to jeopardize the continued existence of any endangered species. Instead, these actions provide an additional layer of protection to the marine turtles by prohibiting trawling for shrimp in certain areas such as off Texas during periods of rapid shrimp growth. This generally coincides with the period when turtles may be in the adjacent coastal waters or nesting on the adjacent beaches.

Effect on Wetlands

The proposed action has no effect on any flood plains, wetlands, trails, or rivers.

Vessel Safety

The proposed actions do not impose requirements for use of unsafe (or other) gear nor do they direct fishing effort to periods of adverse weather conditions.

Data Collection

This amendment requires no additional data collection subject to the Paperwork Reduction Act.

Scientific Data Needs

To monitor shrimp stocks to determine whether overfishing occurs, the SEFC of NMFS currently monitors shrimp catch by size (age) to estimate recruitment and parent stock.

Federalism

This proposed action does not contain policies with federalism implications sufficient to warrant preparation of a federalism assessment under E.O. 12612.

Coastal Zone Management Consistency

The Assistant Administrator has determined that this proposed action will be implemented in a manner that is consistent to the maximum extent practicable with the approved coastal zone management program of Florida, Alabama, Mississippi, and Louisiana. This determination has been admitted for review by these states under Section 307 of the Coastal Zone Management Act.

VII. CONCLUSION

Mitigating measures related to the proposed action: no significant environmental impacts are expected; therefore, no mitigating actions are proposed.

Unavoidable adverse effects with implementation of the proposed action negative net economic benefits are discussed in the Regulatory Impact Review.

Irreversible and irretrievable commitment of resources involved with the proposed action government costs are not expected to change significantly, if at all, as a result of this action.

Recommendation

Finding of No Significant Environmental Impact

In view of the analysis presented in this document, I have determined that the proposed action in this amendment to the Fishery Management Plan for Gulf Shrimp would not significantly affect the quality of the human environment with specific reference to the criteria contained in NAO 216-6 implementing the National Environmental Policy Act. Accordingly, the preparation of a Supplemental Environmental Impact Statement for this proposed action is not necessary.

Approved: _____ _____

Assistant Administrator for Fisheries Date

Responsible Agencies

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

List of Public Hearing Locations

Galveston Texas, February 23, 1994
Corpus Christi, Texas, March 3, 1994
Fort Myers, Florida, March 23, 1994
Bon Secour, Alabama, March 15, 1994
Biloxi, Mississippi, March 30, 1994
Houma, Louisiana, March 29, 1994
Corpus Christi, Texas, May 10, 1994

List of Agencies and Persons Consulted

Gulf of Mexico Fishery Management Council's
- Scientific and Statistical Committee
- Shrimp Advisory Panel
- Shrimp Stock Assessment Panel

Coastal Zone Management Programs
- Louisiana
- Mississippi
- Alabama
- Florida

National Marine Fisheries Service
- Southeast Fisheries Center
- Fisheries Operations Branch - Southeast Regional Office

Trade Associations:
- Texas Shrimp Association
- Louisiana Shrimp Association
- Concerned Shrimpers of America
- American Shrimp Processors Association
- Southeastern Fisheries Association

List of Preparers

Gulf of Mexico Fishery Management Council
- Terrance R. Leary, Biologist
- Antonio B. Lamberte, Ph.D., Economist

Much of the analysis on overfishing and Figures 1 through 4 are from the report of the Workshops on Shrimp Recruitment Overfishing (Klima, Nance, Martinez, and Leary, 1990 and the Shrimp Stock Assessment Panel, 1993). Other data have been provided in reports by the Southeast Fisheries Center of NMFS.

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Ricker, W. E., 1975. Handbook of Computations for Biological Statistics of Fish Populations. Bulletin of the Fisheries Research Board of Canada 119: 1-300.

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Figure 1. Brown shrimp recruitment overfishing index level.

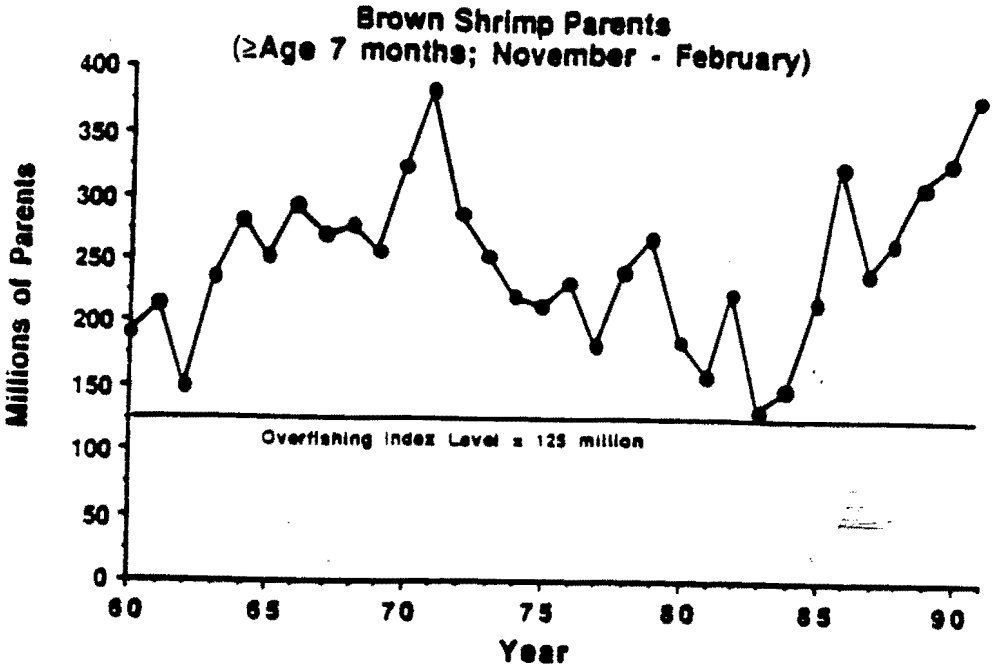


Figure 2. Pink shrimp recruitment overfishing index level.

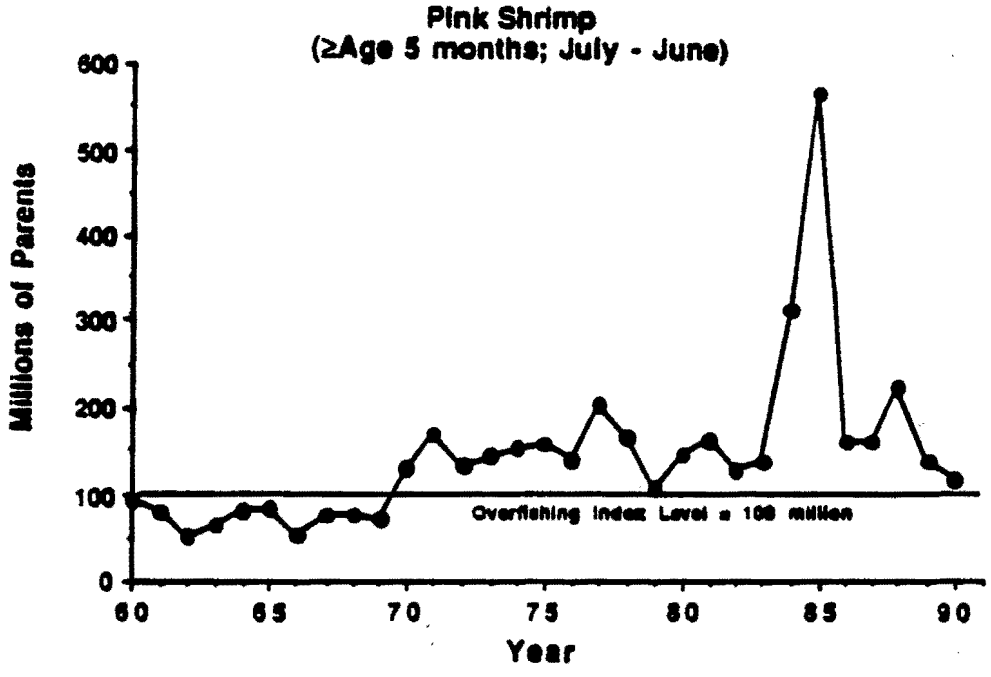


Figure 3. Numerical comparison of two white shrimp parent stock levels.

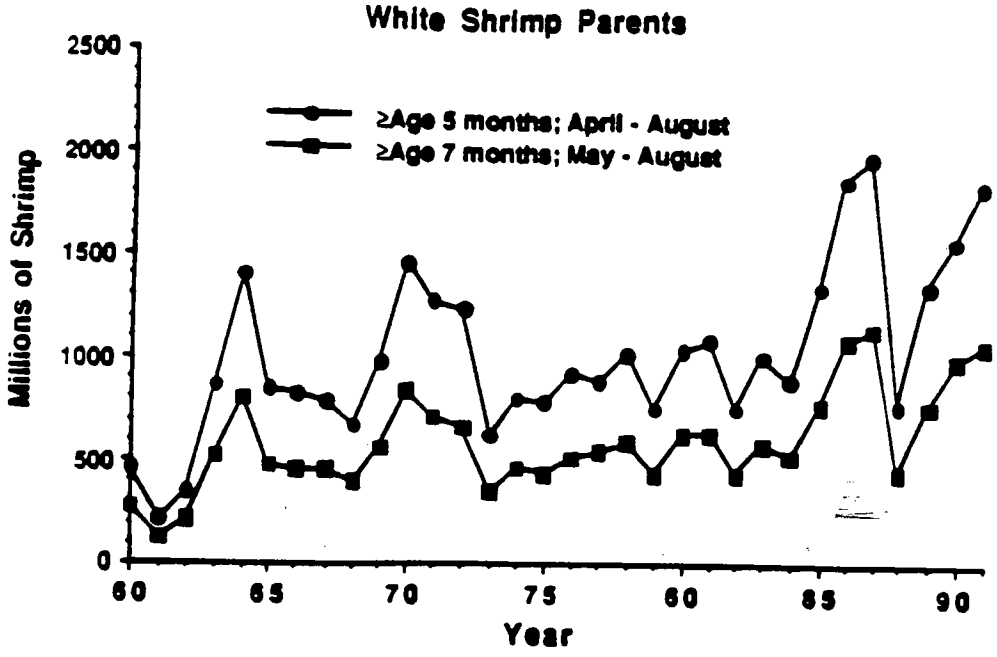


Figure 4. Comparison of brown and white shrimp parent stocks.

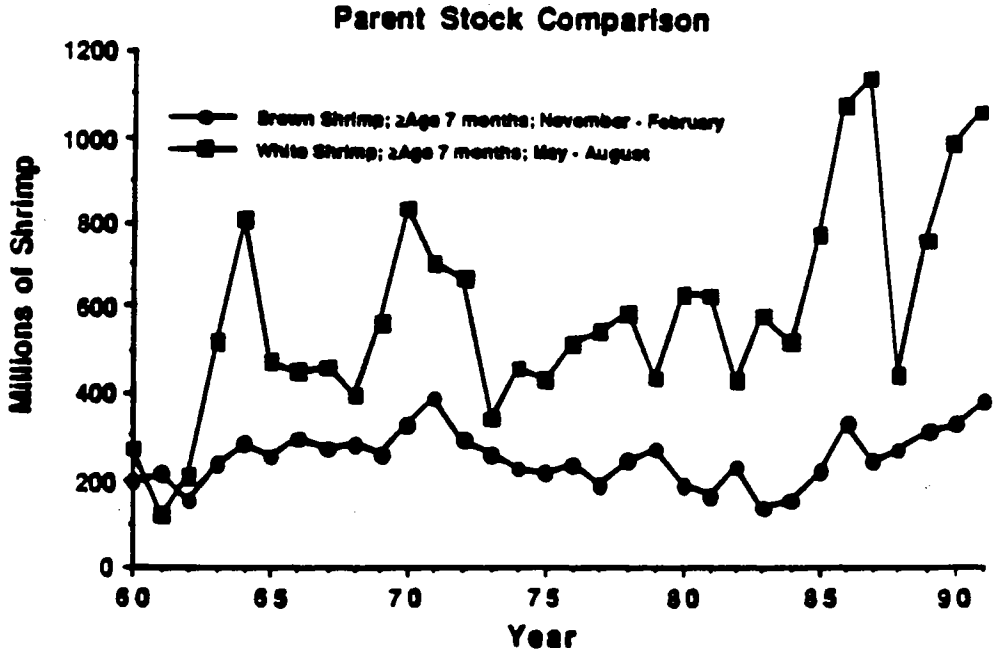


Figure 5. White shrimp recruitment overfishing index level.

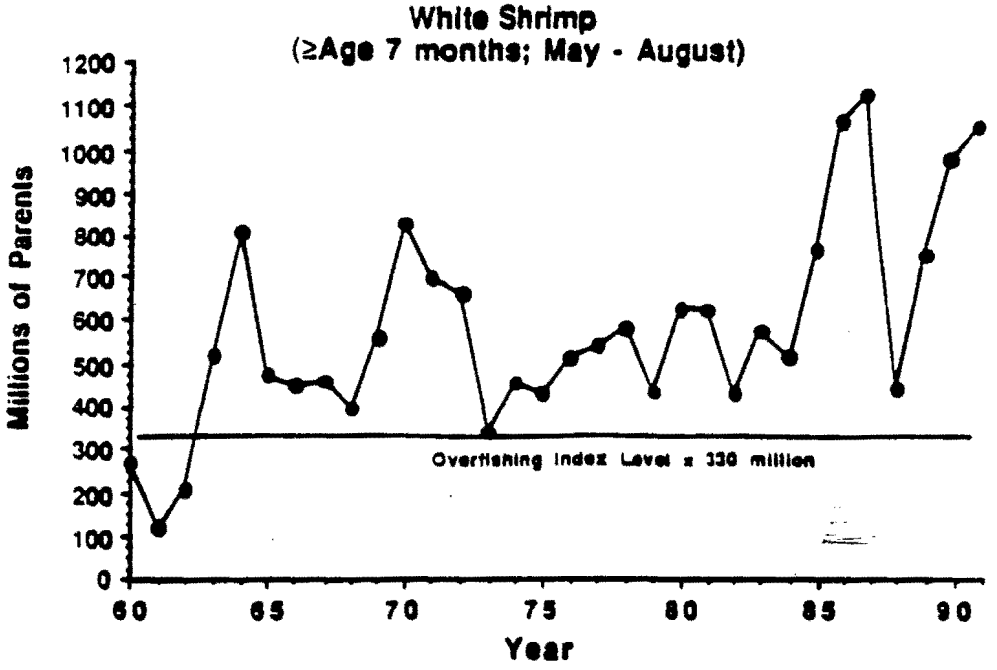
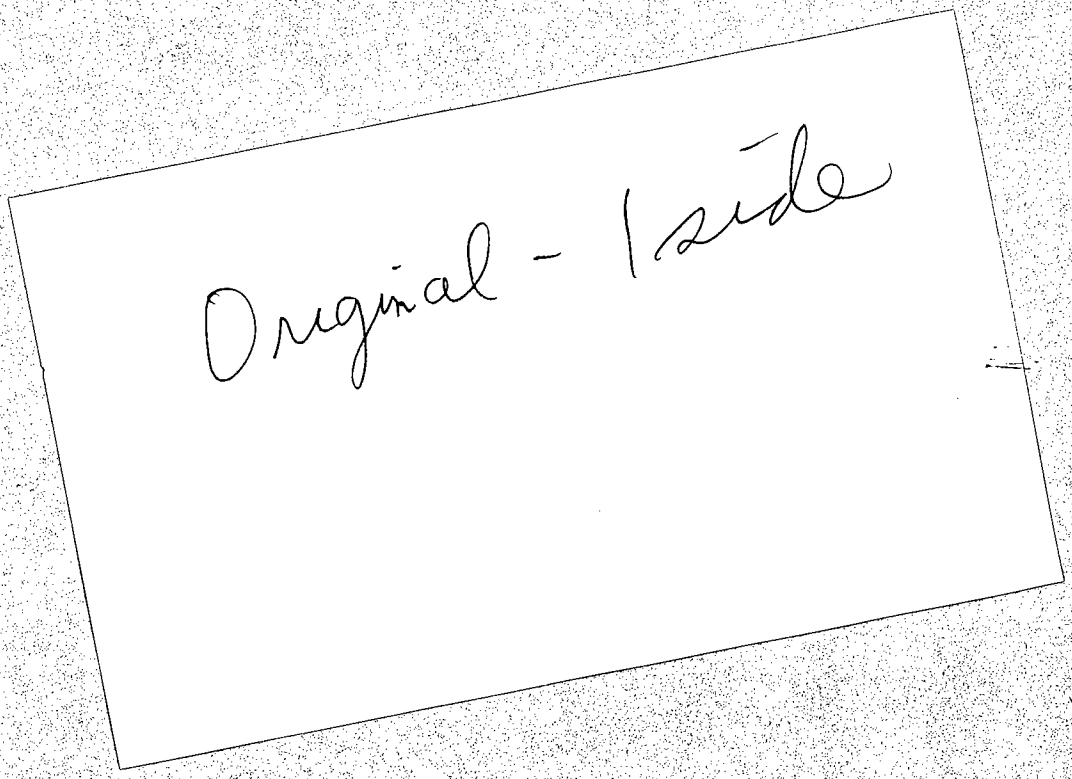


Figure 6. White shrimp effort in the inshore and offshore waters of the Gulf of Mexico.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