

AMENDMENT NUMBER 3
AND
ENVIRONMENTAL ASSESSMENT
AND
SUPPLEMENTAL REGULATORY IMPACT REVIEW
AND
INITIAL REGULATORY FLEXIBILITY ANALYSIS
TO
THE FISHERY MANAGEMENT PLAN
FOR THE STONE CRAB FISHERY
OF THE GULF OF MEXICO

APRIL, 1986

GULF OF MEXICO FISHERY MANAGEMENT COUNCIL
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ENVIRONMENTAL ASSESSMENT (EA) AND SUPPLEMENTAL REGULATORY IMPACT REVIEW (SRIR) AND INITIAL REGULATORY FLEXIBILITY ANALYSIS (IRFA) AND AMENDMENT NUMBER 3 FOR THE FISHERY MANAGEMENT PLAN FOR THE STONE CRAB FISHERY OF THE GULF OF MEXICO.

a. Introduction

The fishery management plan for the stone crab fishery of the Gulf of Mexico (FMP) was prepared by the Gulf of Mexico Fishery Management Council (Council) to provide for management and regulation of this fishery in the fishery conservation zone (FCZ). When implemented, this FMP resolved an armed conflict between stone crab and trawl fishermen operating off the southwest coast of Florida. The FMP was published in the Federal Register on April 3, 1979, and was implemented by regulation on September 14, 1979 (44 FR 53520). An Environmental Impact Statement (EIS) was prepared on the FMP and was filed with the Environmental Protection Agency (EPA). Amendment Number 1 was implemented November 8, 1982 (47 FR 41757). Amendment Number 2 was implemented August 31, 1984 (49 FR 30715).

b. Description of Fishery and Utilization Patterns

The FMP, as amended, provides for management and regulation of the stone crab fishery off the west coast of Florida in the FCZ. The fishery is jointly managed by the Council and the State of Florida (State).

In terms of landings the fishery is largely a commercial fishery with limited recreational participation which is confined to the nearshore waters within the State's jurisdiction. The commercial fishery extends from the Florida Keys north to Wakulla County in the Florida Big Bend Area (Figure 1). Recent electrophoresis studies indicate a genetically separate race of stone crabs exist west of this area through the northern Gulf of Mexico (Gulf). A hybrid zone exists between Wakulla County and Cedar Key, Florida (Levy County). The principal counties of landing include Monroe and Collier near the Keys and more recently, to a lesser extent, Pasco and Citrus, north of Tampa Bay.

In these areas of higher participation and landings, the fishery has been subject to rather severe gear conflicts with shrimp fishermen over fishing areas. These conflicts have been largely resolved by the FMP (44 FR 53520) and through Amendment Number 2 to the FMP (49 FR 30715).

The fishery is characterized by rapidly increasing participation levels (Table 1). By the 1984-1985 season, the number of boats and vessels had increased by 179 percent, and fishermen by 206 percent, and traps by 160 percent over that for the 1977-1978 season. The industry, as represented by the Advisory Panel (AP), expressed the need for limitations on participation levels and requested the Council develop alternative limited entry systems for their review by 1987.

The fishery historically was characterized as an expanding fishery with yield (landings) increasing in a direct linear fashion with effort (number of traps) (Table 2 and Figure 2). This trend continued through the 1982-1983 season with landings reaching 2.7 million pounds of claws. Subsequent to that time landings have declined to 1.5 million pounds and 1.7 million pounds in the 1983-1984 and the 1984-1985 seasons, respectively (Table 2 and Figure 2). Catch per unit effort (CPUE) declined significantly over this period (Figure 3).

The fishermen (AP minutes) attributed the reduction in landings to environmental conditions, largely lower water temperatures, and to increased predation on trapped crabs by octopus. The Scientific and Statistical Committee (SSC) concluded that catches may be approaching or have passed MSY and recommended the fishery be monitored more closely. The Council concurred and requested the National Marine Fisheries Service (NMFS) and the State intensify monitoring programs for the fishery.

c. Statement of the Problem

The Florida Marine Fisheries Commission (FMFC) and the Council conducted monitoring evaluations of state and federal management of the fishery during 1985. As a result of this activity the FMFC implemented changes to its rules regulating the fishery (Chapter 46-13) which become effective on April 10, 1985. The Council is proposing compatible changes to its FMP rules through this amendment.

The changes proposed in this amendment are consistent with the objectives of the FMP, which are as follows:

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

The proposed actions of this amendment are anticipated to enhance the attainment of Objectives 2, 3, and 4. Previous amendments to the FMP addressed primarily Objective 1 and the Council has concluded that this objective is being attained through current FMP rule.

In addition to concurring with the FMFC on the need for certain rule changes protecting female crabs with eggs, increasing survival of crabs held on board vessels, and allowing a hardship extension for removal of traps, the Council proposes to modify the FMP's statistical data reporting requirement and has requested technical development of limited entry systems and evaluations of revisions to the closed season which will require longer term actions than are possible through this amendment.

As pointed out in the section describing the fishery and utilization patterns, total landings have declined and CPUE has declined significantly over the last two seasons. Measures adopted by the State providing for increased survival of crabs held on board vessels and providing for immediate release of egg-bearing females are anticipated to improve standing stock and harvest potential from the resource.

This amendment is necessary to bring the FMP rules in conformance with those of the State which have already been promulgated by the FMFC and is necessary to eliminate the duplicative reporting burden on the fishermen and to improve the effectiveness of the reporting system.

d. Proposed Action

The action proposed through this amendment to the FMP consists of the following new measures or revisions of existing measures, the first three of which have been adopted by the State:¹

- o Revision of the FMP measure [1 (c)] regulating the holding of crabs aboard vessels prior to declawing by requiring the crabs be kept damp and held in a manner to avoid compression mortality. Such revision will increase survival of declawed crabs.
- o Include a new FMP measure [1 (f)] prohibiting declawing or possession of female crabs with eggs attached. Such measure will increase the number of young produced.
- o Modify FMP measure (2) to provide for extension of the grace period for removal of traps after the season upon individual request, for hardship. This would alleviate much noncompliance associated with trap removal due to hardship.
- o Revise FMP measure (4) pertaining to vessel registration to require utilization of a uniform vessel identification system at such time as it is adopted by the State of Florida.
- o Delete FMP measure (5) (as amended) setting forth Federal mandatory reporting requirements and utilizing in lieu thereof the data reported under the Florida trip ticket system. This will eliminate the burden of a duplicative reporting system from the industry.

MEASURE 1 (c)

This measure is revised to read as follows: "c. Live stone crabs may be held on board a vessel while it is at sea until such time as the claws are removed, provided the crabs are held in shaded containers and wet with sea water every 30 minutes, or more often if necessary, to keep the crabs in a damp condition. Containers shall not be stacked in a manner which compresses the crabs."

¹ It should be recognized in reviewing costs and benefits of these measures that much of the impact has already occurred as a result of the State action.

Rationale/Analysis

Laboratory and field tests conducted by personnel of the Florida Department of Natural Resources (FDNR) indicate a very high mortality (100 percent) for crabs held more than six hours without being kept wet, but approximately equal mortality for crabs returned to the water immediately (23 percent) held six hours in aerated tanks (15 percent) or wet down every hour (25 percent).

The revised measure requires that the crabs be kept damp which is enforceable (at sea). The required wetting interval is more frequent than is required for 75 percent survival. The shading requirement enhances maintaining a damp condition and is likewise enforceable. The requirement prohibiting compressing crabs promotes survival since gill functions are retarded by compression. Enforceability is enhanced because the fishermen have a vested interest in keeping the crabs alive. First, if crabs die, the claws must be refrigerated at sea which destroys the quality of the product (meat sticks to shell if refrigerated before boiling). Secondly, higher survival of declawed crabs will result in greater overall harvest productivity from the resource.

FDNR studies have shown that under current handling practices in the fishery approximately twelve to fifteen percent of declawed crabs survive and regenerate claws which may be harvested the following season. Assuming that none of the crabs are currently kept damp and the survival rate is currently 25 percent, the measure has the potential to increase such survival to a maximum of 36 to 45 percent. However, some fishermen are already keeping their crabs wet (AP minutes); therefore, the potential gain will be less than the maximum levels, but it will result in positive gain in productivity, possibly by an additional 12 to 15 percent in annual harvest production. This corresponds to an increase in the annual exvessel value of the fishery of \$893,000 to \$1,116,000, based on the average seasonal catch for 1981-82 through 1984-85 and average weighted price adjusted to June 1984 dollars (see Table 2).

The measure results in a negligible cost to small business entities (fishermen). Since shading is currently required, the only additional cost is the effort by the existing crew to periodically wet the crabs down with buckets of sea water.

Alternatives to the Proposed Measure Which Were Rejected

- A. Require immediate declawing and return crabs to water.

Analysis

This alternative was originally considered by both the Council and State and rejected primarily because it would result in a drastic economic impact on the industry. If the claws were removed as the crabs were harvested on longer trips, they would have to be refrigerated to avoid spoilage. Refrigeration significantly reduces the value and quality of the product since the meat sticks to the shell if refrigerated before boiling. Boiling claws at sea would require purchase of additional equipment for this purpose, use of an additional crew member, and a significant increase in safety hazard (and probably insurance rates) due to the open

flames and boiling water maintained on board. This would result in higher operation costs and significant loss of operating efficiency for each small business entity (vessel). The percentage mortality associated with immediate release (23 percent) is not appreciatively different from that resulting from keeping the crabs damp (25 percent) Thus this alternative would not yield increased production over the preferred measure but would lead to either a significant reduction in exvessel value due to price effects of quality deterioration, or significant increases in production costs in order to maintain product quality.

B. Require aerated live wells for holding crabs.

Analysis

This alternative would require significant additional expense to the industry for tanks, pumps and aeration equipment, and annual fuel costs associated with transportation of the weight of the water. The potential gain in survival of approximately ten percent would translate into a potential maximum increased productivity of only 1.2 to 1.5 percent over the preferred alternative. This would represent a gain of 25,500 to 31,900 pounds, based on the average of the 1981-82 through 1984-85 seasons, with an exvessel value of \$89,000 to \$112,000, in 1984 dollars. For the 466 craft fishing in the 1984-85 season, this would have amounted to an increase in gross exvessel revenue of \$190 to \$240 each. This would not be significant enough to compensate each small business entity (vessel) for the costs incurred.

MEASURE 1 (f)

A new subsection (f) is added to read as follows: "f. It is unlawful to remove claws from egg-bearing female stone crabs or to have any egg-bearing female stone crabs on board a vessel or to remove eggs from any stone crab."

Rationale/Analysis

The FMP was originally silent on this issue thereby allowing the harvest of claws from egg-bearing female crabs in the FCZ. When the plan was developed and implemented the fishery was characterized as an expanding fishery which had not reached the MSY level. Under these circumstances no prohibition on harvesting egg-bearing females appeared justified, since there appeared to be adequate escapement of egg-bearing females, as a result of the closed season and the size limit which allowed the crabs to spawn one season before entering the fishery. Now that landings have declined during the past two seasons it appears a prudent conservation measure to require that egg-bearing females be returned to the water immediately with claws unharvested to increase the survival of eggs and release of larvae.

FDNR studies have indicated a significant reduction in the viability of eggs exposed to air. Whereas the crabs held on board are capable of survival through occasional wetting, the eggs are not. The measure would increase egg survival, not only through immediate return of the females to the water, but through retention of the claws which allows the females to more effectively gather food while carrying the eggs.

The prohibition on possession makes the measure enforceable, since under operation practices in the fishery the crabs must be held on board before declawing to prevent spoilage. Even if some claws are illegally harvested the crabs will be returned to the water immediately assuring greater survival of eggs.

The benefit of the proposed measure can not be quantitatively expressed, but may be significant if reduced larvae abundance is responsible for recent declines in landings. Some fishermen are already returning egg-bearing females to the water with claws unharvested (1985 AP minutes).

The immediate individual impact through compliance with the measure is expected to be small. Egg-bearing females are present in the fishery predominantly during the last month of the season (May) when about 50 percent of the females taken in one FDNR study were found to be ovigerous. Because of the ever increasing participation levels (Table 1), the effective harvest season is being compressed and catch and CPUE (Figure 4) decline during the latter part of the season. Catches during May of 1980-1983 averaged only 2.2 percent of annual catch (Table 4 of Regulatory Impact Review for Amendment 2 to the FMP). If females make up 50 percent of the population, then egg-bearing females would be 25 percent of the population in May and the maximum loss in May from this measure would be 0.55 percent of the annual catch, ignoring the present practice of some fishermen to return egg-bearing females to the water with claws unharvested. This suggest that the individual impact, in May, would be a reduction in exvessel value of about \$90 per fishing craft. However, this short-term loss would be partially offset by the later (following season) recapture of the surviving females and harvest of larger claws.

Alternative to the Proposed Measures Which Were Rejected

- A. No action - allow harvesting of claws from egg-bearing females.

Analysis

Considering the recent decline in landings for the last two seasons, it appears prudent to implement measures to assure increased larvae production in the fishery. The proposed alternative has already been implemented by the State and is supported by the industry. The impact of the preferred measure is expected to be minimal and is less than that for Alternative (B), which was also rejected. The loss of production by rejecting this alternative is expected to be small, since available data on percentage of egg-bearing females in the catchable population indicate a virtually nil occurrence during the colder months (November through February) with the peak spawning period occurring May through September. As noted above, a maximum estimate of the immediate production loss associated with the proposed measure (i.e. rejecting this alternative) is 0.55 percent of the annual catch. This is probably an over-estimate since the percentage of fishermen already returning egg-bearing females to the water with claws unharvested is unknown, and this estimate ignores the impact of the later recapture of the females after spawning and the harvest of larger claws at that time.

- B. Amend the duration of the season to prohibit fishing when significant numbers of egg-bearing females are present.

Analysis

The Council considered this alternative and rejected it because sufficient data were not currently available to specify the most effective change in season to prohibit the harvest of egg-bearing crabs and data were not available to evaluate the impact of such action. The Council did, however, request that FDNR and the scientific community further evaluate this option. If future stock assessments and monitoring indicate a continuation in depressed landings unrelated to cyclic fluctuations as a result of environmental factors, this alternative may be implemented cooperatively by the Council and State. The immediate impact of this option would be greater than that for the proposed measure (i.e., average reduction in catch from two to nine percent, depending on timing and duration of the reduction by earlier closure of the season). However, this impact may be moderated by opening the season earlier, if data support this.

MEASURE 2

This measure is modified by adding the following: "Fishermen may request a ten-day extension to the five-day grace period for removal of traps from the FCZ after the close of the season for reasons of hardship (i.e., hazardous weather, medical emergencies, or equipment breakdown). Such request shall be made to and granted by the office of Regional Director of NMFS or his designee."

Rationale/Analysis

The FMFC implemented a similar rule applying to State jurisdiction at the request of the industry. The Council adopted the measure at the request of the AP. The hardship allowance should address the congressional concern that a FMP take into consideration hazardous weather in its measures. It should result in less traps being abandoned following the season. The impacts should be beneficial to industry and resource.

Alternatives to the Proposed Measure Which Were Rejected

- A. No action – don't allow the hardship extension.

Analysis

In more recent years in the fishery the most productive period for harvest has become more compressed. This factor in conjunction with the normal (typical) crab distribution and weather conditions in May has resulted in many fishermen ceasing to fish before the end of the season (May 15th). The proposed measure would not benefit most fishermen under these conditions. However, in an atypical year crab abundance remains high into May and major fishing effort continues to the season ends. Under these conditions the five-day grace period for removal of traps, as provided in the FMP, may not be adequate for removal of traps, especially if any of the hardship conditions occur. The fishermen then unintentionally become in violation of the FMP provision requiring removal of traps.

MEASURE 4

This measure is modified by adding the following: "Commercial vessels operating in the fishery shall display their vessel documentation number or state vessel registration number in a manner to be set forth by regulation when a compatible system is adopted by the State of Florida."

Rationale/Analysis

The FMP measure currently provides for enumeration of the vessels fishing in the fishery which is currently accomplished through a regulation provision (44 FR 53520) requiring use of and display of the state permit number (or such number issued by the Regional Director of NMFS). The state system of vessel identification for the stone crab fishery requires display of the state stone crab permit number. In other Gulf fisheries regulated by FMPs, vessels with permits are identified by display of documentation or registration number, which under the other FMP regulations are required to be 18-inch numerals for vessels 65 feet or over and 10-inch numerals for vessels less than 65 feet. Some of these vessels (e.g., mackerel vessels) fish in the stone crab fishery. These vessels are now required to display two sets of permit numbers (e.g., Federal-mackerel and State-stone crab). The Council has requested the State modify its requirements for vessel identification display to that standardized system required by other FMPs. The proposed measure would make the standardized system a FMP rule at such time as the State modified its rule.

The proposed measure when implemented would require vessel owners to paint their documentation or registration numbers on port or starboard bows and an overhead weather deck. The costs would involve the paint required to do so and the labor which are cumulatively estimated not to exceed an initial cost of \$15 per vessel, or \$6,000 for the industry, exclusive of vessels complying under other FMPs. Maintenance cost should not exceed current cost of maintaining the required state permit and registration numbers. The proposed measure would eliminate maintaining separate state and federal identification for vessels engaged in multiple fisheries.

Alternatives to the Proposed Measure Which Were Rejected

A. No action.

Analysis

If the Council takes no action and the State amends its system to adopt the more standardized vessel identification system recommended by the Council and by the Gulf States Marine Fisheries Commission's Law Enforcement Committee, then the FMP will have to be amended in order to have compatible state and federal rules. Under the proposed measure this occurs only after the State adopts such a system. Under the no action alternative no industry costs are incurred as a result of federal action.

MEASURE 5

This measure (as amended) is deleted in its entirety. Data provided by fishermen to dealers reporting under the State of Florida's product license trip ticket system (Chapter 16-B45) will be utilized for management in lieu of data collected under the federal reporting requirement.

Rationale/Analysis

The current measure of the FMP requires mandatory reporting by participants in the fishery and specifies that fishermen will submit daily trip tickets (logbooks) on catch and other fishery statistics. Amendment 1 modified the logbook requirement to apply to those fishermen selected by the NMFS Center Director (a sample of fishermen). The log-book requirement was implemented in 1979 (44 FR 53520). In 1985, the FDNR implemented a trip ticket system under which persons selling their catch in Florida are required to provide catch information to dealers who complete a trip ticket for each sale which lists landings, area and gear fished, and other statistical information almost identical to that collected under the FMP rule. This has resulted in duplicative state and federal systems collecting essentially the same data. The Council recommended that NMFS and FDNR attempt to combine the two systems to reduce the reporting burden. This was impossible because the mandatory State system does not provide for confidentiality of data, whereas a federal mandatory system must insure confidentiality of data.

FDNR has indicated that a bill providing for confidentiality of data collected by the State is before the legislature and that those data elements previously collected on a voluntary basis can be made mandatory by administrative rule.

In reaching its decision to utilize the State system in lieu of the FMP logbooks the Council reviewed data collected by both systems to ascertain whether the data needed for management would be provided by the State system. The State system provides for mandatory reporting for each trip of date, area landed, and poundage. Voluntary data reported are area fished, depth, traps pulled and soak time. The FMP fisherman logbooks provided the same data, except for soak time. FMP dealer logbooks provided monthly landings and value.

The FDNR prepared a detailed comparison of data collected through both systems for a portion of the 1984-1985 season. This period (January-May, 1985) was during the initial implementation period for the State system (i.e., before full awareness of and compliance with the system). Despite this, the State system collected data from an additional 21 minor dealers, not monitored by the federal system. Comparisons for the same dealers indicated dealer reporting of landings was accurate for both systems. Comparisons indicated that total trips reported were not comparable. (Fisherman utilizing FMP logbooks may be reporting more than every other trip as required, P. Phares, NMFS, Pers. Comm.) Statistical analysis suggested that catch per trip from the fisherman logbooks was biased high, possibly as a result that principally the larger fishing operators were complying with the FMP requirement (approximate compliance level equals 40 percent).

Overall the analysis indicated the State system collects accurate catch (landings) data, is less biased in estimates of trips and catch per trip, and collects an equal (or greater) number of records with voluntary information as the logbooks do on a mandatory basis. The Council and NMFS SEFC concluded the State data system provided the data necessary for management.

Alternatives to the Proposed Measure Which Were Rejected

- A. No action – retain FMP log book requirement.

Analysis

If this alternative was retained, persons in the fishery would be subject to an unnecessary reporting burden through duplicative State and Federal systems, as reporting under both systems is mandatory. This would result in continuation of the 400 man-hour Federal reporting burden.

ENVIRONMENTAL FEDERAL CONSEQUENCES

The actions proposed in the amendment have no impact on the physical environment. The proposed measures which require that crabs held on board be kept damp and not compressed and which require egg-bearing female crabs be returned to the water immediately with claws unharvested will have beneficial impacts on the fishery resource. The first measure is expected to increase the potential harvest of crabs which have regenerated claws by approximately twelve to fifteen percent, (or possibly greater percentages). The second measure will increase the viability of eggs from egg-bearing females caught in traps resulting in increased larval production available for recruitment to the fishery.

The economic and social impacts are expected to be beneficial, especially for that measure eliminating an unnecessary reporting burden which results from duplicative State and Federal systems. This measure would eliminate a Federal reporting burden estimated to be approximately 400 manhours. Anticipated costs of the proposed actions to small business entities (vessel owners/operators) will be offset by expected economic gains. Specific economic and social impacts are discussed under the Analysis section for each of the proposed actions and their alternatives.

The proposed actions have no anticipated impact on threatened or endangered species or on marine mammals. A Section (7) consultation was held for the FMP with a "no jeopardy opinion" being rendered. The proposed actions do not alter provisions of the FMP that would affect these animals.

CONCLUSIONS

- o Mitigating Measures Related to the Proposed Action

None

LIST OF AGENCIES AND PERSONS CONSULTED

Gulf of Mexico Fishery Management Council

-Stone Crab Advisory Panel

-Scientific and Statistical Committee

-Law Enforcement Advisory Panel

Operations Unit for Stone Crab FMP

Florida Department of Natural Resources

Florida Marine Fisheries Commission

National Marine Fisheries Service

-Southeast Fisheries Center

-Fisheries Management Division, Southeast Regional Office

-Protected Species Branch, Southeast Regional Office

-Law Enforcement Division, Southeast Regional Office

Florida Coastal Zone Management Program

United States Coast Guard

LIST OF PREPARERS

Gulf of Mexico Fishery Management Council

-Wayne Swingle, Biologist

-Paul Hooker, Economist

Southeast Fisheries Center, NMFS

-Patty Phares, Stock Assessment

Southeast Regional Office, NMFS

-Don Geagan, Biologist

LOCATION AND DATE OF PUBLIC HEARINGS

All hearings were scheduled from 7:00 p.m. to 10:00 p.m. as follows:

o February 18, 1986

Disabled American Veterans Hall

7280 Overseas Highway

Marathon, Florida

o February 19, 1986

County Meeting Room

3301 Tamiami Trail East

Naples, Florida

o February 20, 1986

Saint Benedicts Church Annex

455 South Suncoast Boulevard

Crystal River, Florida

Table 1. Operating units for the Florida commercial stone crab fishery (from the General Canvass of Fisheries).

Season -----	Vessels -----	Boats -----	Crew -----	Traps -----
1977-78	61	199	394	264,300
1978-79	55	190	375	222,000
1979-80	72	219	454	297,600
1980-81	72	236	491	314,600
1981-82	106	215	612	419,000
1982-83	110	232	602	461,000
1983-84	124 (434)	310	752	421,000
1984-85	N/A (466)	N/A	812	423,000

Table 2. Stone crab landings, value and prices for the west coast of Florida, by stone crab season, 1977-78 to 1984-85, and averages over the 1981-82 to 1984-85 seasons.

Season	Landings (Pounds claws)	Ex-vessel Value (Current dollars)	Ex-vessel Price (Current dollars)
1977-78	2,100,000	3,822,000	1.82
1978-79	1,850,000	Not available	Not available
1979-80	1,931,000	5,135,400	2.66
1980-81	1,640,000	4,874,000	2.97
1981-82	2,668,000	7,574,000	2.84
1982-83	2,699,000	7,799,000	2.89
1983-84	1,478,000	6,852,000	4.64
1984-85	1,665,000	6,394,000	3.84
1981-85 avg.	2,128,000	7,440,000*	3.50*

*Average value and ex-vessel price in June 1984 dollars based on Bureau of Labor Statistics producer price indexes for processed foods and feeds.

Source for 1981-82 through 1984-85 landings and ex-vessel values: E. Snell, SEFC, December 12, 1985, personal communication with P. Hooker, GMFMC.

Figure 1. Map of the stone crab fishing grounds; statistical areas and zones.

FOR FISHING NORTH OF FORT MYERS

**ZONE 1 - Territorial Sea
(inside 9 nautical miles)**

**ZONE 2 - FCZ Shoreward of 8 Fathoms
(outside 9 nautical miles
and LESS THAN 8 fathoms)**

**ZONE 3 - FCZ Seaward of 8 Fathoms
(outside 9 nautical miles
and MORE THAN 8 fathoms)**

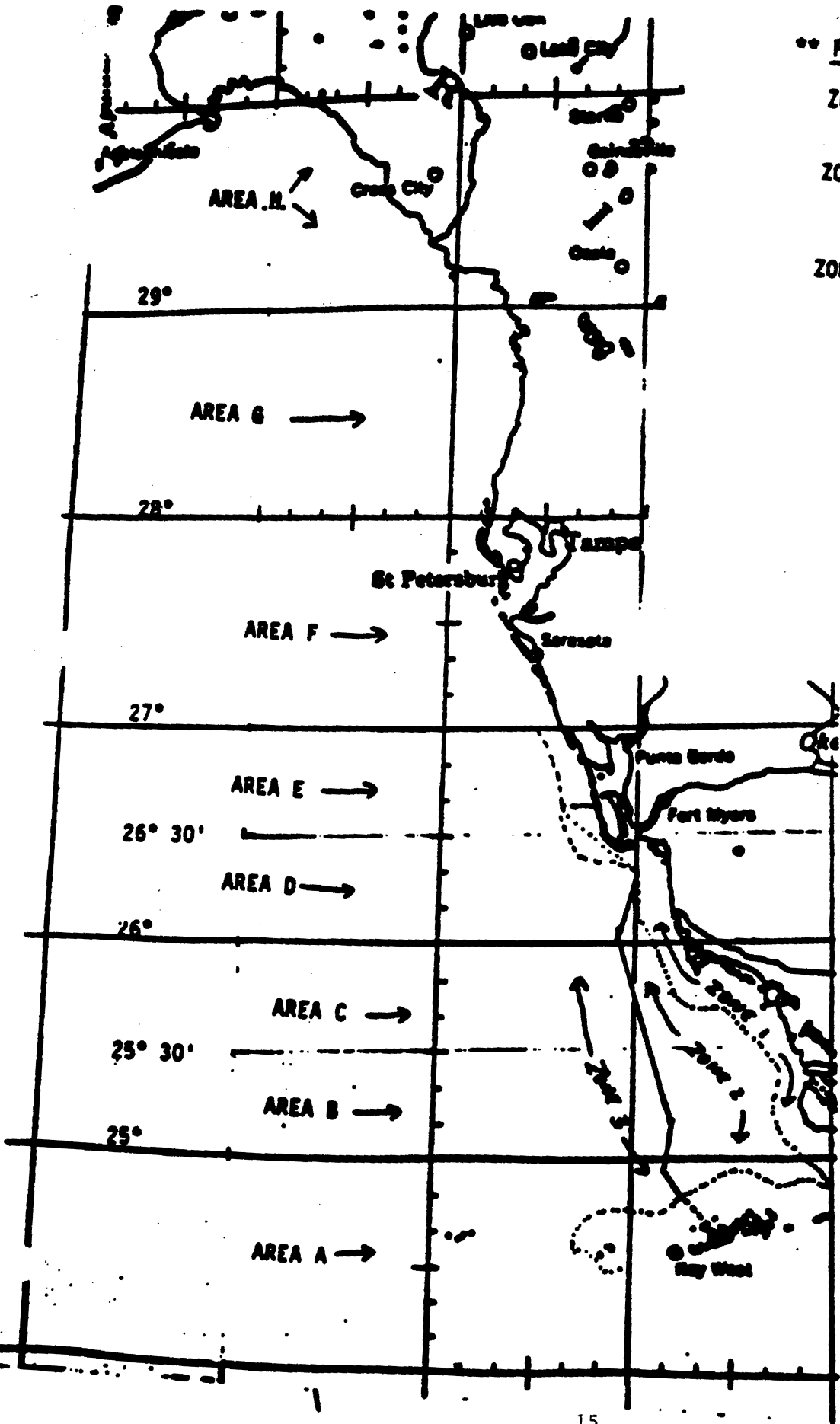


Figure 2. Annual yield by fishing season versus effort (traps used)

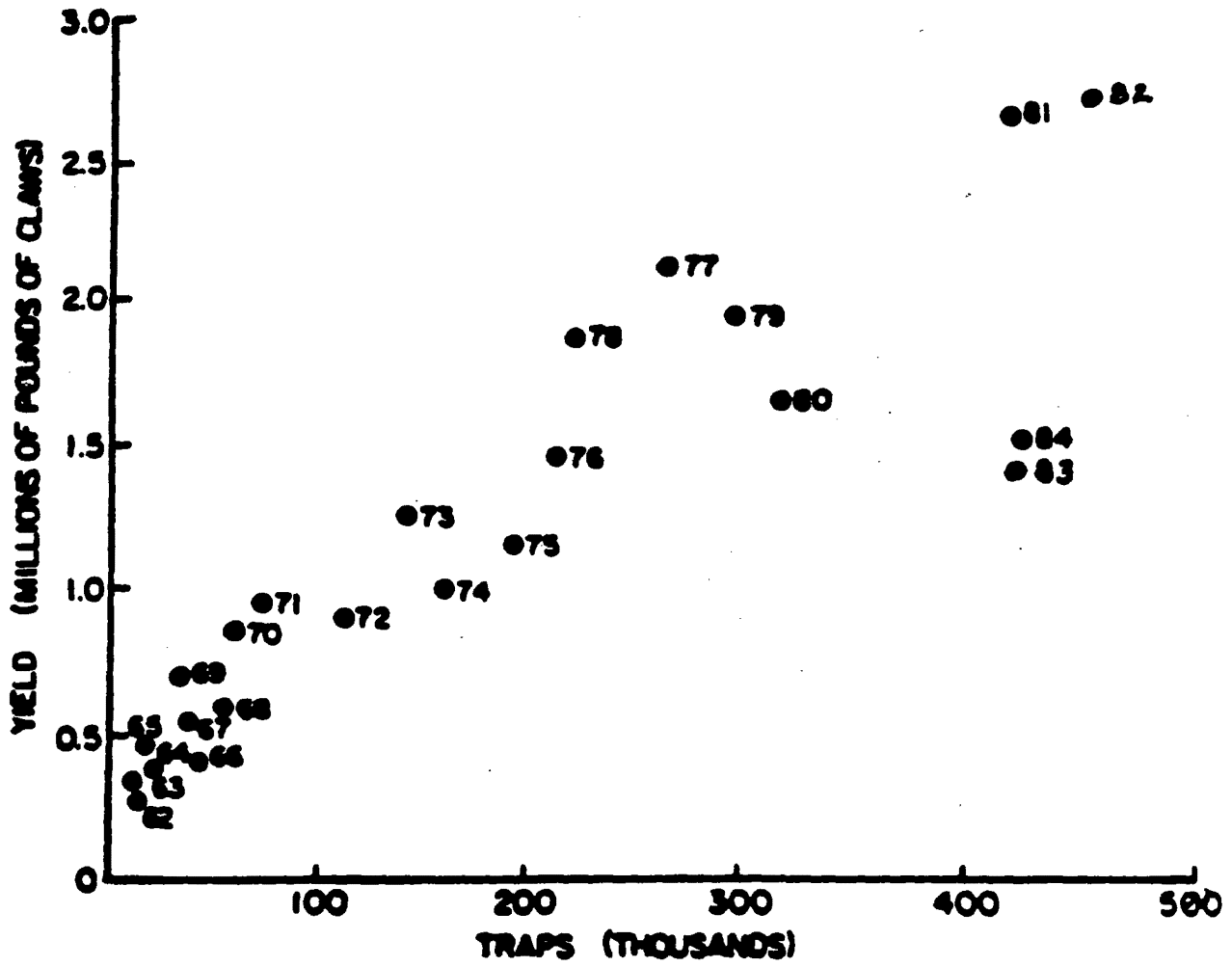


Figure 3(a). Trends in catch and effort, 1962-1984 (catch from the Florida Landings; effort from the General Canvass)

(b) Trends in catch-per-trap for the data in (a).

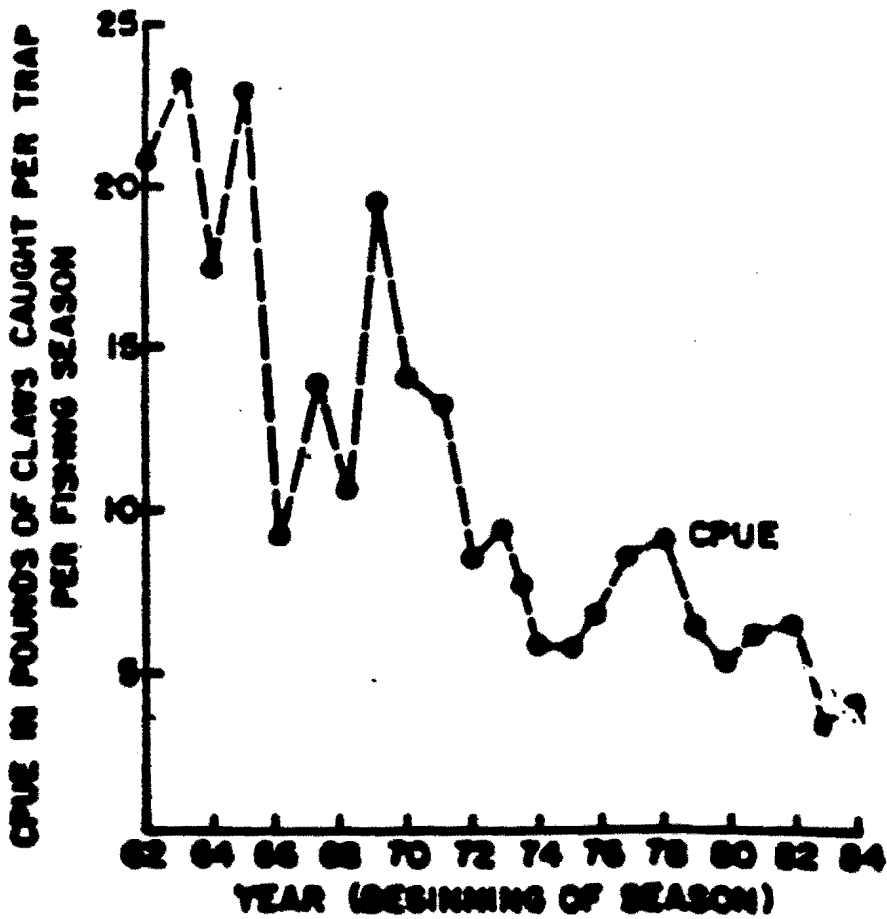
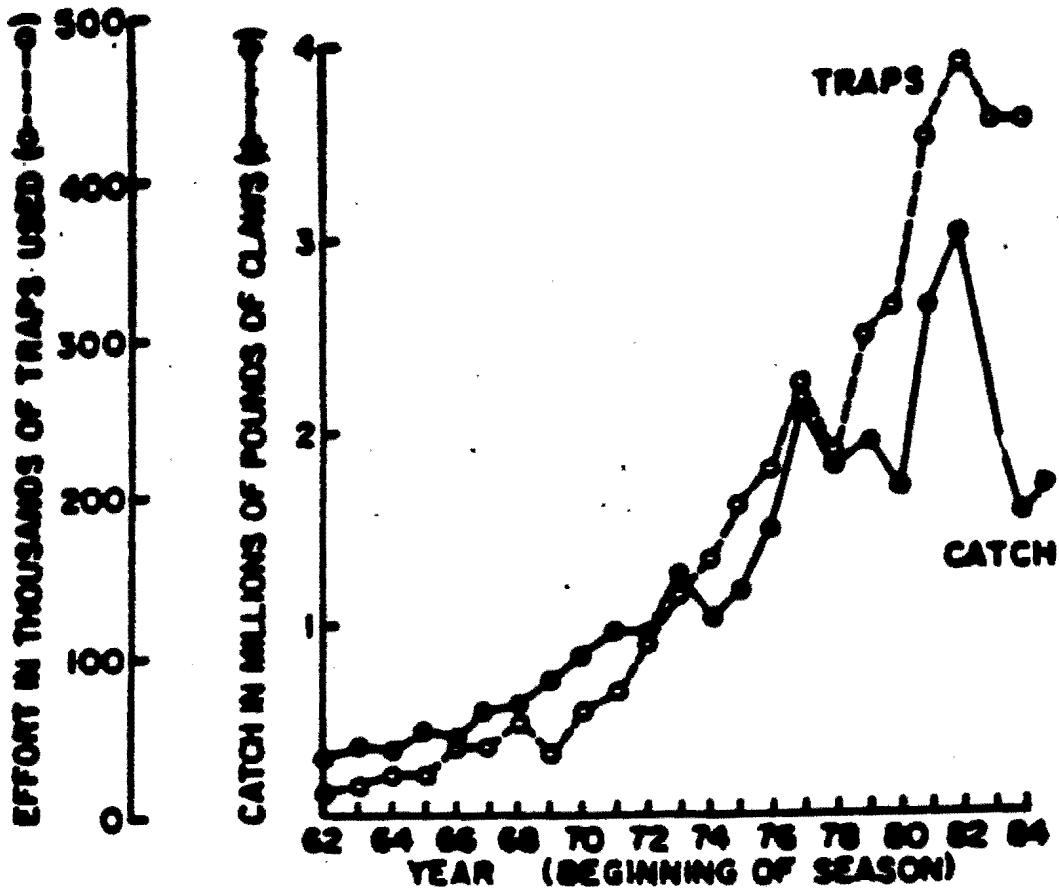


Figure 4(a). Regression estimates of mean catch-per-trap-fishing.

