AMENDMENT 4

TO THE

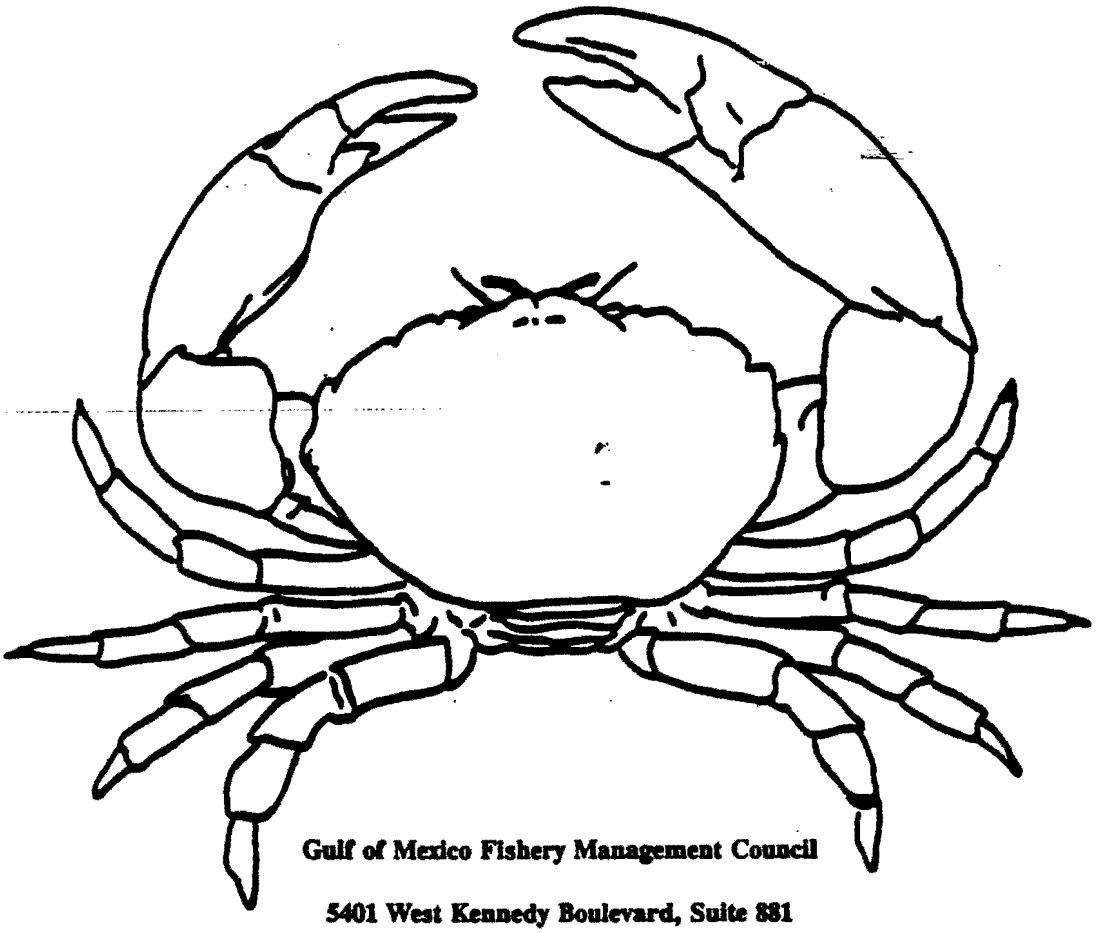
FISHERY MANAGEMENT PLAN

FOR

THE STONE CRAB FISHERY

OF THE GULF OF MEXICO

(Including Environmental Assessment



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I. Introduction

The Fishery Management Plan for the Stone Crab Fishery of the Gulf of Mexico (FMP) was implemented on September 30, 1979 (44 FR 53519). The FMP resolved an armed conflict over competing gear use between stone crab and shrimp fishermen operating in the EEZ off Southwest Florida and extended Florida's rules regulating the fishery into the EEZ. The management area of the FMP is limited to the EEZ seaward of the west coast of Florida in the Gulf of Mexico (Gulf). The FMP has been amended three times. Amendment 1 was implemented on November 8, 1982 (47 FR 41757), and specified a procedure for evaluating the area zoned to resolve the conflict. Amendment 2 was implemented on August 31, 1984 (49 FR 30713), and established procedures for resolving gear conflicts in Central West Florida. Amendment 3 was implemented on September 25, 1986 (51 FR 30663), and included management measures to enhance survival of crabs held on board and prohibited harvest of egg-bearing female crabs.

This Amendment contains provisions for adding a scientifically measurable definition of overfishing and an action plan to arrest overfishing should it occur as required by the Magnuson Act National Standards (50 CFR 602), and a section on vessel safety considerations and a revised habitat section as required by the Magnuson Act.

II. Description of the Fishery and Utilization Patterns

The FMP, as amended, provides for management of the fishery in the EEZ off the west coast of Florida. The fishery is managed jointly by the State of Florida and the Gulf of Mexico Fishery Management Council (Council). The fishery is largely commercial with limited recreational participation confined to the near-shore waters within state jurisdiction.

The fishery is unique in that only the claws are harvested, and the live crabs with one or both claws removed are returned to the water. Data from Florida Department of Natural Resources (FDNR) studies indicate 3 to 8 percent of these crabs regenerate claws that may be harvested in a subsequent season (Amendment 3). Claws regenerate to approximately 70 percent and 100 percent of their original (pre-autotomy) size one and two molts after de-clawing, respectively in (Restrepo, 1989).

Figure 1 indicates the trends in the fishery in terms of traps deployed, catch (or landings) of claws, and annual catch per trap. Landings and number of traps deployed increased in similar linear trends until 1981 (at the level of approximately 350,000 traps). After that time, increases in number of traps did not result in increased landings and landings have fluctuated around 2.0 million pounds, indicating full exploitation. Annual catch per trap (CPUE) declined from the 1960s, remained essentially stable from 1974 to 1981, and declined thereafter to a level of approximately five pounds of claws per trap.

The Scientific and Statistical Committee (SSC) in reviewing these data concluded that increases in traps beyond the 1981 level (approximately 350,000 traps) in addition to not increasing landings probably did not increase fishing mortality. Essentially, the increases just further overcapitalized the industry through gains in excess fishing capacity without impacting the resource. The SSC indicated that total traps deployed in the fishery was a poor bench mark for examining CPUE trends since many fishermen fished in the spiny lobster fishery in the first part of the stone crab season. Also as indicated by the Stone Crab Advisory Panel (minutes, 1983), fishermen tend to deploy excess traps in certain areas to reserve fishing areas weeks before the crabs migrate into that area or the traps are fished.

III. Statement of the Problem

NMFS in July 1989, published revised guidelines for fishery management plans that interpretatively address the Magnuson Act National Standards (50 CFR, Part 602). These guidelines require each plan

to include a scientifically measurable definition of overfishing and an action plan to arrest overfishing should it occur. The FMP for stone crab is being revised by this amendment to comply with the guidelines and to include a section on vessel safety considerations and a revised habitat section as required by amendments to the Magnuson Act.

IV. Proposed Action

The actions proposed in this amendment to the FMP are as follows:

- o inclusion of a FMP section on Overfishing
- o inclusion of a FMP section on Vessel Safety Considerations
- o revision of the FMP section on Habitat of the Stocks

ACTION 1: OVERFISHING

Proposed Alternatives

1. **Definition of Overfishing**: "Overfishing exists when the realized egg production per recruit is reduced below 70 percent of potential production (see Figures 4 and 5). Overfishing will be avoided when there is a minimum claw length (length of propodus; Figure 2) that assures survival of the crabs to achieve the 70 percent egg production per recruit potential."

2. **Management Measure to Arrest Overfishing**: Should overfishing occur, the Council and State of Florida will adjust the minimum claw length or fishing mortality rate (F) by regulatory amendment as authorized under this measure to increase the egg production potential to at least 70 percent.

Discussion: The SSC in reviewing the analyses for stone crab from the NMFS SEFC Overfishing Workshop (February 12-14, 1990) concluded that at the current minimum claw length (70mm = 2 3/4 inches), recruitment overfishing is unlikely. That is because on the average males and females mature at age 2 (50 percent maturity), the male crusher and pincher claws reach legal length between age 2 and age 3, and female claws reach legal lengths one to two years later (Figure 3). Therefore, females spawn for at least one or more years before entering the fishery. Restrepo (1989) suggested the egg production potential is largely independent of the male/female ratio in the population since a single copulation fertilizes a female for the season and males can copulate several females. Therefore, the fact that males enter the fishery at earlier ages and may be reduced relative to the number of females does not appear to impact egg production potential. Females are capable of producing up to 13 batches of eggs after a single copulation (four to five batches on the average) during the reproductive season. Fecundity is linearly related to size and large females produce upwards of 350,000 eggs per batch. Therefore, at the present minimum claw length of 70mm, more than 70 percent of potential egg production will be maintained over a wide range of fishing mortality rates, both higher and lower than the present mortality rate (Figures 4 and 5).

In addition to the protection from overfishing as a function of egg production potential afforded by the current minimum claw length, several other management measures enhance this protection. Harvest is prohibited by a closed season during the principal months females are carrying gravid eggs (May 15 to October 15). Egg-bearing females must be released unharmed immediately, i.e., possession at any time is prohibited. All crabs held aboard a vessel must be kept damp and in a shaded container before de-clawing to increase survival rates of crabs returned to the water (i.e., lab studies indicate about 75 percent survival over six hours by periodically wetting the crabs). There is no allowable tolerance for possession of undersized claws and no legal market for them. All of these measures provide additional protection against overfishing.

Although overfishing should not occur under the current fishery management measures, Ehrhardt and Restrepo (1989) and Restrepo (1989) concluded that yield per recruit (YPR) in terms of weight could be increased by

reducing existing minimum claw size. Bert, et. al. (1986) suggested stone crabs live to be about 6 years old. Also, females do not fully enter the fishery until age 5 (Figure 3). Therefore, the potential exists for reducing the minimum claw size at some future time to obtain a greater YPR. However, as Restrepo (1989) indicated this may affect the reproductive capacity of the stone crab population (see Figures 4 and 5). Another significant consideration of any such action to reduce the minimum claw size is the economic impact it would have on the fishermen. Although gains in poundage landed would be achieved, that action may result in losses in total exvessel value since there is a significant price differential between claw sizes. For example, during the 1988-1989 season, claws landed were classified as follows: 5 percent jumbo, 48 percent large, 25 percent medium, 9 percent small, and 13 percent unclassified (Sutherland, 1989). Current exvessel prices per pound (1989-1990 season) are $6.55 for jumbo, $6.13 for large (the majority of landings), and $5.49 for small. Since the small classification are claws just exceeding the minimum size limit, the creation of a market classification below that size would likely result in a lower exvessel value that would have to be contrasted against gains in poundage.

Analyses Related to Proposed Alternative

Figures 4 and 5 from the Overfishing Workshop report present isopleths that relate potential egg production per recruit to various levels of fishing mortality (F) and minimum claw size. Figure 4 uses a natural mortality (M) level of 1.9 which is the upper bound of the range of estimates (1.9 to 0.95) and also assumes trap selectivity by size. It is presented as the best case scenario for the relationships. Figure 5 uses the lower boundary of M and assumes no trap selectivity. It is presented as the worst case scenario. The true relationship lies between the two cases. The estimates of fishing mortality rates (F) have ranged between 0.75 and 4.1 per season (Bert, et. al. 1986; Restrepo 1989; and Ehrhardt 1990) and F varies by sex and size (or age) of crabs. The best estimate of current F is approximately 2.0. The Overfishing Workshop report suggested a safe limit for egg production potential per recruit be set at no lower than 70 percent in the absence of more definitive information. Utilizing the isopleth of Figure 5, minimum claw sizes at 70 percent of egg production potential per recruit are as follows:

F	Minimum Claw Size
0.75	62mm
2.0	66.5mm
4.1	68mm

Since the worst case scenario was used to be conservative for this amendment, the minimum claw size at which overfishing would occur is defined at 66.5mm. This standard may be changed by regulatory amendment as better data result in selection of the best isopleth for describing this relationship.

Ecological Impacts: Since the current minimum size has maintained egg production potential at a high level and since neither the Council nor the Florida Marine Fisheries Commission (FMFC) propose to reduce the minimum size, the long-term impact should be a stable fishery without the occurrence of overfishing. The current expression of overfishing at a minimum claw length of 66.5mm was arrived at very conservatively by using a relatively high level of egg production potential per recruit (i.e., 70 percent) and the worst case scenario from a series of isopleths. Therefore, the possibility of overfishing occurring even at that minimum size is unlikely. However, the methodology used in establishing the definition provides a method of monitoring the reproductive potential and condition of the stock that will become more precise as better estimates of M, F, and the age structure of landed crabs are derived and as more reliable isopleths relating these parameters to egg production are computed. In the interim, the proposed management measure allows adjustments by regulatory amendment of claw size or fishing mortality rate to maintain a 70 percent egg production potential per recruit. All of the analyses and discussion of Action 1 apply to the stone crab Menippe mercenaria which constitutes more than 90 percent of landings. While M. adina occurs in northwest Florida, its life history, though less documented, appears to be essentially the same. It is the judgement of the Council that the definition of overfishing and proposed management measure affords the same degree of protection to M. adina.

Socioeconomic Impact:

There are no direct impacts on the fishermen or economy as a result of the proposed alternative. If any actions are taken by regulatory amendment under the proposed measure, the impacts of those actions will be included in the Regulatory Impact Review as part of that regulatory amendment. The maintenance of a stable fishery without overfishing occurring, as appears to be the case under the current management practices of the FMP and FMFC, has very beneficial long-term impacts.

Rejected Alternative

No action - Status Quo.

Discussion: The current rules under status quo established by FDNR, FMFC, and the Council appear to assure overfishing will not occur provided the rules are not altered. Based on the provisions and analyses of the proposed alternative, it is unlikely that the rules affecting reproductive potential will be changed. The proposed alternative, however, is superior to status quo by providing a method of monitoring the reproductive potential and condition of the stock and instituting the corrective actions necessary to prevent recruitment overfishing.

Ecological Impacts:

The effects are essentially the same as the proposed alternative with the exception that the proposed alternative provides a method to measure the stock reproductive potential and condition and to take corrective actions.

Socioeconomic Impacts:

None are associated with the status quo alternative.

ACTION 2: VESSEL SAFETY CONSIDERATIONS

Section 13.0 of the FMP is modified by adding a new subsection 13 (x), Vessel Safety Considerations, to read as follows:

13 (x) Vessel Safety Considerations

No management measures included in the FMP or in this Amendment adversely impact vessel safety that would result from weather or unsafe ocean conditions through constraint placed on access to the fishery. Fishermen may harvest stone crabs at any time during the fishing season (October 15 to May 15) and thereby may avoid unsafe conditions. Geographical areas where there is extreme competition for fishing grounds between trawl and trap gear are zoned to provide exclusive fishing grounds for each gear.

ACTION 3: HABITAT OF THE STOCKS

Section 6.0 of the FMP is revised by adding a new Description of the Habitat of the Stocks which is included in the Amendment as Appendix A.

V. Environmental Consequences

The actions proposed in the Amendment have no adverse impact on the physical environment. The effect of these actions is to amend the FMP to include a measurable definition of overfishing that allows monitoring of the fishery and a management measure to prevent overfishing.

The proposed actions of the Amendment have no anticipated impact on threatened or endangered species or marine mammals. A Section (7) Consultation was held for the fishery with "no jeopardy opinion" being rendered.

VI. Conclusions

Mitigating Measures Related to the Proposed Action

None.

Unavoidable Adverse Impacts

None.

Relationship Between Local Short-Term Use of the Resource and Enhancement of Long-Term Productivity

No impacts on short-term use are anticipated. Long-term productivity should be enhanced by implementation of a system that will prevent overfishing.

Irreversible or Irretrievable Commitment of Resources

The federal management commitment will be slightly increased by analyses associated with monitoring of condition of the stock.

Findings of No Significant Environmental Impact

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

_____ _____

Assistant Administrator for Fisheries Date

RESPONSIBLE AGENCIES

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LIST OF AGENCIES AND PERSONS CONSULTED

Gulf of Mexico Fishery Management Council
- Stone Crab Advisory Panel
- Scientific and Statistical Committee

Florida Marine Fisheries Commission

National Oceanic and Atmospheric Administration (NOAA)
- General Counsel's Office (SERO)

National Marine Fisheries Service
- Division of Fisheries Management
- Southeast Fisheries Center

LIST OF PREPARERS

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National Marine Fisheries Service
- Joseph Powers, Ph.D., Population Dynamics

LOCATION AND DATES OF PUBLIC HEARINGS

The Council accepted written comments on the amendment through November 9, 1990.

Public hearings were held as follows:

October 25, 1990	November 14, 1990
Marathon High School Cafeteria	Omni Hotel at Westshore
350 Sombrero Beach Road	700 North Westshore Boulevard
Marathon, Florida	Tampa, Florida
6:00 - 7:30 p.m.	8:45 - 9:30 a.m.

LITERATURE CITED IN AMENDMENT OR OVERFISHING WORKSHOP REPORT

Bert, T.M. 1986. Speciation in western Atlantic stone crabs (genus Menippe): the role of geological processes and climatic events in the formation and distribution of the species. Marine Biology 93: 157-170.

Bert, T.M., R.E. Warner, and L.D. Kessler. 1978. The biology and Florida fishery of the stone crab Menippe mercenaria (Say) with emphasis on southwest Florida. Florida Sea Grant Technical Report Number 9. University of Florida Sea Grant Program, Gainesville, Florida.

Bert, T.M., J. Tilmant, J. Dodrill, and G.E. Davis. 1986. Aspects of the population dynamics and biology of the stone crab (Menippe mercenaria) in Everglades and Biscayne National Parks as determined by trapping. Report SFRC-86/04. National Park Service South Florida Research Center.

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Ehrhardt, N.M. 1990 (in press). Mortality and catchability estimates for the stone crab (Menippe mercenaria) in Everglades National Park. Bulletin Marine Science.

Ehrhardt, N.M. and V.R. Restrepo. 1989. The Florida stone crab fishery: a reusable resource? Pages 225-240 in J.F. Caddy (ed.): Marine Invertebrate Fisheries: Their Assessment and Management. J. Wiley and Sons, New York.

Florida Department of Environmental Regulation. Coastal Zone Management Plan (numerous volumes and annual appendices to program). Tallahassee, Florida.

Lindberg, W.J., and M.J. Marshall. 1984. Species profiles: Life histories and environmental requirements of coastal fishes and invertebrates (south Florida) - stone crab. U.S. Fish and Wildlife Service Biology Service. FWS/OBS-82/11.21. Washington, D.C. U.S. Army Corps of Engineers TR EL-82-4.

Restrepo, V.R. 1989. Population dynamics and yield-per-recruit assessment of southwest Florida stone crabs, Menippe mercenaria. Ph.D. dissertation, University of Miami, Coral Gables, Florida.

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Wilber, D.H. 1989. Reproductive biology and distribution of stone crabs (Xanthidae, Menippe) in the hybrid zone on the northeastern Gulf of Mexico. Marine Ecology Progr. Service 52:235-244.

Williams, A.B. and D.L. Felder. 1986. Analysis of stone crabs: Menippe mercenaria (Say), restricted, and a previously unrecognized species described (Decapoda:Xanthidae). Proc. Biology Soc. Washington 99: 517-543.

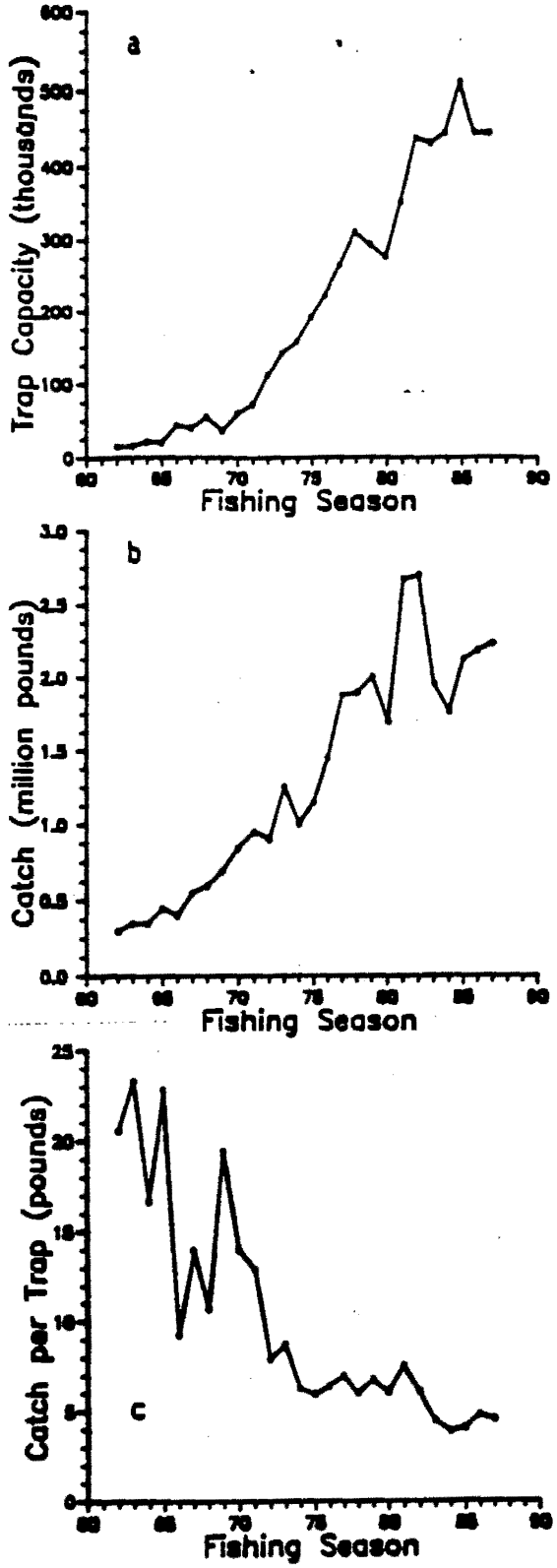

FIGURE 1: Fishing season (Oct 15 - May 15) trends in a) trap capacity, b) catch, and c) catch per trap capacity for the Florida west coast stone crab fishery.

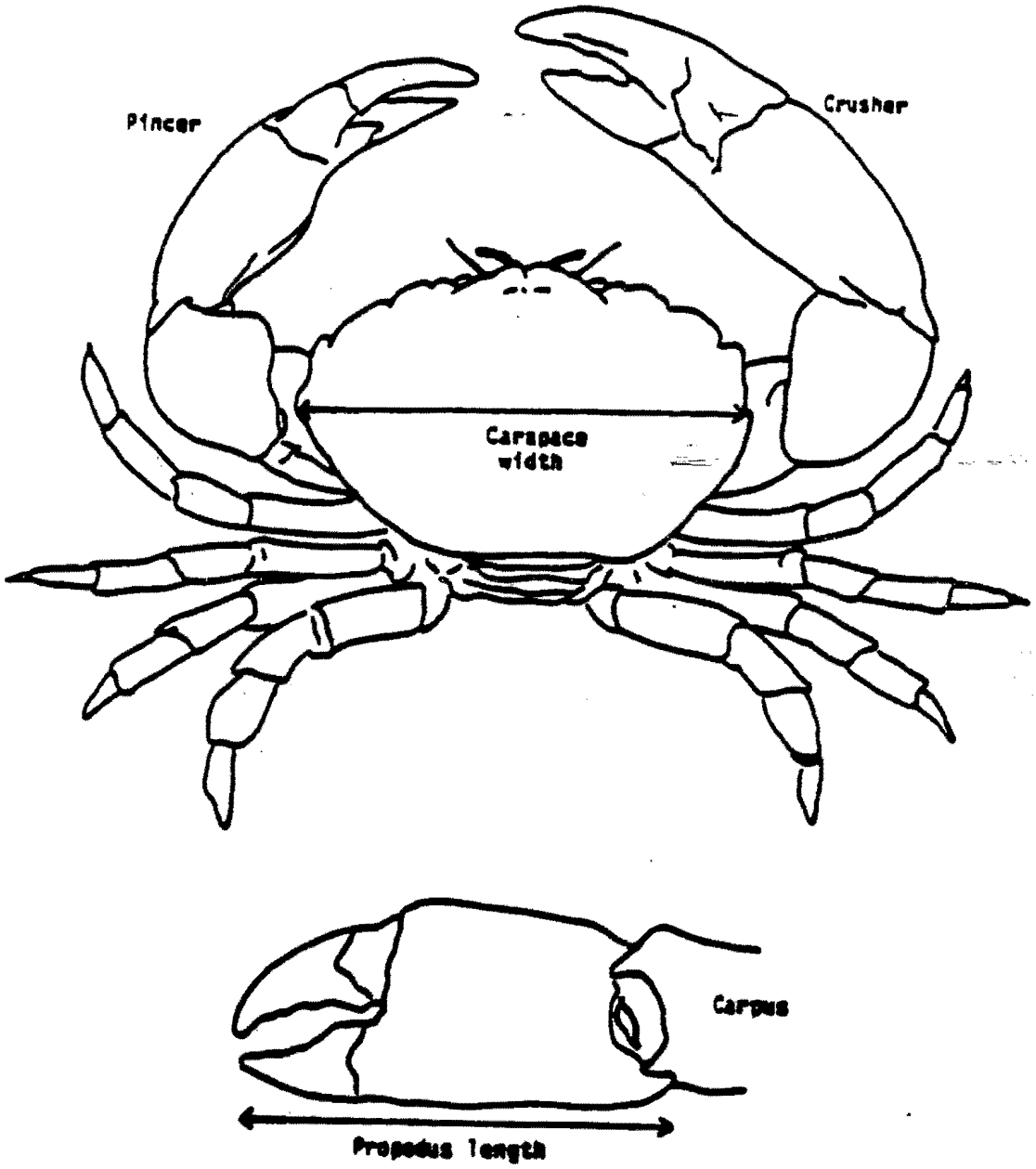

FIGURE 2. A stone crab and its chelae (the major claw, or "crusher" and the minor claw, or "pincer"). Body length is commonly measured as carapace width and claw size is measured as propodus length.

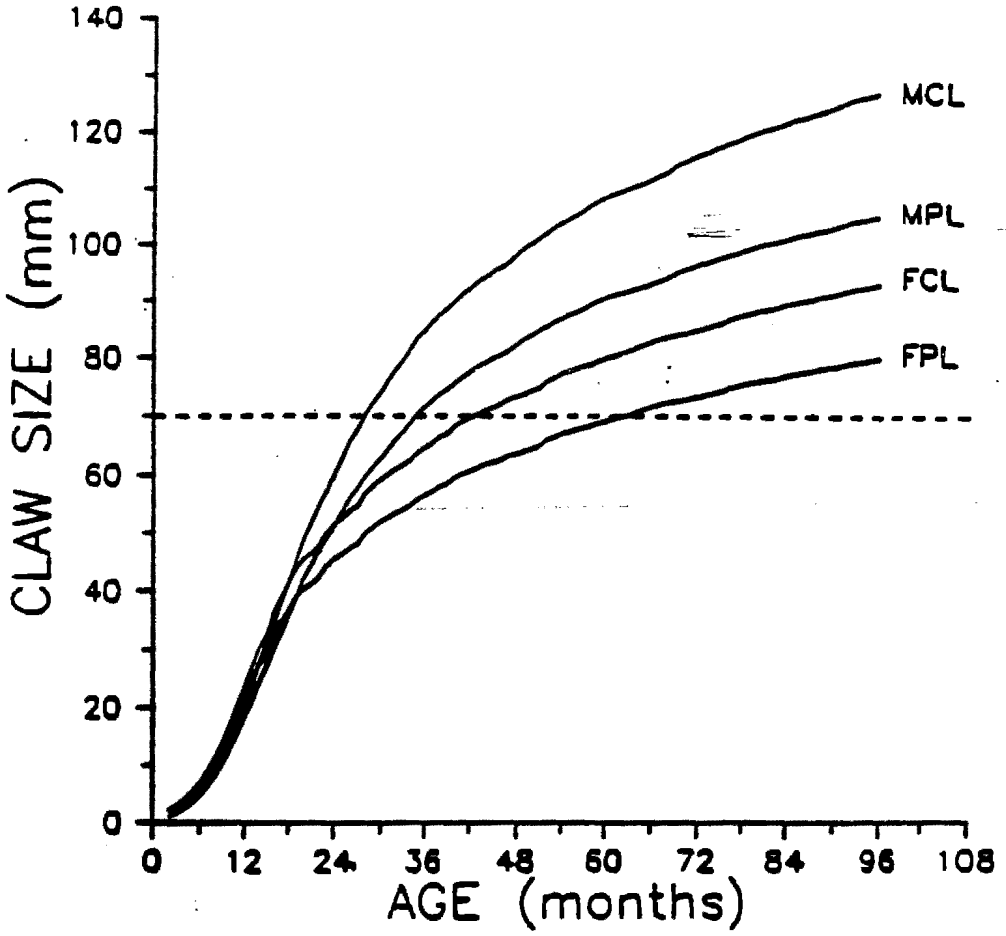

FIGURE 3: Claw growth curves for stone crabs. M= males; F = females. PL = pincer length; CL = crusher length.

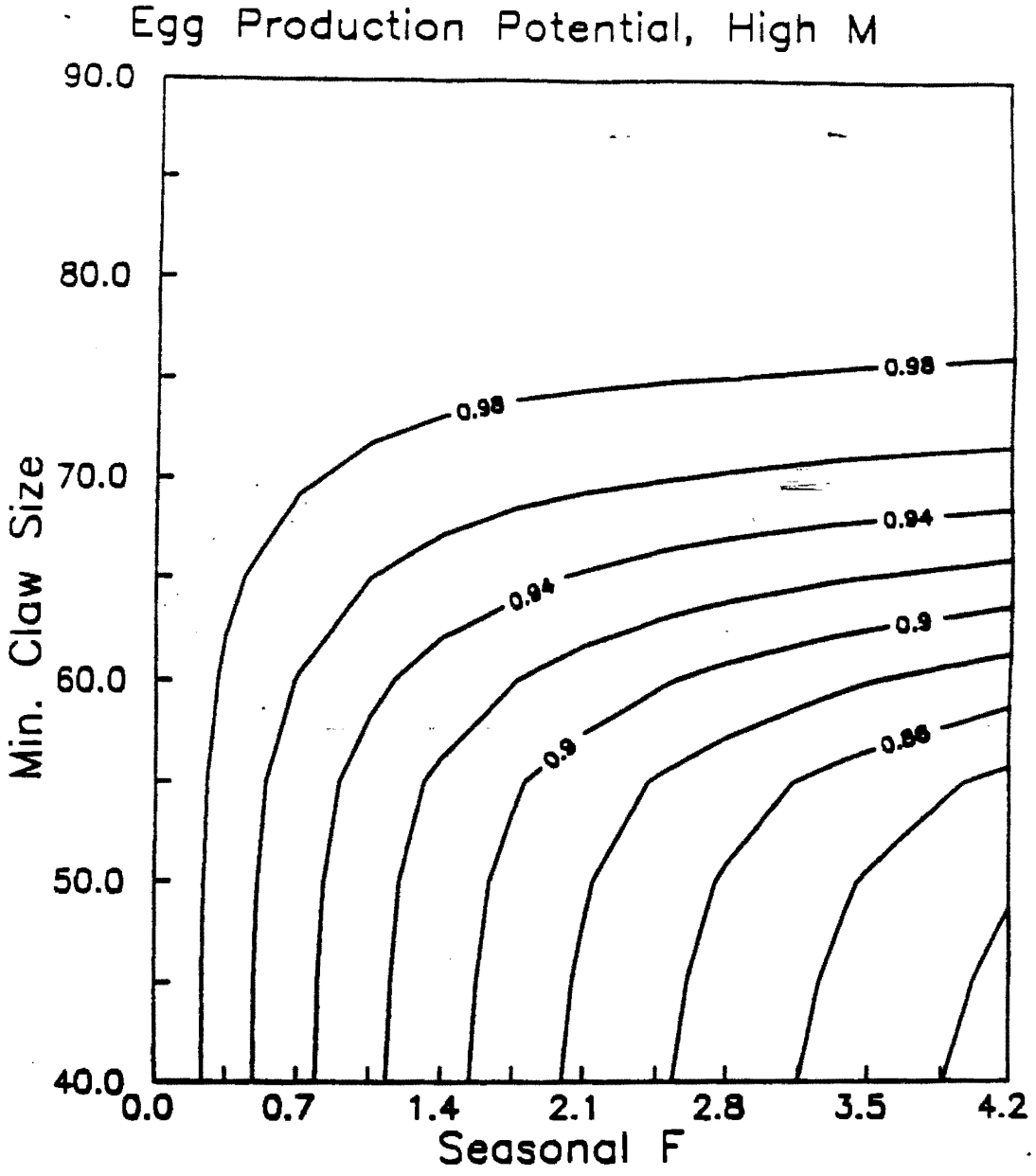

FIGURE 4: Egg production per recruit isopleths for female stone crabs under a scenario with high natural mortality (M=1.9) and trap selectivity. Values are given as a fraction of those expected in an unexploited stock.

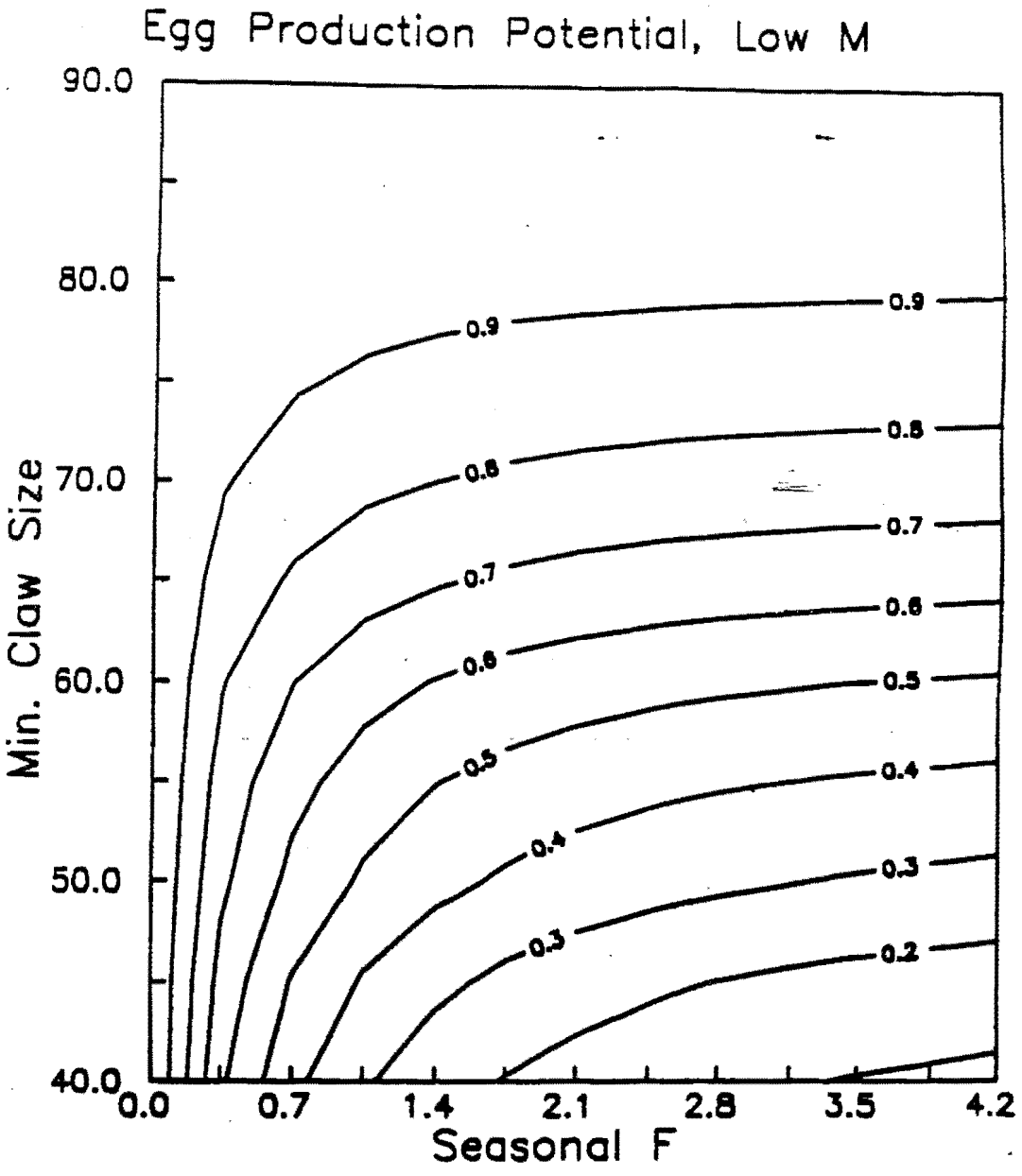

FIGURE 5: Egg production per recruit isopleths for female stone crabs under a scenario with lower natural mortality (M=0.95) and full trap retention. Values are given as a fraction of those expected in an unexploited stock.

APPENDIX A

6.0 DESCRIPTION OF HABITAT OF STOCK COMPRISING MANAGEMENT UNIT

The following subsections were reviewed in comparison to the most recent literature on stone crabs and were judged as adequate descriptions without further revisions except for the indicated notes:

(i) Condition of Habitat

(A) Description of Stone Crab Habitat

a. Habitat occupied during the life history of stone crab

Note: Bert (1986), based on electrophoretic studies, suggested that M. mercenaria was a taxonomic supergroup composed of two subspecies, one which inhabits the western-most part of the range, from northwest Florida to Texas, and the other the eastern part of the range. Williams and Felder (1986) designated crabs in the western part of the range as a different species Menippe adina. Bert et. al. (1989) suggest a hybridization zone between M. mercenaria and M. adina around the Cedar Key, Florida area. Wilber (1989) concluded the two species and hybrids share similar life history characteristics in terms of seasonal growth, reproduction, and movement.

b. Habitat along the west coast of Florida

(B) Factors Affecting Habitat Productivity and Probable Future Condition

Note (1): This section discusses threats to the habitat.

Note (2): There are no known pollution sources or habitat conditions that affect the ability to harvest and market stone crabs.

(ii) Habitat Areas of Particular Concern

(iii) Habitat Protection Programs

(A) Coastal Zone Management Programs

Note: Florida has an approved Coastal Zone Management Program that provides comprehensive protection from habitat degradation in the coastal zone. The program incorporates by reference all Florida laws and regulations pertaining to habitat alteration, discharges, project siting, marine fisheries, etc., i.e., all statutory programs related to the marine environment. Consistency determinations of activities proposed in the coastal zone must be obtained from the program office within the Department of Environmental Regulation.

(B) Existing Federal Programs

Note: The following two subsections are added:

r. Marine Sanctuaries Act. Under this program, NOAA establishes marine sanctuaries to protect areas of unique environmental or historical importance and promulgates and enforces rules to prevent habitat alteration within the sanctuaries.

s. Waterways Safety Act of 1978. The Act charges the U.S. Coast Guard with marine environmental protection which includes principal responsibility for oil spill enforcement and clean up.

t. Outer Continental Shelf Lands Act. In administering the oil and gas resources on the Outer Continental Shelf, the Department of Interior through the Minerals Management Service has the authority to require that the oil and gas lease permit stipulations protect the environment.

u. Clean Water Act. The Environmental Protection Agency is the permitting agency for chemical discharges into the Gulf of Mexico, under the National Pollution Discharge Elimination System (NPDES) program of the Clean Water Act for chemicals used or produced in the Gulf (i.e., drilling muds, produced water, or biocides).

(C) Existing State Laws

Note: In addition to laws cited, the Coastal Zone Management Program has incorporated by reference all statutes and rules applying to the marine environment (Florida Department of Environmental Regulation).

(D) Existing County Programs

The following new subsections are added:

(iv.) Habitat Information Needs

The following research needs relative to stone crab habitat are provided so that state, federal, and private research efforts can focus on those areas that would allow the Councils to develop measures to better manage stone crabs and their habitat (see FMP Operations Plans):

1. Determine patterns of dispersal of all life stages, including movement patterns, recruitment areas, and nursery areas;
2. Define temporal and spatial variation in larval and juvenile distribution and abundance, particularly in southwest Florida;
3. Determine the effect of environmental factors on abundance and catch levels, especially those related to recruitment rates, post-settlement survival, and catchability coefficients;
4. Determine the effects of lost or abandoned traps upon stone crab habitat;
5. Identify optimum environmental and habitat conditions and those that limit stone crab production;
6. Identify additional areas of particular concern for stone crab life history stages;

7. Determine methods for restoring stone crab habitat and/or improving existing environmental conditions that adversely affect habitat; and,

8. Identify mitigative methods for preserving and/or establishing habitat.

(v.) Habitat Recommendations

The stone crab resources contribute to the food supply, economy, and health of the nation and provides for recreational and commercial fishing opportunities and aesthetic enjoyment. The continued use of these resources can only be assured by the wise management of all aspects of habitat. Increased productivity may not be possible without habitat maintenance and regulatory restrictions.

Recognizing that all species are dependent on the quantity and quality of their essential habitats, it is the policy of the Council to protect, restore, and improve habitats upon which commercial and recreational marine fisheries depend to increase their extent and to improve their productive capacity for the benefit of the present and future generations. This policy shall be supported by three objectives which are to:

1. Maintain the current quantity and productive capacity of habitats supporting important commercial and recreational fisheries, including their food base (this objective may be accomplished through the recommendation of no loss and minimization of environmental degradation of existing habitat);

2. Restore and rehabilitate the productive capacity of habitats which have already been degraded; and,

3. Create and develop productive habitats where increased fishery productivity will benefit society.

To achieve these goals, the Council has formed a Habitat Protection Committee and Advisory Panels. The purpose of the committee is to bring to the Council's attention activities that may affect the habitat of the fisheries under their management. The Council, pursuant to the Magnuson Act, will use its authority to support state and federal environmental agencies in their habitat conservation efforts and

will directly engage the regulatory agencies on significant actions that may affect habitat. The goal is to ensure that habitat losses are kept to the minimum and that efforts for appropriate mitigation strategies and applicable research are supported.