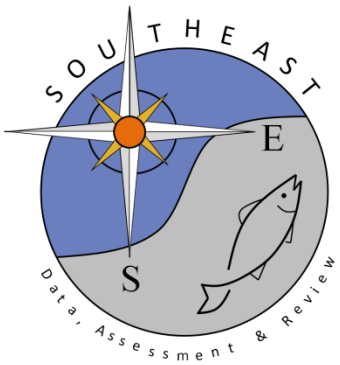
Amendment 1 and Environmental Assessment and Regulatory Impact Review to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region

South Atlantic Fishery Management Council

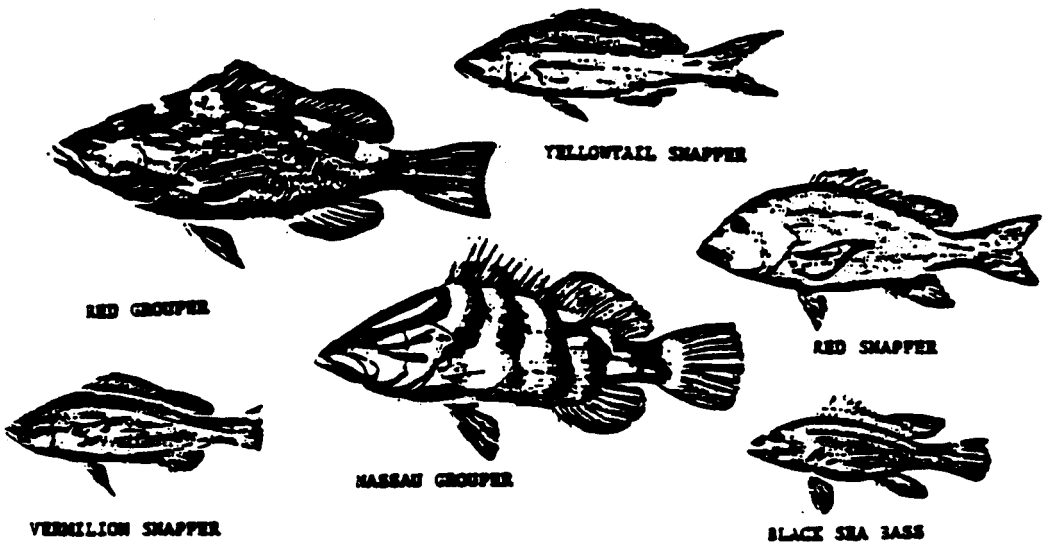
SEDAR41-RD30

9 July 2014



FINAL

AMENDMENT NUMBER 1 AND ENVIRONMENTAL ASSESSMENT AND REGULATORY IMPACT REVIEW TO THE FISHERY MANAGEMENT PLAN FOR THE SNAPPER GROUPER FISHERY OF THE SOUTH ATLANTIC REGION



SEPTEMBER, 1988

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SNAPPER GROUPER AMENDMENT 1 ADDENDUM

ACTION 3: ADD VESSEL SAFETY CONSIDERATIONS TO THE FISHERY MANAGEMENT PLAN

Amendment by P.L. 99-659 to the Magnuson Act requires that a fishery management plan, must consider and may provide for, temporary adjustments, after consultation with the Coast Guard and persons utilizing the fishery regarding access to the fishery for vessels otherwise prevented from harvesting because of weather or other ocean conditions affecting the safety of the vessels.

No vessel will be forced to participate in the fishery under adverse weather or ocean conditions as a result of the imposition of the management regulations set forth in the original Fishery Management Plan or in Amendment 1. Therefore, no management adjustments for fishery access will be provided.

A. Fishery access and weather related safety. There are no fishery conditions or management measures or regulations contained in the original Fishery Management Plan or Amendment 1 that would result in the loss of harvesting opportunity because of the crew and vessel safety effects of adverse weather or ocean conditions. There have been no concerns raised by the Coast Guard or by persons engaged in the fishery, that the proposed management measures directly or indirectly pose a hazard to crew or vessel safety under adverse weather or ocean conditions.

B. No Impact Determinations. Vessel safety has not been identified as a relevant or significant issue in the snapper grouper fishery or in the management measures set forth.

C. Adjustments. There are no procedures for making management adjustments in the original Fishery Management Plan or Amendment 1 because no person will be precluded from a fair or equitable harvesting opportunity by the management measures set forth.

D. Coast Guard Evaluation. No vessel safety issues, whether pertinent to fishery access and weather-related vessel safety or to other significant or relevant safety issues have been identified by the Coast Guard.

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

F. Other Safety Issues. There have been no significant and relevant safety issues raised by fishery users, other public or the Coast Guard, therefore, there are no social or economic implications resulting.

AMENDMENT NUMBER 1 AND ENVIRONMENTAL ASSESSMENT AND REGULATORY IMPACT REVIEW TO THE FISHERY MANAGEMENT PLAN FOR THE SNAPPER GROUPER FISHERY OF THE SOUTH ATLANTIC REGION

Prepared By The

South Atlantic Fishery Management Council

SEPTEMBER, 1988

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I. INTRODUCTION

The Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region was prepared by the South Atlantic Fishery Management Council and implemented by the Secretary of Commerce on August 31, 1983 [48 Federal Register 39463]. The Fishery Management Plan was prepared to prevent growth overfishing in thirteen species in the complex and to establish a procedure for preventing overfishing in other species in the future. The Fishery Management Plan established a four inch trawl mesh size to achieve a twelve inch minimum size for vermilion snapper. Yield per recruit analyses indicated that a 12 inch minimum size would increase yield by 34 percent and maximize yield per recruit thereby minimizing growth overfishing. The South Atlantic Fishery Management Council considered prohibiting roller trawls in the original Fishery Management Plan; input from National Marine Fisheries Service indicated that trawl gear probably resulted in some damage but there was no quantitative information available. As a result, the Council adopted the position that there was inconclusive evidence concerning habitat damage caused by bottom roller trawls. Information is now available that documents habitat damage associated with bottom trawls used over live bottom and the ineffectiveness of the 4 inch mesh measure. Cummins et al. (1962) first used the term "live bottom" to describe the following bottom type: "Loggerhead sponge, generally present, small to large amounts; fire sponge, generally present, variable amounts; other sponge, always present, small amounts; coral, occasionally present, small amounts; rock, sometimes present, variable amounts; and shell, usually present." To address the problems of habitat damage and growth overfishing, Amendment 1 prohibits use of trawl gear to harvest fish in the directed snapper grouper fishery south of Cape Hatteras, North Carolina (35°15' N. Latitude) and north of Cape Canaveral, Florida (Vehicle Assembly Building, 28°35.1' N. Latitude). A vessel with trawl gear and more than 200 pounds of fish in the snapper grouper fishery (as listed in Section 646.2 of the regulations) on board will be defined as a directed fishery. The amendment also establishes a rebuttable presumption that a vessel with fish in the snapper grouper fishery (as listed in Section 646.2 of the regulations) on board harvested its catch of such fish in the Exclusive Economic Zone.

II. DESCRIPTION OF FISHERY AND UTILIZATION PATTERNS

The Fishery Management Plan and Source Document describe the fishery and utilization patterns in Section 8.0 of each document. Basic information on the trawl fishery was included; however, given that trawl gear is the major thrust of this amendment, more detailed information concerning the development of this gear is presented. In addition, this amendment presents all

readily available information that was not included in the original Fishery Management Plan.

Basically nets used in this fishery are high-rise trawls (large vertical opening) with heavy roller-rigged ground lines. Foot ropes on the nets range from 100 to 180 feet with head ropes ranging from 80 to 150 feet. Vertical openings on these nets are 20 to 30 feet. Long leg lines and numerous floats on the head rope are used to achieve these high openings. Steel vee-doors are used to spread the nets. Codend mesh size was initially about 2 inch stretch measure but is currently four inches. Trawling is conducted over relatively flat areas of predominantly hard bottom, including sections considered live bottom. High-relief areas and slab rock bottoms are avoided because of gear damage or loss. Recently the Council was informed that bottom trawl gear has been modified to fish just off the bottom thereby eliminating some need for rollers. This would not however eliminate habitat damage from the doors, leg lines and periodic net contact with the bottom. In addition, one would have to question the validity of this statement given the description of gear used during an April, 1988 cruise of the R/V Georgia Bulldog (Christian, 1988). Either the net used by the R/V Georgia Bulldog no longer resembles the type of net used commercially or the statements of recent changes to bottom trawl gear are incorrect.

The South Atlantic Fishery Management Council Snapper Grouper Source Document (SAFMC, 1983) describes bottom trawl gear and provides a discussion of the habitat requirements for species in the snapper grouper complex. The Source Document further describes conflicts among domestic fishermen resulting from the substantial increase in trawling during 1979 and 1980. Basically, hook and line fishermen claimed that trawlers, by taking large quantities of small fish, are reducing the amount of larger fish that will become available. They also maintained that trawling damages physical habitat by destroying invertebrate growth on live bottom and disrupts schooling activity so that fish do not return to areas that have been heavily trawled. Additional concern was expressed about the non-selectivity of trawls. Halifax Reef brought suit against the Secretary of Commerce and the Council during, the development of the original plan, seeking a positive injunction to ban trawl gear.

History of Bottom Trawl Development

Early experimental cruises were conducted testing the utility of otter trawling gear for red snapper fishing in the Gulf of Mexico intermittently from June 1957 through May 1959 (Captiva and Rivers, 1960). The gear consisted of nylon netting, wooden rollers and Vigneron-Dahl rigging which was necessary for trawling on the rough and broken bottom. Eleven species of snapper and nine species of grouper were caught; the best individual catch was 1,775 pounds in 90 minutes. No mention was made of benthic invertebrates being caught in the nets. One of the authors' concluded that "Broken and rough bottom areas, previously considered untrawlable, can be worked economically with gear properly designed and constructed."

Exploratory fishing with this same type of gear was conducted between Ft. Pierce, Florida

and Cape Hatteras, North Carolina (Cummins et al., 1962). The shelf edge between 15 and 30 fathoms where the bottom varied from smooth to broken was covered. Between Cape Lookout and Cape Canaveral live bottom areas were found where fish were caught with bottom trawls in 15 to 70 fathoms. The authors report that the best catches were made on live bottom when fish tracings appeared on a recorder (Appendix A, Figure 1). No mention of benthic invertebrates is made in this report.

Experimental fish trawling on the Florida west coast occurred during April to July 1965 (Juhl, 1966). "The rugged doors, heavy twine, and roller rig were used because broken bottom, coral reefs and loggerhead sponge areas characterized much of the area surveyed. Tears and hang-ups were frequent but damage to the gear was not excessive." The largest catch was 525 pounds but consisted of mostly non-food fish. The conclusion of the work was "Although the survey trawls were smaller than typical commercial gear, catch composition proved fishing capability equal to shrimp trawls and demonstrated that roller-rigged fish trawls can be fished without excessive damage in areas unsuitable to conventional shrimp trawling. This type of fish trawl can be adapted for use on standard double-rigged and single-rig shrimp boats. In addition to preventing excessive trawl damage, rollers help considerably in avoiding undesirable bottom detritus." This is the first mention of benthic invertebrates being caught.

Huntsman (1976) reported that experimental roller trawling produced good catches of snappers and groupers, based on a R/V Dan Moore cruise, but that commercial fishermen were not interested in the technique. He further noted that of nine commercial roller trawl cruises from Georgetown, South Carolina during the winter of 1973-74, three had a total catch of 20,000 pounds with the remainder being unsuccessful; damage to gear and bad weather precluded further fishing and the operators planned no more fish trawling on rough bottom. The author's concluded, regarding the status of the snapper grouper resource in 1976, "The current handline and head boat fisheries are of relatively low intensity, the former because there are few vessels, the latter because the time vessels spend on the fishing grounds is limited. Also, both fisheries readily utilize all available species and seem to be in approximate equilibrium with the fish populations."

Three papers mentioning bottom trawls were presented during a snapper grouper workshop in November 1977. The first reported on attempts to use trawls that did not prove successful. Barans and Powles (1977) reported that "When we use the MARMAP half-hour trawl procedure in a rocky area, we usually leave the trawl on the bottom or pull it up ripped to pieces." The locations of the sampling stations are shown in Figure 2 in Appendix A. Smith and Rivers (1977) reported on fish trawling activities off the Georgia coast during 1976 and 1977. The University of Georgia began working with a commercial fisherman, and the best one day catch was 5,000 pounds at an average of $0.62 per pound. The average catch was 4,400 pounds on an average trip of 1.7 days. They also reported that the success of this new fishery was overshadowed some by the enormous expenses of gear loss. Most of their trawling activities were on hard, live bottom areas (Figure 3,

Appendix A). Refinements to the gear include plastic mud rollers which are not as heavy as rubber or wood rollers and chaffing gear on the net to protect the bag from rough bottom and sharks. Two questions were asked after the Smith and Rivers (1977) presentation that are important to this amendment: (1) "What's the maximum relief you can work with a trawl? There must come a point at which some bottom is untrawlable, but how much vertical lift can you jump with those rollers? Answer: Well, I've seen areas where on the depth recording machine you probably see just a small rise of say two or three feet and your door would get caught or you may have these long sweeps that could get caught on a lump. I've seen times when we've had 5 or 6 feet of relief yet we have gone right over it without a hang. It's hard to say whether a 14 inch roller is going to go over 6 feet or 6 inches. It's a hard question to answer. It all depends on the type of bottom"; and (2) "Would you consider the shelf break habitat trawlable? I really don't know what it looks like off Georgia, but is this area trawlable in any way with any gear? Answer: Sharp breaks and peaks are what we have to avoid. Maybe some day they'll develop something like a one-boat mid-water trawler."

The third paper reported on the feasibility of using the University of Rhode Island high-rise trawl off South Carolina for demersal finfish resources on live-bottom areas (Smith, 1977). The authors wanted to find a fishery that could support components of the shrimp trawl fishery during the off-season for shrimp and make use of a portion of the significant latent capital and labor resources. The University of Rhode Island 60/80 net used 6 inch "cookies" or rubber discs punched out of truck tires, heavy doors (750 pounds each) and a heavy net (around 1,000 pounds). They reported that hanging up and tearing the net was the rule rather than the exception. Based on 17 days away from the dock, 35,000 pounds of marketable fish were caught (30% red snapper, 25% vermilion snapper and 15% grouper). In addition, they note that in a typical drag little trash and almost no bottom growth was encountered although occasionally a large loggerhead sponge would be brought aboard. Gear modifications were going to a Chinese Vee door which helps to deflect obstacles that were hanging-up the net, big rollers (about 24 inches) instead of small cookies and some home made rollers constructed of oak. One question raised at the workshop after the Smith (1977) presentation is worth repeating: "Are there any indications that roller trawls are damaging "live-bottom" areas? Answer: The only indications that I have are what they bring up in bottom growth. The catches usually contain very little bottom growth but I have no way of definitely assessing what the damages are, if any."

The work in South Carolina, partially described in Smith (1977), was reported on in much greater detail by Ulrich et al. (1977). The mean monthly trawl catch for all species per vessel-day was 2,107 pounds; the mean monthly commercial hook and line catch for all species per vessel-day was 719 pounds. The trawl catch was composed of red snapper (31%), vermilion snapper (25%), groupers (14%) and red porgy (17%); the commercial hook and line catch included red snapper (8%), vermilion snapper (15%), groupers (50%) and red porgy (22%). Size composition of trawl and commercial hook & line catches were significantly different for red snapper, vermilion snapper

and red porgy; trawl caught fish were smaller than commercial hook & line caught fish. For red snapper, the mode of trawl caught fish was 45 cm total length and 50 cm total length for hook & line caught fish. For vermilion snapper, the modes were 25 and 35 cm total length and for red porgy 25 and 40 cm total length for trawl caught versus hook & line caught fish respectively.

Christian et al. (1985) reported on bottom trawling off the southeastern coast of the U.S. and their introduction bears inclusion:

> "The major seafood industry in the South Atlantic Bight is based on shrimp, and this dependence on one crop has made the industry financially precarious. In recent years, weather-caused mortality of shrimp populations, escalating fuel costs, and the increased numbers of vessels have squeezed profit margins to the limit. Therefore, fishermen have looked to other activities such as bottom trawling for finfishes to supplement their income. This is not the single salvation for the whole industry. Although fish trawling can offer an alternative which may aid some shrimpers in maintaining year-round income, suitable trawling bottom in this area is limited, and target species of such a fishery (snapper, grouper, and porgies) are relatively long-lived, slow-growing, and can sustain only limited fishing pressure. This bulletin contains information on how to modify a vessel for bottom trawling, fishing tips, and recommended areas to fish."

A detailed description of boat and gear modifications necessary to convert a typical shrimp boat to fish trawling is presented. A protective sweep is still necessary to keep trawl damage to a minimum and is composed of a 6 inch cookie sweep with 12 inch diameter molded rubber rollers in the belly section and bunt rollers in the wing section. The authors report that the "rubber rollers roll over the bottom and help keep the net from hanging on bottom obstructions."

A historical review of fish trawling in South Carolina is currently being drafted by Dr. Bob Low of the South Carolina Wildlife and Marine Resources Department and will be a part of a South Carolina fishery status report. The following information was obtained from the draft report. The number of boats operating in the fishery in South Carolina and landed weight and value are shown in Figure 4 and the average catch per trip in Figure 5(Appendix A); data for 1985 and 1986 are not presented due to the confidential nature of this data. The author reports that landings peaked in 1981 with an estimated 13 vessels in the fishery. Total landings and effort declined in 1982 and 1983. In 1983, vermilion snappers replaced porgies as the principal species in the catch. Declines continued in 1984 with over 50 percent of the catch composed of very small vermilion snappers and the landings of larger fish such as red snapper and groupers very low. Further, in the 1976 experimental fishery, in which a smaller net was used, the average catch rate was 2,107 pounds per day; in 1983, the daily catch rate had dropped to 1,851 pounds and in 1984 it declined to 1,231 pounds. As mentioned previously the statistics for 1985 and 1986 are confidential but both landed weight and value were considerably lower than in 1984 and only a few boats operated in the fishery.

The Snapper Grouper fishery management plan implemented in 1983 required a 4 inch minimum mesh regulation effective September 28, 1984 for trawl nets targeting fish in the snapper grouper fishery (25 percent or more of the fish on board by weight are fish in the snapper grouper fishery) (SAFMC, 1983). The objective of this measure was to prevent or reduce growth overfishing and increase the yield of vermilion snapper by 34 percent. The Fishery Management Plan projected the impacts as follows: "Based on commercial catch composition, the expected reduction of the small vermilion snapper component of the trawl catch (at least 50 percent) and reduction in other species will reduce the total landings of bottom trawls (as presently operated) by at least 50 percent in the short run until vermilion grow to a larger size."

The most recent information on fish trawling in the South Atlantic is from the April, 1988 cruise report of the R/V Georgia Bulldog (Christian, 1988). The purpose of this cruise was to evaluate the density and diversity of traditional trawling areas, to evaluate trawl designs and modifications and to collect biological and hydrographic information. A rock-hopper type net consisting of 14 inch rubber circular hoppers at the center of the net's mouth and tapering to 9 inch rubber circular hoppers in the net's wing area was used on a total of 14 bottom trawl stations. The mean catch per hour of commercial species was 73.3 pounds and the highest individual tow yielded a catch of 207 pounds per hour. The area fished is indicated in Figure 6 (Appendix A). In examining the catch information from each station it becomes apparent that sponges and other benthic invertebrates are still being collected by this type of gear.

Background on Council Actions

The Council approved the Snapper Grouper Fishery Management Plan in March, 1983 and required a minimum of four inch stretch mesh for all trawl nets that target species in the management unit (those where 25 percent or more of the catch by weight is comprised of species in the management unit). This mesh size was to be installed within 12 months of the Fishery Management Plan's implementation (effective September 28, 1984). This measure was developed to accomplish a 12 inch minimum size for vermilion snapper and did not directly address habitat damage. Impacts on fish trawling were described in the Fishery Management Plan: "Based on commercial catch composition, the expected reduction of the small vermilion snapper component of the trawl catch (at least 50 percent) and reduction in other species will reduce the total landings of the bottom trawls (as presently operated) by at least 50 percent in the short run." The Council would have liked to address habitat loss directly but quantitative data were not available at that time.

Without the ability to harvest undersized fish, coupled with increasing fuel and other operating costs, the number of vessels in the trawl fishery declined significantly and the Council received little if any feed-back from fishermen concerning further catches of small vermilion or habitat destruction until early 1987. Mr. Ken Doss wrote the Council (March 12, 1987) on behalf of the Two Way Sport Fishing Club in Brunswick, Georgia indicating the growing concern of their club,

commercial fishermen, and other fishing and diving clubs from North Carolina to Florida over the destruction of live bottom, the taking of undersized fish, and the destruction of non-marketable fish by roller-rigged trawlers fishing on live bottoms. Mr. Doss requested that the Snapper Grouper Fishery Management Plan be amended to prohibit the use of roller-rigged trawls on live bottom areas in the South Atlantic Council area of jurisdiction.

The Council discussed this matter at its March 24, 1987 meeting. Dr. Joseph, Council Chairman, reviewed the Council's historical dealings with this gear and indicated that the four inch mesh requirement cut the number of boats operating in South Carolina in 1984 from twelve to one. One vessel was currently operating in South Carolina and after its catch was measured, appeared to be using a legal mesh size. Mr. Harris, Council member from Georgia, indicated that there were three boats currently operating off the Georgia coast. The Council agreed that it was time to review this trawl gear in light of its recent resurgence in the fishery.

The Snapper Grouper Committee met April 29, 1987 and discussed this matter in detail. Ms. Shipman, Council member from Georgia, presented information that the vessels were fishing from Hilton Head, South Carolina south to about Fernandina, Florida and perhaps as far south as St. Augustine, Florida, predominantly hitting the snapper banks. Confidential landings data indicate that there are thousands of pounds of small vermilion (six to the pound) as well as undersize sea bass, cobia and snappers being harvested. Ms. Shipman indicated that there is considerable concern among sport and commercial fishermen; fishing had been going on during the winter months after the shrimp fishery closed in mid-January. These were primarily shrimpers who were fishing for the two or three month off-season for shrimp and turned to this as a transitional fishery to keep their boats operational. This is not traditional gear that has been in that fishery; these are boats that are turning to that fishery and could use other gear available in the snapper grouper fishery. She added that there had also been evidence of habitat destruction; some fishermen who previously used roller trawls on their shrimping vessels have come to sportfishing club meetings and given "testimonials" of sponges, hard and soft coral, etc. that were brought up in nets. The committee also discussed recent changes in shrimp gear wherein something like a mongoose net could be used to fish in live bottom areas even without the use of large doors and rollers. The use of such a net would still result in significant habitat destruction. Dr. Joseph commented that at the time the mesh regulation was adopted, everyone in that fishery was using large, high rise nets with heavy doors and big rollers because of its effectiveness. However, now there are some low profile, live bottom areas where one may be able to fish with a relatively unmodified mongoose type shrimp trawl. The current regulation states that shrimp trawls are specifically exempt from the regulation. Ms. Shipman stated that she agreed with Dr. Joseph; one can pull a trawl through sponges without putting considerable weight or even rollers on the gear and still cause considerable damage to sponges. Dr. Joseph stated that the Council's intent was to prevent the use of trawls in the snapper grouper fishery. The reason shrimp, calico scallop and rock shrimp trawls were exempt was to

ensure that the Council's regulations did not interfere with those fisheries. The Council wanted to be very explicit that they were not outlawing trawlers; they were outlawing the use of trawls in the snapper grouper fishery which is executed almost 100 percent over live bottom areas. Fishes in the snapper grouper fishery are rarely found on other than live bottom. This is why fishermen set their gear in hard bottom/live bottom areas.

The committee met again June 23, 1987 and received a detailed presentation of the results of a final report entitled "Effects of Roller Trawling on a Hard Bottom Sponge and Coral Community" prepared in November, 1983 by R. F. Van Dolah, P. Hinde and N. Nicholson. These results were published in Fisheries Research 5 (1987): 39-54 as "Effects of a Research Trawl on a Hard-Bottom Assemblage of Sponges and Corals" by Van Dolah et al. After the presentation, Dr. Joseph added that prior to this study, there was a great deal of concern expressed by different groups on the effects of bottom trawls on habitat. Most complaints he heard were from the commercial sector, predominantly at that time, the hook & line component of the fishery. There was a lot of sympathy on the part of the Council for outlawing use of bottom trawls in the snapper grouper fishery. The position of National Marine Fisheries Service at that time was that bottom trawls probably did do some damage but there was no supporting documentation and therefore, the Council could not proceed with outlawing bottom trawls. This study is at least a step, a clear demonstration, that there is damage. He stated that it was very important to keep in mind that this study consisted of one pass of a relatively small trawl through an area; one cannot translate the degree of damage to the commercial sector as the study indicated. The study does document there is damage.

There was considerable discussion about the harvest of small fish and habitat damage. The committee also reviewed a letter from the Georgia Department of Natural Resources, other correspondence and a number of petitions objecting to the use of this gear. The committee was presented with the policy statement adopted by the Habitat and Environmental Protection Committee (see pages 24-25). A motion was approved to exclude trawl gear from the snapper grouper complex by plan amendment. The rationale would be the study that quantifies damage caused by bottom trawl gear and further, that such action would be consistent with the habitat policy. The motion was approved by the South Atlantic Fishery Management Council. This action has the additional benefit of addressing harvest of small fish.

III. STATEMENT OF THE PROBLEM

The reemergence of trawl gear in the snapper grouper fishery (Table 1) is resulting in damage to the habitat upon which the species in the fishery depend for shelter and food. The Snapper Grouper Source Document (SAFMC, 1983) contains a diagram of the bottom habitat on the continental shelf which is included as Figure 7 (Appendix A). This diagram when viewed along

with the other figures in Appendix A, support the Council's position that trawl fishing is taking place on live bottom habitat even though the exact location and distribution of live bottom is unknown. Trawling in this area will reduce habitat available to snapper and grouper species and result in lower long-term yields from the fishery. In addition, vermilion snapper (*Rhomboplites aurorubens*) less than 12 inches continue to be harvested by trawl gear even though a minimum trawl mesh size of four inches was implemented on September 28, 1984.

IV. PROPOSED ACTION

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

ACTION 1: PROHIBITION OF TRAWL GEAR

Section 10.3 is deleted and replaced with the following:

10.3 Management Measure #19: Prohibition of Trawl Gear

The use of trawl gear to harvest fish in the directed snapper grouper fishery south of Cape Hatteras, North Carolina (35°15' N. Latitude) and north of Cape Canaveral, Florida (Vehicle Assembly Building, 28°35.1' N. Latitude) is prohibited. A vessel with trawl gear and more than 200 pounds of fish in the snapper grouper fishery (as listed in Section 646.2 of the regulations) on board will be defined as a directed fishery. The amendment also establishes a rebuttable presumption that a vessel with fish in the snapper grouper fishery (as listed in Section 646.2 of the regulations) on board harvested its catch of such fish in the Exclusive Economic Zone.

Rationale

The Council is basing the trawl prohibition on habitat destruction and the desire to prevent overfishing of vermilion snapper. Fishes present in live bottom areas are described by Grimes et al. (1982) and include 113 species representing 43 families of predominantly tropical and subtropical fishes. Vermilion snapper were more abundant on the shelf edge than on the open shelf

(Grimes et al., 1982). Miller and Richards (1980) described the distribution of live bottom habitat in the South Atlantic Bight and reported the most productive area of the shelf for commercial reef fish as being in the open shelf zone between 33 and 40 meters. Parker et al. (1983) reported on a survey of the areas from Cape Canaveral, Florida to Cape Fear, North Carolina and from Cape Fear to Cape Hatteras, North Carolina. From Cape Hatteras to Cape Fear 14,486 square km between 27 and 101 m were surveyed and contained 2,040 square km (14%) of reef habitat of which only 204 square km (10%) had one meter or more relief (distance from the highest point of the live bottom to the ocean floor). In the area from Cape Fear to Cape Canaveral, 24,826 square km between 27 and 101 m were surveyed and contained 7,403 square km (30%) of reef habitat of which 1,743 square km (7%) had one meter or more relief. The Oregon II cruise report (Anon, 1978) supports the scattered nature of live bottom in the South Atlantic from Cape Canaveral, Florida to Cape Hatteras, North Carolina. The Fishery Management Plan reported that in terms of the entire shelf area, current data suggest that from three to 30 percent of the shelf is suitable bottom for snapper grouper species (SAFMC Snapper Grouper Fishery Management Plan, 1983).

The report on effects of a research trawl on live bottom (Van Dolah et al., 1987) documents that habitat damage does occur from the use of trawl gear even in the case of one pass through an area in a controlled study. The abstract is as follows:

> "The effects of a research trawl on several sponge and coral species was assessed in a shallow-water, hard-bottom area located southeast of Savannah, Georgia. The study entailed a census of the numerically dominant species in replicate 25-m^2 quadrants located along five transects established across a trawling alley. The density of undamaged sponges and corals was assessed in trawled and non-trawled (control) portions of each transect immediately before, immediately after, and 12 months after a 40/54 roller-rigged trawl was dragged through the alley once. Some damage to individuals of all target species was observed immediately after trawling, but only the density of barrel sponges (*Cliona* spp.) was significantly reduced. The extent of damage to the other sponges (*Ircinia campana*, *Haliclona oculata*), octocorals (*Leptogorgia virgulata*, *Lophogorgia hebes*, *Titanideum frauenfeldii*) and hard corals (*Oculina varicosa*) varied depending on the species, but changes in density were not statistically significant. Twelve months after trawling, the abundance of specimens counted in the trawled quadrants had increased to pre-trawl densities or greater, and damage to the sponges and corals could no longer be detected due to healing and growth. Trawl damage observed in this study was less severe than the damage reported for a similar habitat in a previous study. Differences between the two studies are attributed to (1) differences in the roller-rig design of the trawls used, and (2) differences in the number of times the same bottom was trawled."

The authors point out that in a study by Tilmant (1979) looking at the effects of commercial bait shrimping with roller-frame trawls in a shallow-water area of Biscayne Bay, Florida damage was much more severe: "Tilmant observed severe damage (specimens crushed or torn loose) to more

than 80% of the stony corals, 50% of the sponges and 38% of the soft corals along the trawl path." It should be noted however, that this frame trawl consists of a solid, rectangular frame to which a net is attached and is used to fish grass bed areas; it was not designed to "roll over" live bottom and would be expected to cause significant damage to corals, etc.

Importantly, habitat damage described by Van Dolah et al. (1987) resulted from one tow of trawl gear through the study area. That study was designed to evaluate the effects of a research trawl that does not typically cross the same bottom area more than once. Commercial trawling does not operate in this manner. Under commercial fishing conditions, a live bottom area would be fished over and over until the catches from such an area become unprofitable. Under such conditions, habitat damage would be expected to be much greater than is indicated from the above study.

The Oregon II cruise report (Anon, 1978) indicated that drags with a trawl yielded a total catch of 476 pounds which included 424 pounds of finfish and 46 pounds of sponges and corals (10 percent of the total catch). This area was reported to have been on a mud bottom but turned out to be a low profile live bottom of sand ridges, clumps of sponges and scattered corals. Further indication of habitat damage is reported by Wenner (1983):

> "The 3/4 Yankee trawl net effectively covers a much wider area of the bottom than the measured sweep (8.7 m) due to the configuration of the otter doors, ground cables, and bottom leg lines. Although this arrangement cannot increase the actual spread of the net beyond the headrope length, the passage of these cables over the substrate creates a disturbance that serves to herd fish in the path of the net (Baranov 1969). This net does, however, damage the sponge-coral habitat by shearing off sponges, soft corals, bryozoans, and other attached invertebrates. The 56 trawl tows made in the sponge-coral habitat for this study collected 2,351 kg of attached invertebrates (including sponges, soft corals, tunicates, bryozoans, and hydroids) yielding an average 42 kg/tow. This is only the amount of bottom material actually removed from the habitat. An estimate of the total amount of bottom destroyed by the doors, ground cables, and leg lines cannot be ascertained from the current study.
>
> Personal observations and interviews with commercial fishermen attest to the productivity of the sponge-coral habitat. Most studies indicate the importance of habitat availability and space in determining the abundance and diversity of reef fishes (Emery 1978). With this in mind, and given the knowledge that 1) the use of the 3/4 Yankee trawl net reduces the amount of attached invertebrate growth (the amount damaged by doors and ground cables is presently not quantifiable); 2) the places where the invertebrates had been attached may be sanded over and rendered unsuitable for recolonization; and 3) the removal of these attached invertebrates reduces refugees for decapods, polychaetes, etc., that are food items for *Centropristis striata* and other benthic feeders, one must conclude that the continued use of this trawl net reduces the amount of productive fish habitat. For these reasons, in addition to the ineffectiveness of the gear in sampling commercially important species, alternate nondestructive methods, such as direct observations or the use of mark-recapture techniques with trap catches, should be employed in assessment surveys of the commercially important species of this habitat."

Results of trawl survey work in Australia provide some insight into what can happen to catches in an area after the continued use of commercial trawl gear. Young and Sainsbury (1985) report that "At moderate to low levels of fishing effort, the main effect of fishing on the relative abundance of bottom shelf fishes is by alteration of the relative frequency and spatial distribution of habitat types. In particular this refers to the conversion of areas with dense epibenthos (sponge, corals, hydroids, gorgonians) to areas with sparse epibenthos. (It may be noted that even at the relatively low intensity of trawling of the past few years the fishing effort exerted on the main trawl grounds is sufficient to sweep 50 to 100 per cent of the area of those grounds per year.)." These results are from trawling conducted in 1982 as compared to trawl catches in 1966 from the same locations and at the same time of year. The catch composition shifted from species associated with sponges, soft corals etc. (during 1966) to those associated with open sandy bottom (during 1982).

A similar type of scenario for the South Atlantic was suggested by Bob Low (pers. comm.):

> Parker et al. (1983) estimated that, in the area they surveyed between Cape Fear and Cape Canaveral, there were 7,403 square km of reef habitat. Of this, 1,743 square km had an average profile exceeding 1 m. Assuming that such ground could not be trawled, this leaves about 5,660 square km (1,398,000 acres) of trawlable reef habitat. The average boat might pull a net with a footrope of 120 feet, giving an effective sweep of the roller gear of about 72 feet maximum. A typical tow over open bottom is perhaps 3 hours at 2 knots. The area swept by the roller gear per tow is then about 20 acres/hour or 60 acres/tow. Assume that 20 boats participate for 4 months (January-April) each year. [Note: The actual number of vessels during 1987 was seven.] The average vessel makes 3 trips/month, with 3 days of fishing each trip. The average (24 hr) fishing day includes perhaps 4 tows. A typical trip therefore consists of 12 tows or 36 hr of fishing. The 20 boats make an aggregate of 240 trips. This equates to 2,880 tows, covering around 172,800 total acres. If each tow was over a previously unswept area, the total area covered by the roller gear would then amount to about 12% of the trawlable reef habitat estimated by Parker et al. (1983). Under one set of assumptions, the area affected by the doors, bridles, and warps would add to this. Under a second set, repetitive trawling over identical areas would reduce the total area impacted. Van Dolah et al. (1987) noted a substantial renewability within a year. There are likely to be 8 months of recovery time between trawling seasons. Doesn't that allow for significant restoration in many of the trawled areas?

The above scenario indicated that about 12 percent of available habitat between Cape Fear and Cape Canaveral would be impacted annually by trawling, whereas in the Australian work the area impacted was between 50 and 100 percent. The Council has concluded that the level of damage to the live-bottom habitat in the South Atlantic is significant and that our available knowledge is not sufficient to risk impacting the long-term abundance of snapper and groupers by reducing their habitat. The results shown by Van Dolah et al. (1987) indicated that regeneration of tissue sufficient to have rounded off the tops of partially severed sponges and to have closed wounds on

other sponges occurs within a year but that additional growth is limited as indicated by some of the sponges being obviously shorter than before the trawling damage. This supports the Council's concern because in a four month trawling season there would be a net loss of habitat (i.e. more damage than regrowth) with the effects being cumulative over time. By destroying habitat we destroy the productivity of the resource being harvested and we are in essence drawing on the principal, not just taking the interest so that next year the same amount of trawling will represent more than 12 percent of the habitat and the year after even more. Given this information, the South Atlantic Fishery Management Council concluded that over the long-term there would be a net loss of existing habitat, which is counter to the Council's habitat policy and the Magnuson Act.

Indirect evidence of habitat damage is provided in Christian et al. (1985) where they report on attempts to use crab nets rigged with light chain and plastic mud rollers. These nets proved to be inadequate for offshore fish trawling on broken bottom because the light molded plastic mud rollers were not durable and did not prevent net damage. They further reported that captains who tried crab nets soon switched to nets with heavy netting, properly rigged sweep systems and steel vee-doors for trawling over rough bottom. Further indication of habitat damage was presented in Section II of this amendment with the numerous references to gear damage, gear loss and the need to use rollers and modified doors to be able to trawl in rough and broken areas.

An additional reference concerning potential habitat damage is provided by Moore and Bullis (1960) when they reported on the discovery of a deep water reef in the Gulf of Mexico. The MV Oregon was cruising over the continental slope about 40 nautical miles due east of the Mississippi Delta and observed an unusual tracing on the depth recorder. They sampled this bottom area using a shrimp trawl and reported the following: "A drag, made over the area with a shrimp trawl, contained a large mass of coral, other invertebrates, and fish. The netting of the trawl was torn and most of its contents were lost, but about three hundred pounds of coral remained in the bag. A sample was brought back to the laboratory where is was identified by Moore as *Lophelia prolifera*."

Invertebrates associated with sponges and corals occur in disproportionately high densities which suggests that they may use sponges and corals as a food source or a refuge from predation (Wendt et al., 1985). These invertebrates in turn serve as a food source for various snapper and grouper species. In addition, corals are very slow growing with some such as *Oculina* sp. only growing between 11 and 16 mm per year (Reed, 1981). Damage to these areas can negatively affect the food and shelter available to snappers and groupers. Further, Grimes et al. (1982) note the importance of the live bottom and shelf edge habitats in serving as reservoirs for recruits in shallow areas (less than 30 m).

The best estimate of the number of boats operating in the fishery during the winter of 1986/87 was four boats (one South Carolina boat fishing in South Carolina and three North Carolina boats fishing in South Carolina, Georgia and Florida). The number of vessels increased to seven during the winter of 1987/88. These vessels fished during the slow period for shrimp which

is normally January to March/April. Even though the actual number of boats is small, the amount of habitat damage is significant when one realizes that these boats fish directly on the limited live bottom habitat in these areas. Productive snapper grouper habitat on the continental shelf is limited and trawl gear is fished repeatedly in these areas over this three to four month period. Most, if not all, fishermen use Loran which allow them to return to the exact spot and trawl a particular rock out-cropping repeatedly. The data previously described from Australia points out the changes to bottom habitat and catches resulting from such a fishery.

Vermilion snapper are experiencing growth overfishing (see Fishery Management Plan p. 44-58 for a more detailed discussion). Yield per recruit (or yield per individual) analysis indicated that a 12 inch minimum size will increase yield per recruit from 132 g to 177 g which is equivalent to a 34 percent increase in yield if recruitment is constant. Confidential data available to the South Atlantic Council indicate that the minimum mesh size of 4 inches is not being adhered to and as a result the Council's prior action establishing the mesh restriction has not been effective in releasing small vermilion (less than 12 inches). The trawl prohibition will result in an increase in yield for vermilion snapper. Catch data from South Carolina (Bob Low, pers. comm.) show a slight negative correlation between trawl landings and hook & line landings ($r = -0.13$). A good fishery independent index of abundance would allow us to examine the affect of trawl catches on abundance of vermilion snapper. Given the available information, the South Atlantic Fishery Management Council concluded that the trawl prohibition would increase yield; however, our ability to measure this increase is lacking.

The potential exists for more vessels to enter the fishery particularly if the calico scallop, shrimp and sea scallop fisheries have not been productive or are not active during this time period. We have no data with which to quantify this number. Public testimony at the December 2, 1987 committee meeting indicated that one to two vessels have operated sporadically each year and that we could expect between one and five vessels during the 1987/88 winter fishing period. The actual number of vessels during 1987/88 was seven, greater than the number expected. This further supports the Council's concern that effort could increase rapidly.

Impacts on affected vessels from prohibiting use of trawl gear in the snapper grouper fishery will not be significant. Input from public hearings, committee and Council meetings indicates that income from fish trawling makes up a small portion of total income. No trawl fishermen came forward with information during the public hearing process that impacts would be significant. Fishermen use it primarily as a fill-in activity and could utilize other gear (e.g. electric & hydraulic reels, black sea bass traps, longlines, etc.) to fish snappers and groupers. These general conclusions are supported by Christian et al. (1985):

> "The major seafood industry in the South Atlantic Bight is based on shrimp, and this dependence on one crop has made the industry financially precarious. In recent years, weather-caused mortality of shrimp populations,

escalating fuel costs, and the increased numbers of vessels have squeezed profit margins to the limit. Therefore, fishermen have looked to other activities such as bottom trawling for finfishes to supplement their income. This is not the single salvation for the whole industry. Although fish trawling can offer an alternative which may aid some shrimpers in maintaining year-round income, suitable trawling bottom in this area is limited; and target species of such a fishery (snapper, grouper, and porgies) are relatively long-lived, slow-growing, and can sustain only limited fishing pressure."

Economic Analysis

Operational and financial characteristics of reef fish vessels during 1980-81 in the South Atlantic based on captain interviews are described by Poffenberger (1985). This information points out that there are other methods of fishing snapper and grouper that cost less than the approximately $10,000 cost of a fish trawl. This most recent economic information on vessels in the snapper grouper fishery compares longlines and handlines (powered reels). Longline captains reported catching almost 300 percent more pounds of fish than those using handlines; the difference in total revenue was almost 400 percent. Gear cost information presented indicated that for a handline vessel the depreciated gear cost was $1,686 and cost of gear purchase was $2,604; for longlines the costs were $900 and $6,781 respectively. Net returns for handline vessels on average was negative $124 and for the longline vessels was $57,859. Average wages paid to the captains and crews on handline vessels were $26,061 and $6,650 respectively; for longline vessels $95,954 and $31,788. However, before shifting effort on snapper grouper species the status of the resource should be examined. Low et al. (1985) analyzed the catch per unit effort and length composition of the South Carolina commercial handline fishery during 1976-1982 and offered the following: "Estimates of annual maximum sustainable physical yield (MSY) calculated using a Schaefer model and parameter values from the negative regressions of catch/trip on the number of trips were approximately 144,200 kg for red porgy, 190,000 kg for groupers and 32,000 kg for red snapper in waters from Savannah, Georgia to Cape Fear, North Carolina. For each species, the estimated total (recreational plus commercial) harvest has exceeded MSY in recent years. Time trends in mean total length from 1976 to 1982 showed declines ranging from 8% for gag (*Mycteroperca microlepis*) to 15% for red porgy and red snapper." These conclusions are supported by many other observations and data and has led the South Atlantic Council to request the National Marine Fisheries Service to assess the status of the snapper grouper resource which will form the basis of Amendment 2 to the Snapper Grouper Fishery Management Plan. The South Atlantic Fishery Management Council is convinced that the data will show that additional species are overfished and that additional regulations are required. This is not the appropriate time to consider increasing effort in the snapper grouper fishery. The potential exists for the affected fishermen to be able to enter other fisheries, primarily calico and sea scallops.

Ulrich et al. (1977) address the latent labor resources in the shrimp fishery as follows:

"Recent reports by Roberts (1974), Jones et al. (1976), and Calder et al. (1974) have noted the significance of the off-season latent capital and labor resources in the shrimp trawler fishery. There have been a few attempts in the past by resident South Carolina fishermen to utilize these latent resources through demersal fish trawling operations (Prytherch, 1970), but most have been unsuccessful due to costly gear damage and relatively low revenues. Compared to sea bass trapping, fish trawling was considered economically unfeasible (Rhodes and Bearden, 1974)." During 1976 commercial hook and line fishermen's total gross dollar value (sales) were comprised of grouper (37%), vermilion snapper (22%), red snapper (19%), and red porgy (13%). In contrast the demonstration projects sales were comprised of red snapper (54%), vermilion snapper (26%), grouper (9%), and red porgy (8%). Based on the net profit of $7,759 from the 1976 demonstration project in South Carolina Ulrich et al. (1977) conclude that fish trawling may be more profitable than black sea bass trapping but point out that it is risky to generalize from this demonstration to other fishermen primarily due to the fact that the captain's trawling skills were far better than average. However, they do go on to mention that this one vessel landed nearly the same quantity of snapper and grouper during January to April, 1976 as landed for the entire state in 1975 and due to the fact that several vessel owners are converting to fish trawls serves to indicate that some feel fish trawling to be feasible.

Information concerning the relative fishing power of three vessel types in the South Atlantic area was presented by Huntsman et al. (1983). Based on catch rates, the commercial handline boats were approximately 1.3 to 1.5 times as effective as headboats and trawlers were approximately 3.8 to 5.2 times as effective as headboats.

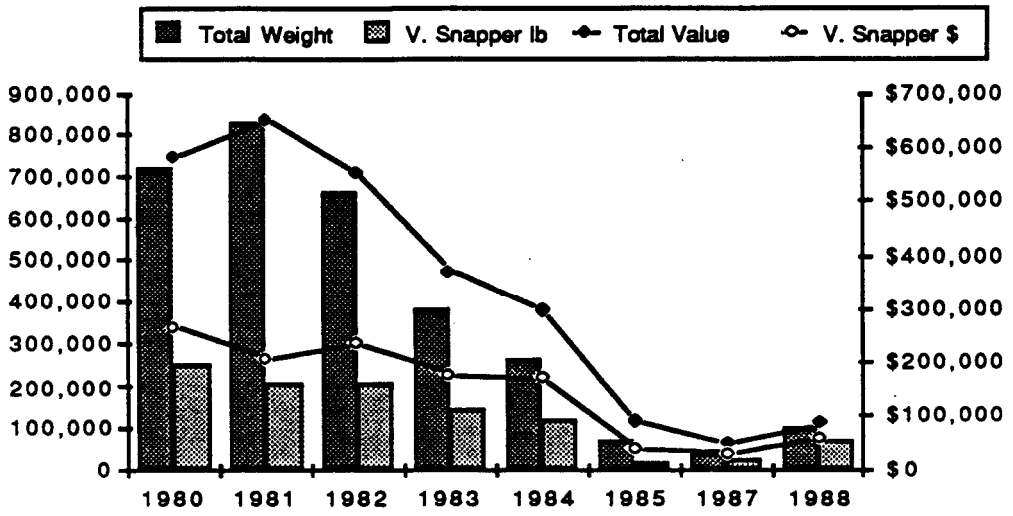
Analysis of Impacts

The National Marine Fisheries Service SEFC was requested to provide information on the use of trawl gear in the snapper grouper fishery off the southeast U.S. No information is available on net or gross income for any of the trawl vessels (NMFS SEFC); however, during 1976 a fish trawl demonstration project conducted in South Carolina yielded a net profit of $7,759 (Ulrich et al., 1977). The number of vessels fishing with trawl gear peaked at 21 in 1980 and 1981, then varied between 14 and 18 between 1982 and 1984 and declined from 7 in 1985 to only 2 in 1986 (Table 1; National Marine Fisheries Service, Southeast Fisheries Center). The number of vessels increased to 7 during 1987 and this is the number of vessels used to estimate impacts of the prohibition.

National Marine Fisheries Service reports that no vessels fishing for snapper grouper using trawl gear are reported from North Carolina and that the vessels landing in Georgia in 1987 were home ported in North Carolina. Upon examination of detailed confidential catch data from North Carolina, it becomes apparent that fishing did occur in 1980 and has occurred sporadically since that time. In addition, vessels from South Carolina fish the waters off North Carolina and land their

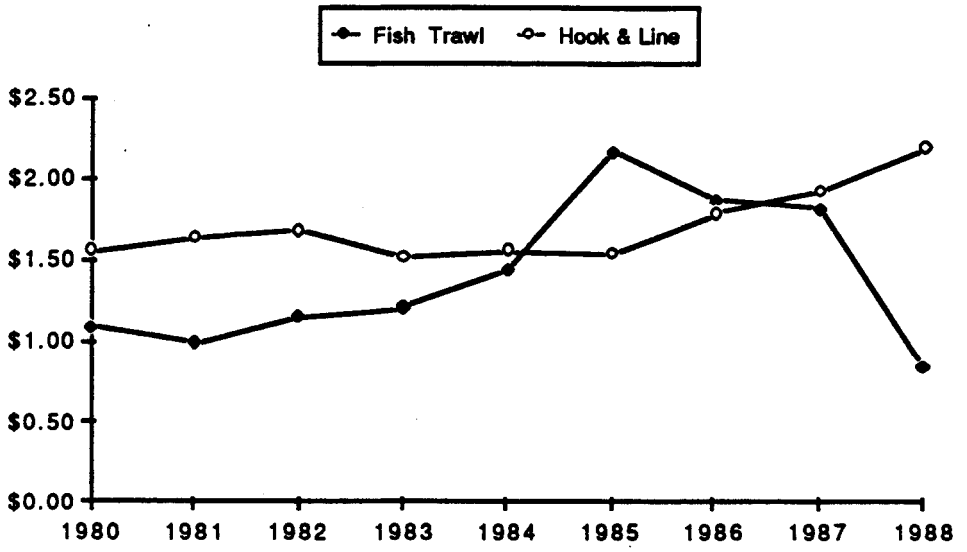
catch in South Carolina. This becomes important in supporting the extension of the trawl prohibition northward to Cape Hatteras, North Carolina.

The trend in catch and value of vermilion snapper and total landings by fish trawls is shown below (Source: National Marine Fisheries Service Landings Database as of August 3, 1988). The quantity and value of catch is confidential for much of this fishery, particularly if examined by state. In addition, National Marine Fisheries Service value figures are based on average prices by species and thus may be overestimates, since portions of the landings for some species (e.g., vermilion snapper) consisted of smaller, lower valued individuals. Landings by vessel are not available (NMFS, SEFC). Data for 1986 are not included due to the confidential nature of this information; however, total landings were less than 50,000 pounds valued at less than $50,000 and the landings and value for vermilion snapper were less than 10,000 pounds and $15,000 respectively. Catches and value peaked in 1981 and declined steadily from 1981 until 1984. During the 1985 fishing season, the 4 inch trawl mesh restriction affected the number of vessels and catches and reduced both catches and value. Catches continued to decline in 1987 and there was a slight increase in 1988 when total production for fish trawls reached 104,825 pounds worth $87,448 with 70,061 pounds of vermilion snapper worth $58,489 included in the catch. Catch data for 1988 will be utilized to analyze impacts of the trawl prohibition.



As mentioned before, the original plan required a 4 inch trawl mesh size be implemented by September 1984 and this first affected catches during 1985. This greatly reduced participation by vessels in the trawl fishery for a period of time. During this time, vessels were able to continue operation by fishing in other fisheries and because the income from fish trawling was not a significant portion of their annual income. Based on the 7 vessels identified to be fishing during 1987 and the catch data from 1988, each vessel will forego the harvest of 14,975 pounds of trawl

caught fish worth $12,493. The portion of the foregone catch composed of vermilion is estimated to be 10,009 pounds worth $8,356. These impacts are expressed as "foregone" because they should be evaluated as delayed catches. The same vessels will have the opportunity to harvest much if not all of this catch (gains from growth and losses to natural mortality would have an unknown impact) by the use of hook & line gear at less cost to the individual vessel. However, this action should not encourage total effort to increase given the status of the resource (Huntsman, 1976; SAFMC, 1983; Huntsman et al., 1983; Huntsman and Waters, 1987). This is particularly true for vermilion snapper which are worth more per pound when they are larger as is shown by the price per pound of hook & line caught versus trawl caught vermilion snapper in South Carolina (South Carolina Annual Data Reports):



This price differential is due in part to the larger size of individual fish caught by hook & line but detailed price by size data is not available. The price of trawl caught fish was high from 1985 through 1987 due to the low quantity landed and possibly a larger size due to adherence to the 4 inch mesh requirement. During 1988, landings increased and the size of individual fish caught was small (based on confidential data made available to the South Atlantic Council) which resulted in a much lower price per pound. Hook & line caught vermilion snapper were worth an average of $2.20 per pound whereas trawl caught fish were worth only $0.83 per pound ($1.37 price differential). Multiplying this price differential by the quantity landed by trawl gear in 1988 results in a loss in potential earnings to these fishermen of approximately $96,000. (Note: This figure is an imprecise estimate given that the analysis does not account for increases in growth or losses due to natural mortality. If left to grow, these fish would still be gaining faster than loses due to natural mortality and actual gains would be higher. In addition, the analysis also does not account for the other species caught in the trawl which would tend to increase the value.)

Law Enforcement Considerations

The South Atlantic Fishery Management Council's intent is that trawls not be used in a directed fishery for snapper grouper in the Exclusive Economic Zone between Cape Hatteras, North Carolina and Cape Canaveral, Florida. However, the Council recognizes that this would require extensive at sea enforcement which is extremely expensive. Given the lack of resources for at sea enforcement and the repeated requests of law enforcement agencies to make fishery regulations enforceable dock side if at all possible, the Council has established a rebuttable presumption that a vessel, with fish in the snapper grouper fishery (as listed in Section 646.2 of the regulations) on board, harvested such fish in the Exclusive Economic Zone. The Council also prohibited the use of trawl gear to harvest fish in the directed snapper grouper fishery south of Cape Hatteras and North of Cape Canaveral. A vessel with any type of trawl gear and more than 200 pounds of fish in the snapper grouper fishery (as listed in Section 646.2 of the regulations) on board will be defined as a directed fishery. The rebuttable presumption is based on known fishing patterns, fish distribution and life history information. Ulrich et al. (1977) noted that during the mid 1970s snapper grouper harvesting off the South Atlantic States was prosecuted beyond the territorial seas (now called the Exclusive Economic Zone). Actual commercial catch statistics reported by the National Marine Fisheries Service Southeast Fisheries Center (End-of-year reports: Annual landings by distance caught from shore - Southeast region for 1985 (preliminary), June, 1986) support this rebuttable presumption:

PERCENTAGE OF ANNUAL LANDINGS BETWEEN 3 AND 200 MILES

	NC	SC	GA	FLEC*
Groupers	100%	99%	100%	87%
Snappers	100%	94%	99%	82%
Black Sea Bass	99%	100%	100%	71%
Porgy/Scup	100%	95%	100%	0%

*This data is for the entire Florida East Coast through Dade County. During 1985, 109,000 pounds of scup/porgy were landed in state waters. The prohibition only applies through Cape Canaveral and it is expected that the majority of the fish shown here were probably caught south of Cape Canaveral.

The 200 pound limit was developed by the South Atlantic Fishery Management Council Law Enforcement Committee and discussed extensively by the Council. The limit is designed to be stringent enough to preclude any directed trawl fishery for snapper grouper yet flexible enough to accommodate occasional minor incidental catches by trawl vessels targeting shrimp and scallops and small directed catches by multiple gear vessels using hook & line gear. This limit will not impact

shrimp trips in North Carolina, South Carolina and Georgia based on discussion with state representatives and examination of state landings data. There may be some impact on shrimp trips in the northeast Florida area based on a July 21, 1988 phone discussion with Mr. Andy Cannon, Director Mayport Chapter of Organized Fishermen of Florida. Mr. Cannon stated that within the Mayport area (excluding Fernandina and St. Augustine) approximately 15 to 20 shrimp fishermen fish with hook & line during the day and shrimp at night during mid-March to July-August. The highest catch over the last two years was 2,500 pounds in one day and one night of hook & line fishing. Income from snappers and groupers to these fishermen is less than $1,000 per month. Mr. Cannon feels that shrimp trawls and roller rig trawls are sufficiently different that the nets can be identified by enforcement personnel. A public hearing was held in Jacksonville, Florida on February 29, 1988 and this potential impact did not surface.

The South Atlantic Fishery Management Council requested the State of Florida to provide information on shrimp trips and snapper/grouper bycatch in northeastern Florida. Information provided by Mr. F. S. Kennedy, Jr. (letter dated June 30, 1988 to Mr. Gregg Waugh, South Atlantic Fishery Management Council Staff) indicated that there were 8,396 trips for shrimp from 1985-87 and only 3 had 200 pounds or more of grouper and snapper combined:

NUMBER OF SHRIMP TRIPS IN NORTHEASTERN FLORIDA WITH SNAPPER AND GROUPER INCIDENTAL CATCH

Pounds of Snapper/Grouper	Number Shrimp Trips
0	8,351
< 50	34
50 - 99	2
100 - 199	6
≥ 200	3

The Bryan Fishermen's Cooperative, the Georgia Fishermen's Association and the Georgia Sea Grant Marine Extension Service objected to the 200 pound limit because of impacts on vessels trapping sea bass, using electric reels or trawling for rock shrimp on a given trip. The net gear can be removed from the vessel prior to going fishing for black sea bass with traps and/or using electric reels. While trawling for rock shrimp they would not be able to retain more than 200 pounds of fishes in the snapper grouper fishery. Data from Georgia does not indicate that this will be an impact or that shrimp trips in Georgia result in catches in excess of 200 pounds of fish in the snapper grouper fishery.

The Council is also prohibiting transfer at sea to prevent vessels from circumventing the 200 pound limit. In the event that it may be economically feasible for a vessel to fish for snappers and groupers with trawl gear and off-load to another vessel prior to exceeding the 200 pound limit, the Council's intent is that this be prohibited due to the habitat damage and overfishing of vermilion snapper that would result.

Benefit Cost Analysis

Cost for the entire development process of Amendment #1 by the South Atlantic Council was estimated to be $61,192 over one and a half years. The Council's attention to making the regulation implementing this action enforceable dockside will result in a net reduction of $33,000 in enforcement costs over the current trawl regulation. National Marine Fisheries Service Southeast Region Law Enforcement Office provided enforcement cost estimates of $2,000 for dockside enforcement associated with the trawl prohibition. The Coast Guard estimated a cost of $36,000 to enforce the 4 inch mesh requirement at sea. This proposed Amendment will reduce enforcement costs by $34,000 which represents a net savings to the government.

The benefits and costs for Amendment 1 are given in Table 2 for the Council's preferred alternative and each of the three options considered and rejected. Where possible, quantitative data have been utilized and are discussed earlier in this document. When quantitative data was not available, qualitative values (+ and -) were utilized. Cost of the trawl prohibition is estimated to be $155,640, which is composed of $87,448 from the delayed catch, $61,192 for document preparation and $7,000 for the value of net gear. The original Fishery Management Plan (SAFMC, 1983) indicated that nets are replaced every 6 to 18 months. For purposes of the benefit/cost analysis it was assumed that nets would last two seasons and that the seven vessels fishing in 1987 purchased their nets new at the start of the 1987 season. Given these assumptions, the nets would be due to be replaced prior to the 1989 fishing season and were given a salvage value of $1,000 (10 percent purchase price) each for a total of $7,000. Benefits of the trawl prohibition are estimated to be in excess of $210,405. This estimate is composed, in part, of $96,000 from potential vermilion gain and $34,000 in enforcement cost savings as previously discussed. The original Fishery Management Plan (SAFMC, 1983) indicated that there would be a 34 percent gain in yield from requiring a 4 inch mesh in trawl nets because that would catch 12 inch vermilion snapper. The trawl prohibition would result in vermilion snapper being caught by hook & line at a size equal to or greater to 12 inches. Therefore, a 34 percent increase in the 1988 vermilion catch of 70,061 pounds would potentially yield 23,821 additional pounds, which at $2.20 per pound, would be worth $52,406. In addition, it is assumed that the other species previously caught by trawls would be caught by hook & line gear; the value of this catch was $28,999. This value is used for the benefit cost analysis and does not account for increases in growth, decreases from natural mortality or any price differential. Utilizing the above assumptions, benefits exceed costs by $54,765.

In summary, impacts to the affected individuals are not significant and the opportunity exists for the vessels to make up this income. In addition, it must be kept in mind that the fish trawl fishery is a supplemental fishery that operates sporadically over three to four months during the winter and the income from the trawl fishery is not a significant portion of the affected fishermen's annual income, which is mostly from shrimping. The South Atlantic Council concluded that the overall net benefit to the nation is positive when the nonquantified, positive benefits of eliminating habitat destruction and the quantified benefits of increasing vermilion yield per recruit, the additional potential vermilion gain, the gain from other species and the reduction in enforcement costs are factored into the initial negative costs. The foregone catch may be caught by the affected vessels and/or other commercial and recreational vessels and does not represent an overall negative impact. Further, the Council has chosen the option that results in the least long-term cost to the fishery and the environment upon which that fishery depends.

Rejected Alternatives to Action 1 (Table 2)

Rejected Alternative 1: The Council considered taking no action, which would, in effect, leave only the 4 inch mesh restriction in place for the trawl fishery. This mesh restriction was implemented one year after the original plan was approved and indirectly prevented habitat damage by eliminating the trawl fishery. The number of boats decreased from approximately twelve to one initially but there have been one to two boats operating sporadically since 1984 and the Council has received input that more vessels entered the fishery this year. Changing prices and species composition of the catch and/or rebuilding of the vermilion resource as a result of the 4 inch mesh size could be factors contributing to the resurgence of this gear. In addition, there is some evidence that the use of illegal mesh sizes last year has also contributed to the gear's resurgence. The Council has received input that deliberate clogging of the four inch mesh with rays is occurring. This subverts the Council's intent to rebuild the vermilion snapper resource and makes it extremely difficult to enforce the mesh restriction at-sea with the use of liners and deliberate clogging of the cod end occurring.

The Council rejected the no action alternative because: (1) it would not provide habitat protection which is necessary to protect long-term productivity and yield of the snapper grouper resource, (2) it would continue to require at sea enforcement, (3) it would continue losses in potential vermilion snapper yield and (4) it would result in a net cost to the nation (Table 2).

Rejected Alternative 2: The Council considered implementing a 12 inch minimum size on vermilion snapper which testimony indicated would have made it uneconomical to fish trawl gear, thereby preventing habitat destruction.

The Council rejected this alternative because: (1) it is an inefficient method to prevent habitat

destruction, (2) changing prices and species composition of the catch could make it economically feasible to continue to fish trawl gear even if small vermilion snapper could not be retained, (3) this would result in continued habitat destruction, (4) this would continue to require at sea enforcement due to the 4 inch mesh requirement, and (5) it would result in a net cost to the nation (Table 2).

Rejected Alternative 3: The Council considered having the trawl prohibition apply only to roller-rig trawl gear.

This was rejected because: (1) other gear (e.g. mongoose shrimp trawls, mid-water trawls) could be used to fish in live bottom areas resulting in habitat destruction. (See the discussion under Action 1 for more information. Also see Wenner (1983), Young and Sainsbury (1985) and Anonymous (1978) for more detailed information.), (2) damage would still occur from the trawl doors and lines and periodic contact of the net with the bottom, (3) it would continue to require at sea enforcement, (4) it would continue losses in vermilion snapper yield, and (5) it would result in a net cost to the nation (Table 2).

The Council could have also considered prohibiting only roller-rig trawl gear within specified live bottom areas but could not due to lack of information. At such time as National Marine Fisheries Service documents the specific extent and distribution of live bottom habitat within the South Atlantic, the Council will make use of this information in determining whether or not this amendment should be altered. Until such time as National Marine Fisheries Service provides this information, the Council is unable to consider this alternative.

Habitat Amendment to the Magnuson Act

The Magnuson Act was amended in 1986 to add the following two sections dealing with habitat matters: (1) "§ 302(i) Fishery Habitat Concerns. Each Council may comment on, or make recommendations concerning, any activity undertaken, or proposed to be undertaken, by any State or Federal agency that, in the view of the Council, may affect the habitat of a fishery resource under its jurisdiction. Within 45 days after receiving such a comment or recommendation from a Council, a Federal agency must provide a detailed response, in writing, to the Council regarding the matter"; and (2) "§ 303 (a) (7) include readily available information regarding the significance of habitat to the fishery and assessment as to the effects which changes to that habitat may have upon the fishery."

As a result, the Council adopted the following Habitat and Environmental Protection Policy:

> Recognizing that all species are dependent on the quantity and environmental quality of their essential habitats, it is the policy of the South Atlantic Fishery Management Council to:

Protect, restore and develop habitats upon which commercial and recreational marine fisheries depend, to increase their extent and to improve their productive capacity for the benefit of present and future generations. (For purposes of this policy, habitat is defined to include all those things physical, chemical and biological that are necessary to the productivity of the species being managed.)

Policy Objectives:

1) To protect the current quantity, environmental quality and productive capacity of habitats supporting important commercial and recreational fisheries. (This objective will be accomplished through the recommendation of no net loss or significant environmental degradation of existing habitat.)

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

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

The Council shall assume an aggressive role in the protection and enhancement of habitats important to marine and anadromous fish. It shall actively enter Federal decision-making processes where proposed actions may otherwise compromise the productivity of fishery resources of concern to the Council.

National Marine Fisheries Service Advance Review

The Council requested (memorandum dated September 30, 1987) that the trawl prohibition be evaluated during the National Marine Fisheries Service advance review solely on the basis of habitat destruction as indicated by Council discussions and intent. National Marine Fisheries Service was also requested to provide any additional habitat information specifically related to the impacts of trawl gear in the snapper grouper fishery. The National Marine Fisheries Service Southeast Region Habitat Conservation Division searched the available literature and could find no additional information related to impacts of trawl gear in the snapper grouper fishery. The National Marine Fisheries Service Southeast Fisheries Center provided two additional references that do not directly address trawl damage but do provide descriptions of the habitat and species assemblages of the South Atlantic Bight (Grimes et al., 1982; Sedberry and Van Dolah, 1984). They were not aware of any other published material that addresses trawl damage. We received no written correspondence from the Office of Protected Resources and Habitat Programs, National Marine Fisheries Service Washington. However, they verbally reported to the Southeast Regional Office that they could identify no additional information to be included. A representative of the Office of Protected Resources and Habitat Programs was present at the November/December (1987) Council meeting during which the Council was briefed on the National Marine Fisheries Service advance

review. It was pointed out at that meeting that since no additional material surfaced during the advance review, the South Atlantic Council concluded that Snapper Grouper Amendment 1 would not be rejected based on habitat considerations.

National Marine Fisheries Service Informal Review & Public Hearings

The Council conducted six public hearings during which extensive public input was received. Forty five individuals spoke in favor of the amendment and forty two against. Forty one letters were received from individuals (31 in favor and 10 against) and nineteen from organizations and agencies (16 in favor and 3 against). In addition, 13 form letters, 301 signatures on petitions and 15 notes were received in favor of the amendment. One petition was received (signed by 615 individuals) requesting that the amendment be redrafted to prohibit highrise bottom trawls but reconsider the 200 pound limit. These comments and suggestions have been addressed by the Council in finalizing this amendment.

Critical comments raised by National Marine Fisheries Service were (1) inadequate Regulatory Impact Review and Regulatory Flexibility Act sections, (2) justification for the scope of the trawl prohibition and (3) rationale for the 200 pound criterion used to define a directed trawl fishery. Substantive comments related to habitat, undersize vermilion snapper, the rebuttable presumption, need to prohibit snapper grouper trawling versus other trawling, updating information on the trawl fishery in the Fishery Management Plan, discussion of alternative fishing opportunities and the weakness of the environmental consequences section. The National Marine Fisheries Service comments were addressed and the revised habitat section developed by the National Marine Fisheries Service Southeast Region incorporated (See Action 2 for habitat information).

ACTION 2: UPDATE OF THE HABITAT SECTION OF THE Fishery Management Plan

Replace Section 8.2 with the following:

8.2 Description of Habitat of the Stocks Comprising the Management Unit

Snapper grouper utilize both pelagic and benthic habitats during their life cycle. A planktonic larval stage lives in the water column and feeds on zooplankton and phytoplankton. Juveniles and adults are typically demersal and usually associated with bottom topographies on the continental shelf (less than 100 m) that have high relief; i.e., coral reefs, artificial reefs, rocky hard-bottom substrates, ledges and caves, sloping soft-bottom areas, and limestone outcroppings. More detail on these habitat types is found in the Fishery Management Plan for Corals and Coral Reefs

(GMFMC and SAFMC, 1982). However, several species are found over sand and soft-bottom substrates. Some juvenile snapper and grouper such as *Lutjanus analis*, *L. griseus*, *L. jocu*, *L. synagris*, *Ocyurus chrysurus*, *Epinephelus itajara*, *E. morio*, *Mycteroperca microlepis* and *M. venenosa*, may occur in inshore seagrass beds, mangrove estuaries, lagoons, and bay systems.

The principal snapper grouper fishing areas are located in live bottom and shelf-edge habitats, and to a lesser extent the lower habitat. Temperatures range from 11° to 27° C over the continental shelf and shelf-edge due to the proximity of the Gulf Stream, with lower shelf habitat temperatures varying from 11° to 14° C. Depths range from 54 to 90 feet or greater for live-bottom habitats, 180 to 360 feet for the shelf-edge habitat, and from 360 to 600 feet for the lower-shelf habitat.

The exact extent and distribution of productive snapper grouper habitat on the continental shelf north of Cape Canaveral is unknown. Current data suggest that from 3 to 30 percent of the shelf is suitable bottom. These hard, live-bottom habitats may be low relief areas supporting sparse to moderate growth of sessile invertebrates, moderate relief reefs from 1.6 to 6.6 feet, or high relief ridges at or near the shelf break consisting of outcrops of rock that are heavily encrusted with sessile invertebrates such as sponges and sea fans. Live-bottom habitat is scattered irregularly over most of the shelf north of Cape Canaveral, but is most abundant off northeastern Florida.

South of Cape Canaveral the continental shelf narrows from 35 to 10 mi and less off the southeast coast of Florida and the Florida Keys. The lack of a large shelf area, presence of extensive, rugged living fossil coral reefs, and dominance of a tropical Caribbean fauna are distinctive characteristics. The coral rock reefs, from 30 to 46 feet at the shallowest lies between West Palm Beach and Miami and from 80 to 125 feet for the deepest most rugged reefs, are natural habitats for snappers and groupers. These reefs comprise from 20 to 30 percent of the shelf area south of Cape Canaveral.

Man-made artificial reefs also are utilized to attract fish and increase fish harvests. Research on man-made reefs including those composed of cars, tires, pipes, etc., is limited and opinions differ as to whether or not artificial structures actually promote an increase of biomass or merely concentrate fishes by attracting them from nearby natural areas. Some evidence indicates that artificial reefs actually increase the standing stock of snappers and groupers (Stone, 1978; Stone et al., 1979). Driessen (1985a) believes that, "offshore platforms and other artificial reefs raise primary productivity levels, create new habitats, augment carrying capacities, and increase the variety, numbers, range, size, and growth rates of highly desirable fish and shellfish." The following excerpt from Bohnsack and Sutherland (1985) adequately portrays the current state of knowledge on artificial reefs:

> "Artificial reef literature was critically reviewed to determine what knowledge about the biology, ecology, and economics of artificial reefs had been scientifically established and to identify and recommend future projects, areas, and methods of research. General agreement exists that artificial reefs are effective fish attractants and an

important fishery management tool. Most published papers deal with building artificial reefs or are qualitative descriptive studies detailing successional changes and species observed. Conclusions were often based on little or no scientific data. Few studies used quantitative experimental methods and many lacked scientifically valid controls.

Drastically different approaches to artificial reefs in terms of purpose, funding, research, materials, and size have been taken by Japan and the United States. Most marine artificial reefs in the United States are large, low budget, and haphazardly constructed from scrap materials, using volunteer labor. These reefs are usually built in deeper offshore waters for use by recreational fishermen with boats. Japan's artificial reefs, however, are designed and constructed by engineers, built of durable, non-waste, prefabricated materials, placed in scientifically selected sites in shallow and deep water, and are primarily used by commercial fishermen.

In this paper, 29 recommendations are made for future studies. Improved professional publication standards and more carefully controlled studies using an experimental approach are suggested. Greater emphasis should be placed on determining optimal design, size, and placement of artificial reefs to maximize production. More attention should be given to small, shallow, nearshore artificial reefs that are accessible without a boat. Also, reefs designed for increasing larval and juvenile recruitment, survival, and growth should be considered. Improved quantitative assessment techniques are needed to describe artificial reefs, reef communities, and to monitor biotic changes. Artificial reef data bases should be maintained so that the effectiveness of various artificial reefs can be more easily assessed. The importance of fish attraction versus fish production and the relationship between standing crop and fish catch have not been adequately addressed. The economics and social impact of artificial reefs also have not been carefully examined, especially the benefits from alternative designs and approaches."

Currently, Florida has at least 175 active permitted artificial reef sites (Driessen, 1985b). Artificial reef programs also are underway in Georgia, South Carolina, and North Carolina.

8.2.1 Habitat Condition

Offshore areas used by adults appear to be the least affected by nearshore habitat alterations and water quality degradation. Since most of the catch comes from offshore in deeper water, there is an unknown effect of pesticides, herbicides, and other harmful wastes which have been considered as deleterious to many inshore fisheries (Ketchum, 1972; Walsh et al., 1981; Walsh, 1984). Nearshore reefs have been adversely affected to various degrees by man (see later discussion), but overall are in good condition. Some coral reef tracts are protected. These include Dry Tortugas (Ft. Jefferson National Monument), Looe Key, Biscayne National Park, and Grays Reef. Other important areas are listed below.

The estuarine phase of juveniles, if obligatory, may be critical as alterations of the

environment coupled with local changes in environmental parameters, such as temperature and salinity occurred to a large extent in estuaries. Natural and man-induced changes have altered freshwater inflow and removed much habitat. Natural wetland losses result from forces such as erosion, sea level rises, subsidence, and accretion. The major man-induced activities that have impacted environmental gradients in the estuarine zone are:

1. construction and maintenance of navigation channels;
2. discharges from wastewater plants and industries;
3. dredge and fill for land use development;
4. agricultural runoff;
5. ditching, draining, or impounding wetlands;
6. oil spills;
7. thermal discharges;
8. mining, particularly for phosphate, and petroleum;
9. entrainment and impingement from electric power plants;
10. dams;
11. marinas;
12. alteration of freshwater inflows to estuaries;
13. saltwater intrusion;
14. non-point-source discharges of contaminants.

All south Atlantic estuaries have been impacted to some degree by one or more of the above activities. Estuaries also have been the most impacted by water quality degradation. Numerous pollution-related reports and publications exist, but there still is no complete list of chemical contaminants, their effects, or concentrations. A comprehensive inventory to assess how seriously the South Atlantic's estuaries are polluted also is needed. The majority of snappers and groupers spend their entire life cycle offshore where environmental conditions are more stable and man's effect on estuaries is less severe. However, if an obligatory relationship between juveniles and estuarine habitats is determined, estuaries will have to be managed to the same degree for snappers and groupers as for other estuarine-dependent species such as shrimp.

Important coral reef tracts have been identified in the south Atlantic in the Corals and Coral Reefs Fishery Management Plan (GMFMC and SAFMC, 1982). These include the Key Largo Coral Reef (Figure 1), Looe Key (Figure 2), Dry Tortugas (Figure 3), Biscayne National Park (Figure 4), *Oculina* Banks (Figure 5), and Grays Reef (Figure 6). Since these reefs play an essential role in the life cycle of the species by providing excellent snapper grouper habitat, they are again identified here.

Other valuable areas include John Pennekamp Coral Reef State Park at Key Largo, Florida,

the Florida Reef Tract (Figure 2) and the other reefs and live bottoms between North Carolina and Cape Canaveral, Florida (Figure 6). The relationship between snapper grouper and the estuaries is still poorly understood. If an obligatory relationship is determined in specific estuaries, then these estuaries also will be listed as Habitat Areas of Particular Concern.

We are unaware of any current habitat condition that affects the ability to harvest and market snapper grouper resources. The same applies to recreationally caught fish. Stout (1980), however, has found low levels of DDT, PCB, endrin, and dieldrin organochlorines in red and black grouper, gag, and red snapper. If the residue levels of organochlorines or other pesticides ever becomes dangerous to humans it is likely that the marketability of snapper and grouper could be adversely affected.

8.2.2 Habitat Threats

Currently, the primary threat to offshore habitat comes from oil and gas development and production, offshore dumping, and the discharge of contaminants by river systems. The destruction of suitable reefs (natural and man-made) or other types of live bottom areas also may prove deleterious to this fishery as most of the current data indicate an affinity for these habitats by snapper grouper (Starck, 1968; Shinn, 1974; Huntsman and Waters, 1987). Natural impacts on reef habitat may arise from severe weather conditions such as hurricanes and excessive freshwater discharge resulting from heavy rain. Human impacts on reef habitat result from activities such as pollution, dredging and treasure salvage, boat anchor damage, fishing and diving-related perturbations, and petroleum hydrocarbons (Jaap, 1984). Ocean dumping and nutrient over-enrichment also may cause local problems. Discussion of some of these factors occurs in the Corals and Coral Reefs Fishery Management Plan (GMFMC and SAFMC, 1982) and will not be repeated here.

Nearshore reefs, especially off Florida, may be impacted by coastal pollution such as sewage and non-point-source discharges, urban runoff, herbicides, and pesticides (Jaap, 1984). Residues of the organochlorine pesticides DDT, PCB, dieldrin, and endrin have been found in gag, red grouper, black grouper, and red snapper (Stout, 1980). Heavy metal accumulations in sediment and reef biota near population centers have been noted (Manker, 1975). Disposal of wastes has created local problems. Jaap (1984) reports of batteries and refuse disposed of on the reef flat at Carysfort Lighthouse in Florida. Juvenile snapper and grouper temporarily residing in estuaries may be adversely affected by coastal pollutants and alterations.

Hydrocarbon pollution also may adversely affect fish and other biota. Malins (1982) reviewed laboratory experiments describing the deleterious effects of petroleum fractions on fish. Pierce et al. (1980) documented that wild fish have been injured by petroleum pollutants. Grizzle (1983) suggested that larger liver weights in fish collected in the vicinity of production platforms vs

control reefs could have been caused by increased toxicant levels near the platforms. He also suspected that severe gill lamella epithelium hyperplasia and edema in red snapper, vermilion snapper, wenchman, sash flounder, and creole fish were caused by toxicants near the platforms. These types of lesions are consistent with toxicosis.

Dredging and salvaging near or on reefs is potentially the most damaging physical human activity. Dredge gear impacts reefs by dislodging corals and other organisms and by creating lesions or scars that lead to infection or mortality. Sedimentation from dredging may seriously damage reefs. Dredged sediments may be anaerobic and bind up available oxygen thereby stressing corals and other sessile reef organisms. If the organisms cannot purge the sediments deposited on them, they generally are killed. Silt generated by dredging may remain in the area for long periods and continue to impact reefs when suspended during storms. Reef habitat also may be removed by dredging for borrow materials and disposal on beaches and by dredging and filling associated with navigation channel construction and maintenance.

Anchor damage is a significant threat to reefs, especially those composed of corals. Anchors, ground tackle, lines, and chains can break hard and soft corals, scar reefs, and open lesions which can become infected. Heavy use of reef areas by boaters can compound the problem. Although anchoring by oil and gas lease operators is prohibited on most of the coral reefs, anchoring for other purposes is not restricted. Fishing gear such as bottom trawls (See Action 1 in this amendment), bottom longlines, and traps also damage reefs. Effects are similar to anchor damage and in many cases more widespread. Hook and line fishing and related losses of line, leaders, hooks, and sinkers also may damage corals. Disposal of garbage by boats has been identified as a problem at Pulaski Shoal near Dry Tortugas (Jaap, 1984).

Recreational spearfishing, especially with explosive power heads, has damaged corals and may become more of a problem in areas of heavy diver concentration. Divers often overturn corals and cause other damage. Specimen collecting also may result in localized reef damage, especially when chemical collecting agents are improperly used. Collecting corals and the use of chemicals are regulated under the Coral Fishery Management Plan (GMFMC and SAFMC, 1982).

8.2.3 Habitat Information Needs

The vast majority of our highly valued living marine resources are critically dependent upon healthy environments. Declines in several of these commercially and recreationally important fisheries have been attributed to overfishing, loss of habitat, pollution, environmental alteration, disease, and natural variability of the stocks. Effective fisheries management requires an improved understanding of these factors.

The Council's chief concern related to living marine resources is how human activities impact fishery productivity. Research is needed to provide knowledge of the factors that affect energy

flow. This understanding of ecological processes must then be combined with information on the health, distribution, and abundance of ecologically important organisms. By understanding the ecological linkages and information on the status of fishery stocks, managers of fisheries and habitat will be better able to manage estuarine dependent living marine resources.

To understand the causes of fishery declines and better predict the effects of human activities on fishery populations, the following research needs relative to snapper grouper habitat are provided so that state, federal, and private research efforts can focus on those areas that would allow the South Atlantic Fishery Management Council to develop measures to better manage snapper grouper and their habitat:

1. Identify optimum snapper grouper habitat and environmental and habitat conditions that limit snapper grouper production (e.g., what are the critical fisheries habitats for food, cover, spawning, nursery areas, and migration?);

2. Determine the relationship between juvenile snapper grouper and estuarine habitat. If an obligatory relationship is found, determine the distributions, rates of change, and documented causes of loss for estuarine habitat types;

3. Quantify the relationships between snapper grouper production and habitat (e.g., what are the key trophic pathways in the ecosystem, and how does the flux of essential nutrients, carbon compounds, and energy through these systems influence fisheries productivity?);

4. Determine the relative effects of fishing, pollution, and natural mortality on fishery population dynamics. Also determine the effects of cumulative habitat loss on fisheries productivity and economic value;

5. Determine methods for restoring snapper grouper habitat and/or improving existing environmental conditions that adversely affect snapper grouper production. The 29 recommendations for future studies in Bohnsack and Sutherland (1985) are supported here; and

6. Identify areas of particular concern for snapper grouper.

8.2.4 Habitat Protection Programs

State and federal agencies and laws and policies that affect snapper grouper habitat are found in Section 8.3 of the Snapper Grouper Fishery Management Plan (SAFMC, 1983). Specific

involvement by other federal agencies are noted as follows:

Office of Coastal Zone Management, Marine Sanctuaries Program, National Oceanic and Atmospheric Administration. Specifically, this program manages and funds the marine sanctuaries program. On-site management and enforcement are generally delegated to the states through special agreements. Funding for research and management is arranged through grants.

National Marine Fisheries Service. The enactment of the Magnuson Act provides for exclusive management of fisheries seaward of state jurisdiction. This includes both specific fishery stocks and habitat. The process for developing Fishery Management Plans is highly complex. It includes plan development by various procedures through fisheries management councils. National Marine Fisheries Service implements approved plans. The Coast Guard, National Marine Fisheries Service, and states enforce Fishery Management Plans. The National Marine Fisheries Service is responsible for data collection, research and resource assessment in support of Fishery Management Plans. Fishery Management Plans under authority of the South Atlantic Fishery Management Council for corals and coral reefs, snapper grouper, swordfish, coastal migratory pelagics, and spiny lobster are in force.

National Park Service. National parks and monuments are under the jurisdiction of the National Park Service. Management, enforcement, and research are accomplished within the agency.

Minerals Management Service. This agency has jurisdiction over mineral and petroleum resources on the continental shelf. Management has included specific lease regulations and mitigation of exploration and production activities in areas where coral resources are known to exist.

Fish and Wildlife Service. Fish and Wildlife Service assists with environmental impact review, develops biological resource evaluations, and administers the endangered species program with the National Marine Fisheries Service. The Fish and Wildlife Service manages parks and refuges for wildlife in the south Atlantic.

Geological Survey. In the coral reef areas Geological Survey has conducted considerable reef research and assisted or cooperated with other institutions and agencies to facilitate logistics and support of coral reef research.

U.S. Coast Guard. The 1978 Waterways Safety Act charges the Coast Guard with marine environmental protection. The Coast Guard is the general enforcement agency for all marine activity in the federal zone. Among the duties are enforcement of sanctuary and fishery

management regulations, managing vessel salvage, and coordinating oil spill cleanup operations at sea.

U.S. Army Corps of Engineers. The Corps of Engineers contracts and regulates coastal engineering projects, particularly harbor dredging and beach renourishment projects. The Corps of Engineers also reviews and is the permitting agency for coastal development projects, artificial reefs, and offshore structures.

Environmental Protection Agency. This agency has a general responsibility for controlling air and water pollution. Disposal of hazardous wastes and point-source discharge permitting are Environmental Protection Agency functions. Certain mineral and petroleum exploration and production activities are managed by Environmental Protection Agency. Environmental research germane to waste disposal and pollution also are funded.

Federal environmental agencies such as the National Marine Fisheries Service, Mineral Management Service, Fish and Wildlife Service, and the Environmental Protection Agency also analyze projects proposing inshore and offshore alterations for potential impacts on resources under their purview. This is similar to the function of the South Atlantic Fishery Management Council Habitat Committee. Recommendations resulting from these analyses are provided to the permitting agencies (the Corps of Engineers for physical alterations in inshore waters and territorial sea, the Mineral Management Service for physical alterations in the Outer Continental Shelf or the offshore Exclusive Economic Zone and Environmental Protection Agency for chemical alterations). Even though the Corps of Engineers issues permits for oil and gas structures in the Exclusive Economic Zone, they only consider navigation and national defense impacts, thus leaving the rest to the Department of Interior, in a nationwide general permit.

In administering the oil and gas resources on the Outer Continental Shelf, the Department of Interior through the Mineral Management Service has not been recognizing the authority of the Fish and Wildlife Coordination Act. Instead they have contended that the Outer Continental Shelf Lands Act, as amended, supersedes the Fish and Wildlife Coordination Act. They also require that the oil and gas lease permit stipulations be more closely coordinated with other Department of Interior bureaus, e.g., Fish and Wildlife Service, as provided in Departmental Manual 655. Coordination with other federal and state agencies is less frequent. For example, coordination between National Marine Fisheries Service and Mineral Management Service results from NOAA participation in the Outer Continental Shelf Advisory Board and from authorities under the Endangered Species Act and National Environmental Policy Act. The latter involves the periodic review of environmental statements for proposed lease sales. While review under Endangered Species Act generally involves exploration and development plans, it is very difficult for agencies like National Marine

Fisheries Service to have Mineral Management Service implement less environmentally damaging procedures in oil and gas operations around reefs, etc., if the Fish and Wildlife Service has not already objected to the procedure during the Department of Interior, Departmental Manual 655 coordination. However, though not required to do so, Fish and Wildlife Service frequently informally coordinates their proposed actions under Departmental Manual 655 with National Marine Fisheries Service. None of the fish and wildlife agencies have veto power over Mineral Management Service permitting for oil and gas exploration, development and production on the Outer Continental Shelf, or on essentially the Exclusive Economic Zone.

Environmental Protection Agency is the permitting agency for chemical discharges into waters of the south Atlantic, under the National Pollution Discharge Elimination System program of the Clean Water Act for chemicals used or produced in the south Atlantic (i.e., drilling muds, produced water or biocides) and then released, or under the Ocean Dumping Regulations of the Marine Protection, Research and Sanctuaries Act if the chemicals are transported into the Atlantic Ocean for the purpose of dumping. When discharge or dumping permits are proposed, federal and state fish and wildlife agencies may comment and advise under the Fish and Wildlife Coordination Act and National Environmental Policy Act. The South Atlantic Fishery Management Council may do likewise under the Magnuson Act and National Environmental Policy Act. The South Atlantic Fishery Management Council also protects snapper grouper habitat under the Corals and Coral Reefs Fishery Management Plan.

8.2.5 Habitat Recommendations

The snapper grouper fishery contributes to the food supply, economy, and health of the Nation, and provides recreational and commercial fishing opportunities. The fishery is dependent upon the survival of these resources, which can only be assured by the wise management of all aspects of snapper grouper habitat. Increased productivity of stocks 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 South Atlantic Fishery Management 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. Protect the current quantity, environmental quality and productive capacity of habitats supporting important commercial and recreational fisheries. (This objective will be accomplished through the recommendation of no net loss or significant 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 South Atlantic Fishery Management Council has formed a Habitat Committee and Advisory Panel for the south Atlantic states. The purpose of the Committee is to bring to the Council's attention activities that may affect the habitat of fisheries under their management. The South Atlantic Fishery Management Council, pursuant to the Magnuson Act, will use its authorities 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 snapper grouper habitat. The goal is to insure that habitat losses are kept to the minimum and that efforts for appropriate mitigation strategies and applicable research are supported.

V. ENVIRONMENTAL CONSEQUENCES

Physical Environment

The actions proposed in this amendment will have positive impacts on the physical environment. The effect of Amendment 1 is to prohibit the use of trawls in the snapper grouper fishery between Cape Hatteras, North Carolina and Cape Canaveral, Florida. The habitat necessary for species in the snapper grouper complex and a description of the trawl gear are given in the Snapper Grouper Source Document (1983) and in the Fishery Management Plan (1983). More detailed information on trawl gear and new, readily available information concerning the habitat of snapper and grouper species are included in this amendment. Quantitative habitat damage by one pull of a research trawl is described in Van Dolah et al. (1987). Qualitatively expanding this damage indicates that about 12% of the available habitat would be impacted annually by commercial fishing activity. This and other information led the South Atlantic Fishery Management Council to prohibit trawl gear in the snapper grouper fishery in order to protect and restore habitats upon which commercial and recreational marine fisheries depend as called for in recent amendments to the Magnuson Act and the Habitat and Environmental Protection Policy adopted by the South Atlantic Council. This habitat is critical to the long term viability of the entire snapper grouper resource and fishery. Information to quantitatively describe the importance of habitat to the physical environment of snapper and grouper species is unavailable; research suggestions are made for the National Marine Fisheries Service to gather information for future amendments.

Fishery Resource

The proposed actions would have an indirect beneficial impact by preventing the harvest of undersized snappers and groupers, increasing the yield of vermilion snapper, and preventing the harvest and mortality of a number of unusable species. This action will also have the benefit of protecting the limited live bottom available that is critical to the long term viability of the entire snapper grouper resource and fishery. Information to quantitatively describe the affect of habitat loss on the fishery resource is unavailable; research suggestions are made for the National Marine Fisheries Service to gather information for future amendments.

Human Environment

The cost for the entire development process of Amendment 1 by the South Atlantic Council was $61,192 over one and a half years. The Council's attention to making the regulation implementing this action enforceable dockside will result in a net reduction of $34,000 in enforcement costs over the current trawl regulation. This represents a savings to the government.

Benefits and costs for Amendment 1 are given in Table 2 for the Council's preferred alternative and each of the three options considered and rejected. Where possible, quantitative data has been utilized and is discussed earlier in this document. When quantitative data was not available, qualitative values (+ and -) were utilized.

The proposed amendment will delay the trawl harvest component of the catch from seven vessels. The initial impact of the delayed catch for the seven vessels would be $87,448 based on 1988 data. The loss of net gear would amount to $7,000 and the cost of document preparation was $61,192. Total costs are estimated to be $155,640. Benefits total in excess of $210,405 from potential vermilion gain ($96,000), increase in vermilion yield per recruit ($52,406), catch of other species ($28,999), savings from enforcement ($34,000) and habitat protection (nonquantified but high). The resulting benefit/cost ratio is 1.35.

In summary, impacts to the affected individuals are not significant and the opportunity exists for the vessels to make up this income. In addition, it must be kept in mind that the fish trawl fishery is a supplemental fishery that operates sporadically over three to four months during the winter and the income from this fishery is not a significant portion of the annual income from shrimping. These fishermen could utilize other gear (e.g. electric & hydraulic reels, black sea bass traps, longlines, etc.) to fish snappers and groupers. Additionally, the potential exists for them to enter other fisheries, primarily calico and sea scallop. The South Atlantic Council concludes that the overall net benefit to the nation will be positive when the nonquantified, positive benefits of eliminating the habitat destruction, and the quantified benefits of increasing vermilion yield per recruit, the additional potential vermilion gain, the gain from other species and the reduction in enforcement costs are factored into the initial negative costs. The foregone catch may be caught by the affected vessels and/or other commercial and recreational vessels and does not represent an

overall negative impact.

Effect on Endangered Species and Marine Mammals

The proposed amendment has no anticipated impact on marine mammals and an unknown but positive impact on threatened and endangered species of turtles. It is known that turtles associate with live bottom areas and have been caught in trawls in these areas. The species most likely encountered and caught is the loggerhead, although leatherbacks could be caught since they have been taken in shrimp trawls. The South Atlantic Council initiated the Section 7 procedure with the National Marine Fisheries Service and prepared a biological assessment in the original Fishery Management Plan. Marine mammals occur within the geographic area of the Fishery Management Plan; however, they are not in any way impacted by association with or impacted by prosecution of the snapper grouper fishery. The National Marine Fisheries Service concurred with Council determination that endangered/threatened species under their purview would not be affected by the measures contained in the original Fishery Management Plan. The proposed actions in Amendment 1 do not alter provisions of the Fishery Management Plan that would affect these animals.

Effect on Wetlands

The proposed Amendment 1 will have no effect on any flood plains, wetlands, trails or rivers.

VI. CONCLUSIONS

Mitigating Measures Related to the Proposed Action

None.

Unavoidable Adverse Effects

Prohibition on the use of trawl gear in the snapper grouper fishery between Cape Hatteras, North Carolina and Cape Canaveral, Florida affecting seven vessels (based on 1988 data) during three to four months of the year.

Relation Between Local, Short-Term Users of the Resource and Enhancement of Long-Term Productivity

Utilization of the resource by seven trawl vessels will be eliminated between Cape Hatteras, North Carolina and Cape Canaveral, Florida but the impact will not be significant. This action will protect the habitat that is required for the snapper and grouper resource. The snapper and grouper resource is currently overfished and the Council has already implemented minimum sizes on a number of species and a minimum trawl mesh size. These measures have not prevented the

continued overfishing of the snapper grouper resource. Amendment 1 addresses impacts from trawl gear and the Council is in the process of developing Amendment 2 which will evaluate existing minimum sizes and determine the status of other species. It is expected that more restrictive measures will be forthcoming in order to reverse the overfished status of the snapper grouper resource.

RECOMMENDATIONS

Having reviewed the environmental assessment and available information relating to the proposed actions, I have determined that there will be a positive but not significant impact on the environment resulting from this proposed action.

Approved:_____ Date:_____
Title

RESPONSIBLE AGENCIES

South Atlantic Fishery Management Council
1 Southpark Circle
Southpark Building, Suite 306
Charleston, South Carolina 29407-4699
(803) 571-4366

LIST OF AGENCIES AND PERSONS CONSULTED

Florida League of Anglers
Sport Fishing Institute
Arthur Ravenel, Jr.
Skidaway Anglers Association
Conservation Alliance of St. Lucie County
Center for Environmental Education
Ft. Pierce Sportfishing Club
Halifax Reef, Inc.

Volusia Flagler Environmental PAC
Stuart Sailfish Club (560 members)
Central Florida Offshore Anglers (350 members)
Concerned Fishermen of Florida
Atlantic Coast Conservation Association of South Carolina
U.S. Fish and Wildlife Service
National Coalition for Marine Conservation
The Oceanic Society
Two-Way Boating and Sportfishing Club (200 members)
Georgia Fishermen's Association
Bryan Fisherman's Cooperative
Georgia Marine Extension Service
Savannah Dive Club

LIST OF PREPARERS

South Atlantic Fishery Management Council
- Gregg Waugh, Fishery Biologist/Statistician

National Marine Fisheries Service
- Andreas Mager, Jr. (Habitat Section)

LOCATION AND DATES OF PUBLIC HEARINGS

February 29, 1988	Holiday Inn Oceanfront	Jacksonville, Florida
March 1, 1988	Holiday Inn I-95 at highway 341	Brunswick, Georgia
March 2, 1988	Holiday Inn Downtown	Savannah, Georgia
March 2, 1988	S.C. Wildlife & Marine Resources Center	Charleston, South Carolina
March 3, 1988	Murrells Inlet Community Center	Murrells Inlet, South Carolina
March 4, 1988	Carteret Community College Auditorium	Morehead City, North Carolina

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Table 1. Number of vessels using trawl gear in the snapper-grouper fishery by year and state of landing.

State	1980	1981	1982	1983	1984	1985	1986	1987
SC	10	9	4	4	4	2	2	4
GA	5	6	7	9	5	0	0	3
FL EC*	6	6	5	5	5	5	0	0

* FL EC - Florida East Coast

(SOURCE: NMFS SEFC)

TABLE 2. SUMMARY OF BENEFITS AND COSTS FOR AMENDMENT #1.

	TRAWL PROHIBITION	NO ACTION	12" MINIMUM SIZE LIMIT	PROHIBIT ONLY ROLLER-TRAWLS
COSTS (7 vessels + support industry + consumers)				
Initial Impact of Delayed Catch	$87,448	$0	-	$87,448
Value of Net Gear	$7,000	$0	$0	$70,000
Document Preparation	$61,192	$61,192	$61,192	$61,192
Potential Impact on Shrimp Trips	-	$0	$0	$0
TOTAL	$155,640	$61,192	$61,192	$218,640
BENEFITS (7 vessels + nation)				
Potential Vermilion Gain	$96,000	-	-	$96,000
Increase Vermilion YPR	$52,406	-	+	-
Catch of Other Species	$28,999	-	+	-
Enforcement	$34,000	-	-	-
Habitat Protection	+ +	-	-	-
TOTAL	$211,405	-	-	-
NET BENEFITS - COSTS	$55,765	-	-	-
BENEFIT/COST RATIO	1.36			

Qualitative positive Benefits/Costs are shown as +
Qualitative negative Benefits/Costs are shown as -

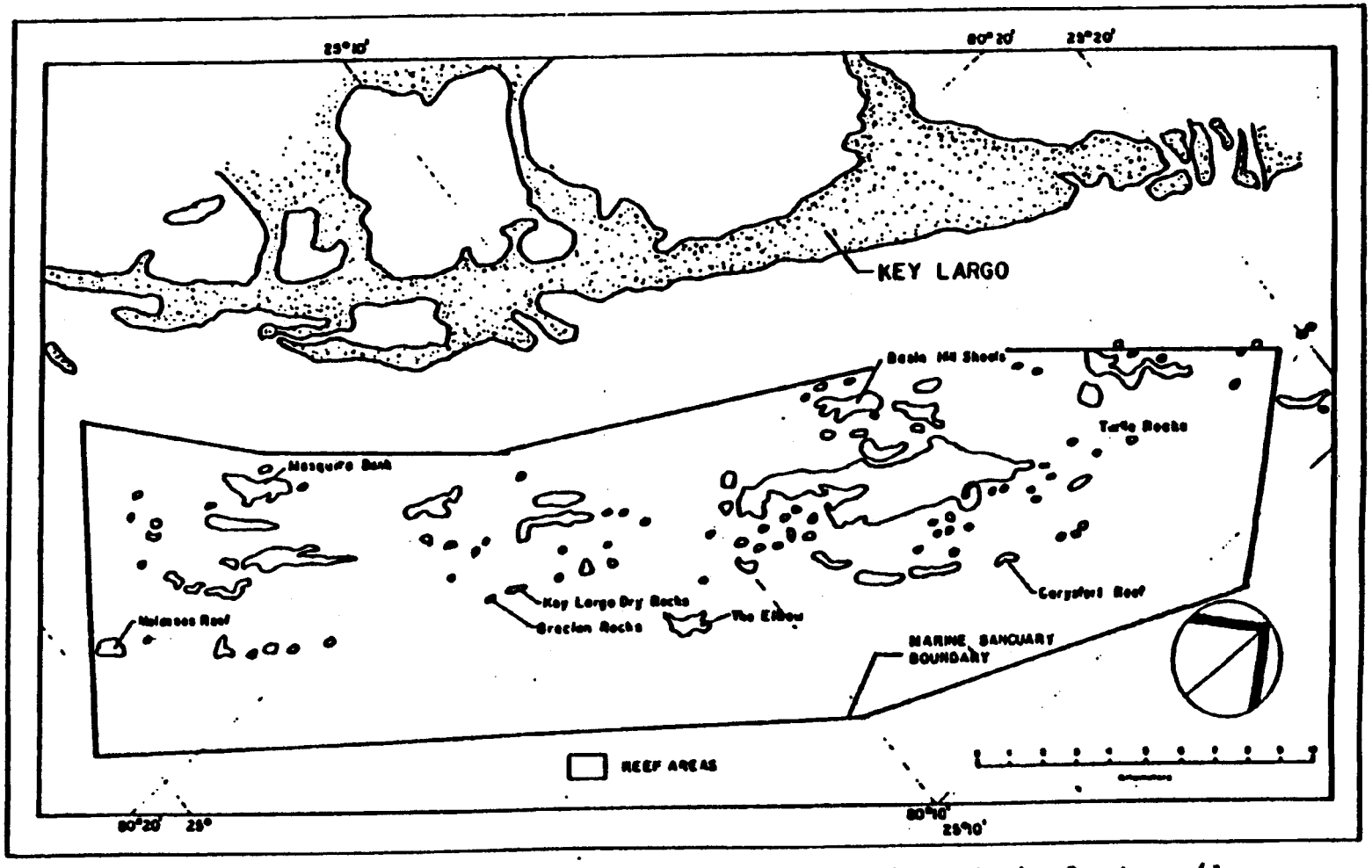


FIGURE 1. Reefs and approximate boundaries of the Key Largo Coral Reef Marine Sanctuary (Jameson, no date).

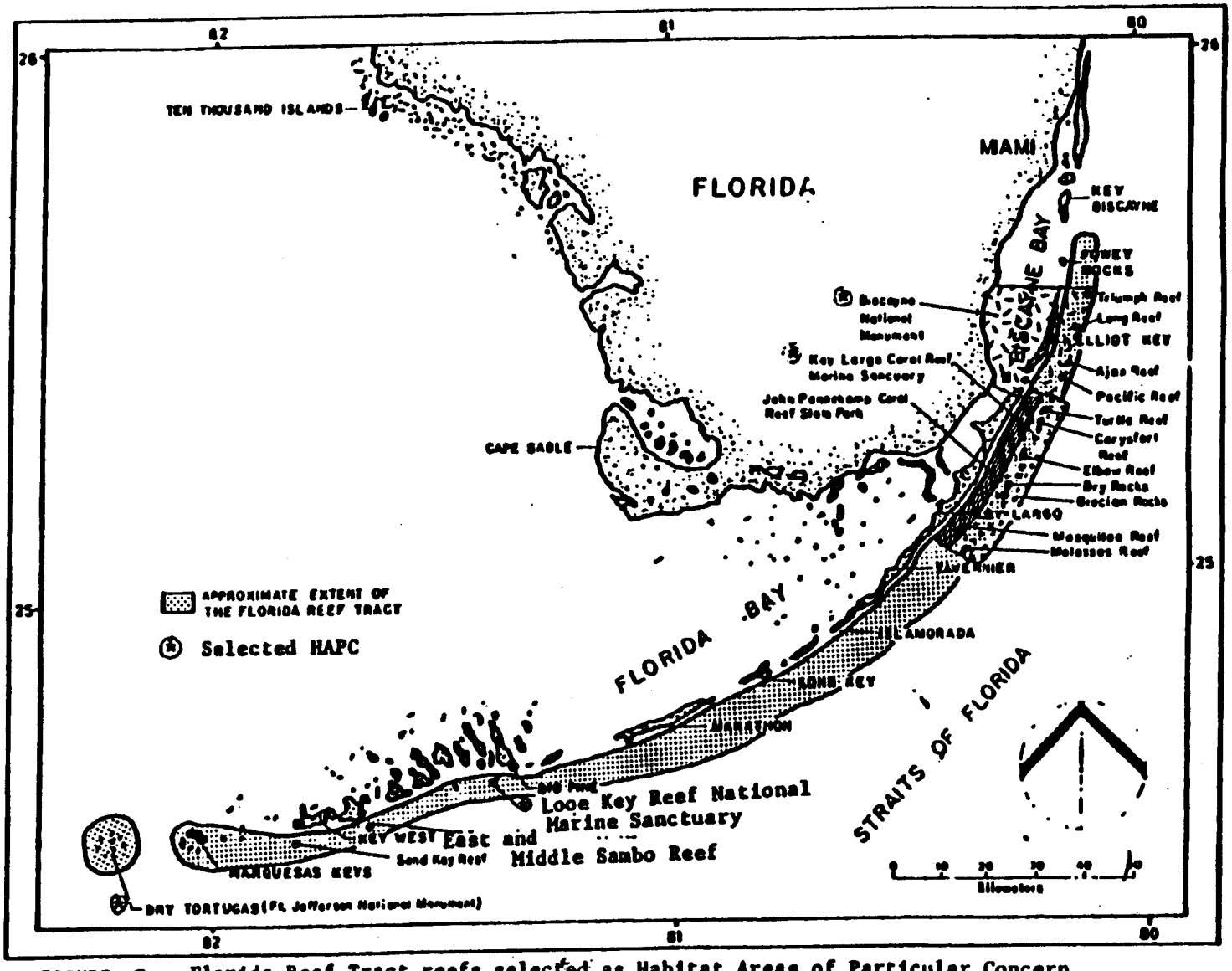


FIGURE 2. Florida Reef Tract reefs selected as Habitat Areas of Particular Concern.

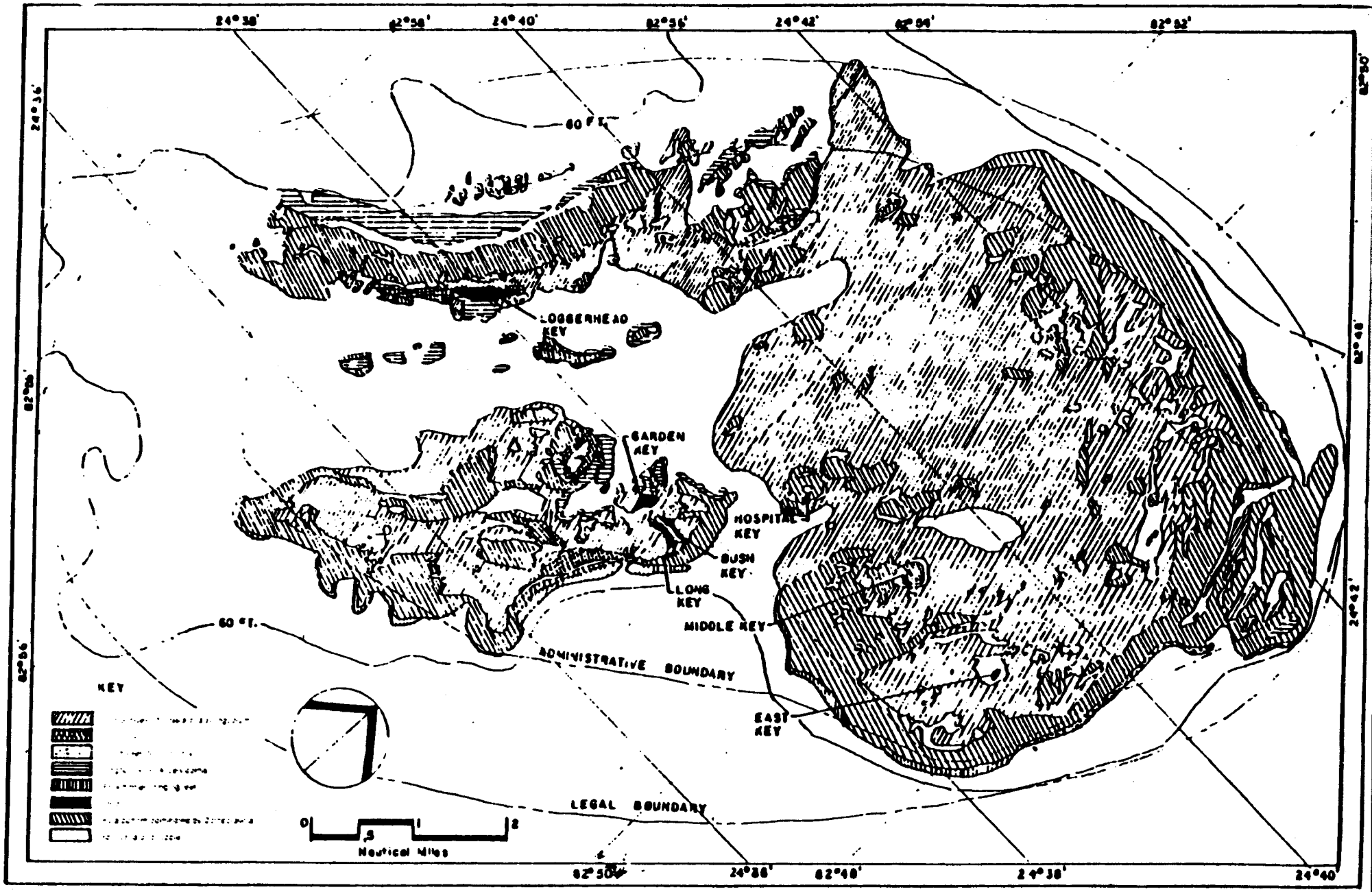


FIGURE 3. Outer continental shelf resource management map, coral distribution, Fort Jefferson National Monument, The Dry Tortugas (after map published by BLM, OCS Office, New Orleans, 1979).

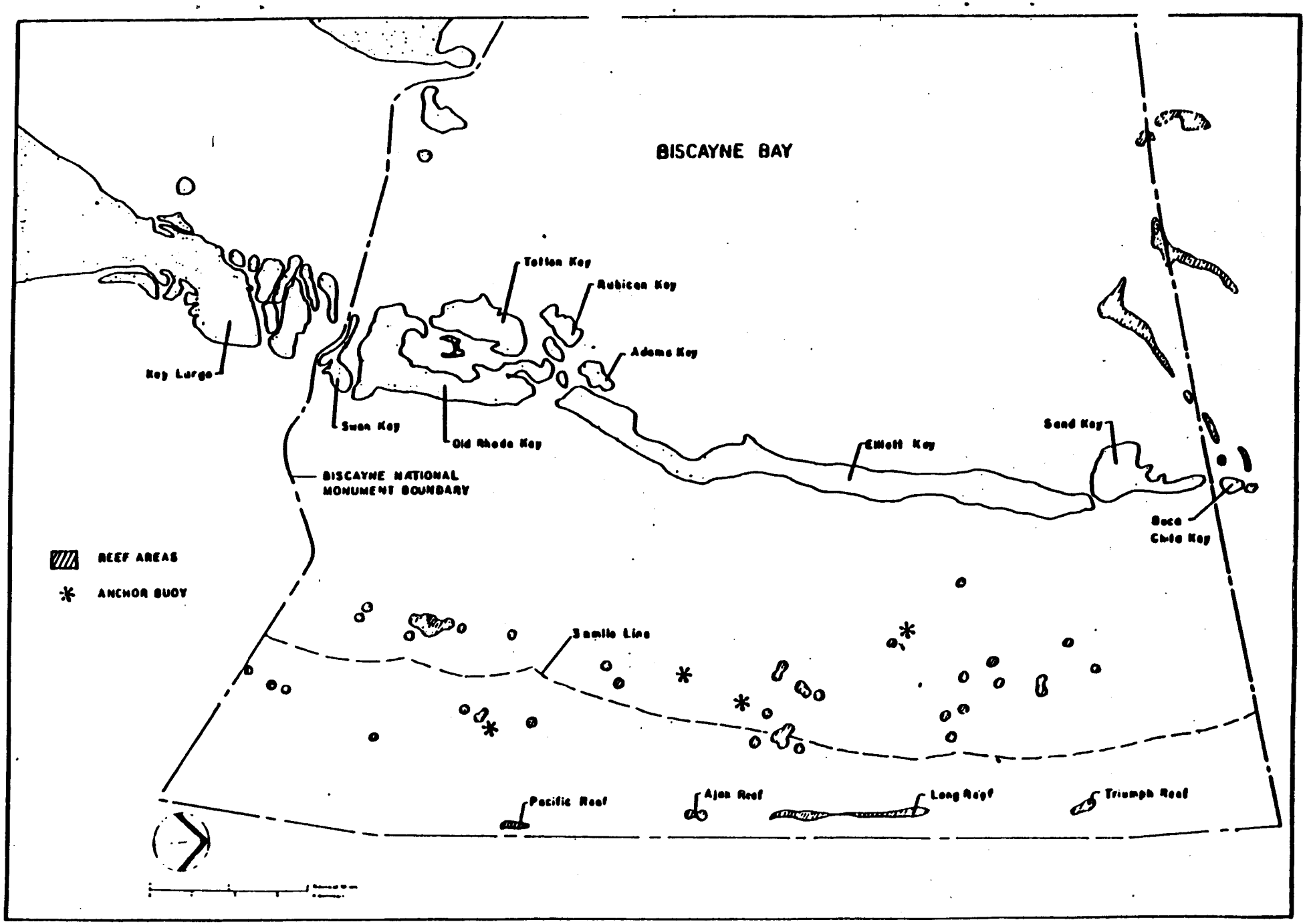
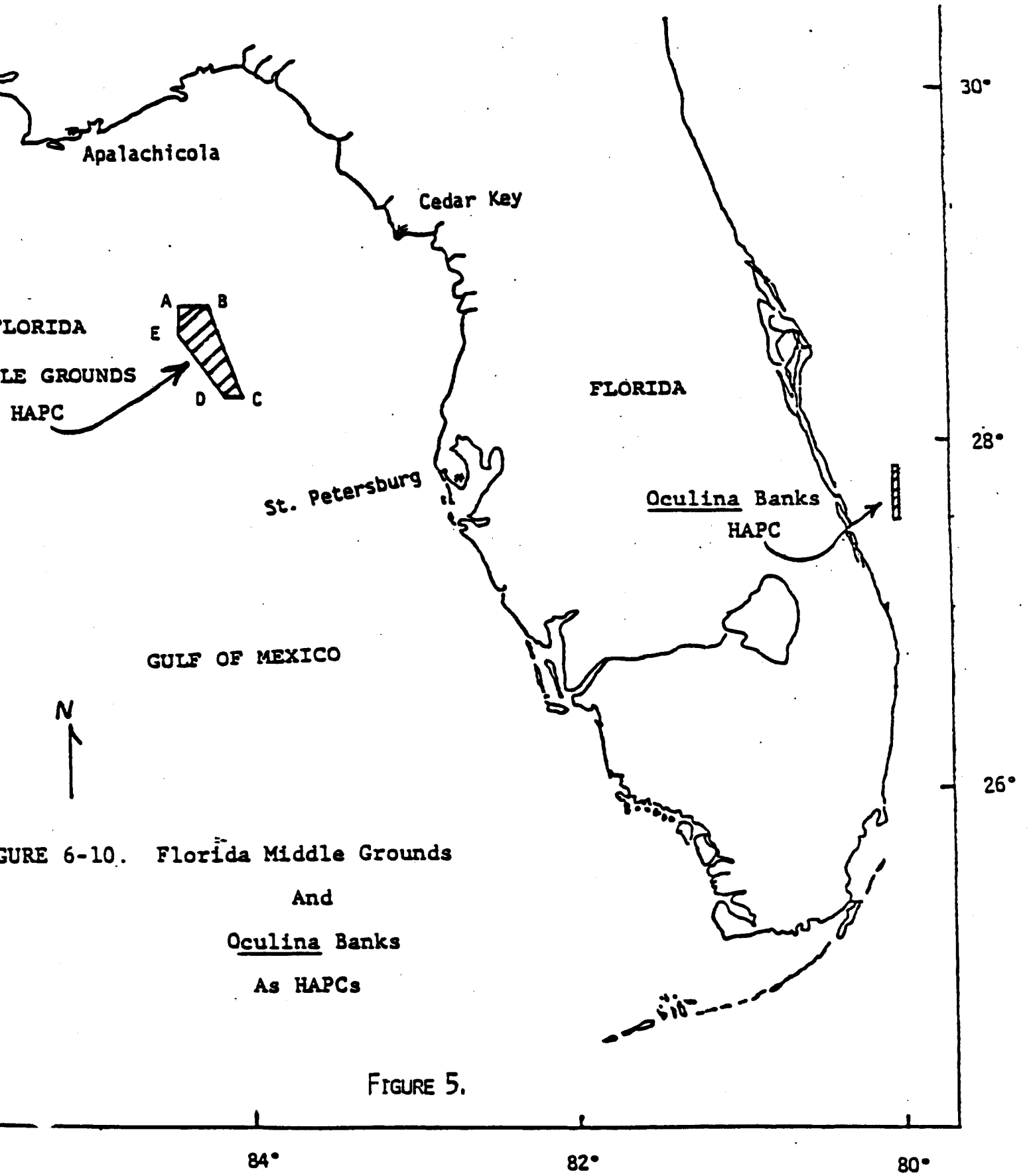


FIGURE 4. Reefs in the Biscayne National Park boundary.



GURE 6-10. Florida Middle Grounds
And
Oculina Banks
As HAPCs

FIGURE 5.

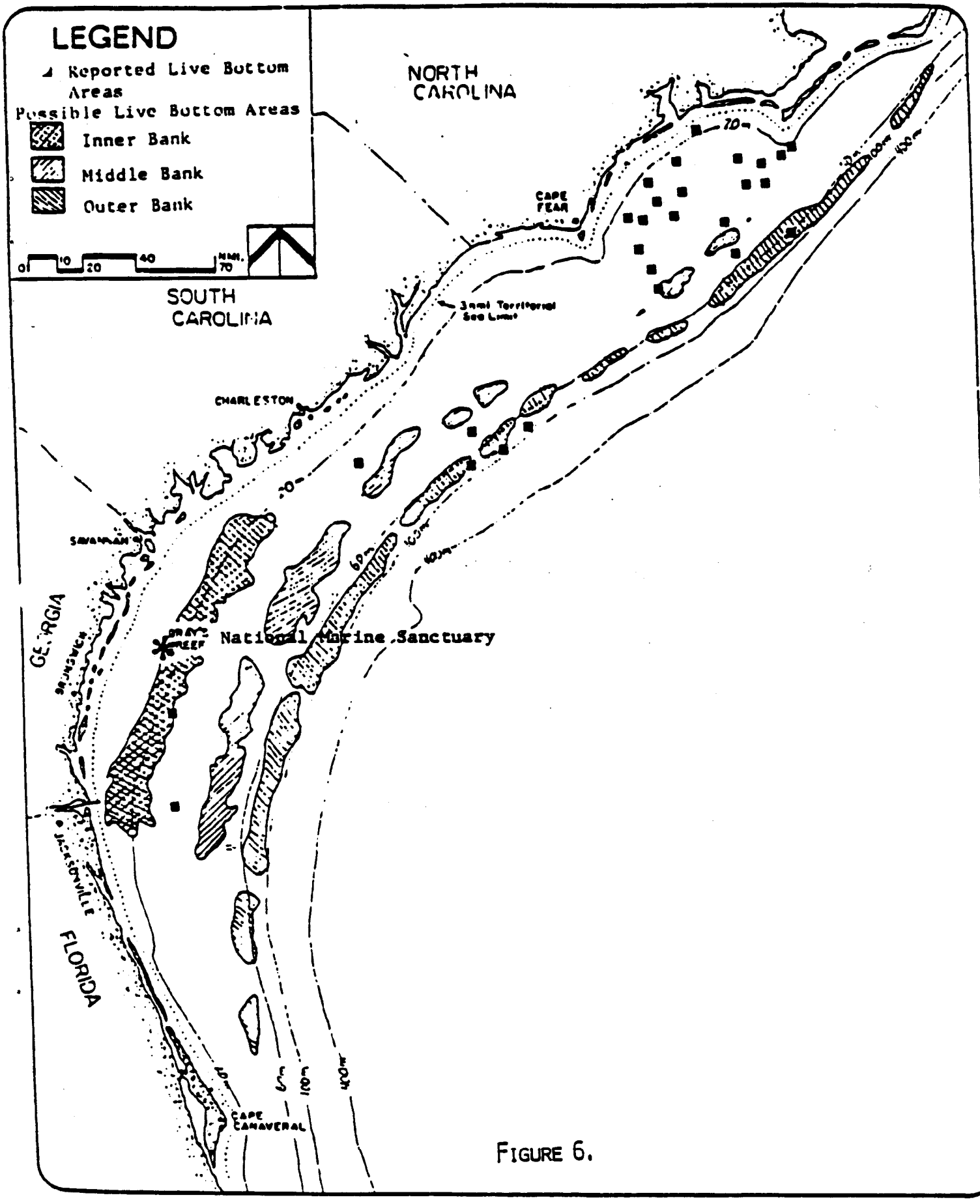

LEGEND
Reported Live Bottom Areas
Possible Live Bottom Areas
Inner Bank
Middle Bank
Outer Bank
0
10
20
40
NMI.
70
NORTH CAROLINA
SOUTH CAROLINA
CAPE FEAR
3 nmi Territorial Sea Limit
CHARLESTON
SAVANNAH
GEORGIA
BRUNSWICK
JACKSONVILLE
FLORIDA
CAPE CANAVERAL
70m
60m
40m
National Marine Sanctuary

FIGURE 6.

APPENDIX A

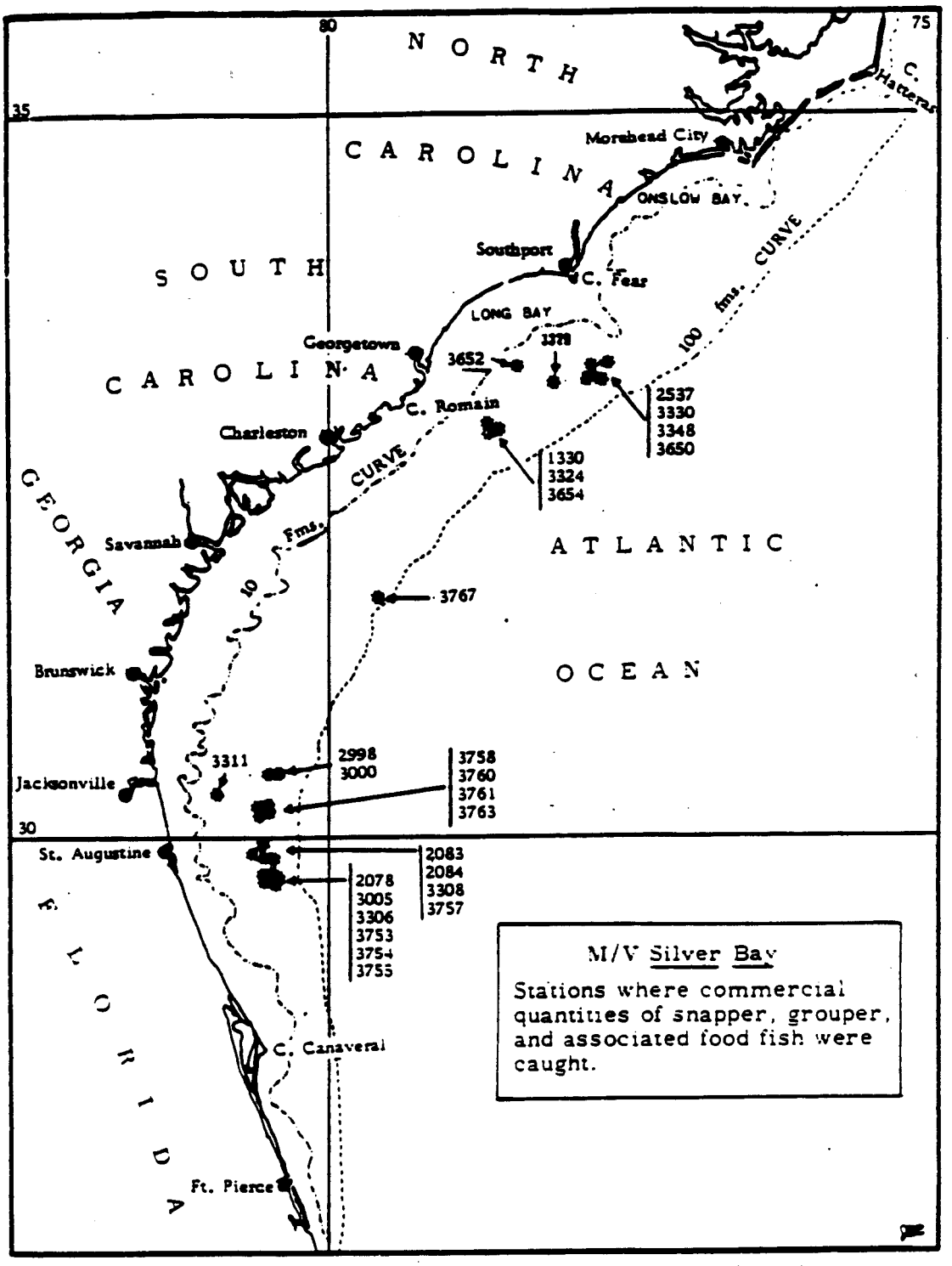


Fig. 1 - Chart of southeastern coastal waters explored for snapper and related food fishes, October 1959-March 1962.

APPENDIX A. FIGURE 1. (SOURCE: Cummins et al., 1962)

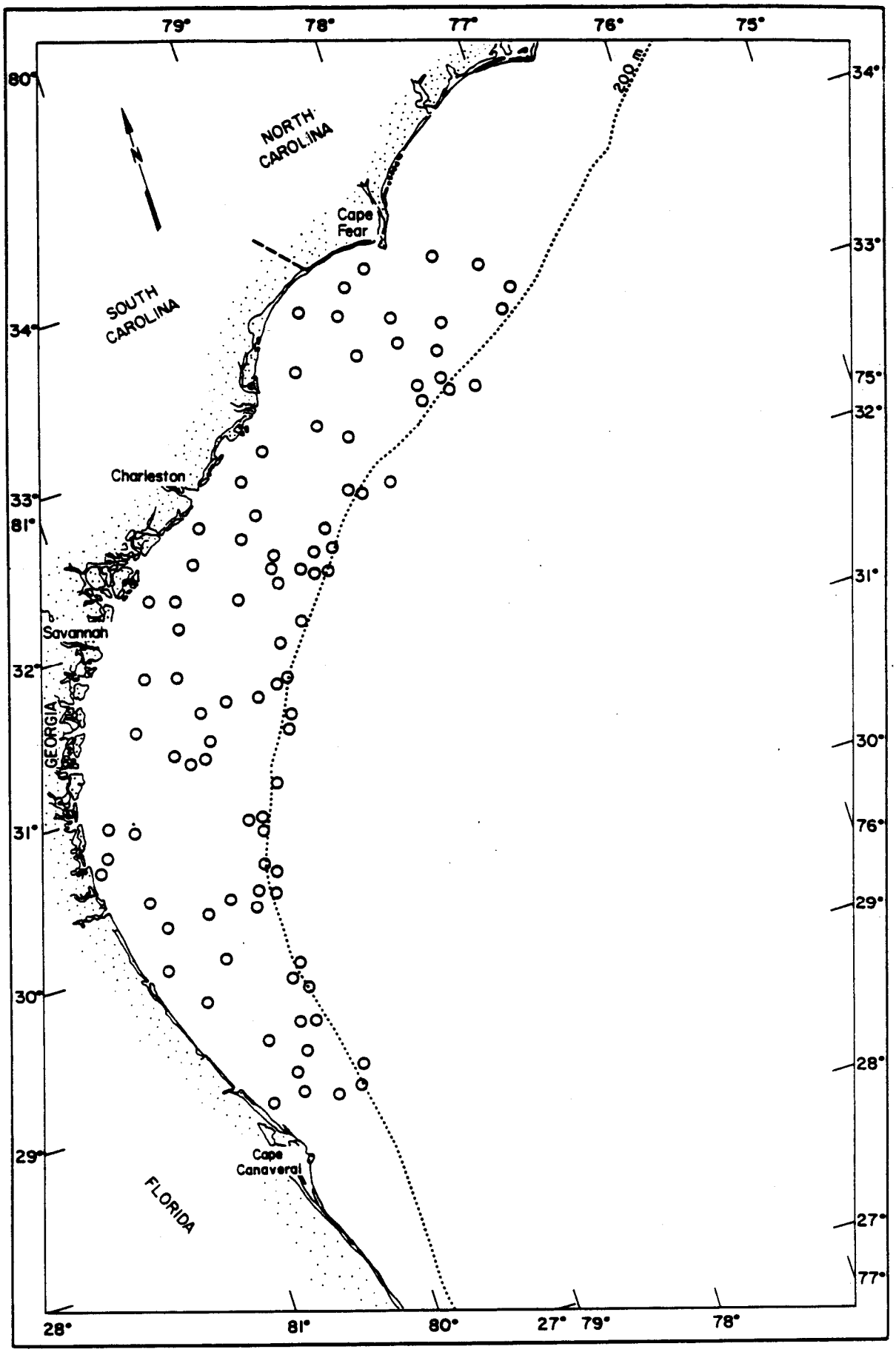


FIGURE I. The location of bottom trawl stations of MARMAP Cruise DP7701 conducted between January and February, 1977.

APPENDIX A. FIGURE 2. (SOURCE: Barans and Powles, 1977)

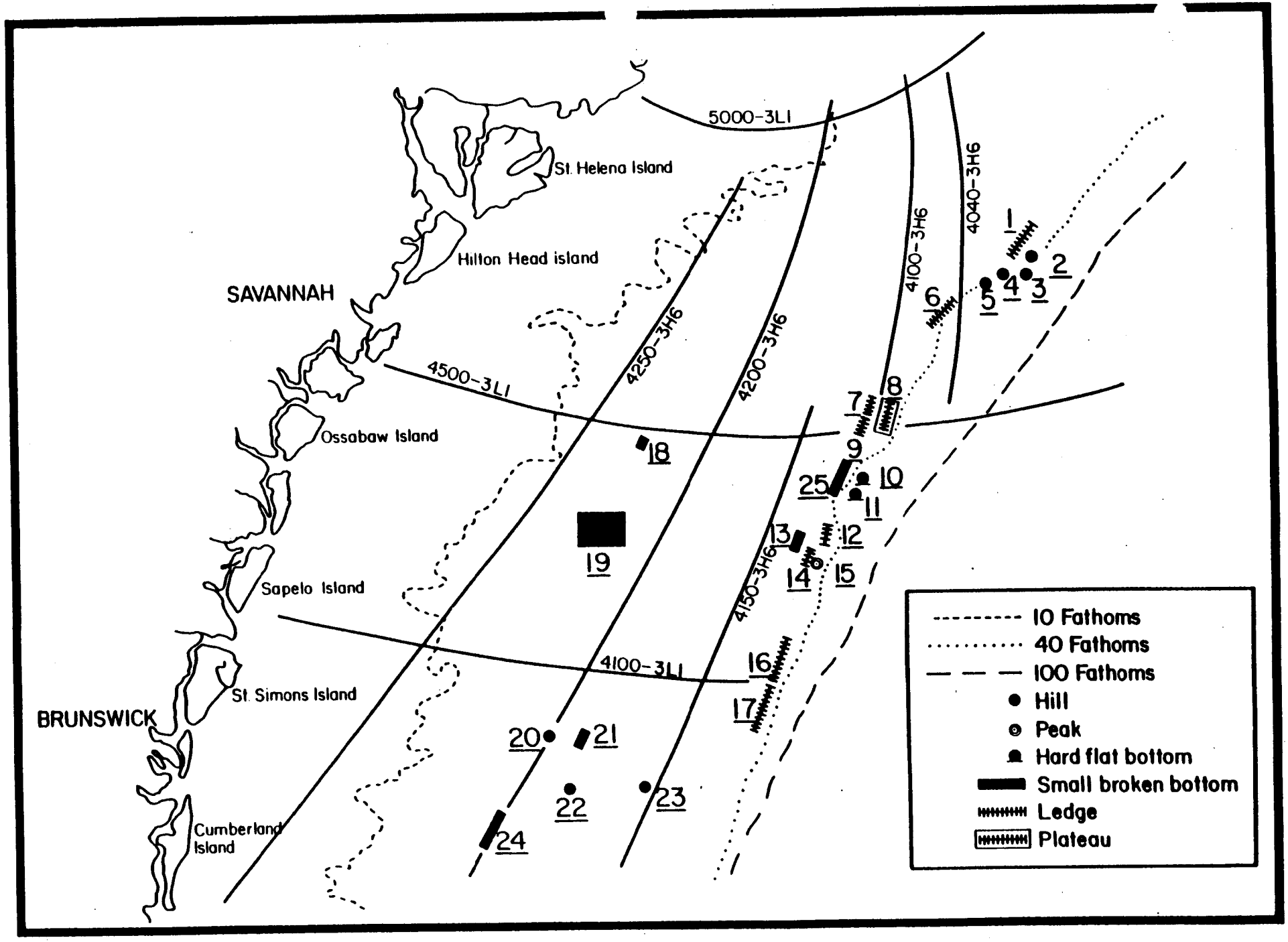


FIGURE 1. Areas off the coasts of Georgia and South Carolina where the University of Georgia Marine Extension Service has been conducting exploratory

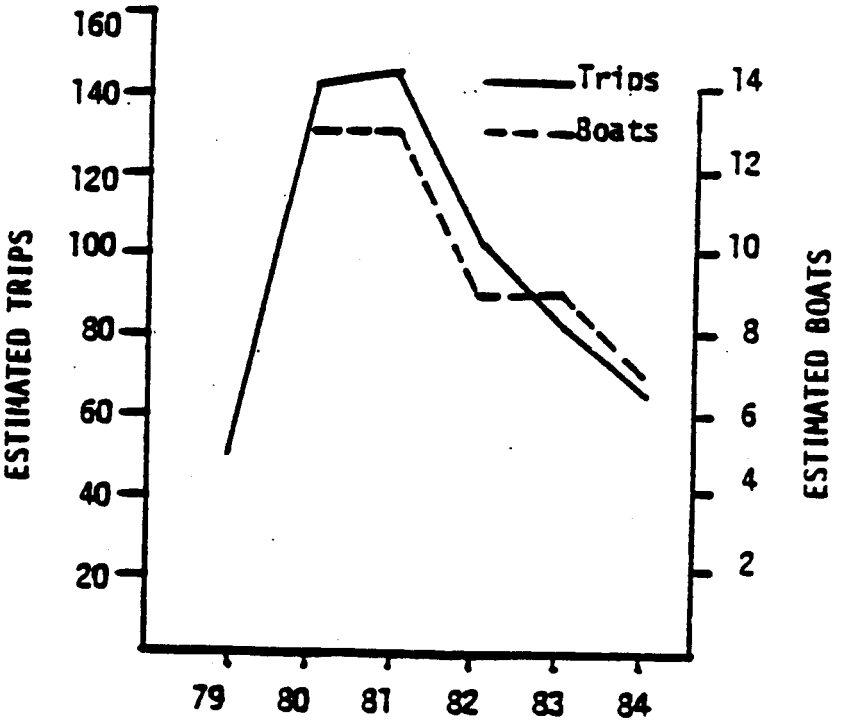


Fig. 30. Participation (number of boats) and effort (number of trips) in the South Carolina commercial finfish trawl fishery.

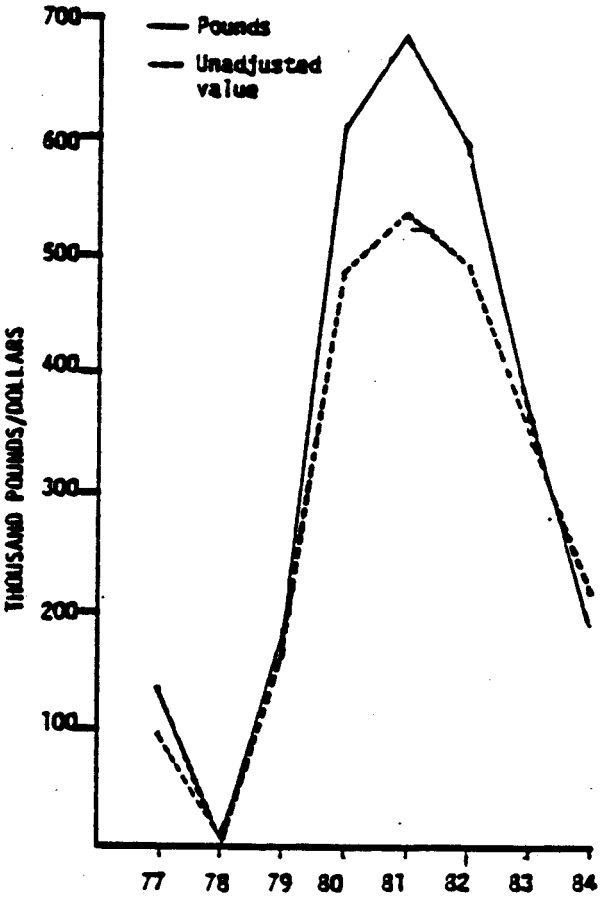


Fig. 31. Landed weight and value of offshore fish produced by the South Carolina commercial offshore trawl fishery. Data for 1985-1986 are subject to confi-

APPENDIX A. FIGURE 4. (SOURCE: Low, in press)

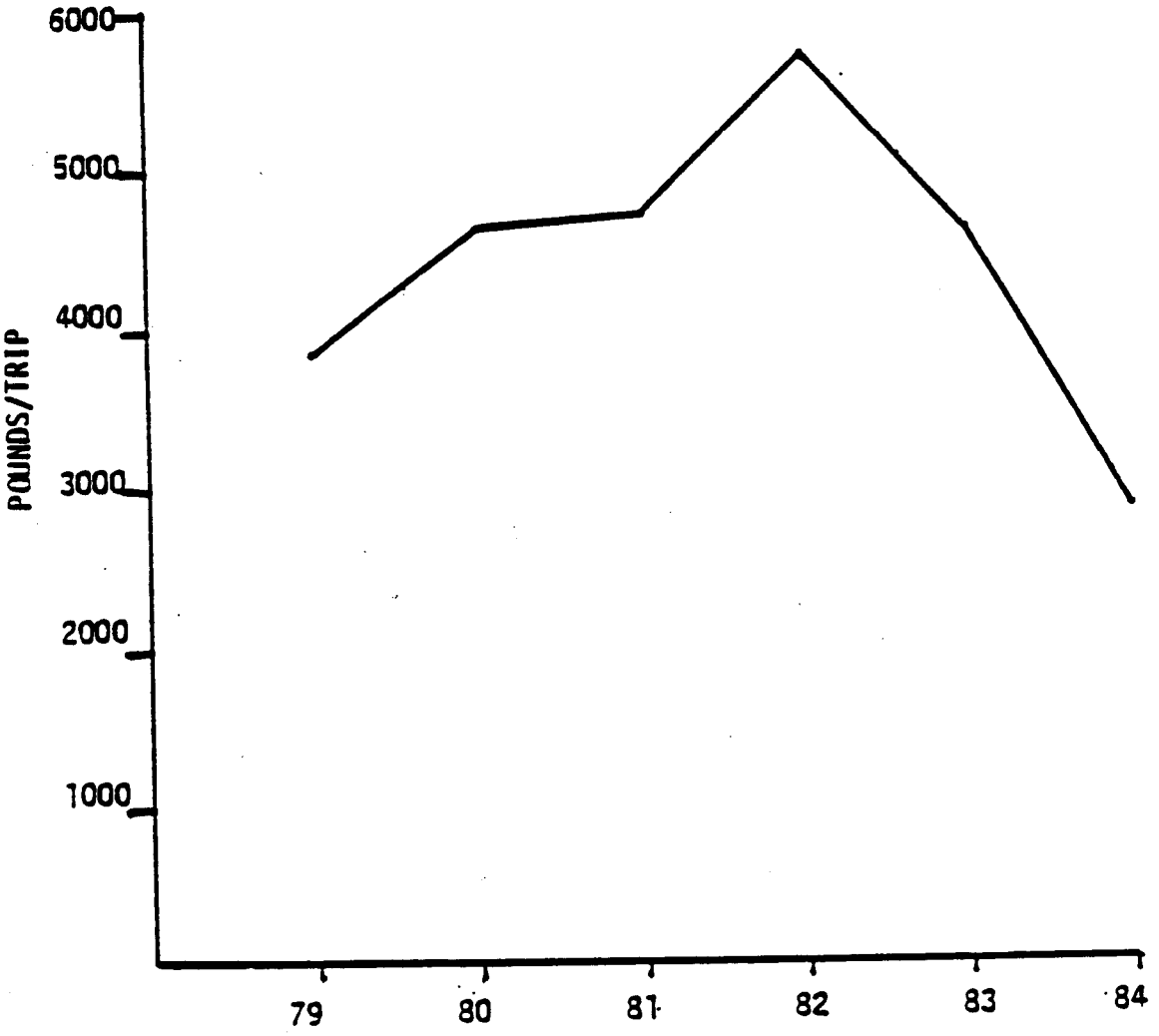


Fig. 32. Average trip production of South Carolina commercial finfish trawlers.

APPENDIX A. FIGURE 5. (SOURCE: Low, in press)

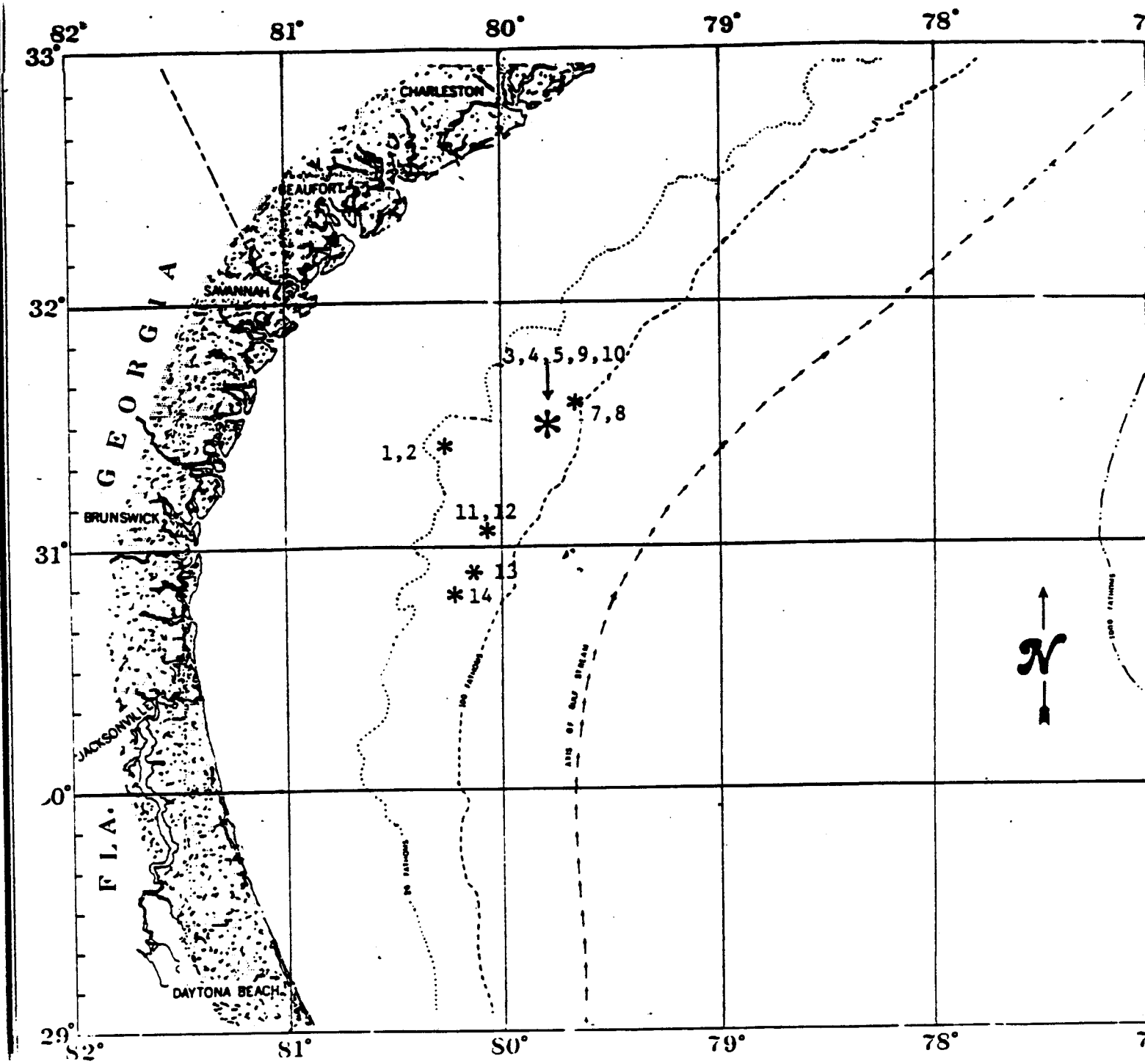


Figure 1. Stations trawled by the R/V GEORGIA BULLDOG on Cruise No. 102, 12-17 April 1988.

APPENDIX A. FIGURE 6. (SOURCE: Christian, 1988)

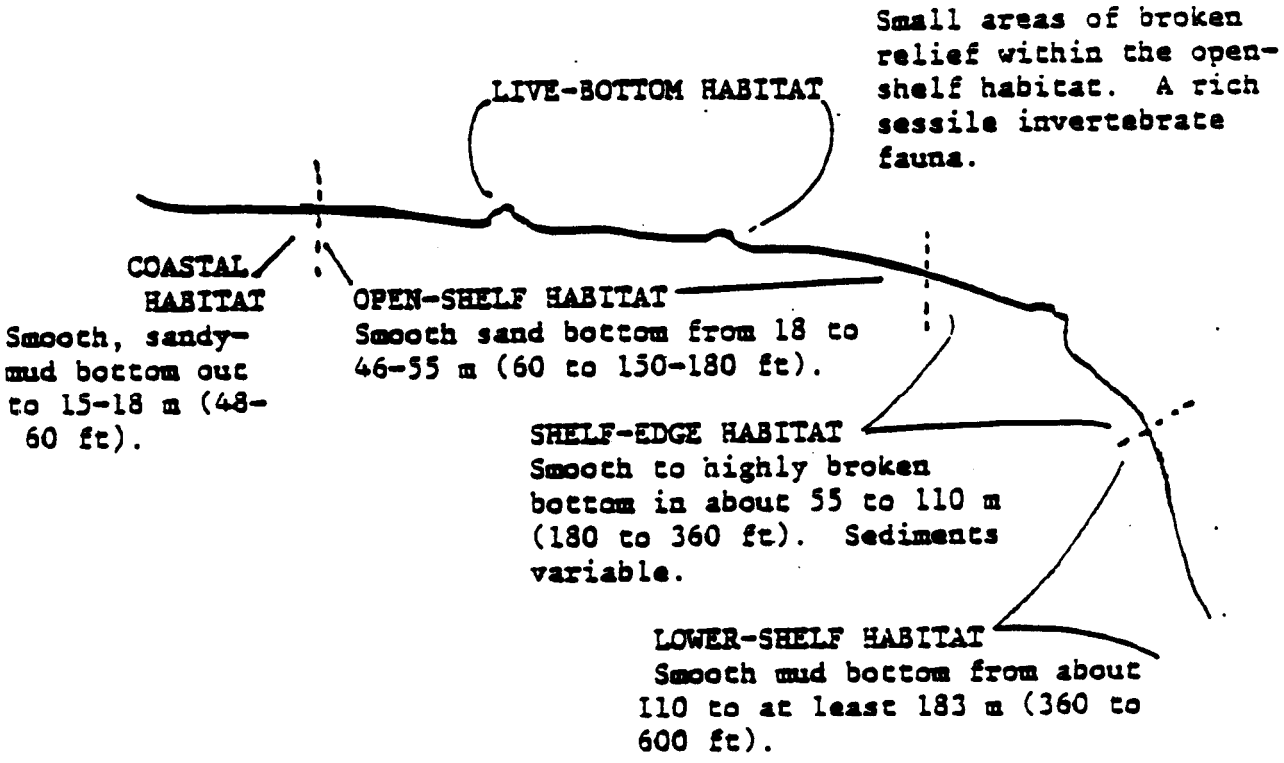


Figure 8-2. The five major types of habitat on the Continental Shelf off the Southeastern United States. (Source: Struhsaker, 1969)

APPENDIX A. FIGURE 7. (SOURCE: SAFMC Source Document, 1983)