FISHERY MANAGEMENT PLAN

for the

STONE CRAB FISHERY

of the

GULF OF MEXICO

GULF OF MEXICO FISHERY MANAGEMENT COUNCIL
Tampa, Florida

Prepared by a Gulf Council Task Team directed by the
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1. PREFACE

This fishery management plan for stone crabs, Menippe mercenaria and M. nodifrons was prepared for the Gulf of Mexico Fishery Management Council by a task team directed by the National Marine Fisheries Service. The following were members of the task team:

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2. SUMMARY

This is a plan to manage the stone crab resources of the Gulf of Mexico. Although the plan considers the resource throughout its range from Florida to Texas, the area which will be regulated under this plan is confined to the waters of the West Coast of Florida, including the Keys, in the Fishery Conservation Zone (9 nautical to 200 miles). The purpose of restricting the management regime to this area is because very few stone crabs are taken in other areas and no regulation is needed at this time in these areas. The proposed reguations which are different from those now in effect will be considered by Florida for implementation in the waters of the territorial sea.

The purpose of this plan is to manage the stone crab resource in the FCZ and to reduce gear conflict between stone crab fishermen and shrimp fishermen in southwest Florida. Therefore, citizens utilizing both of these resources are impacted by the plan.

Specific Management Objectives of this plan

(1) Provide for an orderly stone crab fishery by reducing conflict between stone crab and shrimp fishermen.

The conflict which erupted into violence during the 1977-78 season is the prime reason for development of the plan at this time. The proposed regulations of the plan which were selected to achieve this objective were developed with input by both shrimp and crab fishermen in an attempt to resolve the conflict as fairly as possible.

(2) Establish an effective statistical reporting system.

This plan would require user groups to report information relative to harvesting and utilization of the resource which is essential to effective fishery conservation and management.

(3) Attain full utiization of the resource.

This is an expanding fishery and the management regime provides for growth and development. However, minimal restrictions which are necessary for stock conservation are applied.

(4) Promote uniformity of regulations throughout the management area.

The Council, State of Florida, and National Park Service will attempt to standardize regulations for the fishery when it serves a useful purpose to do so.

Maximum Sustainable Yield (MSY)

The MSY for the stone crab fishery of the West Coast of Florida was calculated to be 2.4 million pounds. The largest commercial harvest

of stone crabs was during the 1977-78 season when 2.1 million pounds were landed. The scientific biological information in the plan indicates that harvest from the fishery is still well below the actual amount of annual harvest that can be taken without resulting in overfishing and decine in abundance of future annual crops. The MSY stated here is the best mathematical estimate (as required by law) based on current available catch data.

Optimum Sustainable Yield (OY)

The OY is designated as all harvestable adult stone crabs in the management area between October 5 and May 15 that have a claw size of 7.0 centimeters (2-3/4 inches) or greater. (This will be approximately 2.4 million pounds of claw weight.)

Management Measures recommended in the plan

1.0 Harvest practices

1.1 Minimum claw size of 2-3/4 inches.

1.2 Declawed crab bodies should be returned to the water and not landed.

1.3 All vessels and boats are required to shade the live crab box from direct sunlight.

1.4 Harvest of both claws allowed.

1.5 It is illegal to pull another person's traps.

2.0 Fishing season

2.1 Closed season between May 15 and October 15.

2.2 The grace period for trap placement is 10 days prior to the season and for recovery is 5 days after the season.

2.3 Legal to pull traps only during daylight hours.

3.0 Gear restrictions

3.1 Degradable panels required in nondeteriorating traps.

4.0 Vessel enumeration

4.1 All fishing vessels or boats in the FCZ must be enumerated.

4.2 Fishermen be classified as full-time or part-time.

5.0 Information reporting

5.1 Monthly dealer/processor reporting of pounds, value, size class of fishermen's and processed products.

5.2 Monthly submission of daily trip tickets by fishermen reporting catch, traps pulled daily, number of traps and catch zone.

6.0 Steps to resolve the gear conflict

6.1 Establish a line of separation.

6.2 Prohibit shrimp trawling inshore of the line Janaury 1 to May 20.

6.3 Distribute charts and description of line including loran coordinates.

6.4 Allow limited supervised exploratory shrimp fishing inside of line January 1 to May 20.

6.5 Recommend state adoption of 6.1 and 6.2 in territorial waters.

6.6 Permit live bait shrimping inshore of line.

6.7 Require identification markings on live bait vessels.

Alternative management measures considered and rejected

1.0 Harvest practices

1.1 Maximum harvest size.

1.2 Harvest of one claw only.

1.3 Harvest of egg-bearing females prohibited and they should be returned to the water immediately.

2.0 Fishing season

None

3.0 Gear restrictions

3.1 Restricted trap float size.

3.2 Define legal trap construction materials.

3.3 Limit number of traps.

3.4 Possession limit of 24 claws per person for non-commercial fishermen.

4.0 Vessel permits

4.1 Designation as recreational or commercial fisherman.

4.2 Fee per license or per trap.

4.3 Illegal to lend or transfer permits or licenses.

4.4 Make it illegal for dealers/processors to purchase stone crab claws from persons without a commercial fishing permit.

5.0 Information reporting

5.1 Reporting by dealers/processors on number of fishermen supplying catch, traps used, and amounts purchased from other dealers.

6.0 Steps to resolve the gear conflict

6.1 Prohibit shrimp trawling inshore of the line, February 15 to April 15.

6.2 Prohibit stone crabbing offshore of the line.

7.0 Other management measures

7.1 Close Everglades National Park to stone crabbing.

7.2 Limit total harvest by area.

7.3 Limit the number of stone crab fishermen.

3. CONTENTS

4. INTRODUCTION

For the past two decades the State of Florida has closed to shrimping a large area of water off the southwest coast known as the Dry Tortugas nursery grounds. The nursery area provided a sanctuary for young, maturing shrimp and also served as a boundary line between stone crab and pink shrimp fishermen. Stone crabbers fished their traps inside the nursery area while shrimpers essentially fished outside the nursery area. Under this arrangement conflicts between the user groups were rare, even during the three-month period (February-April) that the fisheries overlapped. In recent years, however, the stone crab fishery has expanded offshore, and effort has increased in the shrimp fishery resulting in territorial conflicts during the period of overlap.

In 1976, two major events occurred which led to conflict between these two fisheries. A poor shrimp season along the South Atlantic coast coupled with the displacement of U.S. shrimpers from foreign waters by nations that extended their fisheries jurisdiction caused an influx of shrimpers into the pink shrimp fishery off Florida. Concomitantly, a decision was reached by the U.S. Supreme Court, U.S. v. Florida, [420 US 531 (1975) which redefined the seaward boundary along the Florida Gulf Coast and effectively disrupted the provisions of the Florida nursery area statute. Although Florida could still control and regulate its own citizens in the Dry Tortugas nursery area, the state had no authority over out-of-state fishermen more than nine nautical miles off the coast. The combined effect of these two events resulted in major gear conflicts within the former nursery area and set the stage for threats and acts of violence between stone crab and shrimp fishermen as well as other fishermen in the same area using incompatible gear.

As a stop-gap measure, the U.S. Coast Guard designated a boundary in the disputed area in an attempt to confine shrimp fishing activities to one side and stone crabbing activities to the other. The line established by the Coast Guard was unenforceable and did not effectively resolve the dispute.

The Fishery Conservation and Management Act of 1976 (P.L. 94-265) provides for the preparation and implementation of management plans for all fisheries that occur within the 200 mile Fishery Conservation Zone. A jurisdictional gap will continue to exist until a management plan governing the stone crab or shrimp fishery is adopted. This management plan for the stone crab fishery presents specific management options designed to resolve this conflict as well as the establishment of an overall management regime for the stone crab fishery.

The Fishery Management Plan for Stone Crabs of the Gulf of Mexico is written in compliance with provisions of the Fishery Conservation and Management Act of 1976. The goal of this plan is to present in a clear orderly form all available information necessary for intelligent long-range management of stone crabs within the jurisdiction of the Gulf of Mexico Fishery Management Council. The plan:

(i) describes the fishery according to the requirements of Public Law 94-265.

(ii) assesses and specifies the present and probable future condition and optimum yield from the resource. Assesses and specifies the present and probable future capacity of the United States fishermen to harvest the optimum yield.

(iii) provides necessary conservation and management measures applicable to foreign and domestic fishermen.

(iv) identifies and recommends conservation and management measures applicable to and affecting harvesting, spawning and nursery areas of the Gulf of Mexico.

(v) identifies state, interstate and foreign management systems for the stone crab resources and adopts measures to ensure the effective management of the resource throughout the management area.

(vi) provides statistical bases and alternative methods by which the allocations that may be required under Section 301(a)(4) of the Fishery Conservation and Management Act can be made.

(vii) requires and promotes improvement of the collection and dissemination of statistics regarding commercial and recreational fisheries necessary to implement or modify the fishery management plan.

(viii) identifies the areas where additional data are needed to improve the base of formulating management plans or to improve an implemented plan.

(ix) identifies environmental, biological, economic and sociological effects of the various management options (and proposed regulations) on the various segments of the fishery community.

(x) identifies trophic relationships and their effect on the management of the stone crab fishery, including descriptions of fisheries harvesting predator species.

(xi) develops management options and proposed regulations which promote optimum allocation and utilization of the resource and which ensure the highest possible quality of the product.

(xii) the area of concern is the west coast of Florida in the Fishery Conservation Zone (Florida-Alabama state border southward to and including the Florida Keys.) This plan deals with stone crabs, Menippe mercenaria and Menippe nodifrons.

5. DESCRIPTION OF THE STOCK COMPRISING THE MANAGEMENT UNIT

(i) Species Comprising the Unit and their Distribution.

The North American stone crab fishery is supported by a single species, Menippe mercenaria (Say, 1891) (Figure 5-1). This species ranges from the Yucatan peninsula through the Gulf of Mexico into the Atlantic Ocean as far north as Cape Lookout, North Carolina (Williams, 1965), with a few records from the Caribbean (Karandeyva and Silva, 1973). Juvenile stone crabs are found intertidally in coastal estuaries (Manning, 1961) with adults offshore to depths of 54 m (Bullis and Thompson, 1965).

M. mercenaria exhibits three distinct phases in its life cycle: larval, juvenile, and adult. Each phase requires an unique set of ecological conditions. Female stone crabs move on to nearshore grass beds offshore and produce six to ten egg masses during each spring-summer spawning season (Futch, 1966; Bender, 1971). Each egg mass contains 100,000 to 1,000,000 eggs. The planktonic larvae, called zoea, pass through five or six distinct stages in 20 to 35 days, and prefer warm stable seawater salinities (Ong and Costlow, 1970). After molting out of the last larval stage, the megalops, juvenile stone crabs migrate inshore to coastal estuaries, particularly those with extensive oyster bars. They grow to maturity in about two years, eating small mollusks, polychaete worms, and crustaceans. During the cold winter months, adult stone crabs may seal themselves in burrows in the mud bottom.

After one year of maturity, at age 3, the crabs enter the fishery. The harvest is comprised of primarily age 3 and 4 crabs, with increasingly fewer age V crabs being caught in recent years (Sullivan, in press).

Cheung (1973) suggested that adult male stone crabs reach a terminal molt stage at about 112 mm carapace width (age IV or V), after which no further growth or claw regeneration occurs.

A closely related species, M. nodifrons, apparently replaces M. mercenaria in the Caribbean (Rathbun, 1930), although it is found infrequently along the Atlantic coast of Florida (Gore, et al., 1978).

(ii) Abundance and Present Condition

Current information regarding the abundance and biological condition of stone crab stocks in the Gulf of Mexico is available only from the southwestern Florida fishery. Only total landings data, as pounds of claws, are available for the rest of the Florida fishery, and there are no accounts of stone crab abundances for the rest of the Gulf of Mexico, except as anecdotal references to occasional observations from shrimp trawlers. Therefore, this description is limited to that area regularly fished by Florida boats from Key West to Tampa Bay.

Figure 5-1. Menippe mercenaria (Say)

(Photo courtesy Warren Zeiller, Miami Seaquarium)

In a recent study conducted by the Florida Department of Natural Resources (Sullivan, in press), mark/recapture population estimates indicated a 30 to 50 percent reduction in the number of legal-sized stone crabs available to trappers from October 1975 to May 1976. Assuming that a crab trap fishes an area of about 1 hectare, the density of legal-sized stone crabs in the offshore area varied from about 1,400 to 4,700 crabs per square kilometer (Sullivan, in press). Sullivan also found the modal size of harvested crabs was well above the minimum legal harvest size, representing primarily year III and year IV crabs, and that there was a large population of sub-legal sized year II crabs available for recruitment. However, the extreme inshore portion of the fishery in Everglades National Park has shown severe reductions in catch per unit of fishing effort between 1972 and 1976 (Davis, in press) and within the fishing seasons (Davis and Thue, 1977). Harvesting operations were virtually terminated in 1974, 1975 and 1976 after six months of season because of low catch rates. The park fishery reported a catch rate of 113 grams of claws per trap-night in 1972, but by 1976 traps in the park yielded only 29 grams of claws per night. The number of traps in the park during this time was relatively constant at about five traps per square kilometer.

The size distributions of claws in the Collier County landings were relatively stable between 1970-71, 1974 and 1975-76 (Savage, et al., 1975, Sullivan in press). Although there appears to be progressively fewer "jumbo" claws in the harvest each year, the increased proportion of "large" claws has more than made up for the loss of the "jumbos." It appears that this offshore portion of the fishery is showing the characteristics of a newly developing fishery that has recently expanded to the limits of its stocks, and has removed the few exceptionally large individuals characteristic of unfished stocks. Improved catch rates in the inshore fishery in the 1977-78 season point out the potential importance of environmental conditions that may well override and mask the effects of fishing activity on crab abundance and availability (Table 5-1).

(iii) Trophic Relationships

The transfer of food energy through a series of organisms by repeated eating and being eaten is referred to as a food chain (Odum, 1971). Food chains are interconnected and the interlocking pattern is termed a food web. Insufficient information exists to define the food web within which stone crabs occur as predator and prey, but the trophic levels (levels of feeding or links in the food chain) within which stone crabs function, and a food web, can be hypothesized.

Trophic levels in a marine ecosystem are usually limited to five (Odum, 1971): (1) producers - attached plants and phytoplankton, (2) herbivores - plant consumers, (3) primary carnivores, (4) secondary carnivores, and (5) tertiary carnivores. Animals feeding on both plants and animals are classified as omnivores.

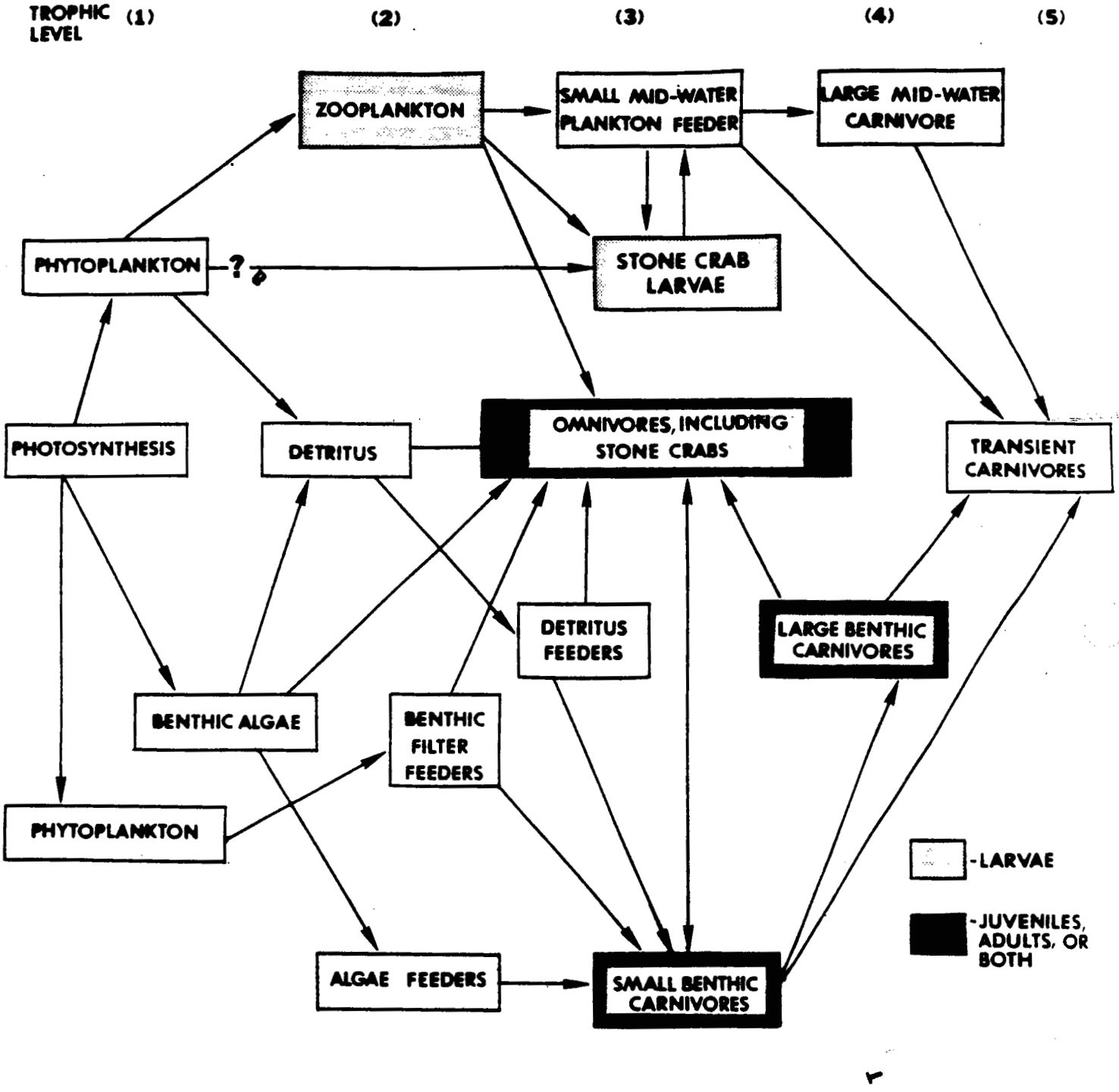


Figure: 5-2 Hypothetical food web for the stone crab (modified from Hiatt and Strasburg, 1960).

Table 5-1. Size frequency distributions of stone crab claws in the southwest Florida fishery, 1970-71, 1973-74, and 1975-76.

	Percent Frequency		
Claw Size*	1970-71**	1973-74**	1975-1976***
Small	20	35	34
Medium	40	22	24
Large	24	32	39
Jumbo	16	11	3
(N)	7,025	2,746	6,772

* Claw sizes are approximate as they are sorted visually by fish house personnel according to criteria described by Savage, et al. (1975)

** Data from Savage, et al. (1975).

*** Carapace width frequencies converted to claw sizes using data and conversion equations from Sullivan (in press).

Stone crabs may occupy more than one trophic level according to life history stage and source of food. Predator-prey and trophic relations will be discussed for larval (up to 2 mm carapace width-CW), juvenile (from 2 to 29 mm CW), and adult (over 29 mm CW) life history stages. Savage and McMahan (1968) described young juveniles with carapace widths of 2.04 mm.

(A) Larvae

From 160,000 to 350,000 eggs are produced per spawn by a mature female stone crab several times per year (Bert, et al, 1978). These eggs develop into larvae that immediately become part of the plankton and enter the food chain as prey for primary carnivores. These larvae are fed upon by adult filter-feeding fishes, larval fishes, and other types of zooplankton. Stone crab larvae probably remain in the water column for 3-6 weeks, depending on temperature and salinity (Ong and Costlow, 1970), and, if like most marine invertebrates, suffer high mortality during this period (Thorsen, 1949). In the Everglades and Big Cypress estuaries, juvenile stone crabs are frequently found in red drum, Sciaenops ocellata, and jewfish, Epinephelus itajara, stomachs.

The natural diet of stone crab larvae is not known. Based on laboratory studies the larvae are voracious predators, consume smaller zooplanktonic animals, and feed at the primary carnivore level (Mootz and Epifanio, 1974). Data so far indicate that the larvae do not feed on phytoplankton. Several studies have shown that larval stone crabs thrive on young brine shrimp, Artemia (Porter, 1960; Savage and McMahan, 1968; Cheung, 1969; Mootz and Epifanio, 1974), whereas larvae fed single-celled algae, Chlamydomonas and Nannochloris, died (Porter, 1960). The growth rate, number of brine shrimp shrimp consumed, and efficiency of food conversion for larval stone crabs fed brine shrimp were reported by Mootz and Epifanio (1974).

(B) Juveniles

Little is known about what species prey upon juvenile stone crabs. Stone crabs were taken from the stomachs of large grouper and black sea bass, Centropristis striata, (Bender, 1971), and it is probable that a large number of adult fishes feed on the juveniles. Small stone crabs were eaten in the laboratory by the oyster conch, Thais floridana, and by larger stone crabs (Powell and Gunter, 1968).

Juvenile stone crabs feed on polychaetes, flatworms, small bivalves, oyster drills, seagrass blades, or the epiphytic and epizoic organisms that grow on the blades, and carrion (Wass, 1955; Savage, McMahan, 1968; Powell and Gunter, 1968; Bender, 1971). Several species of animals, and some vegetative material, were ingested by juvenile or adult or both stages of stone crabs in studies conducted by Powell and Gunter (1968). Based on available information it appears that juveniles function to some degree as herbivores and as primary and secondary carnivores.

(C) Adults

Known predators on the adult stone crab are horse conchs, Pleuroploca gigantea, sea turtles, octopuses, other stone crabs, and man (Powell and Gunter, 1968; Bert, Warner, and Kessler, 1978). Some fishes such as the cobia, Rachycentron canadum, and the larger groupers such as Jewfish, Epinephelus itajara, occasionally prey on adults.

Adult stone crabs feed in captivity and in the natural environment on oysters, oyster-shell parasites, boring clams, acorn barnacles, Balanus eburneus, conchs, Thais floridana, flatworms, grapsoid crabs, blue crabs, Callinectes sapidus, hermit crabs, Clibinarius vittata, cabbage-head jellyfish, Stomolophus meleagris, and carrion (Powell and Gunter, 1968; Savage and McMahan, 1968; Bender, 1971). Powell and Gunter suspected that algae constitutes part of the stone crab's diet based on its habit of picking up diatom-laden materials and on vegetable matter found frequently in the gut. The adults, like the juveniles, appear to function as herbivores and as primary and secondary carnivores.

A hypothetical food web for stone crabs is shown in Figure 5-2. Stone crab larvae are shown as obtaining their food from zooplankton with some food energy possibly obtained from phytoplankton. Juvenile and adult stone crabs feed at trophic levels 2-4 as omnivores, small benthic carnivores, and large benthic carnivores.

(iv) Estimate of Maximum Sustainable Yield (MSY)

Assessment of the west coast of Florida stone crab fishery treats the stone crab resource which is exploited in NMFS statistical zones 1-7 (Figure 5-3), as a unit stock. The small amount of crabs caught on the east coast of Florida is not included in the analysis. Recreational harvest is considered negligible in the Fishery Conservation Zone, because this area of relatively deep water is not easily accessible to recreational fishermen. Knowles (1978) detailed the growing importance of recreational fishing for Cedar Key to Fort Myers, in shallow water. No catch statistics are available covering the poundage of stone crabs taken in the recreational catch. Only commercial catch statistics are used in the analysis. Catch and effort statistics were provided by the NMFS Southeast Fisheries Center.

(A) Methodology

The generalized stock production model (Fox, 1975) was used to estimate MSY. The method requires a time series of catch and effort data (Table 5-2). A linear regression line is statistically fit to the relationship of catch per unit of effort and effort to estimate the parameters (constants) necessary to fit the curve to the relationship of yield and effort. The yield curve thus derived provides an estimate of MSY and the optimum fishing effort to attain MSY.

(B) Stock assessment

Figure 5-4 shows the effort trend in the stone crab fishery. Effort increased slowly for the first ten years, but since 1971 it has increased dramatically. The catch trend (Figure 5-5) follows the effort trend rather closely, but at a somewhat slower rate. Although catch per unit of effort has decreased over time (Table 5- 2), total catch shows no indication of leveling off. Thus the fishery appears to be still expanding at this point. This may be due largely to the expansion of fishing effort into new grounds in recent years.

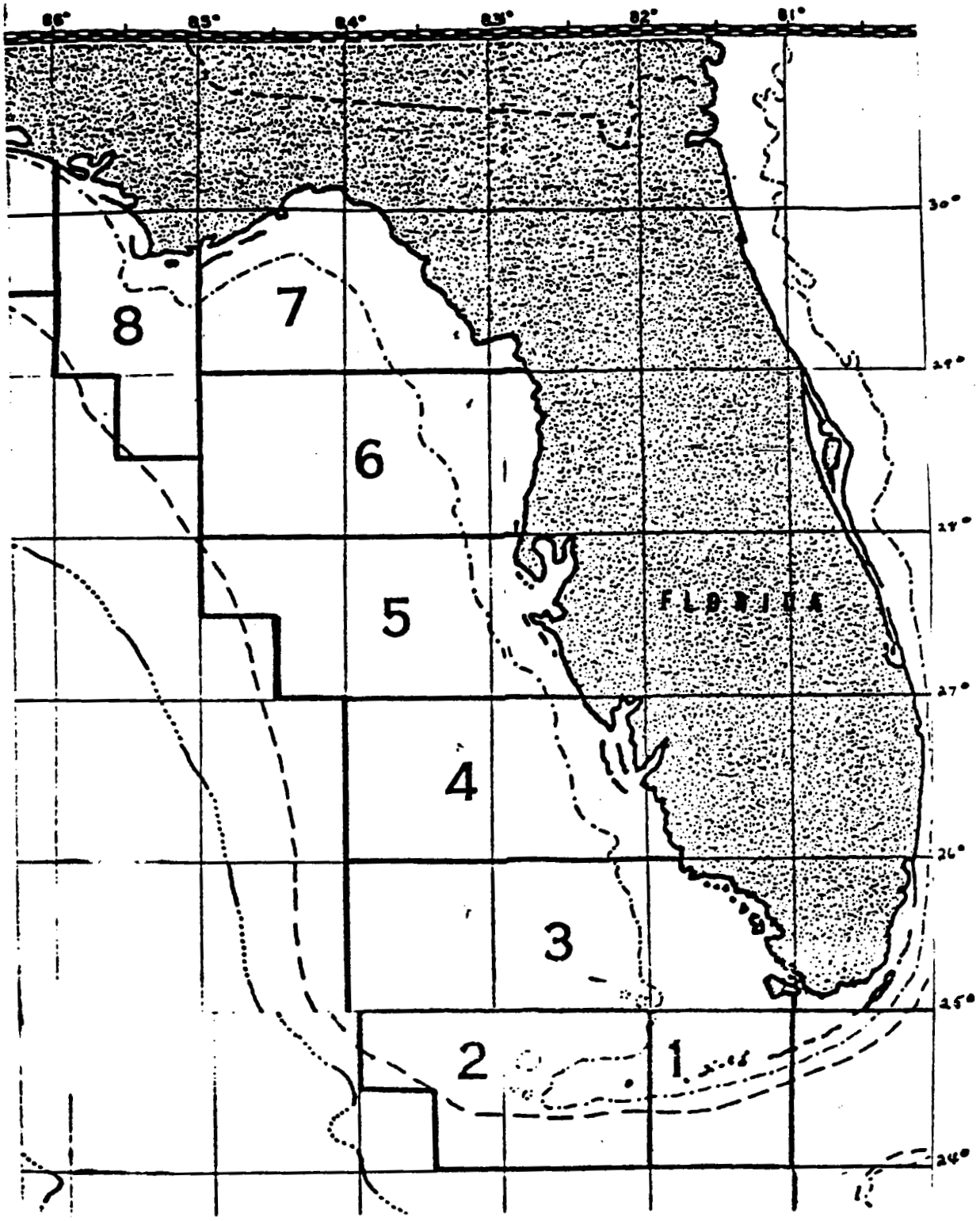


Figure 5-3. Stock area of the west coast of Florida stone crab fishery. The assessment covers zones 1 - 7.

Table 5-2. Catch and effort statistics for the west coast of Florida stone crab fishery.

Season	Catch* millions of pounds	Traps thousands	Catch Per** Trap (lbs)
1962-63	.30	14.6	20.6
1963-64	.35	15.0	23.3
1964-65	.35	21.0	16.7
1965-66	.45	19.7	22.8
1966-67	.40	43.2	9.3
1967-68	.55	39.3	14.0
1968-69	.60	55.9	10.7
1969-70	.70	36.0	19.4
1970-71	.85	60.8	14.0
1971-72	.95	73.7	12.9
1972-73	.90	113.3	7.9
1973-74	1.25	143.0	8.7
1974-75	1.00	159.1	6.3
1975-76	1.15	193.2	6.0
1976-77	1.45	213.8	6.8
1977-78	2.10	264.3	8.0

* Catch is claw weight. Claw weight is 1/2 whole weight.

** Fishermen believe that catch per trap has decreased because of the increased number of traps and because of the practice of setting traps in areas of low potential to reserve fishing rights.

Given the above considerations, a production model analysis must be employed with caution. The model is applied here simply to provide a provisional estimate of MSY as required by the Fishery Conservation and Management Act (FCMA). The fishery should be monitored closely and a reassessment made each year as new data become available. The provisional estimate of MSY, using only commercial landing data for 1962-78, is approximately 1.8 million pounds (claw weight) (Figure 5-6). However, this estimate does not consider that the area of the fishery is expanding, that annual catches are rising, and that there are additional landings by both commercial and recreational fishermen which are not recorded by the present statistical reporting system. Fishing areas have continued to expand beyond previous boundaries. Annual catches rose 300,000 pounds from 1975-76 to 1976-77, rose 650,000 pounds from 1976-77 to 1977-78 and the capacity exists to further increase catches in 1978-79. Unreported landings may be as high as 20 percent of reported landings or 400,000 pounds. In view of these facts, the estimate of MSY is set 1/3 above the provisional estimate, or 2.4 million pounds.

(v) Probable Future Condition

Stone crab stocks are abundant in the Gulf of Mexico only along the Southwest coast of Florida. Elsewhere in the Gulf stone crabs are harvested in a few areas as occasional catch in other commercial fishing operations. This catch of stone crabs is unreported in the commercial statistics. A very small recreational catch of stone crabs is probably harvested in each of the Gulf Coast States.

To estimate the probable future condition of stone crab stocks we note first that the fishery has expanded rapidly in the past ten years. This expansion has occurred both with increased numbers of traps in the historic near-shore grounds and with sizable numbers of traps being set in new areas farther offshore. We may expect the total annual catch to stabilize in the next few years. Since the claw size regulation of the State of Florida and the regulations recommended by this plan protects immature stone crabs, the standing stock should be protected from over-exploitation.

A second consideration of primary importance in predicting the probable future condition of stone crab stocks is the condition and future condition of stone crab habitat. Young stone crabs are abundant in shallow near-shore areas. This indicates stone crabs are estuarine dependent as are many crabs of the family Xanthidae. The center of abundance of stone crabs is in the area of Everglades National Park. Ecological conditions in the park are stable and predicted to remain stable. This indicates that we can expect little or no deterioration of stocks due to habitat changes.

Some erosion of near-shore habitat has occurred elsewhere on the west coast of Florida, but we estimate this has had minor effect on stone crab stocks. The degree of future habitat changes is restricted by law.

The probable future condition of stone crab populations is that they should remain stable and productive.

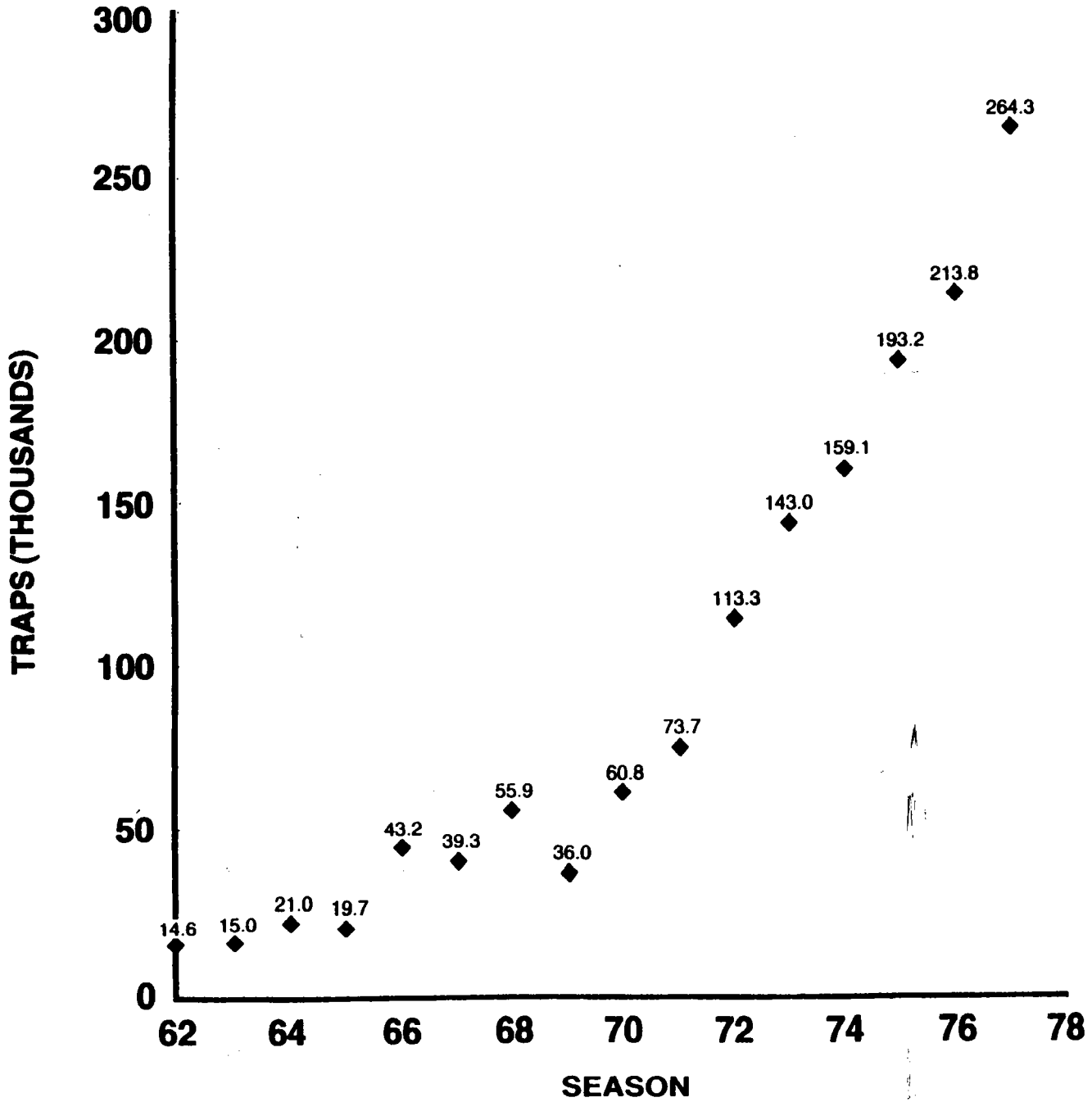


Figure 5-4. Effort trend in the west coast of Florida stone crab fishery.

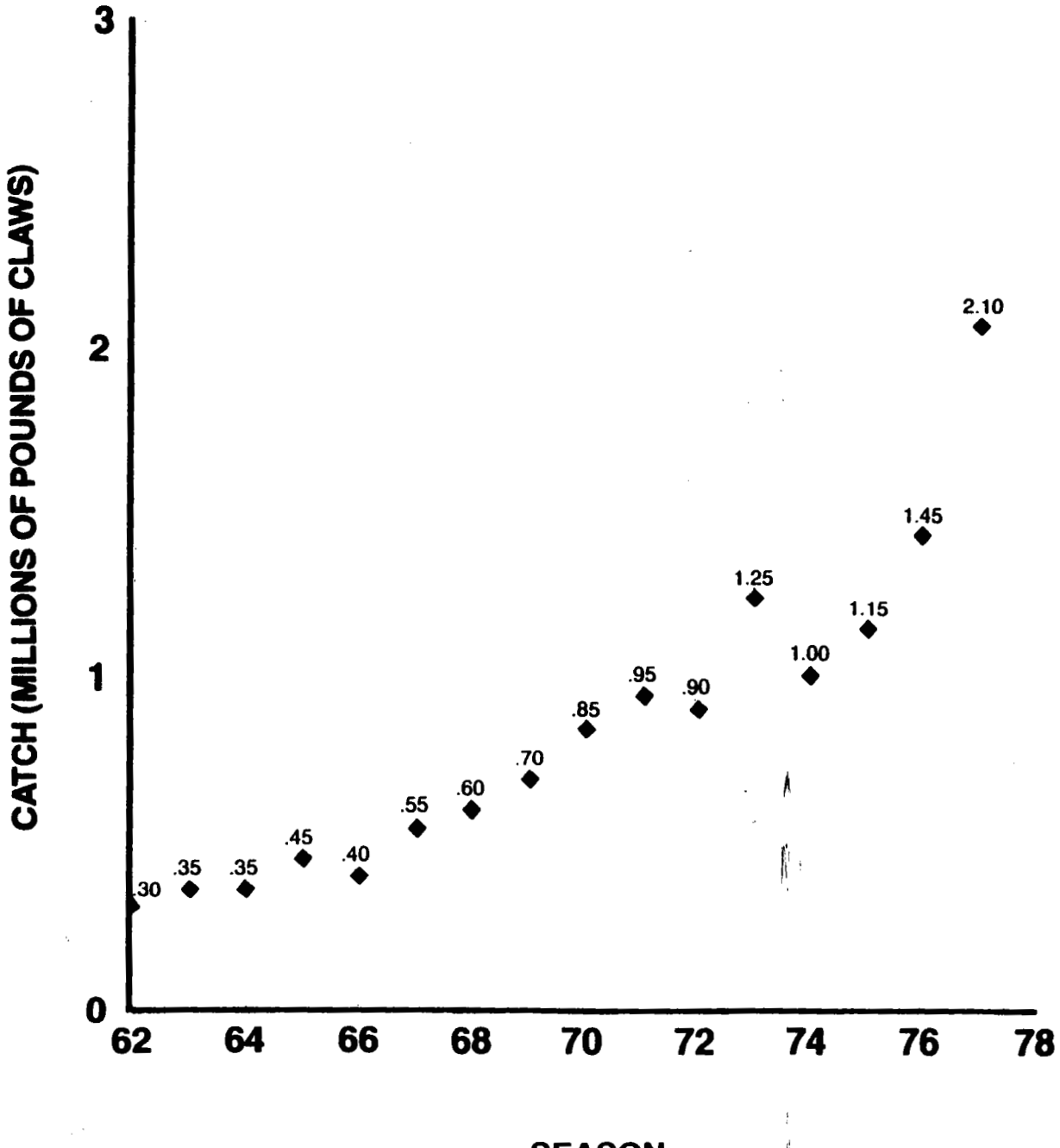
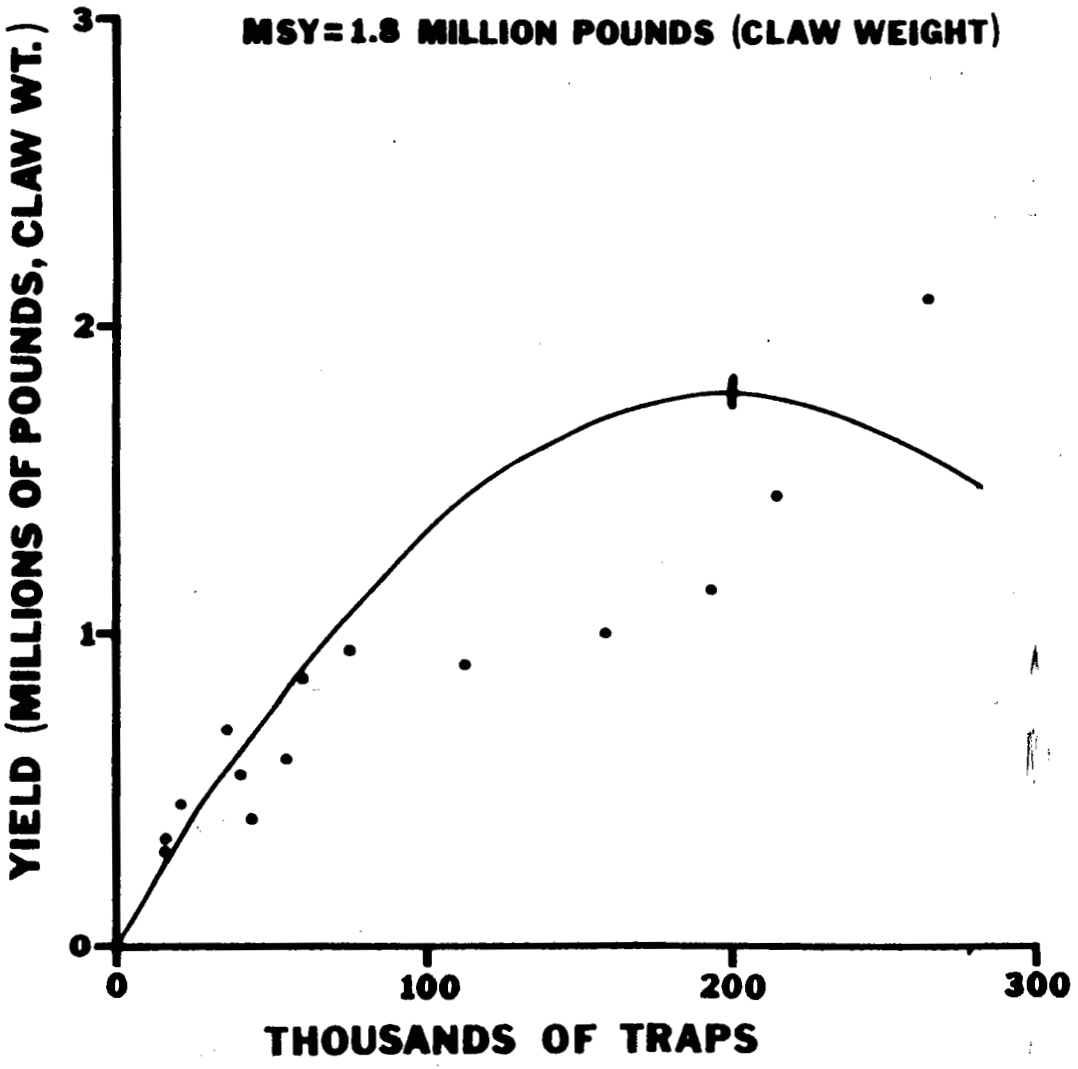


Figure 5-5. Catch trend in the [illegible]t coast of Florida stone crab fishery.

Figure: 5-6 STONE CRAB FISHERY



6. DESCRIPTION OF HABITAT OF THE STOCK COMPRISING THE MANAGEMENT UNIT

(i) Condition of the Habitat

(A) Description of stone crab habitat

a. Habitat occupied during the life history of the stone crab.

Adult stone crabs burrow under rock ledges, coral heads, dead shell, or grass clumps (Sullivan, in press). In seagrass flats (primarily Thalassia testudinum) and along the sides of tidal channels they inhabit burrows (McRae, 1950; Bender, 1971) which may extend 127 cm (50 in.) into the substrate (McRae, 1950). They occasionally inhabit oyster bars (McRae, 1950) and rock jetties (Whitten, et al., 1950). Flocculent sand is the least preferred habitat (McRae, 1950).

Juveniles (less than 30 mm carapace width, CW) do not dig burrows (Powell and Gunter, 1968); they utilize readily available hiding places that offer close proximity to food items (Bert, et al., 1978). Juveniles have been reported to be abundant on shell bottom, sponges, and Sargassum mats (Bender, 1971) as well as in channels (McRae, 1950: Manning, 1960; Bender, 1971) and deep grass flats (McRae, 1950; Bender, 1971). Hay and Shore (1918) stated that young crabs, after attaining a true crab form, were found under shell fragments in deep waters of harbor channels. After reaching a width of about one-half inch (12.5 mm), the crabs lived among oyster shells and rocks in shallow parts of estuaries. From the south jetty of Aransas Pass, Texas, Powell and Gunter (1968) found a large number of juveniles with no adults present. There are numerous reports of large juveniles - small adults (up to 60 mm CW) being abundant on oyster reefs (Menzel and Nichy, 1958; Bender, 1971).

Unlike the benthic dwelling adults and juveniles, stone crab larvae are planktonic (drifting with water currents). Although they are capable of feeble swimming, they are essentially at the mercy of water currents. Adults and juveniles appear to be hardy: they tolerate most environmental extremes within their distributional range (Bert, et al., 1978) and are capable of surviving salinities considerably higher or lower than 35 ppt (Karandeyva and Silva, 1973). However, stone crab larvae require warm water 30°C (86°F) and high salinity (30 - 35 ppt) for most rapid growth. Larval survival and growth rates decline rapidly below 25° C (77°F) and 25 ppt (Ong and Costlow, 1970). Thus in certain broad areas of shallow water where salinity and temperature can dramatically fluctuate, such as upper Florida Bay, larvae may have high mortality rates due to these factors alone.

b. Habitat along the west coast of Florida.

The broad, gently sloping continental shelf and numerous estuarine systems of west Florida, particularly in the southwest, provide extensive habitat for stone crabs. The gentle slope of the shelf, and presence of numerous barrier islands, tend to dampen wave energy a considerable distance from the shoreline, allowing development of extensive offshore seagrass flats. In most areas there is only a thin veneer of sediment overlying bedrock, and there are numerous limestone outcroppings which support sponge and coral communities.

In the lower Florida Keys, the southernmost limit of the commercial fishery, stone crabs are taken from soft coral and sponge bottom in shallow water among the Keys. Few are caught commercially along the Atlantic side of the Keys.

The most productive habitat by far is found in the Everglades - Florida Bay (E-FB) area (Figure 8-4). Stone crabs are sought in shallow Florida Bay and offshore from Cape Sable to Cape Romano out to a water depth of 15 to 18 m (50 to 60 ft). The shoreline in this area is characterized by a broad maze of mangrove swamp, with extensive oyster reef development in the Ten Thousand Islands area (Hoffmeister, 1974). Extensive turtle grass flats occur from Cape Sable northward to Cape Romano Shoals (Sullivan, in press). However, in the area of Cape Romano Shoals, the bottom is characterized by "flocculent sand" and mud and is not commercially fished (Sullivan, in press). Offshore of the turtle grass habitat (along the west coast of Florida turtle grass is found to a maximum depth of 6 to 9 m (20 to 30 ft); Humm, 1973), hard packed sand with scattered shell and patches of hard bottom with attached soft coral and sponge communities typifies stone crab habitat (Sullivan, in press).

North of Cape Romano to Tarpon Springs, the coast is characterized by a series of barrier islands. Wave energy conditions are higher here than to the south or north due to a greater offshore ramp slope (Brooks, 1973). There is usually 20 feet or more of water within one-third to one-half mile from shore. Extensive grass flats prevail in sheltered areas, especially in lower Charlotte Harbor, lower Tampa Bay and Anclote Estuary. Offshore outcroppings are particularly numerous in the sponge grounds off Tarpon Springs (Humm, 1973).

In the Cedar Key Region (Pasco, Hernando, Citrus, Levy, Dixie, and Taylor Counties) the land grades into the sea through an extensive development of Spartina tidal flats, and in areas of reduced salinity, oyster bars flourish (Brooks, 1973). There are extensive areas of shallow water, with depth in offshore areas increasing about one foot per mile. Humm (1973) noted that in this area, seagrass beds may form a bank that is 10 to 15 miles

wide. As is common along the west Florida coast, subdued rock outcroppings are found offshore.

In the Panhandle region of Florida stone crab landings are small compared to landings in the Everglades-Florida Bay area. Barrier islands occur along the Apalachicola delta and the offshore area is characterized by shoaling and offshore rock outcrop.

Unfortunately, although general habitat types have been indicated (e.g., hard packed sand, rock out croppings, and grass flat), no information is available on the percentages of various bottom types found on the continental shelf of west Florida. In fact, the extent of the habitats described here is very poorly known, and there are no quantitative estimates of the area occupied by either seagrass beds or offshore rock outcroppings.

(B) Factors affecting habitat productivity and probable future condition

The productivity of west Florida's coastal waters, which supports stone crabs in commercial quantities, is basically dependent upon the estuaries and seagrass beds that abound along the coast. Nutrient rich, freshwater runoff flowing into the estuaries fertilizes the seawater, resulting in high seagrass and phytoplankton productivity. Lower salinity (which can often exclude predators) and plentiful phytoplankton are ideal for oysters, worms and other organisms. These provide abundant food and shelter for juveniles and adult stone crabs. Seagrasses and mangrove forests, often the dominant features in near-shore and estuarine environments, and the epiphytic algae on them are generally considered to be the major producers of organic matter in coastal ecosystems (Humm, 1973; Goering and Parker, 1972; Heald, 1971). They provide protective covering, and along with the phytoplankton in the surrounding water, support the food items of the stone crab.

However, coastal development by man, with ensuing pollution and dredge and fill operations, can reduce the productivity of coastal ecosystems. To date, the undeveloped nature of the lower west Florida coast and the habitat and stock protection provided by Everglades National Park appears to have maintained a healthy system. Also, there are a number of state and federal laws [see section 6.(iii)] which are intended to eliminate or minimize environmental damage caused by coastal development in the future.

The rapid growth of Florida's population (the present figure of 8.5 million is expected to reach 13.5 million by the year 2000), with three-fourths of its new residents settling in the coastal zone, can be expected to put more demands on the coastal ecosystem. The Big Cypress Swamp, which protects a significant portion of the watershed flowing into the Ten Thousand Island Region, receives some protection from the state areas of critical concern program, and by establishment of the Big Cypress Natural preserve. Also, although Florida has planned many habitat protection programs, they have not yet been formally approved.

(ii) Habitat Areas of Particular Concern

Apparently, shallow, inshore grass flats serve as important spawning areas. Bender (1971) found that females spawn in shallow, grassy areas during the spring, and summer with peak numbers of ovigerous females occurring in July and September. During the summer, females dominated the grass flat stone crab population, with males being more abundant in channels (McRae, 1950; Bender, 1971). Bender (1971) noted that conditions on the grass flats during the summer are optimum for spawning females and stone crab larvae. Food is abundant for reproductively active females (Bender, 1971), and prevailing high temperature and salinity are optimum for larval growth and development (Ong and Costlow, 1970).

Furthermore, these same shallow grass flats are important mating areas. Several investigators (Bender, 1971; McRae, 1950; Noe, 1967; Sullivan, in press) and fishermen have noted an inshore movement of stone crabs, especially males, after the spawning season. Evidently, a large population of males move into the shallow grass flats to mate with resident female crabs (Bert, et al., 1978) and young recently matured females that move onto nearshore areas earlier in the summer (Bender, 1971). Bender suggested that two stone crab populations exist: an offshore population, comprised mostly of males, which migrates inshore in the early winter for mating; and an inshore population, comprised mostly of females, which remains inshore all year and spawns from March to October. This observation by Bender contrasts with observations by commercial fishermen.

The nursery areas for juveniles are not yet clearly defined. Observations presented elsewhere (Section 6 (i)) suggest oyster bars support populations of large juveniles and small adults. Conditions in such areas appear to be ideal for young stone crabs. Shelter is abundant for young, non-burrowing stone crabs and food is plentiful to ensure rapid growth and development. However, other observations (Bender, 1971; McRae, 1950) have also noted an abundance of juveniles on deep grass flats. Many juveniles may simply remain hiding among scattered debris and seagrasses until they reach sexual maturity.

These observations on spawning, mating, and nursery areas all point to the importance of grass beds and inshore oyster bar habitat to the life history of the stone crab. Therefore they should be considered as particularly important to the stone crab fishery. More specifically, it is significant to note that, there is extensive oyster bar habitat in the Ten Thousand Island Region of southwest Florida (Gary Davis, pers. comm). This area may be a vital nursery area that significantly contributes to the offshore stone crab fishery. A large portion of this area is protected by Everglades National Park and Big Cypress National Preserve and if the integrity of the Park is maintained a large part of the area will remain intact.

(iii) Habitat Protection Programs

(A) Coastal Zone Management programs

There are no approved Coastal Zone Management Programs within the region.

(B) Existing Federal programs

a. Rivers and Harbors Act of 1899 (33 U.S.C 407). This act prohibits the alteration of any navigable water of the United States unless the work is authorized by the Secretary of a permit issued by the Army Corps of Engineers which must relate its permitting review to other significant Federal Laws.

b. An Act to Establish a National Park Service, 1916 (16 U.S.C. 1), established a National Park Service, to conserve and protect wilderness areas for the enjoyment of future generations. In the management area being considered, Everglades National Park, (16 U.S.C. 410-410r) is an extremely important habitat protection program.

c. Wildlife Restoration Act of 1937 (16 U.S.C. 669-669i) authorized the Secretrary of Interior to cooperate with state fish and game departments, and provide financial aid for wildlife restoration projects meeting federal standards.

d. Fish Restoration and Management Projects, 1950 (16 U.S.C. 777-777k) provides monies to state fish and game departments for fish restoration and management.

e. Atomic Energy Act of 1954 (42 U.S.C. 2011). National Marine Fisheries Service reviews proposals for nuclear projects (primarily power plants) located in areas where they may effect living marine resources.

f. Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742j) declares that fish, shellfish, and wildlife resources of the Nation make a material contribution to the health, recreation and well being of U.S. citizens. This Act authorizes programs and investigations that may be required for the development, management, conservation, and protection of the fishery resources of the U.S.

g. Fish and Wildlife Coordination Act of 1958 (16 U.S.C. 661-666c) Stipulates that the U.S. Fish and Wildlife Service, and the state agency having responsibility for fish and wildlife, evaluate the effects on fish and wildlife of dredge and fill activities which require Corps of Engineers permits. The district engineer cannot issue a permit in the face of unresolved objections based on fish and wildlife considerations. In such cases, the matter must be referred to the respective Secretary for final decision.

h. Commercial Fisheries Research and Development Act of 1964 as amended (16 U.S.C. 779-779f). Authorizes the Secretary of Commerce to cooperate with the states, through their respective state agencies which regulate commercial fisheries, in conducting studies of fishery resources. Funds made available are used to supplement, and to the extent possible, increase the amounts of state funds that would be available for commercial fisheries research and development in the absence of these federal funds.

i. Land and Water Conservation Fund Act of 1965 (16 U.S.C. 460d, 4601-4601-7). This Act, administered by the Bureau of Outdoor Recreation of the Department of the Interior, was established to make Federal funds available to states on a fifty-fifty matching basis for outdoor recreation projects.

j. Estuaries and their Natural Resources Act of 1968 (16 U.S.C. 1221-1226). Authorized the Secretary of Interior to conduct a study and inventory of the nation's estuaries. Provides that all Federal agencies, in planning for the use or development of water and land resources, shall give consideration to estuaries and their natural resources; and the state and local subdivisions are to be encouraged to take into account the needs and opportunities for protecting estuaries in the development of plans which involve various Federal-State grant-in-aid programs.

k. National Environmental Policy Act of 1969 (42 U.S.C. 4321-4347). Requires filing of Environmental Impact Statements (EIS) on proposals for legislation and other Federal action which significantly affect the quality of the human environment. Preparation of the EIS requires applicants to consider alternative approaches that eliminate or minimize adverse environmental impacts.

l. Ports and Waterways Safety Act of 1972 (33 U.S.C. 1221). Deals with transportation and pollution problems resulting from operation and casualties of vessels carrying oil or other hazardous substances. It is designed to protect the living resources, recreational resources, and scenic values of coastal waters.

m. Federal Water Pollution Act, and Amendments of 1972 (33 U.S.C. 1451). Requires, among other things, that states, and regions engage in land use planning to control the location of new sources of pollution, including sources which pollute runoff waters and underground aquifers, and restrain the dredging and filling of wetlands or other waters without a permit from the Army Corps of Engineers. Discharge of effluents is regulated by the Environmental Protection Agency, and at the state level is regulated by the Department of Environmental Regulation in Florida.

n. Marine Protection, Research and Sanctuaries Act of 1972, commonly referred to as the "Ocean Dumping Act" (33 U.S.C. 1401-1444).

This Act regulates the transportation from the United States of material for dumping into the oceans, coastal, and other waters, and the dumping of material from any source into waters over which the United States has jurisdiction. Title III of this Act authorizes the Secretary of Commerce, with Presidential approval, to designate ocean waters as marine sanctuaries for the purpose of preserving or restoring their conservation, recreational, ecological, or aesthetic values. Marine sanctuaries may be designated from the intertidal zone to as far seaward as the outer continental shelf. Management plans established by a Regional Fishery Management Council and the Secretary of Commerce can be expressly established as consistent with the sanctuary's purpose and can therefore remain fully in effect. However, under particular circumstances, additional restrictions could be adopted under the Act following consultation with the council.

o. Coastal Zone Management Act of 1972 (16 U.S.C. 1451). Establishes a national policy "to preserve, protect, develop, and where possible, restore or enhance the resources of the Nations's coastal zone for this and succeeding generations." The Act provides financial assistance to states in developing and implementing management plans for their coastal area (state participation in the program is voluntary). If the state program meets with Federal requirements it will receive a grant to implement the program. Once a state program has been approved, federally funded or permitted projects must be consistent with the state coastal management program to the maximum extent possible. The Act also authorizes the Secretary to make available to a coastal state grants for the costs of acquisition, development, and operation of estuarine sanctuaries for the purpose of creating natural field laboratories to gather data and make studies of the natural and human processes occurring within estuaries of the coastal zone.

p. Deepwater Port Act of 1974 (33 U.S.C. 1501-1524) Establishes procedures for the location, construction, and operation of deepwater ports off the coasts of the U.S.

q. Fishery Conservation and Management Act of 1976 (16 U.S.C. 180) Establishes a fishery conservation and management regime to be implemented by the Secretary of Commerce. Establishes a fishery conservation zone extending from the limits of the territorial sea to 200 nautical miles from the baseline from which the territorial sea is measured. The Act defines fishery resource to include "any habitat of fish," and enjoins the Secretary to carry out a research program which must include "...the impact of pollution on fish, the impact of wetland and estuarine degradation, and other matters ...".

(C) Existing state laws

a. Aquatic Preserves of 1975 Program (Chapter 258.35-258.46 Florida Statutes). Established 31 aquatic preserves (800,000 acres along the Florida coastline) in order to protect, preserve, and allow for public enjoyment of certain state-owned submerged lands of exceptional quality and value. This program, which is administered in the division of Resource Management (FDNR), operates in two essential ways: 1) the discouragement of the sale of state-owned valuable aquatic acreas; 2) strict regulation of activities and alteractions in established Aquatic Preserves.

b. Beach and Shore Preservation Act (Chapter 161 Florida Statutes) was enacted to control erosion by: providing beach nourishment and erosion control and establishing setback lines for construction on the sand beaches.

c. Florida Air and Water Pollution Control Act (Chapter 103; Part I, Florida Statutes). Much of this Act is similar to the Federal Water Pollution Act of 1972 (see above) with which it was intended to be consistent. Basically, it gives the Department of Environmental Regulations (DER) the power to control air and water pollution; requires development of long-range plans for air and water quality control and authorizes a permitting program for discharges into state waters. Also, provisions of Chapter 2S3, Florida Statutes, requires DER to review applications to dredge and fill based upon the expected impact on state owned lands.

d. Florida Electrical Power Plant Siting Act (Chapter 403.501-403.516 Florida Statutes). This Act established procedures and regulations concerning electrical power plant siting in Florida and is intended to provide that "the location and operation of electrical power plants will produce minimal adverse effects on human health, the environment, the ecology of the land and its wildlife, and the ecology of state waters and their aquatic life."

e. Florida Environmental Land and Water Management Act of 1972. (Chapter 380, Florida Statutes). The areas of critical state concern program was authorized by this Act. The intent of program is to identify particular geographic areas which are of statewide or regional significance and assure that local land development regulations are sufficient to protect the unique characteristics of the area. Local development regulations are reviewed by the Division of State Planning to assure that regional or statewide concerns are met. To date, three areas - Big Cypress Swamp, Green Swamp, and the Florida Keys - have been designated as Areas of Critical State Concern.

f. Florida Water Resources Act of 1972 (Chapter 373, Florida Statutes). This is the principal statute providing for water management in the state. Five water management districts (WMD's) are established in Florida to implement the Act. The WMD's are given a wide range of power, and among other things, they must manage water resources to ensure continued productivity of the state's coastal waters. Also, Section 373.036 Florida Statutes, requires that the WMD's develop a state water use plan as soon as possible.

g. Land Conservation Act of 1972 (Chapter 259 Florida Statutes). Declares the state's intent to protect and conserve environmentally unique and irreplaceable lands as valuable ecological resources of the state. The Act charges the Executive Board of the Department of Natural Resources with the preparation of a comprehensive plan to conserve and protect environmentally endangered lands, and it authorized $240 million in bonds (200 million for the purchase of endangered lands and 40 million for new parks).

h. Oil Spill and Pollution Control Act (Chapter 376.011-376.21 Florida Statutes). This statute empowers the Department of Natural Resources to: a) deal with the hazards and threats of oil spills; b) require the prompt containment and removal of pollutants spilled; and c) inspection and supervision of those activities which may result in spills.

i. Local Government Comprehensive Planning Act of 1975 (Chapter 163.3161-163.3211 Florida Statutes). This law stipulates that municipalities and counties must prepare and adopt a comprehensive development plan, which in the coastal areas must include a coastal zone protection element by July 1, 1979.

(D) Existing county programs

a. Monroe County:

1. The Monroe County Shoreline Protection Ordinance (No. 17-1-75) was designed to maintain the functional integrity of mangrove communities and to preserve marine productivity. It establishes a shoreline protection zone with the interior boundary at a line extending 50 feet laterally from the landward limit of the shoreline mangroves. Uses and activities in this zone are restricted.

2. The Major Development Ordinance (No. 21-1975) requires Community Impact Statement that evaluates a given major development project's impact on the overall environment and ecology.

b. Collier County:

1. The Special Treatment Areas Ordinance (Section 9 of the Zoning Ordinance for the coastal area planning district of Collier County) of Collier County provides for the identification of ecologically important areas (e.g., mangroves, estuaries) and the etablishment of ordinances and standards for development in these areas.

7. FISHERY MANAGEMENT JURISDICTION, LAWS, POLICIES

(i) Management Institutions

Stone crab stocks are managed within state territorial waters by state conservation agencies. Within the Gulf of Mexico area these are: Alabama - Department of Conservation and Natural Resources, headquarters in Montgomery. Florida - Deptartment of Natural Resources, headquarters in Tallahassee. Louisiana - Wildlife and Fisheries Commission, headquarters in New Orleans. Mississippi - Marine Conservation Commission, headquarters in Biloxi. Texas - Parks and Wildlife Department, headquarters in Austin. Stone crab stocks within the boundaries of Everglades National Park are managed by the U.S. Department of Interior, National Park Service.

Stone crab stocks within the Fishery Conservation Zone (FCZ) beyond state territorial waters will be managed by the U.S. Department of Commerce based on the plan submitted by the Gulf of Mexico Fishery Management Council.

(ii) Treaties or International Agreements

Currently there are no treaties or international agreements which apply to stone crab stocks of the Gulf of Mexico.

(iii) Federal Laws, Regulations and Policies

The Fishery Conservation and Management Act of 1976 (Public Law 94-265) defines specific procedures for management of fisheries which lie within the Fishery Conservation Zone (FCZ). Prior to enactment of this law no statutory authority was available to manage stone crabs in waters which lie beyond the Gulf states territorial seas.

The Endangered Species Act of 1973 (P.L. 93-205) is for the conservation of endangered and threatened species. Because of the possibility that manatee and sea turtles may become entangled in stone crab gear, the Gulf of Mexico Fishery Management Council requested a Section 7 threshold consultation with Fish and Wildlife Service and the National Marine Fisheries Service. The opinion derived from the consultation was that the proposed management regulations contained in the Stone Crab Plan are not likely to jeopardize the continued existence of any threatened or endangered species; or result in the destruction or adverse modification habitat determined to be critical to such species.

Marine Mammal Protection Act of 1972 (P.L. 92-522) is for the conservation and protection of marine mammals. There are no records of marine mammals other than the manatee having been adversely affected by activities of the stone crab fishery. The biological opinion from a Section 7 threshold

consultation under the Endangered Species Act stated that the management regulations of the Stone Crab Plan are not likely to jeopardize the continued existence of the manatee.

Other federal laws also affect the stone crab resources, fishery, and industry. The Submerged Lands Act (43 U.S.C. 1301-1343) established the rights of States to title and ownership of natural resources, including fish, within the boundaries of the respective States. The Estuarine Areas Act (16 U.S.C. 1221-1226) coordinates with the State to provide for protection, conservation, and restoration of resources of estuaries in the United States. The Federal Water Pollution Control Act (33 U.S.C. 1215-1376) sets water quality standards for effluent limitations. These laws are important because a critical habitat of stone crabs is coastal estuaries within State boundaries.

The Coastal Zone Management Act (16 U.S.C. 1451-1464) encourages States to develop coastal zone management programs supported by a federal funding system. This objective is to be attained by assisting the states in developing land and water use programs for the coastal zone, including unified policies, criteria, standards, methods, and processes for dealing with land and water use decisions of greater than local significance. Intergovernmental cooperation is thus encouraged with respect to both creation and implementation of the management program.

The Coastal Zone Management Act sets forth four situations in which a federal agency or federal licensee or permittee is required to conduct its activities in a manner "consistent" with state management programs which have received approval from the office of Coastal Zone Management. First, each federal agency "conducting or supporting activities directly affecting the coastal zone" and any federal agency "which shall undertake any development program in the coastal zone" shall ensure that the project is "to the maximum extent practicable," consistent with approved state management programs. Second "any applicant for a required federal license or permit to conduct an activity affecting land and water uses in the coastal zone" shall provide in the application a certification that the proposed activity complies with the state's approved program. Third, any person who submits "any plan for the exploration or development of, or production from, any area which has been leased under the Outer Continental Shelf Lands Act" shall certify that such activity will be consistent with the approved state program. Fourth, state and local governments submitting applications for federal assistance under other federal programs affecting the coastal zone shall indicate the relationship of such activities to the approved management program of the coastal zone.

In light of these requirements and the probability that any fishery management plan would "directly affect" or "be carried out in" the coastal areas, 50 C.F.R. Part 601.21 (b)(3), as published in 42 Fed. Reg. 334453 provides:

> Coastal Zone Management Act of 1972, as Amended (16 USC 1451 et seq.)
>
> "The principal objective of this Act is to encourage and assist States in developing coastal zone management programs, to coordinate State activities, and to safeguard the regional and national interests in the coastal zone. While the coastal zone

does not extend beyond the territorial sea, activities taking place beyond the territorial sea may impact on the coastal zone and thus come within the influence of fishery management plans, Councils should be particularly cognizant of the provisions of Sec. 307 (C) of the Act that require that any Federal activity directly affecting the coastal zone of a State be consistent with the State's approved coastal zone management program. Thus, Councils will need to coordinate their planning actions with the appropriate State agencies involved in coastal zone program development."

The Fishery Conservation and Management Act (FCMA), the other Federal laws which establish State rights and responsibilities, and the Coastal Zone Management Act (CZMA) which provides a tool for coastal zone management, all stress the importance of state and federal cooperation in managing fishery resources such as stone crabs which are not confined to a single area of jurisdiction.

The National Environmental Policy Act of 1972 (42 U.S.C. 4321-4347) requires that the Federal Government recognize and consider the impact or major Federal actions on the environment. Fishery management plans are generally considerred to be major Federal actions. Preparations of a fishery management plan thus requires examination of impacts of the proposed action on the human environment, assessment of adverse environmental effects, and thorough review of alternatives to the proposed action.

Federal legislation affecting the stone crab industry is in the area of domestic commerce, direct financial assistance to the industry, labor, and vessels. The Federal Ship Financing Act of 1972 (46 U.S.C. 1271-1280) set up a fund for federal ship mortgage insurance. Stone crab vessels in the Gulf of Mexico have not been financed under this program. However, some shrimp vessels which have the capability of fishing for stone crabs have been so financed.

Title 36 of the code of Federal Regulations Chapter 1 Section 7.45 (g) prohibits harvest of female stone crabs, males with a claw less than 4½ inches (total length), or from inshore areas of Everglades National Park. It also requires permits to fish up to 400 traps in the Park and requires that the trapping be begun and ended at 14 day intervals.

Other Federal laws relate to stone crabs in a peripheral way.

(iv) State Laws, Regulations, and Policies

Since the stone crab fishery is limited primarily to coastal waters of Florida, the laws, regulations, and policies of this state have major impact upon the management of this fishery. Regulatory agencies of the State of Florida conduct marine fisheries research, develop management policies, enforce marine laws, counsel the legislature on fisheries' problems, but do not independently enact fisheries' regulations. Stone crab fishery laws are in yearly editions (from 1929 to present) of the Laws of Florida, primarily in

Chapters 370.13 and 370.14. These laws are also referenced in the statutes of Florida (Chapters 370.13 and 370.14).

For 50 years the State of Florida has regulated the stone crab fishery in her coastal waters by legislating various laws. The minimum size is set to ensure crabs are two years old, and potentially have spawned one season, before entering the fishery. Declawing and return of the live animal to the water was promulgated as a conservation measure. Subsequent studies by Florida Department of Natural Resources, Marine Research laboratory (Savage and Sullivan, 1978; Sullivan, 1978) showed that a small percentage survive and regenerate claws to commercial size. Closure during the spawning season was promulgated for the protection of breeding crabs. Trap limits and gear restrictions attempt to allocate landings among fishermen and reduce wasteful gear. Regulations requiring traps to be visibly marked and not to be navigation hazards reduce conflict between fishermen and boaters. The registration and marking of boats and gear facilitates administration and enforcement in the fishery.

(A) Seasons and time of day

In 1929 (Laws of Florida, 1929), it became unlawful to possess any stone crab between the 21st day of March and the 21st day of July. Closed seasons of four to six months duration changed from these original limits through intervening legislation to April 15 - October 15 (Laws of Florida, 1953), and June 1 - October 15 (Laws of Florida, 1963), to the present closed season of May 15 - October 15 (Laws of Florida, 1969). Traps can only be transported, placed in the water and baited ten (10) days prior to the opening of the stone crab season and have to be removed within five (5) days after the close of the season (Laws of Florida, 1971). Traps in violation of this restriction are seized and destroyed.

Current restrictions on working traps only during daylight hours were legislated in 1977 (Laws of Florida). Pulling traps from one hour after official sunset until one hour before official sunrise is prohibited.

A closed season during spawning is a conservation measure that limits landings on a short-term basis but eventually contributes to increased stocks and, by implication, landings. It affords protection to breeding crabs. Daytime fishing aids enforcement.

(B) Areas

Area restrictions on stone crab fishing were imposed by 1935 legislation prohibiting the catching or taking of stone crabs in the waters of the State of Florida lying south of latitude 25°50' N by the use of traps, lobster pots or other equipment of like nature and provided a penalty for the violation (Laws of Florida, 1935).

This area restriction was effective for 21 years (Laws of Florida, 1961). It is unlawful to place any crab trap in a navigation channel maintained by the Corps of Engineers or any county or municipal government (Laws of Florida, 1973). Obstruction of navigation of boats drawing three feet of water by stone crab traps is also prohibited.

The effect of the 1935 moratorium on stone crab fishing in Florida Bay is not clear. Also, it is not clear what caused original concern for these stocks, but this area now supports heavy commercial fishing pressure. Keeping traps from navigation channels and from shallow waters is a safety measure that reduces conflict between stone crab fishermen and other boaters.

(C) Gear and vessels

Regulations against using spears, gigs or similar devices were introduced in 1953 (Laws of Florida, 1953) and are still in effect. Later legislation outlawed the use of grains, grabs and hooks in the capture of stone crabs.

Any trap with a throat or entrance exceeding four inches in width and six and one-half inches in length cannot be fished, set, or placed in Florida's waters (Laws of Florida, 1971). Buoy specifications were designated that included continuous floatation, easy visual discrimination, marking with current permit holder's number at least three inches high on each buoy and trap, and the permit to remain on the boat with the operator subject to inspection at all times. An addendum in 1973 required that color and permit number be permanently and conspicuously displayed on the boat. Later changes specified that boat designations had to be readily identifiable from the air and water (Laws of Florida, 1977). Any violation can result in suspension or revocation of permit and a misdemeanor conviction punishable by fine or imprisonment in addition to confiscation of any gear equipment, boats, vehicle or item used in the violation.

Buoy specifications and marking serve a variety of purposes. They aid fishermen and enforcement officers in reducing trap molestation which carries a misdemeanor penalty, reduce the hazard during daylight hours to navigation, and are a visual marker for the owner to locate his lines.

There are presently no regulations by the State of Florida on size, type or number of vessels in the stone crab fisheries.

(D) Possession of crabs

In 1929 it became unlawful to possess or sell any stone crab smaller than ten inches long with claws extended (Laws of Florida, 1929). These measurements changed through intervening legislation to a claw length not less than four inches (Laws of Florida, 1953), to a length of four and one-quarter inches measured by the closest distance between the bottom of pincher closed and the knuckle joint that meets the body with claw extended (Laws of Florida, 1971), to present restrictions of a forearm (propodus) of two and three-quarters inches (7 cm) in length measured by a straight line from elbow to tip of the lower immovable finger (Laws of Florida, 1973).

The general management policy of fishing mature animals, except during a closed spawning season, prevails in the majority of fishery legislation of Florida. The present minimum size limit is a conservation measure allowing stone crabs to reach maturity and spawn before entering the fishery at about two years of age. Studies determining whether this is at or near the size to optimize yield per recruit would be desirable to determine the best size for

processing economics. The Florida laws were amended in 1973 to prohibit the transport by boat, land vehicle, airplane or other conveyance of any intact stone crab or stone crab body whether dead or alive, allowing only claw removal with immediate return to the water of live animals in the same area where taken. Whole stone crabs can be possessed or transported solely for educational or scientific purposes and only with permit from the Division of Marine Resources. This regulation is a departure from present Federal regulations within the Everglades National Park (7iii), requiring possession of whole crabs.

Regulations against taking or possessing female stone crabs at any time were introduced in 1953 (Laws of Florida 1953). The prohibition against taking females was repealed 20 years later (Laws of Florida, 1973). Federal regulations for Everglades National Park waters conflict, however, allowing only male stone crabs to be taken.

Regulations protecting females are a conservation measure that is enforceable only if the whole crab is landed. Changes in the regulations prohibiting possession of whole crabs enabled fishing all adult crabs above the minimum size limit. Return of declawed, live crabs to the water is a conservation measure that potentially can allow individuals to return to the fishery by regenerating claws and spawning before natural mortality. The impact of this management practice on individual declawed crabs, within the stone crab populations or between other members of their benthic community have not been determined. It effectively solved the immediate problem of dockside disposal of dead crab bodies not being utilized by processors. Processors and dealers now receive their products ready for cooking and immediate sale.

(E) Permits and licenses

A permit system, without fee, is in effect in Florida's territorial waters. A person acquiring ownership of stone crab traps from another party has to notify the Division of Marine Resources within five (5) days and request a transfer of the stone crab permit (Laws of Florida, 1974).

Permitting aids administration and yields some fishery data. Data on number of permits, number of boats, and some information on number of traps are currently available.

(F) Processing

Extensive regulations for the dealers of stone crab products were promulgated in 1976, (Laws of Florida, 1976). Sworn reports of the quantity in pounds of frozen stone crab claws and frozen crabmeat are required to be reported to the Division of Marine Resources within three days after the commencement of the closed season for the fishery. Any reports postmarked later than midnight of the third day may not be accepted and frozen stocks confiscated. Any dealer reporting a greater or lesser amount than is in his possession or name is considered in violation and subject to seizure of his entire supply. Reported stocks may then be sold; however, additional inventory reports on the 1st and 15th day of each month are required throughout the duration of the closed season. Reports postmarked later than midnight of the

2nd and 16th of each month may not be accepted and stock may be impounded for the remainder of the closed season.

These regulations are all for enforcement and administration of landings and stock inventories for legal sale during closed seasons. Crabs are marketed year round.

(G) Enforcement

The enforcement of Florida's statutes in regard to any marine fishery is the responsibility of the Division of Law Enforcement, Florida Marine Patrol, within the State's territorial waters extending three nautical miles from the historic coastline of the State on the Atlantic side and to three leagues (approximately nine nautical miles) on the gulf side. These boundaries were fixed by the Constitution of the State of Florida in 1885. The State has the power to govern its own citizens upon the high seas "with respect to matters in which the State has a legitimate interest" (Case of Lambiris Skiriotes vs. State of Florida, 313 US 69-79, 1940). The Fishery Conservation and Management Act of 1976 (Pub. Law 94-265) established a Fishery Conservation Zone contiguous to the territorial seas of coastal states. Enforcement of that Act's provisions governing foreign fishing in the waters from three to nine nautical miles off the coast of Florida in the Gulf of Mexico, by agreement between the governments of the United States and the State of Florida (1976), is the jurisdiction of the Florida Marine Patrol in conjunction with the Coast Guard and the National Marine Fisheries Service.

Personal communication with Colonel Clifford Willis, Director of the Division of Law Enforcement for the Florida Department of Natural Resources, outlined current enforcement problems regarding stone crab regulations. In general, present regulations are enforceable and are being strictly enforced, with one exception. As a matter of Department policy, enforcement officers have not been holding commercial fishermen too closely to adherence of the regulation prohibiting retention of live crabs on deck. This evolved from the difficulty of fishermen with a large number of traps, in declawing and returning crabs immediately to the water using present methodologies. It is generally accepted that immediate declawing and return is a slower process than holding crabs on deck until the entire trap line is fished, then declawing and returning to the water while underway. Colonel Willis notes that since desiccation time has been shown to effect the survival rate of returned animals (Schleider, 1978), he anticipates a stronger enforcement policy is desirable and his office will be responding more firmly. He is also concerned that stone crabs are fished well beyond the territorial sea (up to 30 miles from the coast) and the fishery is not presently regulated outside the nine nautical mile limit. Extension of stone crab management into the Fishery Conservation Zone would allow enforcement agencies to regulate the entire fishery stock; however, Federal help will be needed to enforce regulations in the extended zone.

(v) Local and Other Applicable Laws, Regulations, and Policies

County exclusions to applicability of state laws, although technically not local laws, were introduced in 1929 and continued in force for 40 years.

Closed-season restrictions were not applicable for the person or persons catching stone crabs for their own use and personal consumption within the waters of Levy County and St. Johns County (Laws of Florida, 1929). Successive legislation added the following county exclusion of the stone crab closed season: Manatee County (Laws of Florida, 1949), Hernando, Washington and Holmes counties (Laws of Florida, 1955), Dixie County (Laws of Florida, 1961), Citrus County (Laws of Florida, 1963), and Collier County (Laws of Florida, 1965). Provisions in stone crab laws for 1965 allowed the possession of stone crabs for personal consumption at all times in any county of the state having a population of not less than 15,700 and not more than 16,400 and in any county with a population of not less than 10,000 and not more than 10,800, according to the latest official census. These exceptions were specifically repealed by legislation in 1969.

An act limiting the number of traps which may be used for stone crab fishing on any one boat (600 trap maxima per boat) in Citrus, Dixie, Levy or Taylor counties is a current state law (Laws of Florida, 1973) applicable to only a portion of the state populace and may be interpreted as local law. It is the only example of state legislation limiting the number of traps. It should be noted that this act only restricts the number of traps set by a fisherman in county waters and does not restrict or prevent him from setting any number anywhere else in territorial waters.

Contact with officials in Gulf states other than Florida and a preliminary review of state regulations indicates few if any regulations pertain specifically to stone crabs.

8. DESCRIPTION OF FISHING ACTIVITIES AFFECTING THE STOCK COMPRISING THE MANAGEMENT UNIT

(i) History of Exploitation

Stone crabs were fished for food and recognized as a delicacy since the 1800's in certain Atlantic and gulf areas of the United States. In west Florida coastal areas the stone crab supplied a "considerable share" of food to the inhabitants. Tebeau (1968) noted that settlers of the Everglades were frequently cut off from external food sources and relied heavily upon local seafood items, such as stone crabs. Stone crabs, however, were known only in localized areas of catch such as Key West and Fernandina, Florida; Charleston, South Carolina; and Beaufort, North Carolina. Catches were made by hand, dip nets and traps (Rathbun, 1884, 1887). In Key West, stone crabs were caught in traps incidental to the spiny lobster fishery. Schroeder (1924) states, "... the Key West catch varies from about 10 to 50 dozens a day during the winter and spring season... Small crabs measuring about 3 inches in width across the carapace, sell at retail for about $1.00 a dozen, while those 4 or more inches in width bring from $1.50 to $2.00". Landings in Monroe County ranged from 2,123 kg (4,680 lb) in 1895 to 9,979 kg (22,000 lb) in 1919 (Schroeder, 1924).

Stone crabs were fished within a mile from shore, along channels and rocky bottom. Stone crabbing took place throughout the year but was best from February to April. Stone crabs were sold by fish venders who sold to individuals from steet corners or directly to restaurants in the town (Schroeder, 1924).

In the 1920's and 1930's, one to three fishermen fished for stone crabs around Cedar Key, two to three fishermen around Everglades City, and one man fished in the Florida Keys near Key West.

Live stone crabs were packed in wooden boxes layered with seagrass (Thalassia testudinum and Syringodium filiforme) and shipped to restaurants within the state or as distant as New York City. Fishermen that fished during that period reported that the crabs arrived alive and in good condition when shipped by this method.

The stone crab fishery slowly developed along the Florida Gulf coast until the 1960's.

(A) Vessels and gear types

The stone crab fishery was conducted from shore or small boats[1/] until 1963. In that year, the first vessel entered the fishery (Table 8-1).

1/ For NMFS statistical purposes, a "vessel" is documented by the U.S. Coast Guard and has a capacity of at least 5 net tons. A "boat" is not documented and has a capacity of less than 5 net tons.

Table 8-1. Gulf of Mexico stone crab fishery. Number of vessels, boats, fishermen and traps, 1961-1975.

Year	Vessels (5 tons or over)	Boats (less than 5 tons)	No. of full-time fishermen*	No. of part-time fishermen*	No. of traps**
1961	0	69	66	15	13,608
1962	0	70	66	17	14,610
1963	1	65	67	15	14,906
1964	2	78	93	17	20,974
1965	4	71	57	30	19,960
1966	8	92	121	10	43,243
1967	11	84	108	19	39,328
1968	18	108	158	9	55,870
1969	14	93	125	18	35,975
1970	15	143	151	40	60,800
1971	20	122	173	14	73,685
1972	32	157	251	22	113,300
1973	35	162	292	16	142,999
1974	40	185	327	16	159,076
1975	57	123			

* "Full-time" fishermen receive more than one-half their annual income from fishing; "part-time fishermen receive less than one-half.

** Number of traps listed differs from those shown in Table 5-2. This occurs because different sources of statistical information were used and in part because Table 5-2 is based on seasonal information rather than annual information.

Sources: 1961-1974 Compiled from Fishery Statistics of the United States.
1975 From Statistics and Market News Division, NMFS.

Most stone crabs were caught in traps adapted from assorted containers, ice cans, crates, oil drums, etc. Glass jars or coconuts served as marker buoys. Bait consisted of scrap and trash fish, sharks and sting rays. Early fishermen set their traps in shallow water at the edge of nearby channels and between islands. Rarely were traps set deeper than 9 m (30 ft.). Fishermen usually set out between 50 and 300 traps.

(B) Fishing areas and quantities

The stone crab occurs along the Gulf coast from Florida to Texas, but commercial catches are reported to the NMFS Statistical Division only in Florida. An unknown quantity is caught and sold to restaurants in Texas (Powell and Gunter, 1968) and possibly other states. The fishing area was mainly in shallow waters of Florida in Monroe, Collier, Manatee and Pinellas Counties until the 1960's. Schroeder (1924) stated "They are found rather near the shore and generally not farther than one mile from land". Rathbun (1887) mentioned that crabbing takes place in shallow waters by waders. In more recent years, the area fished has expanded to 30 miles (48 km) offshore in depths of up to 60 feet (18 m) or more off most Gulf coastal counties from Monroe to Franklin.

Originally the market for stone crabs was restricted to restaurants and consumers in the immediate area of the fishery (Powell and Gunter, 1968). With a poorly developed marketing system, in many instances, whole crabs had to be taken to large cities by fishermen where only the best were accepted. As recently as 1962, the supply exceeded the demand, and whole stone crabs were sometimes sold for only $.30 per dozen. The market, though broader, is still composed chiefly of sales to local retail outlets, seafood restaurants, hotels, and specialty food stores in larger cities (Bert, et al., 1978).

Commercial landings of stone crabs in the Gulf of Mexico were generally under 100,000 pounds (45,350 kg) per year in whole crab weight until the 1950's.[2/] This brief summary of historic information on stone crab catches is reported in whole crab weight because early catches were reported and marketed as whole crabs. In 1956, the commercial landings of stone crabs were reported in only Monroe, Collier, Lee, Manatee, Sarasota, Pinellas and Levy Counties in Florida. Eighty-eight percent of this catch was landed at Collier, Monroe and Manatee Counties. Since the 1960's, the stone crab landings and value increased steadily with most counties from Monroe to Franklin contributing to the landings. The landings reached 500,000 pounds (226,750 kg) in 1962, one million pounds (453,500 kg) in 1968. A summary of recent catches by region is given in Table 8-2. Stone crab landings in other sections of this plan are reported in claw weight which is half of whole weight. A summary of catches in recent years is given in Section 9.

There is no foreign fishing for stone crabs within the U.S. FCZ.

2/ Claw weight = $\frac{\text{whole crab weight}}{2}$

Table 8-2. Florida west coast stone crab fishery; percentage of landings by region, 1967-1976.[1/]

YEAR	EVERGLADES FLORIDA BAY	SOUTHWEST COAST	TAMPA BAY	CEDAR KEY	PANHANDLE
1967	93.4%	1.6%	0.5%	4.5%	-
1968	90.5	4.0	0.3	4.4	-
1969	77.5	4.8	3.4	14.3	-
1970	80.8	3.4	1.9	13.8	-
1971	83.1	2.4	0.0	13.3	1.2%
1972	89.0	2.5	0.7	7.4	0.4
1973	72.9	14.1	1.8	10.3	0.9
1974	79.3	10.6	0.9	8.5	0.6
1975	79.7	3.1	2.2	14.2	0.9
1976	68.0	7.9	5.2	18.2	0.7

1/ For definition of counties within each region, see Section 8.(ii)(D)

(ii) Present Commercial and Recreational Activities

(A) Participating user groups

The west coast of Florida stone crab fishery is composed of the commercial fishery with licensed full- and part-time fishermen, stone crab dealers and processors, and restaurant owners who often purchase directly from the fishermen.

The recreational fishery is composed of fishermen with Florida stone crab trapping permits and fishermen without permits who catch stone crabs while wading in shallow water or skin diving.

(B) Commercial vessels, gear, and fishing operations

Vessels:

There is no standard design or construction for stone crab vessels and boats. Many are multi-purpose craft used in other fisheries part of the year. The stone crab vessels are usually from 9 to 15 m (30 to 50 ft) in length, diesel powered, and have a large after deck (Figure 8-1). The stone crab boats are of various designs up to 9 m (30 ft) in length, gasoline or diesel powered.

Fishing Gear:

A single device, the trap, is used to catch stone crabs in the Florida commercial fishery. The trap is equipped with a line for hauling and a marker buoy. Each trap and buoy must be marked with the permit number, and the buoy must be colored as registered on the permit.

Trap hauling gear consists of an open sheave block mounted on a davit. To haul, the buoy line is passed over the open block, and the line with attached trap is pulled aboard by hand or by a powered line (trap) hauler.

Fishermen usually build their traps or have them made to specifications. The trap is constructed of pine or cypress lath which is pressure treated with wood preservative to extend the life of the trap. Typical gear used in the stone crab fishery is shown in Figures 8-2 and 8-3.

Traps must adhere to stringent regulations regarding the maximum size of the trap entrance (4 x 6 in. or about 10.2 x 16.5 cm) (370.13, Florida Statutes); however, the design and dimensions of other parts of the trap may be modified.

The majority of traps measure about 40 x 40 x 28 cm (16 x 16 x 11 in) or 36 x 53 x 28 cm (14 x 21 x 11 in) in length, width, and height respectively. The frames are made of 5 x 5 cm (2 x 2 in) wood covered with 2.5 x 5 cm (1 x 2 in) lath spaced about 3.8 cm (1.5 in) apart. Concrete is poured into the bottom to a thickness of 3.8 cm (1.5 in) to weight the trap. (Since traps are custom made from rough-cut lumber, sizes in this paragraph are nominal.)

The top of the trap is removable -- a short section of 10 cm (4 in) diameter polyvinyl chloride (PVC) pipe situated in the center of the top

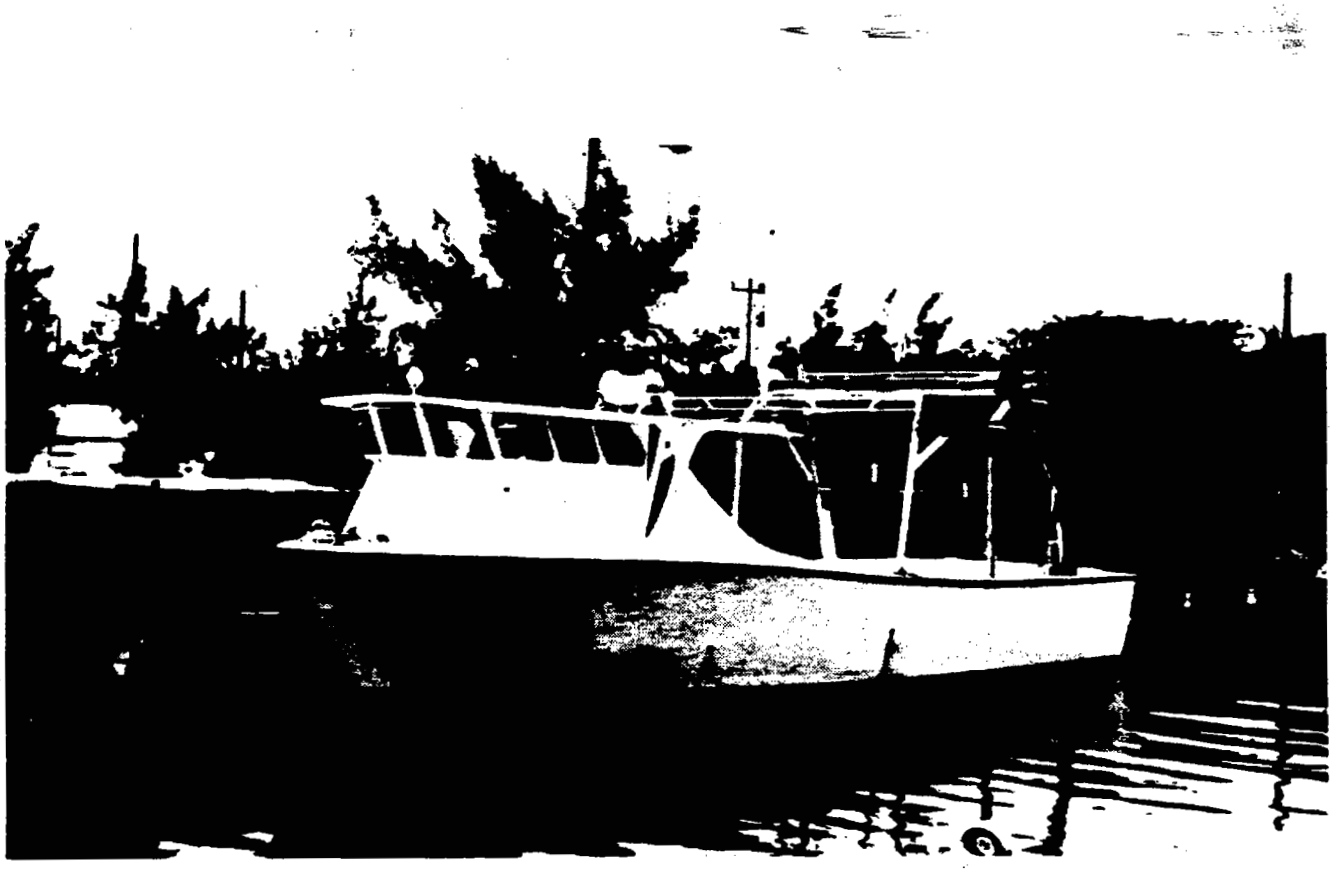


Figure 8-1. A 48-foot boat outfitted for net fishing and trap fishing.

Figure 8-2. Stone crab traps stacked on the beach at Marathon, Florida during the closed season.

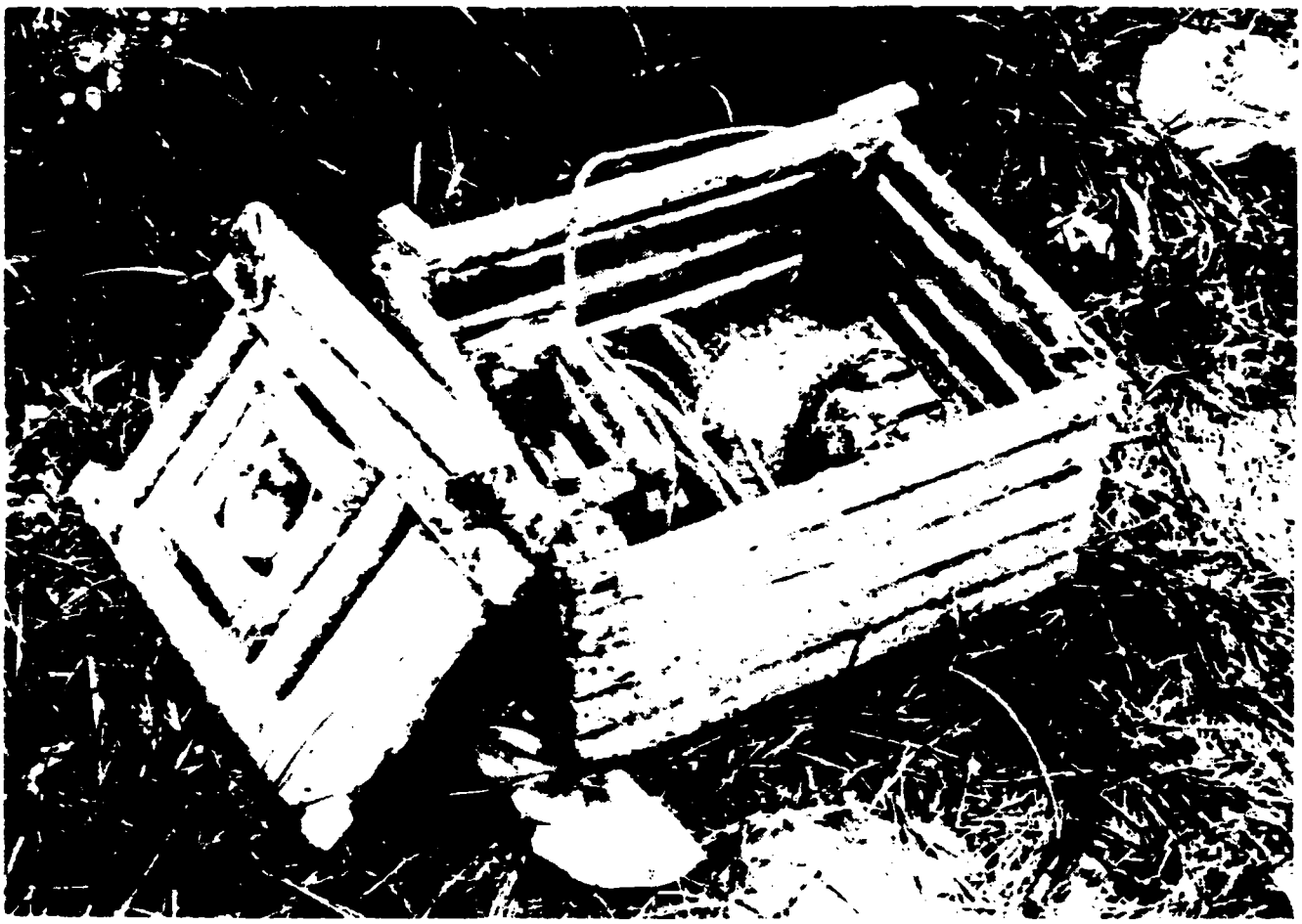


Figure 8-3. A typical wooden stone crab trap with cover, bait box, buoy and buoy lines.

serves as the trap entrance. Fishermen experiment with trap design and contend that certain designs are more effective. In some cases, fishermen have evolved trap designs that work better in specific areas.

Plastic traps and blue crab traps are used to a lesser degree.

Fishing Operations:

The Florida stone crab season begins on October 15 and ends on May 15 of the following year. Preparations to vessels and gear are made before the season opens, but traps may not be set until October 5.

Traps are baited with trash fish and fish remnants. Grouper, mullet and snapper heads and jacks, sharks and skates, or rays, cut into 0.5 to 0.6 kg (1 to 1.5 lb) sizes are often used. Fishermen experimented with rawhide and canned fish-base petfood, but most believe that fish works best, particularly the tough meat of cartilaginous fish and jacks. From 0.5 to 1.5 kg (1 to 3 lb) of bait are used per trap. The bait may be simply placed in the trap, hung from the top, or set in a bait container. Depending on the method and amount used, the bait will last from two days to three weeks.

Stone crab fishing is usually a one-day trip since the claws must be cooked before they can be chilled. This is necessary to prevent the flesh from sticking to the shell.

There are two variations to the basic fishing operation depending upon the size of the craft and the number of fishermen aboard.

Vessel fishing:

Larger-scale operations use diesel-powered vessels from 10 to 15 m (30 to 50 ft) in length with large after decks, often covered to provide shade. The crew is composed of the captain and one or two pullers.

The baited traps are usually set in the traditional double line where traps are spaced 30 to 90 m (100 to 300 ft) apart and run parallel to the bottom depth contour. Fishermen may modify this pattern, however, into a grid, cross, or circular pattern. Traps are placed on sandy ocean bottom spotted with sponge and rocks or soft coral and small hard coral heads. Many fishermen contend that "the best catch is where the grass and open sand meet."

Vessel fishermen pull their traps 10 to 21 days after setting the trap lines. The vessel approaches the buoy and line in such a manner to avoid entangling the propeller. The pullers catch the buoy line with a hook and then haul the attached trap aboard, aided by a powered trap hauler. The crabs are removed and tossed into wooden boxes. Traps are rebaited, repaired and reset. The captain, in the interim, has been maneuvering to the next buoy in the trap line, and the operation is repeated. The crabs are kept aboard until the end of the fishing day. The pullers declaw the crabs as the vessel is returning to port. This is in violation of 370.13 Florida Statutes. Claws are removed by grasping them firmly from the rear and twisting downward or upward with a swift snapping motion.

Vessels usually dock free-of-charge at a fish processing house, which provides the fisherman with storage and maintenance facilities for his traps and vessel. In exchange, the fisherman sells his catch to the processor and purchases his bait and fuel there.

Vessels with a three-man crew haul and reset traps at a rate ranging from about 25 to 100 traps per hour, depending on weather conditions, tides, smoothness of the operation, condition of the equipment, and personnel. Sixty traps per hour is considered a good average speed. Many fishermen service 400 traps per day, maintaining that efficiency of equipment and personnnel is maximal at this rate. Vessel fishermen set out from 1,500 to 6,000 traps per season.

Boat Fishing:

Smaller-scale operations use diesel or gasoline powered boats up to 9 m (30 ft) in length and one man performs all the operations. Occasionally, an additional person, usually a family member, will assist. Boat fishermen work in shallower water, closer to port, but pull their traps more often than vessel fishermen, every few days if the weather permits. Boat fishermen basically follow the same procedures as the three-man vessels. The fisherman pulls his trap by hand or with a powered trap hauler, removes the catch, services and resets the trap. The number of traps worked per day ranges from 25 or less to 300. The number of traps set out in a season varies but may be as many as 1,500.

Declawing procedure may vary with the boat fisherman. Some will declaw as the traps are pulled, either throwing the crab back in the water at that time, or keeping the declawed bodies on board to move them away from the area of the trap lines. Others follow the same procedure as vessel fishermen, declawing while returning and at dockside. Fishermen fishing within the Everglades National Park are required to keep the whole crab on board until out of the National Park's jurisdiction, and then they declaw accordingly.

Recreational Fishing:

Recreational fishing "is fishing for pleasure, amusement, relaxation, or home consumption" (Fisheries of the United States, 1977, 1978) and, for stone crabs, can be divided into two sectors: fishermen with Florida stone crab trapping permits using essentially the same types of boats, gear and fishing methods as commercial boat fishermen, and waders and skin divers who catch stone crabs by hand, snares, bent rods and sticks.

1. Trap fishermen:

   A variety of problems prevents an adequate evaluation of the extent of recreational fishing for stone crabs:

   (1) Defining the recreational fisherman is exceedingly difficult because nearly all stone crab fishermen sell at least some of their catch.

(2) Most stone crab fishermen are involved in some other occupation or fishery, making a "percentage of income" demarcation between commercial and recreational fishermen very difficult.

(3) Both commercial and recreational stone crab fishermen may have any number of traps, preventing a definition of recreational fishermen by survey of number of traps utilized.

(4) No registration of number of traps employed is required, nor is there a permit fee, allowing anyone to easily obtain a permit and preventing separation of recreational and commercial fishermen using permit data. Also, many individuals obtain permits and do not put any traps in the water.

(5) Vessel registration provides a limited estimate of larger commercial crabbing operations, since recreational crabbers would probably not have boats of this size. However, both commercial and recreational boats are registered to State waters and cannot be discriminated.

Thus, the only estimates of recreational stone crabbing come through interviews with processors, local crabbers, and persons otherwise associated with the industry. The greatest number of recreational trap fishermen are located in the lower Florida Keys (Big Pine to Key West). Residents set out a few traps in shallow water usually less than 6 m (20 ft). They catch up to several hundred pounds per year, keep most, or give them to friends and relatives, and sell a few -- commonly enough to "break even" on trap and boat expenses. It appears that at most a few tens of thousands of pounds are taken by recreational fishermen in the Keys.

The only other area of recreational trapping is along the west central Florida coast (Lee County to Manatee County) where some weekend fishermen set traps, ordinarily fewer than 200. Discerning recreational from commercial fishermen is particularly difficult because nearly all commercial fishermen use the stone crab fishery as an accessory fishery and can employ the same size boat, same number of traps, and same fishing grounds as the recreational fishermen.

2. Waders and divers:

On the Florida west coast from Fort Myers to Cedar Key, stone crabs move into shallow waters and burrow in the flats or hole up in coastal rocks and jetties during the winter (Knowles, 1978). The numbers of fishermen or their catch is not known; however, Knowles (1978) in one week caught 200 crabs from one jetty. Stone crabs are taken by recreational divers around Monroe and Pinellas Counties incidental to seeking reef fish or spiny lobsters. Crabs are caught by teasing the crab up into the water column and grasping its claws when it is suspended or by pulling the crab out of its burrow with a hooked pole. (Technically, this method of hooking stone crabs is illegal [370.13, Florida Statutes]). Poor clarity of water or absence of stone crabs prevents divers from harvesting in many areas.

Recreational fishermen are restricted by the proposed management options with the exception of the maintenance and submission of daily trip tickets. Exclusion of these data have a minimal impact since limited recreational fishing occurs in the FCZ.

(C) Employment in commercial and recreational sectors

Commercial Sector:

There are few fishermen that rely on the stone crab fishery as their sole source of income. Open season is seven months duration (October 15 - May 15) and stone crab fishermen participate in other fisheries or occupations for the remainder of the year. Because of the similar fishing technique and gear, stone crab and spiny lobster trapping are often combined by Monroe County fishermen (Bert, et al., 1978).

As the demand and price of stone crabs steadily increased, the number of stone crab fishermen increased. Starting about 1968, larger vessels entered the fishery and ranged farther offshore in their trapping operations than in previous years. Many spiny lobster and mackerel gill net vessels first entered the offshore fishery at this time (Johnson, 1969). Between 1968 and 1974, the continuing strong market for stone crabs encouraged the increase in the size of the fishery. This is reflected in the number of fishermen employed which increased from 167 in 1968 to 342 in 1974. Most of these are full-time fishermen, the percentage of part-time fishermen (fishermen earning less than 50 percent of their income from fishing) was four percent in 1974.

Florida stone crab trapping permits are issued to resident commercial and recreational fishermen free of charge. In 1976, there were about 1,700 west Florida permits issued. Permit information, however, does not indicate whether the applicant is a commercial or recreational fisherman. Because of the disparity between the number of commercial fishermen and the number of stone crab permits issued, a large percentage of permit holders is assumed to be inactive or in the recreational fishery or do not sell to dealers.

An unknown amount of stone crabs are sold directly to restaurants or consumers and are not recorded in the fishery statistics.

Recreational Sector:

There is no information available concerning employment in the recreational sector of the stone crab fishery.

(D) Fishing and landing areas utilized

Since about 1970, growth of the stone crab fishery along the west coast of Florida has mushroomed (Table 8-1). A number of new fishing locations have developed, and traditional fishing areas have generally enlarged. For the purposes of this paper, the west coast fishery was divided into five regions, based on fishing grounds (Figure 8-4):

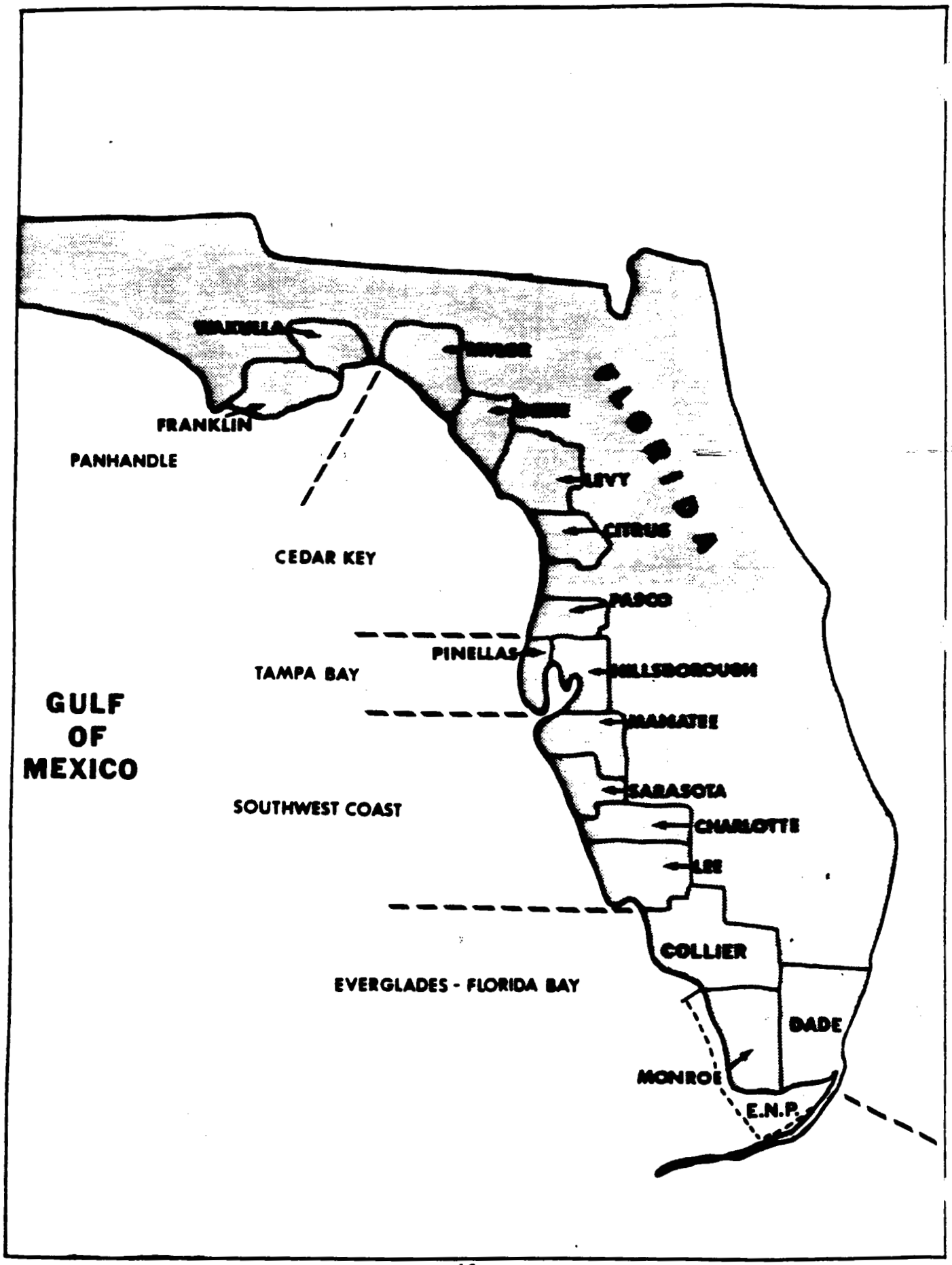


Figure 8-4. Gulf of Mexico stone crab fishing grounds by region and county.

1. the Everglades-Florida Bay region -- Monroe and Collier Counties;

2. the Southwest Coast region -- Lee, Charlotte, Sarasota and Manatee Counties;

3. the Tampa Bay region -- Pinellas and Hillsborough Counties;

4. the Cedar Keys region -- Pasco, Citrus, Levy, Dixie, Hernando and Taylor Counties;

5. the Panhandle region -- Wakulla, Franklin, Gulf, Bay, Walton, Leon, Okaloosa, Santa Rosa and Escambia Counties.

The percentage of landings by each region is shown in Table 8-2.

Everglades-Florida Bay Region

This region produces most of the catch in the west coast stone crab fishery and was described in detail by Bert, et al., (1978). Since 1970, the area fished in the Everglades-Florida Bay region increased nearly five-fold. It currently spans an area of approximately 9,850 sq km (3,800 sq mi). Fishermen fished to a depth of 12 to 15 m (40 to 50 ft) for at least ten years. Although depth of trapping has not increased greatly, the number of traps in waters beyond the 9 m (30 ft) depth has increased tremendously.

a. Monroe County:

Since 1970, Monroe County fishermen have expanded their fishing range from localities among the Keys and in shallow Gulf of Mexico waters (less than 9 m, or 30 ft) behind the Keys to encompass the entire area from the Harbor Keys to the vicinity of Highland Point above the Shark River basin and out to 15 m (50 ft) deep. A few crabbers set traps between 15 and 18 m (50 and 60 ft). From the original area estimated at about 900 sq km (350 sq mi) in 1965, the Monroe County fishery has expanded to about 5,050 sq km (1,950 sq mi). Fishermen report that no conflicts have arisen between crabbers of the two counties over the sharing of fishing grounds.

Three centers of stone crab fishing activity developed: the Upper Keys, Marathon, and the Lower Keys. Upper Keys fishermen (Long Key to Key Largo) operate small one-man boats for easy maneuverability in the shallow water of Florida Bay to Cape Sable. Fishing effort is concentrated in the areas of Sandy Key and the center of Everglades National Park waters. Only six to eight boats operate out of processing houses in this area. Most fishermen have between 50 to 500 traps, cook their catch, and sell to dealers or restaurants in the vicinity.

Fishermen centered in Marathon use large vessels that are operable in heavier seas and can accommodate a three-man crew. They may travel as far as Harbor Keys or above the Shark River basin and eastward to Sandy Key and generally set their traps in deeper waters. In 1978, about 34 vessels were based at processing houses in Marathon. Each vessel worked between 1,500 and 4,000 traps.

The third center for stone crab fishing exists in the Lower Keys. Most fishermen in that area are single-man boat operators and stay essentially in

shallow water among the Keys. There are seven two-man boats associated with particular processors and about 50 small boat fishermen who cook their own catch and sell to processors or restaurants. These men have up to 300 traps each. Also, a small incidental stone crab catch from spiny lobster traps is landed in this area.

Relatively few Monroe County fishermen rely on crabbing exclusively as their source of income. Vessel fishermen combine crabbing with spiny lobster fishing. Since the differences between crabbing and lobstering are very slight, it is a simple matter for the fishermen to combine the two. The effort devoted to either species depends upon fishing success during the course of the overlapping seasons. Vessel fishermen may also be rigged for net fishing.

Boat fishermen are also diversified and often support themselves by lobstering and crabbing from late summer through spring and switch to sponging, bottom fishing, or collecting ornamental reef fish during the early mid-summer months.

b. Collier County:

The Collier County fishery is centered in Everglades City and Chokoloskee and operates from the Shark River basin to Cape Romano. They set traps in inshore waters of the Ten Thousand Islands and extend offshore to the 18 m (60 ft) depth contour and beyond. Five fish processing houses with approximately 25 two- and three-man vessels are based here. During the season fishermen from other counties, primarily Monroe County, work for these processors also. The fishermen generally work 1,000 to 3,000 traps, but some have as many as 6,000.

Collier County fishermen rely heavily on crabbing, drawing a large proportion of their income from it. Some Collier County crabbers also fish for spiny lobster; however, the supply in their area is depleted by the opening of stone crab season, and nearly all fishermen switch exclusively to crabbing.

Southwest Coast Region

Although this region is adjacent to the most productive area in the Gulf, Lee and Charlotte County landings range only 2 to 14 percent of the total Gulf landings (Table 8-2).

Boats are usually 6 to 7.5 m (20 to 25 ft), two-man operations without powered trap haulers. Fishermen have fewer than 200 traps and fish in waters less than 6 m (20 ft) deep. Most fishermen are either "weekenders" with jobs not associated with the fishing industry, or shrimp or mullet fishermen who engage in crabbing on weekends. Claws are sold to fish processors dealing primarily in fish or shrimp or directly to local restaurants.

Tampa Bay Region

Pinellas County supports a moderate, though sporadic fishery (Appendix Table 1). A few crab processing houses occur throughout the county, but with the exception of one family-owned processing house with its own boats, they

deal in stone crab claws only as an accessory product. Stone crabbers are mostly part-time mullet fishermen with less than 50 traps. They bring cooked claws to dealers or restaurants. Three individuals use crabbing as their major income source -- two in Clearwater and one at Johns Pass in St. Petersburg. Most crabbing is limited to water shallower than 9 m (30 ft) off Tarpon Springs.

Cedar Keys Region

The five county Cedar Keys region composed of Taylor, Dixie, Levy, Citrus and Pasco Counties supply about 10 percent of the west coast landings. There are 10 to 15 fishermen; five obtain the majority of their earnings from stone crabbing. Crabbing is a two-man operation, and 6 to 9 m (20 to 30 ft) open boats with no powered trap hauler are used. These men have up to 1,000 traps each. A few part-time fishermen from inland Florida come to the coast to work their traps on weekends. Blue crab fishermen also land an incidental catch of stone crabs. Most traps are set between Horseshoe Key and Port English Light but may extend to Rock Island above Steinhatchee. Possibly because of the proximity to a juvenile nursery ground (McRae, 1950; Bender, 1971), the proportion of small claws is very high (80 to 90 percent), and many juvenile stone crabs are seen among the Cedar Keys islands. Also, crabbers report a high percentage of females in the area. An eight-week cessation in catches occurs during mid-winter, when water temperature drops below 20°C (68°F). Despite the break, crabbers leave their traps in throughout the season. Fishermen sell their catch to one of three fish processors, who then ship claws to restaurants in surrounding counties and a few to other southern states.

Panhandle Region

There are few stone crab fishermen in the Panhandle region, and landings average less than one percent of the total west coast fishery. Cold winters and low dockside prices severly limit the fishery, and freezing temperatures can begin one month after the opening of the season in fall and last until one month before closing of the season in spring. The length of the active stone crab season is highly variable and dependent on the weather. In addition, the blue crab industry is far more important in the region and the blue crab processors are reluctant to deal with stone crab claws. Stone crab price per pound is about one-half of that paid in southern Florida, and no higher price is given for large claws, even though about 50 percent are large claws. At present, stone crabs are principally an incidental catch to blue crabs in Franklin and Wakulla Counties. No stone crabs are landed in other counties of the region.

Only one individual is a full-time stone crab fisherman in this region. He operates two one- or two-man boats, 8 and 10 m (26 and 34 ft) in length equipped with trap haulers. He works several hundred traps offshore of Panacea to the 14 m (45 ft) depth. He hauls his catch by truck to the south and north and currently is attempting to develop the industry in the vicinity.

(E) Conflicts among domestic fishermen

Within the stone crab fishery there are no serious conflicts among the members of the commercial sector or between the commercial and

recreational sectors. The area of most competition and conflict is between commercial stone crab fishermen and other fishermen fishing the same area using non-compatible gear.

Since about 1968, stone crabbers seeking new grounds have been expanding their fishing effort offshore into deeper water (Johnson, 1969). Some fishing has extended 30 miles (47 km) offshore in water over 60 feet (18 m) in depth. This resulted in some competition for fishing areas between the commercial Florida stone crab and net fishermen. These problems were temporarily resolved by the fishermen involved. This was possible because stone crab fishermen work several fisheries and understand local conditions. Many are net fishermen themselves for a portion of the year.

The principal conflict at the present time is between stone crab and shrimp fishermen. The stone crab fishery expanded activities offshore into deeper waters at the same time shrimpers moved into the same areas formerly prohibited to shrimp trawling by Florida law. As a result, stone crab traps were damaged or destroyed by shrimp trawling. This management plan will attempt to resolve the conflict that seriously affects the orderly management of the stone crab fishery. The following information will serve as a basis for better understanding of this problem.

Background:

For the past twenty years, the State of Florida has closed to shrimping a large area of water off the southwest coast known as the Dry Tortugas nursery area (FSA 370.151). The nursery area provided a sanctuary for young, maturing shrimp, and also provided a boundary line between stone crab and pink shrimp fishermen. Stone crab fishermen in quest of the crab claw (the only part of the crustacean they are allowed to process and sell) would drop their "pots" or traps inside the nursery area boundary and be relatively assured that the pots would not be scooped up in a shrimp trawl. Shrimpers remained outside the nursery area and conflicts between the two groups were rare even during the three-month period (February - April) that the two fisheries overlapped.

There were two major events affecting the fisheries in 1976. The first was a disastrous shrimp season along the south Atlantic coast, causing an increase in the number of vessels in the pink shrimp fishery off Florida's west coast. The second event was the United States Supreme Court decision which fixed Florida's seaward boundary in the Gulf of Mexico at nine nautical miles offshore. Much of the Dry Tortugas nursery area thereby fell outside of Florida's jurisdiction. Florida can control and regulate its own citizens in the Dry Tortugas nursery area, but has no authority over out-of-state fishermen more than nine nautical miles off the coast.

The Problem:

Stone crabbers set out hundreds of traps in strings up to 10 miles (16 km) long and leave them in the same place as long as they are productive. Attached to each crab trap is a spherical-shaped marker buoy which identifies, by its color and number, the owner. The marker buoys are relatively easy to spot during the daylight hours, but at night, when the pink shrimp fishermen do most of their work, the buoys are difficult to spot. Before the influx of

out-of-state shrimpers and the Supreme Court decision, there were few, if any, gear conflicts between the two groups because shrimpers stayed outside the nursery area. With the influx of more shrimpers into the former nursery area, however, crabbers began losing their pots to trawlers and some crabbers reported losses in the thousands of dollars. Tempers flared and some fishermen resorted to threats and violence. Since the preliminary agreement of March 14, 1978, one boat was riddled by bullets from an automatic weapon. Other incidents were also reported. As a stopgap measure to prevent injury, the U.S. Coast Guard drew an arbitrary line in the disputed area and required shrimpers to remain on one side and crabbers on the other. The Coast Guard line made an "X" with the old nursery line allowing shrimping in some parts of the former nursery area, but closing to shrimpers waters open to them under the old nursery line. The major area of dispute occurred in a circular area around the point where the two lines crossed. Unsure of its authority in the area and strained to provide adequate enforcement of the line, the Coast Guard hoped that another solution to the problem could be found.

Proposed Solutions:

Tampa Meeting:

On March 13, 1978, a meeting was held in Tampa, Florida, at the office of the Gulf of Mexico Fishery Management Council to review the problem and seek solutions. In attendance were representatives of various fishermen's groups, two representatitves of the National Marine Fisheries Service, and officials and members of the Gulf Council.

The group concluded that no governmental entity had authority in the disputed area. The State of Florida could regulate its own citizens anywhere and out-of-staters within nine miles of the coast but could not enforce the nursery line as it previously existed. The Gulf Council, by virtue of a hiatus in the Fishery Conservation and Management Act of 1976, had no authority in the area until a fishery management plan for either stone crabs or shrimp was adopted and implemented, a process that was more than a year away. Jack Dunnigan, an attorney for NMFS, was of the opinion that no other provision in the FCMA would allow emergency action to be taken until a fishery management plan was adopted. In essence, a jurisdictional void existed in the area and would not be filled until a specific fishery management plan on either of the two species was adopted. A voluntary agreement between the two groups of fishermen appeared to be the most feasible solution and also the quickest to implement.

The following suggestions were offered:

(1) Stone crabbers could offer to place some of their members on board the shrimp boats at night as observers to help spot the crab pots and prevent them from becoming entangled in the trawls.

(2) Crabbers could string their pots in an east-west or north-south direction, and shrimpers could pull their trawls in the same direction so that a gear conflict could be avoided.

(3) The Gulf Council could request that NMFS prepare on an expedited schedule a fishery management plan for stone crabs so that by next year at this time some type of boundary would be implemented.

(4) Stone crabbers could be asked to place radar reflectors on their buoys in order that radar-equipped shrimp boats could spot them more easily.

(5) A joint steering committee composed of equal numbers of shrimpers and crabbers could be formed to formulate a temporary solution for the remainder of this season.

(6) Some type of voluntary gear reporting system could be implemented whereby crabbers could report the location of their traps so shrimpers would be able to avoid them. This solution was proposed in a similar controversy between lobster fishermen and trawlers along the northeast Atlantic coast, but reports from the area indicate the system is not working.

Miami meeting:

On Tuesday, March 14, 1978, the day after the Tampa meeting, shrimp and crab fishermen and some of the attendants of the previous meeting met in Miami to discuss which solution would be implemented. The meeting was held at Senator Lawton Chiles' office in the Federal Building.

The problem was again discussed in detail, and new information was brought to light. Crabbers reported that most of the boats in the former nursery area were from out-of-state, and most left the area when they were told crab traps had been placed there. The crabbers also said that some of their members were threatening to "mess up the bottom" if shrimpers continued to encroach on their trap strings. Both groups agreed that only a relatively small number of fishermen are causing the problems and that most fishermen want to avoid trouble and earn a peaceful living.

After the problem had been thoroughly discussed, the following solutions were agreed to:

(1) The old nursery boundary line would be voluntarily reinstated effective at dusk, Friday, March 17, 1978. Both groups promised to inform their members of the decision, and both said they should be able to live with the old line since it had been in effect for the previous 20 years without too many problems.

(2) An advisory panel comprised of members from the two groups would meet again later to adopt further compromise measures.

(3) The Gulf Council would recommend immediate development of a stone crab plan with the hope that it would be ready for adoption and implementation by the time the problem surfaces again in 1979.

(4) States whose fishermen are fishing in the disputed area would be contacted so that their officials could apply jaw-bone pressure on the shrimpers to abide by the voluntary decision.

(5) Boats with advanced depth meters would voluntarily chart bottoms in the area, and bottoms unsuitable to shrimping could be pointed out to stone crabbers for their use.

(6) The Coast Guard would patrol the area until the old boundary line was reimposed with the Florida Marine Patrol taking up enforcement from there.

A series of additional meetings were held in Tampa, New Orleans, and elsewhere, seeking a solution to the problem. Finally, representatives from the stone crab industry and the shrimp industry agreed on a line to separate the two groups of fishermen during the primary time when conflict had occurred. This agreement was considered as part of this management plan (see Section 12).

(F) Amount of landings

The stone crab fishery is small compared with other Gulf of Mexico fisheries but has expanded rapidly in recent years with continuing demand and favorable prices. The ex-vessel value of landings increased over 20 times since 1954. A summary of catches and values of stone crab catches in the Gulf of Mexico is given in Section 9.

(G) By-catch

Crabs which are not legally harvestable and fish are occasionally taken as by-catch. These are returned to the water alive. The traps utilized in this fishery are not conducive to the capture of large fish; therefore, the majority are returned to the water with a few being retained for home consumption.

(iii) Assessment and Specification of the U.S. Harvesting Capacity

The growth of the Gulf stone crab fishery concurred with the market demand for the product. Because of the versatility of the stone crab fishermen, whose work is seasonal, and who must participate in several fisheries annually, the capacity of the fleet is more flexible than those with most other fisheries. This was demonstrated in the 1960's. The size of the fleet quickly increased from 69 craft in 1961 to 158 craft in 1970. As market demand and fishing pressure increased, activity expanded into new areas farther offshore and in deeper water. Stone crabs occur in the U.S. Gulf of Mexico in NMFS statistical zones 1 through 21 (Figure 8-5). The present commercial range of stone crabs is in the NMFS statistical zones 1 through 7 with fishing concentrated in zones 1, 2 and 3. Underexploited areas may exist in the other zones or in other states where effort is light. Powell and Gunter (1968) mentioned a commercial stone crab fishery in Port Aransas, Texas. Stone crabs are also caught in Texas in blue crab traps (C.E. Bryan, Texas Parks and Wildlife).

Based upon the expanding fleet size (250 vessels in the 1977-78 fishery), increase in the number of traps fished (264,300 in the 1977-78 fishery), and increased annual landings (2.1 million pounds in the 1977-78 fishery), it is apparent that the U.S. presently has the capacity to harvest optimum yield. Trends in this expanding fishery are shown in Tables 9-5 and 9-6 of the following section. These trends, coupled with the additional recreational catch, assures that the U.S. has the capacity to harvest OY.

(iv) Assessment and Specification of U.S. Processing Capacity

Processing consists simply of boiling the claws and freezing or chilling the boiled claws and requires no sophisticated equipment. Therefore, the domestic processing capacity will always exceed the U.S. harvesting capacity.

(v) Foreign Fishing Activities

None of the stone crab stocks of the Gulf of Mexico is currently being harvested by foreign fishing vessels.

(vi) Interaction Between Domestic and Foreign Participants in the Fishery.

Since there are no foreign participants in the stone crab fishery, interactions are zero.

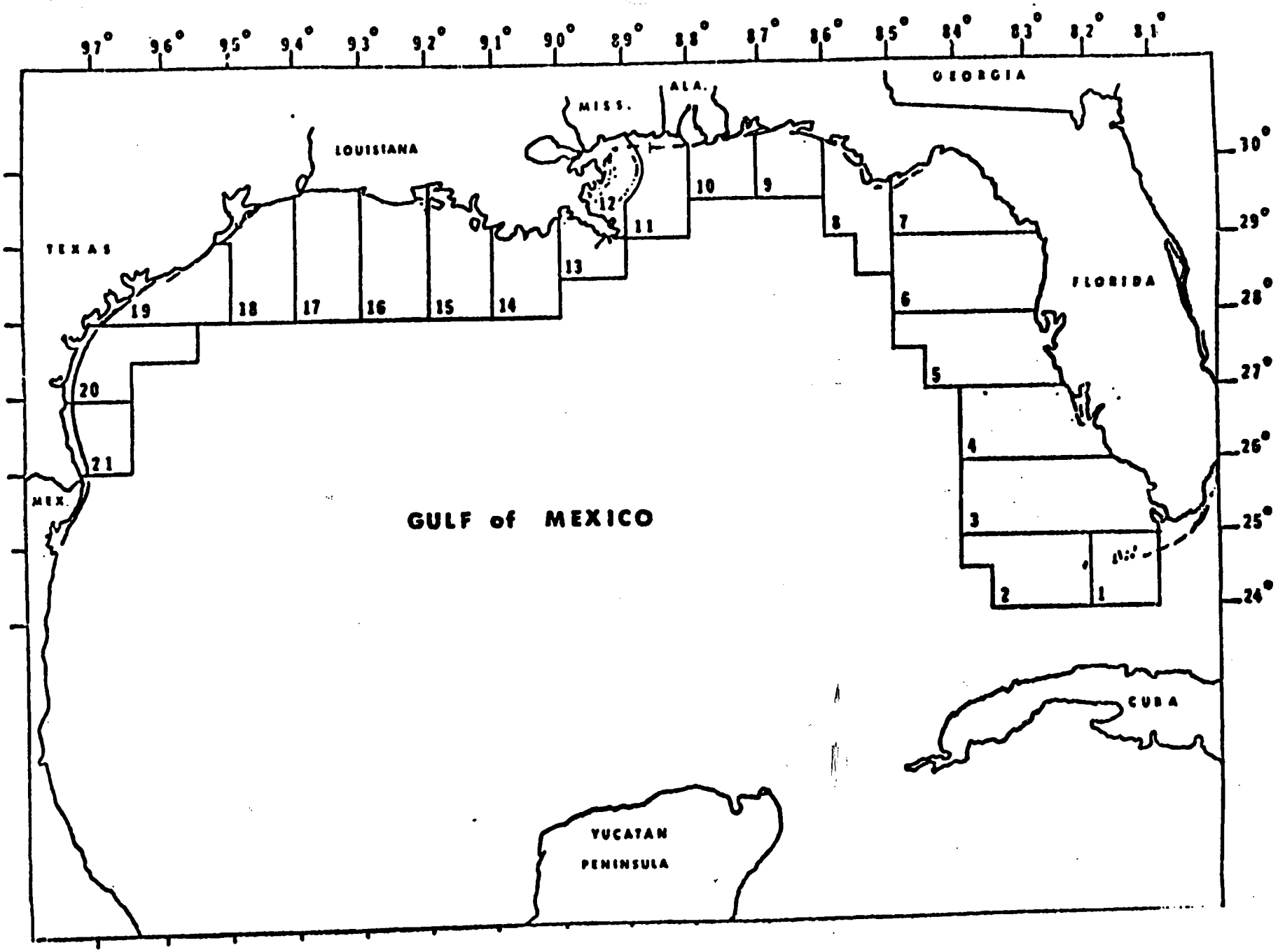


Figure 8-5. Occurrance of stone crabs in the Gulf of Mexico, NMFS statistical zones for the U.S. Gulf coast.

9. DESCRIPTION OF ECONOMIC CHARACTERISTICS OF THE FISHERY

(i) Domestic Harvesting Sector

(A) Landings and value

Stone crab reported landings on the west coast of Florida for the 1977-78 season totaled 2.1 million pounds on a claw basis with a value of 3.8 million dollars, as reported by the National Marine Fisheries Service, Table 9-1. Stone crabs are produced in signifcant quantities only in Florida among Gulf Coast States. Total reported pounds of claws landed increased from 0.3 million in 1962-63 to 2.1 million in 1977-78. This is an increase of 7 times over the 15 seasons. However, landings declined during three seasons of the period, Figure 9-1. The growth in market value of stone crab claws during the period reflects both increased production and higher current prices received by crabbers.

In comparison to all Florida West Coast fisheries and the Gulf of Mexico the stone crab fishery is not large. Stone crabs accounted for 3.55 percent of the reported value and 2.05 percent of reported landings, live weight basis, of all Florida West Coast fisheries in 1974, Table 9-2. In comparison to all Gulf of Mexico fisheries stone crabs represented 0.76 percent of the reported value and 0.14 percent of landings in 1974. Since 1964, the fishery has grown at a faster rate than have all fisheries of either the Gulf of Mexico or Florida West Coast. On the Florida West Coast stone crab landings in 1974 represented 2.05 percent of total pounds of all fisheries as compared to just 0.57 percent in 1964. Similarly, value at dockside in 1974 was 3.55 percent compared to 0.96 percent in 1974.

Stone crab production and value also are reported on a county basis for several years. There is considerable variation in reported landings for some counties from one year to the next and to avoid comparisons of erratic landings data a three-year average of landings was computed, Table 9-3. The two county areas of Collier and Monroe have produced about 75 percent of all West Coast landings in recent years. The next largest area appears to be the Pasco-Citrus counties with 118,733 pounds landed during 1974-76. Landings, value and price information by county, 1962-76, are reported in Appendix Table 1.

(B) Stone crab prices

Prices reported in Table 9-1 are for stone crab claws ex-vessel basis. These prices are derived from value and pounds of stone crab claws reported by dealers. Only stone crab claws are traded on the market, not whole crabs.

The ex-vessel price of claws increased from .704 dollars per pound in 1962-63 to 1.82 dollars per pound in 1977-78. This was an increase of 159 percent and compares to an increase in the consumer price index of 98 percent during this period, Figure 9-2. In other words, claw prices increased faster

Table 9-1. Stone crab landings, value, and price for the west coast of Florida, by stone crab season, 1962-63 to 1977-78

Stone Crab Season	Landings* (pounds claws)	Value of Landings* (current dollars)	Ex-vessel Price of Claws (current dollars)
1962-63	300,000	211,200	0.704
1963-64	350,000	219,100	0.626
1964-65	350,000	216,300	0.618
1965-66	450,000	348,300	0.774
1966-67	400,000	333,600	0.834
1967-68	550,000	532,400	0.968
1968-69	600,000	561,600	0.936
1969-70	700,000	777,000	1.11
1970-71	850,000	867,000	1.02
1971-72	950,000	950,000	1.00
1972-73	900,000	1,107,000	1.23
1973-74	1,250,000	1,700,000	1.36
1974-75	1,000,000	1,460,000	1.46
1975-76	1,150,000	1,920,500	1.67
1976-77	1,450,000	2,595,500	1.79
1977-78	2,100,000	3,822,000	1.82

Source: National Marine Fisheries Service, Stone Crab Data Memorandum, August 4, 1978, Southeast Fisheries Center.

*Based on reports of stone crab dealers. Therefore, does not include sales by crabbers direct to retailers and consumers or the catch of individuals for personal use or recreation.

Table 9-2. Stone crab landings (liveweight basis) and value compared to all fisheries of the Florida west coast, and Gulf of Mexico by calendar year, 1964-74

AREA AND FISHERY	Landings		Value	
	Thousand Pounds	Percent	Thousand Dollars	Percent
FLORIDA WEST COAST				
1964				
Stone crabs	752	0.57	233	0.96
All fisheries	129,659	100.00	24,165	100.00
1974				
Stone crabs	2,524	2.05	1,849	3.55
All fisheries	123,000	100.00	52,000	100.00
GULF OF MEXICO				
1964				
Stone crabs	752	0.05	233	0.23
All fisheries	1,317,834	100.00	99,298	100.00
1974				
Stone crabs	2,524	0.14	1,849	0.76
All fisheries	1,776,000	100.00	242,000	100.00

Source: National Marine Fisheries Service, Washington, D.C.

Table 9-3. Stone crab landings (liveweight basis) and percent of total by counties for the 1962-64 and 1974-76 calendar year periods.

Florida County	Three year average of landings		Percent of total	
	1962-64	1974-76	1962-64	1974-76
	Pounds		Percent	
Monroe	268,367	836,100	41.0	35.4
Collier	126,700	949,433	20.0	40.1
Lee	1,066	103,633	0.2	4.4
Charlotte	0	47,233	-	2.0
Sarasota	4,167	1,433	0.7	0.1
Manatee	6,333	23,600	1.0	1.0
Pinellas	7,667	66,033	1.2	2.8
Pasco-Citrus*	44,667	118,733	6.8	5.0
Levy	89,533	109,233	13.8	4.6
Dixie-Taylor*	84,833	91,700	13.0	3.9
Wakulla*	9,033	16,900	1.4	0.7
Others	0	733	-	**
TOTAL	656,200	2,364,783	100.0	100.0

Source: Basic data National Marine Fisheries Service, Washington, D.C.

* Combined counties since basic data was published for combined counties.

** Less than 0.1 percent

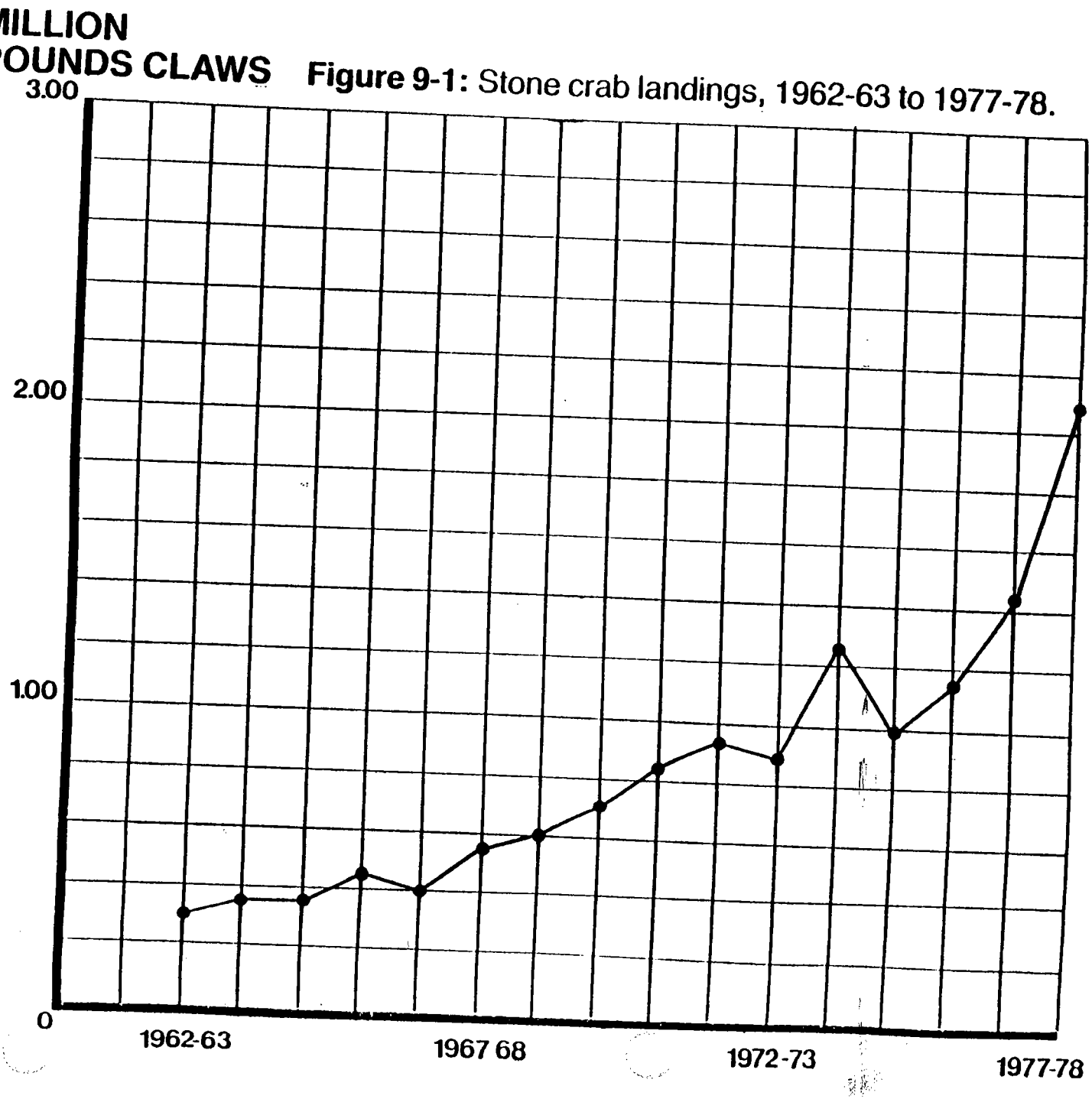


Figure 9-1: Stone crab landings, 1962-63 to 1977-78.

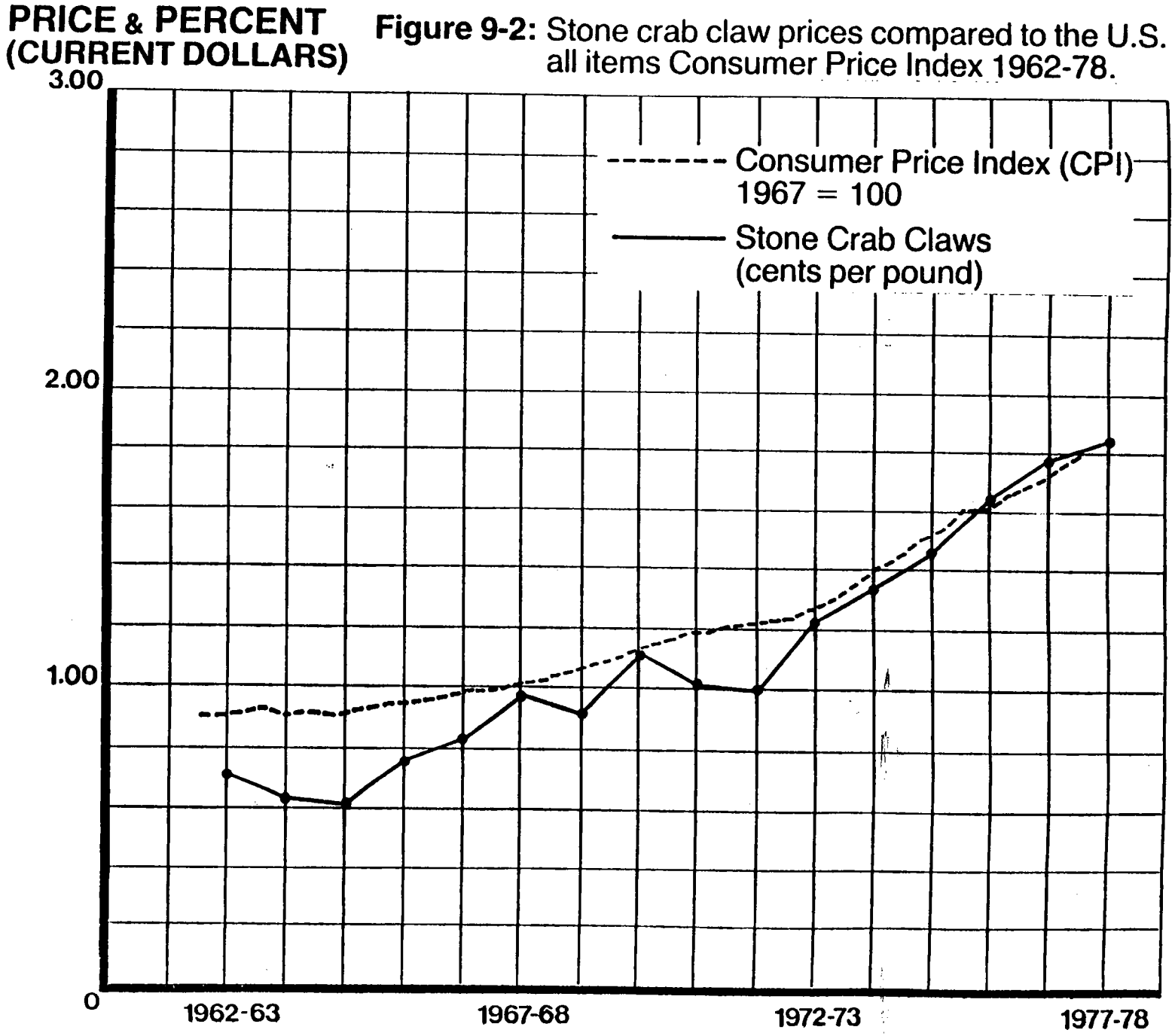


Figure 9-2: Stone crab claw prices compared to the U.S. all items Consumer Price Index 1962-78.

than the general price level during this twenty-five year period. This is an indication of the growing popularity of stone crab claws as a seafood delicacy. During the 1962-63 to 1977-78 period, claw prices declined from the previous season on five occasions, but they increased during the last six seasons of the period. There is a strong and growing demand for claws as reflected in simultaneous increases in prices and production.

(C) Stone crab price analysis

Analysis, based on 1962-76 annual data, reveals that the demand for stone crabs has been shifting upward quite rapidly in recent years. This shifting has been closely associated with the rise in the number of potential consumers of the product and their disposable incomes.

Stone crab prices were found to be sensitive to changes in landings and to consumer incomes. The following formula was applied in the examination of this relationship.

$$P = \underset{}{-0.017} \underset{(-2.54)}{- 0.001 (L)} \underset{(6.02)}{+ 0.00044 (DPI/N)}$$

Where:
P = Ex-vessel price
L = Annual landings
DPI/N = Florida disposable personal income in current dollars.

Quantities in parenthesis are the t-statistic for the respective coefficient.

Coefficient of determination (r^2) = 0.966 which indicates that this expression is a very acceptable explanation of the data.

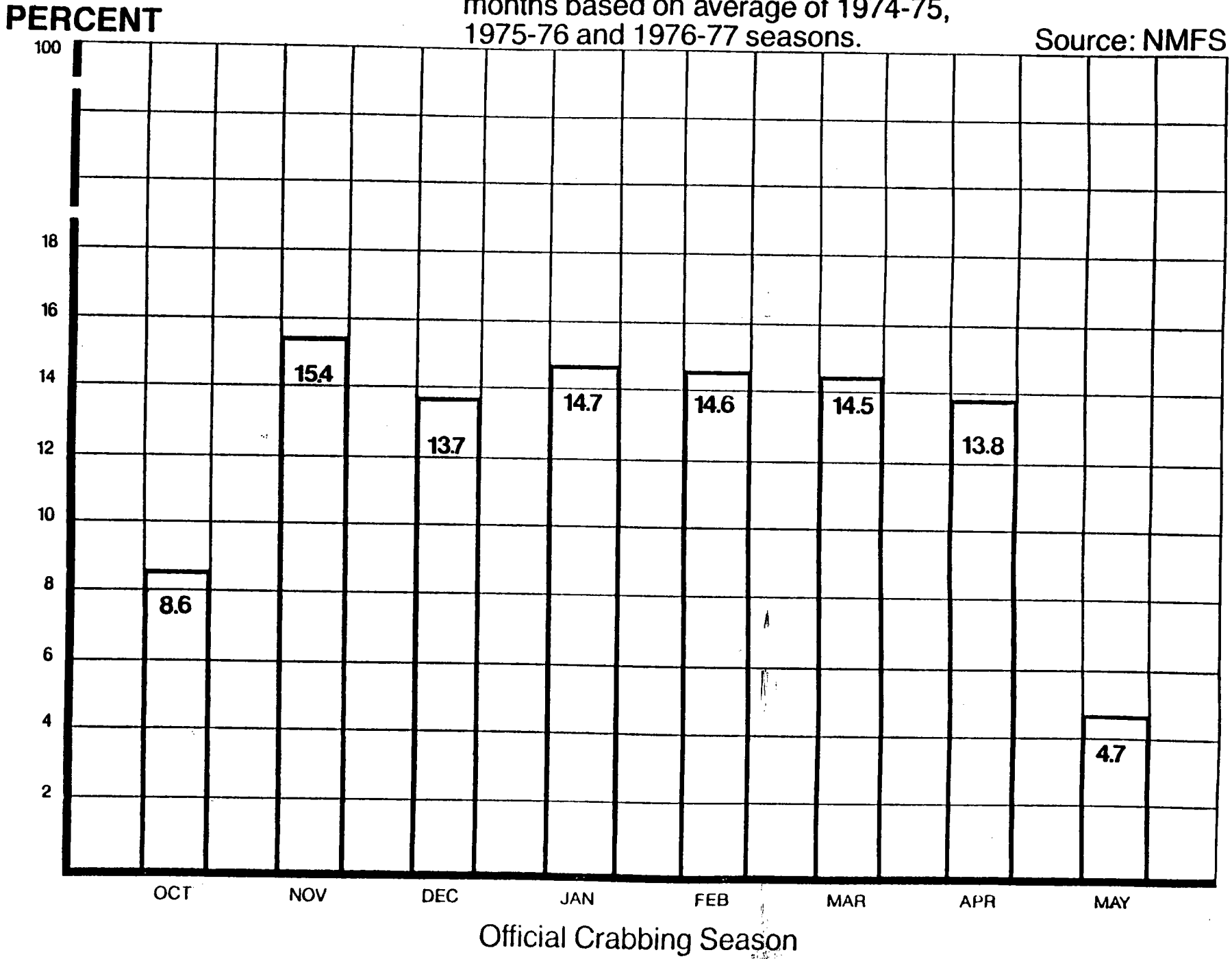
The price flexibility for this equation (at the mean) is 0.66 which means that for every one percent increase (decrease) in quantity landed there would be an expected decrease (increase) of 2/3 of one percent (0.66 percent) in price. In the case of a 200,000 pound decrease in landings, the price would be expected to increase by about $0.11 per pound of claws based on the 1977-78 price of $1.82 per pound; this assumes that other factors remain the same.

Price flexibility for disposable income on the ex-vessel price is estimated to be 1.5. This means that with every one percent increase (decrease) in per capita disposable income, there is a 1.5 percent increase (decrease) in price, other factors remaining unchanged. Obviously, disposable income has had a greater effect on stone crab claw prices than have changes in landings.

(D) Seasonality of stone crab landings

The percent of stone crab claws landed each month of the season is relatively consistent ranging from a high of 15.4 percent in November to a low of 13.8 percent in December. Crabbing in October and May is limited to only one-half of each month. The seasonal pattern shown in Figure 9-3 relates the percent that each month's landings was of the seasonal landings for the three seasons (1974-75, 1975-76 and 1976-77). Even though there was uniformity in monthly catch, there were also noteworthy patterns and variations.

Figure 9-3: Percent of stone crab landings by months based on average of 1974-75, 1975-76 and 1976-77 seasons.



October and November appear to be the most productive months in that order. On a whole month basis, October landings appear to exceed November. The 15-day crabbing period in May is only about half as productive as is the similar period in October. However, the 10-day soak time, a period prior to October 15, the initial day of the season, is probably a much more important factor in the harvest than is the five-day period allowed for pulling traps after May 15. Important to management of the fishery is that about 38 percent of landings occur prior to January 1 while 62 percent are caught between December 31 and May 15. Therefore, an area restriction between January 1 and May 15 would impact on 62 percent of the total seasonal harvest.

(E) Number of stone crab fishermen

The number of persons engaged in stone crab fishing is estimated based on the indications below:

Commercial (Full-time)

Florida DNR permit applications (1977)	813*
Processor-dealer survey (1978)	500
NMFS (1975)	385

Recreational (Part-time)

Florida DNR permit appliations (1977)	1,197*
Processor-dealer survey	not available
NMFS (1975)	24

*Permits are issued to vessels and boats; therefore the number of permits equals vessels and boats, not the number of employed crabbers.

The Florida Department of Natural Resources (FDNR)stone crab permit applications totaled 813 full-time crabbers with vessels and boats for the 1977-78 season. If full-time is accepted as commercial, then this is the highest, of the three available above, indication of the number of commercial stone crabbers. A permit is issued to each crabber with a vessel or boat and commonly each vessel or boat is manned by a crew of two persons. The number of commercial crabbers, vessel owners plus helpers, could, therefore, range as high as 1,626 full-time crabbers. This number is considered to be an upper limit. For instance some individuals obtain the free FDNR permits year after year even though they do not fish for stone crabs but wish to retain their identity and right to fish. Others may identify themselves as full-time fishermen but are merely part-time or occasional fishermen.

The NMFS reported 385 stone crabbers in 1975. This number is based on reports of stone crab dealers alone and does not include commercial stone crab fishermen who sell their catch directly to retailers and consumers. Therefore, the 385 stone crabbers is considered to be a lower limit since a segment of those operating is missed and also because this is 1975 data and obsolete in a growth fishery even though it is the most recent information available.

A 1978 processor-dealer survey estimated that 500 crabbers and 250 vessels supplied these firms during the 1977-78 season Table 9-4 and above. This number applies only to crabbers selling through 38 processor-dealers. It does not include crabbers selling direct to consumers and retailers. It, too, understates the number of commercial crabbers. Considering all the above information plus dealer verbal indications it is estimated that there were about 950 full-time commercial stone crab fishermen, vessel owners plus helpers, during the 1977-78 season.

Persons identified as part-time stone crab fishermen on FDNR permit applications are considered to be fishing for home consumption, occasional sale, and/or recreation. There were 1,197 such individuals in 1977-78. We have no reason to deviate from this number of part-time stone crabbers in 1977-78.

The total number of stone crabbers for the 1977-78 season is therefore estimated to be 2,147 of which 44 percent are full-time and 56 percent part-time. This estimate, however, makes no allowance for the many hundreds, or perhaps thousands, who fish for stone crabs occasionally without traps which requires no FDNR permit. A limited survey of DNR permit applications should be conducted to determine the proportion of applicants that do actively fish the resource.

(F) Total and average gross income from harvesting

Total gross income of the fleet is the ex-vessel value reported in Table 9-1. It was about 3.822 million dollars for the 1977-78 stone crab season. The best indications are that 250 vessels and 500 crabbers were paid the 3.822 million dollars. Therefore, the vessel gross income for the 1977-78 season averaged about $15,288, Table 9-4. Without deducting for the vessel, the average gross for the 500 crabbers was about $7,644. The number of traps fished by the 250 vessels supplying processor-dealers was estimated at 264,300. The average gross income per trap was $14.46. This analysis was based on processor-dealer reports only and does not include crabbers who sell directly to the retail trade such as restaurants.

Table 9-4. Total and average gross income of stone crab fishermen, vessels, and traps, 1977-78.

Totals	1977-78 Season
Gross income	3.822 mil.
Number vessels	250*
Number commercial crabbers	500*
Number traps	264,300
Averages	
Gross income per vessel	$15,288
Gross income per crabber	7,644
Gross income per trap	14.46

Source:
* Processor-dealer survey, 1978, unpublished data, Number = 38.

The gross income per vessel varied widely among geographical areas in 1977-78. The average gross income for vessels operating out of Collier county was $35,788, it was $29,336 for Monroe county based vessels and $4,862 per vessel for the remainder of the west coast of Florida, Table 9-5. This data reflects the economic importance of stone crabbing in Collier and Monroe counties where crabbers fish up to 5,000 or more traps per vessel. While this income is from stone crab claw sales, many of these same vessels operated in other fisheries, such as spiny lobster, a part of the year. Thus, their annual average gross income from all fisheries is in excess of that given in this report. Many fishermen in other counties, commonly place greater emphasis on other fisheries and stone crab claw sales are a smaller proportion of their annual gross income. This is thought to account for the low average for other counties. However, even in these areas there are several relatively large stone crab fishery operations which parallel the large operations of Collier and Monroe counties.

Table 9-5. Total and average gross income of stone crab fishermen and vessels by geographical area, 1977-78 season.

County and area	Number vessels	Gross Income	Gross income per vessel
Monroe	37	$1,085,448	$29,336
Collier	55	1,968,330	35,788
All other counties	158	768,222	4,862
Total	250	$3,822,000	$15,288

Source: Processor-dealer survey, 1978

(G) Stone crab fishing effort

One measure of the effort to harvest stone crabs is the number of traps fished. The best available long term indication of current and past effort is a time series of number of traps as reported by NMFS, 1969-77, Table 9-6. The number of reported traps increased from 14,600 in 1962-63 to 264,300 in 1975. This was an increase of 18 times. Comparisons show that reported traps have increased at a faster rate than reported landings and that landings per trap declined to 7.9 pounds claw weight during the 1977-78 season from 20.5 pounds claw weight in the 1962-63 season. The reader should consider that these are reported traps; not necessarily fished traps. (The NMFS trap estimate is considered to be low. It is based on reports of dealers and does not account for traps of crabbers who sell directly to the retail trade, consumers or for personal consumption. In contrast to NMFS, the FDNR issued stone crab permits for 535,000 traps for the 1977-78 season. This number is thought to be high. The actual number of traps fished under a permit, therefore, must have been between 264,300 and 535,000).

Figure 9-4 reflects the rather constant relationship between reported number of traps and reported pounds of crab claws landed. Therefore, while landings per trap have declined, total landings are directly proportional to effort as measured by traps. In 1977-78 processor-dealers were asked to estimate the percentage of time during the 1977-78 season that reported traps were in the water. The average ranged from 60 to 100 percent and the weighted average, weighted by traps, was 88 percent. This, however, has no bearing on the trend in effort since it applies to only the 1977-78 season.

In terms of gross income in current dollars per trap, indications are that commercial crabbers are receiving about the same gross income per trap today as in the 1962-63 season. However, the current dollar figures are inflated values and not comparable to the 1962-63 season. The deflated value, real-dollars, for the 1977-78 season is about one-half of the current value or about $7.25 per trap for the season. The indications in Table 9-6 vary in such a manner that leads one to question the reliability of base data. This is a data base which must be strengthened in terms of completeness and expanded to include other essential economic values such as cost data and net returns.

Recent estimates by Bert, et al., 1978), found the catch and value trends to favor the three person vessels over the single vessels/boats as follows: 1/

1/ Bert, Theresa, M; Warner, Richard E; Kessler, Lorin D; The Biology of the Stone Crab with Emphasis on Southwest Florida, Marine Resource Inventory, Report No. 3., Florida Cooperative Extension Service

Table 9-6. Number of traps, landings, landings per trap and value per trap, 1969-1975.

Year	Number Traps	Landings (pounds claws)	Landings/traps (pounds claws)	Value of landings (current dollars)	Ex-vessel Price of claws (current dollars)	Value of landings per Trap (current dollars)
1962-63	14,600	300,000	20.5	211,200	0.704	14.47
1963-64	15,000	350,000	23.3	219,100	0.626	14.61
1964-65	21,000	350,000	16.7	216,300	0.618	10.30
1965-66	19,700	450,000	22.8	348,300	0.744	17.68
1966-67	43,200	400,000	9.3	333,600	0.834	7.72
1967-68	39,300	550,000	14.0	532,400	0.968	13.55
1968-69	55,900	600,000	10.7	561,600	0.936	10.05
1969-70	36,000	700,000	19.4	777,000	1.11	21.58
1970-71	60,800	850,000	14.0	867,000	1.02	14.26
1971-72	73,700	950,000	12.9	950,000	1.00	12.89
1972-73	113,300	900,000	7.9	1,107,000	1.23	9.77
1973-74	143,000	1,250,000	8.7	1,700,000	1.36	11.89
1974-75	159,100	1,000,000	6.3	1,460,000	1.46	9.18
1975-76	193,200	1,150,000	5.6	1,920,000	1.67	9.94
1976-77	213,800	1,450,000	6.8	2,595,500	1.79	12.14
1977-78	264,300	2,100,000	7.9	3,822,000	1.82	14.46

Source: National Marine Fisheries Service, Washington D.C., unpublished operating units data.

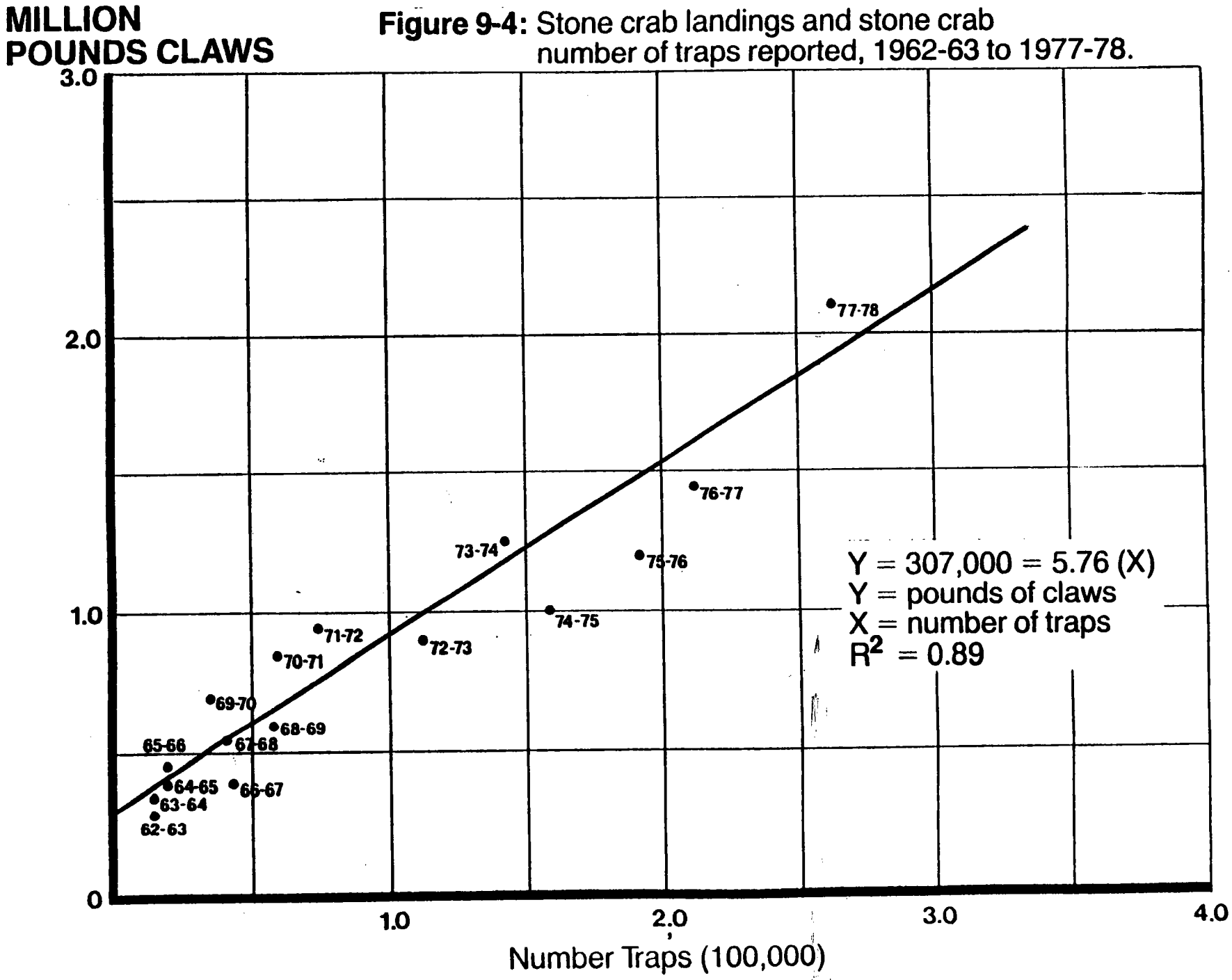


Figure 9-4: Stone crab landings and stone crab number of traps reported, 1962-63 to 1977-78.

	Average* Daily Catch per Trap (pounds of claws)	Average Gross Value per Trap (ex-vessel dollars)
Single-Man vessel/boat		
1970-71	0.247	0.257
1975-76	0.078	0.156
Three-Man vessel		
1970-71	0.250	0.260
1975-76	0.119	0.238

* The number of observations is 20.

This information indicates that a single-person operation is catching less per day and the daily value of his catch is declining even though the dockside price increased over the time period. Apparently the three-person vessel is relatively better off than the single-person vessel. However, the large vessel catches have also declined per unit of time.

Neither total costs of all vessels nor total costs by vessel size are available; therefore, more meaningful net returns could not be computed. However, assuming constant costs over time, it appears that the near shore stocks have declined and that fishermen are going further from shore to make catches. Thus, the greater success, relatively, of the larger vessels.

(ii) Domestic Processing Sector

Stone crab processing commences when the claws are removed from the crab. This occurs on board the crab vessel. Processing usually includes several functions, the principal one being cooking of the claws. Other functions identified as processing activities are grading by size, grading or culling for quality, packaging, chilling and freezing. No canning of stone crab meat was reported in 1977-78. Hereafter, in this report, cooking of claws will be considered synonymous with processing.

Processing is carried out at various levels in the marketing system. Claws are usually cooked by the various dealers both at the port and in the central city. Sometimes, claws are cooked by crabbers themselves both on the vessel and at home.

The marketing system is composed of relatively small fish houses (crab houses) located on or near the water, crab distributing firms located in the center city and retailers of all sorts both domestic and foreign. The small fish houses are termed primary dealers, the center city and distributors secondary dealers.

Generally, primary dealers are first buyers of crabs from crab boats, Figure 9-5. A field survey in 1978 located 38 primary processor-dealers. At this position about 80 percent of the crab claws are cooked. However, some primary dealers buy both cooked claws and uncooked claws from crabbers. Many primary dealers are diversified in that they buy and sell fin fish and other shell fish. In some areas, the stone crab business is the primary source of income of dealers and is the principal source of livelihood of area residents.

Crabbers sell both cooked and raw claws to dealers and retail firms. It is estimated that about 10 percent of all harvested claws are cooked by crabbers. This is a common practice in some areas. Little of this occurs in Collier County. It seems to be common in other areas.

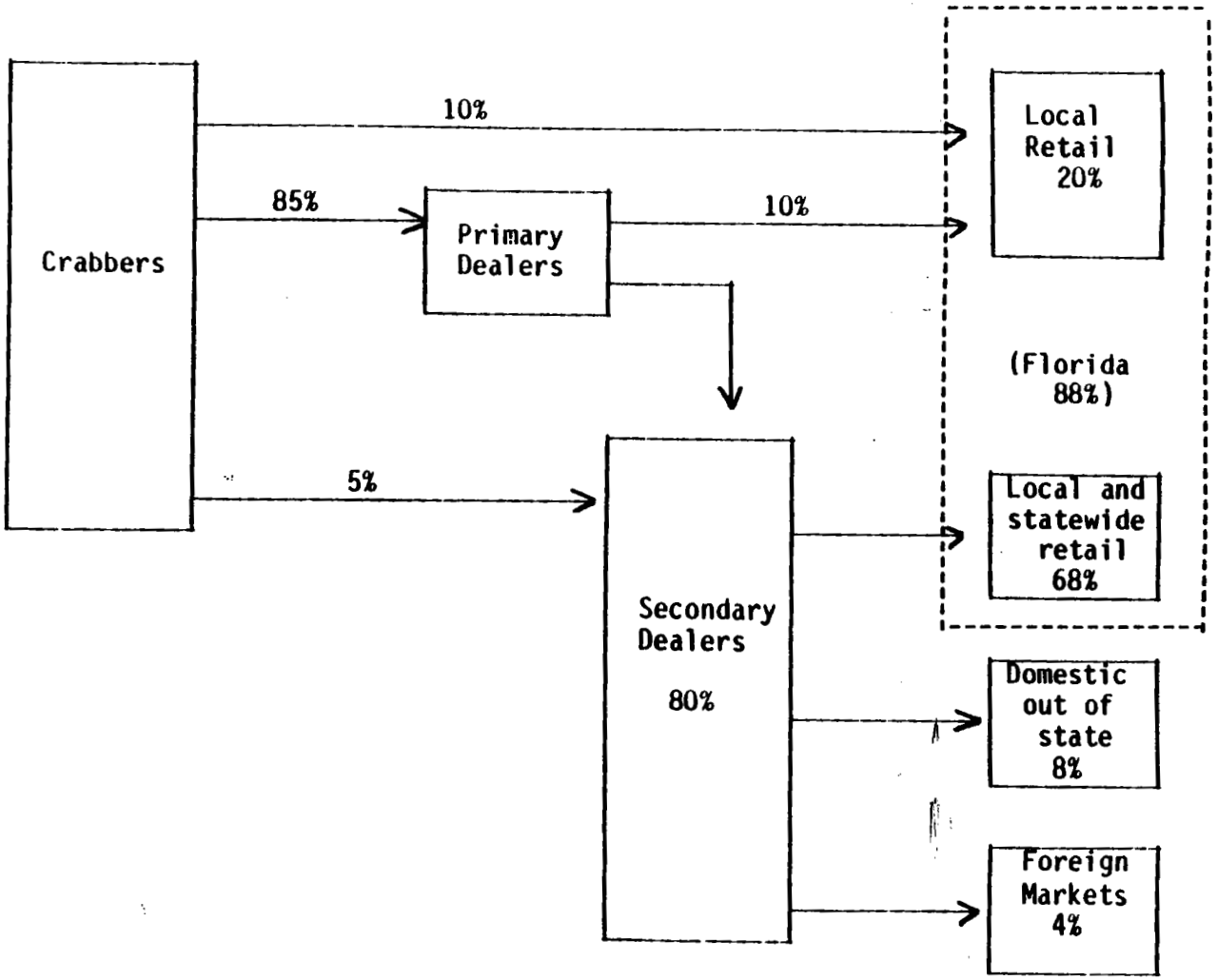
The secondary dealer is located in the center city, primarily Miami. These firms received both chilled, and frozen cooked claws from primary dealers and distribute them worldwide. They do little or no cooking (processing) of claws. However, some secondary dealers buy either cooked or uncooked claws directly from the crabbers but this is not a common practice. Their functions are promotion and sales. They appear to have a primary role in price and market making for claws at all levels. The field survey located 38 primary and 8 secondary dealer-processors in 1978. NMFS reported 14 processors in 1975.

(A) Volume and value of sales

Stone crab dealers reported handling 2.2 million pounds of cooked stone crab claws valued at 4.6 million dollars (resale value) in the 1977-78 season, Table 9-7. About 90 percent of the production is marketed cooked and chilled. The remainder is sold cooked and frozen. Stone crab claws are not canned. Reliable time series data are not available with which to make meaningful comparisons but dealers reports and incomplete NMFS data indicate a positive and rather rapid growth in crab claw sales volume in recent years.

Collier County was the largest producer of claws with a volume of 1.1 million pounds valued at about 2.4 million dollars. The Everglades City-Chokoloskee area of Collier County appears to be heavily dependent on this source of income. Dealers reported that a significant decrease in production would have considerable adverse impact upon the area economy. Indeed, the stone crab industry appears to be the primary economic base industry of the area. Monroe County ranks second to Collier in production and processor-dealers and the two counties combined handled 80 percent of the 1977-78 production. The stone crab business is a less significant factor in the economy of the Keys area of Monroe County than in the Everglades City-Chokoloskee area. The stone crab fishery is smaller in other counties of the west coast of Florida than in Collier and Monroe Counties, but is a significant part of the economy in some communities in other counties.

Figure 9-5. Estimate of commercial crab distribution system, 1977-78.



Source: Processor-dealer reports, 1978

Table 9-7. Pounds, value and price of cooked stone crab claws sold by the primary (initial) dealer, by county, 1977-1978.

COUNTY(S)	COOKED CLAWS (Pounds)	VALUE (Dollars)	PRICE (Dollars)
Monroe	651,977	1,303,954	2.00
Collier	1,095,398	2,366,060	2.16
Lee/Charlotte/ Manatee/Sarasota	145,679	286,988	1.97
Pinellas/Pasco/ Hernando	160,710	368,026	2.29
Citrus/Levy/Dixie	133,890	270,458	2.02
TOTAL	2,187,654	4,595,468	2.10

Source: Processor-dealer reports, 1977-78

(B) Processing capacity

Facility requirements are very minimal in stone crab claw processing. Needed facilities consist of an open-type cooker and some type of refrigeration equipment suitable for chilling or freezing the product. Processing capacity is therefore very flexible and poses no limit to stone crab marketing in either the short or long term. U.S. processors currently process all stone crabs landed and because of the minimal facilities required, they have the capability to process harvest at the OY level.

In most instances stone crab claws are only one of many fish and seafood items processed by dealers. Stone crabs, in terms of percent of total business, ranged from 1.0 to 100 percent and averaged about 25 percent of overall volume when measured in pounds handled in the 1977-78 season. For many dealers, especially in Collier and Monroe counties but in other areas as well, stone crab claws are essential to their economic existence.

(C) Employment by dealers

The seasonal, part-time, and full-time nature of employment coupled with the diversity of tasks in a fish house, makes employment in the stone crab industry an estimate at best. However, Table 9-8 contains a summary of processor-dealer reports of employment which totals about 106 persons on a full-time person-year basis. This is employment in-plant and directly with stone crabs. It does not include the estimated 500 crabbers who sell directly to dealers. Neither does it include support personnel such as truck drivers, sales personnel and others involved in the stone crab business.

Table 9-8. Estimated direct person-year basis employment in stone crab industry, 1977-78

ITEM	PRIMARY DEALERS	SECONDARY DEALERS	TOTAL
Number of firms	38	8	46
Number of employees	81	25	106

Source: Reports of processor-dealers, 1978

(D) Dealer prices

Primary dealers base prices paid to crabbers on prices received for their product. This price making system functions daily but prices do not vary daily. The primary dealers sell a given volume daily at a specified price to the secondary dealers or to retailers. If the secondary dealers offered price changes the primary dealer changes prices paid crabbers accordingly. Primary dealers pay crabbers on either the cooked weight basis or fresh weight basis. Claws cooked by crabbers are priced at cooked weight basis. Dealers also cook claws received fresh and customarily pay crabbers for acceptable quality claws on cooked weight basis only. Other dealers buy and sell claws by size as follows:

Medium	Under 3 oz.
Large	3 oz. and over

There are deviations from this pricing practice. Some dealers sort out jumbo claws and a few sell super jumbos. In some instances the sizes are on the basis of the number of claws rather than the weight. When jumbo claws were sold pricing by size was usually as follows:

Medium	Under 3 oz.
Large	3 oz. to 5 oz.
Jumbo	Over 5 oz.

(iii) International Trade

Trade statistics do not reflect stone crab claw imports or exports.[2/] The U.S. Customs Service combines stone crab data with all other crab trade

2/ Imports and Exports of Fishery Products, Annual Summary, 1976. Current Fishery Statistics No. 7205, NMFS, NOAA, December 2, 1977, Washington, D.C.

statistics which explains the lack of stone crab statistics. However, a few dealers report overseas sales of stone crab claws. U.S. exports are estimated to be not more than five percent of the total volume handled by secondary dealers during the 1977-78 season. Similarly, some stone crab (or close substitute products) imports have been tried with little success. Consequently, international trade in this product should be considered as minor.

The Tariff Schedule of the United States (TSUS) Column 1 shows an ad valorem duty of 7.5 percent on fresh, chilled or frozen crabmeat which is the duty applicable to imports of stone crab claws from all western countries. A Column 2 duty of 15 percent ad valorem applies to most communist-oriented countries.

Tariff and nontariff barriers applicable to U.S. crab sales abroad vary by country and are frequently significant impediments to international sales.

10. DESCRIPTION OF THE BUSINESSES, MARKETS, AND ORGANIZATIONS ASSOCIATED WITH THE FISHERY

(i) Relationship Among Harvesting, Brokering and Processing Sectors

This information is provided under item 9, (ii) Domestic Processing Sector.

(ii) Fishery Cooperatives and Associations

There are no fishery cooperatives operating in the stone crab fishery.[1/] There are two associations to which members of the stone crab industry belong. These are:

Organized Fishermen of Florida

Southeastern Fisheries Association, Inc.

The number of crabbers or industry firms with membership in each association number several hundred and this plan is expected to result in increased membership and participation by members in both organizations.

(iii) Labor Organizations

Discussions with dealers and crabbers confirm the absence of labor organizations in this fishery.

(iv) Foreign Investment

Discussion with dealers indicate no foreign investment in this fishery save a small number of persons of Cuban extraction who migrated to the U.S. in recent years and are involved in harvesting operations.

1/ List of Fishery Cooperatives in the United States, 1976. National Marine Fisheries Service, U.S. Department of Commerce, Washington, D.C., May 1977

11. DESCRIPTION OF SOCIAL AND CULTURAL FRAMEWORK OF DOMESTIC FISHERMEN AND THEIR COMMUNITIES

The Gulf of Mexico stone crab fishery is essentially limited to Florida. NMFS county landings show that about 80% of the total Florida gulf coast catch is landed in the Everglades-Florida Bay region (Table 8-2). By far the most important ports are Everglades City and Chokoloskee in Collier County and Marathon in Monroe County. Each of these counties will be discussed later in the following sections.

The Cedar Keys region accounts for about half the remaining 20 percent statewide landings. Crystal River in Citrus County, Cedar Key in Levy County and Steinhatchee in Dixie County are the preliminary ports in that region . The region will be discussed as a whole.

The Southwest Coast and Tampa Bay regions do not contribute as significantly to commercial landings but do provide recreational entertainment and some financial benefit to a number of people. These regions will be discussed together.

(i) Ethnic Character, Family Structure, and Community Organization

(A) Monroe County

Monroe County's population grew from a 1950 population of 29,957 to a 1960 population of 47,921 and has held a population of about 53,000 throughout the 1970's. The 1980 population is projected at 56,000 by the University of Florida. Key West's population was 33,956 in 1960, decreased to 27,563 by 1970, and has remained about that size to the present. Marathon had 4,397 people in 1970.

Monroe County had 4,222 blacks in its population of 52,586 in 1970. In addition, there were 5,650 residents (11 percent) with Spanish surnames. This group is distributed rather evenly throughout the occupational spectrum of the county, from professionals to laborers. The total population is composed of a large number of new arrivals of all age groups, from the affluent retirees to young unskilled groups. In 1950, 7.5 percent of Monroe County's population was 60 years of age or older; this increased to 13.3 percent in 1970.

Although no established statistics are available, it can probably be assumed that Monroe County has the largest number of non-resident commercial stone crab fishermen in the State. Over 40 percent of the permits issued for Monroe County are for residents of other counties, primarily Dade County (Bert, et al., 1978). Monroe County fishermen and Miami processors report that the upper Keys (Vaca Key to Key Largo) have a large proportion of Cuban fishermen who fish in Everglades National Park or adjacent waters. Examination of their names on permit records confirms this observation.

Monroe County captains or boat owners using the Fishery Conservation Zone (FCZ) are Caucasian, most of whom have moved to the Keys since 1960 and live in or near Marathon. Nearly all have families, with several children. The male parent is usually the sole income source. His wife or children may assist him in fishing in some capacity.

Helpers on boats, or "pullers," are Caucasian young men without family responsibilities, who have recently moved to the Keys for a short-term stay. A few hope to own their own fishing boats and equipment.

Marathon is primarily a fishing community. Tourism and fishing are the only industries. Commercial fishing is probably at least as important as tourism.

Stone crabbing presently accounts for 3 to 4 percent of Monroe County's dockside revenue. It is, however, the fourth most important fishery in the county, behind the shrimp, mackerel, and spiny lobster fisheries. Many fishermen are turning to stone crabbing, as supplemental income, as other fisheries in the Keys become increasingly saturated.

(B) Collier County

Collier County is another south Florida county whose population has grown rapidly. From 6,488 in 1950, the population increased 142 percent to 15,753 in 1960, 158 percent to 38,040 in 1970, and is currently estimated at 64,000. Naples grew from 4,200 in 1960 to 12,042 in 1970 and is currently estimated at 17,500. The popularity of large residential developments and the seasonal qualities of the Naples environs contributed greatly to its population boom.

Of the total population, Collier County, in 1970, had about 9 percent blacks and had 3,290 people with Spanish surnames. Unlike those of Spanish descent in Monroe County, this segment of Collier's population is foreign-born and engaged more in laboring and unskilled positions, particularly agriculture. There are few Spanish surnamed families with traditions of business and the professions as in Monroe County.

Collier County stone crabbers are Caucasian fishermen, most of whom have lived in or near Everglades City or Chokoloskee throughout their lives. Several families have lived there for generations. Like Monroe County fishermen, many have families and are the sole income source. Everglades City and Chokoloskee rely heavily upon stone crabbing as an industry. Fishing is the only industry in the two communities.

(C) Cedar Keys Region - Cedar Key, Steinhatchee, and Crystal River

U.S. Census figures show more modest growth rates for this region than for the southern counties. Dixie County grew from 3,928 in 1950 to 5,480 in 1970. Levy County grew from 10,137 in 1950 to 12,756 in 1970. Citrus County had the greatest growth with 6,111 in 1950 and 19,196 in 1970. These counties have practically no foreign-born population as compared to Monroe and Collier counties with 5 to 6 percent foreign-born. The counties of the Cedar Keys region have, however, greater proportions of blacks to whites than either of the southern counties. For example, Dixie and Levy have respectively, 21 percent and 33 percent blacks in the total population.

Fishermen in these communities are Caucasian and have lived along the northwest Florida coast most or all of their lives. They are married and have several children. Very few wives and children work, other than to assist in fishing. (Only about 10 percent serve in this capacity.)

Except for some tourism in Crystal River, no industry exists in the communities, except for fishing. The prospect of other industries moving into the region is very slight.

(D) Southwest Coast and Tampa Bay Regions

The population in this region also increased from 1950 to 1970. Tampa, for example, grew from 179,335 in 1950 to 301,740 in 1960, and 368,742 in 1970. Likewise St. Petersburg's population grew from 114,596 in 1950 to 324,842 in 1960 and to 495,157 in 1970. There are few commercial stone crabbers in this region but all are Caucasian. Some have moved to coastal Florida within the past 15 years. Little information is available on recreational fishermen. Probably most are middle or lower income citizens with families.

Most of the communities these individuals live in are developing coastal towns or cities that have seen much growth in the past 10 years. Tourism and fishing are the major industries in virtually all of the communities except Tampa and vicinity, where other large industries exist. Ocean related activities motivated many of these people to move to the coast from inland Florida and other states. Recreational fishing is sociologically important to them. Activities such as recreational stone crabbing provide their primary source of entertainment, as well as supplemental food and income.

(ii) Age and Educational Profiles of Fishermen

(A) Monroe County

Age of boat captains/owners ranges from early 30's to late 50's. Age range of pullers is from the late teens to the late 20's. The general county education level is between 11 and 12 years of education. The education of captains/owners is unknown. However, very few have attended college. Education of pullers ranges from grammar school through college.

(B) Collier County

General county education levels have been between 11 and 12 years of training. Age and educational profiles of captains/owners is the same as for Monroe County. The pullers' ages are similar to that of Monroe County. Education of pullers is usually high school graduate or less.

The increase of median age from 30.2 years in 1960 to 35.2 in 1970 of the total county's population reflects the recent influx of retirees.

(C) Cedar Keys Region

Boat captains/owners range in age from 20 to 60; most are between 30 and 50. Age of pullers varies considerably.

Citrus and Dixie counties have populations with median education ranging from 11 to 12 years, comparable to Monroe and Collier. However, Levy County had a somewhat lower education level of 9.9 years in 1970. Some captains/ owners in these counties have graduated from high school but most have received less than 8 years of education.

Dixie County had a median age of 25.8 in 1970, reflecting very little change from that of 1960. Likewise, Levy County showed little change from 1960, and in 1970 the median age was 31.1. The stable age figures demonstrate rather stable populations and areas having little growth, comparatively, to Monroe or Collier. However, Citrus County had a different set of data for age levels. In 1960, Citrus County had a comparatively older age median, 37.5 years of age. And, in 1970, that median had increased to 49.0 years. Further investigation shows that the number of people 62 years or older had increased from 21.5 percent of the population in 1960 to 32.2 percent of the population in 1970, a figure considerably higher than either Monroe or Collier. This increase was almost surely caused by the immigration of elderly whites, since the median age for black males in Citrus County in 1970 was 19.2, and for black females, 22.6 years. These figures are comparable for black age medians in all counties under discussion.

(D) Southwest Coast and Tampa Bay Regions

Stone crabbers from these regions are of a wide age range -- from late teens to mid 60's. Most are about 30 to 50 years of age. Since a large proportion are recreational fishermen, their educational level is of a wide range. Commercial fishermen have a high school education or less; recreational fishermen may have a college degree.

(E) Panhandle Region

No survey was made in this region.

(iii) Employment Opportunities and Unemployment Rates

(A) Monroe County

The stone crab fishery in Monroe County appears to be stabilizing somewhat. The increase in number of permits since 1968 has not kept pace with statewide increases, and landings have increased little since 1970 (with the exception of the anomalous 1977-78 season) (Bert, et al, 1978). Stone crab fishermen agreements with net and trawl fishermen have reduced the fishing area. Unless large areas are opened up in the FCZ, or OY is extended well beyond MSY, potential employment opportunities within the stone crab fishery in Monroe County are probably limited.

In the Keys, most stone crabbers that fish the FCZ are vessel operators whose boats have been outfitted for a number of different fisheries. They are versatile and normally take advantage of the most profitable fishery of the season. None is totally dependent upon the stone crab fishery. Employment opportunities in other local fisheries are good, and will continue to be so,

provided that these fisheries do not become grossly oversaturated. Warner, et al. (1977) have noted that the spiny lobster fishery -- the most frequently utilized alternative to stone crabbing -- appears to be heavily overharvested in the Florida Keys.

For Monroe County, in general, the potential of economic expansion and stability should be considered as quite tentative. Table 11-1 shows that the most employees are in trade and services, 53 percent, with few people engaged in manufacturing. This reflects a heavy participation in the tourist industry and taken together, with the information from Table 11-2, shows Monroe County with a high unemployment rate. This hints of a weak economy. Key West has had a negative growth rate for years, and there is a possibility that the U.S. Naval Air Base will be phased out in a year or two. The base has provided a substantial input to Monroe's economy, and its phasing out would seriously effect the economy of that county.

The only available employment, other than that related to the fishing industry, is associated to the tourist industry. Fishermen in the area view occupations associated with the tourist industry as a poor second choice compared to fishing. Severe restrictions on land development in the Keys (Section 6) make it difficult to build and establish a business in the area.

For Marathon the reliance on stone crabbing suggests that restrictions on the fishery could be felt throughout the local economy.

The stone crab fishing season is from October 15 to May 15. A great many non-residents move to the Keys in the fall and take winter employment as fishing helpers for boat captains or processors. In summer these people either:

1. Continue working for the captain/owner part-time to ready his boat and equipment for the following season;

2. move north to summer jobs;

3. vacation and live off their winter earnings;

4. draw unemployment benefits.

Boat captains/owners usually spend the off-season readying equipment for the following season. Some also utilize other fisheries in the summer. Permanent employees of processing houses either vacation or work part time.

(B) Collier County

Collier County is similar to Monroe in that some 55 percent of the employment is in trade and services. Also, only a small portion of workers are employed in manufacturing; however, over 11 percent of Collier's workers are employed in construction. This reflects the rapid population expansion and the less restrictive conditions for construction in Collier County. Unemployment rates fluctuated between 5.9 and 7.0 percent during the first half of 1978, and we expect the rates to be higher during the summer months, which are slacker for fisheries, tourism, and agricultural production.

Table 11-1. Employment in industry for calendar year 1977 in selected Florida counties

	MONROE	%	COLLIER	%	CITRUS	%	DIXIE	%	LEVY	%
Construction	1,000	5.9	2,230	11.2	710	10.5	160	9.6	270	8.2
Manufacturing	800	4.7	810	4.1	410	6.0	440	26.3	610	18.4
Transport, utilities sanitation	900	5.3	870	4.4	490	7.2	50	2.9	240	7.3
Trade	4,800	28.5	5,960	29.8	1,840	27.1	280	12.6	700	21.1
Finance, real estate, insurance	900	5.3	1,870	9.4	440	6.5			110	3.3
Services and miscellaneous	4,100	24.4	5,060	25.3	1,290	19.0	170	10.2	320	9.6
Government	4,300	25.6	3,200	16.0	1,610	23.7	640	38.3	1,060	32.0
Total all industries	16,800		20,000		6,790		1,670		3,310	

Bureau of Labor Statistics, U.S. Department of Commerce, Washington, D.C.

Table 11-2. Labor force data for selected counties for 1970 and for January-June 1978

	MONROE		COLLIER		CITRUS		DIXIE		LEVY	
	Labor Force	% unempl.	Labor Force	% unempl.	Labor Force	% unempl.	Labor Force	% unempl.	Labor Force	% unempl.
1970		4.3		2.6		5.4		3.1		2.8
1978										
Jan	19,973	9.9	26,782	7.0	14,180	8.6	2,793	6.1	7,853	8.1
Feb	20,186	8.4	28,027	6.7	14,291	7.1	2,854	5.5	7,928	6.3
Mar	20,027	8.8	27,770	6.1	14,032	7.2	2,820	5.2	8,008	6.4
Apr	19,846	7.9	27,753	5.9	14,668	6.9	2,916	4.6	8,003	5.2
May	19,298	7.4	26,190	5.9	14,704	6.7	2,910	5.8	8,104	5.2
June	19,990	7.6	25,660	7.0	15,253	6.6	2,940	5.9	8,527	6.0

Florida Department of Commerce, Division of Employment Security, Office of Research and Statistics, 1978

The fishing industry in Collier County relies on stone crabbing. NMFS landing statistics for the county show that stone crabs have accounted for 35 to 40 percent of yearly landings for the past 10 years. Fishing for spiny lobster is occasionally used as supplemental income but the majority of fishermen in the area fish exclusively for stone crabs. Stocks of other commercially valuable organisms are not plentiful enough in easily accessible areas to afford many alternate employment opportunities in other fisheries. In Everglades City and Chokoloskee little industry exists other than fishing. Remoteness from good seaports and proximity to Federal-preserved marshlands preclude the chance of much industrial development in the foreseeable future. In short, most people of these two communities rely on activities related to stone crabbing as the basis of their economy. Restrictions on the fishery could have a substantial impact on these communities.

In summer, most captains and helpers work to repair, and add to, their equipment for the following season.

(C) Southwest coast and Tampa Bay regions

Many other hook-and-line or net fisheries exist in these regions and are available for further exploitation to varying degrees. In addition, shrimp fishing is important. The stone crab fishery itself is unpredictable from year to year but could probably support some additional fishermen, at least as a supplemental fishery.

Other employment is usually available in the form of construction, tourist related jobs, and other blue collar jobs. Alternate employment opportunities within a given community are directly related to its growth rate.

(D) Cedar Keys region

Of the three counties, Citrus most resembles Monroe and Collier in that it has a small (6.0 percent) number of employees in manufacturing, a rather large proportion of industrial employees in trades and services, and the greatest unemployment rates of the three counties, ranging from 8.6 to 6.6 percent in 1978. Dixie and Levy counties both have much higher percentages of employees engaged in manufacturing, fewer in trades and services, and the lowest rates of unemployment of all the counties. All three counties of this region have 8 to 10.5 percent of workers in the construction trades. Crystal River is developing rapidly and offers greater prospects in employment, construction, entertainment, and other jobs.

Concerning the fisheries, there is no evidence that the stone crabbing has reached saturation levels in the Cedar Keys region (Section 9). The stone crab fishery could probably support additional employment. However, adverse weather and outbreaks of the octopus population make the success of crabbing unpredictable from year to year. Recently, a few fishermen have moved into the region from other fishing communities where severe restrictions on fishing have been initiated.

Blue crabbing is more important to Cedar Keys region fishermen than stone crabbing and is usually done simultaneously with stone crabbing. Stone crabbers may also net or hook-and-line fish or collect oysters. These fisheries

may offer good alternative employment opportunities, as long as they do not become overextended.

Like the Collier County communities, Cedar Key and Steinhatchee have no industry other than fishing. Job opportunities other than those associated with fishing are extremely poor and seem likely to remain so in the foreseeable future.

Fishermen and processors are employed throughout the year in the Cedar Keys region. They switch to blue crabbing and hook-and-line or net fishing exclusively in summer, combine these with stone crabbing in winter, and rely heavily upon stone crabbing in late fall and early spring.

(E) Panhandle region

No survey was made of this region.

Summary of (i), (ii), and (iii)

Monroe and Collier counties produce about 80 percent of the stone crab landings. Of the two counties, Monroe has the more vulnerable economy with higher unemployment, less industry, half the construction employment, and the largest non-resident group of stone crabbers. The participation by recreational fishermen is the largest in this county also. Monroe County has been declared an area of critical concern by the State, which resulted in more stringent development regulations.

Collier County, which appears more the conventional southern Florida county, is beginning to develop rapidly. Nevertheless, the coastal communities producing the stone crab landings in Collier are relatively remote, and local fishermen are mostly dependent on the fishery for income. The total county economy appears more diversified and because of its geographical location has potential for economic growth.

With the exception of Collier fishermen, stone crabbing provides supplemental income for most of the fishermen in this fishery. In all of the counties under discussion, the fishery was developed by older established family groups with traditions of fishing and coastal life.

(iv) Recreational Fishing

The social and cultural characteristics of fishermen who participate in the recreational sector of the fishery have been discussed in Section 8 and elsewhere in this section. The social and cultural benefits generated by the recreational sector have also been enumerated in these sections.

(v) Economic Dependence on Commercial or Marine Recreational Fishing and Related Activities

Based upon available evidence, there are perhaps as many as 950 full-time stone crab fishermen who are largely if not solely dependent upon, the stone crab fishery for a livelihood. Half of these or approximately 475 are vessel owners and operators. These individuals are private businessmen as well as crabbers and have substantial investments in a vessel, traps, other gear and equipment. The loss or a large permanent reduction in crab catch could result in heavy financial losses or bankruptcy to some vessel owners. Approximately 475 crabbers who work with vessel owners are also dependent on the fishery for a livelihood. Alternative employment in some of the stone crab fishery areas does not appear to be particularly bright.

Florida Department of Natural Resources reports that in addition to these, there are approximatley 1197 part-time crabbers who were issued permits for 1977-78 season and who fish for stone crabs as a source of crabmeat for home consumption, for sale and as a source of recreation.

The stone crab claw processing sector is made up of some 46 dealers of all sorts who are on the average about 25 percent dependent on stone crabs for business income. This segment employs about 105 person-years full-time in stone crab processing alone. In addition, support industries such as stone crab trap manufacturers are dependent on stone crabs as a source of income. Some of these are home industries composed of family members and are located in low income areas. Indications are that crabbers own about 265,000 traps and related gear with a purchase value of about $2.7 million and $5.4 million and a useful life of about 3 years duration.

It is estimated that there are in total approximately 950 persons who are directly employed in the stone crab industry and who are dependent on it for a living. In addition, there are many others who are indirectly involved with the stone crab industry and who derive at least a part of their income from this fishery. This latter group includes vessel, boat, trap, and other gear manufacturers; local marine supply firms, transportation, packaging, and sales personnel.

The area of Everglades City-Chokoloskee in Collier county and a part of Monroe county is heavily dependent on the stone crab fishery as an economic base. This fishery is estimated to be about 75 percent of this community's economic base. No other community is so heavily dependent on the fishery. However, there are other small communities where the stone crab fishery is an important source of income.

Further detailed analysis of the economic dependence of local communities on stone crabs must be postponed pending the availability of additional data.

From available information we find no established Indian fishing rights which apply to the stone crab fishery.

12. DETERMINATION OF OPTIMUM YIELD

Optimum yield from a fishery is the amount of fish which will provide the greatest overall benefit to the Nation, with particular reference to food production and recreational opportunities, and which is prescribed as such on the basis of the maximum sustainable yield from that fishery, as modified by any relevant economic, social, or ecological factor (PL 94-265).

(i) Specification of the Fishery and Management Unit

The stone crab fishery exists throughout the northern Gulf of Mexico from Florida to Texas. However, because of limited habitat and less than optimum environmental conditions, the abundance of stone crabs is extremely limited in the northern Gulf of Mexico westward of Franklin County, Florida. Stone crabs have not been recorded in the commercial landings west of this area. Stone crabs are extremely rare in the waters of Alabama, Mississippi, Louisiana and east Texas and, therefore, no management is needed.

The management unit or regime under this plan is specified to be the West Coast of Florida, including the Keys. Should the need for management of the stocks in other areas arise in the future, the management unit will be modified to include these areas.

(ii) Specific Management Objectives

In consideration of all biological, economic, social and ecological factors the following are specific management objectives appropriate for the Gulf of Mexico stone crab fishery:

1. Provide for orderly conduct of the stone crab fishery in the management area to reduce conflict between stone crab fishermen and other fishermen in the area.

2. Establish an effective fishery statistical reporting system for monitoring the stone crab fishery.

3. Attain full utilization of the stone crab resource in the management area.

4. Promote uniformity of regulations throughout the management area.

(iii) Description of Alternatives

To achieve the management objectives listed in section 12(ii), a variety of options were considered by the stone crab task team, by the stone crab

advisory panel, and finally by the Gulf of Mexico Fishery Management Council. The following are the recommended management options to achieve the management objectives listed above:

1. Harvest

   a. Adopt the minimum claw size (7.0 centimeters (2 3/4 in) propodus) presently required under Florida statutes (Figure 12-1). Life history information given in Section 5, and explanatory information given in Section 12(v) suggests harvest of stone crabs with claws this size will both provide for a highly acceptable market product and allow sufficient spawning prior to harvest. Orderly enforcement is also enhanced by specifying this claw size identical to that required by Florida statutes.

   b. Require that declawed stone crabs and crabs with undersized claws be returned to the water, not landed. This objective is recommended not only in FCZ, but also in Everglades National Park waters. The Council should request that the Florida statute that requires declawed bodies to "be returned immediately to the water" be amended to read "be returned to the water, not landed." Processing practices require that crabs be kept aboard and declawed on the way to shore. This is because claws cannot be refrigerated before cooking without adversely affecting the quality.

   c. Require that all vessels and boats fishing stone crabs in the FCZ be required to shade the live crab box from direct sunlight. Shading will eliminate some mortality among crabs being held aboard the vessel and thereby increase survival of crabs returned to the water after declawing.

   d. Allow harvest of both claws as is allowed under Florida statutes. Considering the harvest mortality information available, harvest of both claws is the wise management practice.

   e. Make it illegal to pull another person's pots (traps) in the FCZ and restrict the pulling of traps to daylight hours.

2. Fishing season

   The closed season for taking of stone crabs in the FCZ each year shall be between May 15 and October 15. Life history information indicates this closed season will allow harvest of crabs only during the time when minimum spawning occurs. This season is also fully compatible with present Florida statutes, therefore, will allow orderly management and minimize enforcement problems. The FCZ open season for stone crabs shall include a grace period which allows that traps be placed in the water 10 days prior to the season opening and be allowed in the water until 5 days after the season closes.

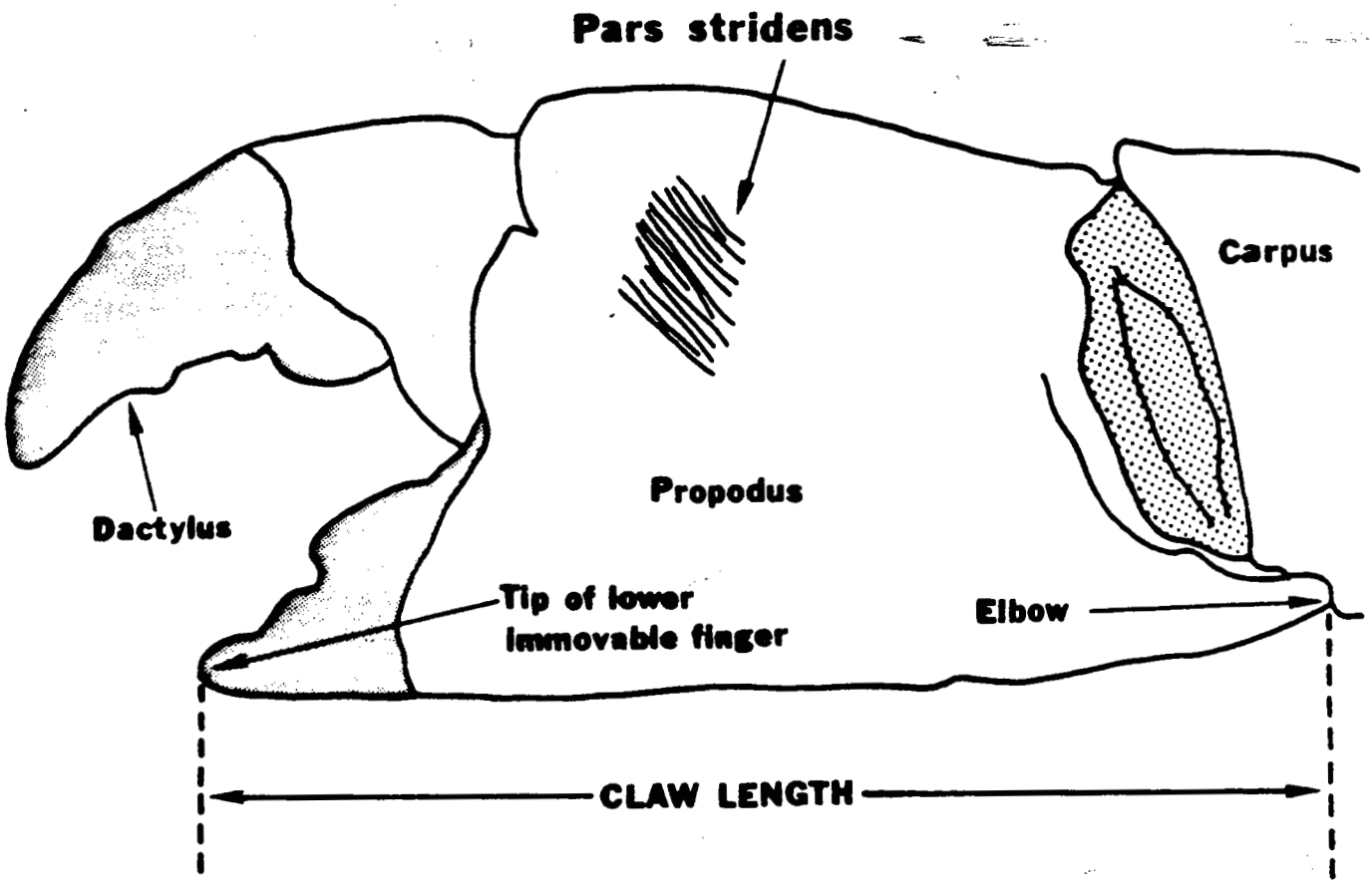


Figure: 12-1 Measurement of the claw length (propodus) in stone crabs (Adapted from manuscript by T. Savage and J. R. Sullivan)

3. Gear Limitations

Require degradable escape panels in plastic or other nondeteriorating stone crab traps. The purpose of this recommendation is to prevent unnecessary mortality in lost traps which continue to fish unattended.

4. Registration

All vessels fishing for stone crabs in the FCZ be enumerated for the purpose of collection of data necessary to properly manage the fishery. Vessels shall be designated:

1. Commercial, full or part time
2. Recreational

5. Information to be reported by fishermen and processors/dealers

a. Dealer/processors shall be required to report pounds of stone crabs handled, value, and size classes of claws.

b. Fishermen shall be required to submit daily trip tickets reporting catch, traps pulled daily, total number of traps being fished and the zone where traps are being fished. To implement a statistical system covering all segments of the stone crab resource, the Department of Commerce should coordinate their system with the system now in use by Everglades National Park.

6. Steps recommended to avoid gear conflicts

a. Establish a line of separation starting in the Florida Keys at Snipe Point (Point F defined on Chart 11420 as 24° 41.9'N and 81° 40.5'W) proceeding northwesterly to Point E (defined as 24° 54.5'N and 81° 50.5'W) thence northeasterly along a line on a compass bearing of approximately 010° magnetic to Point D (25° 09.0'N and 81° 47.6'W) thence northwesterly along the 8 fathom line on a compass bearing of approximatley 344.5° magnetic to Point C (described as 26° 0.0'N and 82° 04.0'W) and thence northeasterly to 6 fathoms along a line on a bearing of approximatley 016° magnetic to Point B (26° 16.0'N and 81° 58.5'W) and thence northwesterly along a line on a compass bearing of approximately 311° magnetic to Point A (26° 36.4'N and 82° 24.3'W) and thence east to Captiva Pass (Figure 12-2). The specific location of Points A through F are as follows:

Point	Location			
A	lat.	26° 36.4'N	long.	82° 24.3'W
B	lat.	26° 16.0'N	long.	81° 58.5'W
C	lat.	26° 00.0'N	long.	82° 04.0'W

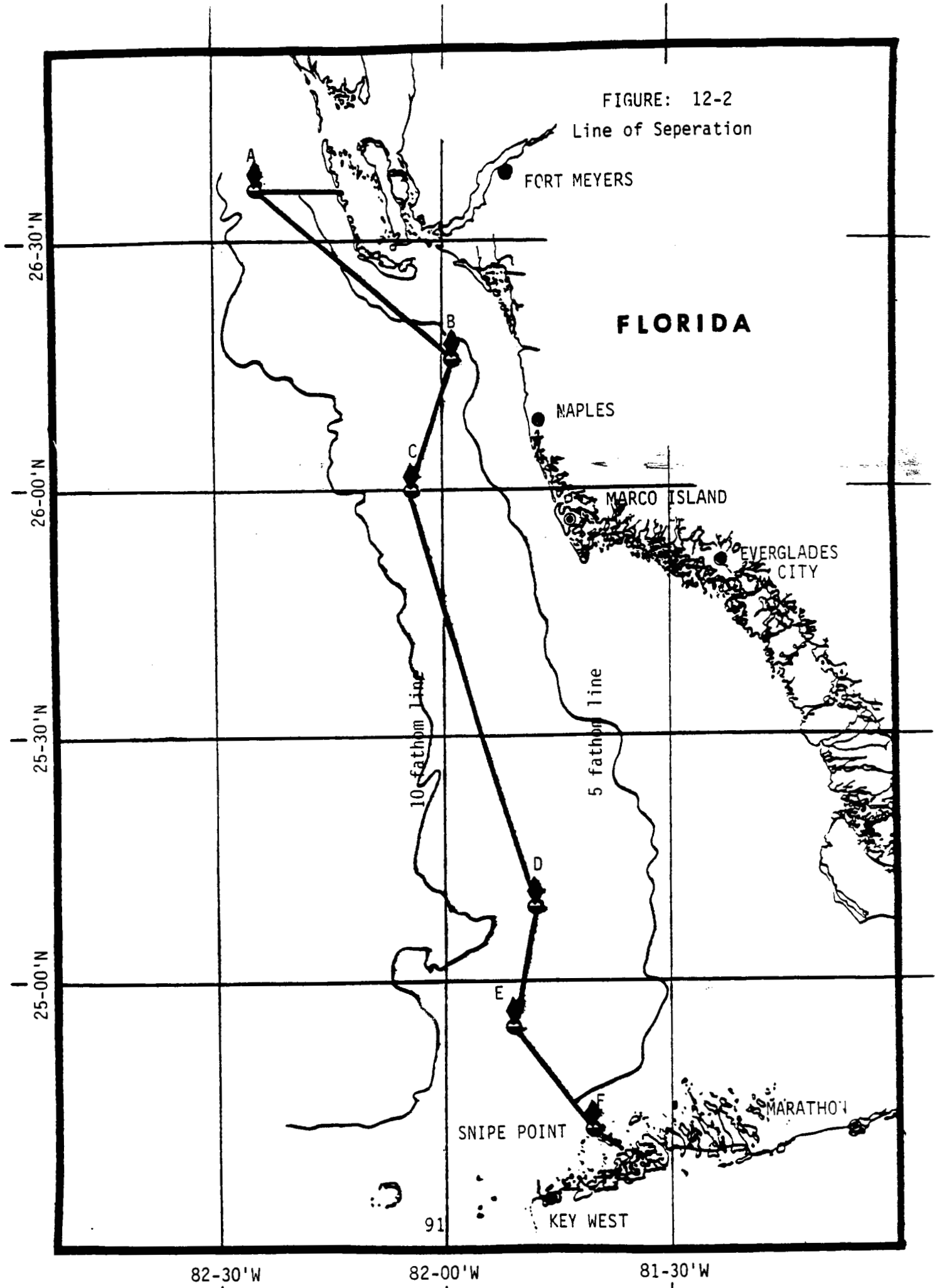


FIGURE: 12-2
Line of Seperation
FORT MEYERS
FLORIDA
NAPLES
MARCO ISLAND
EVERGLADES CITY
10 fathom line
5 fathom line
A
B
C
D
E
F
SNIPE POINT
MARATHON
KEY WEST
91
26-30'N
26-00'N
25-30'N
25-00'N
82-30'W
82-00'W
81-30'W

D	lat.	25° 09.0'N	long.	81° 47.6'W
E	lat.	24° 54.5'N	long.	81° 50.5'W
F	lat.	24° 41.9'N	long.	81° 40.5'W

b. Prohibit shrimp trawling inshore of the line January 1 to May 20.

c. Distribute charts and a description of the line including loran coordinates.

d. Allow limited supervised exploratory shrimp fishing inside of line, January 1 to May 20.

e. Recommend state adoption of trawling prohibition in territorial waters (within line).

f. Permit live bait shrimping inshore of line.

g. Require identification marking for live bait vessels to facilitate enforcement.

(iv) Analysis of Beneficial and Adverse Impacts of Recommended Management Options

Most of the beneficial or adverse impacts of the options being recommended are given or inferred in Section 12(ii). The following primary options require further consideration:

1. Establishment of the "line of separation ..." shown in Figure 12-2.

Benefits

This line was established in a series of meetings between representatives of the stone crab and shrimping industry. The meetings were held under the auspices of the Gulf of Mexico Fishery Management Council. The line, if legally established, will aid in solving the primary problem identified as orderly management of Gulf stone crab stocks. The line will minimize conflicts between stone crab fishermen and shrimp fishermen (details of these conflicts are given in Section 8.)

Adverse impacts

The line given in Figure 12-2 even though restrictive to shrimp fishermen, will result in a net positive effect on both the stone crab and shrimp fisheries.

2. Adopt minimum claw size of 7.0 centimeters (2 3/4 inches).

Benefits

This option will allow orderly enforcement of regulations relating to stone crabs. Without uniform regulations in the FCZ and in state territorial waters enforcement of regulations would be very difficult.

Adverse impacts

There are no obvious adverse impacts to this proposed option except that the option will require constant cooperative action between state and federal authorities in enforcement.

3. Adopt a closed season between May 15 and October 15.

The best life history information available indicates this season will provide adequate unmolested spawning for stone crabs. The fact that this closed season is identical to the season in the State of Florida territorial waters aids enforcement.

Adverse impacts

No adverse impacts are noted in considering this recommended season.

(v) Trade-Offs Between the Beneficial and Adverse Impacts of the Preferred or Optimal Management Options

Few preferred versus optional management options were available for this plan. Most options considered could be readily selected or rejected. Possible trade-offs are inferred in information and comments given in Section 12(i), 12(ii), 12(iii), and a general discussion of management options as they apply to crab fisheries is given in Section 13.

(vi) Specification of Optimum Yield (OY)

The Gulf of Mexico stone crab fishery, currently centered in the State of Florida, is a fishery which will provide the greatest overall benefit to the nation by harvesting the maximum poundage which can be produced on a sustainable basis. OY is specified as follows:

> All harvestable adult stone crabs in the management area between October 5 and May 15 that have a claw size of 7.0 centimeters (2-3/4 inches) or greater. (This will be approximately 2.4 million pounds of claw weight.)

Life history factors detailed in Section 5 and management recommendations given in this plan provide reliable constraints on this fishery to prevent overfishing and support the OY as stated above. Briefly, these factors and constraints are:

(1) Stone crabs exhibit a high reproductive potential. A single female may produce six to ten egg masses each spawning season and each egg mass may contain 160,000 to 350,000 eggs.

(2) Stone crabs grow to maturity in about two years but do not reach legal size until they are approximately three years old. Therefore, they have the opportunity to spawn several times before they are subject to harvest by the fishery.

(3) Stone crabs are protected from harvest during most of the spawning season by regulations of the State of Florida and by management recommendations on the fishing season in this plan.

(4) Since only the claws of stone crabs are taken, a percentage of the crabs returned to the water survive to produce a second crop of harvestable claws.

13. MEASURES, REQUIREMENTS, CONDITIONS OR RESTRICTIONS SPECIFIED TO ATTAIN MANAGEMENT OBJECTIVES

Measures or regulations used in attempts to solve management problems in North American crab fisheries were discussed by Miller (1976). These measures included: minimum size limits; closed areas; closed seasons; protection of egg-bearing, or female crabs; gear restrictions; licensing of fishermen; limited entry of fishermen or boats; daily bag limits; total catch limitations; and habitat improvement. Each of these types of measures has been considered for this plan.

(i) Permits and Fees

No permits will be required for vessels fishing stone crabs in the FCZ nor will fees be charged. All vessels fishing for stone crabs in the FCZ, however, must be registered (enumerated) by the appropriate federal or state agency.

(ii) Time and Area Restrictions

Required time and area restrictions are covered in Section 12. Briefly, the open season for stone crab fishing in the FCZ should be identical to that now designated for the State of Florida, i.e., October 15 to May 15 as specified in Statute 370.13 of the Florida laws. The season recommended was chosen primarily on the basis of life history studies covered in Section 5 of this plan. Our analysis concluded that the season now set by the State of Florida follows sound management principals. Additional comments relating to the recommended season are given in Section 12(v)(3).

Required area restrictions, to avoid conflicts between fishermen, is given in Section 12 (iii) 6. It is important to note that conflicts between fishermen have been disruptive to the fishery, and the area restrictions recommended are designed specifically to minimize these conflicts.

(iii) Catch Limitation

(A) Total allowable level of foreign fishing

Optimum yield for the stone crab fishery is estimated to be approximately 2.4 million pounds of claws. The present fishery is expanding and catches may continue to increase. The domestic fishery has the capacity to harvest the optimum yield (see Section 8). Therefore, no surplus exists between optimum yield and the domestic harvesting capacity. The total allowable level of foreign fishing (TALFF) is therefore zero.

(B) Types of catch limitations

This section is discretionary. No further information is required other than that given in Section 12.

(iv) Types of Vessels, Gear and Enforcement Devices

This section is discretionary. No additional information is required regarding vessels, gear and enforcement devices to formulate an effective stone crab management plan.

(v) State, Local, and Other Laws and Policies

Information relevant to state management measures and regulations is given in Section 7(iv). One goal of this management plan is to achieve compatibility with state laws relating to management of stone crab populations.

(vi) Limited Entry

Limited entry was addressed for the stone crab fishery within the management unit and is not recommended at this time.

(vii) Habitat Preservation, Protection and Restoration

Preservation of stone crab habitat and its productivity is of vital importance in ensuring continuing maximum stone crab production. Fortunately, the area of greatest fishing intensity and productivity (The Everglades-Florida Bay Region) has been protected in the past, and is expected to be protected in the future, by the National Park Service. Also federal, state, and in the case of Monroe and Collier Counties, local laws, restrict the degree of future habitat changes throughout the range of the stone crab fishery [see section 6(iii)j]. Therefore, we have concluded that proper enforcement of existing legislation should be adequate to prevent degradation of stone crab habitat, and that no new measures are needed to protect or restore habitat.

(viii) Development of Fishery Resources

An insignificant poundage of bycatch is taken in the stone crab fishery.

(ix) Management Costs and Revenues

No sources of revenue have been identified in this plan. To estimate annual management and enforcement costs to implement the stone crab management

plan some basic costs were obtained from the NMFS Regional Law Enforcement Division, St. Petersburg, Florida, and from the U.S. Coast Guard. Patrol of the line separating the stone crab fishery from the shrimp trawl fishery will be required. Patrol by the U.S. Coast Guard will be needed particularly in the period from January 1 to May 20. Basic enforcement costs are as follows:

(1)	Two full-time patrol agents	$ 50,000.00
(2)	Use of an 82-ft Coast Guard patrol boat for 60 days at $2,031.38 per day	243,765.60
(3)	Use of one Coast Guard H-3 helicopter for a total of 23 hours at $910.20 per hour	41,869.20
	TOTAL	$335,634.80

14. SPECIFICATION AND SOURCE OF PERTINENT FISHERY DATA

(i) General

Proper management of the stone crab fishery can only be achieved if adequate information is made available to authorities for correct interpretation of the status of the fishery over time. Data needs fall into three broad classes: biological, economical, and sociological. Section 12(ii) lists information which will be acquired in the near future in a required statistical reporting system. Most of the remaining unavailable information will need to be clearly identified and generated through well designed research projects on a priority basis.

Complete understanding of the biology and ecology of the organism is necessary for understanding the stock availabliltiy to the fishery and the effects of harvesting on the ecosystem in which the animal is interacting. Important biological data include:

1. construction of life tables for the stone crabs-- age specific fecundity and mortality;

2. knowledge of life history strategies--size and age of first and last reproduction, estimated reproductive contribution over the life span; number of offspring per brood, timing of reproductive effort, and energy investment for reproductive effort;

3. patterns of dispersal of all life stages--migratory patterns and recruitment and nursery areas;

4. distribution and abundance--deliniation of stock units, standing stock assessments, and behaviorial and/or ecological factors influencing distribution and abundance.

The nature of the stone crab fishery is such that information is also needed on:

1. natural growth--molt frequency and claw loss and regeneration rates of legal sized crabs of both sexes and by size class;

2. declawing and desiccation effects--survival rates and reproductive potentials of harvested crabs after prolonged exposure to air followed by declawing.

Knowledge of these biological data are necessary not only for proper management of the fishery but also to improve the maximum sustainable yield estimates in the management plan and as a predictive tool to estimate available harvest in subsequent years.

Economic statistics serve as an indicator of profitability and as a measure of health of the fishery. They also enable some prediction of response of the industry to fluctuations in catch or value of catch. Two economic statistics are also valuable from a biological viewpoint:

1. catch (pounds and price) by month, area, and gear type;

2. size composition of the catch.

Other economic data needs include:

1. production statistics--landings, and measures of effort; and cost-benefit relationships;

2. market information--employment, prices, and volume sold at all levels of turnover (dockside, wholesale, and retail).

3. income from other fisheries in which stone crab fishermen participate and interrelationships of the fisheries.

Sociological data can help interpret dependence of an area on the fishery and impact of proposed management decisions upon the population. Relevant data are:

1. socio-economic statistics--per capita income, employment levels and opportunities, and potential of the area for income sources other than fishing (industrial development, tourism, etc.);

2. demographic information--population size and structure, age composition, family size, and educational backgrounds of individuals involved in the industry.

Collection of data in all categories cannot be easily attained. However, effort can be minimized and much information obtained by fully exploiting periodic reportage of data from fishermen and processors. Suggestions for maximizing the amount of data retrieved from fishermen and processors are discussed in the following sections.

(ii) Domestic Fishermen (Data requirements)

Stone crab fishery statistics can be obtained from the Data Management and Statistics Division, NMFS. The specific sources are the "Current Fisheries Statistics" (CFS) publications, "Annual Dealer Surveys," and the annual "Fishery Statistics of the U.S., Statistical Digest".

The CFS publications pertain mainly to information and statistics of landings, value, ports of landings, and prices of seafoods, Market conditions and summarizations of fisheries may be included. These are compiled from dealer reports and periodic interviews by port statistical agents with industry members. The statistical information is published in preliminary form and appears tri-weekly, weekly, monthly, and annually. Special summaries and analyses are also published in this series.

Information from "Annual Dealer Surveys" is available as computer data tapes from the Data Management and Statistics Division. These data tapes,

entitled the "General Canvass Survey", provide the following: year, state, county, water, gear, species, pounds, value, and price. The "Vessel Operating Units Survey" provides the following: vessel name, and number, rig, gross tons, length, year built, engine horsepower, number of crew, number of gear, year, state and county. These data are unpublished, but can be obtained by request.

Historical information is available from the publication "Fishery Statistics of the U.S." which is derived from NMFS, other governmental and non-governmental sources. Fishery statistics generated by the Data Management and Statistics Division are directed toward various users in different fields, economics, marketing, finance, as well as the fishing industry, scientists, and managers.

Fishermen are required by law to obtain a vessel permit to set stone crab traps in Florida state waters. Permit applications are valuable sources of much data and, with modification, could easily provide even more statistical information. Florida state permit applications provide the following information:

1. Florida address;

2. whether or not the individual is a resident of Florida and his permanent address if he is out-of-state;

3. number of traps to be fished;

4. whether the individual is part-time or full-time;

5. boat registration--name and address of registered owner of boat;

6. area fished by county;

7. color of buoys and boats.

These statistics provide economists with much information on the extent of the industry. However, the reliability of answers given by participants should be checked at least every fifth year by sampling permit holders through independent mail questionnaires or interviews, or actual field checks on numbers of traps stored during closed season.

Permit applications presently used by the Florida Department of Natural Resources do not allow easy division of participants in the fishery into recreational or commercial fishermen. This division is important in fishery management and, as illustrated in other sections of this management plan (Sections 8 and 9) has been very difficult to ascertain. Additional information that would help clarify the status of participants could be incorportated into the current permit application form. Questions should include:

1. whether the individual considers himself a recreational or commercial fisherman;

2. size of vessel by length, gross tonnage, and motor size;

3. actual number of traps fished the previous year;

4. number of men usually in the crew of the registered boat listed on the permit application.

Incorporation of these additional questions would also provide much needed information for estimates of catch per unit effort and enable relatively easy verification of validity of answers given by cross checking with other data sources, such as state and federal craft registrations.

An additional problem in the stone crab fishery occurs when fishermen bypass processors and sell directly to a final market-local grocery, restaurant, or another individual. An unknown quantity of crab claws enter the market in this way. Information submitted by participants in the fishery is required to be held confidential (P.L. 94-263, Part 603). Fishermen may provide more personal information that would help account for these landings if a statement to this effect was included in the permit application.

To monitor and make meaningful assessments or predictions of the condition of the stone crab fishery, more detailed information on a continuous basis is required. Methods of collecting more detailed data from domestic commercial fishermen are:

1. Fishing logbooks are useful if pertinent data are entered by the fishermen on a regular basis. Information on number of men in the crew, length of time traps have been left in the water before each pulling, actual number of traps pulled per day, actual number of traps in the water at a given time, actual area fished, and dates of fishing can best be documented by keeping a simple log. However logbooks are often inaccurate since data are estimated or entered after-the-fact. Some fishermen already keep such a log for their own use. This practice requires a little effort on the fisherman's part, but considerable work is needed to compile and analyze the data unless it is computerized. The system requires constant contact between fishermen and collection personnel. The log booklets could be distributed and returned each year with permit applications. Logbooks should be subject to inspection by authorized officials of the National Marine Fisheries Service and should be presented for examination as required. Logbooks must contain the following information:

    1. name and address of the vessel owner;

    2. name, number and size of vessel;

    3. landings in pounds of claws by trip, by size and place of landings;

    4. pounds sold to dealers and pounds sold to other than processor/dealers;

    5. ex-vessel value in dollars of sales of landings as specified above;

6. number of other crew members;

7. number of days fished during the report period;

8. kind and numbers of traps fished.

Other information may be required by the Secretary from time to time.

2. Personal interviews and field surveys are necessary in all methods in order to maintain acceptable quality and flow of data but complete dependency on interviews and field surveys are not feasible due to high cost of personnel and travel.

3. The fish ticket system is the most effective method of obtaining complete, accurate, continuing detailed information. The foundation of the system is the individual fish receipt (fish ticket) made out by the dealer which serves as a legal record of a purchase transaction with a fisherman. Every purchasing transaction is recorded on an accountable numbered fish receipt form supplied to the dealer by the collection agency. The dealer obtains information from the producing fisherman at the time of the transaction. A carbon copy duplicate of each completed transaction is sent to a data collection center for processing. No other reporting is required of the dealer. The data collection center produces a continuing record of all commercial seafood production.

In order to operate successfully all commercial fishermen, vessels and dealers must be permitted.

Foreign Fishermen

There is no foreign fishing for stone crabs in U. S. waters of the Gulf of Mexico.

(iii) Processors

Monthly landings by processor and area are currently taken by NMFS. A recurrent problem in attempting to evaluate landings and price data is the lack of uniformity in size classes of claws. Some standardization should be enacted and pounds and value of dockside landings recorded for each size class for each processor.

Among processors, crab claws are frequently exchanged at least twice. Recording pounds and prices, by size class, of claws obtained from other processors would provide additional economic information on total value of the fishery. Also, processors could list their sales by pounds, price, and purchaser. Presently, processors are only required to record pounds received from, and price paid to fishermen. Similar statistics on their sales would assist in correct market analysis.

All persons, individuals, firms, corporations or other business associations at any port or place in the United States or its possessions that buy and/or receive stone crab claws from U.S. vessels or boats are required to maintain and provide to any authorized agent of the National Marine Fisheries Service as requested, records of all transactions involving stone crab claws on forms supplied by the National Marine Fisheries Service. In the State of Florida, as in other states, data collection from seafood dealers by the National Marine Fisheries Service should be fully coordinated and in cooperation with the Florida Department of Natural Resources to avoid duplication of reporting and compiling of statistics. Data requirements of processors and other dealers are listed below.

Name and address of the firm.

Name of the respondent.

Telephone number of the respondent.

Reporting period.

Number of stone crab vessels owned.

Number of stone crab vessels supplying the firm during the reporting period.

Pounds of stone crabs landed by your own vessel by size.

Pounds of stone crabs bought from supply vessels by size.

Pounds of stone crabs bought from other sources.

Pounds of stone crab claws processed (cooked).

Pounds of processed stone crab claws sold by size.

Value of stone crab claws sales at wholesale and at retail by size.

Additional data may be required by the Secretary from time to time.

15. RELATIONSHIP OF THE RECOMMENDED MEASURES TO EXISTING APPLICABLE LAWS AND POLICIES

(i) Fishery Management Plans

Measures recommended for the stone crab fishery have no impact on other approved fishery management plans. The measures recommended will have an impact on the Gulf of Mexico shrimp management plan now in preparation. Details of this relationship are given in the Economic Impact Analysis for the stone crab fishery.

(ii) Treaties or International Agreements

Since no foreign fishermen participate and stone crab stocks considered here are within U.S. waters, treaties and international agreements currently have no impact on this fishery.

(iii) Federal Law and Policies

Federal law and policies which may have some impact on the Gulf of Mexico stone crab fishery are discussed in Section 7 (iii).

(iv) State, Local and Other Applicable Laws and Policies

State local and other laws which may constrain implementation of the recommended measures are discussed in detail in Section 7 (iv) and 7 (v).

16. COUNCIL REVIEW AND MONITORING OF THE PLAN

(i) General Approach

The Gulf of Mexico Fishery Management Council, will, after approval and implementation of this plan by the Secretary, maintain a continuing review of the fishery managed under this plan by the following methods:

(A) Maintain close liaison with the management and enforcement agencies involved to assess the condition of the stocks and the effectiveness of the management measures and regulations and compliance by the fishermen with the regulations. Florida Department of Natural Resources, National Marine Fisheries Service, National Park Service and the U.S. Coast Guard are the primary agencies with which especially close liaison will be established for plan monitoring. Periodic contacts will be maintained with other state resource agencies.

(B) Maintain close liaison with the members of the Stone Crab Subpanel and Shrimp Subpanel of the Council's Fishery Advisory Panel to assess the effectiveness of the management measures (and regulations) and the need for implementation of other measures or revisions of existing measures.

(C) Promote research to increase the knowledge of the fishery and resource by the following methods:

a. Identify the research required for better management of the fishery and resource.

b. Request National Marine Fisheries Service (NMFS) consider these research needs and identify those which they can immediately address and those which will require efforts by other agencies or groups.

c. Request state and university participation in research under their own programs to fill these data needs.

d. Provide Council funding for research that cannot be addressed by NMFS, state and university entities.

e. Assess the effectiveness of the statistical reporting system and recommend changes to NMFS or fund specific one-time surveys for data collection where data gaps exist.

(D) Conduct public hearings at appropriate times and locations in the areas where the fishing effort is concentrated to hear testimony on the effectiveness of all aspects of the plan and the changes needed in the plan. Hearings will normally be held following the fishing season, unless special problems which require more immediate action arise at other times.

(E) Consideration by Council and its advisory groups of all information gained from the first four activities listed above, and if necessary, prepare

amendments to the plan. Hold public hearings on the amendments prior to sending them to the Secretary.

(ii) Specific Monitoring Considerations

(A) Line of separation to reduce gear conflict

One of the primary objectives of the plan is to reduce the gear conflict between stone crab and shrimp fishermen. The line as described in the plan will be evaluated annually for its effectiveness, fairness, and impact on the two industries. Efforts through properly supervised exploratory fishing will be made to delineate shrimp grounds of prime importance within the area closed to shrimpers. If prime areas of importance are located, mechanisms for allowing limited access during peak periods of shrimp production will be explored. The need for extension of the line as described in this plan or some modification to other areas to resolve gear conflict, will be evaluated annually.

(B) Status or condition of the stocks

The annual standing stock of harvestable crabs and MSY will be determined on best available data. As the statistical reporting system is improved and other surveys are completed which cover the data needed from all segments of the user groups, valid mathematical assessment of these population parameters will be available; however, for the immediate future, and as the plan presents no evidence of overfishing, emphasis will be on assessing the weakness, if any, and completeness of the present system and proposing and implementing modifications.

(C) Harvesting practices

Harvesting practices proposed under the plan will be evaluated for their effectiveness and for the additions or modifications needed. This will require identification and implementation of the research needed to effectively evaluate existing or proposed harvesting practice regulations.

(D) Limits on fishing participation/effort

Periodically (possibly less than annually), the statistical and other data generated on stock size, harvest, number of participants, amount of gear, catch per unit of effort, economic parameters of the fishery and other factors will be reviewed to assess the stability of the stocks and the economic stability of the industry and to determine if a limited access system is needed.

(E) Standardization of management measures:

The Council will continue to work with the affected states to attempt to standardize regulations for the fishery in the FCZ and state territorial waters, where such standardization will serve a useful purpose.

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18. APPENDIX

(i) Technical Discussion of Stone Crab Price Analysis

There are several practical and structural considerations one must include when analyzing the relationship between price and quantity of crabs landed. First is the hypothesis that the structural relationship at the producer level, price is usually a function of quantity landed instead of the theoretical demand relationship which puts price as a function of quantity demanded. A second consideration is the inclusion of an explanatory variable which would measure underlying shifts in the demand curve. The variable included in the functional relationship analyzed for the stone crab fishery is per capita disposable personal income for the state of Florida. Florida was chosen because about 90 percent of total consumption is estimated to take place within the state. A third consideration is that both price per pound of stone crabs landed and disposable personal income would provide greater explan-atory results if these values in current dollars were used. The equation used to estimate this functional relation is:

$$P = \underset{}{-0.017} \quad \underset{(-2.54)}{-0.001\,(L)} \quad \underset{(6.02)}{+0.00044\,(DPI/N)}$$

where P is price per pound, L is landings in pounds of claw weight and (DPI/N) is the per capita disposable personal income for Florida (as reported in the Florida Statistical Abstract). The values in parentheses are the t-statistic for the respective coefficients and they indicate that both variables are significant at a 99 percent level of confidence. The coefficient of determination (r^2) of this equation for annual data from 1962 to 1977 is .966 which indicates a very acceptable explanation of the data.

This structual relation permits an estimate of the change in price resulting from a change in the quantity of stone crabs landed. The price flexibility for this equation (at the mean) is .66 which means that for every one percent increase (decrease) in the quantity landed, there would be an expected decrease (increase) of 2/3 of one percent (i.e. .66 percent). For example, if there was an anticipated decrease in landings of 200,000 pounds due to an area closure, this would increase the price per pound $ .11 based on the 1977-78 average price of $1.82 per pound (provided, of course, that everything else remains the same.)

The price flexibility with respect to disposable income, on the other hand, is positive and greater than one estimated to be 1.50. This implies that with every one percent increase (decrease) in income, there is 1.5 percent increase (decrease) in price, everything else remaining the same.

The structural equation is a simplified model of the total demand and supply relationship for stone crabs. The primary reason is the complete lack of a supply (or production) function. However, the existing data do not permit even a simplified estimate of a production function for this fishery.

Appendix Table 1. Stone crab landings (liveweight basis) value and price per pound by county for the West Coast of Florida, 1962-76.

Calendar Year	Monroe			Collier			Lee		
	Pounds	Value	Price	Pounds	Value	Price	Pounds	Value	Price
1962	265,900	93,597	35.2	63,000	22,176	35.2	1,000	352	35.2
1963	215,600	67,698	31.4	165,500	51,967	31.4	1,600	502	31.4
1964	323,600	100,275	31.0	151,600	46,996	31.0	600	186	31.0
1965	477,100	188,707	39.6	90,000	36,857	41.0	5,000	1,619	32.4
1966	593,100	253,469	42.7	228,700	94,997	41.5	9,700	3,525	36.3
1967	484,100	234,402	48.4	307,100	153,210	49.9	2,700	1,119	41.4
1968	623,300	295,360	47.4	539,400	255,249	47.3	8,900	3,763	42.3
1969	580,600	336,032	57.9	394,200	236,672	60.0	2,900	1,750	60.3
1970	615,500	355,672	57.8	598,200	299,639	50.1	2,300	1,142	49.7
1971	714,500	375,450	52.5	656,400	339,354	51.7	3,200	1,664	52.0
1972	826,300	533,186	64.6	887,100	530,858	59.8	12,900	9,341	72.4
1973	472,500	343,669	72.7	1,009,600	683,671	67.7	186,700	135,524	72.6
1974	855,400	657,985	76.9	1,145,900	820,305	71.6	196,500	140,098	71.3
1975	754,700	659,382	87.4	934,200	748,391	80.1	30,700	21,458	69.9
1976	898,200	889,086	98.9	768,200	650,079	84.6	83,700	77,251	92.3

Calendar Year	Charlotte			Sarasota			Manatee		
	Pounds	Value	Price	Pounds	Value	Price	Pounds	Value	Price
1962	0	0	0	400	141	35.3	200	70	35.0
1963	0	0	0	300	94	31.3	0	0	0
1964	0	0	0	11,800	36,658	31.0	18,800	5,828	31.0
1965	0	0	0	3,200	1,162	36.3	8,700	4,286	49.3
1966	0	0	0	800	307	38.4	18,400	4,600	25.0
1967	700	274	39.1	100	21	21.0	10,100	3,528	34.9
1968	2,500	947	37.9	31,900	12,454	39.0	17,200	8,608	50.0
1969	10,500	3,934	37.5	11,600	5,705	49.2	35,500	19,523	55.0
1970	0	0	0	17,800	8,637	48.5	31,600	15,793	50.0
1971	0	0	0	13,400	6,259	46.7	22,800	11,834	51.9
1972	0	0	0	23,500	15,355	65.3	11,200	7,493	66.9
1973	35,800	23,076	64.5	36,500	28,008	68.5	26,900	19,505	72.5
1974	68,800	51,451	74.8	300	210	70.0	2,300	1,800	78.3
1975	28,800	24,922	86.5	900	645	71.7	5,700	4,660	81.8
1976	44,100	42,548	96.5	3,100	2,500	80.6	62,800	56,168	89.4

Source: National Marine Fisheries Service, Washington, D.C.

Calendar Year	Pinellas			Pasco-Citrus			Levy		
	Pounds	Value	Price	Pounds	Value	Price	Pounds	Value	Price
1962	3,400	1,197	35.2	90,700	31,927	35.2	98,700	34,742	35.2
1963	10,000	3,140	31.4	29,900	9,389	31.4	84,100	26,408	31.4
1964	9,600	2,976	31.0	13,400	4,154	31.0	85,800	26,598	31.0
1965	900	292	32.4	28,700	9,876	34.4	31,400	7,751	24.7
1966	6,200	2,484	40.1	12,400	4,643	37.4	8,800	2,244	25.5
1967	3,800	1,714	45.1	28,100	12,644	45.0	9,500	3,100	32.6
1968	4,500	2,275	50.6	20,000	9,749	48.7	36,000	12,459	34.6
1969	42,600	24,819	58.3	37,700	18,987	50.4	99,500	34,999	35.2
1970	28,700	16,073	56.0	57,300	24,856	43.4	97,100	32,284	33.2
1971	500	230	46.0	58,600	27,143	46.3	100,700	40,118	39.8
1972	13,700	7,444	54.3	35,900	24,159	67.3	62,200	29,083	46.8
1973	37,100	28,088	75.7	43,500	31,102	71.5	100,100	60,830	55.2
1974	24,000	19,479	81.2	61,300	47,744	77.6	88,700	56,098	63.2
1975	46,100	43,672	94.7	94,600	84,514	89.3	72,000	78,919	85.8
1976	128,000	111,796	87.3	200,300	169,661	84.7	147,000	98,806	67.2

Calendar Year	Dixie-Taylor			Wakulla			Hillsborough		
	Pounds	Value	Price	Pounds	Value	Price	Pounds	Value	Price
1962	21,300	7,498	35.0	12,300	4,330	35.2	200	70	35.0
1963	109,700	34,446	31.4	13,100	4,113	31.4	5,800	1,821	31.4
1964	123,500	38,285	31.0	1,700	527	31.0	11,300	3,503	31.0
1965	9,500	2,886	30.4	0	0	0	0	0	0
1966	4,900	2,135	43.5	0	0	0	0	0	0
1967	400	103	25.8	0	0	0	100	30	30.0
1968	900	263	29.2	0	0	0	0	0	0
1969	42,100	13,512	32.1	0	0	0	400	173	43.3
1970	53,600	15,338	29.0	0	0	0	0	0	0
1971	60,600	18,448	30.9	19,500	6,615	33.9	0	0	0
1972	43,900	20,086	43.2	8,400	3,515	41.8	0	0	0
1973	56,100	29,846	63.2	13,500	4,381	32.5	0	0	0
1974	65,300	44,845	68.8	13,400	7,565	56.5	0	0	0
1975	110,800	87,818	79.3	20,300	11,354	55.9	0	0	0
1976	99,000	88,266	89.2	17,000	9,896	58.2	50	50	100.0

Calendar Year	Other West Coast Counties*		
	Pounds	Value	Price
1962			
1963	24,200	7,599	31.4
1964	0	0	0
1965	0	0	0
1966	0	0	0
1967	0	0	0
1968	0	0	0
1969	0	0	0
1970	0	0	0
1971	0	0	0
1972	0	0	0
1973	5,800	1,447	24.9
1974	2,200	1,043	47.4
1975	0	0	0
1976	0	0	0

* Other west coast counties include: Franklin, Gulf, Bay, Walton, Okaloosa, Santa Rosa, Escambia and Hernando

Appendix Table 2. Stone crab monthly landings (liveweight basis) 1974-75 to 1976-77.

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Totals
	Thousand Pounds								
1974-75	141	257	368	354	325	324	216	52	2,037
1975-76	164	423	304	376	282	215	333	111	2,308
1976-77	319	341	316	334	352	511	453	179	2,895
TOTALS	624	1,111	988	1,064	1,059	1,050	1,002	342	7,240
Percent	8.6	15.4	13.7	14.7	14.6	14.5	13.8	4.7	100.0
Average Monthly	208.0	370.3	329.3	354.7	353.0	350.0	334.0	114.0	2413.3

(ii) List of Public Meetings and Summary of Proceedings

Texas A&M Research and Extension Center, Corpus Christi, Texas
November 27, 1978

Discussion Leaders
Bob Mauermann, Hearing Officer
Don Geagan, NMFS

Public Attendees
Leroy Wieting, GSMFC
Russ Miget, Texas A&M Extension Service

Staff
Dr. Gale Lyon
Jan Ward
Sharon Schwab

The public hearing was called to order at 8:00 p.m., November 27, 1978, by Mr. Bob Mauermann. Mr. Mauermann introduced all in attendance and stated that the draft plan was available for review by interested parties.

Neither Mr. Wieting nor Mr. Miget had any comments on the plan.

The hearing was adjourned at 8:05 p.m.

Marine Education Center, Biloxi, Mississippi
November 28, 1978

Discussion Leaders
Edward Swindell, Hearing Officer
Bill Turner, NMFS
Nicholas Mavar, Council
Dennis Chew, Council Alternate

Public Attendees
Gerald Corcoran, Marine Education Center

Staff
Dr. Gale Lyon
Sharon Schwab
Jan Ward

The public hearing was called to order at 8:00 p.m., November 28, 1978, by Chairman Ed Swindell. Attendees were introduced.

As no members of the general public were in attendance, the hearing was adjourned at 8:05 p.m.

South Carolina Wildlife and Marine Resources Department, Charleston, South Carolina
November 28, 1978

DISCUSSION LEADERS
Edwin B. Joseph, SAC
Jerry Sansom, SAC
Jack Brawner, NMFS

STAFF
Bonnie Rudd

PUBLIC ATTENDEES
Steve Hopkins, SC Wildlife & Marine Res. Dept.
E. G. Sturgis, Jr., Mt. Pleasant Seafood Co.
William Matthews, News & Courier
Susie B. Backman, Backman Seafood, Inc.
Joseph E. Backman, Backman Seafood, Inc.
David W. Weatherly
Will Lacey, SC Wildlife & Marine Res. Dept.
David Cupka, SC Wildlife & Marine Res. Dept.

The hearing was called to order at approximately 7:35 p.m. by Edwin Joseph who welcomed the public on behalf of the South Atlantic Council. He then introduced Jerry Sansom, South Atlantic Council member, and Jack Brawner, National Marine Fisheries Service representative, and provided background information on P.L. 94-265 and the meeting purpose. The public was informed that NMFS and the Gulf Council would accept written comments until December 18 and that all comments received would be reviewed at their December 21 meeting. At that time the plan would be revised if changes were called for. The public will again be given the opportunity to comment on the proposed final regulations when they are published by the Secretary of Commerce through National Marine Fisheries Service. Presentation of the DEIS was given by Mr. Brawner. Mr. Sansom presented a summary of the Stone Crab FMP. Dr. Joseph then opened the floor for public comment.

The question was raised by Mr. E. G. Sturgis as to what effect this plan would have on South Carolina if a stone crab industry is developed in the future. The response was that even though there are stone crabs in this area, there wouldn't be much application of the plan because it applies only to the territorial sea, not state waters. To the best of our knowledge there are no stone crabs in the territorial sea off South Carolina. Mr. Sturgis also asked how the decision was made as to where the line of separation should be placed on the map. How much consideration was given to the inshore shrimp fishery. Mr. Sansom indicated the line had been decided on during several meetings of the FMP Council group.

Having no further public comment, the hearing was adjourned.

City Hall, Bayou La Batre, Alabama
November 29, 1978

Discussion Leaders
Edward Swindell, Hearing Officer
Walton Kraver, Council
Ed Burgess, NMFS
Bill Turner, NMFS

Staff
Dr. Gale Lyon
Jan Ward
Sharon Schwab

Public Attendees
Chris M. Brannon, Shrimper
Billy Howerin, Howerin Trawlers, Inc.
Mac Rawson, Sea Grant Advisory Service
Robert Smallwood, Shrimper
Jimmy Wigfield, The Mobile County News
Fred Engle, WKRG-TV News
Jim Shuler, WKRG-TV News
Loreth F. Smith, WKRG-TV News

The public hearing was called to order by Chairman Ed Swindell at 7:30 p.m., November 29, 1978. Council members, NMFS representatives and staff were introduced.

Mr. Swindell explained the purpose of the hearing was to elicit public comments on the plan, with written comments being accepted through December 18. The Gulf Council will review all comments on December 21, and revise the plan at that time if changes are needed.

A brief explanation of the FCMA was given along with the reason for development of the plan and implementation. It was explained that the regulations will only cover the west coast of Florida.

Gale Lyon presented a briefing on the plan outlining management measures, proposed regulations, MSY and OY. The proposed line of separation for shrimpers and stone crabbers from February 15 to April 15 was also explained.

Bill Turner presented conclusions of the Draft Economic Impact Statement explaining the physical, biological and socio-economic impacts of the plan.

Mr. Swindell asked for comments from the audience.

Mr. Chris Brannon, shrimper from Bayou La Batre, questioned the increase in shrimp size due to closure of the area inside the boundary line. Mr. Brannon felt that shrimp could move offshore in a very brief time, and felt the increase was overstated. In addition, shrimp will be in the inshore area where shrimpers would not be allowed to fish. Mr. Brannon also pointed out that many shrimpers have gear losses because of crab traps left in the water.

Mr. Brannon stated that there should be better coverage and publicity for the hearings, as most of the shrimpers were out fishing and could not attend. He suggested more fishermen could be reached through advertising in Fish Boat, Fishing Gazette and National Fisherman.

Mr. Billy Howerin, President, Howerin Trawlers, Inc., stated that he was concerned with the line in Zone 2, and stated that the line will hurt the shrimpers in the area of Key West and Marquesas. Mr. Howerin also felt that there were few, if any, stone crab traps west of Smith Shoal. He proposed the line stop at Point E as it was not necessary in the area of the Keys.

Mr. Swindell explained that all comments will be reviewed by the Council and thanked all for participation.

The hearing was adjourned at 8:30 p.m.

Franklin County Courthouse, Apalachicola, Florida
November 30, 1978

Discussion Leaders
Robert Jones, Council
B. J. Putnam, Council
Bill Turner, NMFS
Ed Burgess, NMFS

Two members of the public

Staff
Wayne Swingle
Mary Jane Lombardo
Franchesca Lala

Hearing Chairman Bob Jones called the meeting to order at 7:30 p.m., Thursday, November 30, 1978 in the County Commissioner's Room of the Franklin County Courthouse, Apalachicola, Florida.

Chairman Jones explained the formation of the regional councils, Public Law 94-265 and read the seven National Standards.

Wayne Swingle gave a slide presentation summary of the Draft Stone Crab Fishery Management Plan.

Ed Burgess reviewed the Draft Environmental Impact Statement.

Following these presentations, Mr. Jones asked for questions or comments from those in attendance.

Mr. Walter C. Shell, a commercial shrimper, expounded on the Cedar Key stone crab/shrimp conflict and expressed his concern over the use of small trawls by recreational and bait fishermen during the season and in areas closed to commercial fishermen. Chairman Jones informed him of the shrimp public hearings coming up and requested he address his points there.

Meeting adjourned at 9:00 p.m.

Village Inn, Eulonia, Georgia
November 30, 1978

Discussion Leaders
David H. G. Gould, SAC
Jerry Sansom, SAC
Donald Geagan, NMFS

Public Attendees

16 members of the public

Staff
Bonnie Rudd

The hearing was opened by David Gould who introduced the discussion leaders. Mr. Gould indicated the purpose of the hearing and the plan comment period until December 18. Mr. Jerry Sansom provided a summary of the Stone Crab Fishery Management Plan and Mr. Donald Geagan gave a presentation on the DEIS. The hearing was then opened for public comment.

Mr. Gould read a statement provided by the Georgia Fishermen's Co-op, Inc. (copy attached). Mr. Jack Amason commented that some adjustment should be made to show, beyond the longtitude and latitude, but the lower end coordinates (loran) should also be reflected (referenced the FMP summary). A general discussion between Messrs. Gould, Sansom and Amason indicated that if these were not in the plan, they should (or would) be included. (The chart used during the hearing was to be adjusted). A copy of the chart (Exhibit 1) was to be furnished Mr. Amason.

Mr. George Redding stated he was one of the first fishermen to fish in Sanibel and agreed with the nursery area as designated in the plan if it was agreeable with Ft. Myers fishermen who depend on the fishery for their living. He agreed that from Point C (Exhibit 1) on down should be closed to fishing as a nursery. It was his opinion that if the crabbers would keep their traps off the bottoms fishable by shrimpers, there would be no conflict since the shrimping areas were, to his understanding, not the same areas where crabbing was productive (specifically reference area A-C of Exhibit 1).

Mr. E. W. Lewis inquired about the South Atlantic/Gulf Council boundary and if the South Atlantic Council would develop its own Stone Crab FMP. He was told that boundary was under review by the Secretary of Commerce and the South Atlantic would not undertake a separate Stone Crab FMP in the near future. Mr. Lewis inquired about the OY basis, if it was based on landed claws. He felt that possibly the way it was stated might lead to confusion by lay people reviewing the plan. Mr. Lewis felt there was a possible conflict because of a 30-day overlap in fishing season of crabbers and shrimpers. He also felt that the types of material should be stated in the plan, referencing the biodegradable panel for crab pots. Mr. Lewis commended Gulf Council on development of this plan in a short time.

Rev. Garnett Rushing requested loran readings for A & C (Exhibit 1). Mr. Sansom indicated he could provide readings for C, but not A at this time. Mr. Sansom indicated that the longitude and latitude given could be used and plotted on the chart. Mr. David Harrington stated you could not convert the A to C. It would not stand in a court of law. Mr. Sansom indicated the intent was not to convert A to C. An attempt would be made to ascertain the loran readings for A.

Hearing no further comment, the hearing was adjourned.

Holiday Inn, Wrightsville Beach, North Carolina
December 5, 1978

Discussion Leaders
Edward G. McCoy, SAC
Jerry Sansom, SAC
William Turner, NMFS

Public Attendees
Mrs. Billie Perkins, News & Observer

Staff
Bonnie Rudd

The hearing was called to order at 8:15 p.m. by Edward McCoy. Mr. McCoy indicated that at that time one member of the public was in attendance. Hearing no comment from the public, the meeting was adjourned.

Sheraton-Anastasia, St. Augustine, Florida
December 7, 1978

Discussion Leaders
Allen F. Branch, SAC
Jerry Sansom, SAC
Edward Burgess, NMFS

Public Attendees
Elroy Leonard, Leonard & Sons Shrimp Co.
Larry A. Catchell, Commercial fisherman
Bryan S. Jones, Commercial fisherman
Joseph G. Halusky, Florida Sea Grant MAP

Staff
Bonnie Rudd

The hearing was opened by Mr. Allen Branch who introduced the discussion leaders. He indicated the purpose of the hearing and the plan comment period until December 18. Mr. Jerry Sansom provided a summary of the Stone Crab FMP and Mr. Ed Burgess gave a presentation on the DEIS. The hearing was then opened for public comment.

Mr. Elroy Leonard commented that he had worked the designated nursery area since 1952 getting about 80 percent of his shrimp. The closing of this area would cause a tremendous impact on his 5 boats fishing there and the fleet of 50 that works with him.

He indicated he felt the figures used in the plan in relation to the impact on shrimpers were incorrect. Mr. Sansom indicated that in plan formulation, shrimpers were reluctant to designate the areas they were interested in. Mr. Leonard responded that he had, at a meeting in Marathon, indicated such areas. Mr. Sansom requested that Mr. Leonard again supply this information by December 18 so it can be considered. Mr. Leonard expressed the opinion that crabbers should be kept from setting traps on bottoms where shrimpers drag. (Mr. Leonard pointed out to Mr. Sansom on displayed chart his most productive shrimping areas.) Mr. Leonard answered affirmatively in response to Mr. Sansom's inquiry if he would be interested in participating in supervised exploratory trawls inside the line which was designated as sanctuary line.

Mr. Leonard indicated that he felt that the advertisements for this hearing should have been greater. Mr. Sansom requested he put together a list of places he knew of that would post announcements relative to upcoming hearings. Mr. Halusky indicated that draft plans were available at several locations in Florida for review for interested parties. Mr. Leonard was given copies of the printed summary to distribute.

Having no additional public comments, the hearing was adjourned.

Marathon High School, Marathon, Florida
December 11, 1978

Discussion Leaders
O. B. Lee, Gulf Council
Jerry Sansom, South Atlantic Council
Jack Brawner, NMFS

90 members of the public

Staff
Dr. Gale Lyon
Jan Ward
Sharon Schwab

Hearing Chairman O. B. Lee called the meeting to order at 7:45 p.m., Monday, December 11, 1978, in the Marathon High School Cafeteria.

Mr. Lee explained the formation of the regional councils, Public Law 94-265 and read the seven National Standards.

Dr. Gale Lyon of the Gulf Council Staff gave a viewgraph presentation summary of the Draft Stone Crab Fishery Management Plan.

Jack Brawner, NMFS, reviewed the Draft Environmental Impact Statement.

Following these presentations, Mr. Lee asked for comments or recommendations from those present.

Mr. Hilery Deweese, stone crab fisherman from Marathon, Florida, recommended that the line as shown in Figure 12-2 of the Plan should extend from Point D to K or Snipe Point. He also felt the season should be lengthened and Point E through K ("boot") should be eliminated.

Mr. John Browning of Marathon, Florida, recommended that the line be extended to Smith Shoal.

Mr. Austin S. Baumann of Baumann Electronics, Marathon Shores, Florida, stated he was against anything in the Plan which would affect the economy of the area.

Mr. Dave Horan, Key West, Florida, representing the Florida Keys Shrimping Group stated this conflict was one between shrimpers and the stone crabbers

were caught in the middle. His group proposes an 8 fathom line from Sanibel to Snipe Point. He further stated that the proposed line as it is will cut off 90 percent of the total shrimp production of Monroe County. He recommended the line go from Point E to point K.

Mr. Wade Daniels, commercial stone crab fisherman from Marathon, Florida, recommended extending the line to 60 feet instead of 8 fathoms. He would also like to see the elimination of point D-E to K.

Mr. Jerry Collins, stone crabber from Marathon, Florida, questioned the accuracy of the figures used in the Economic Impact Statement and recommended that the figures be looked at again.

Mr. Freeman Bateman of Captain Cliff's Seafood, Marathon, Florida, recommended the line be extended straight down from point D eliminating E through L. He also felt supervised exploratory shrimping inside the line under proper controls to delineate prime trawling areas should be allowed everywhere, not just in one area, and that the line should be closed year around.

Mr. Tim Daniels, stone crabber from Marathon, Florida, stated he felt the 8 fathom line should extend from point D to Snipe Point and should be closed year round. He further recommended that the Director of NMFS have the authority to lengthen or shorten the season if the line cannot be closed year round.

Mr. Kenneth Midget, shrimper from Marathon, Florida, recommended the line extend from point E straight down to point K.

Mr. Byron Hopkins from Marathon, Florida, felt the shrimpers were not adequately represented on the Gulf Council Shrimp Advisory Panel, and recommended that a knowledgeable shrimper be placed on this panel. He also supported a change in the line from D to Snipe Point.

Mr. Lee asked for a show of hands of those who were in favor of a proposed line from approximately E to Snipe Point. It is noted for the record that the majority of those present were in favor of this.

Mr. Chris Martin of Marathon, Florida, recommended that the line be closed year round.

Mr. Chuck Myers, banker of Marathon, Florida, expressed concern with the figures in the Economic Impact Statement and suggested more consideration be given to the recommendations of the shrimpers and stone crabbers.

Mr. Wade Daniels asked for a show of hands of those who wanted the line closed year round. For the record, all crabbers wanted this closure year round and the majority of the shrimpers agreed.

Meeting adjourned 9:10 p.m.

City Hall, Cedar Key, Florida
December 11, 1978

Discussion Leaders
B. J. Putnam, Council
Bob Jones, Council
Don Geagan, NMFS

32 members of the public

Staff
Wayne Swingle
Mary Jane Lombardo
Franchesca Lala

Hearing Chairman B. J. Putnam called the meeting to order at 7:30 p.m., Monday, December 11, 1978, in the City Hall of Cedar Key, Florida.

Chairman Putnam explained the formation of the regional councils, Public Law 94-265 and read the seven National Standards.

Wayne Swingle gave a slide presentation summary of the Draft Stone Crab Fishery Management Plan.

Don Geagan reviewed the Draft Environmental Impact Statement.

Following these presentations, Mr. Putnam asked for questions or comments from those in attendance.

State Representative Gene Hodges made a statement to the effect that the line does not affect the Cedar Key area and does not affect bait shrimping.

Henry Brown stated he would like to see the Cedar Key area included in the Plan. He understands Cedar Key is a "problem area". He feels they need Federal help because of trap losses.

R. B. Davis, R. B. Davis & Sons Seafood, commented this part of the coast is not protected.

Naomi Sparks, live bait shrimper from Yankeetown, Florida, commented that one half of their income is from dead bait and they need a larger allowance for dead shrimp aboard vessels.

James Yoakum, J. Yoakum Shrimp Company, Yankeetown, Florida, live bait trawler, questioned the government's definition of trawler. His understanding of trawler is anything that pulls a catch net behind it. He feels plan trawling prohibition may be extended to live bait trawlers. His bait boats are trawlers with rigid frames. Rigid frames are more compatible to crabbers equipment than the door net type and he would like to see this brought out in the Plan. He feels plan should define legal live bait shrimping gear.

Jack Sparks, Jack and Ruth's Bait and Seafood Company, Yankeetown, Florida, commented that now they carry permits to live bait and also to commercial shrimp. They catch shrimp within the line. Presently, they catch commercial shrimp with bait shrimp rigs. They keep these commercial shrimp on board on

ice, then sell them. How are they affected? Mr. Jones replied if you are fishing for dead shrimp you will be prohibited during the two month period from February 15 to April 15. This applies if you are fishing from Sanibel south; Sanibel north is not affected. You can still catch commercial shrimp from the Florida line inshore under Florida laws.

Billie Kennedy, Cypress Marina, Yankeetown, Florida, bait shrimper, commented if the line does continue on up north, they would not throw their dead bait overboard if it would be money out of their pockets. He would like to see a definition of "size of net". Needs a better definition of trawler for bait shrimping.

Henry Brown restated the need for line in FCZ off Cedar Key area. Stated he lost 900 traps last year.

L. H. Turner, stone crabber from Ingles, Florida, stated he would like to see the commercial shrimper stay out while stone crabbers are crabbing, but he had no problems with bait shrimpers. Voluntary agreement between crabbers and shrimpers would be better than a line of separation.

James Yoakum stated that only rigid frame trawls should be allowed.

George Coake, stone crabber from Cedar Key, questioned the enforcement aspect of the Plan. Stated he lost 300 traps last year.

Kenneth Hurst, commercial bait shrimper, commented he would like crab traps to run in one direction only.

Jack Parks stated that he commercial fished with rigid frame trawls.

Lester Green, stone crabber, stated he also lost traps and, therefore, will become a live bait shrimper.

Charles Green, stone crabbers, stated that it is not possible to set out traps in only one direction, besides, it would provide no advantage to shrimpers.

Meeting adjourned at 9:00 p.m.

Key West High School, Key West, Florida
December 12, 1978

Discussion Leaders
B.J. Putnam, Gulf Council
Bob Mauermann, Gulf Council
Bob Jones, Gulf Council
Jerry Sansom, South Atlantic Council
Jack Brawner, NMFS
George Rees, NMFS

78 members of the public

Staff
Dr. Gale Lyon
Jan Ward
Sharon Schwab

Hearing Chairman B. J. Putnam called the public hearing to order at 7:40 p.m., Tuesday, December 12, 1978, at the Key West High School Auditorium.

Mr. Putnam, in his opening remarks, explained the formation of the Councils, Public Law 94-265, and the purpose of the hearings.

Dr. Gale Lyon presented a viewgraph briefing on the plan outlining management measures, proposed regulations, MSY and OY. The proposed line of separation for shrimpers and stone crabbers from February 15 to April 15 was also explained.

Jack Brawner presented conclusions of the Draft Economic Impact Statement explaining the physical, biological and socio-economic impacts of the plan.

Following these presentations, Mr. Putnam asked the members of the public for recommendations and comments.

Mr. Wade Daniels, stone crab fisherman from Marathon, Florida, recommended that gravid female crabs be harvested, as they constitute a large portion of the catch during certain periods. Mr. Daniels also recommended that the separation line run directly from Point F on the chart to Snipe Point, and that the line remain in effect year round.

Mr. Ronnie Boggess, shrimper and stone crabber from Marathon, stated that at previous meetings of both parties, a line running from Point D to Snipe Point was agreed upon. Mr. Boggess recommended that the portion of the line running around the Keys be eliminated, and the line be in effect the year round.

Jerry Collins, stone crab fisherman and Stone Crab Advisory Panel member, agreed that the original line recommended was a 48 foot line running to Snipe Point, and he also recommended that the line remain in effect the year round, as two months would not provide adequate protection. Mr. Collins also recommended that the season be opened thirty days earlier and closed one month later to prevent trapping of gravid female crabs. This season adjustment would also eliminate a conflict with the net fishermen fishing for pompano and Spanish mackerel in the shallow waters of Florida Bay.

Steven Flowers, shrimper from Key West, recommended that the separation line run from Point E to Snipe Point, as there are few, if any, crab traps south of Point E.

Ralph Hewett, Key West, recommended the line run from Point E to Snipe Point. Mr. Hewett also stated that the shrimpers from the Keys area were not represented on the Advisory Panel, and wished to be represented.

Mrs. Al Flowers, Styron Shrimp Company, Key West, recommended a separation line from Point D to Snipe Point.

Richard Thomas, Summerland Key, stated that the line would not be in effect for a long enough period and recommended that the line be in effect during the entire year. He also expressed a need for an interim plan to be activated immediately.

Mr. Charles W. Smith, stone crabber, Marathon, recommended the line run from Point E to Snipe Point, and that the area be protected year round.

John Barker, Key West, recommended that shrimpers not give up any shrimping grounds because the economy of Key West relied on this resource.

Stuart T. Atwood, Jr., shrimper from Key West, recommended the line run from Point D to Snipe Point, and was opposed to the closure of the area around the Keys.

David Paul Horan, attorney for Singleton Enterprises, Marathon Seafood, Freeman-Bateman, and Marquesas Shrimp Co., stated that the line, as drawn in the Plan, would result in a loss of $9,000,000 in shrimp in the Keys. Mr. Horan recommended the line run from Point C to Point D to Snipe Point.

Mr. Collins asked for a show of hands in support of a line from Point C to Point D to Snipe Point. The majority responded that they were in favor of such a line. Eleven participants were in support of the line as drawn in the Plan.

Mr. Al Armitt, Summerland Key, stated that if the line is drawn directly to Snipe Point, it would have a negative impact on the spiny lobster fishery and the Spiny Lobster Plan.

Bob Jones thanked all participants and stated that the regulations will be drawn in accordance with the National Standards and P.L. 94-265.

Mr. Mauermann assured all participants that all recommendations will be considered by the Council and included in the Plan.

Mr. Sansom invited all public comments on any issues being addressed by the Councils.

Mr. Putnam thanked all in attendance and stated that comments would be reviewed by the Council on December 21, 1978.

Hearing adjourned at 9:05 p.m.

St. Petersburg Junior College, Tarpon Springs, Florida
December 12, 1978

Discussion Leaders
O. B. Lee, Council
Ed Burgess, NMFS

16 members of the public

Staff
Wayne Swingle
JoAn Wheat
Mary Jane Lombardo

Hearing Chairman O. B. Lee called the meeting to order at 7:30 p.m., Tuesday, December 12, 1978, in Room 463 of St. Petersburg Junior College, Tarpon Springs Campus.

Mr. Lee explained the formation of the Regional Councils, Public Law 94-265, and read the seven National Standards.

Mr. Swingle gave a slide presentation summary of the Draft Stone Crab Fishery Management Plan.

Ed Burgess reviewed the Draft Environmental Impact Statement.

Following these presentations, Mr. Lee asked for questions or comments from those in attendance.

Mr. Mitchell House of Tarpon Seafood stated that he did not feel that it was equitable that a shrimper from another area, such as Texas, could come to Florida and be protected by the Plan but a stone crab fisherman could not fish in areas outside of Florida and be provided the same kind of protection. He further stated that dates should be extended to May 20.

Mr. John Williams, commercial fisherman from Marathon, Florida, stated that he did not feel the shrimping segment was well represented at meetings in which the demarcation line was selected. During gear conflicts which arose last year, it was agreed by the two segments, in meetings with Senator Chiles, that the line should be as shown in Figure 12-2 of the Plan up to D, but at this point, it should extend directly to Snipe Point. He also felt that shrimping should be prohibited at all times outside the line as there could be further gear conflicts with crawfishermen. He stated that the DEIS was incorrect in the assessment of losses of shrimp -- losses are much greater.

Mr. Paul Williams raised the point that the Plan had no provisions to address conflicts outside the line.

Meeting adjourned at 8:30 p.m.

Ft. Myers Exhibition Hall, Ft. Myers, Florida
December 13, 1978

Discussion Leaders
Robert Jones, Council
O. B. Lee, Council
Jack Brawner, NMFS
Bob Spraitz , NMFS

72 members of the public

Staff
Wayne Swingle
JoAn Wheat
Franchesca Lala

Hearing Chairman Robert Jones called the meeting to order at 7:30 p.m., Wednesday, December 13, 1978, in the Patio Room of the Ft. Myers Exhibition Hall.

Mr. Jones explained the formation of the Regional Councils, Public Law 94-265, and read the seven National Standards.

Mr. Swingle gave a slide presentation summary of the Draft Stone Crab Fishery Management Plan.

Jack Brawner reviewed the Draft Environmental Impact Statement.

Following these presentations, Mr. Jones asked for questions or comments from those in attendance.

Paul Herring, Durant-Herring Company, stated that there will be an adverse economic impact in this area during the closed season. The 40 count and larger shrimp will be lost. They will not be caught and will be lost due to predators or natural mortality. Should move the 8 fathom line to a shallower depth.

Leslie E. "Duke" Turner, Turner Seafood (crabber), said he felt that the line needs to be established during the entire crabbing season since all traps can be destroyed in as short a time as four days. Trawl lines need to be established.

Hilbert Kiesel, Island Trawlers, Inc., (shrimper), stated the large shrimp are caught inshore of points A, B, C and D. The present line causes the loss of 50 percent of shrimping area as there is only 5 percent trawlable bottom inshore and 5 percent offshore. This would cause an economic loss of $250,000. Suggests the line be set at 6 fathoms from A to D (Boca Grande down to D).

Richard Kalliainen, Stella Mestre, Inc., agreed with Mr. Kiesel.

James A. Lycett, R&L Shrimp Corporation, stated that there is no basis for the line except to prevent conflict. Would prefer no line. If there has to be a line, make it 10 miles offshore from Point A to where it intersects with the old nursery line. The economic impact is greater for shrimpers in lost fishing area than the loss to crabbers. There trawling area is further restricted by grassy bottoms and jelly. Should require crab boats to have a fathometer.

Mr. John F. Cattanach, shrimper, and Mr. William I. Brink, Penaeus, Inc., agreed with Mr. Lycett.

G. T. Denty, shrimper, stated they need to fish inside the line.

Mr. Clyde D. Jones, shrimper, recommended no line to Point D.

Mr. Sid Jacobsen, shrimper, recommended no line to Point D.

Donald R. Kiesel, Don Kiesel Shrimp Company, recommended a five fathom line.

Mr. John N. Ogle, Florida Shrimp Trawlers, Inc., stated crabbers need to have equipment to locate the bad bottom areas. Shrimpers should be allowed to either move traps or bring them back to the docks.

Meeting adjourned at 9:05 p.m.

City Hall, Everglades City, Florida
December 14, 1978

Discussion Leaders
O. B. Lee, Council
B. J. Putnam, Council
Jack Brawner, NMFS

40 members of the public

Staff
Wayne Swingle
JoAn Wheat
Franchesca Lala

Hearing Chairman O. B. Lee called the meeting to order at 7:30 p.m., Thursday, December 14, 1978 in the City Hall, Everglades City, Florida.

Chairman Lee explained the formation of the regional councils, Public Law 94-265, and read the seven National Standards.

Wayne Swingle gave a slide presentation summary of the Draft Stone Crab Fishery Management Plan.

Jack Brawner reviewed the Draft Environmental Impact Statement.

Following these presentations, Mr. Lee asked for questions or comments from those in attendance.

John Marini, Capri Fisheries, stated he would like to recommend closure to trawling from January 1 to May 20.

Duke Turner, Turner's Seafood, is concerned with the Sanibel area. He would like to see the line between A and B moved further offshore. If the line is run parallel to the 82° then it would give them 9 miles offshore. Second recommendation is that exploratory shrimping be by permit only. Closure to trawling should be year round.

Gary McMillin, stone crabber, recommended dropping the line from E to terminate at Snipe Point. This is an area not used by the stone crabbers and the Key West shrimpers have asked for that area. Also, he feels there are too many laws now without making it a law to return gravid females immediately to the water, which is something they have always tried to do anyway. He would like to see the reporting system for fishermen eliminated and use only dealer's reports.

Steve Ambros commented his recommendation had already been stated about the enlargement of the Sanibel area.

Viron Bender, offshore charterboat fisherman, states he has seen a drastic change in the floor of the Gulf. It is difficult to find any rock for grouper fishing.

Gary McMillin commented he feels the bottom is damaged because shrimpers have leveled it off.

Richard Wolfferts, stone crabber for Diamond Head, Inc., questioned how the line would be marked and also, if the line changed would there be another hearing. Wayne Swingle commented once the final regulations are published, there is a 45-day period for comment, then the regulations become law with changes made by the Secretary based on public comments. On enforcement, Coast Guard participation was discussed as well as Marine Patrol. Bait shrimper boats would be distinguished from regular shrimper boats by boat markings.

Duane McMillin, Vikings, Inc., recommended that a marker be placed at each turning point on the line. Day markers would serve the purpose.

Gary McMillin recommended the "hot spots" be buoyed.

John Marini recommended day markers every five miles or so.

Billy Potter questioned what kind of enforcement would be used.

Johnny Walker, stone crabber, commented shrimpers do not support the local economy.

Phil Johnson recommended closing inshore of line to shrimpers from October 5 to May 20.

Thorne Hollister, Ernest Hamilton Stone Crab, Inc., feels the government should pay for buoys.

Les Turner feels buoys should be placed uniformly throughout the distance of the line.

Meeting adjourned at 9:00 p.m.

FINAL

ENVIRONMENTAL IMPACT STATEMENT

FOR THE

STONE CRAB FISHERY

OF THE GULF OF MEXICO

GULF OF MEXICO FISHERY MANAGEMENT COUNCIL
LINCOLN CENTER, SUITE 881
5401 WEST KENNEDY BOULEVARD
TAMPA, FLORIDA 33609

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL MARINE FISHERIES SERVICE
SOUTHEAST REGION
9450 KOGER BOULEVARD
ST. PETERSBURG, FLORIDA 33702

SUMMARY SHEET

Environmental Impact Statement for the Stone Crab Fishery of the Gulf of Mexico.

( ) Draft (x) Final Environmental Statement

Responsible Agencies: Gulf of Mexico Fishery Management Council
Contact: Wayne Swingle
Lincoln Center, Suite 881
5401 W. Kennedy Boulevard
Tampa, Florida 33609

National Marine Fisheries Service
Contact: William H. Stevenson
Regional Director
9450 Koger Boulevard
St. Petersburg, Florida 33702

1. Name of Action (X) Administrative ( ) Legislative

2. Description of Action: The proposed action will result in management of the stone crab fishery in the Gulf of Mexico Fishery Conservation Zone (FCZ)adjoining the west coast of Florida from the Florida-Alabama line southward to and including the Florida Keys. The basic objectives will be to manage these stocks for their optimum yield to domestic user groups, while reducing conflicts between fishing sectors, conserve the stocks while attaining their full utilization, establish an effective informational reporting system, and promote uniformity of regulations throughout the management area. The management actions will be implemented through the Fishery Management Plan for Stone Crabs prepared pursuant to the Fishery Conservation and Management Act of 1976 (P.L. 94-265).

3. Management Tools: In order to achieve the overall management objectives listed above, regulations are proposed for the stone crab fishery and a portion of the shrimp harvesting sector in the management area. Proposed measures include: harvest practices, fishing season, gear restrictions, vessel enumeration, information reporting system, and establishment of a separation line with its auxilliary provisions. Alternative management measures and their impacts are discussed.

4. Summary:

a. Impacts

(1) No changes in the physical environment are expected to result from this action.

(2) Impacts of the proposed regulations and adoption of state regulations in the FCZ would be biologically advantageous to stone crab stocks. Additionally, the proposed separation line may prove advantageous to shrimp stocks in potential increase in harvested size composition.

(3) Minor adverse economic impacts are expected.

b. Unavoidable Adverse Impacts

Only minor unavoidable adverse impacts are expected. These occur from adjustments in traps to provide escape panels and in reporting requirements.

5. Alternatives: Six categories of alternatives to the proposed action were evaluated with both more restrictive and less restrictive components.

(a) Size regulations
(b) Harvest practices
(c) Seasonal limitations
(d) Closed Areas
(e) Gear restrictions
(f) Statistical reporting systems

6. Comments Requested

Department of Interior
Department of State
Department of Agriculture
Department of Transportation
Department of Energy
Environmental Protection Agency
Florida, Alabama, Mississippi, Louisiana, and Texas state agencies
All Fishery Management Councils
Southeast Fisheries Association
Florida Shrimp Association
South Carolina Shrimpers Association
Texas Shrimp Association
Louisiana Shrimp Association
Florida League of Anglers
North Carolina Commercial Fisheries Association, Inc.
Alabama Fisheries Association

Written comments were received from the following:
Department of Interior
Environmental Protection Agency
Marine Mammal Commission
Georgia Fishermen's Co-Op, Inc.

The letters are reproduced in the Appendix, (Section 9) to the FEIS with responses to substantive comments.

7. Hearings

City	Date	Location
Corpus Christi, TX	27 Nov 78	Texas A&M Research and Extension Center
Charleston, SC	28 Nov 78	SC Dept. of Wildlife and Marine Resources Center
Biloxi, MS	28 Nov 78	Marine Education Center
Bayou La Batre, AL	29 Nov 78	City Hall - Courtroom
Townsend, GA	30 Nov 78	Village Inn
Apalachicola, FL	30 Nov 78	Franklin County Courthouse
Wrightsville Beach, NC	5 DEC 78	Holiday Inn
St. Augustine, FL	7 Dec 78	Sheraton - Anastasia
Cedar Key, FL	11 Dec 78	City Hall
Marathon, FL	11 Dec 78	Marathon High School Cafeteria
Tarpon Springs, FL	12 Dec 78	St. Petersburg Junior College Tarpon Springs Campus
Key West, FL	12 Dec 78	Key West High School Auditorium
Ft. Myers, FL	13 Dec 78	Ft. Myers Exhibition Hall (Patio Room)
Everglades City, FL	14 Dec 78	City Commission Room, City Hall

All hearings began at 7:30 P.M.

Comments received at the above hearings have been collated and summarized with appropriate responses in the Appendix (Section 9) to the FEIS.

8. Draft Statement to EPA: October 27, 1978

9. Final Statement to EPA: date

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INTRODUCTION

For the past two decades the State of Florida has closed to shrimping a large area of water off the southwest coast known as the Dry Tortugas nursery grounds. The nursery area provided a sanctuary for young, maturing shrimp and also served as a boundary line between stone crab and pink shrimp fishermen. Stone crabbers fished their traps inside the nursery area while shrimpers essentially fished outside the nursery area. Under this arrangement conflicts between the two user groups were rare, even during the three-month period (February-April) that the fisheries overlapped. In recent years, however, the stone crab fishery has expanded offshore, and effort has increased in the shrimp fishery resulting in territorial conflicts during the period of overlap.

In 1976, two major events occurred which led to conflict between these two fisheries. A poor shrimp season along the South Atlantic coast coupled with the displacement of U.S. shrimpers from foreign waters by nations that extended their fisheries jurisdiction caused an influx of shrimpers into the fertile pink shrimp fishery off Florida. Concomitantly, a decision was reached by the U.S. Supreme Court, U.S. v. Florida, which re-defined the seaward boundary along the Florida Gulf coast and effectively disrupted the provisions of the Florida nursery area statute. Although Florida could still control and regulate its citizens in the Dry Tortugas nursery area, the state had no authority over out-of-state fishermen more than nine nautical miles off the coast. The combined effect of these two events resulted in major gear conflicts within the former nursery area and set the stage for threats and acts of violence between stone crab and shrimp fishermen as well as other fishermen using incompatible gear in the same area.

As a stop-gap the U.S. Coast Guard designated a boundary in the disputed area in an attempt to confine shrimp fishing activities to one side and stone crabbing to the other. The line established by the Coast Guard was unenforceable and did not effectively resolve the dispute. The Fishery Conservation and Management Act of 1976 (P.L. 94-265) provides for the preparation of management plans by the Gulf of Mexico Fishery Management Council for all fisheries that occur within the 200-mile U.S. Gulf Fishery Conservation Zone. However, no single agency has authority to resolve the dispute within and outside the Territorial Sea. The Council with the assistance of the other concerned agencies is addressing this issue. A jurisdictional gap will continue to exist, however, until a specific management plan governing the stone crab or shrimp fishery is adopted. This DEIS/FMP for the stone crab fishery presents specific management options designed to resolve the conflict.

1.0 STATEMENT OF PROPOSED ACTION

The proposed action is to implement a fishery management plan establishing a management regime for stone crabs in the Gulf of Mexico Fishery Conservation Zone adjoining the West Coast of Florida from the Florida-Alabama line southward to and including the Keys. Management measures are confined to this area

because of the limited abundance of stone crabs in the remainder of the Gulf. The action is authorized by the Fishery Conservation and Management Act of 1976 (P.L. 94-265).

This document is prepared in compliance with the National Environmental Policy Act of 1969 which requires a detailed Environmental Impact Statement when major federal actions significantly affect the quality of the human environment.

1.1 Management Objectives

The Council has determined that the plan address the following objectives:

1.1.1 Provide for orderly conduct of the stone crab fishery in the management area in order to reduce conflict between stone crab fishermen and other fishermen in the area.

1.1.2 Establish an effective fishery statistical reporting system for monitoring the stone crab fishery.

1.1.3 Attain full utilization of the stone crab resource in the management area.

1.1.4 Promote uniformity of regulations throughout the management area.

1.2 Description of the Fishery

1.2.1 Stone Crab Environment

The stone crab, Menippe mercenaria (Say), occurs throughout the Gulf of Mexico and in the Atlantic Ocean as far north as Cape Lookout, North Carolina, with some records from the Caribbean. The U.S. fishery for this species is largely restricted to South Florida where abundance is greatest due to more favorable habitat conditions.

Stone crabs are estuarine dependent with the juveniles inhabiting the bays and estuaries and adults moving offshore. The low-energy coast line of Southwest Florida with its shallow shelf, sea grass beds, and numerous rock outcroppings provides excellent habitat for this species. Large estuarine systems and the Ten Thousand Island area adjacent to the Everglades serves as a vast nursery area for the subadults.

Inshore grass beds are utilized for spawning, and the pelagic larvae drift into the bays where they become benthic and grow rapidly. Shelter in the form of rock, shell, sponge or other protective cover is sought by the stone crab throughout its life span. Those without cover burrow into the bottom. As the crabs grow and mature, they move offshore to deeper water. The fishery presently extends to depths over sixty feet and may be thirty miles offshore.

Natural enemies include predator fishes, particularly on the juvenile forms. Octopuses prey on the adult population, and occasional blooms of the red tide organism Gymnodinium breve, may devastate local populations. A major predator is of course, man, removing some four million pounds (live weight) of crabs annually from the fishery. Even though all crabs are returned to the water after claw removal, a high percentage suffer mortality in the process.

Degradation of estuarine habitat through dredge-fill operations and pollution by excessive nutrient loading of the bays through sewage discharge has been a more serious threat to estuarine-dependent species than fishing mortality. More stringent State and Federal regulation in permitting such operations has greatly reduced the trend toward loss of habitat for the estuarine animals.

1.2.2 Human Environment.

There are approximately 950 commerical fishermen engaged in the fishery and an estimated 46 dealers and processors employing 106 people.

The ex-vessel value of the product in the 1978 season was in excess of $3.8 million with a wholesale value of about $4.6 million.

Few fishermen rely entirely on the stone crab fishery because the season is closed five months. Many are also engaged in the spiny lobster fishery which utilizes similar gear and fishing area.

The fishery remained small and was restricted to inshore waters until the 1960's. Most activity was centered around Florida Bay. Since that time, the commercial fishery has mushroomed and continues to grow as fishermen move further offshore. Most landings are made between Key West and Panacea, Florida, with the greatest production coming from Florida Bay.

Crab fishermen deploy stationary traps on the bottom while shrimpers drag trawls across the bottom. Shrimpers fish at night, and many are newcomers displaced from the depressed fishery of the South Atlantic Coast or from grounds off foreign countries by extension of their fishery jurisdiction. Many of these shrimpers are unfamiliar with the area and the practices of the stone crab fishermen. The result has been the destruction and loss of crab traps and armed conflict in some instances between shrimpers and crabbers.

The recreational fishery for stone crabs is not large as compared with the commerical fishery but is increasing. Some recreational fishermen utilize traps, but most are wade fishermen in family groups. The recreational fishery is limited almost entirely to the state's internal waters and territorial sea.

1.3 Related Federal Activity

1.3.1 Shrimp Fishery Management Plan

Under the provisions of the Fishery Conservation and Management Act of 1976, (P.L. 94-265), the Gulf of Mexico Fishery Management Council is responsible for developing a management plan for each fishery within its geographical area of authority. A plan for the Gulf shrimp fishery is concurrently being developed with the stone crab plan. The shrimp plan will consider as a management option the reestablishment of the shrimp nursery sanctuary in Florida Bay adjacent to the Everglades and the Keys.

1.3.2 Everglades National Park

The 750,000 acres of brackish and salt water in Everglades National Park lies in the heart of stone crab range and provides an ideal habitat and nursery area. Stocks which lie within the Park boundaries are managed by the Department of the Interior, National Park Service.

Park regulations have closed 375,000 acres of the Park to crab fishing, and provide that only male crabs may be harvested from the open area. The concept is to maintain an undisturbed ecosystem in the closed area and to maintain high populations of adult female crabs.

The Park "sanctuary" can serve as an undisturbed reservoir of brood stock and may provide a genetic pool for future stocks.

1.3.3 Coral Reef Management

The Bureau of Land Management of the Department of the Interior has issued regulations for protection and management of coral communities under authority of Sec. 5, Outer Continental Shelf Lands Act (67 Stat. 462; 43 U.S.C. 1334). Coral reefs provide essential shelter and habitat for the bottom dwelling stone crabs. This action provides interim protection until the Secretary of Commerce can implement a Coral Management Plan being developed by the Gulf of Mexico Fishery Management Council.

1.4 Proposed Regulations

In order to achieve the management objectives listed in Sec. 1.1, regulations are proposed for the stone crab fishery in the fishery conservation zone of the management area (Florida from the Florida-Alabama line southward through the Keys). These regulations for the greater part are in conformity with Florida regulations. (* notes conformity to Florida law.)

1.4.1 Size restrictions

*Minimum claw size of 2-3/4 inches (propodus); both claws may be harvested.

1.4.2 Harvest practices

1.4.2.1 *Declawed crab bodies returned to the water and not landed.

1.4.2.2 Live crab holding box be shaded

1.4.2.3 *Illegal to pull another person's traps.

1.4.3 Closed season

1.4.3.1 *Season closed between May 15 and October 15

1.4.3.2 *Grace period for trap placement and recovery (10 days before and 5 days after open season)

1.4.3.3 *Traps may be pulled only in daylight hours

1.4.4 Closed area

1.4.4.1 *The area of the FCZ shoreward of the line shown in Figure 1 (A-F) to be closed to trawling from January 1 to May 20 except:

a. *live bait shrimp trawling is permitted by marked vessels.

b. limited, supervised exploratory shrimp fishing is permitted.

1.4.4.2 State action to adopt similar regulations for Territorial Sea adjacent to the closed area is recommended.

1.4.5 Gear restrictions

Degradable panel required in nondeteriorating traps.

1.4.6 Statistical reporting

1.4.6.1 Enumeration for informational purposes required of all stone crab vessels fishing in the FCZ .

1.4.6.2 Monthly reporting of pounds and value of catch and pounds and value of processed products by wholesale dealers and processors.

1.4.6.3 Monthly submission of trip tickets or log books by commercial fishermen of catch, number of traps, and area of capture.

2.0 RELATIONSHIPS OF THE PROPOSED ACTION TO LAND-USE PLANS, POLICIES AND CONTROLS

State conservation agencies have the management responsibility for stone crab stocks in state territorial waters. In the Gulf of Mexico these agencies are Alabama Department of Conservation and Natural Resources, Florida Department of Natural Resources, Louisiana Department of Wildlife and Fisheries, Mississippi Marine Conservation Commission, Texas Parks and Wildlife Department. Florida, however, is the only state that presently regulates the stone crab fishery.

Stone crab stocks that occur within the boundaries of Everglades National Park are managed by the National Park Service U.S. Department of Interior.

Stone crab stocks within the Fishery Conservation Zone (FCZ) will be managed by the U.S. Department of Commerce under this Fishery Management Plan developed by the Gulf of Mexico Fishery Management Council.

2.1 Treaties or International Agreements

There are no treaties or international agreements which apply to stone crab stocks of the Gulf of Mexico.

2.2 Federal Laws, Regulations and Policies

The Fishery Conservation and Management Act of 1976 (Public Law 94-265) defines specific procedures for management of fisheries within the Fishery Conservation Zone (FCZ). Prior to enactment of this law there was no legal mechanism for the management of stone crabs in waters beyond the Gulf states territorial seas.

The Endangered Species Act of 1973 (P.L. 93-205) is for the conservation of endangered and threatened species. Because of the possibility that manatee and sea turtles may become entangled in stone crab gear, the Gulf of Mexico Fishery Management Council requested a Section 7 threshold consultation with the Fish and Wildlife Service and the National Marine Fisheries Service. The opinion derived from the consultation was that the proposed management regulations contained in the Stone Crab Plan are not likely to jeopardize the continued existence of any threatened or endangered species; or result in the destruction or adverse modification of habitat determined to be critical to such species.

Marine Mammal Protection Act of 1972 (P.L. 92-522) is for the conservation and protection of marine mammals. There are no records of marine mammals other than the manatee having been adversely affected by activities of the stone crab fishery. The biological opinion from a Section 7 threshold consultation under the Endangered Species Act stated that the management regulations of the Stone Crab Plan are not likely to jeopardize the continued existance of the manatee.

Stone crabs are benthic animals. Protection of the bottom communities they occupy is of vital importance. Therefore, federal legislation pertaining to the protection and management of marine coral communities has

an impact on stone crab management. Under authority of Sec. 5, Outer Continental Shelf Lands Act (67 Stat. 462; 43 U.S.C. 1334), the Bureau of Land Management (U.S. Dept. of the Interior) has issued regulations relating to the protection and management of viable coral communities located on the Outer Continental Shelf. These regulations, published in the Federal Register, Sept. 16, 1976 (Vol. 41, No. 181) state that "no person shall engage in any operation which directly causes damage or injury to a viable coral community that is located on the Outer Continental Shelf...". The Outer Continental Shelf Lands Act therefore affords considerable protection to habitat occupied by stone crabs.

The Coastal Zone Management Act of 1972 (P.L. 92-583) provides for planning and management of coastal areas. Implementation of P.L. 92-583 is carried out by individual states. Land use policies under Coastal Zone Management programs may have an important impact on stone crab populations since nearshore water quality is frequently controlled by these programs. The stone crab stocks impacted by this plan, however, occur in that portion of the FCZ off Florida which does not have a Coastal Zone Management Program.

Stone crab stocks within the boundaries of Everglades National Park are regulated by the National Park Service, U.S. Department of Interior. It is recognized that the primary management objectives of the National Park Service differ from those of the State and the FCMA, however, a cooperative management system will be established to the extent possible.

2.3 State Laws, Regulations and Policies

Since the stone crab fishery is limited primarily to coastal waters of Florida, the laws, regulations and policies of this state have major impact upon the management of this fishery. Stone crab fishery laws are in yearly editions (from 1929 to Present) of the Laws of Florida, primarily in Chapters 370.13 and 370.14. These laws are also referenced in the statutes of Florida (Chapters 370.13 and 370.14).

Florida statutes establish a minimum size to ensure crabs are two years old and have the potential of spawning before entering the fishery. Declawing and return of the live animal to the water was instituted as a conservation measure. Fishing is prohibited during the peak egg development period. Trap limits and gear restrictions were initiated in an attempt to allocate catch among fishermen. Traps are required to be visibly marked so as not to be navigation hazards. The registration and marking of boats and gear is required to facilitate enforcement. For the most part present state plans and regulations for the stone crab fishery within the territorial sea of Florida are compatible with the management options presented in the FMP. Should viable stone crab fisheries develop in other Gulf Coast states, regulations adopted should also be compatible with these management options.

2.4 Local and Other Applicable Laws, Regulations and Policies

An act limiting the number of traps which may be used for stone crab fishing on any one boat (600 trap maxima per boat) in Citrus, Dixie, Levy

or Taylor counties is a current state law applicable to only a portion of the state populace and may be interpreted as local law. It is the only state legislation limiting the number of traps. It should be noted that this act only restricts the number of traps set by a fisherman in county waters and does not restrict or prevent him from setting any number elsewhere in territorial waters.

The Monroe County Shoreline Protection Ordinance established a shoreline protection zone to maintain the functional integrity of mangrove communities and to preserve marine productivity. Uses and activity within this zone are restricted.

The Special Treatment Areas Ordinance of Collier County provides for the identification of ecologically important areas (e.g., mangroves and estuaries) and the establishment of standards for development.

3.0 PROBABLE ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

The impacts presented in this section are those that could be caused by the proposed regulations presented in Section 1.4 and are based on changes from the situation during the period 1972-1977.

3.1 Physical Impacts

Little, if any change in impact on the physical environment is envisaged from implementation of management regulations proposed for this plan. Decrease in shrimp trawling shoreward of the separation line during the stone crab season may decrease the disturbance of the benthic habitat, while the same restriction will increase trawling efforts offshore. The effects of such physical impact would be difficult to determine. Other recommended regulations dealing with harvest practices, fishing seasons, vessel enumeration, information reporting, and other aspects of the establishment of a separation line should have no physical impact.

3.2 Biological Impacts

The impacts of the proposed regulations and adoption of state regulations in the FCZ would be for the most part biologically advantageous to stone crab stocks. In addition, the impact of the proposed separation line may prove advantageous to the shrimp stocks in the potential increase in harvested size composition of the catch.

3.2.1 Harvest Practices

The harvestable minimum claw size of 2-3/4 inches assures the adequate reproduction potential because this minimum size is above the size at sexual maturity. This minimum approximates the "critical size" which is that harvestable size at or above the point where recruitment and growth equals natural mortality.

Returning declawed crabs and undersized crabs to the water enhances future harvest of the stocks. Survival rates of 20 percent for declawed legal-sized crabs and claw regeneration to harvestable sizes within a year of loss has been demonstrated. Declawing crabs at sea and returning the animals in areas of natural stone-crab habitat and not dumping crabs in one mass should enhance the survival and growth of the harvested crabs.

Minimizing the dessication (drying) level and time of both declawed and crabs held for declawing would increase the survival potential of crabs returned to the water. There is evidence that exposure to air or crowded holding conditions influence survival. The reproductive potential of adult stone crabs is reduced and egg viability and larval survival lowered considerably - up to 60% loss when animals are held out of water and exposed to sunlight half a day (5 hrs). Storing whole crabs (not declawed) in a holding box and protected from direct sunlight by a canopy are proposed regulations.

The proposed regulations making it illegal to pull another person's traps in the FCZ and restricting the pulling of traps to daylight hours have no discernable biological impact.

3.2.2 Fishing Season

The proposed season closure to harvesting extends between May 15 and October 15 and is patterned after present Florida law. The greatest ovarian (egg) development is found during the warmest months of the year with initial development brought on by increased light intensity and temperature (spring) with new egg formation curtailed by decreasing light intensity during the fall. Evidence indicates that mating occurs late in the year (November or December) and the female molts and mates again soon after spawning. Embryonic development requires 9-13 days, and then hatching occurs. Essentially most egg-bearing females occur during the closed season, and therefore such a regulation will have positive biological effect in conserving the reproductive potential of the stocks.

The grace period for trap placement of 10 days before the onset of the season allows for "soaking time" for traps and has little, if any, biological impact.

3.2.3 Gear Restrictions: Degradable Panels in Nondeteriorating Traps

Management regulations of this type would reduce mortalities and minimize non-harvest of entrapped stone crabs. Self destruct panels would increase reproductive and harvestable capacity of the stock by returning individuals to the habitat. Wood slat traps are currently the primary traps used in this fishery and are considered self-destructing. Adult crabs are capable of crushing the slats, and smaller crabs are able to escape so that only non-deteriorating traps require a self-destruct panel.

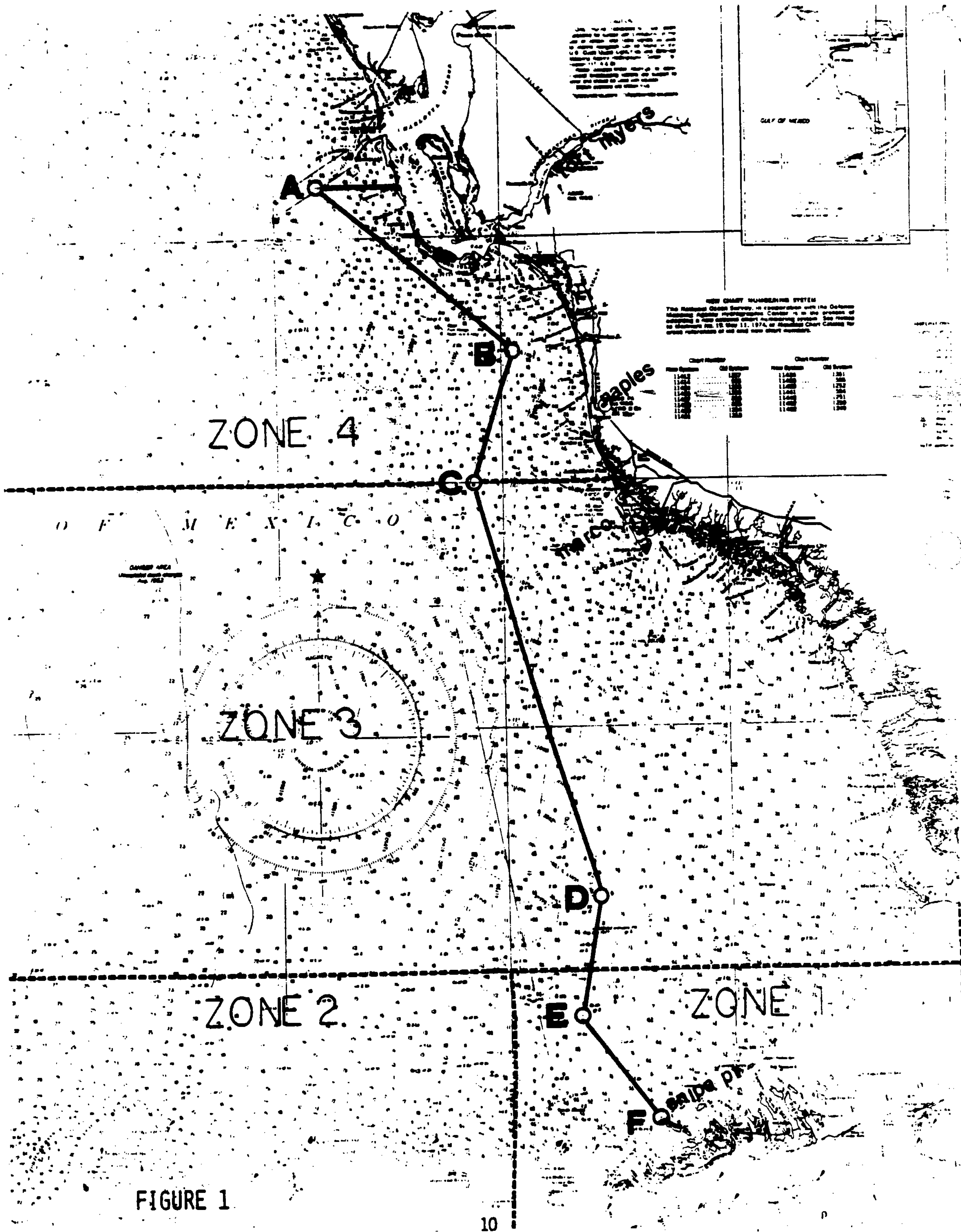

FIGURE 1

3.2.4 Vessel Enumeration, Classification of Fishermen, and Information Reporting

Vessel enumeration is dictated presently in Florida law as a permit system and does not impose a form of limited entry as there is no upper limit in the number of such permits and by itself will have no biological impact.

Improvement and refinement of the existing data collection system would increase validity of the data base for subsequent analysis and allow for tracking of MSY/OY determinations. The effectiveness of regulations proposed by this management plan could be more accurately determined and subsequent adjustments, if necessary, of management options could be made. The biological impact would be the enhancement of conservation methodologies.

3.2.5 Establishment of Shrimp/Stone Crab Harvest Separation Line

The proposed regulation of a compromise line of separation as indicated in Section 1.4.4 is the primary focus to resolve gear conflict in this fishery. Shrimp trawling is to be prohibited inside (shoreward) of the line during January 1 to May 20. Limited supervised exploratory fishing for shrimp is to be allowed and no biological impact is expected. Live bait shrimping will be allowed to continue inshore of the line during the enforcment period.

The biological impact of the separation line and the prohibition of inshore shrimp trawling should benefit the shrimp stocks. Basic shrimp research shows that young shrimp develop in the inshore areas and grow during the offshore migration approaching "optimal size". Postponement of harvesting until May 20 should increase the individual size of shrimp and total weight harvested.

3.3 Social and Economic Impacts

3.3.1 Impact on the stone crab fishery and fishermen and related industry

Proposed harvest practice management measures that include minimum claw size, return to the water of declawed crabs, harvest of both claws, and prohibition against pulling other persons' traps are currently consistent with Florida law, and these management measures will not have an economic impact.

The requirement for a shaded live box should not have a significant economic impact because most vessels already utilize canopies, and minimum measures are required to equip vessels to comply with such a provision.

The stone crab fishing season proposed by the management plan is currently in effect for Florida resident fishermen and extending these regulations into the FCZ should have no economic impact.

Table 1. Summary of economic impacts of adopted stone crab management options by impact category, January, 1979

Impact Category	Harvest Practices	Fishing Season	Gear Restrictions (Stone Crab)	Vessel Enumeration	Information Reporting	Resolve Gear Conflict	
						Stone crab	Shrimp
	Dollars						
1) Price	0	0	0	0	0	-105,000	0
2) Supply (production costs)	0	0	-26,430	0	0	+75,000	0
3) Employment	0	0	0	0	0	small, if any	small increase expected
4) Distribution of Income	0	0	0	0	0	0	0
5) Productivity	0	0	0	0	0	+136,500	+1.8 mil.
6) International impact	0	0	0	0	0	0	0
7) Market structure	0	0	0	0	0	0	0
8) Government sector	0	0	0	0	-16,500	0	0
TOTALS	None	None	-26,430	None	-16,500	+106,500	+1.8 mil.

Implementation of the regulation requiring a degradable panel on non-deteriorating traps should have little economic impact. It is estimated that 90 to 95 percent of traps currently in use are wooden, and the industry feels that these traps are essentially self-destructing. The remaining 5 to 10 percent of the traps are non-deteriorating (metal or plastic) and as such would require degradable panels at an estimated cost of $.75 to $1.00 per trap. Maximum number of these metal/plastic traps is 26,430 (1978 figure) with a maximum cost estimate of the panels to be $26,430 or about one percent of total trap investment. This added cost is not considered to have an appreciable market price effect.

Vessel enumeration for informational purposes may have a minimal economic impact on stone crab fishermen. Currently, a vessel "permit" is required by Florida law; however, there is no fee.

The cost of the proposed information reporting management measures will be paid primarily by the National Marine Fisheries Service (estimated to be $15,000 for the 1978-1979 season) and will have little direct economic impact on stone crab fishermen. The economic impact on the fishermen is an opportunity cost and can be calculated in terms of time needed to complete the daily fishing log. It would amount to a total of 18 hours for each fisherman spread over the entire fishing season and the entire commercial stone crab fishery would devote 700 days per season to informational reporting.

The adoption of a line separating shrimp and stone crab harvesting presents economic impacts on both groups of fishermen. This line is described in Section 1.4 and is illustrated as line A-F in Figure 1.

The effect of excluding shrimp trawling inside the line from January 1 to May 20 is expected to eliminate the stone crab gear loss of 15,000 traps at an estimated value of $75,000 (1977-1978 season). This value is based on 50 percent of the cost of a new trap. The actual loss, not quantified, was higher due to loss of fishing effort of the destroyed gear. The reduced risk of trap loss will tend to increase stone crab harvesting efforts and provide fishermen with a greater choice in trap placement.

Greater freedom in trap placement inshore of the line, is expected to result in larger harvests by stone crab fishermen during the period when shrimping is not permitted shoreward of the line. Estimates of this larger annual harvest are 75,000 pounds of claws valued at $136,500.

The social impact, because of the extreme lack of sociological information is difficult to ascertain. Some sociological adjustment on the part of the fishing sector will be necessary to maximize the effectiveness of the informational reporting system.

The economic impact (ref. Table 1) on the stone crab harvesting sector can be summarized as follows:

Supply: Reduction in loss of traps with a resultant saving of $75,000 annually.

Prices: Current ex-vessel prices of claws are estimated to decrease by about 5 cents per pound. The price decrease will result in gross income decrease of about $105,000 annually.

Productivity: Net production is expected to increase by about 75,000 pounds of claws or about 4 percent. Gains to crabbers will be approximately $136,500 annually.

Employment: Production is expected to increase. This increase will be absorbed by present operating units with little or no increase in employment.

Market Structure: No significant impact expected.

Distribution of income: No information available.

International implications: No foreign fishing is presently involved.

Benefits and costs: Stone crab fishermen would realize a net gain of about $106,500 annually but would absorb a cost of $26,430. There would be some limited marketing gains. The potential loss of life, incapacitation, and major property loss (vessels) from gear conflicts cannot be ascertained in an economic sense. However, the separation line is expected to prevent possible major conflicts among fishing sectors.

3.3.2 Impact on the shrimp fishery, fishermen, and related industries:

The only proposed management measure in this fishery management plan to impact the shrimp fishery is the establishment of the separation line during the January 1 to May 20 period and the exclusion of shrimp trawling inshore of this boundary during that time.

Implementation of the boundary as illustrated in Figure 1 (and Figure 12-2 in the FMP) will have both a positive effect and a negative impact on the shrimp harvesting sector. The benefits to the fishery will be based on the closing of the shrimp nursery grounds allowing development and growth of the shrimp stocks which will be available, after the initial closure, both outside the line during the January 1 to May 20 period and inside the boundary after May 20. Thus the positive effect will be a combination of additional shrimp caught outside the line and a higher value for the larger-sized shrimp. The negative effects of the separation line will be the amount or value of legal sized shrimp that could be harvested if no boundary existed and fishing was allowed shoreward of the proposed line in the nursery grounds.

Basic shrimp data is collected in terms of grid zones (Figure 1, numbered bold rectangles). The analysis of the potential negative impact was conducted on a zone basis and then summarized resulting in an estimated 275,000 pounds of shrimp not landed because of the proposed management regulation prohibiting trawling shoreward of the separation line during the specified period.

The positive impact of harvest restrictions outside the line involves both a poundage and value effect. The basic premise is that some of the shrimp not allowed to be harvested inside the boundary during the January 1 to May 20 period will be caught outside the line or may be caught inside the line after May 20. Furthermore, the value effect is based on the proposition that shrimp allowed to develop will be larger on the average than if they were caught in close proximity to or in the nursery areas and large shrimp are priced higher than small shrimp. Commercial catch data for shrimp in the 6-10 fathom area supports the biological argument on increased size. While a firm estimate of positive effects prior to enactment of the boundary is impossible to derive, given the available data a one million pound positive effect does not appear unreasonable.

Combining the negative poundage effect with the estimated positive value effect gives a net positive effect of about 725,000 pounds harvest.

Using an average shrimp size of 36-40 count and a September 1978 price of $2.43 per pound, the net positive value effect of curtailing shrimping inside the line is projected to be about $1.8 million. Dividing this total among the 910 shrimp vessels fishing the grounds during the 1976 season there is a positive effect on total revenue for each vessel of $1,936.

The economic impact on the shrimp harvesting sector can be summarized as follows:

Supply: There should be little, if any, change in overall cost.

Prices: The poundage involved is relatively small compared to the total annual U.S. supply of shrimp (0.1 percent) so that the effect on shrimp prices would be negligible.

Productivity: Production is expected to show a net increase of 0.725 million pounds valued at $1.8 million. Higher production is expected from added size of harvested shrimp.

Employment: There would be a minor increase in employment although most of the increased harvest would result from higher per vessel catches for the existing fleet.

Market Structure: No shift in market structure is expected.

Distribution of income: Any positive benefits will accrue to all participants. Total revenue increases per vessel (910

shrimp vessels) would be $1,936. However, a number of vessels from the South Atlantic area and a number of Florida boats fished in the traditional nursery areas in the 1977 and 1978 seasons, and their impact is difficult to ascertain. It is anticipated that those boats which fished in the area of the FCZ shoreward of the line segments B-C, C-D may experience a considerable adverse impact.

International Implications: No foreign fishing is involved.

A tabulated summary of the benefits and costs to both the stone crab and shrimping sectors is given in Table 1.

4.0 ALTERNATIVES TO THE PROPOSED ACTION

4.1 Size regulations

4.1.1 No size regulation - The present fishery is based primarily on year III and IV crabs with a large population of sub-legal size year II crabs available for recruitment. This is the result of Florida law which prohibits taking, possession, or sale of stone crab claws smaller than 2-3/4 inches. If the FCZ did not conform, the effect would be minimal so long as Florida continued enforcement of its possession and sale regulations because all claws are presently landed in Florida ports. If this were not the case and claws smaller than 2-3/4 inches could be harvested and landed from the FCZ, year II crabs would be fished resulting in higher catch the first year with lower landings in subsequent years due to the loss of recruits. Crabs would be fished below the critical size.

Enforcement of the Florida size limit by state officials would become more difficult, possibly undermining a well-managed program.

4.1.2 Maximum size limit - This would result in a waste of the resource because very large crabs reach a terminal molt and no longer spawn.

4.2 Harvest Practices

4.2.1 Permit the landing of whole crabs - Studies by the Florida Department of Natural Resources have shown that over 20 percent of legal, declawed stone crabs survive and regenerate claws. If, however, the whole animal is landed and killed, the 20 percent that now survive to reenter the fishery, would be lost.

4.2.2 Permit the taking of one claw - Florida regulations permit harvest of both claws so a one claw limitation in the FCZ would be difficult to enforce. Studies have shown a 20 percent survival of crabs with both claws removed. A one claw limitation would severly reduce present production.

4.2.3 Require immediate return of declawed crabs to the water - This requirement is technically part of the Florida statute but is not followed in practice. Claws to be retained any length of time aboard the vessel must be chilled or cooked on board to prevent spoilage. The latter is impractical, and chilling prior to cooking destroys the value of the product because the meat adheres to the shell.

4.2.4 No shading required of live crab holding box - Unshaded crabs will suffer higher mortality and fewer can be expected to return to the fishery. Additionally, claws removed from dead crabs can be of poor quality.

4.2.5 Prohibit the harvest of claws of egg-bearing females - The establishment of a fishing season will give adequate protection to egg-bearing females during peak spawning. The non-retention of egg-bearing females would be inconsistent with the Florida state law.

4.2.6 Prohibit harvest of female crabs - This would conflict with Florida regulations and would be difficult to enforce. It would cut production severely. There is no evidence of a shortage of spawning crabs.

4.2.7 No action to prohibit pulling another's traps - Florida statutes presently prohibit robbing crabs from another's traps in the territorial sea. This prohibition should also apply within the FCZ for consistency throughout the management area and to avoid conflicts.

4.2.8 Limitation on catch by recreational stone crab fishermen - It was recommended as an option that recreational fishermen be limited to 24 claws per person per day. The recreational fishery is small in comparison with the commercial fishery. There is no supporting biological justification for such action in this growing fishery. Practically no recreational fishing takes place in the FCZ.

4.2.9 Limited Access System - Limited entry for commercial fishermen was considered and rejected as unnecessary. Insufficient economic data are available to determine the need for and impact of such drastic action.

4.2.10 Limit Number of Traps Fished per Boat - This option was suggested by the Task Force Team to prevent saturation of the fishing grounds with traps. It was rejected by the Advisory Panel and Council because there are no biological data supporting a limitation, and such action would decrease the efficiency of the fishing operation.

4.3 Season

4.3.1 A fishing season other than from October 15 through May 15 - Egg bearing females occur in greatest abundance between May 15 and

October 15. Any other fishing season would conflict with the existing season established in Florida waters.

4.3.2 Harvest be permitted both day and night during open season - As a means of controlling theft of crabs from traps, Florida law prohibits pulling traps at night. To permit the harvest of crabs in the FCZ at night would undermine Florida's enforcement program, facilitate theft of crabs, and increase loss to legitimate fishermen.

4.4 Closed area

The purpose of developing a fishery management plan for stone crabs on an emergency basis was to decrease the opportunity for territorial conflict between shrimp fishermen and crab fishermen. The area shown in Figure 1 to be closed to shrimp trawling from January 1 to May 20 was considered to be a fair apportionment of the contested area. Much of the area proposed for trawl closure contains mostly shrimp too small for harvest and had previously been closed to trawling by Florida law because of the small size of the shrimp.

4.4.1 The 8 fathom line - A straight line along the 8 fathom contour from off Sanibel Island to Snipe Point in the Keys was an option for a boundary between crab and shrimp fishermen, the latter to operate to the West. This line approximates one established by the Coast Guard in the 1978 season to separate the fishermen. (In Figure 1, this straight line connects points A, C, D and Snipe Point.)

This line was modified by the Shrimp-Stone Crab Subcommittee and the Council because it would close an important shrimp fishing area southwest of Sanibel.

4.4.2 Several other lines of separation, including no line, (No Action Alternative) were considered but rejected on the basis of inequitable or adverse impacts on the fisheries involved. The line adopted appears to have the least unfavorable impact on both groups of fishermen.

4.4.3 Crab fishing beyond the closed area - Consideration was given to closing the area outside from January 1 to May 20. However, because of the projected adverse effect on the stone crab industry and the likelihood that crabbers can place their gear outside the line in rocky areas not suitable for shrimp trawling, this measure was rejected.

4.4.4 Prohibit shrimping inside the line from February 15 to April 15 - This measure was rejected because it was felt that this shorter period would not eliminate the gear conflict.

4.5 Gear restrictions

Specifications and restrictions on gear, other than a degradable panel to destroy effectiveness of lost traps, were rejected. Fishermen pre-

sently construct and mark traps in accord with Florida law. Trap lines can be expected to crisscross the territorial sea-FCZ boundary. Conflicting or duplicate regulations were deemed to be unnecessary and confusing for fishermen.

4.6 Statistical Reporting

4.6.1 Require federal permits for informational purposes for all stone crab vessels fishing in the FCZ - This option was rejected in favor of vessel enumeration which was determined to be inclusive.

4.6.2 Require federal permits for individual fishermen which designate them as recreational or commercial - This option was rejected because it is not authorized by the FCMA.

4.6.3 Charge a permit or trap fee - The FCMA authorized only a vessel permit fee not to exceed administrative costs. No provision is made for trap fees or vessel permit fees large enough to discourage entry.

5.0 UNAVOIDABLE ADVERSE IMPACTS

Regulations adopted to acheive the stone crab fishery management objectives described in the FMP will result in only minor unavoidable adverse impacts.

5.1 Stone Crab Sector

Management measures that would have an unavoidable adverse impact upon the stone crab sector are the requirements of installing degradable escape panels in non-deteriorating traps and reporting procedures. It is estimated that 5 to 10 percent of the total traps would require degradable panels. The maximum cost is estimated at $26,430 or 1 percent of total trap investments. The cost to the fishermen of information reporting is an opportunity cost and is difficult to estimate. Therefore, the estimate is given in man-days instead of dollars. Assuming an average of 5 minutes per fisherman to complete a daily log, a total of 700 man-days per season would be required.

5.2 Shrimp Sector

Available information indicates that the exclusion of shrimping inside the boundary during the stone crab season will have no overall adverse effects upon the shrimp sector. However, there will be some income redistribution effects. Vessels from distant ports and Florida ports that have fished shoreward of the separation line during mid winter will be adversely impacted. It is anticipated that those boats which fished in the area of the FCZ shoreward of the line segments B-C, C-D may experience considerable adverse impacts. Due to the lack of information on the expected harvesting effort by these vessels a calculation of the potential impact cannot be made.

6.0 RELATIONSHIPS BETWEEN LOCAL SHORT-TERM USE OF THE ENVIRONMENT AND MAINTENANCE OF LONG-TERM PRODUCTIVITY

6.1 Short and Long-term Effects

The proposed management regulations which include harvest practices, fishing seasons, minimal gear restriction, vessel enumeration, classification of fishermen and expanded information reporting are primarily extensions or expansions of State of Florida stone crab management practices. The establishment of a separation line and its ancillary components will have both short and long-term effects.

The initial effect of the separation line should be a solution to the gear conflict discussed in Section 8.ii. E of the fishery management plan. Furthermore with reduced risk of trap loss to shrimp trawlers stone crab fishermen will have a greater freedom of trap placement and a greater harvest effort inside the separation line. Some socio-economic adjustments will be necessary to meet expanded information reporting.

It must also be emphasized that coordination and cooperation must be exercised by federal and state agencies charged with stone crab management responsibilities. To be effective for both short-term use and long-term productivity, the proposed FCZ management strategies must be adopted and enforced by state fisheries managers.

6.2 Foreclosure of Future Options

Although the proposed management recommendations are based upon the best scientific evidence available and the cooperation of the fishing sectors involved, there are possibilities of error due to incomplete information and unpredictable future events. An expanded information reporting system is proposed to track harvesting activities and impacts so that the required yearly review and updating of the fishery management plan can utilize the new data.

The proposed measures have been carefully considered, so that if errors do occur their effects would be in favor of resource stability and conservation and minimize the foreclosure of future resource management options.

7.0 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Minimal irreversible and irretrievable commitments of resources will result from the implementation of this management plan. Basically the plan modifies and/or extends existing State of Florida stone crab fishing regulations to the FCZ. In an effort to eliminate a gear conflict among domestic shrimp/stone crab fishermen a separation line during a specific time frame has been proposed (Section 8.ii. E).

Short-term irretrievable expenditure of public funds associated with monitoring and increased information reporting and analyses are identified in Section 13.iv and 13.ix of the FMP.

Biological Resources - No increase in loss of aquatic flora or fauna populations has been identified. An increase in information reporting is required and yearly plan review will allow for management option changes if adverse impacts are found.

Land Resources - No irreversible or irretrievable commitments of land resources have been identified.

Water and Air Resources - No irreversible or irretrievable commitments of water or air have been identified.

Manpower Resources - An increase, as yet not determined, in expended labor would be required in monitoring and analyzing monthly catch data, wholesale dealer and processor information, as well as management and enforcing regulations of the management plan. These ireversible and irretrievable expenditures will be greater than would be expected if no plan was in effect.

Equipment and Manpower Resources - Implementation of the plan requires monitoring and surveillance which requires the use of additional equipment and consumption of additional materials. Shrimp fishermen will have greater fuel consumption to reach trawling grounds outside the separation line during the time of line enforcement. These uses and consumptions are both irreversible and irretrievable.

8.0. References and notes applicable to this Environmental Impact Statement are found in Section 17 of the Fishery Management Plan.

9.0 APPENDIX

9.1 Summary of Public and Agency Comments on DEIS/FMP

9.1.1 Introduction

This appendix summarizes testimony on the draft EIS/FMP at public hearings or submitted by letter to the Gulf of Mexico Fishery Management Council and National Marine Fisheries Service. Twelve letters commenting on the DEIS/FMP were received. Federal agency and other pertinent letters are included in Section 9.1.3.

Thirteen public hearings were held and attended by 371 members of the public. Section 9.1.2 summarizes comments from these hearings and from the letters received and provides the appropriate responses by the Council/NMFS .

9.1.2 Comments and Responses

1. Comment: Modify the line proposed for separation of trawling from stone crab traps (hereafter known as "the line" by running the line from Point E or Point D (DEIS Figure 1 and FMP Figure 12-2) to terminate at Snipe Point (or a point 2 miles east of Smith Shoal).

   Response: The Council modified the proposed line to terminate at Snipe Point [Section 12 (ii),6.] since it was obvious through testimony of both shrimp and crab fishermen that a westward extension of the line encompassing the Florida Keys was not necessary to resolve the conflict and would adversely impact shrimp fishermen.

2. Comment: The line should run directly from Sanibel Island to Snipe Point at the eight fathom depth.

   Response: This proposal had been originally considered by Council advisory panels and committees as a possible alternative for resolving the conflict and was rejected by the Council. This proposal would eliminate access to shrimpers to the traditional shrimping grounds south of Sanibel Island. The line adopted provides for access to this important fishery and was supported by the shrimp and stone crab advisory panels.

3. Comment: The line should be moved further offshore to ten fathoms.

   Response: This proposal had been considered in developing the proposed line and was rejected because of its adverse impact on the shrimping industry. It was recognized that any line would adversely impact on certain segments of both the shrimp and crab industries. The line adopted appeared to have the least impact on both groups and a net positive effect on both fisheries.

4. Comment: The line should follow the five or six fathom contour from Point B (or Point A) through Point D (or to the intersection with the Florida shrimp nursery line).

   Response: Variations of this proposal were originally considered in trying to resolve the conflict and were rejected as having a severe adverse impact on the stone crab fishery. In testimony from shrimp fishermen from the Ft. Myers and Naples, Florida, areas, the Council was made aware of an impact on their operations by retaining the proposed line at eight fathoms. While testimony indicated a more severe impact than originally anticipated, the opinion of shrimp biologists consulted was the majority of shrimp should eventually migrate seaward of the line and become available for harvest. Testimony indicated that approximately five to ten percent of the bottom inshore of the line was trawlable.

Comment: The line should be moved inshore to a distance ten miles from the shore between Point A and the intersection with the Florida shrimp nursery ground line.

Response: The response is the same as for 4 above.

6. Comment: The line should be moved offshore to eight fathoms between Points A and B to provide additional protection for crab traps off Sanibel Island.

   Response: This was originally considered and rejected as adversely affecting the shrimp fishery in the traditional Sanibel grounds.

7. Comment: There should be no line between Points A and D and crab traps should be placed only on rough bottom unsuitable for trawling.

   Response: The Council adopted the proposed line and considered this proposal; however, most public testimony and the Council supported a line as the only viable alternative which would resolve the conflict. Further, it was evident that current harvest practices and equipment utilized by the stone crab industry are not presently geared to accommodate the requirements of the proposal.

8. Comment: There should be no line, shrimp fishermen and stone crab fishermen should reach a voluntary agreement on areas to be fished by each in each locality.

   Response: The response to No. 7 above applies here. Further, the situation has been complicated by the expansion of both industries and by the influx of shrimp vessels from other areas whose captains are not familiar with the bottoms or with areas fished by crabbers.

9. Comment: Retain the westward extension of the line from Point E around the Florida Keys.

   Response: The Council rejected this proposal as the westward extension was not necessary to resolve the conflict and would impact adversely on local shrimpers (See No. 1 response).

10. Comment: Extend the line northward to the area off Cedar Key, Florida, to protect crab traps.

    Response: The Council rejected this proposal since such a line already exists under state statutes for the waters of the territorial sea. Although testimony indicated some gear loss by crab fishermen, there is little documented evidence of a conflict of the severity to warrant a line of separation in the FCZ between the two groups.

11. Comment: Prohibit trawling shoreward of the line from October 5 through May 20 (duration of stone crab season).

    Response: The Council rejected this proposal because it would unnecessarily restrict the shrimp industry since it appeared that a prohibition of shorter duration would resolve the conflict.

12. Comment: Prohibit trawling shoreward of the line from January 1 through May 20.

    Response: The Council adopted this modification of the time period as it would separate users of the two types of gear during the period that conflict was most likely to occur. Earlier in the stone crab season, fishing effort is normally conducted in waters further inshore than those utilized for shrimp fishing and before January 1st there are fewer shrimp boats fishing the area (Figure 12-2). Intensive concentrations of shrimp and shrimp vessels usually occur in late January through April.

13. Comment: Prohibit trawling inshore of the line permanently.

    Response: Same as for No. 11.

14. Comment: Prohibit trawling inshore of the line from November 15 through May 20.

    Response: Same as for No. 11.

15. Comment: Recommend that NMFS set the period for prohibition of trawling inshore on an "as needed" basis.

    Response: The Council rejected this proposal because of other public testimony which indicated the need for a specific period to resolve the conflict and to provide sufficient notice for trap movement and planning purposes.

16. Comment: Allow shrimp vessels to fish inshore of the line only under permit and controls.

    Response: The FMP provides for controlled limited exploratory shrimping inshore of the line.

17. Comment: Require installation of buoys at each of the points (A through E) along the line.

    Response: The Council through separate action has recommended that the Federal government mark the line at appropriate intervals with buoys or other markers.

18. Comment: Require day markers (piling with radar reflector) at least every four miles (or some uniform distance) along the line.

Response: Same as for No. 17.

19. Comment: Require all crab boats to be equipped with fathometers so they can set gear only on rough bottom.

Response: The response to No. 7 applies here. Further, such a requirement would result in a substantial adverse economic impact on stone crab fishermen.

20. Comment: Require all crab traps to be set out in one direction, i.e., north-south, etc., so shrimp vessels can fish between them.

Response: This was originally considered and rejected as completely unworkable by representatives of both industries. Crab traps are normally set into the prevailing currents and even though oriented in a north-south direction, the trap lines would continue to cross trawlable bottom.

21. Comment: Allow live bait shrimping inshore of the line.

Response: This is already provided for in Section 12.(ii) 6. of the FMP.

22. Comment: Specifically define allowable live bait shrimp gear.

Response: Allowable (legal) gear will be defined in the regulations.

23. Comment: Increase the allowance of dead shrimp which can be legally aboard live-bait vessels.

Response: Live-bait shrimping in state waters is regulated by state statute. Different allowances than required by Florida law would complicate enforcement, and further, almost no live-bait shrimping occurs in the FCZ.

24. Comment: Proposed regulations requiring immediate return of egg-bearing female crabs to the water should be deleted from FMP.

Response: The Council deleted this requirement from the FMP since the closed season and claw size limit protects the spawning stock adequately.

25. Comment: Delete the statistical reporting requirements for fishermen.

Response: The Council rejected this recommendation as the statistical data on catch and effort are important to future management of the resource and data collection is required under the FCMA. Some of these data can only be collected from the fishermen.

26. Comment: Shrimp fishermen should be required to report statistics on their incidental catches of crabs and fish.

Response: Statistical reporting requirements for shrimp fishermen will be considered in the shrimp FMP.

27. Comment: Change the open crab season to September 15 through April 15.

Response: Considering the entire range of the fishery, the season adopted appears best and is founded on a sound biological basis.

28. Comment: The economic impacts reported in the DEIS are not factual -- the impact on the shrimp industry is much higher.

Response: Impacts cited in the DEIS are for the shrimp industry throughout the area (Figure 1) and were based on the best available information. The DEIS recognized that adverse impacts would occur in localized areas, whereas the net overall effect would be beneficial. The DEIS has been revised to reflect changes in the draft FMP and economic impacts reassessed to the extent that information was available.

29. Comment: The economic assessment of trap losses in the DEIS is too low.

Response: The number of traps lost is based on the best information available. Numerical values for monetary losses were based on the value at "half-life" of the trap rather than assuming all were new. The FEIS has been modified to reflect this.

30. Comment: The DEIS improperly assumes shrimp will be caught outside the line if trawling is prohibited inshore of the line, whereas most will succumb to natural mortality.

Response: DEIS assumed some mortality in computing the value of shrimp captured outside of the line at a later date; however, the biological evidence and expertise of the biological personnel consulted support the contention that most shrimp will eventually move offshore of the line at a larger and thus more valuable size.

31. Comment: Whereas the DEIS points out that only 5 percent of the bottom inshore of the line is trawlable, it should also point out that only approximately 5 percent of the bottom outside the line is trawlable out to 15 fathoms.

Response: This comment apparently does not take into account the trawlable bottom of the Sanibel and Tortugas shrimp grounds but is apparently intended to reflect that area from Point C

(Figure 1) southward to a point immediately north of the Tortugas grounds.

32. Comment: See letters appended in Section 9.1.3.

Response: The Council held a Section 7 Consultation under the Endangered Species Act on January 4, 1979, with the Fish and Wildlife Service and National Marine Fisheries Service regarding impacts on endangered species. No adverse impacts on these species is anticipated from implementation of the FMP.

33. Comment: See letters in Section 9.1.3.

Response: These deficiencies have been corrected in the Plan.

9.1.3 Letters Commenting on the DEIS/FMP

Numbers in margin of letters correspond to the numbered responses in Section 9.1.2.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
900 SAN MARCO BOULEVARD
JACKSONVILLE, FLORIDA 32207

December 18, 1978

Mr. Wayne Swingle
Lincoln Center, Suite 881
5401 West Kennedy Blvd.
Tampa, Florida 33609

Dear Mr. Swingle:

We have reviewed the draft environmental impact statement/fishery management plan for the stone crab fishery of the Gulf of Mexico. The following comments are provided in accordance with Section 102 (2) (C) of the National Environmental Policy Act of 1969.

The Fish and Wildlife Service is concerned about an adverse impact which stone crab fishing has on the endangered West Indian Manatee. Neither the management plan nor the draft EIS mention this problem. There are several records of manatees getting their flippers (forelimbs) entangled in the bouy lines of crab or lobster traps. The lines become tightly twisted and can cause loss of the limb, or in more extreme cases, infection and death. 32

We can only speculate on how the entanglement occurs. Manatees have been known to curiously investigate crab traps and may enjoy rubbing against the bouy lines. We are attempting to learn more about this problem. It is thought that certain types of rope may be less prone to twist and knot in a way that manatees can become entangled in them. Unfortunately, we do not know enough about the problem or potential remedies at this time to recommend corrective measures.

This adverse impact of the fishery is not, of course, a result of the proposed action, i.e. implementing the proposed management plan. It is, however, an adverse impact that should be flagged as a problem that will likely require future attention.

We appreciate the opportunity to review your plan and draft impact statement, and to offer our comments.

Sincerely,

John C Oberheu

John C. Oberheu
Staff Specialist, Wildlife

MARINE MAMMAL COMMISSION
1625 EYE STREET, N. W.
WASHINGTON, DC 20006

30 November 1978

Mr. Wayne E. Swingle
Executive Director
Gulf of Mexico Fishery
Management Council
Lincoln Center, Suite 881
5401 West Kennedy Boulevard
Tampa, Florida 33609

Dear Mr. Swingle:

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the Draft Environmental Impact Statement and Fishery Management Plan for Stone Crabs (Gulf of Mexico). Based upon this review, we provide the following comments and recommendations:

The Commission is deeply concerned about the status of the West Indian manatee (Trichechus manatus) in Florida. The population in Florida is approximately 1,000 animals and mortalities may be exceeding recruitment. At least 50% of the recovered dead animals appear to have died as a result of human activities. There is evidence to suggest that gear used to catch crabs may be involved in some of the deaths. The extent of manatee injury and mortality incidental to crab fisheries is unknown presently, but available evidence suggests that manatees may become entangled in the lines used to secure crab traps (c.f., "The West Indian Manatee (Trichechus manatus) in Florida: A Summary and Analysis of Biological, Ecological, and Administrative Problems Affecting the Preservation and Restoration of the Population" by Phoebe Wray, NTIS Publication PB-285 410, p. 15) and subsequently drown. 32

Although manatees inhabit waters where the stone crab fishery is under the jurisdiction of the State of Florida and the Department of Interior, it is unlikely that they inhabit waters more than nine miles off the coast of Florida

in the Fishery Conservation Zone, as described on page 4, Section 1.4, of the Summary Sheet in the DEIS. For this reason, we feel that implementation of the proposed management plan likely will have no significant adverse impact upon manatees.

However, because the stone crab fishery itself may pose a risk to manatees, and in light of the discussion in Section 7(i) of the DEIS, we recommend that the issue of incidental take be discussed in the Final Environmental Impact Statement (FEIS). We also recommend that the goals, policies, and requirements of the Endangered Species Act of 1973 and the Marine Mammal Protection Act of 1972 be included in this discussion. 32

If you have any questions concerning these recommendations, please contact Dr. Robert Hofman, the Commission's Scientific Program Director.

Sincerely,

John R. Twiss, Jr.
Executive Director

cc: Mr. Roland F. Smith
Mr. George Rees

United States
Environmental Protection
Agency

Region 4
345 Courtland Street NE
Atlanta GA 30308

Alabama, Georgia, Florida,
Mississippi, North Carolina,
South Carolina, Tennessee,
Kentucky

EPA

4SA-EIS

December 5, 1978

Mr. Wayne E. Swingle
Executive Director
Gulf of Mexico Fishery Management Council
Lincoln Center, Suite 881
5401 West Kennedy Boulevard
Tampa, Florida 33609

Dear Mr. Swingle:

We have reviewed the Draft Environmental Impact Statement on the Fishery Management Plan for Stone Crabs (Gulf of Mexico) and find no detrimental biological or physical impacts which would result from its implementation. As such, a rating of LO-1 was assigned, i.e., we have no significant environmental objections and no additional information is requested.

As soon as the Final Statement is available we will only need one copy to complete our review. If we can be of further assistance, feel free to call on us.

Sincerely yours,

John E. Hagan III

John E. Hagan, III
Chief, EIS Branch

United States Department of the Interior

OFFICE OF THE SECRETARY

Southeast Region / 148 International Blvd., N.E. / Atlanta, Ga. 30303

December 19, 1978

ER-78/1074

Mr. Wayne E. Swingle
Executive Director
Gulf of Mexico Fishery Management Council
Lincoln Center, Suite 881
5401 West Kennedy Boulevard
Tampa, Florida 33609

Dear Mr. Swingle:

We have reviewed the draft environmental impact statement (DEIS) and draft fishery management plan for stone crabs (Gulf of Mexico) as requested by your letter to the Director, Office of Environmental Project Review. We offer the following comments.

The Fishery Management Plan on page 101 suggests that the Florida State Crab Permit application should be modified to distinguish between commercial and recreational fishermen for the purpose of securing additional statistical data on the catch. Yet the EIS on page 18, paragraph 4.6.2 shows this option as being rejected. Some clarification is needed to show whether separate permits for recreational and commercial fishermen are recommended. 33

Additional suggestions for predictions of the stone crab fishery on pages 102 and 103 include a fishing logbook and a fish ticket system which we assume is applicable only to commercial fishermen. Then the Plan states that all commercial fishermen must be licensed and that no transactions can be made with unlicensed or recreational fishermen. These are confusing statements and if meant to prohibit sales of crabs by recreational fishermen, enforcement could be difficult and may result in an aggravation to all parties concerned. 33

Thank you for the opportunity to review and comment on this draft environmental statement and Fishery Management Plan.

Sincerely yours,

James H. Lee

James H. Lee
Regional Environmental Officer