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INTRODUCTION

This report is a summary of significant events in South Carolina's marine fisheries during 1994. Its objectives are to 1) update and describe trends in the principal fisheries and 2) provide explanatory information relevant to important developments. The discussion is somewhat subjective in interpretive content, but generally represents consensus views of the supervisory staff of the management programs for the various fisheries. The information is intended for a general audience, makes some simplifications, and is not meant to be definitive in the scientific sense.

Publication of landings data for South Carolina's commercial fisheries began in January, 1957, and was based on a monthly reporting system established by the U.S. Fish and Wildlife Service (USFWS). Distribution of information was in the form of monthly bulletins.

At that time, from 75 to 80 seafood dealers operated along the coast. Monthly production forms were mailed to these individuals during the last week of the month, on which they were asked to report their landings for that month. These data were then compiled by fisheries reporting specialists and submitted to the Washington, D.C. office of the USFWS. Additional data were provided by the state's Division of Commercial Fisheries. The specialists also prepared monthly narrative reports describing current conditions and trends. This series was discontinued at the end of 1979.

The current series of annual reports was initiated in 1987. The first issue contained a review of trends and events for 1977-1986. Individual annual reports began with the 1987 issue. The narrative is similar in format to that of the former monthly bulletins.

Data on commercial fisheries catch, effort, and landed value were obtained through 1) mandatory monthly reports submitted by licensed primary wholesale dealers, 2) mandatory shellfish harvest reports, 3) voluntarily submitted weekly shrimp tickets from dock operators, 4) voluntarily submitted offshore fish trip tickets from wholesalers, and 5) reports required in special permit fisheries.

In most cases, annual fishing effort by gear type was estimated by dividing total landings compiled from all sources by the average volume landed per trip (CPUE). CPUE was calculated from information submitted on shrimp tickets, fish tickets or special permit harvest reports. The percentages of total landings reported by such means, and thus the accuracy of the overall effort estimates, varied considerably according to gear type.

Commercial landings data were for wild stock fisheries only. The state's mariculture industry produced 712,000 pounds of

product worth \$2.97 M. Production of Pacific white shrimp was 677,000 pounds of heads-off product worth \$2.86 M. Although volume declined slightly from the 1993 level, value increased nearly 40% due to substantially higher unit prices for most grades of shrimp.

Commercial landings data were subject to confidentiality if less than three sources provided information. Appreciable volumes of product were involved in some cases. If three or four dealers handled an item but only one accounted for most of the volume, this information was also treated as confidential. Confidential data were included in the summaries of total landings.

Reliability of commercial landings data was subject to the perception of under-reporting to avoid taxes and regulations. State law restricts the use of such information to fishery management and it cannot be made available for other purposes except by court order. Verification of submitted information was seldom practiced, except where obvious anomalies were detected.

Because of health-related considerations, shellfish landings were reported in detail, closely monitored, and considered very accurate. Most of the shrimp landings were reported on weekly tickets which provided detailed information. These data also were considered highly reliable, although there was some subjectivity involved in assigning landings by statistical zone.

About 18% of the offshore fish landings (excluding wreckfish) were obtained from fish tickets. Although several of these fisheries were subject to detailed federal reporting requirements by dealers and/or designated harvesters, these were ignored by a significant percentage of the obligated providers. In general, fish ticket information appeared to be comparable to that generated by these systems.

Landings in most other product categories were obtained primarily from monthly dealer reports. The least reliable statistics presumably were for the blue crab and shad fisheries, where under-reporting and non-reporting appeared to be fairly common, based on anecdotal information. It also was likely that incidental catches of fish and crab by shrimp trawlers were underestimated. Some landings were part of the crew's compensation and not handled by the wholesale dealers (and therefore not reported by them).

The major source of recreational fishery data was the Marine Recreational Fishery Statistics Survey (MRFSS) conducted under National Marine Fisheries Service (NMFS) oversight. This was a generalized survey of hook and line fishing from shore or shore-based facilities, charterboats, and private boats. Headboat fishermen were not included.

A telephone survey of randomly selected coastal households was used to obtain information on participation and effort. An on-site

intercept survey (creel census) conducted by the MRD provided data on catch composition, species catch rates, detailed effort data, and length distribution. Results from both activities were combined by the NMFS to generate estimates of total catch by species, fishing modes, seasons, and fishing areas.

Although the MRFSS design has remained basically unchanged since 1979, many adjustments in calculation procedures periodically have been made. In 1993, the NMFS implemented several new procedures for processing effort data obtained in the phone survey. The resulting effort data were statistically more accurate than those obtained from the previous methodology.

The overall effect was an increase in effort and catch estimates for most years compared to previous values. Late in 1994, the NMFS began preparation of a complete revised historical data series based on the new methods. With all years' data standardized, valid trend analysis could then be accomplished. The data included in the current report are from the revised series and therefore differ from those contained in previous annual reports.

The MRD conducted a State Finfish Survey (SFS) in conjunction with the MRFSS. Coverage was directed at private boat fishermen fishing in inland areas. The principal objectives were to expand the sample sizes for length measurements and CPUE observations of important recreational species such as red drum and spotted seatrout. In 1994, most of these data were provided by the SFS.

State law required operators of piers, charterboats and headboats to obtain permits and submit monthly reports of their fishing activities. Pier operators reported the numbers of anglers using their facilities each day.

The charterboat report consisted of logbook sheets completed for each fishing trip, listing the date fished, number of anglers, hours fished, numbers of fish by species kept and released, and pounds of fish retained. Many operators also voluntarily provided information on location fished, method employed, and species targeted.

Since headboats were required by federal regulation to submit trip records to the NMFS, their state obligation was satisfied by sending copies to the MRD. The information elements were essentially the same as those required of charterboat operators. Data included in this report were provided by the NMFS Beaufort (N.C.) Laboratory, based on these records.

COMMERCIAL FISHERIES

Seafood categories were composed as follows. Shrimp landings included whole (heads-on) weights of all penaeid species. Negligible amounts of rock shrimp were landed in 1994. Crab landings included stone crab claws and whole (live) weights of blue

crab (hard and peeler or soft). Shellfish landings were expressed in weights of meats with the equivalent volumes in U.S. bushels (oysters and whelks) or 250-count bags (clams) of whole product noted where appropriate. Also included in aggregate shellfish meat landings were squid and octopus.

Most fish landings were reported in round (whole) weights, although carcass weights applied for swordfish and larger sharks. The offshore category included wreckfish, king mackerel, cobia, oceanic pelagics (dolphin, wahoo, and tunas), swordfish, reef fish (primarily groupers, snappers, black sea bass, porgies, and tilefish), and sharks caught with offshore gears (handline and longline). Coastal fish included mullet, inshore groundfish (e.g. spot and kingfishes or whittings), and sharks taken with inshore gears (shrimp trawls and gill nets). River fish landings consisted almost entirely of American shad in recent years.

South Carolina is not a major producer of marine fisheries products. In 1994, the state ranked 20th in landed volume and ex-vessel value among the 23 coastal states. Most of the landings were shipped out of state as raw or unprocessed products, so the local economy received little benefit from value added.

There were 278 licensed wholesale dealers in 1994, a modest decrease from the previous year's total. The Statistics Program conducted a detailed survey of these dealers to determine the types of products handled, extent of processing, operations characteristics, and employment levels. Responses were received from 231 dealers, 47 of whom reported no business. The following summary is based on information provided by the other 184 dealers.

The majority (57%) were individuals who harvested at least a portion of the product they sold. Most dealers (57%) sold at both the wholesale and retail levels. Relatively few (16%) did any type of processing and there were very few brokers.

Shrimp was the most frequently handled item with many dealers being shrimpers who marketed their catches. There also were numerous crabbers who harvested and sold their catch independently. Most of the dealers selling coastal fish were shrimpers and/or those who also handled shrimp, since incidental landings from shrimp trawlers comprised the product handled by most dealers. Most of the volume in coastal fish, however, was produced and distributed by a few dealers who were haul seine operators.

Shellfish dealers also tended to be harvesters. About one-third of the respondents reported dealing in shellfish. Relatively few dealers (about 30%) handled offshore fish and only 16% reported selling shad. Twelve dealers handled mariculture product, mainly shrimp and clams.

The typical wholesale dealer conducted a small operation

employing less than six additional individuals. About 44% of the active dealers indicated that they worked alone with no employees. Only 17% reported employing more than six people on a continuous basis. Most employees were involved in harvesting, management, and sales (Fig. 1). In 1994, employment included 221 personnel in management/clerical/sales, 113 dockworkers, 3 oyster shuckers, 46 crab pickers, 63 fish cutters, and 147 shrimp headers. Most processing jobs consisted of primary handling, such as shrimp heading and fish cutting. Total employment in the wholesale sector (including the dealers) was therefore about 850 with much of this on a seasonal, part-time basis.

It was difficult to accurately determine the number of commercial fishermen. In order to legally land product, an individual had to have either a land and sell license or a trawler captain's license. There were 651 resident trawler captain and 546 land and sell licenses issued for a probable minimum of 1,197 fishermen. Additional licenses were required for units of gear and/or participation in various fisheries. Since many individuals obtained several such licenses, the totals were not additive. There were 266 shellfish harvester and 338 crabber licenses sold. Presumably, all of these individuals held either a trawler captain or land and sell license as well.

Crewmembers in most fisheries were not required to have any type of license. These included sternmen on crabbing boats, shrimp boat strikers, and crew on offshore fishing boats. In order to estimate total employment for the main fisheries, the following expansion factors were used. The number of crabber licenses was multiplied by 1.5 (total N = 507). Approximately 300 shrimp boats were < 25 ft long. This number was also multiplied by 1.5. For larger boats (about 225), the multiplier was 2.5. Total resident shrimp boat crew (including the captains) was therefore estimated at 1,013.

There were an estimated 73 boats engaged in offshore fishing. Ten boats were primarily trap boats typically operated by a captain and a mate (expansion factor = 2). An estimated four resident boats participated in the surface longline fishery with an average crew of four (including the captain). The expansion factor for the ten bottom longline vessels and four wreckfish boats was 4. Most of the 45 snapper reel/handline boats were fairly small and had a total crew of three (expansion factor = 3). Based on these figures, the estimated total employment on offshore fishing boats was 227, of which 154 were crewmembers.

Total estimated employment in the major fisheries is compared in Fig. 2. The number of unlicensed participants calculated using the above procedures was about 800. Added to those individuals holding either of the two licenses required to land product, total employment in the harvesting sector was approximately 2,000. This applied to resident fishermen only. At certain times of the year, appreciable numbers of transient fishermen were also present.

Fig. 1. Seafood dealer employment.

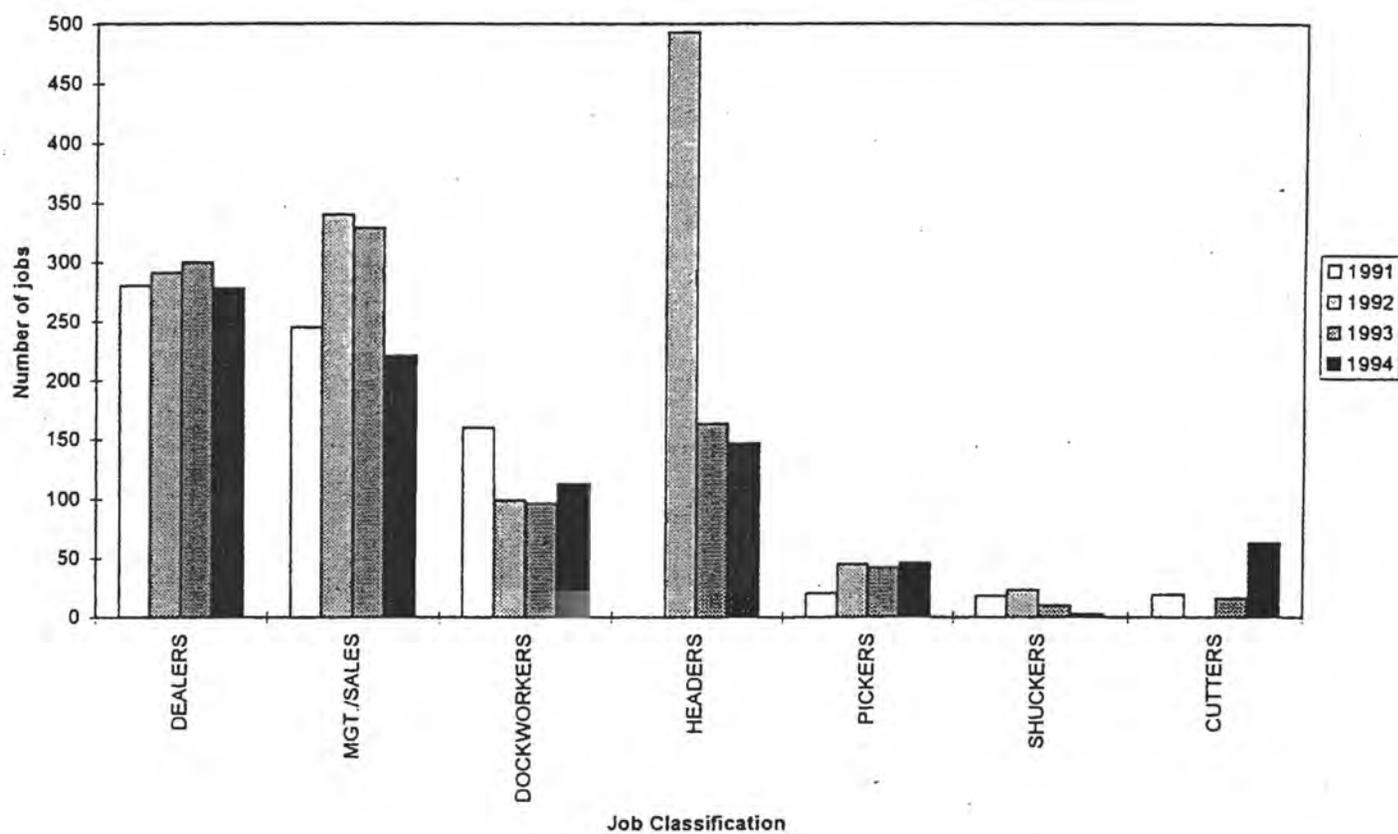
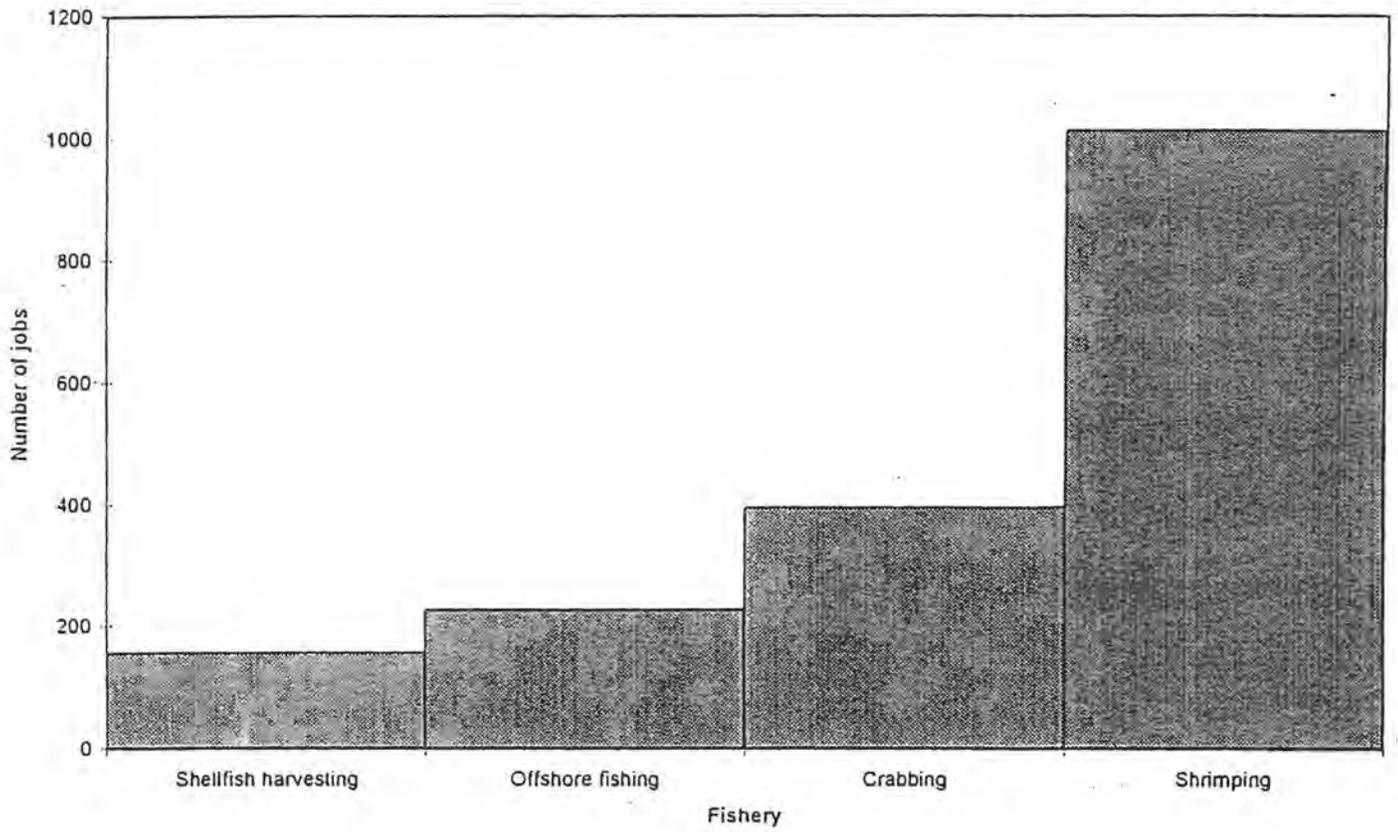


Fig. 2. Commercial fishery employment.



Several small fisheries were not included in these estimates. Gill net licenses sold included recreational fishermen as well as commercial fishermen with no clearcut means of separation. The number of individuals in haul seine crews appeared to vary considerably and the total was unknown.

Total landed volume from wild stocks was 17.609 M pounds. While slightly lower than in the preceding three years, it was nearly identical to the 15-year (1979-1993) average (Fig. 3). The principal factor in the decline was the lowest shrimp production since 1988 with landings 32% below the 1991-1993 average. Shrimp landings, however, were not substantially below the long-term average (Fig. 4).

Landings of shellfish and offshore fish were slightly below those in 1993. Offshore fish production equalled the 15-year average, but shellfish landings were well below it. Landings of coastal and river fish increased slightly in 1994 with coastal fish production relatively good in comparison to the level in recent years. River fish landings, in contrast, were severely depressed. The blue crab catch was well above average and among the largest in the last 15 years.

The total ex-vessel value of 1994's landings was \$27.689 M, slightly higher than in the preceding year. After adjustment for inflation, 1994 value was slightly below the average for the last five years (Fig. 5). Relatively strong shrimp prices were a notable positive factor.

Blue crab was the leading volume contributor in 1994 with 41% of the total landed weight (Fig. 6). Shrimp accounted for 31% and offshore fish contributed 18%. The principal value component was shrimp with 52% of the total, followed by offshore fish with 20% and blue crab with 17%.

South Carolina's commercial seafood industry is heavily dependent upon estuarine resources, including penaeid shrimp, blue crab, oysters, and clams. Inshore fish such as spot, mullet, and flounder spend most of their life in inland areas. Juveniles of several important offshore species, e.g. gag grouper, also inhabit the estuaries, although the extent of their dependence on these areas is not well documented. South Carolina's total seafood production has closely reflected the contribution of estuarine resources, which in 1994 was approximately 13.5 M pounds worth about \$22.0 M.

Nearly half of the state's seafood value production was landed in Charleston County (Fig. 7). Charleston County was the leading producer of shrimp with 1.64 M pounds (heads-off) worth \$7.11 M. Fish landings, mostly of offshore species such as wreckfish, were 1.31 M pounds worth \$2.45 M. Blue crab (3.25 M pounds) was worth \$2.19 M. Most of the state's shellfish production, worth \$1.71 M., came from there. Total landed value was \$13.48 M, an increase of

Fig. 3. Total weight of commercial marine fisheries products.

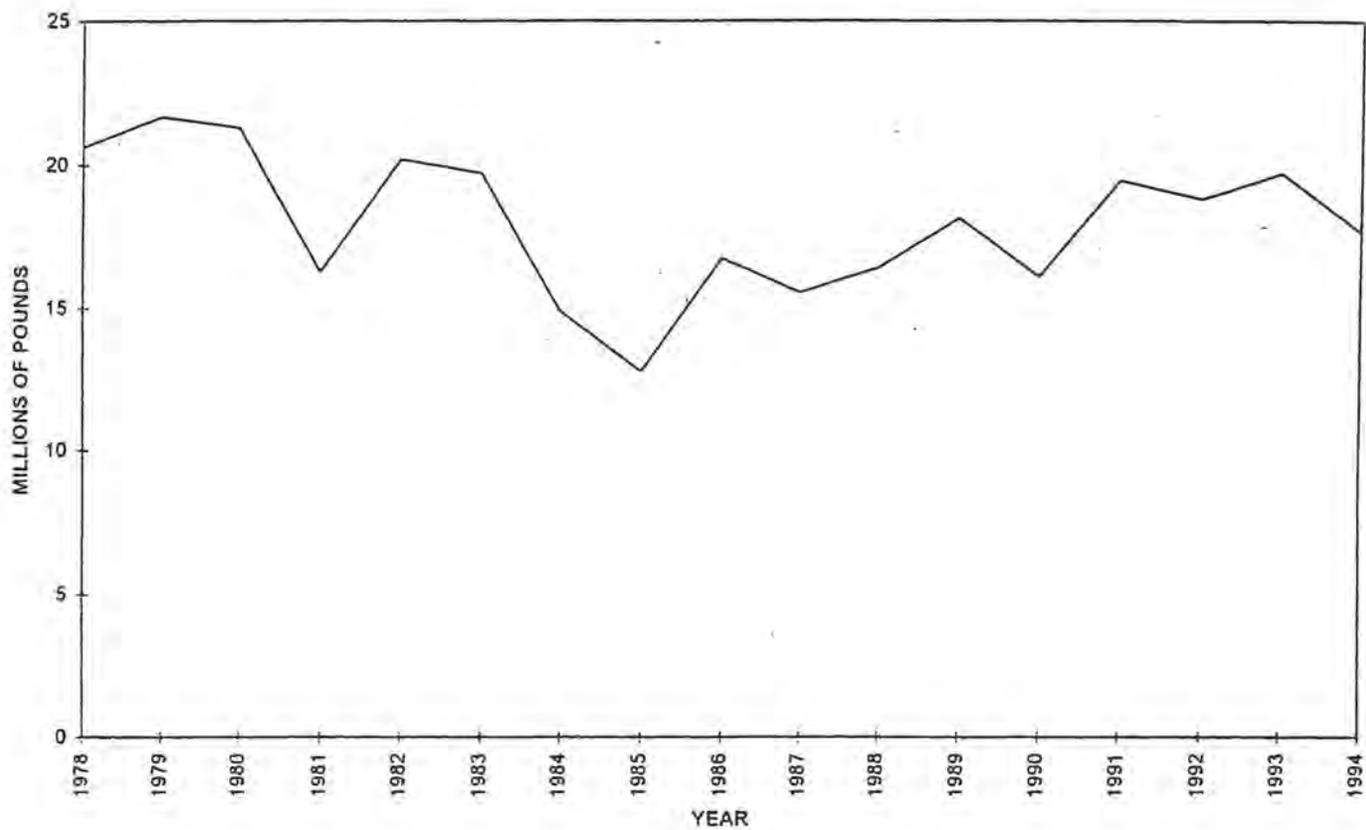


Fig. 4. Production compared to the 1979-1993 averages. Bars indicate percentages of the averages represented by the 1994 landings.

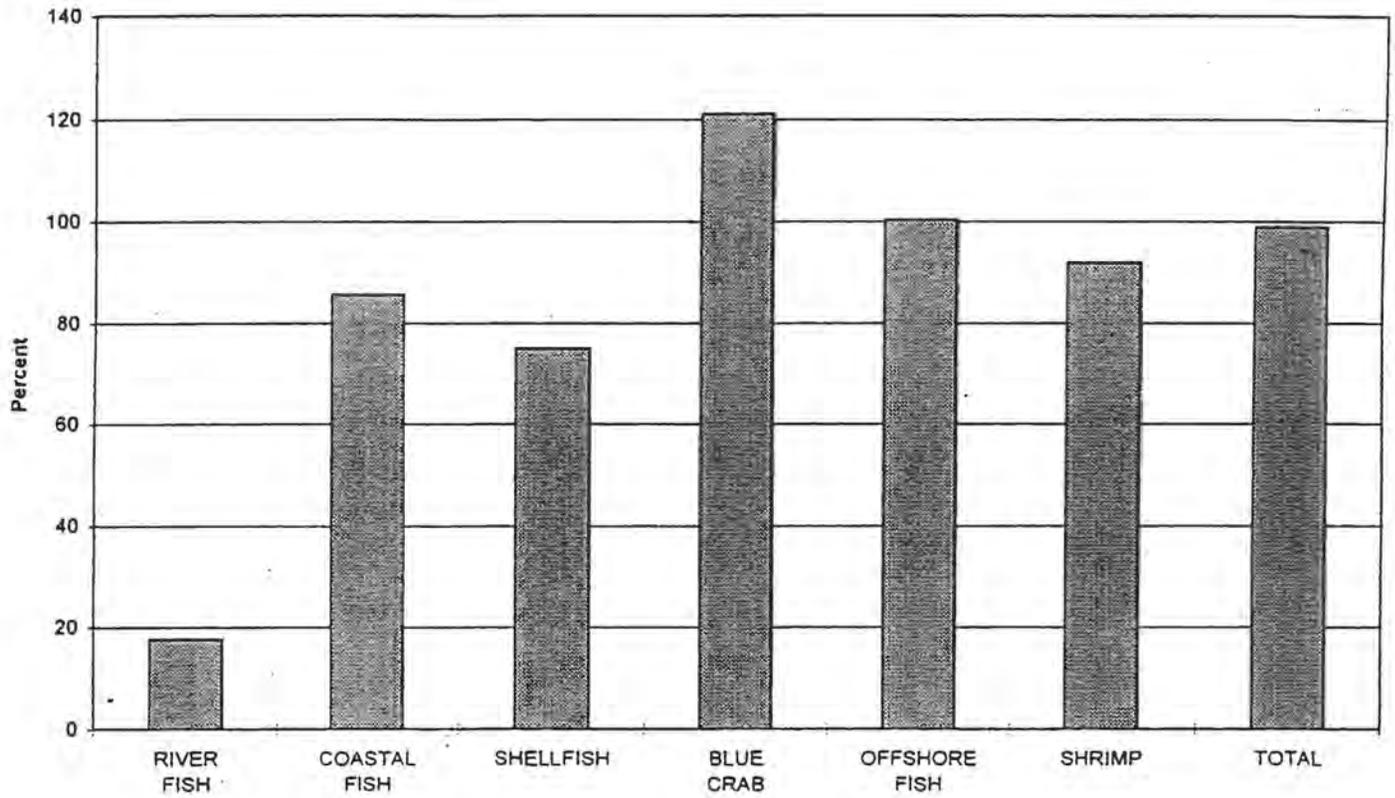


Fig. 5. Total ex-vessel value adjusted for inflation in current dollars.

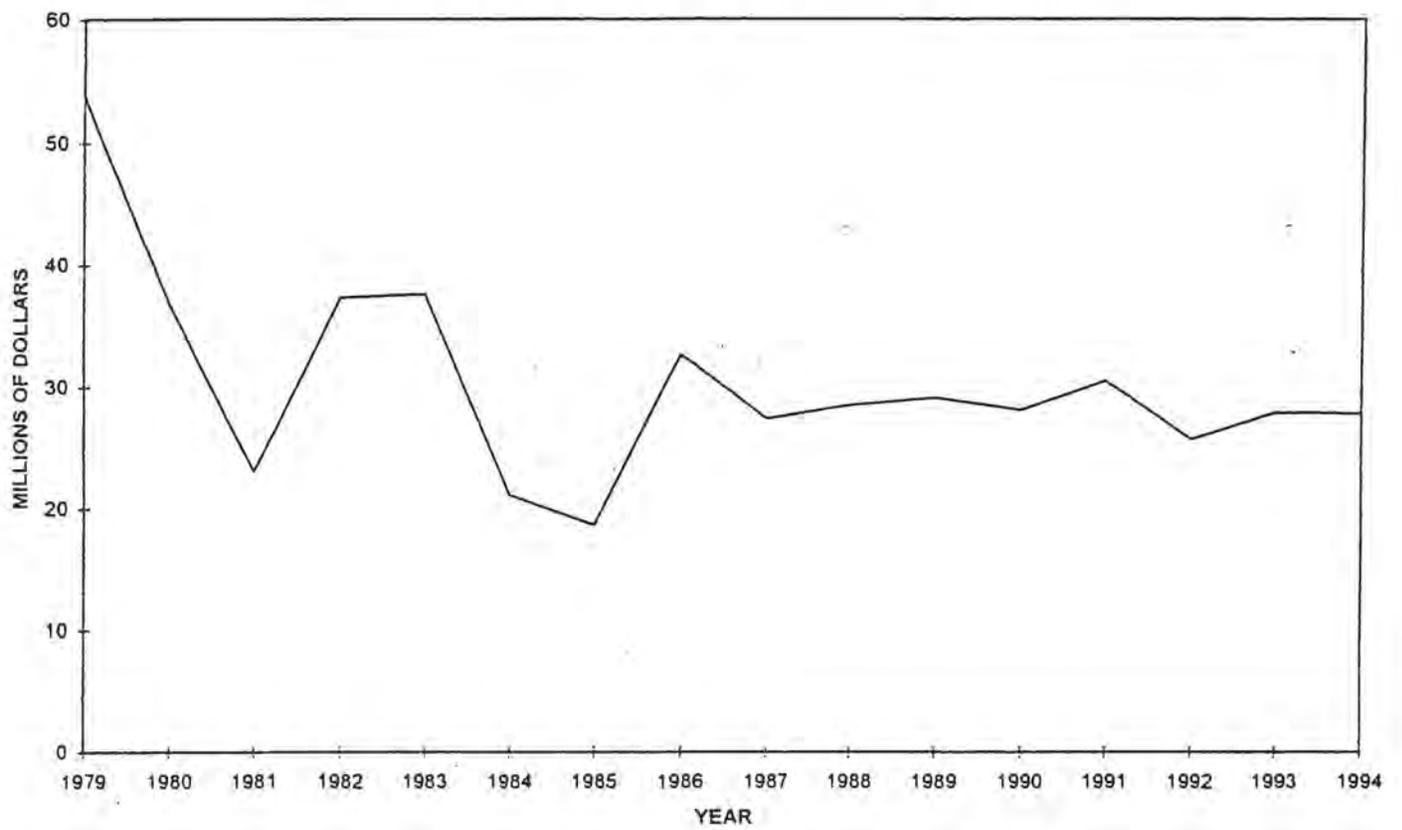


Fig. 6. Weight and value composition of commercial landings in 1994.

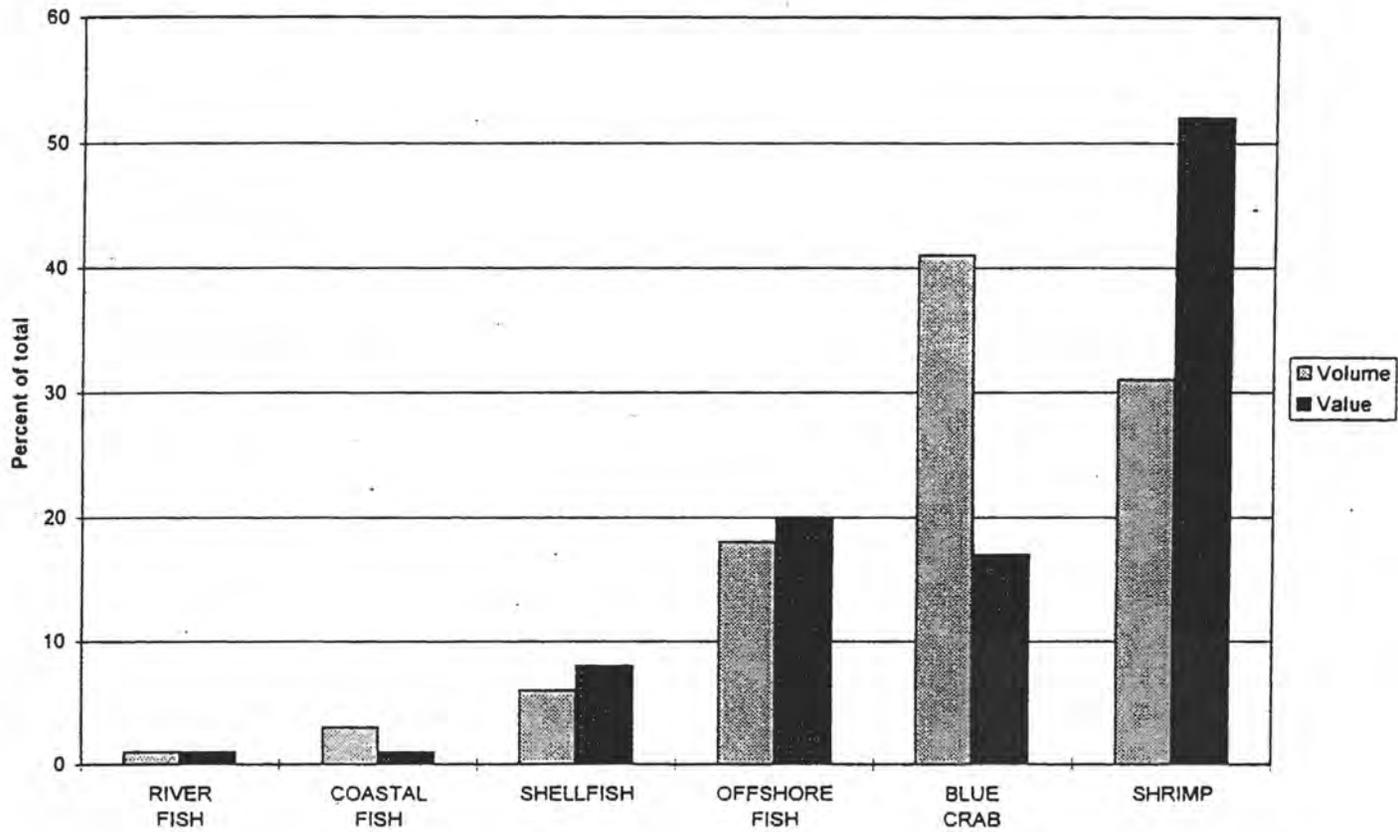
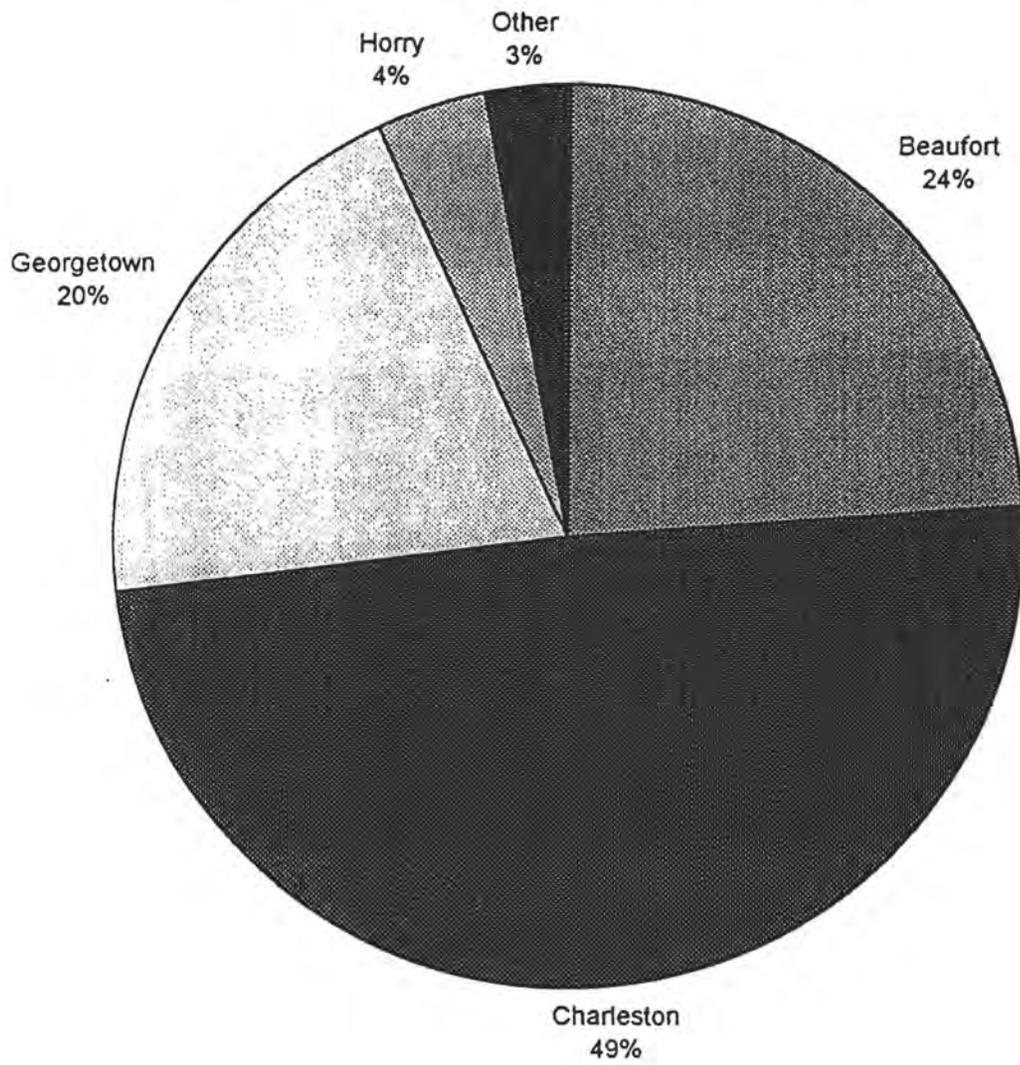


Fig. 7. County distribution of landed value.



over 20% from that in 1993.

In contrast, Beaufort County's production declined in value about 17% to \$6.78 M. The drop was attributable to shrimp with 0.91 M pounds (heads-off) worth \$3.92 M landed. Blue crab volume (3.35 M pounds) was down slightly, but value (\$2.26 M) was considerably higher. Shellfish production declined slightly in volume and value (\$0.51 M) compared to 1993's figures.

Georgetown County dealers reported \$5.41 M worth of product, slightly less than in the previous year. The major contributors were shrimp (0.76 M pounds worth \$2.76 M) and fish (1.35 M pounds worth \$2.19 M).

Other counties accounted for minor amounts of product. Horry County's haul seine fishery contributed most of the state's production of spot and mullet, although both species had a low unit value. Landings of higher-valued offshore fish there were also appreciable. Total production, nearly all of which was fish, was worth \$1.22 M, up about 22% from that in 1993.

SHRIMP

Penaeid landings were 5.419 M pounds (heads-on) worth \$14.559 M. Brown shrimp landings (1.598 M pounds) were 19% below the 15-year average, while white shrimp production (3.809 M pounds) was about average (Fig. 8). Aggregate landed value (after adjustment for inflation) continued the flat trend in recent years with the highest unit price since 1988 offsetting reduced production (Fig. 9).

Water temperatures from late December through early February were considerably colder than in recent years. During January, the water temperature in Charleston Harbor was below the critical level (47 degrees F) for six consecutive days. Historically, cold spells of this duration have caused substantial mortality of overwintering shrimp and the impact on the 1994 population appeared to be no exception.

Abundance of white shrimp in April was much lower than in the preceding three years. April was unusually dry and relatively warm. By late April, white shrimp were relatively large and many were in the advanced stages of ovarian maturation. Movement into the ocean and spawning occurred fairly early and the trawling season was opened on May 26.

Early season catch rates of white shrimp were very low and the total landings of roe shrimp (91,000 pounds heads-on) were far below the exceptional harvests in 1991-1993. Nevertheless, spawning was considered adequate for average fall production.

The summer and fall were among the wettest on record. The heavy rains prompted some early outmigration and August landings

Fig. 8. Annual commercial landings (heads-on) of shrimp.

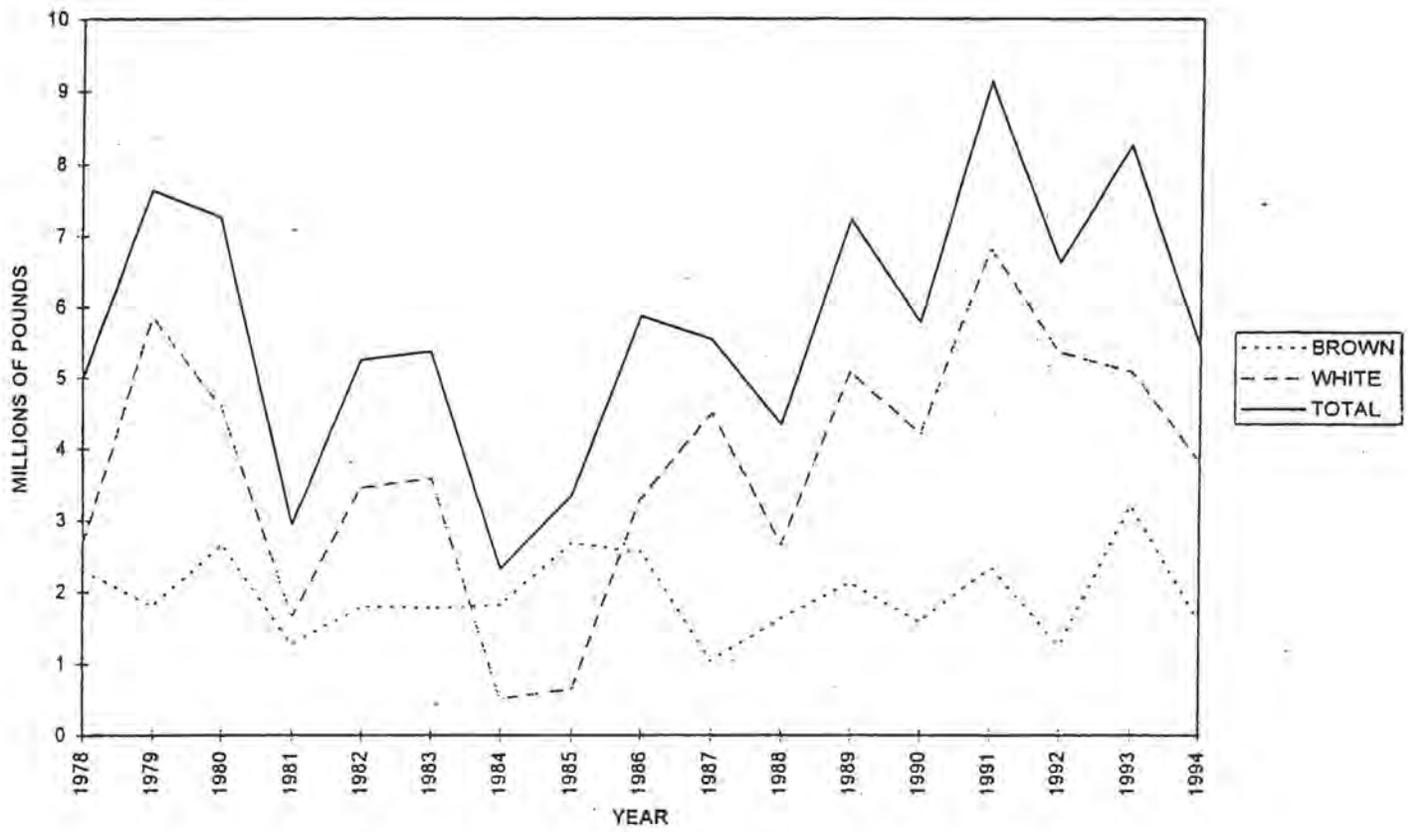
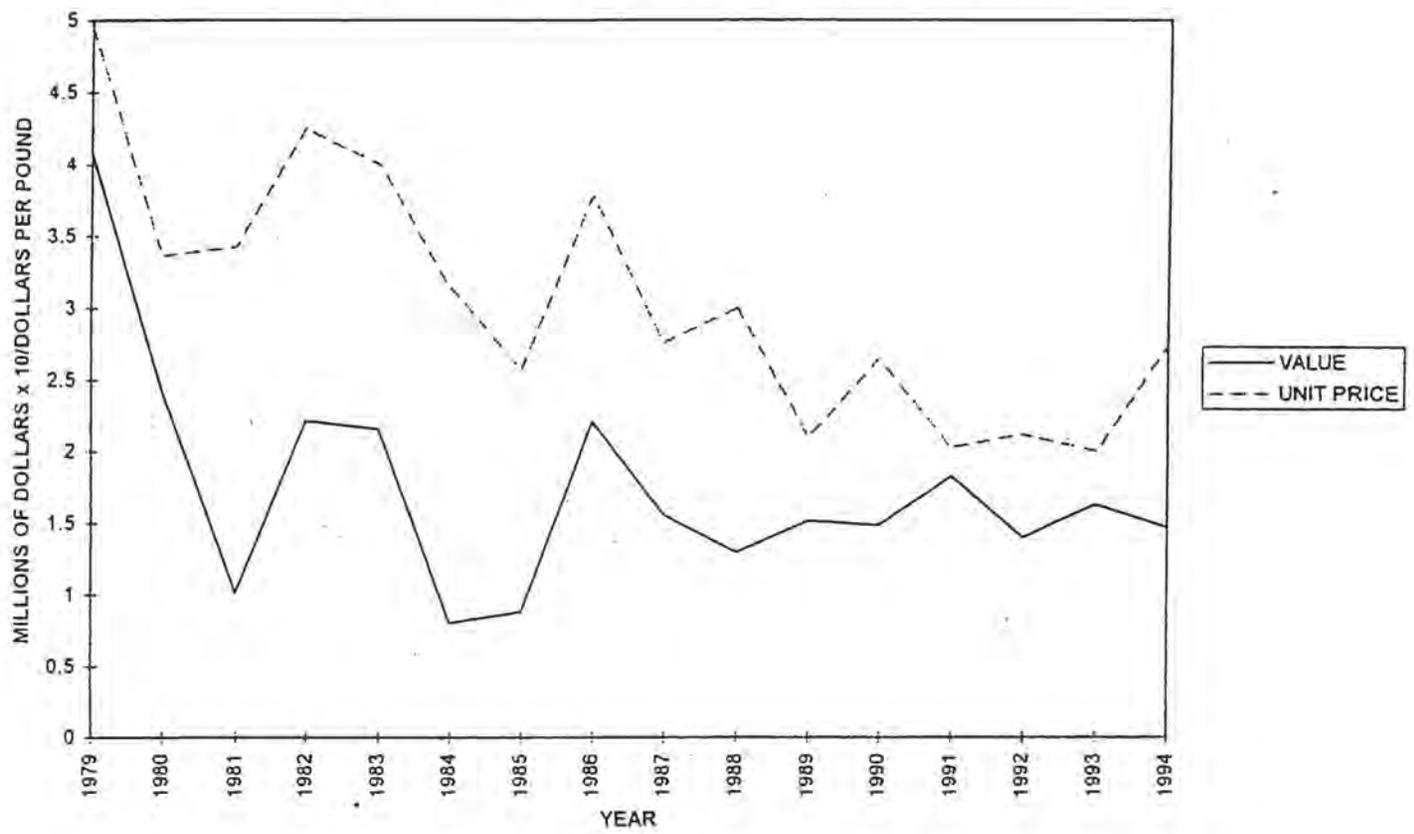


Fig. 9. Annual inflation-adjusted ex-vessel value and unit price of shrimp.



(428,000 pounds heads-on) were well above average. The overall fall white shrimp catch was somewhat below average. The trawling season remained open until January 27, due to mild conditions and continuing availability of modest quantities of shrimp.

Winyah Bay was opened to channel netting and trawling from September 28-November 21, but N. Santee Bay was kept closed, due to small size of the shrimp there. Channel net production (218,000 pounds heads-on) was relatively good.

The recreational baiting fishery has expanded into a major competitor for the fall white shrimp crop. Permit sales were 13,366 with estimated effort of 70,429 trips. This fishery also fared relatively poorly with an estimated total catch of 1.91 M pounds (heads-on), about one-third of the total fall white shrimp landings. This was identical to the baiters' average share since 1987. Their in-season area shares were roughly comparable to those in 1993, except in the vicinity of Beaufort and Georgetown, where the baiting shares were much lower than average (Low 1995).

The number of resident trawler licenses (N = 540) declined slightly from that in 1993. The decrease in nonresident licenses (N = 269) was considerably larger (-12%).

CRAB

Pot fishermen produced 7.017 M pounds of hard blue crab worth \$4.668 M. Minor amounts were landed in the winter trawl fishery and by shrimp trawlers. Abundance of both juvenile and adult crabs was above average in April sampling and the total landings were the largest since 1979 (Fig. 10).

The number of licensed crabbers continued to edge upward (Fig. 10), perhaps in response to a large increase in unit value. The average price/pound for potted hard crab was \$0.67, by far the highest on record. This was primarily responsible for the large increase in total value (Fig. 11).

SHELLFISH

The spring season closed for oysters on May 14 and for clams on May 31. Spring oyster production was 52,000 bu. worth \$621,000, down slightly from 1993's harvest. The fall season opened for clams on September 1 and oysters on October 1. Fall oyster landings were 39,000 bu. valued at \$408,000. Both total volume and value of oysters declined slightly from 1993's figures (Fig. 12). About 37% of the total oyster production came from state shellfish grounds. The average price per bushel (\$11.18) remained the same as in 1992 and 1993.

Clam production increased 31% in volume and 34% in value over 1993's level (Fig. 13). Escalator landings remained about the same with the increase attributable to hand/tong/rake harvest.

Fig. 10. Annual commercial landings of blue crab and number of crab pot licenses.



Fig. 11. Annual inflation-adjusted ex-vessel value and unit price of blue crab.

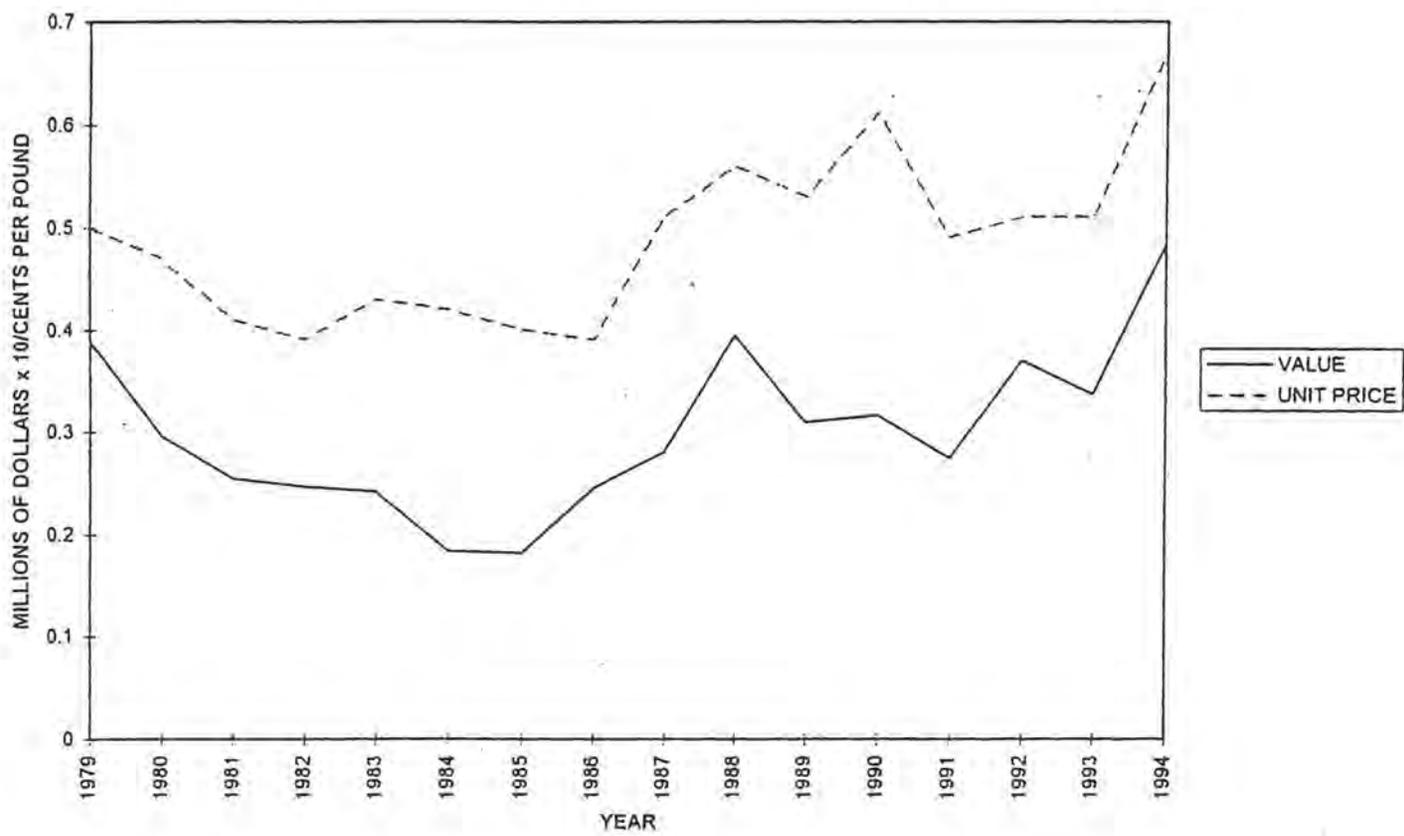


Fig. 12. Annual commercial landings and inflation-adjusted ex-vessel value of oysters.

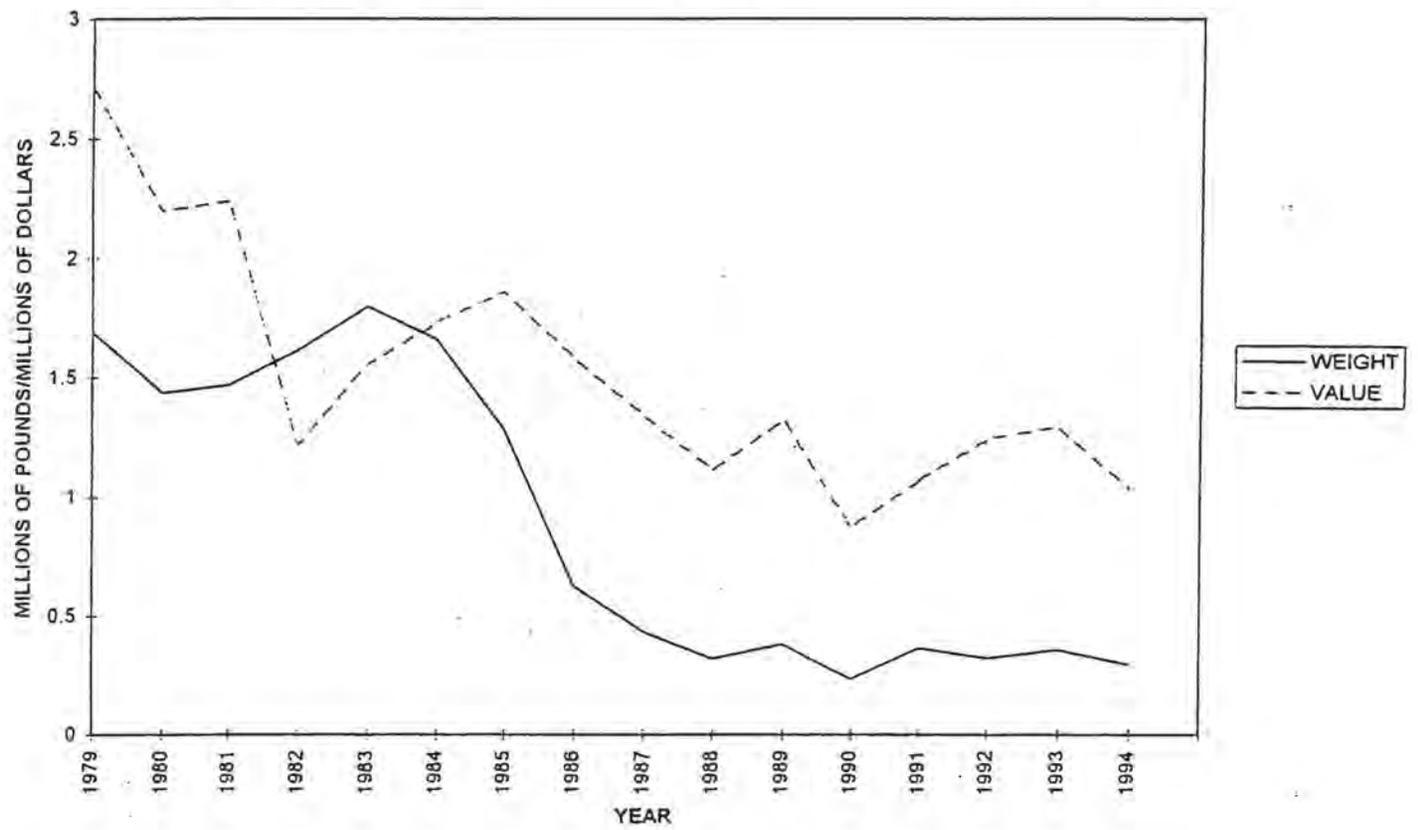
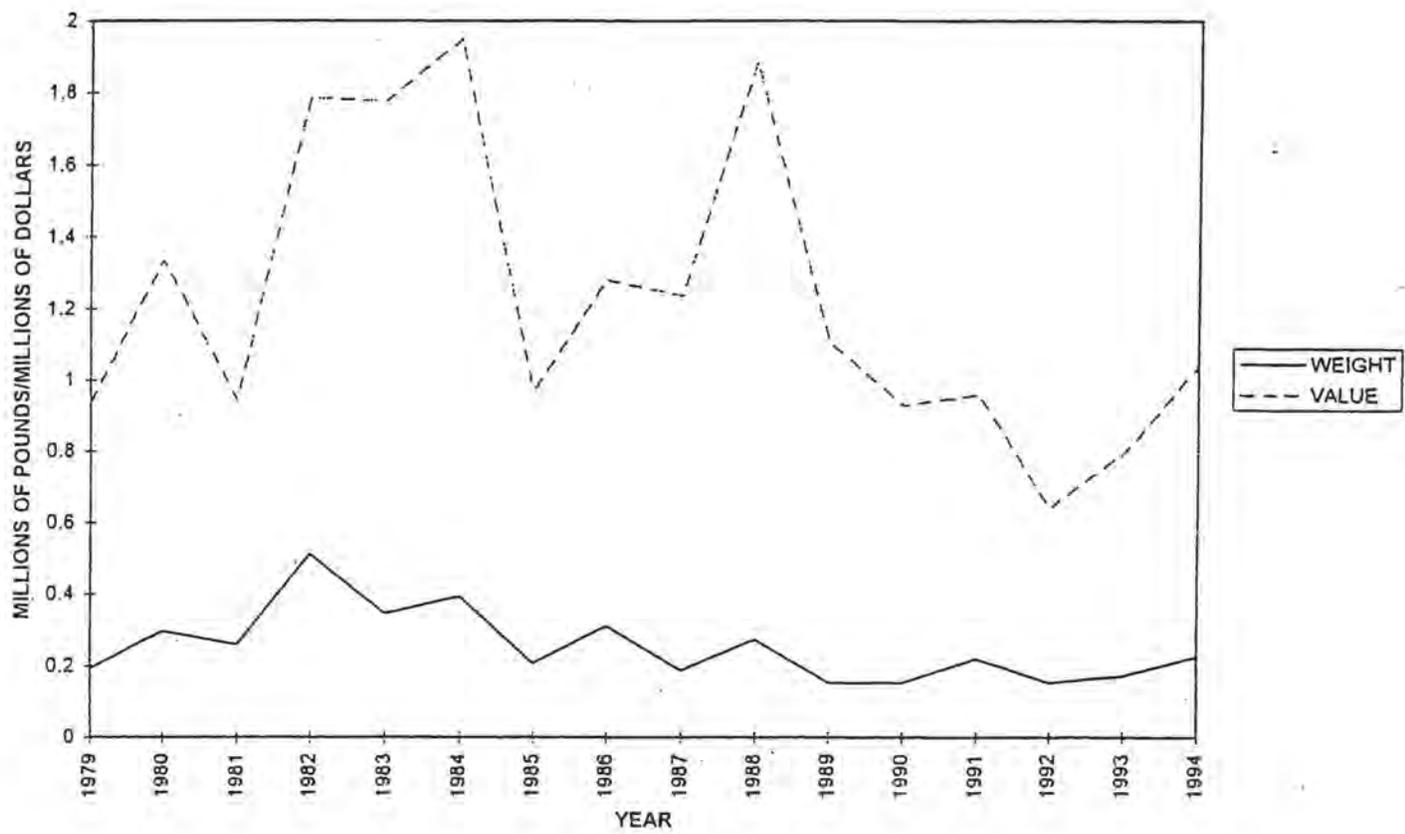


Fig. 13. Annual commercial landings and inflation-adjusted ex-vessel value of clams.



Whelk trawling opened on February 14 and closed on May 3, a shorter season (by three weeks) than in 1993. Production was 26,487 bu. (530,000 lbs of meats) with a total landed value (about \$238,000) close to the 1993 figure.

OFFSHORE FISH

Offshore finfish fisheries are managed under several South Atlantic Fishery Management Council (SAFMC) plans. Boats landing some species are required to submit detailed trip and landings data to the NMFS. Since 1980, the state has operated a voluntary trip ticket system to monitor landings. A port sampling program to collect length measurements from fish of priority species has been conducted more or less continuously since 1977.

The NMFS Trip Interview Program (TIP), which collects both detailed trip information and length measurements, was initiated in South Carolina in 1983. During 1994, catches were sampled at 12 docks and trip data were obtained from 41 boats. A total of 113 trips was sampled, including 53 snapper reel, 28 wreckfish, 18 trap, ten bottom longline, and four troll trips.

Offshore fish production continued to decline gradually (Fig. 14) with decreases in most species and gear categories. Wreckfish landings, the largest volume contributor, were about the same as in 1993. Aggregate grouper landings were down about 8% and snapper production was off 15%. Major declines occurred for king mackerel (- 43%) and sharks (- 48%). Landings of porgies were the lowest to date. Moderate increases were reported for black sea bass (+ 30%) and swordfish (+ 50%). Leading volume categories (Fig. 15) were wreckfish (20%), groupers (19%), and pelagics (including swordfish and king mackerel, 16%).

Total ex-vessel value (\$5.451 M) remained virtually unchanged after adjustment for inflation (Fig. 14). The leading value contributors (Fig. 15) were groupers (\$1.328 M), pelagics (\$1.309 M), and wreckfish. Compared to 1993's unadjusted figures, landed value of pelagics increased about 23%, due mainly to a large increase in swordfish landings. Wreckfish remained about the same, while groupers declined 5%.

The principal source of offshore fish landings was the handline fishery, which had three components: 1) a snapper reel fishery for reef fish, 2) a deepwater reel fishery for wreckfish, and 3) a troll fishery targeted at king mackerel. Aggregate landings in the three were 2.126 M pounds worth \$3.623 M. Both volume and value declined slightly from the 1993 figures.

The snapper reel fishery was the largest offshore fishery in terms of participation and landings. Participants included full-time commercial boats, opportunistic charterboats, and casual part-time fishermen who landed small amounts. Although the latter often used rod and reel gear, their landings were counted with the

Fig. 14. Annual commercial landings and inflation-adjusted ex-vessel value of offshore fish.

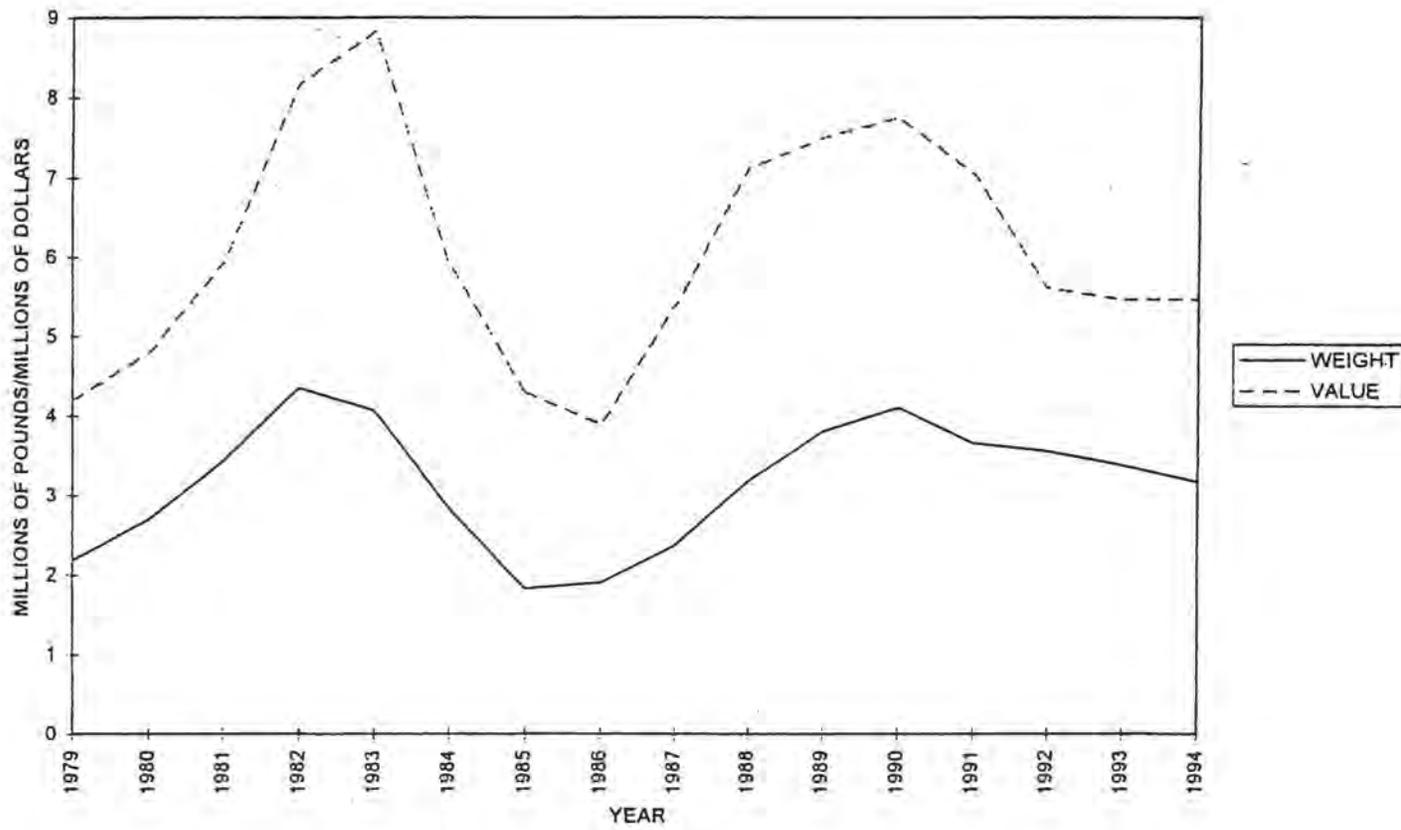
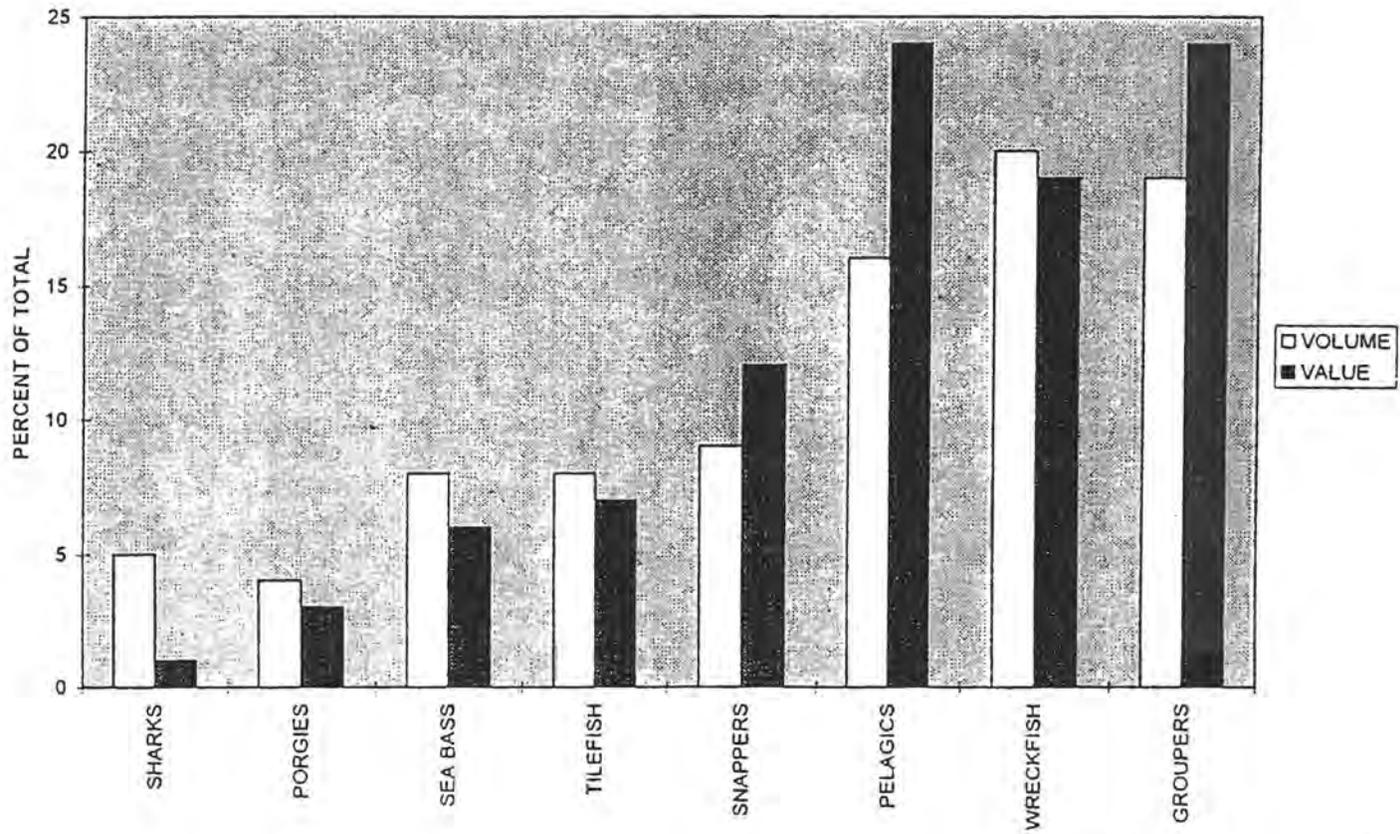


Fig. 15. Landings of major offshore fish groups in volume and value.



snapper reel figures.

A federal permit was required to land reef species, although not all permitted boats actually fished. Based on permit files, vessels submitting fish tickets, and boats identified by dealers, the estimated active snapper reel fleet was about 45 boats.

Ticket landings represented 18% of the total snapper reel landings with 21 boats reporting 371 trips and an average catch per trip (CPUE) of 703 pounds gutted weight. Based on this value and total reported landings, the estimated total effort was 1,900 trips.

Total landings in the snapper reel fishery were 1.486 M pounds worth \$2.557 M. Both volume and value continued the gradually declining trend in recent years (Fig. 16). About 88% of the catch consisted of reef fish. The principal volume components were gag grouper (22%) and vermilion snapper (15%). Percentages of both species have remained constant for the last three years.

Total reef fish landings for all gears were 1.794 M pounds worth \$3.020 M, the lowest volume since 1987. Roughly 75% in each category was accounted for by the snapper reel fishery. One-third of the landed volume consisted of groupers (primarily gag). Miscellaneous species (e.g. amberjack, triggerfish, and grunts) represented 17%. Snappers were 16% and black sea bass composed 13%. Porgies were 7%.

Total grouper landings were 588,000 pounds (the lowest since 1988) worth \$1.328 M. Ninety percent was attributable to the snapper reel fishery with gag (327,000 pounds) and scamp (146,000 pounds) the major species. Gag landings equalled the 1981-1993 average, while scamp landings continued to be relatively large by historical standards.

The average size of gag landed in 1994 was 71.6 cm TL. Fig. 17 illustrates contemporary size distribution compared to that prior to the build-up of the commercial fishery. The annual average size has declined gradually, but steadily. The length distribution of scamp continued the truncated pattern of recent years with the mean size (FL = 54.9 cm) slightly larger than in 1993. Compared to the size distribution at the beginning of the expansion of the commercial fishery off South Carolina, contemporary sizes were much smaller (Fig. 18).

The most important snapper species landed was vermilion snapper with 219,000 pounds worth \$463,000. Both volume and value declined from the 1993 level. Practically all of the catch was taken by the snapper reel fishery. The majority of the fish were close to the 12 inch (30 cm) minimum size limit (Fig. 19). Average size (TL = 36.1 cm) was slightly less than in 1993.

Fig. 16. Annual landings and inflation-adjusted ex-vessel value of the snapper reel fishery.

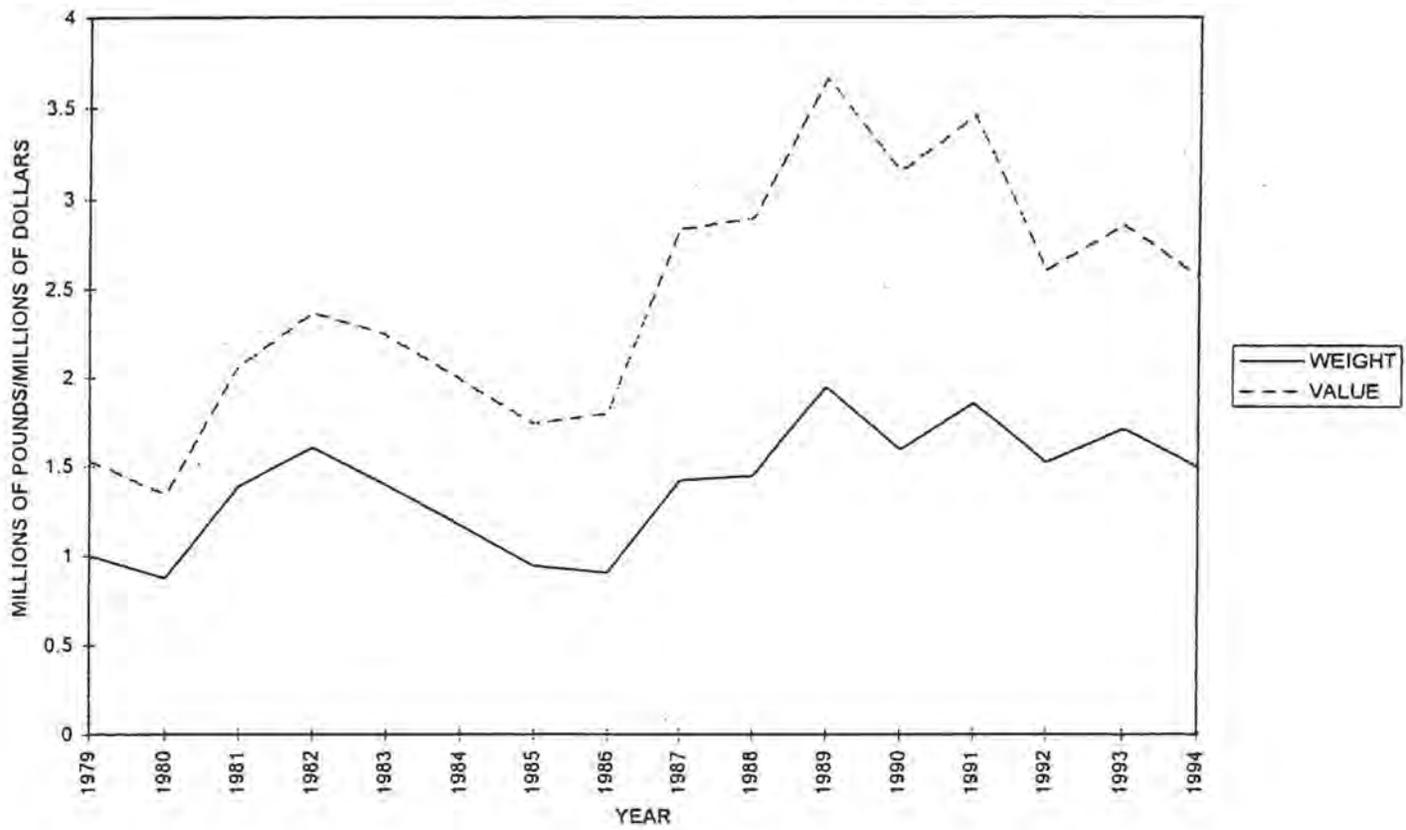
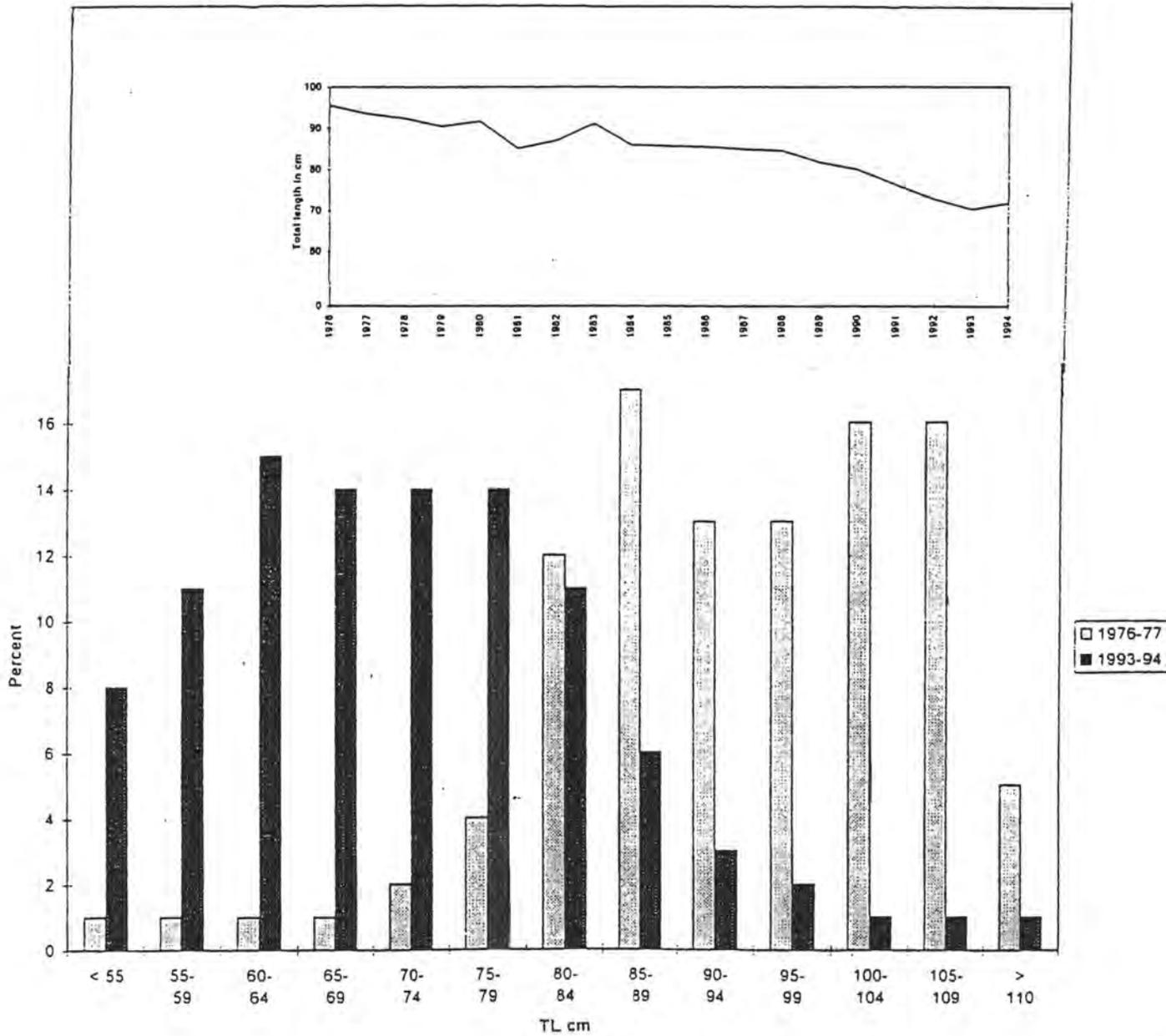


Fig. 17. Length distribution of commercially landed gag.



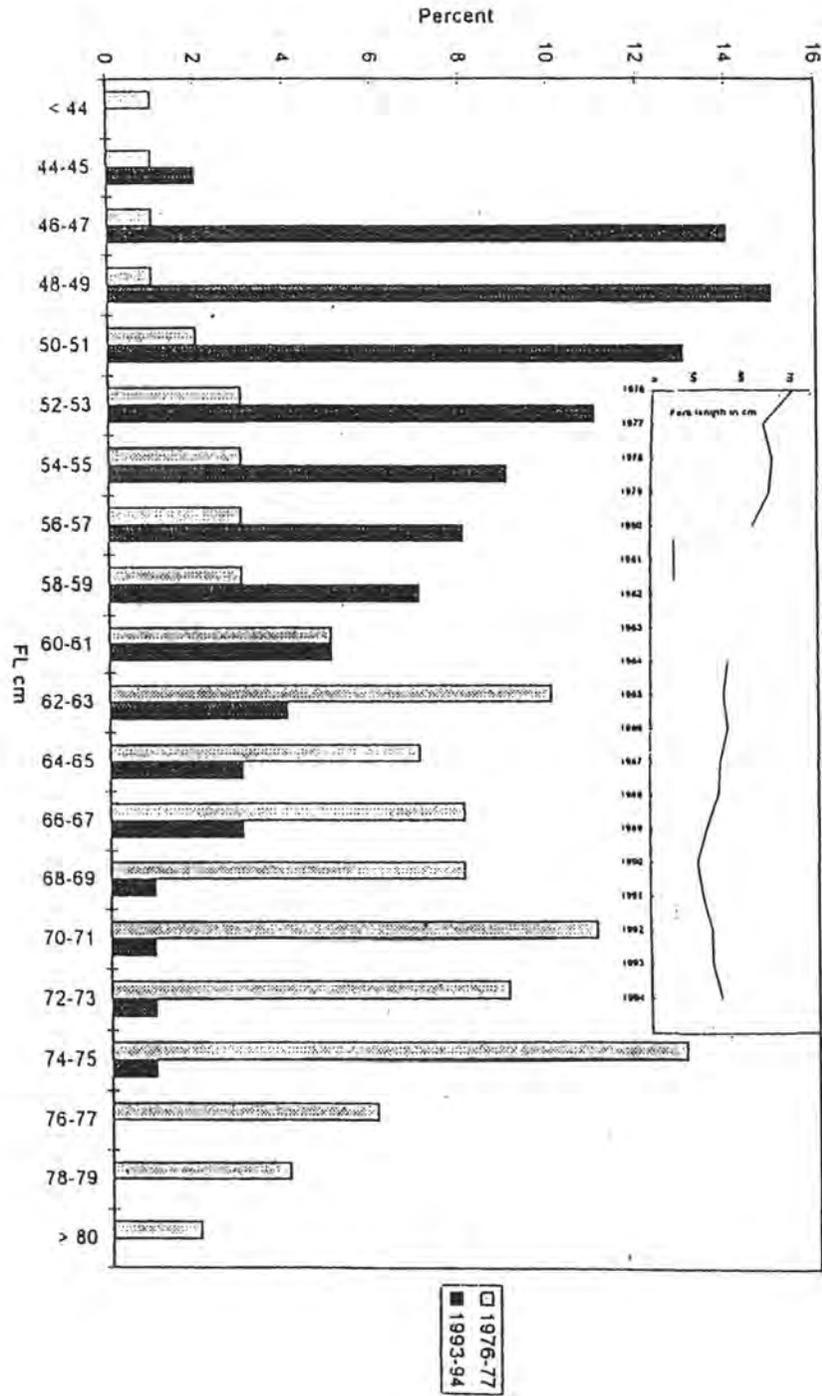
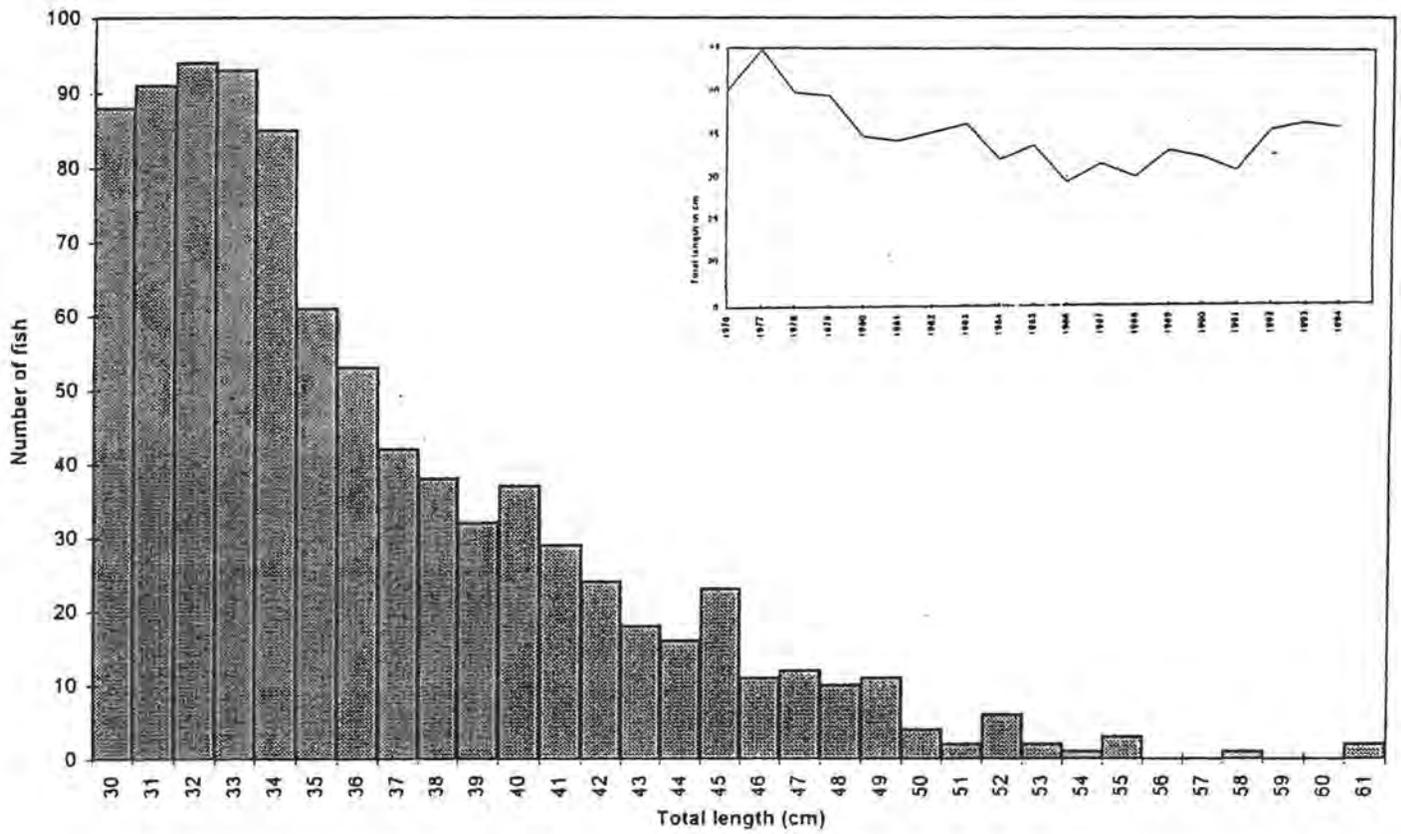


Fig. 18. Length distribution of commercially landed scamp.

Fig. 19. Length distribution of commercially landed vermillion snapper in 1994.



Landings of red snapper continued their highly variable trend with a 31% decrease from the 1993 volume (Fig. 20). Length distribution is shown in Fig. 21. The average size (TL = 58.2 cm) was about 8% larger than in 1993. Both this and the size distribution suggested that the increased minimum size limit was beginning to enhance the relative abundance of larger fish.

Historically, the red porgy was one of the largest components of the reef fish biomass, contributing > 25% of the overall landed volume (of reef species) until 1981. In 1994, the contribution to snapper reel landings was only 7% and the catch (108,000 pounds) was the lowest to date (Fig. 22). The average size was 35.7 cm, nearly identical to that in 1993. This species appears to be one of the most severely overfished, as is evident in the contemporary vs historical size distributions (Fig. 23).

Wreckfish landings were confidential, because only two dealers reported them in South Carolina. The season was closed during the January 15 - April 15 spawning period. The average CPUE from fish ticket data (85 trips) was about 6,700 pounds/trip, slightly less than in 1993. Length distribution (Fig. 24) was very similar to that in previous years and the average size (TL = 98.7 cm) remained virtually unchanged.

The directed troll fishery was very small in 1994 with only a few full-time boats, reflecting in part a scarcity of fish during much of the season. Many of the landings were attributable to charterboats. King mackerel was the principal species, although trolling accounted for less than half of the total catch of this species. Total king mackerel landings were 92,000 pounds worth \$141,000, down very appreciably from the 1993 level. Fishermen reported that this species was scarce off South Carolina during May through September (recreational CPUE was down significantly during this period also). Length distribution (Fig. 25) was typical of that in recent years.

Most of the landings of other pelagic species were attributable to the surface longline fishery. Swordfish was the principal species targeted and taken. Landings were confidential and, though up considerably from those in 1993, remained very low by historical standards. Yellowfin tuna, dolphin, and sharks comprised most of the remaining catch. Yellowfin landings were lower than in recent years, while the dolphin catch continued to increase. Aggregate surface longline landings of all species were 456,000 pounds worth \$1.074 M. Effort was not estimated, because of insufficient trip ticket observations.

The bottom longline fishery landed 393,000 pounds worth \$509,000. Both volume and value were the lowest since 1991. The principal species were sharks (98,000 pounds), golden tilefish (151,000 pounds), blueline tilefish (69,000 pounds), and snowy grouper (53,000 pounds). No major producers, except for one shark

Fig. 20. Annual commercial landings of red snapper.

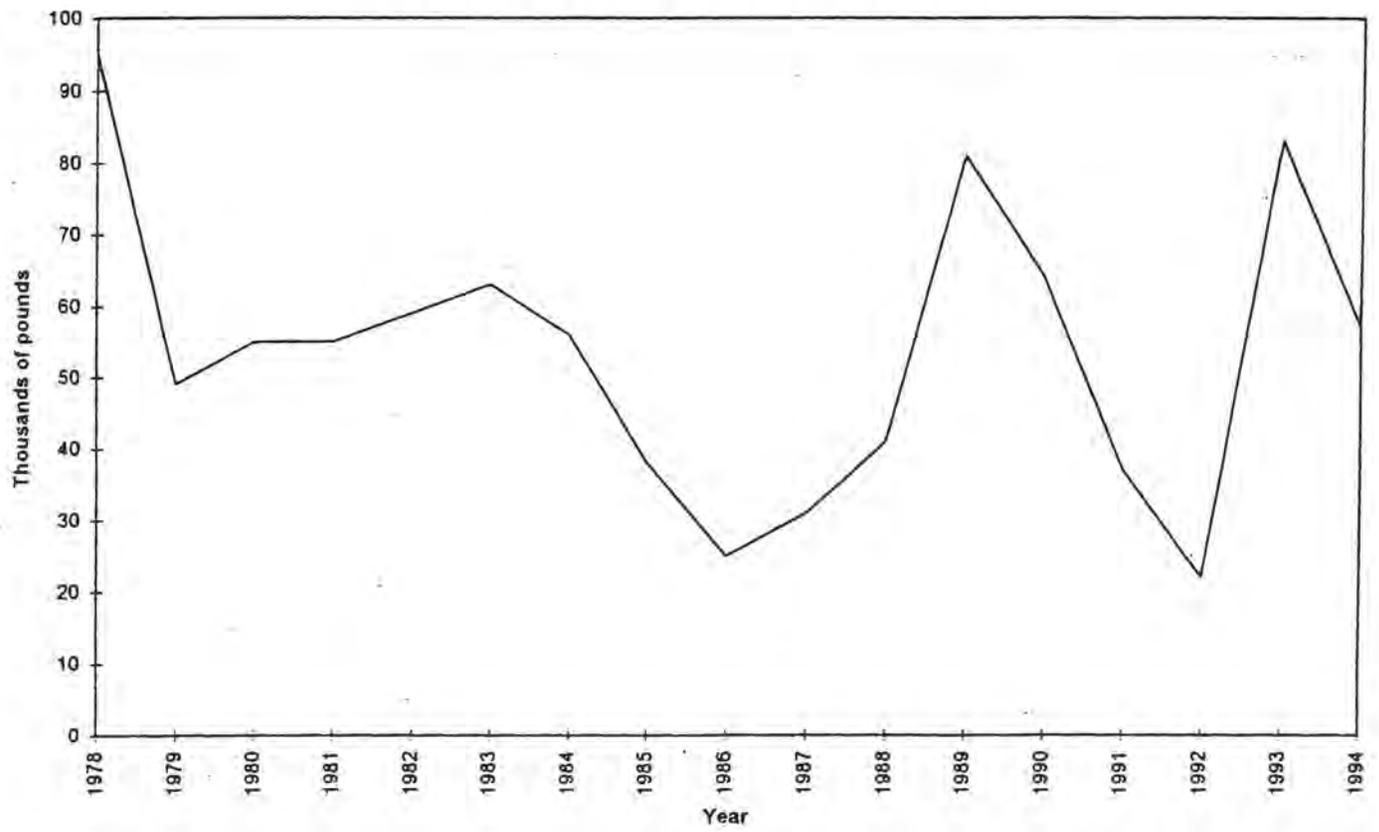


Fig. 21. Length distribution of commercially landed red snapper in 1994.

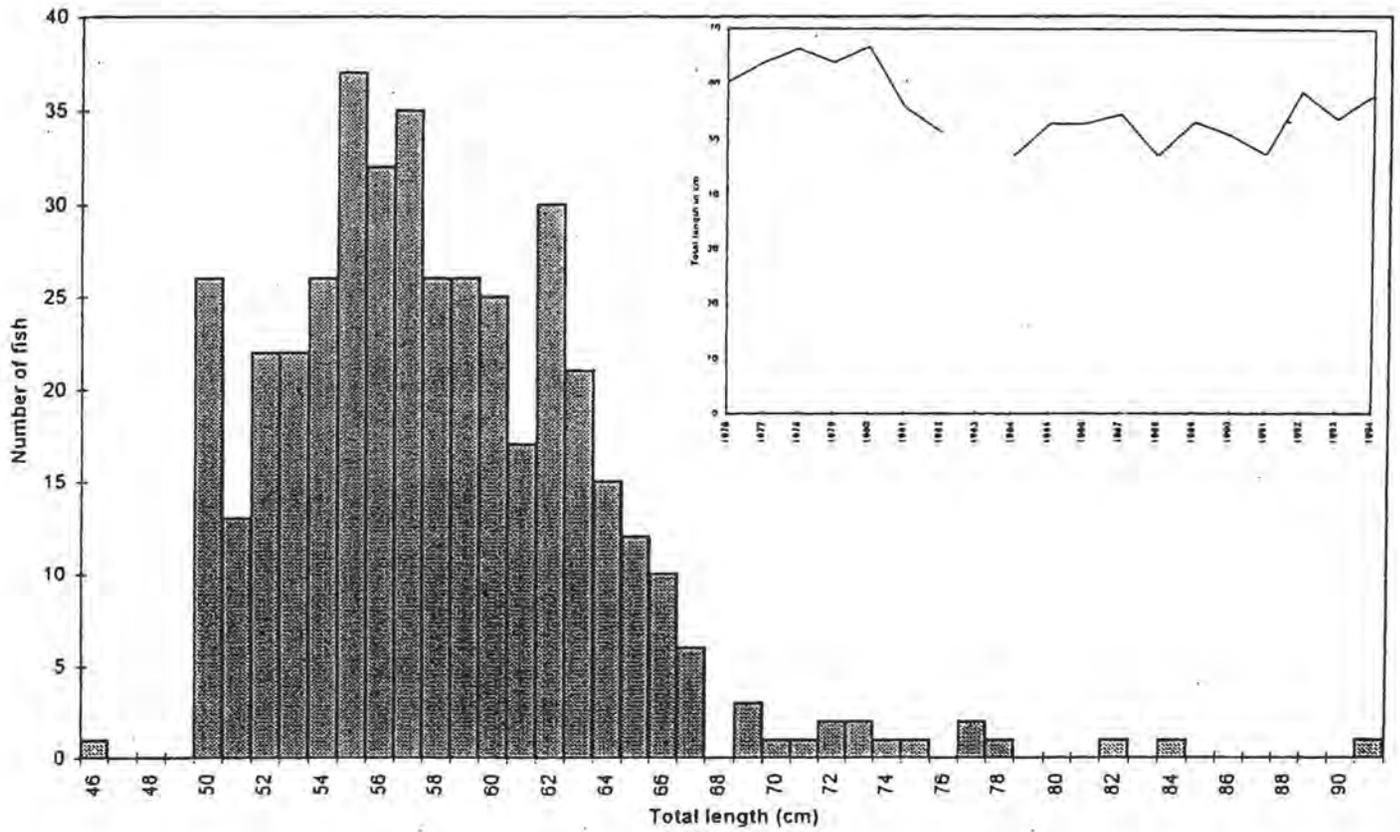


Fig. 22. Annual handline landings of red porgy.

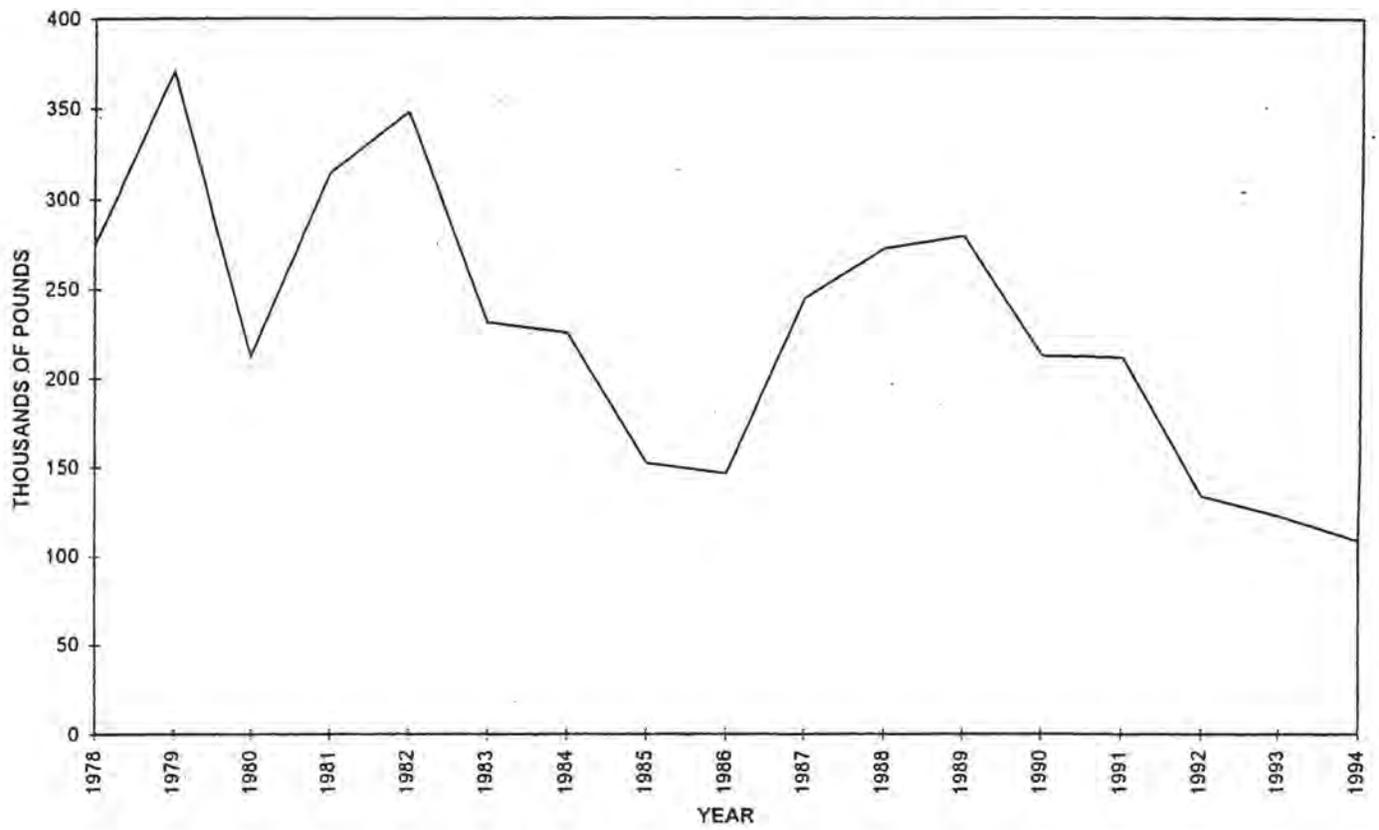


Fig. 23. Length distribution of commercially landed red porgy.

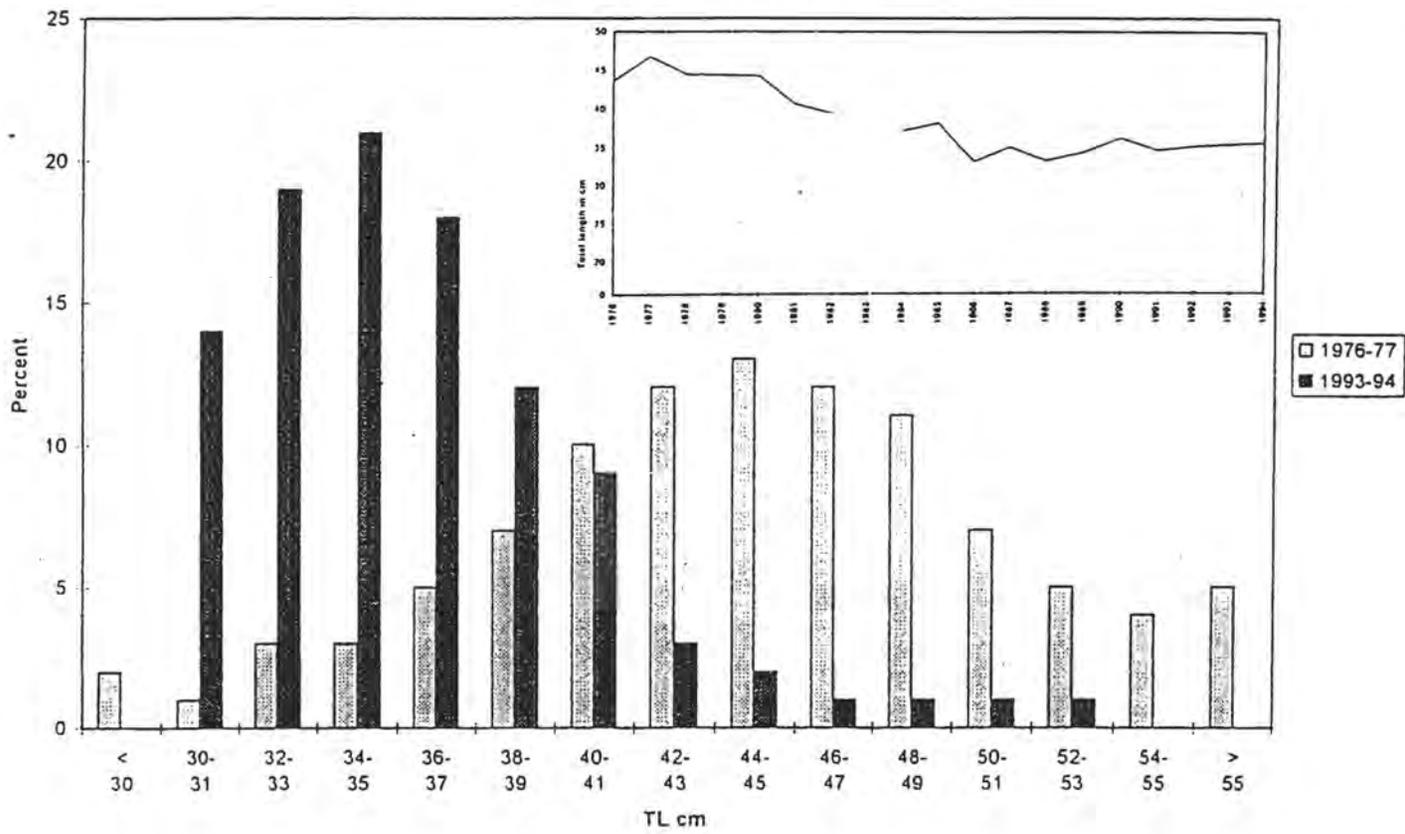


Fig. 24. Length distribution of wreckfish in 1994.

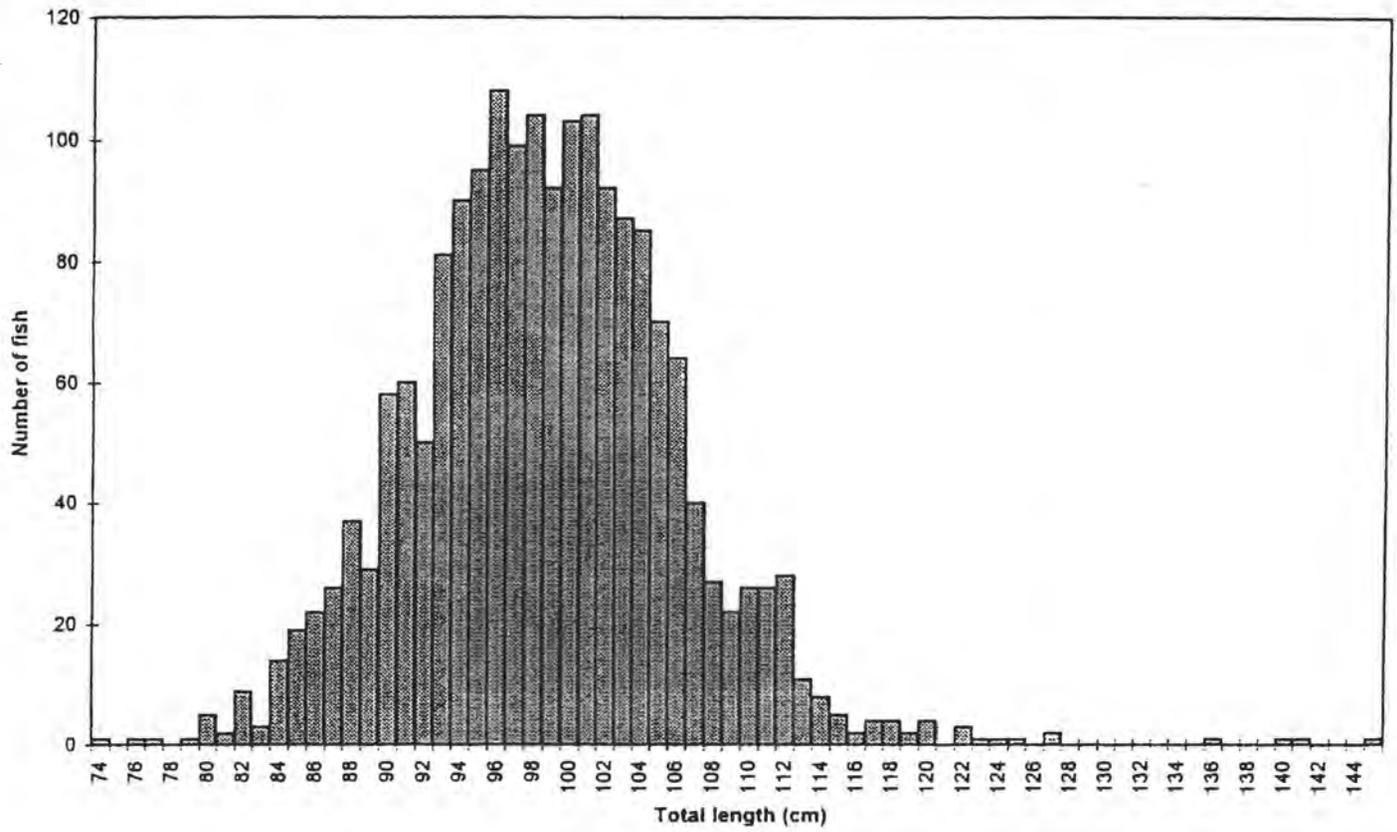
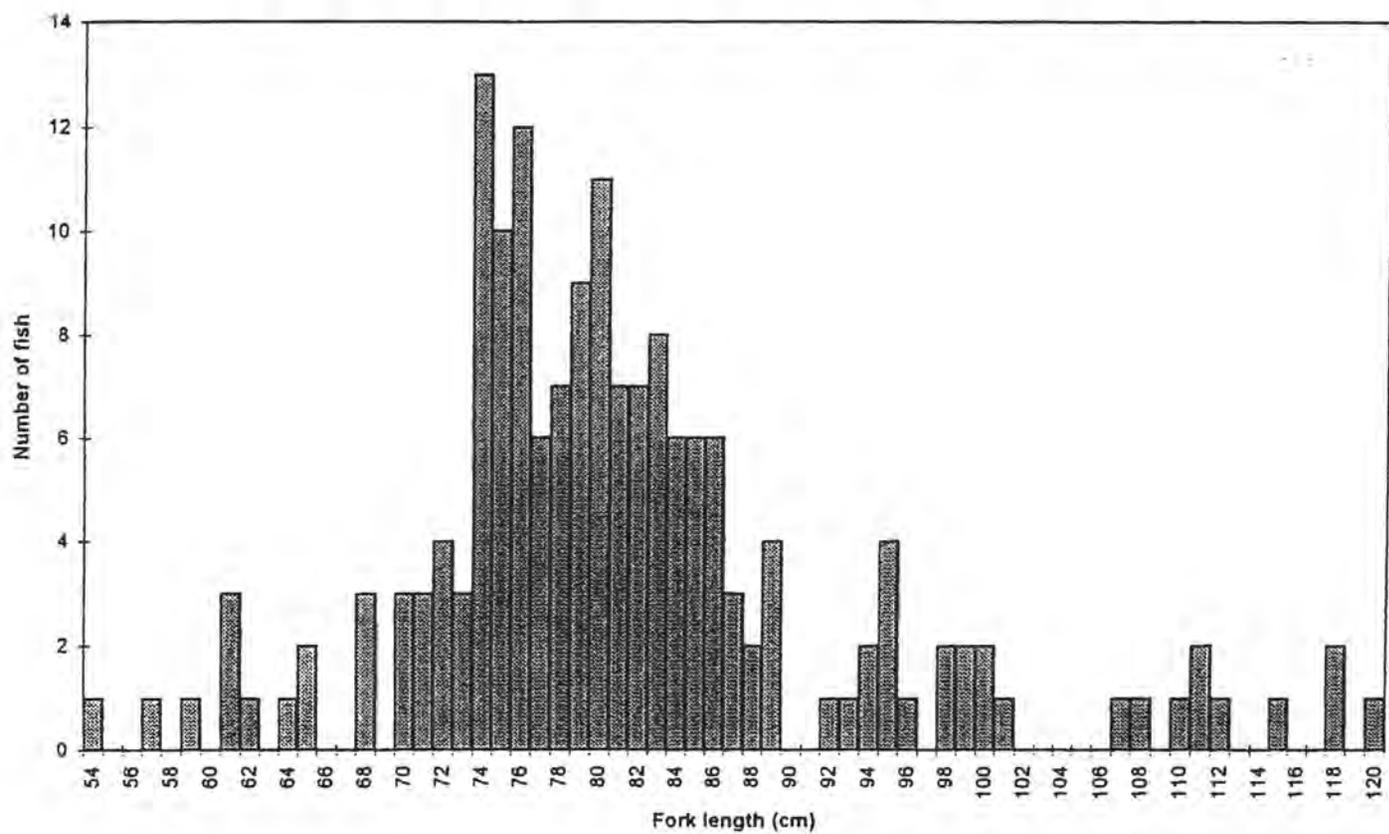


Fig. 25. Length distribution of commercially landed king mackerel in 1994.



boat, were on the ticket system in 1994, which made estimation of effort speculative.

Shark landings were only 39% of those in 1993. Large coastal species appeared to comprise most of the catch, which averaged 1,240 pounds (carcass weight)/trip in 1994. This was 35% lower than in 1993. Estimated effort was 59 trips, 56% fewer than in the previous year. The fishery for the large coastal group was subjected to several closures (May 17-June 30, August 10-31, and November 4-December 31) to avoid exceeding the regional quotas.

Total offshore landings of sharks were 159,000 pounds (including adjustment for fin landings), half of the previous year's catch. The bottom longline fishery contributed 62%, surface longline fishery 25%, and the handline fishery the remaining 13%.

An estimated 331 bottom longline trips were targeted at tilefish and/or grouper. The average aggregate CPUE was only 801 pounds/trip, less than half of the 1993 figure. CPUE probably was underestimated, and effort therefore overestimated, because only 20 trips were reported by ticket (5% of the volume landed). The golden tilefish catch by bottom longliners was down 23%, while that of blueline tilefish was the largest since 1986. Snapper reel landings of golden tilefish (23,000 pounds) were the largest since 1981, when longline gear was introduced. Total snowy grouper landings (53,000 pounds longline, 22,000 pounds handline) were the lowest since 1980.

Length distribution of golden tilefish is shown in Fig. 26. The average size (FL = 56.9 cm) increased slightly from that in 1991-1993. Compared to the size distribution at the beginning of the directed fishery in 1980-1981, most of the fish landed in recent years have been small. (Total length and fork length are nearly equivalent for this species.)

Length distribution of snowy grouper is shown in Fig. 27 (26% of the sample was from snapper reel catches). The average size (TL = 50.9 cm) was among the smallest to date.

The other significant offshore fishery was the trap fishery for black sea bass. Total landings (not including octopus) were 190,000 pounds (\$249,000), of which 88% were black sea bass. CPUE (all species) was 882 pounds/trip with an estimated total effort of 221 trips, considerably higher than in 1993.

Length distribution of trapped fish is shown in Fig. 28. About 41% of the graded sea bass catch consisted of small (< 0.75 pound) fish, the lowest percentage since 1983. The average size, 29.5 cm TL, was slightly smaller than in 1993. Total sea bass landings were 237,000 pounds worth \$330,000, about average for recent years (Fig. 29).

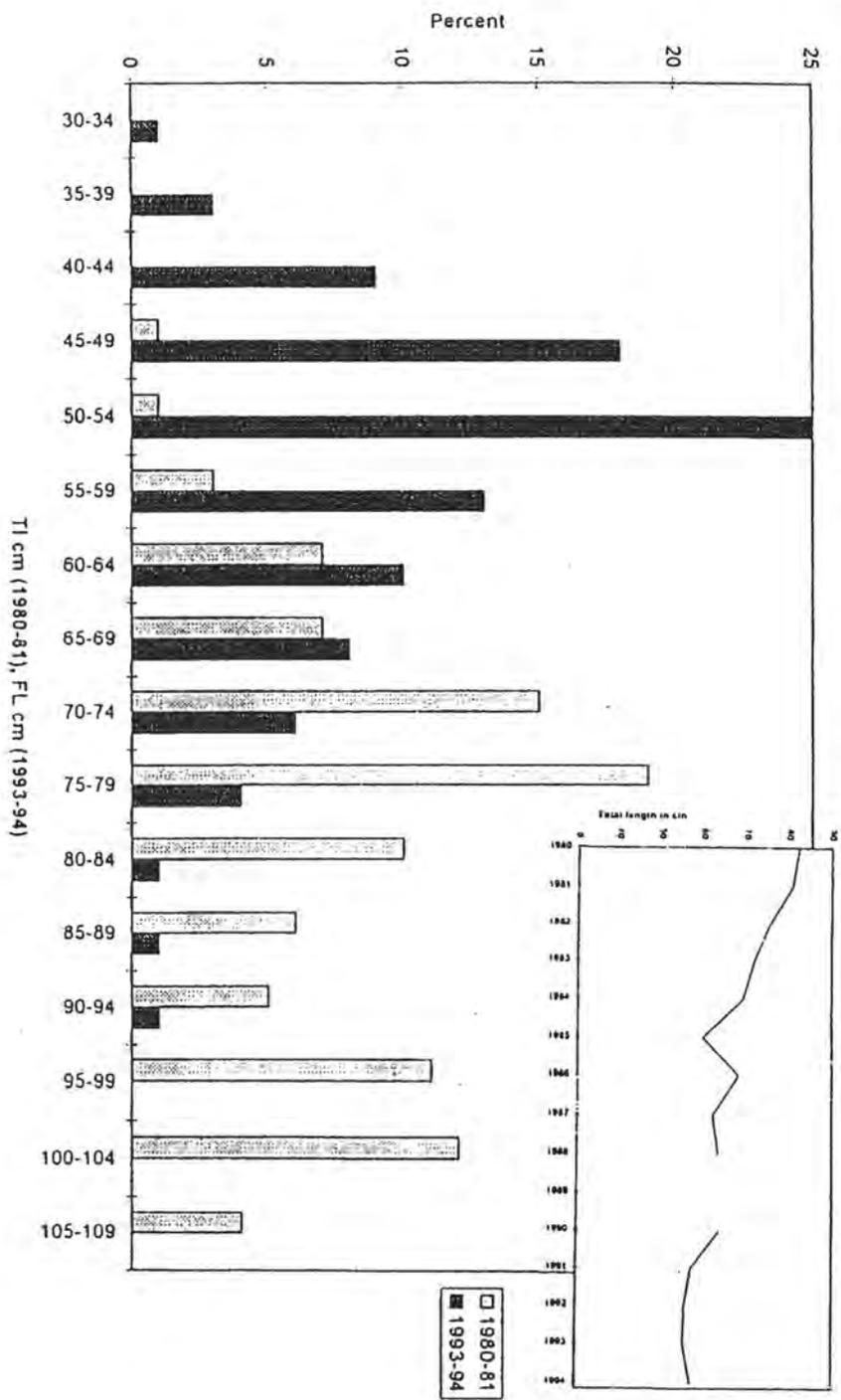


Fig. 26. Length distribution of golden tilefish.

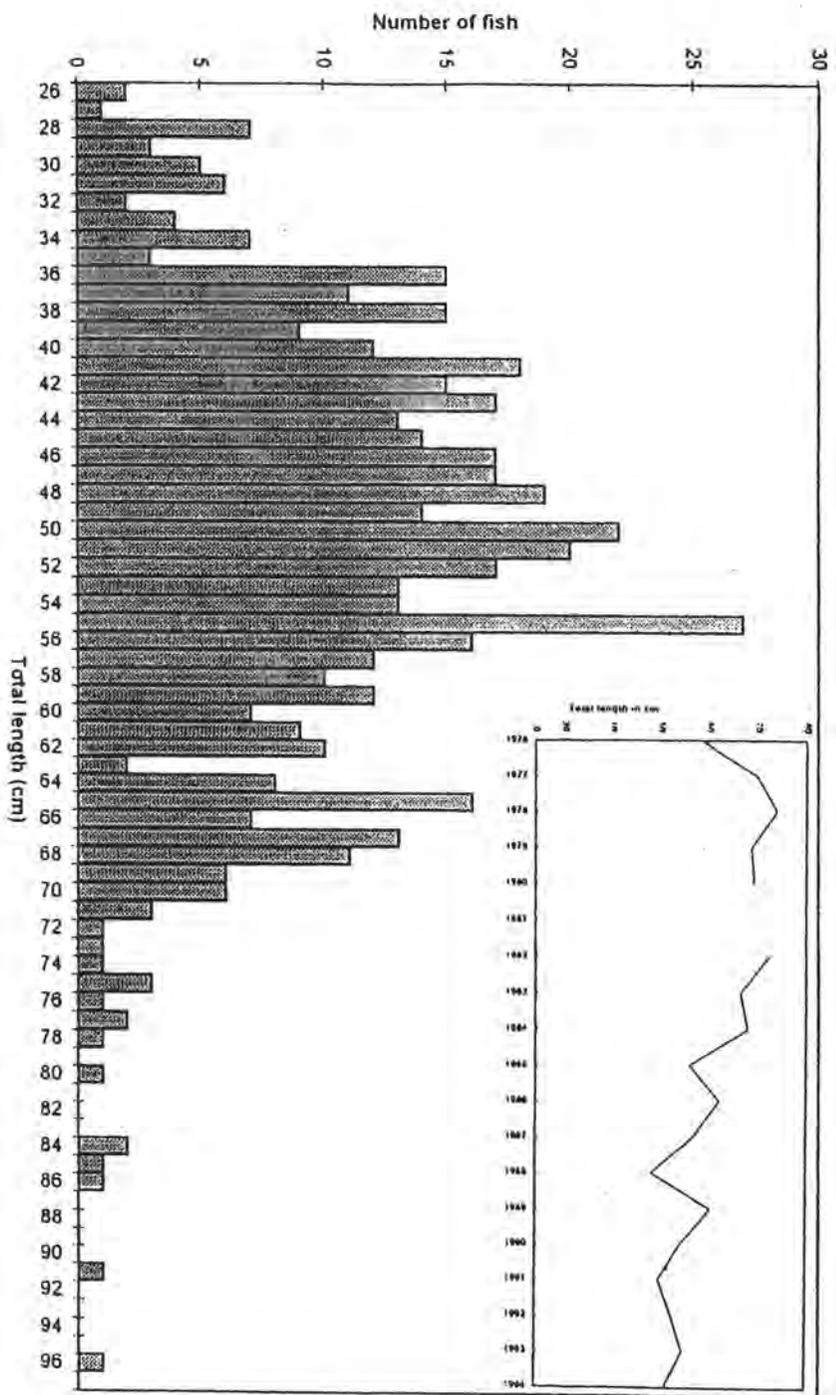


Fig. 27. Length distribution of snowy grouper in 1994.

Fig. 28. Length distribution of trap-caught black sea bass in 1994.

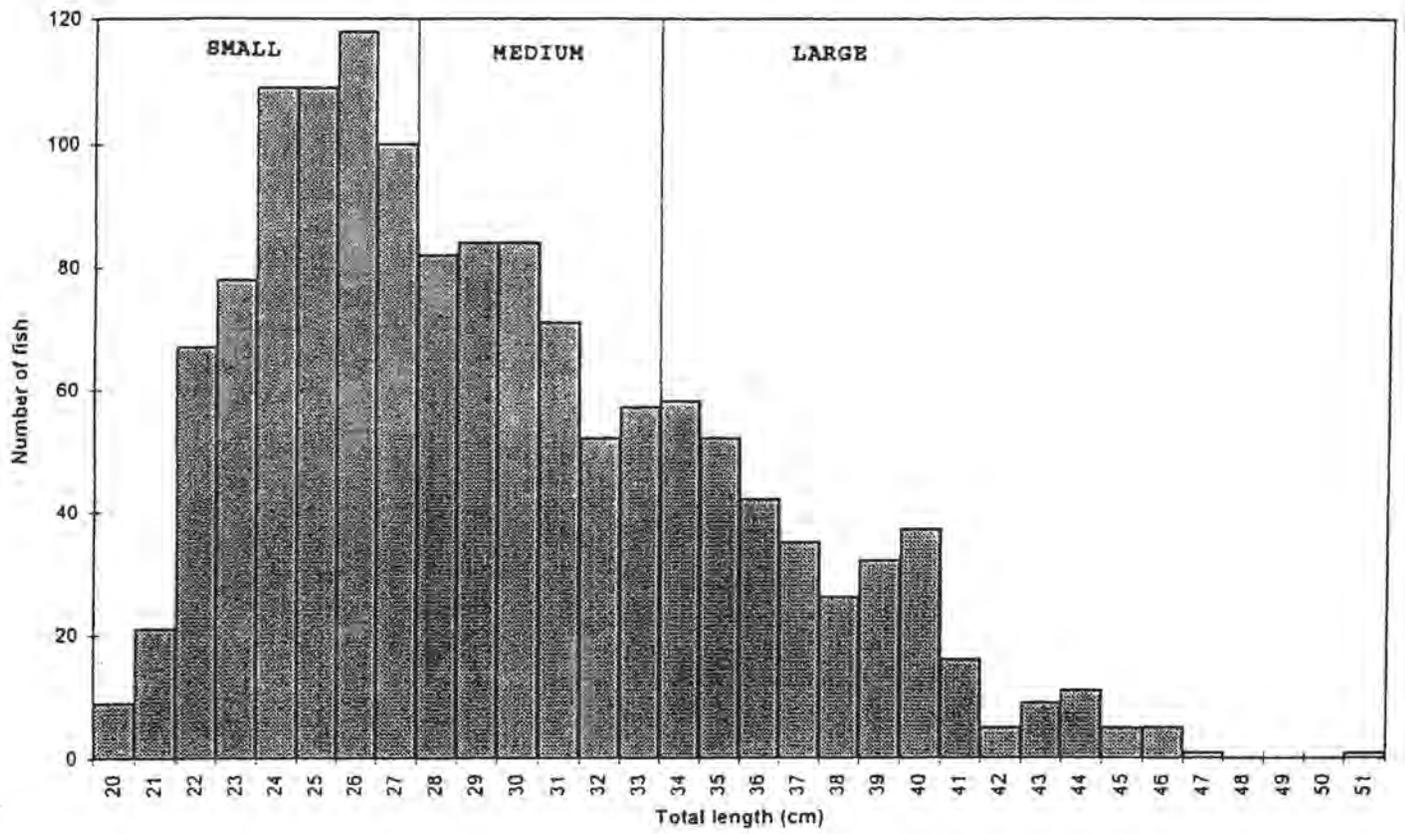
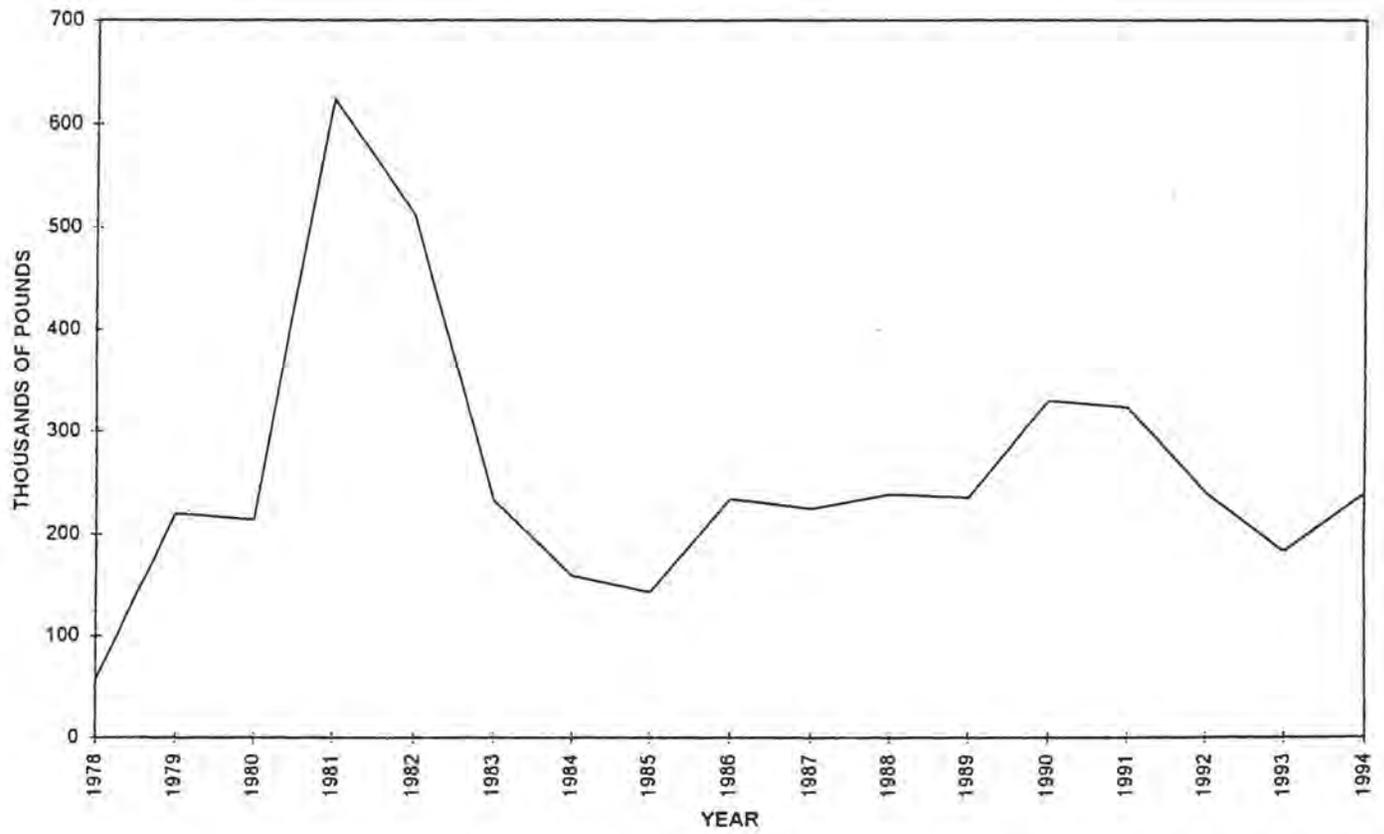


Fig. 29. Annual commercial landings of black sea bass.



COASTAL FISH

Total landings (including inshore sharks) were 622,000 pounds worth \$323,000 and continued the increasing trend of the last few years (Fig. 30). Landings in all major gear categories increased over 1993's levels. Haul seiners landed 412,000 pounds (\$197,000), shrimp trawlers 118,000 pounds (\$68,000), and gill netters 101,000 pounds (\$57,000).

Spot (288,000 pounds and \$132,000) and mullet (134,000 pounds and \$67,000) were the principal species, landed mainly by haul seiners. The spot catch was relatively large, while mullet landings continued to be low by historical standards. Shark landings, mostly from gill nets, contributed 117,000 pounds (\$63,000) and were among the largest to date.

Shrimp trawler landings continued to be relatively low with kingfishes (whitings), spot, and sharks the main components. Flounder landings continued to be very low by historical standards, due to use of excluders and a 12 inch minimum size limit.

RIVER FISH

The 1994 catch consisted entirely of American shad (122,000 pounds worth \$164,000). Landings were barely above those in 1993 and among the lowest on record (Fig. 31).

RECREATIONAL FISHERIES

Regulations remained the same as in 1993. The following sections refer to shore-based, charterboat, and private boat rod and reel fishing activity. The headboat fishery is discussed in a separate section.

PARTICIPATION AND EFFORT

Total participation was estimated by the NMFS at 859,000 fishermen. Coastal residents (457,000) were the largest component (53%). Out of state anglers (247,000) represented 29% and noncoastal residents 18%.

If accurate, participation was the highest to date (Fig. 32): however, the sharp increase from 1993's level appeared to be unrealistic given information from other sources. The number of marine fishing stamps sold to private boat fishermen (about 73,000) remained virtually unchanged from that in 1993 and the percentage of coastal households with a salt water angler increased only 0.4% (from 18.0 to 18.4%).

Estimated effort (1.908 M trips) was also the highest to date (Fig. 33). Coastal residents contributed 59%, out of state anglers 27%, and noncoastal residents 14%. MRFSS phone survey respondents indicated that 62% of their total trips had been made in the

Fig. 30. Annual commercial landings of coastal fish.

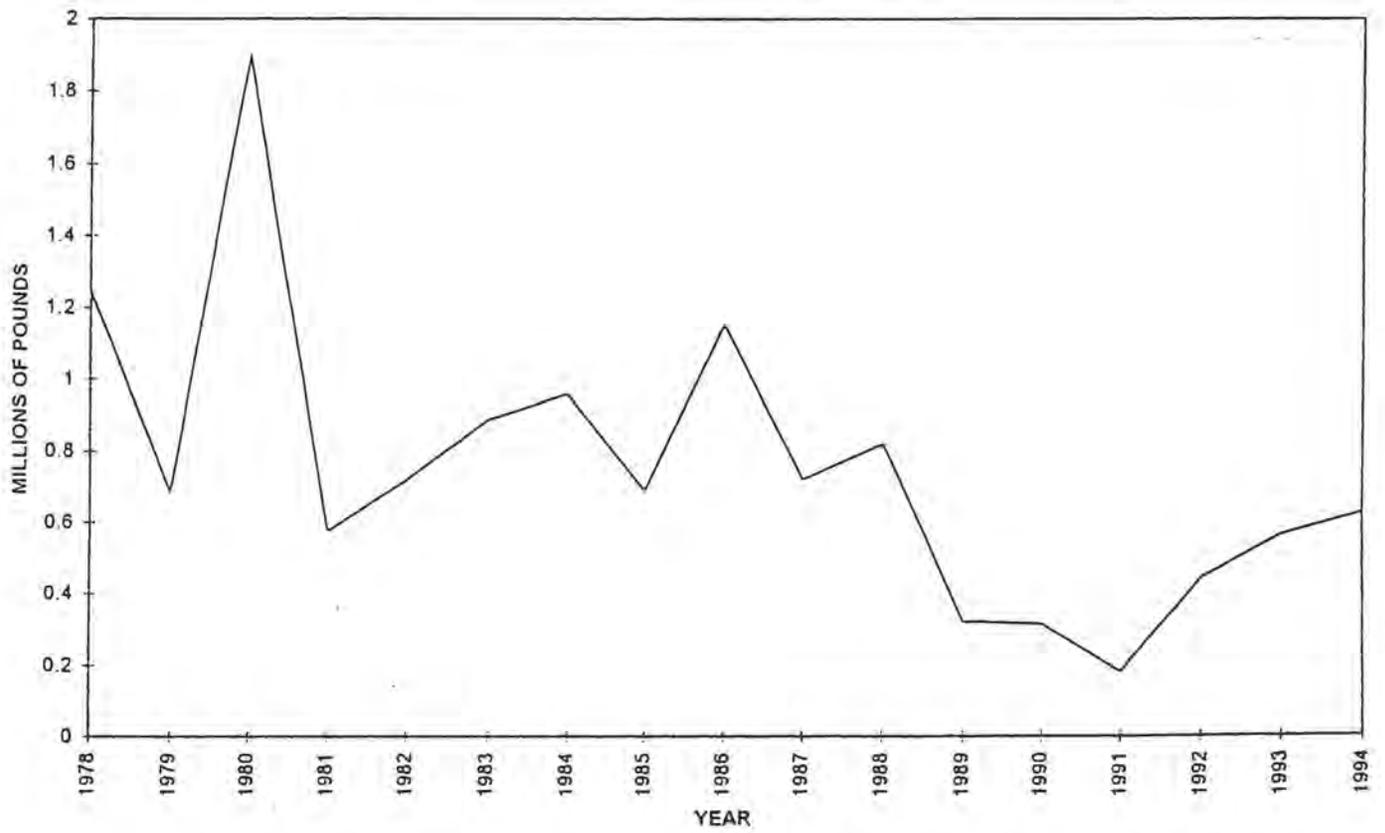


Fig. 31. Annual commercial landings of shad.



Fig. 32. Estimated participation in the South Carolina recreational hook and line fishery.

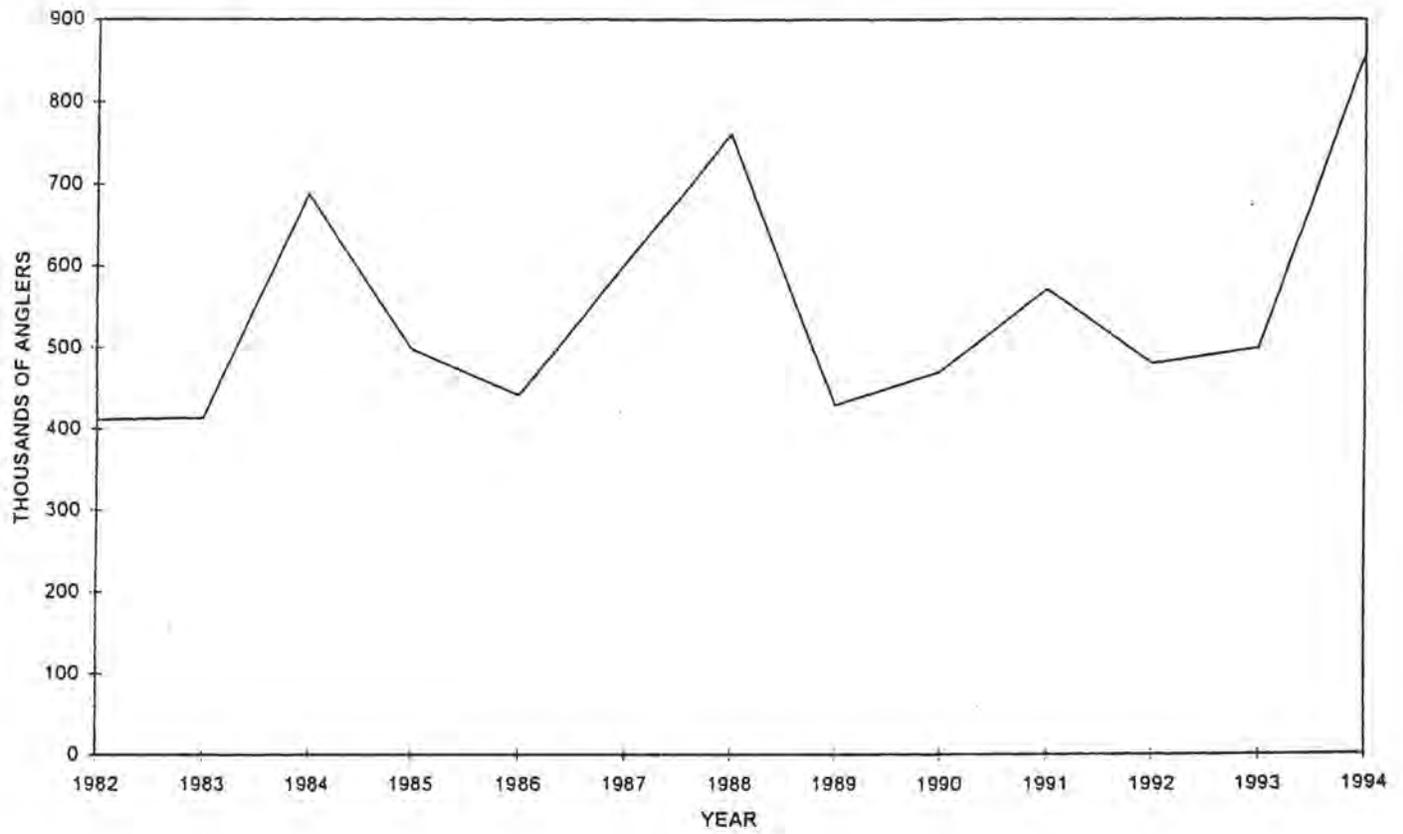
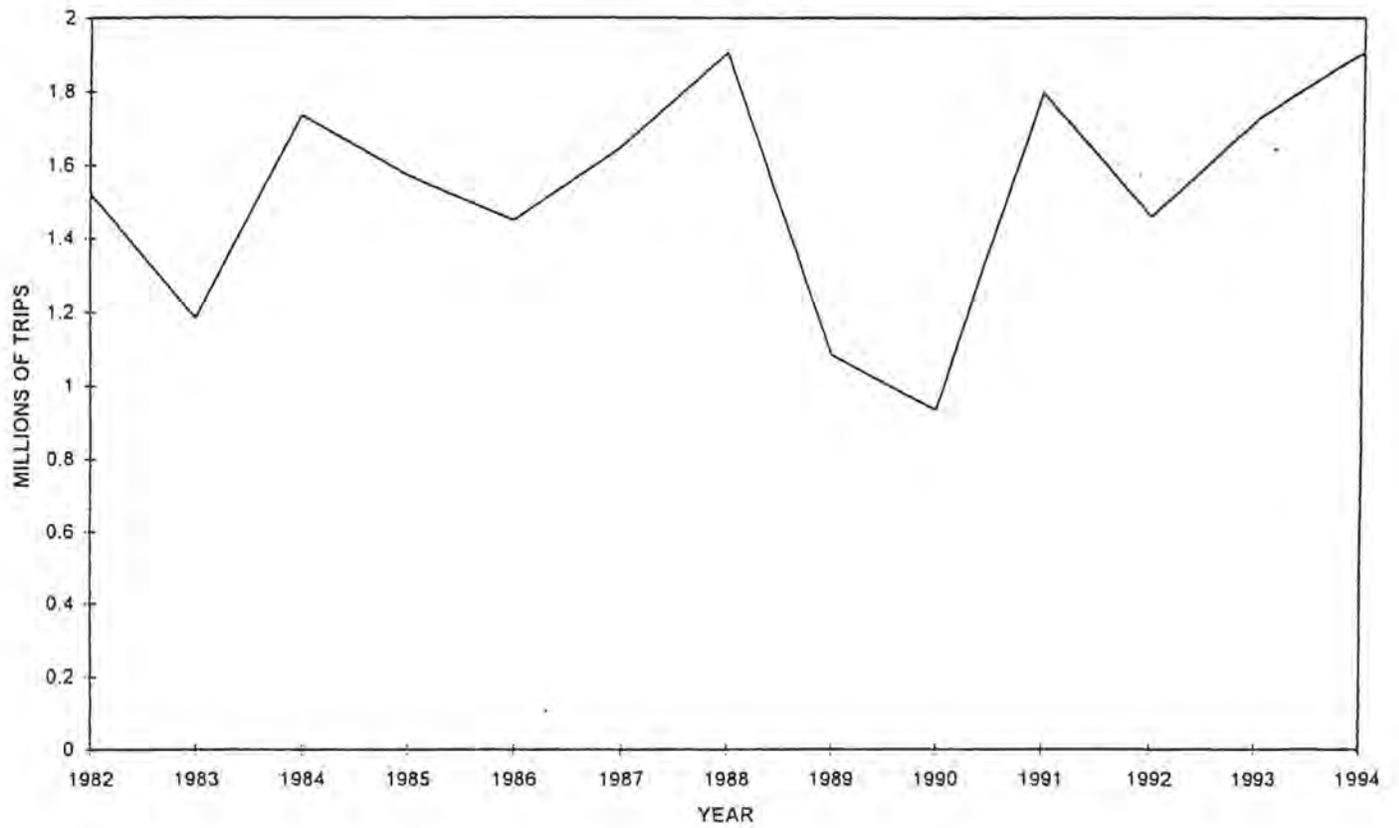


Fig. 33. Estimated effort in the South Carolina recreational hook and line fishery.



private boat mode. About 35% had been shore trips, 3% charterboat trips, and 0.3% headboat trips.

Pier effort (angler trips) reported to the MRD increased 31% (to 204,113) with nine piers licensed. Charterboat angler trips reported to the MRD increased 13% (to 26,175) compared to effort in 1993 with 175 boats permitted. The NMFS estimated that private boat fishermen made 962,769 angler trips, an increase of 28% from 1993's level.

CATCH AND CATCH RATES

The NMFS catch estimates based on the MRFSS were vulnerable to large sampling errors associated with the numbers of fishermen interviewed and catches inspected (sample size), the range in numbers of fish in individual catches (variability), and the frequency of occurrence of unusually large or small catches (probability). Misidentification and confusion over common names may have caused substantial errors in the estimated landings of some similar species. Only catches inspected by the creel clerks could be verified and, for species having large percentages of the landings either released or discarded, their estimated total numbers may have been quite inaccurate.

The estimated total catch of marine fish was 7.886 M fish (Table 1). The numbers for some species, particularly pinfishes, were extremely high by historical standards and were probably greatly exaggerated.

Oceanic pelagics comprised < 1% by number of the overall landings with dolphin the principal species. The dolphin catch reported by charterboat captains was down 2% from that in 1993, although the fish were considerably larger. Bad weather during May, normally a peak month for dolphin, may have been a contributing factor.

Landings of reef fish consisted predominantly of black sea bass. Except for this species, the NMFS catch estimates for major species were much lower than those in 1993.

Spanish mackerel and bluefish dominated catches of coastal pelagic species, particularly in the nearshore ocean (< 3 mi.) zone. Estimated Spanish mackerel landings tripled compared to those in 1993. An unusually large percentage of the catch was reported released, 69% compared to the typical 15% in 1993. The retained catch as estimated by the NMFS increased by only 10%. Reported charterboat landings were about the same as in 1993 with CPUE somewhat lower.

King mackerel landings appeared to decline substantially from those in the last two years. Numbers of fish reported caught by charterboats were 22% less than in 1993 and CPUE was consistently lower throughout the season.

Table 1. Estimated total catch (in thousands of fish) by South Carolina anglers in 1994 (excluding headboat landings). Source: NMFS.

Category	Retained or discarded dead	Released	Total
Oceanic Pelagics			
Dolphin	8	0	8
Wahoo	< 1	0	< 1
Yellowfin tuna	5	0	5
Reef Fish			
Black sea bass	124	356	480
Groupers	1	0	1
Porgies	3	0	3
White grunt	6	0	6
Tomtate	5	0	5
Triggerfish	1	0	1
Spadefish	5	1	6
Spottail pinfish	35	201	236
Sand perch	0	21	21
Amberjack	2	5	7
Coastal Pelagics			
King mackerel	26	2	28
Spanish mackerel	95	209	304
Bluefish	118	132	250
Crevalle jack	0	6	6
Barracuda	2	2	4
Little tunny/bonito	1	2	3
Cobia	1	2	3
Inshore Sportfish			
Red drum	101	311	412
Spotted seatrout	114	220	334
Weakfish	47	0	47
Summer flounder	11	2	13
Southern flounder	151	1	152
Flounder, unclassified	0	86	86
Sheepshead	47	6	53
Inshore Bottomfish			
Kingfishes	207	81	288
Spot	1,339	329	1,668
Croaker	188	142	330
Black drum	7	0	7
Pompano	8	9	17
Sharks			
Sharpnose	28	23	52
Unclassified	51	266	317
Miscellaneous			
Skates/rays	2	77	79
Catfishes	90	286	376
Toadfish	5	129	134
Searobins	0	29	29
Pigfish	10	0	10

Category	Retained or discarded dead	Released	Total
Pinfish	262	1,241	1,503
Mullet	358	2	360
Puffers	0	45	45
Other	19	177	196

Most of the inshore sportfish catch was taken by private boat anglers with red drum and spotted seatrout the principal components. Estimated red drum landings were high by historical standards and substantially above those in recent years (Fig. 34). The percentage of released fish (75%) was exceptionally high, however, and may have inflated the estimated total catch: the indicated retained catch was about 10% less than that in 1993. Statewide CPUE was 86% above that in 1993.

The estimated catch of spotted seatrout was also relatively large by recent standards (Fig. 35). The percentage of released fish (66%) was abnormally high and may have caused the total catch to be overestimated. Retained catch was only 54% of that in 1993 and CPUE indices suggested that the total catch was probably overestimated. The Charleston County CPUE was relatively high, but those for other areas were lower than in recent years. Water temperatures early in 1994 were well below normal and landings after a cold winter have typically been below average.

Mean lengths and size distributions of the principal species continued to be consistent with those observed in recent years.

HEADBOAT FISHERY

The NMFS classified 20 vessels as headboats in 1994, including a military services boat. Two of the boats on 1993's list were sold and left the state, while one (which fished in the sounds for sharks) was added.

Effort and catch were divided between inshore and offshore categories. Inshore referred to trips < 10 hrs in duration to grounds < 25 miles offshore. Offshore referred to trips lasting 10-24 hours in areas farther offshore: these typically were advertised as Gulf Stream trips. The principal target of inshore trips was black sea bass, while offshore effort was directed at the snapper/grouper complex. Catch and effort data are listed in Table 2.

Inshore effort declined 8% from that in the previous year, continuing a long-term downward trend (Fig. 36). Offshore effort increased 6% and extended a generally upward trend. Total effort declined 2%.

The total inshore catch increased slightly from that in 1993. Principal species included black sea bass and tomtate with numbers and aggregate weight of both increasing slightly. By historical standards, however, the inshore catch was very low (Fig. 37).

The offshore catch declined in both numbers and aggregate weight. The principal component was vermilion snapper (49% by number and 31% by weight). Black sea bass was the next most numerous species (14% of the total number).

Fig. 34. Estimated recreational catch of red drum in South Carolina.

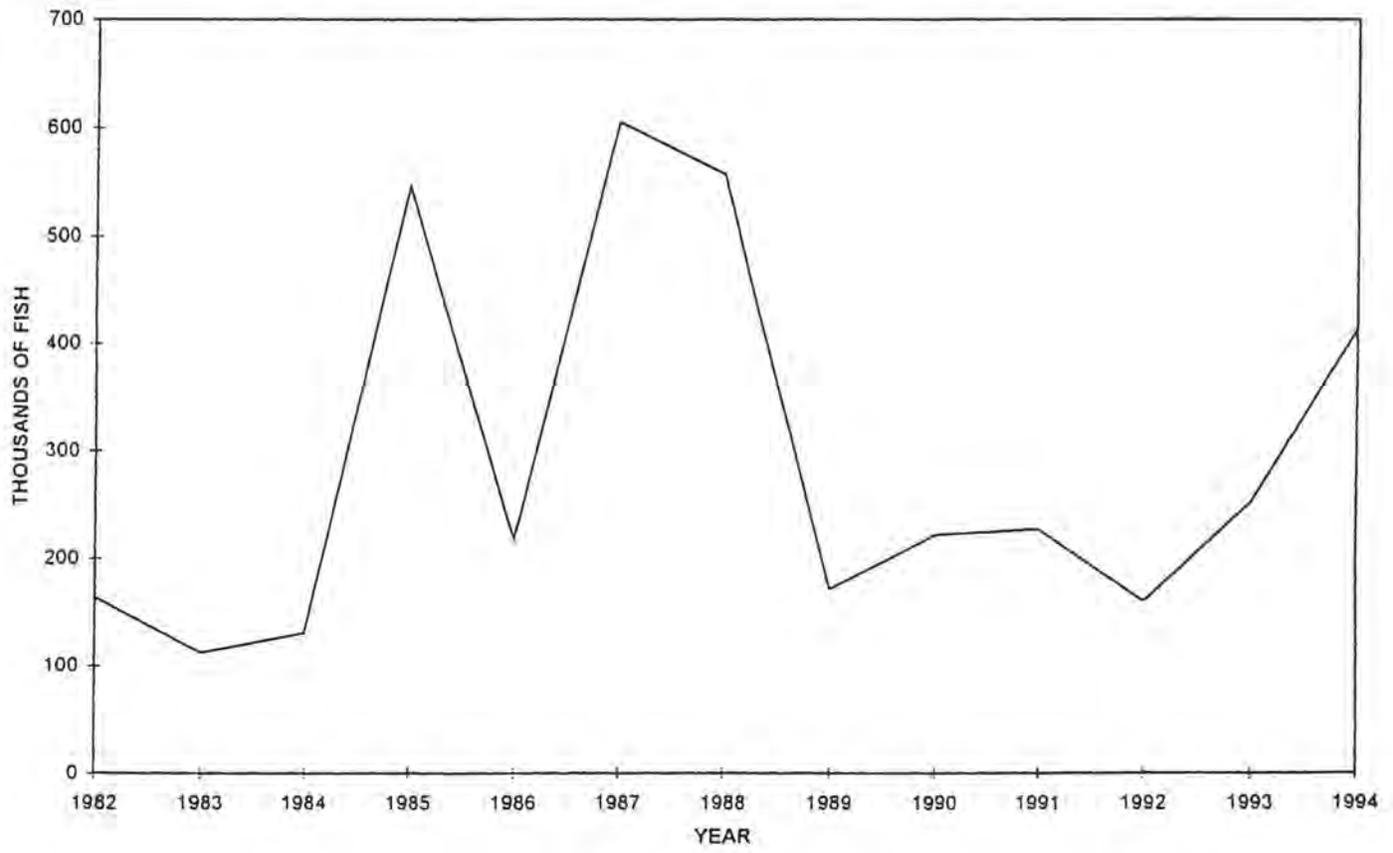


Fig. 35. Estimated recreational catch of spotted seatrout in South Carolina.

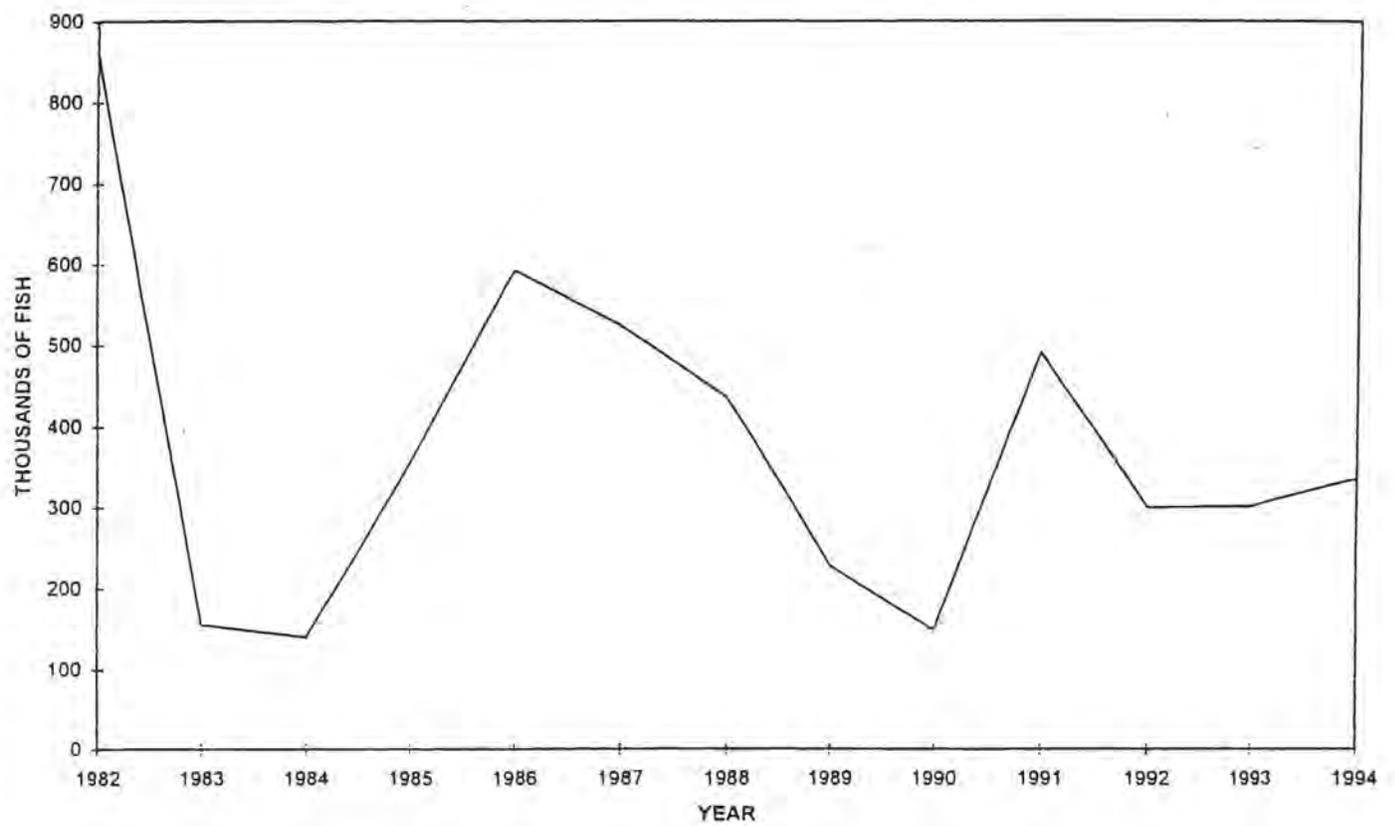


Table 2. Estimated catch (numbers of fish) and effort (angler days) by South Carolina headboat fishermen in 1994.
Source: NMFS Beaufort Laboratory.

Category	JAN. - MAY		JUN. - AUG.		SEP. - DEC.	
	Ins.	Off.	Ins.	Off.	Ins.	Off.
Red porgy	66	9334	198	15535	119	4467
Other porgies	1949	2970	4756	6201	3065	3259
White grunt	2531	3771	3560	8788	1629	3414
Other grunts	4623	9827	25165	22582	9535	12426
Vermilion snapper	306	53475	2764	101423	1387	56860
Red snapper	69	426	15	400	22	1522
Other snapper	1	437	159	35	70	24
Epinephelus grouper	43	427	46	1074	46	489
Mycteroperca grouper	105	2258	212	4012	96	3351
Triggerfish	121	4668	260	10757	176	8715
Black sea bass	25161	25050	53840	26205	19252	10953
King mackerel	50	107	278	330	239	228
Sharks	144	334	949	725	64	236
Other	785	5132	2027	6405	1395	3986
Angler days	5978	7036	21774	16343	5535	6565

Fig. 36. Estimated effort in the South Carolina headboat fishery.

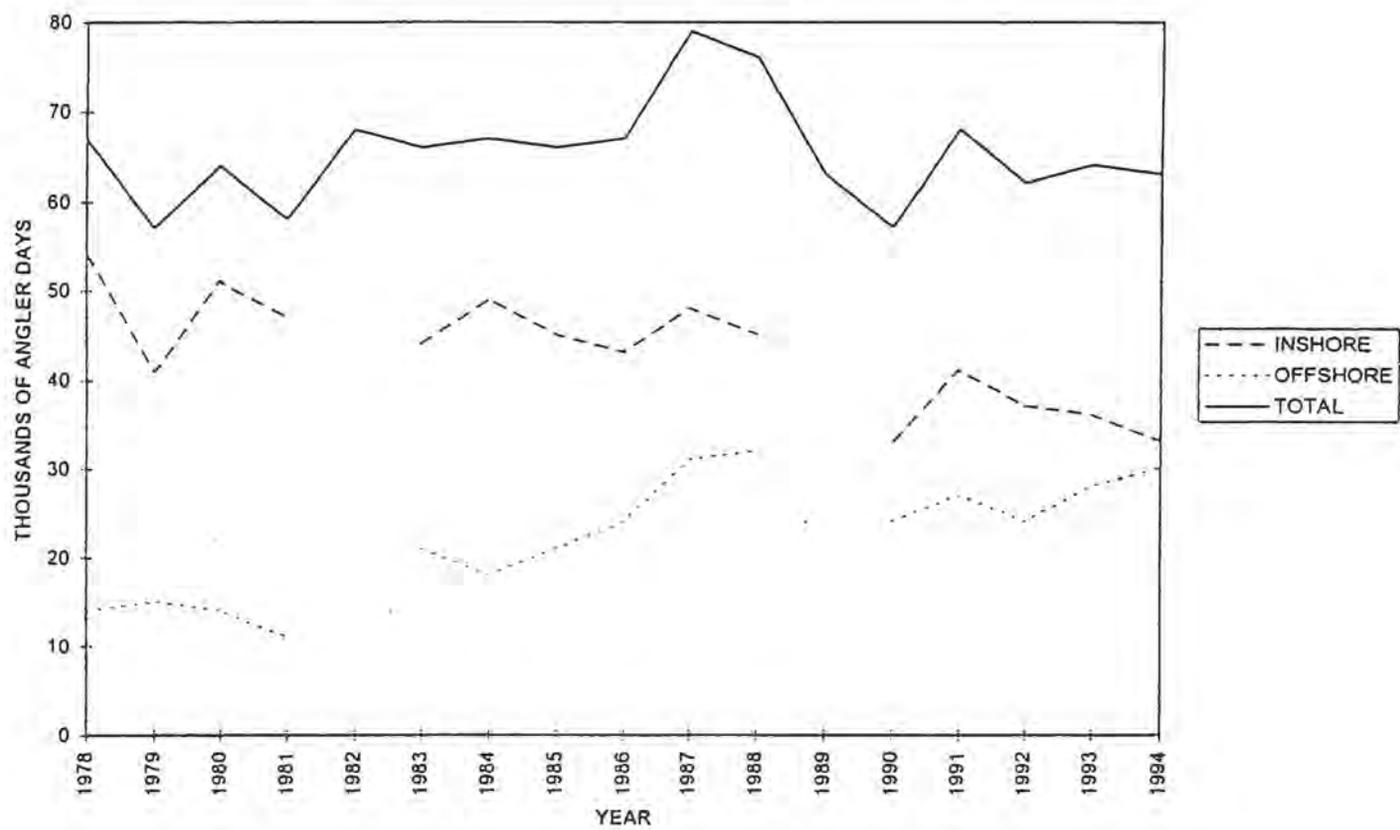
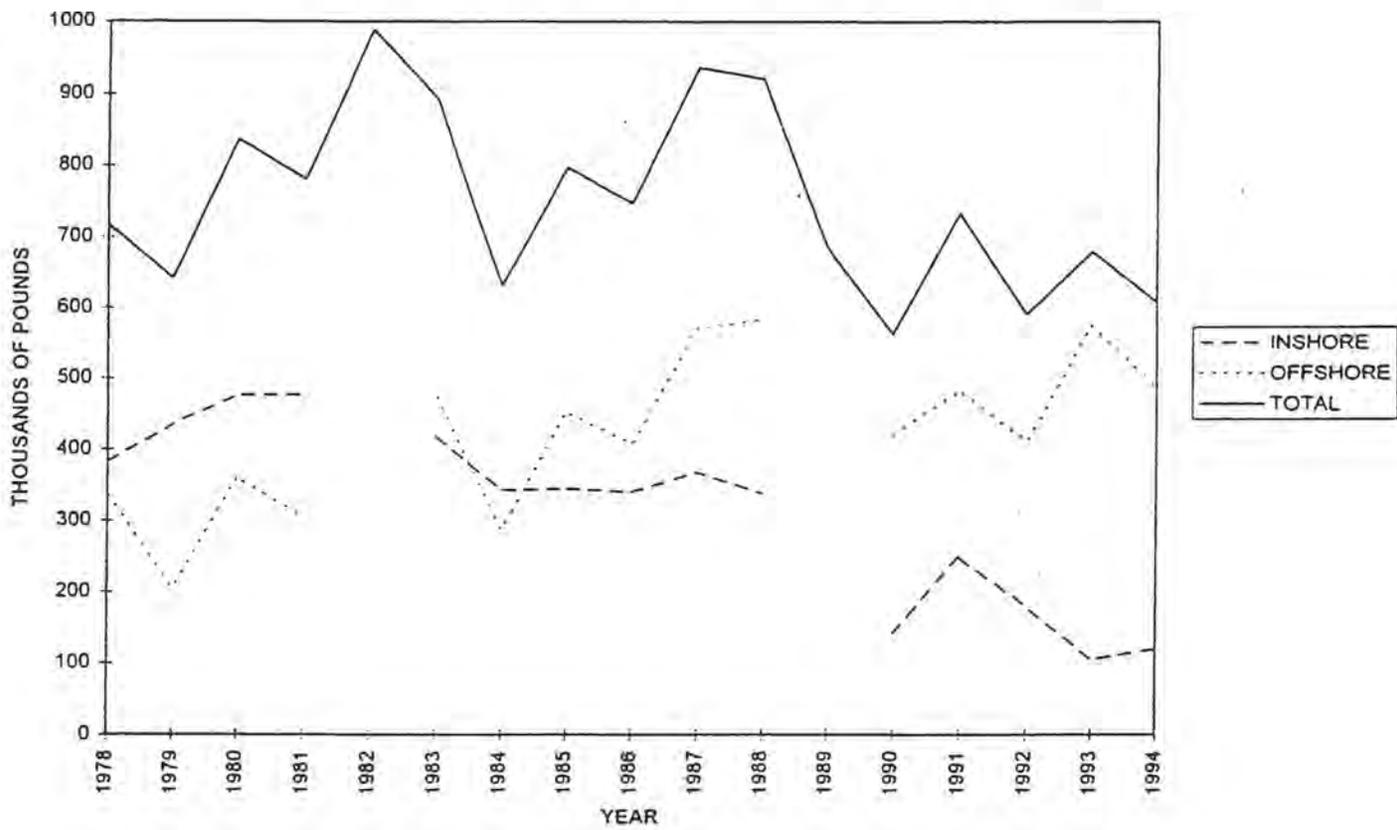


Fig. 37. Estimated catch of the South Carolina headboat fishery.



The inshore catch rate increased slightly after several years of decline, but remained low by historical standards (Fig. 38). The offshore catch rate declined 20% from that in 1993 and was the lowest in ten years.

Landings and catch rates of most principal species declined, although there was little change in the percentage composition of the overall catch. Landings of red porgy, once a major component of the offshore catch, were the lowest to date (Fig. 39). Landed weight of black sea bass was also the lowest on record (Fig. 40).

In contrast, the landings of vermilion snapper continued to increase (Fig. 41). The average catch rate (seven fish per angler day) was the highest on record, although the average size continued to be not much above the 10-inch minimum size limit.

Aggregate weight of *Epinephelus* spp. groupers was very low compared to historical landings, reflecting the low contribution of large species (i.e., snowy grouper and speckled hind) and predominance of smaller fish like red and rock hind. *Mycteroperca* spp. landings remained relatively high, due to continued abundance of scamp.

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- Low, R.A. 1995. Survey of the South Carolina shrimp baiting fishery, 1994. South Carolina Marine Resources Center, Charleston, South Carolina. Data Report Number 21. 17 p.

Fig. 38. Average catch rates in the South Carolina headboat fishery. Data for 1982 and 1989 are unavailable.

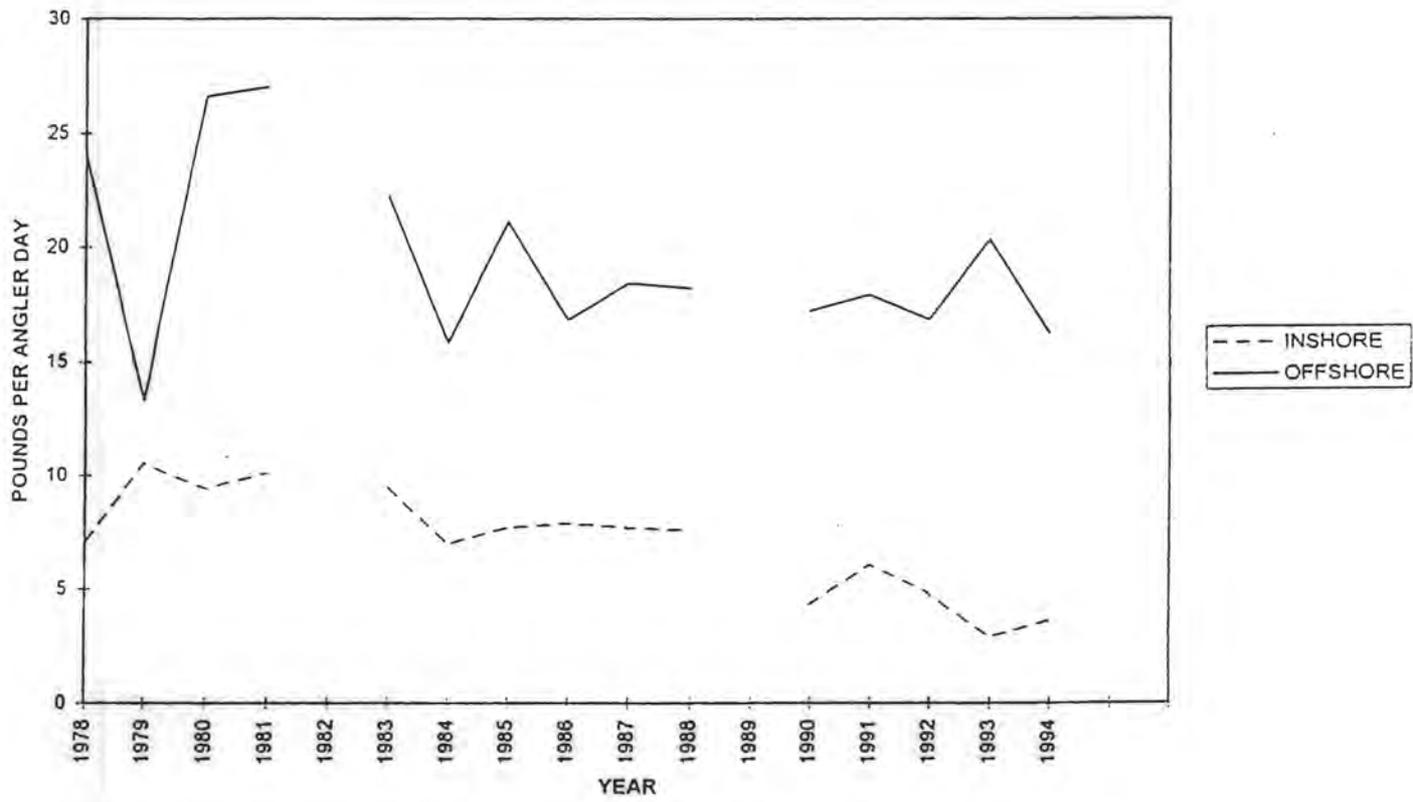


Fig. 39. Landings of red porgy by the South Carolina headboat fishery.

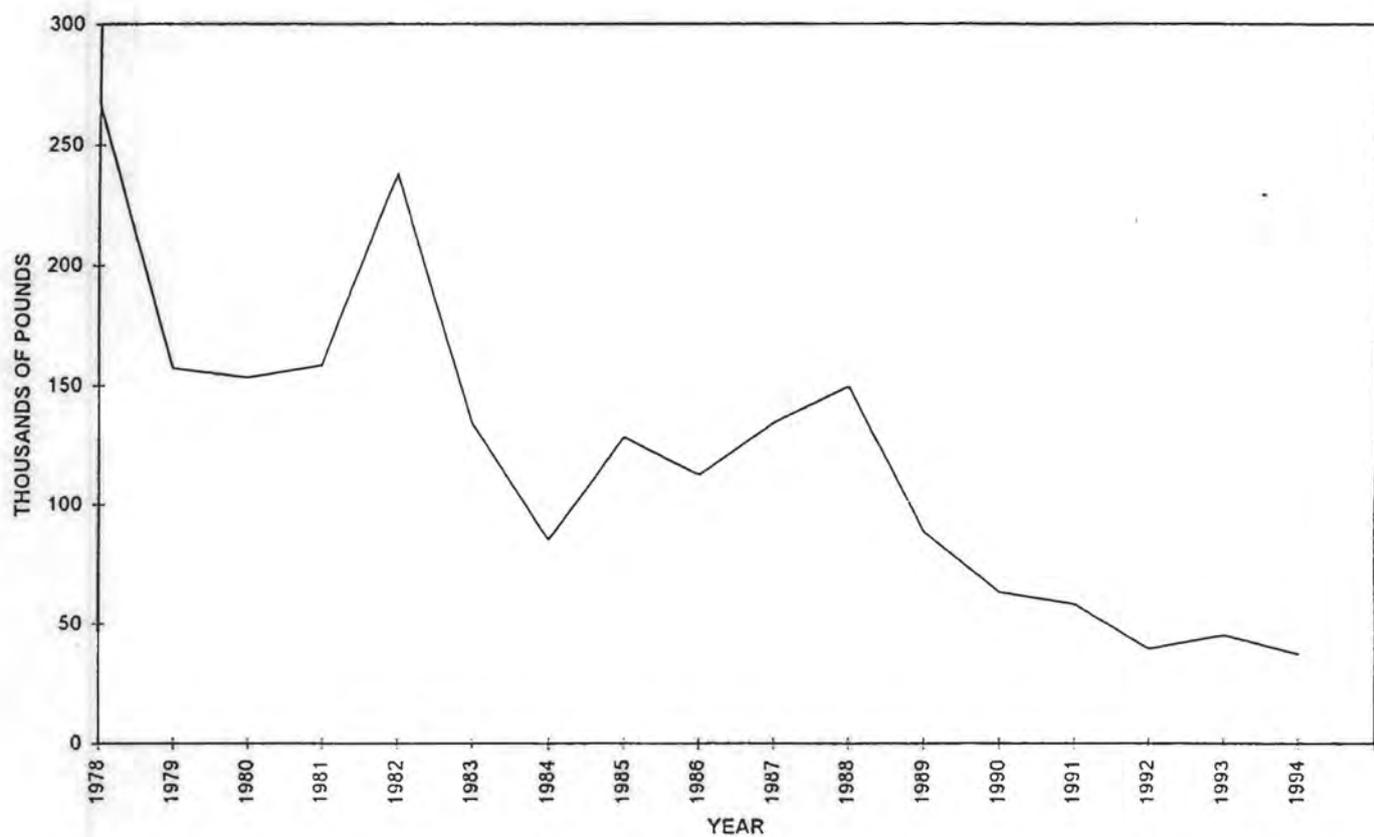


Fig. 40. Landings of black sea bass by the South Carolina headboat fishery. Inshore/offshore data are unavailable for 1982 and 1989.

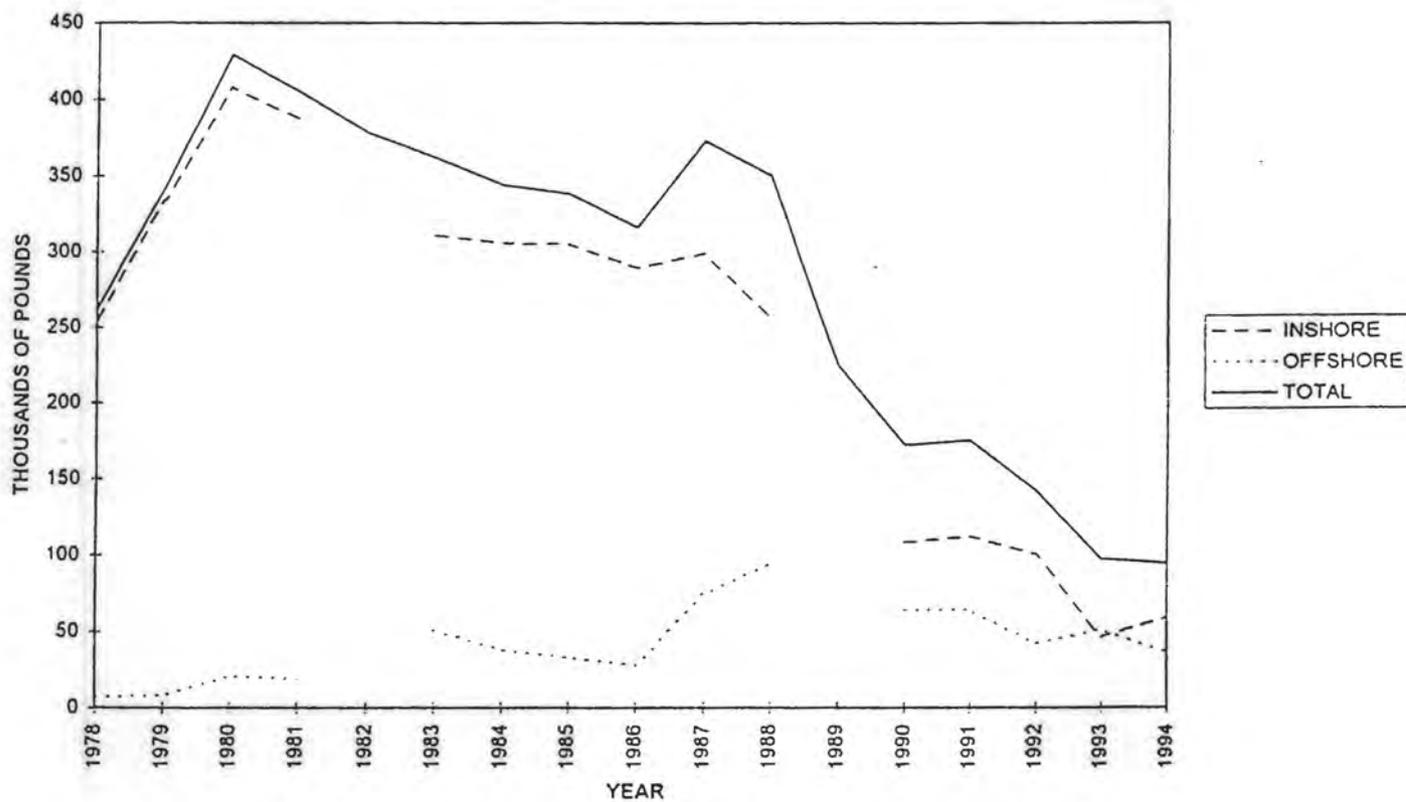


Fig. 41. Landings of vermillion snapper by the South Carolina headboat fishery.

