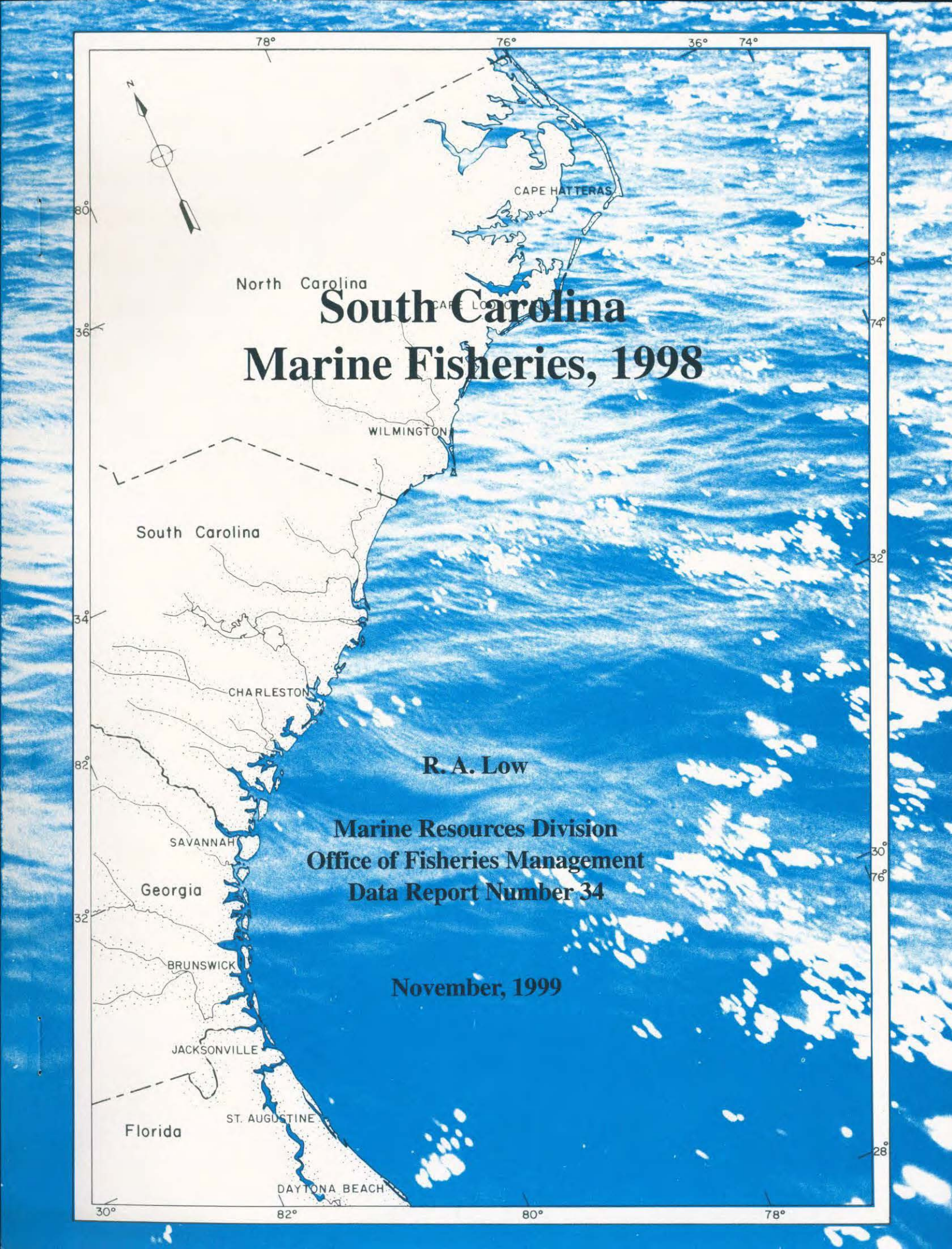

South Carolina Marine Fisheries, 1998

R. A. Low

Marine Resources Division
Office of Fisheries Management

Data Report Number 34

November, 1999

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ACKNOWLEDGMENTS

Robert Wiggers obtained fish measurements and trip interview data from commercial finfish landings. Paige Wilkins collected data on shrimp and shellfish commercial landings. Bryan Stone, Pam Roy, and Kris Reynolds conducted the state creel census of recreational anglers that generated catch per unit of effort and length data. Viette Aikens and Vanessa Geddis entered and edited charterboat data and provided clerical assistance. George Steele performed data processing. Joe Moran supervised the overall operations of the statistics program.

Commercial fisheries data collection was funded in part by a Cooperative Statistics Agreement with the National Marine Fisheries Service (NMFS) of the National Oceanic and Atmospheric Administration (NOAA). The views expressed herein are those of the author and do not necessarily reflect the views of NOAA or any of it subagencies. Recreational fisheries data were collected with funding support by the Federal Aid in Sport Fish Restoration Act (16 U.S.C. 777-777K).

INTRODUCTION

This report is a summary of significant events in South Carolina's marine fisheries during 1998. 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 represents consensus views of the supervisory staff of the management programs for the various fisheries. The presentation is directed at a general audience, makes some simplifications, and is not meant to be definitive in the scientific sense.

Publication of landings data for commercial fisheries began in 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.

Forms were mailed to seafood dealers, on which they were asked to report their landings for that month. Reporting specialists compiled this information and submitted it to the USFWS office in Washington, D.C. The S.C. Division of Commercial Fisheries also provided data. The specialists issued monthly narratives describing conditions and trends, the last in December, 1979.

The current series of annual reports prepared by the Marine Resources Division (MRD) began with an issue that reviewed trends and events for 1977-1986. Individual annual reports commenced with the 1987 issue. The context is similar to that of the USFWS monthly bulletins.

Data on commercial fisheries statistics were obtained through 1) mandatory monthly dealer reports, 2) mandatory shellfish harvest reports, 3) weekly shrimp tickets submitted voluntarily by dock operators, 4) trip tickets for offshore fishing boats submitted voluntarily by fish houses, and 5) reports provided by harvesters in special permit fisheries.

Commercial landings statistics applied to wild stock fisheries only. The mariculture industry again experienced difficulties, but produced $2.03 M worth of product. In 1998, a virus again caused heavy mortalities at shrimp farms. Although the largest clam producer continued to have problems that curtailed production, a second operation commenced on a significant scale. As a result of these factors, clams were by far the most valuable component of the state's mariculture industry in 1998.

Commercial landings data were subject to confidentiality if less than three sources provided information. Appreciable volumes were involved in some categories. 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 is subject to the perception of under-reporting. State law restricts the use of this information to fishery management purposes only. It has been assumed that providers, particularly in a voluntary situation, have little incentive to submit falsified records. Verification was therefore seldom attempted, except where obvious anomalies were evident.

Health concerns dictated that shellfish landings were reported in detail and closely monitored. This information is considered to be very accurate. Most of the shrimp statistics were obtained from voluntary weekly tickets and were also considered quite reliable.

Federal reporting requirements have been implemented for most offshore finfish fisheries with the percentages of total landings accounted for by the MRD trip ticket system being much reduced as a result. Effort estimation based on MRD ticket data was speculative for these fisheries and was terminated.

Landings for 1998 in most product categories other than shrimp and shellfish were obtained primarily from monthly dealer reports. An increasing amount of the blue crab production has been channeled into the "basket trade" by individual fishermen and under-reporting is suspected. Incidental catches of coastal fish by shrimp trawlers were usually part of the crews' compensation and a portion of the landings was therefore not handled by wholesale dealers. It is suspected that under-reporting of the overall landings occurred as a consequence.

The major source of recreational fishery data was the Marine Recreational Fishery Statistics Survey (MRFSS), conducted for the National Marine Fisheries Service (NMFS) by a private contractor. This survey applied to hook and line fishing from shore or shore-based facilities, charterboats, and private boats (headboats were not included). The MRD purchased additional interviews from the contractor to augment the basic NMFS quota.

The MRD continued the State Finfish Survey independently of the MRFSS. Coverage was directed at private boat fishermen fishing inland (estuarine) waters. The principal objectives were to obtain length meaurements and CPUE data for important inshore sport fish such as red drum, spotted seatrout, and flounders.

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 on a monthly calendar. Charterboat captains completed logsheets for each fishing trip, listing the date, number of anglers, hours fished, and catch data.

Headboat operators were required by federal regulation to submit trip reports to the NMFS (their state obligation was met by providing copies to the MRD). Information elements were similar to those on the charterboat reports. The NMFS Beaufort Laboratory had the federal responsibility for processing these data. As of mid-November, 1999, the summaries for 1998 had not been completed.

No directed effort was made to monitor recreational shellfish gathering. Results of a 1994 survey of buyers of the marine fishing stamp (required for shellfish harvest) indicated that rough estimates of recreational landings could be based on percentages of the commercial production. These are therefore noted under Commercial Fisheries in the Shellfish section.

A survey of holders of the marine recreational fisheries stamp was conducted during 1997 to obtain information on their crabbing activity. The results provided percentage estimates applicable to recreational crabbing during July-October. SInce these were based on commercial landings, they are contained in the discussion of the commercial blue crab fishery to facilitate comparison of utilization by each sector.

A survey of the shrimp baiting fishery has been conducted each year since 1987. Results of the 1998 survey are described in MRD Data Report Number 32. A brief summary is included with the discussion of the commercial shrimp fishery, again because of the emphasis on comparative harvests.

COMMERCIAL FISHERIES

Product categories were composed as follows. Shrimp landings included whole (heads-on) weights of penaeid species (there were no rock shrimp landings). Crab landings included live weight of blue crab in various product categories (e.g. hard, soft, and peeler), live weight of horseshoe crab, and pounds of stone crab claws. Shellfish volumes were expressed as meat weights with other units (bushels of oysters and whelks, 250-count bags of clams) noted where appropriate.

Most fish landings were converted into round (whole) weights. Shark landings taken on offshore gear were categorized as "offshore" and those by inshore gear (almost entirely shrimp trawl) were designated "inshore." "Offshore fish" included wreckfish, king mackerel, oceanic pelagics (dolphin, wahoo, tunas), swordfish, and reef fish (e.g. groupers, snappers, sea bass, porgies, and tilefishes). "Coastal fish" consisted of mullet, inshore groundfishes, e.g. spot, whiting (kingfish), and flounders. Riverine fish in 1998 were exclusively American shad, although historical landings often included blueback herring.

Except where noted otherwise, all value figures refer to ex-vessel value, i.e., the amount paid to the harvester. For trend analyses, these have been adjusted for inflation by weighting factors based on the annual Consumer Price Index (CPI). All figures shown are expressed in 1998 dollars.

South Carolina is not a major producer of seafood, typically ranking 20th in volume and value of overall production (including mariculture) among the coastal states. The seafood industry consists largely of harvesting with little processing to add value to the raw product. Most of the landings are shipped out of state as raw or unprocessed product.

State law requires that any seafood product offered for sale must initially be sold to a licensed wholesale dealer. In FY 1997/1998, there were 267 licensed wholesale seafood dealers, about average for recent years (Fig. 1). A description of wholesale operating characteristics is contained in the 1994 report and there appear to have been few significant changes since then. Processing was largely limited to initial handling, such as shrimp heading, shellfish shucking, crab picking, and fish cutting. The 1996 and 1997 processors' surveys included the large wholesale dealers only and no survey was done in 1998. The most recent employment figures (for 1995) are contained in MRD Data Report Number 26.

The number of commercial fishermen was unknown, but presumably was between 1,500 and 2,000. In order to legally land product, an individual had to possess either a Trawler Captain's license or a Land and Sell license. In 1997, the law was amended so that the Trawler Captain's license could only be used to sell trawl-caught product with a Land and Sell license required for all other gears. In FY 1997/1998, there were 1,048 Trawler Captain licenses issued, the most since 1992. The number of Land and Sell licenses sold was 738, by far the most in the last ten years and continuing the general upward trend of recent years (Fig. 1). Presumably, this was a result of the law change.

Additional licenses were required for units of gear and/or participation in various fisheries. Since some persons obtained several of these gear licenses in addition to the Land and Sell or Trawler's Captain licenses, the totals were not additive. Crew in most fisheries were not required to have any type of license and could therefore not be documented.

Total landed weight from wild stocks was 17.269 M pounds, up slightly from the previous year's production (Fig. 2) due to an appreciable increase in blue crab landings; there were declines in most other categories. Fig. 3 illustrates the status of the 1998 landings volume vs the 15-year averages. The two major inshore fisheries, i.e., for shrimp and blue crab, continued to do relatively well vs historical standards.

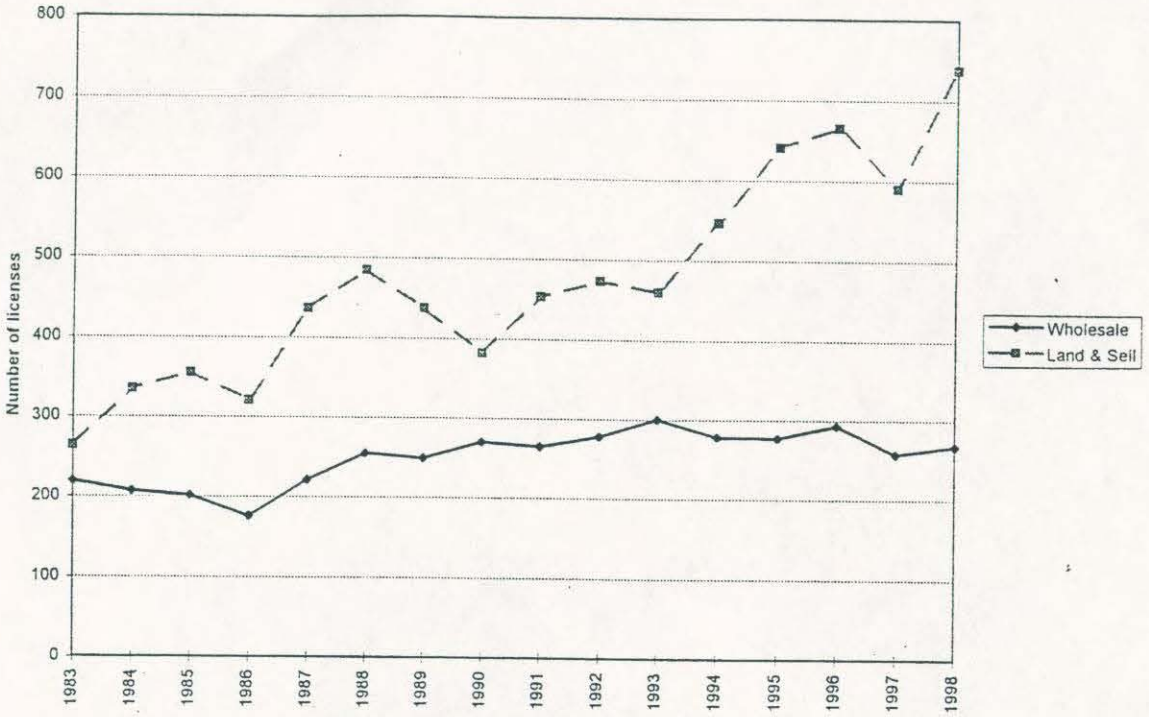

Fig. 1. Sales of commercial licenses.

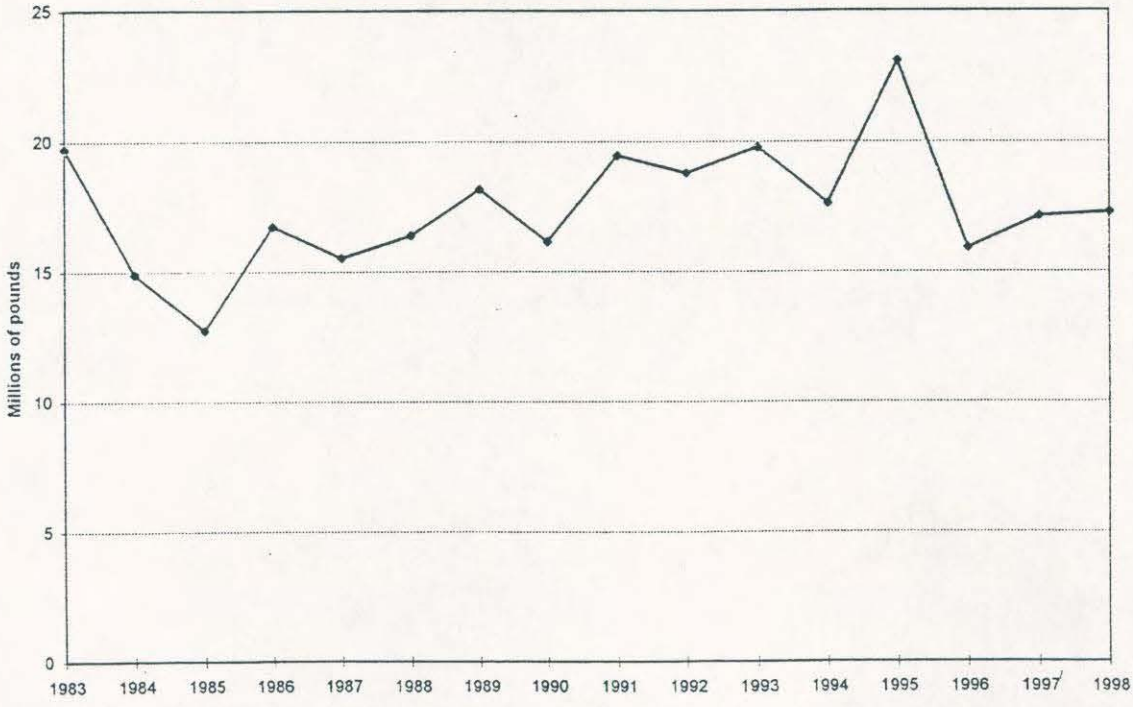

Fig 2. Total weight of commercial marine fisheries products.

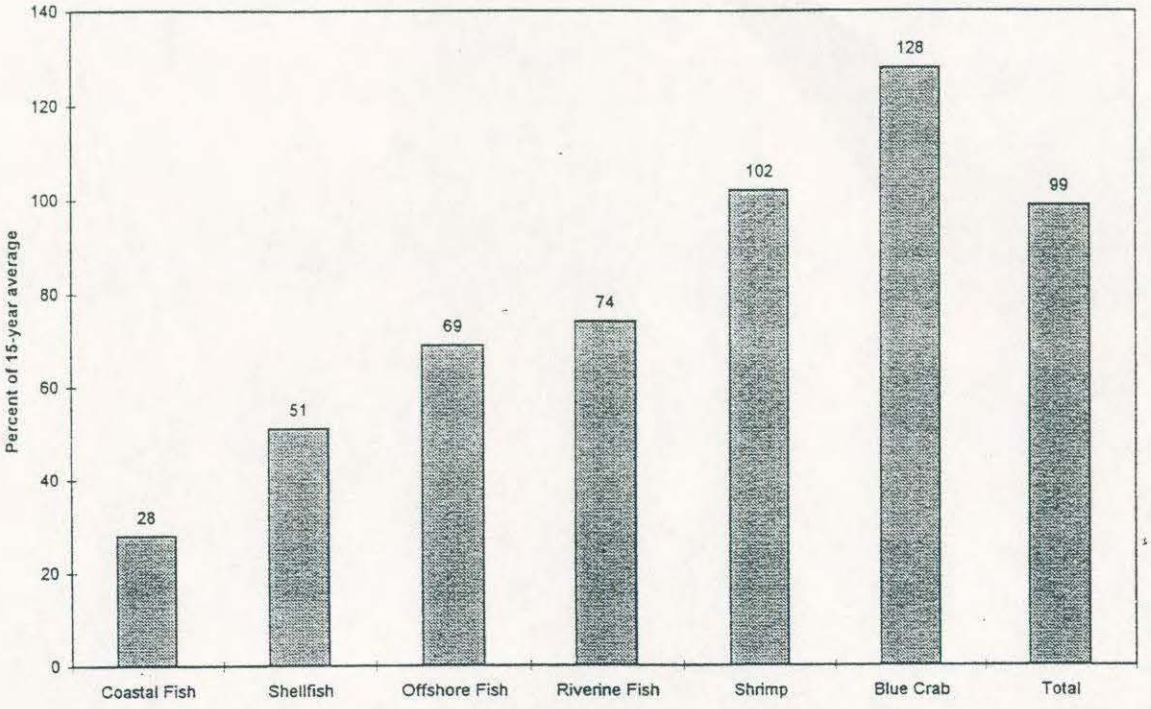

Fig. 3. Production volume compared to 15-year averages.

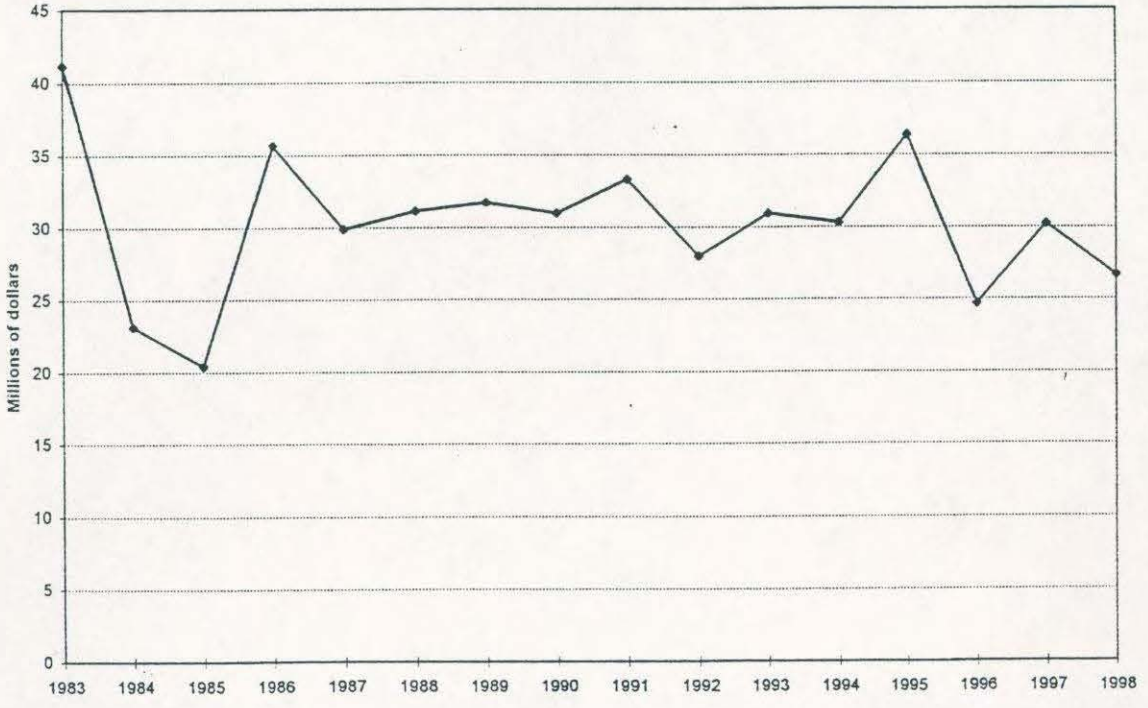

Fig. 4. Total ex-vessel value adjusted for inflation in 1998 dollars.

Total landings were worth $26.628 M, about 87% of the 15-year average (Fig. 4). Blue crab was the largest component in volume with shrimp the value leader (Fig. 5).

County landings included mariculture production. Charleston County was the leading producer with 46% ($13.285 M) of the total landed value (Fig. 6, Table 1). The county led the state in overall production of shrimp and shellfish, accounting for nearly all of the mariculture output in both categories. Total fish landings were 880,000 pounds worth $1.525 M. Nearly all of the wreckfish and swordfish were landed here. Blue crab production (all categories) was 2.953 M pounds valued at $2.269 M.

Beaufort County produced $8.122 M. The leading contributors were shrimp (2.131 M pounds worth $5.08 M) and blue crab (4.009 M pounds at $2.513 M). Production and value in other categories were relatively insignificant.

Georgetown County fishermen accounted for $5.349 M in landings with shrimp ($2.962 M) and fish ($1.917 M) the major components. Horry County harvesters contributed $826,000 in landings, mostly of offshore fish.

SHRIMP

Penaeid shrimp landings were 6.304 M pounds heads-on worth $15.417 M. Above-average white shrimp catches compensated for the lowest brown shrimp harvest in over 20 years (Fig. 7). The total value of the shrimp landings was relatively low by recent standards (Fig. 8).

A total of 554 resident trawler licenses was issued for FY 1997/1998, maintaining the relatively stable level of recent years (Fig. 9). The number of nonresident licenses was relatively high, perhaps a response to good roe shrimp predictions and optimistic forecasts for the fall fishery. The number of Trawler Captain licenses was also relatively high.

The winter was very wet and relatively mild with moderate quantities of overwintering white shrimp. Based on the moderate abundance of roe white shrimp and adequate spawning, the trawling season in state waters opened on May 26. By-catch reduction devices (BRDs) were required (as in 1997) in all trawls having head rope lengths exceeding 16 ft.

Only 745,000 pounds heads-on of brown shrimp were landed with an ex-vessel value of $1.198 M. A fairly cool and very wet spring probably contributed to low abundance by curtailing movement and survival of postlarvae. MRD sampling during June revealed low estuarine abundance. There was no rain to prompt seaward migration and commercial trawl catches were very low in early July. The shrimp tended to be small with a very low unit price. Brown shrimp

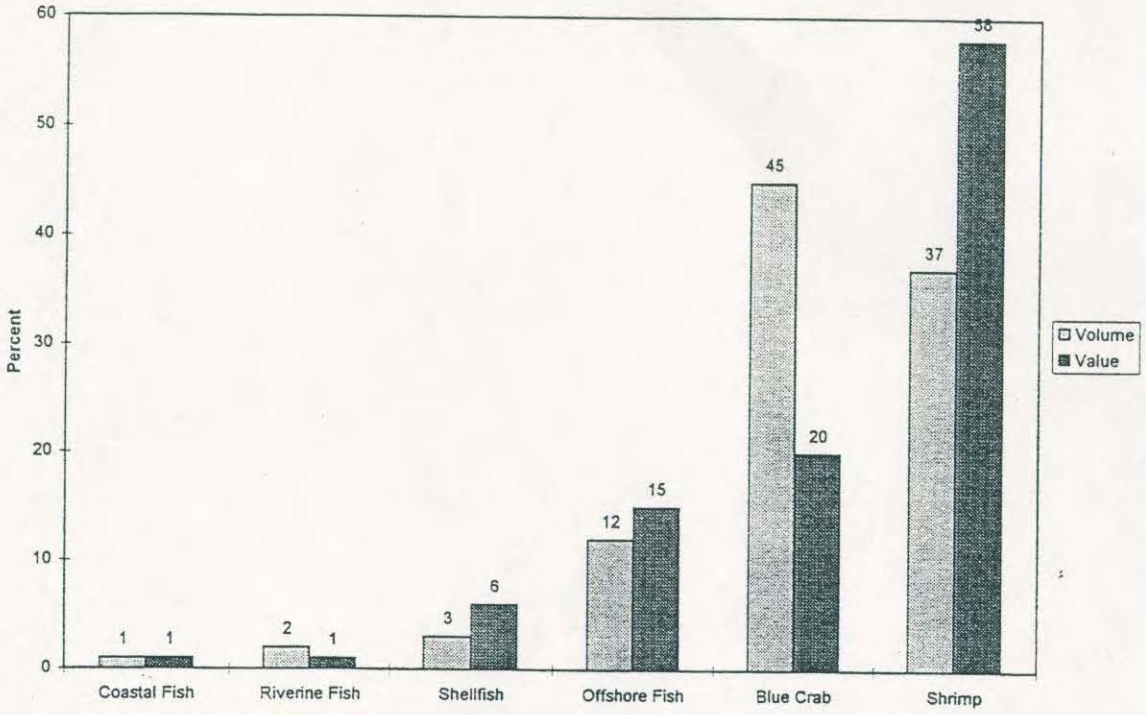

Fig. 5. Weight and value composition of commercial landings.

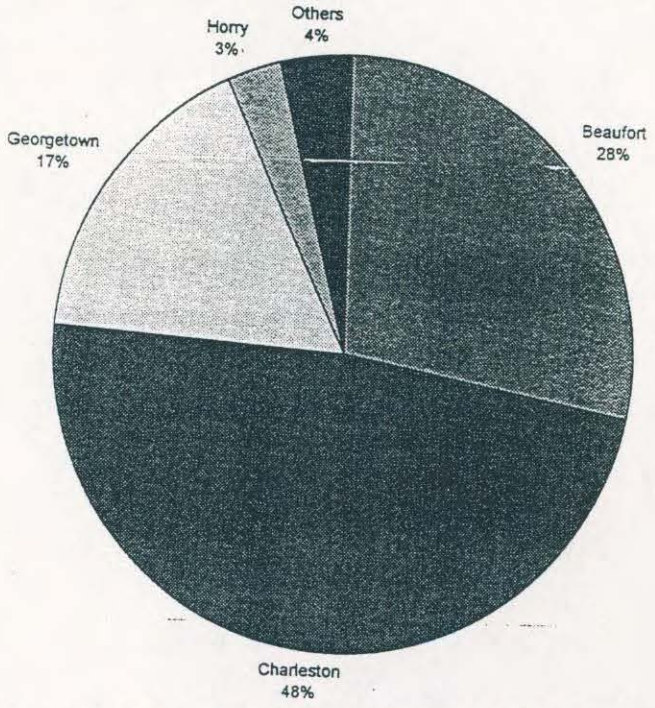

Fig. 6. County distribution of landed value.

Table 1. Production and ex-vessel value by county (in thousands of pounds and dollars).

County	Shrimp	Blue crab	Shellfish	Fish Offshore	Fish Coastal	Fish Riverine
			Volume			
Beaufort	2,131	4,009	134	6	15	16
Charleston	2,500	2,953	519	689	46	144
Georgetown	1,369	320	49	1,030	8	89
Horry	20	27	-	397	97	135
			Value			
Beaufort	5,080	2,513	477	9	15	12
Charleston	6,710	2,269	2,726	1,388	55	82
Georgetown	2,962	257	212	1,862	5	50
Horry	42	16	-	652	29	84

	Total volume	Total value
Charleston	6,851	13,285
Beaufort	6,311	8,122
Georgetown	2,865	5,349
Colleton	354	820
Horry	676	826
Berkeley	78	76
Jasper	210	134
Others	26	43

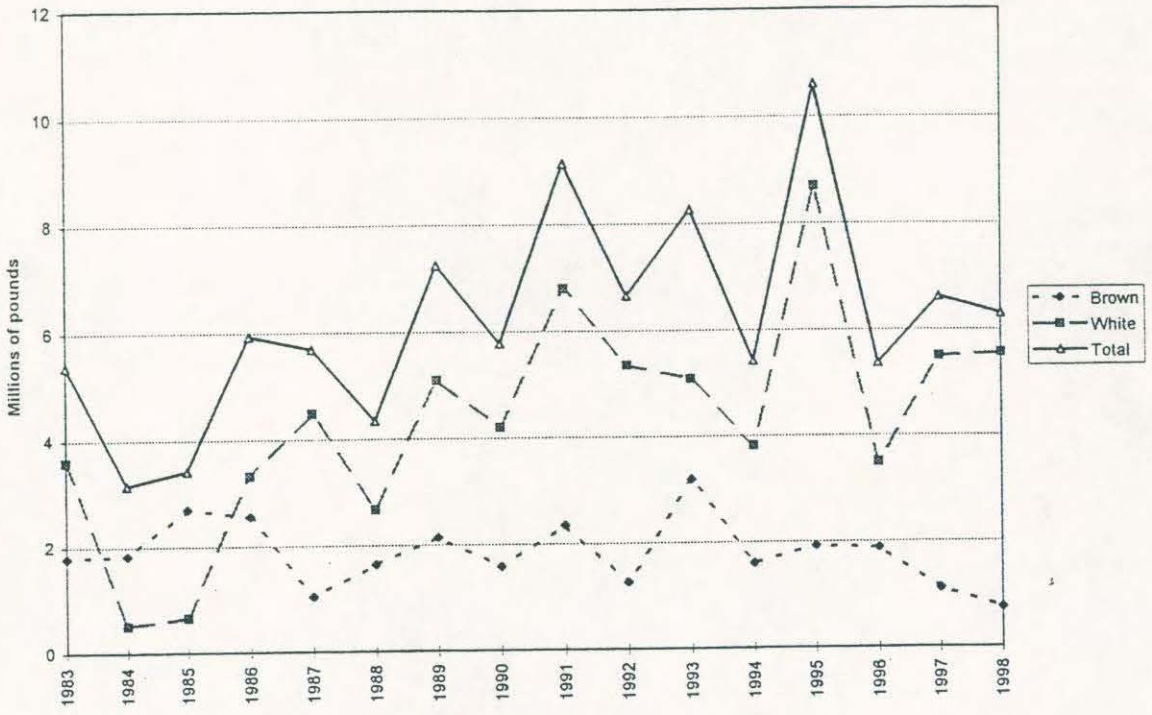

Fig. 7. Annual commercial landings (heads-on) of shrimp.

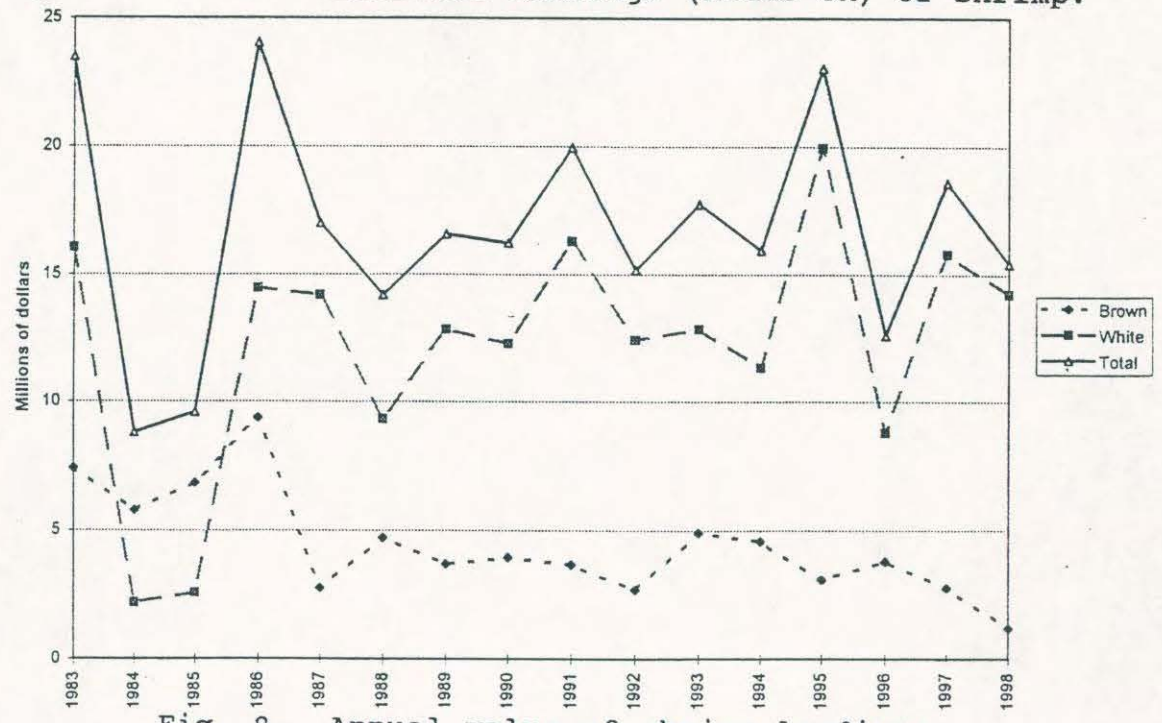

Fig. 8. Annual value of shrimp landings.

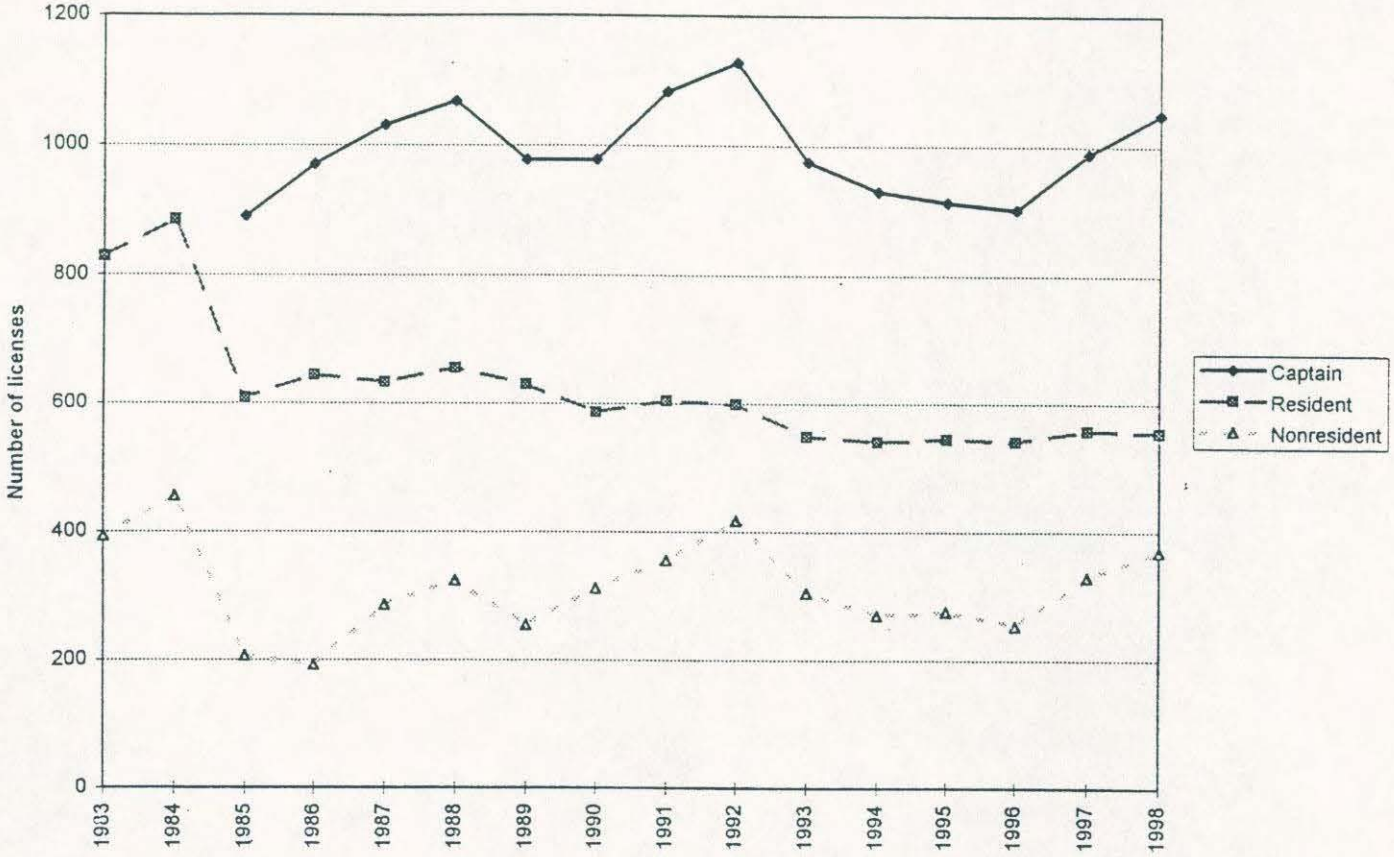

Fig. 9. Trends in sales of commercial shrimping licenses.

comprised just 12% of the total shrimp landings, the lowest percentage contribution in over 20 years.

Based on the moderately abundant spawning stock, fall white shrimp landings were expected to be average or better. August was drier than normal. Although this would normally have delayed outmigration, the August trawl landings were well above average. There were no significant storms to interrupt the fall fishery. The season continued until January 9, 1999 north of Fripp Island and January 15 south of there. Total white shrimp landings were 5.560 M pounds heads-on worth $14.219 M. Although landings were almost identical to those in 1997, the unit price was considerably lower.

The opening of the channel net/trawling season in Winyah and North Santee Bays was delayed until October 14, because of the continued presence of very small shrimp. Channel net landings (78,000 pounds heads-on worth $59,000) were the lowest since 1989 (the year of Hurricane Hugo). Turtle excluder devices (TEDs) were required in Winyah Bay.

In the last decade, recreational baiting has developed into a major competitive factor in the fall white shrimp fishery. Permit sales increased 13% to a record 17,497. Participation (N= 50,436 individuals) slightly exceeded that in 1997. Good weather and early reports of abundance of shrimp were both contributing factors. Total effort (N= 92,484 trips) was slightly less than that in 1997.

Catch rates were relatively low with shrimp scarce after mid-October in most areas. The best shrimping was in the Beaufort area, which historically has had the highest CPUE. The estimated total catch (2.91 M pounds heads-on) was relatively large, due to the high level of effort.

The recreational shrimp baiters' share of the total fall harvest was 41%. Environmental conditions appear to be the principal factor affecting the distribution of fall white shrimp landings. The baiting fishery's largest shares have been obtained in years (1993, 1997, 1998) with unusually dry summer and fall weather, especially during August. In 1998, August was exceptionally dry and baiters took an above-average share of the fall landings in spite of catch rates that were well below normal in nearly all areas.

CRAB

Total blue crab production was 7.563 M pounds, the highest since 1979 (Fig. 10). Potters accounted for nearly all of the production with 7.438 M pounds of hard crab and 115,000 pounds of peeler/soft crab. A wet summer and fall in 1997 appeared to have contributed to above-average recruitment. Total landed value of

blue crab ($5.204 M) was slightly below the record set in 1994 with a relatively high unit value of $0.62/pound for hard crab (Fig. 11).

In 1997, a survey of holders of the marine recreational fisheries stamp was conducted to obtain information on their crabbing activity. Recreational crabbing appeared to be most popular in the southern area with progressively lower participation to the north. The estimated number of crabbers with stamps was about 20,000. Their catch and effort data suggested that their landings during July-October (the peak period for recreational crabbing) equalled 31% of the commercial landings then. A reasonable generalization is that the summer recreational fishery takes roughly one-third of the commercial harvest in the same period.

In the last two years, a fishery has developed for horseshoe crab. Although used as eel bait farther north, the species is taken here almost exclusively to provide fluids for medical purposes and later released alive. In 1998, the landings were 148,000 pounds live weight worth $40,000.

SHELLFISH

Landings data are for calendar year 1998. The number of shellfish dredge licenses issued was the lowest in over ten years. The number of shellfish harvester licenses, 238, was the lowest since 1993.

Oyster production was 63,967 bushels (meat weight 203,000 pounds) valued at $730,000 (Fig. 12). Volume barely exceeded the record low set the previous year and value was the lowest to date. In the spring, heavy rains caused numerous closures for health safety reasons. Fall production was limited by hot, dry weather and low demand. A lot of the State Shellfish Ground acreage was closed to oyster harvest, due to low abundance attributable to overexploitation and/or disease. Results of a 1994 survey of marine fisheries stampholders suggested that the recreational harvest may have approached 40% of the commercial landings.

Clam production was 32,519 (250-count) bags (meat yield 182,000 pounds) worth $860,000 (Fig. 13). Escalator landings were the highest in ten years, while the hand harvest was not much above last year's 20-year low point. Recreational landings were estimated at approximately 30% of the hand harvest as indicated in 1994 survey findings.

The whelk season was opened on January 30 and closed on May 4 with 86 permits issued. Harvest in the directed (trawl) fishery was 8,332 bushels with overall landings of 8,908 bushes (meat weight 178,000 pounds). The catch was valued at $125,000. Both volume and value continued the sharp decline since 1995 (Fig. 14).

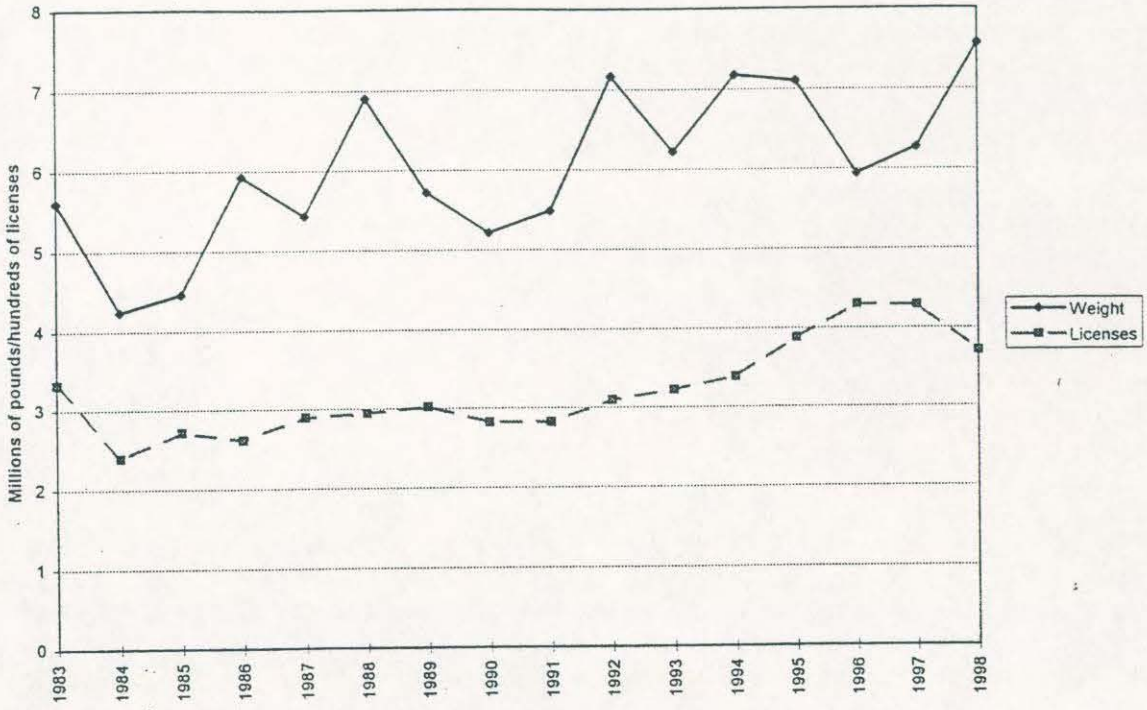

Fig. 10. Annual commercial landings of blue crab and number of crab pot licenses.

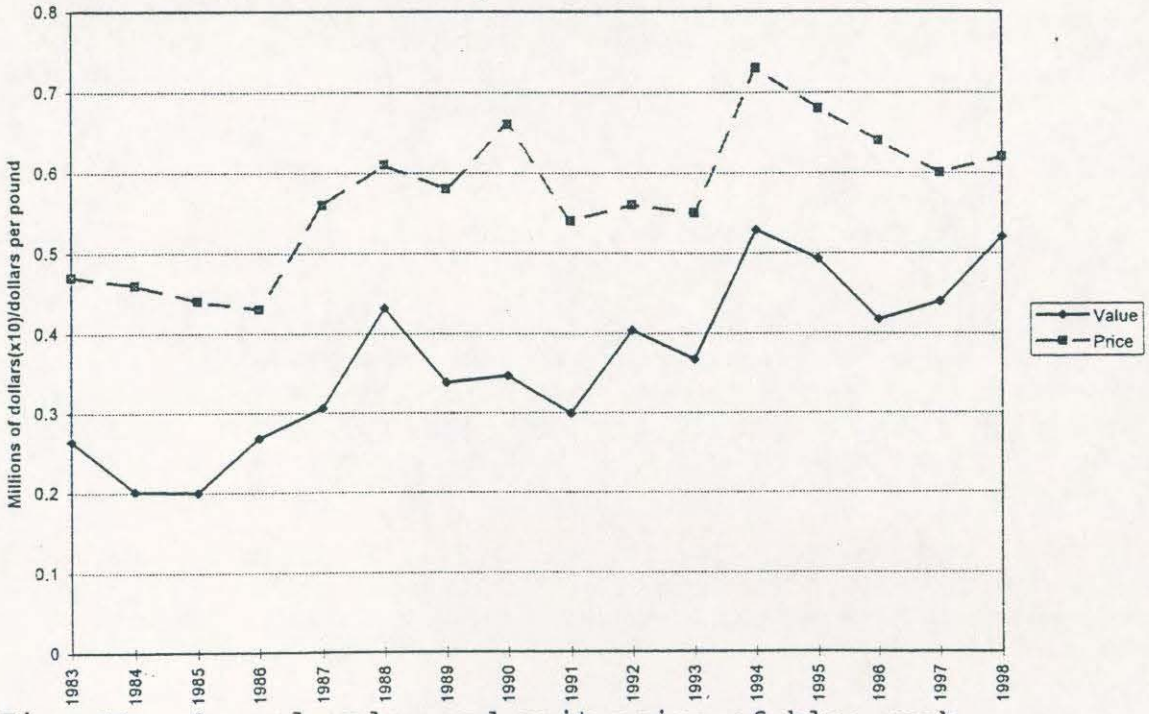

Fig. 11. Annual value and unit price of blue crab.

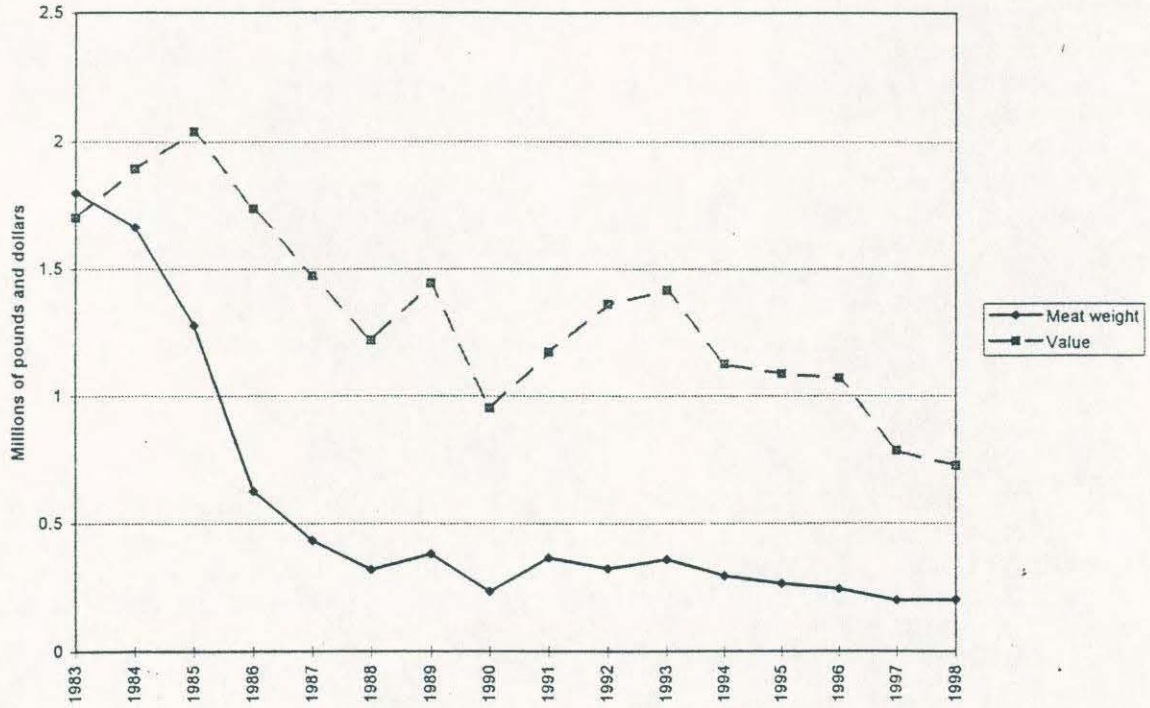

Fig. 12. Annual commercial production of oysters.

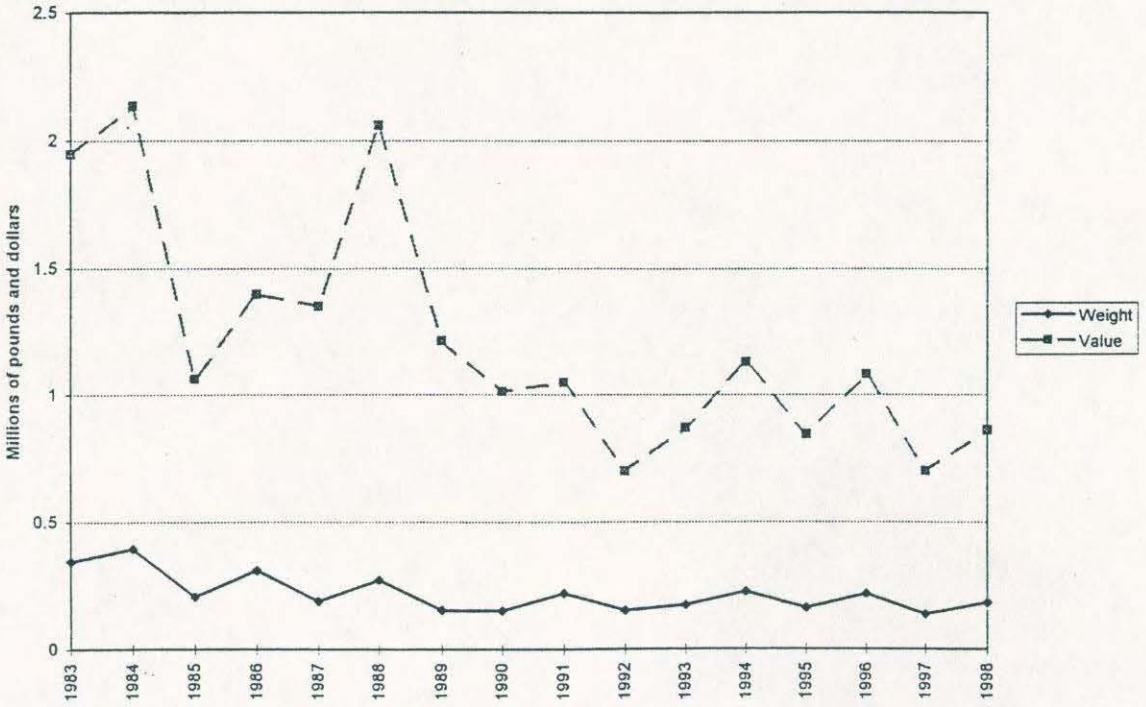

Fig. 13. Annual commercial production of clams.

Annual whelk landings have fluctuated greatly in the last 20 years in a boom/bust cycle. Given the slow growth and essentially nonmigratory (in latitude) characteristics of the resource, it should be feasible to stabilize its long-term yield (and perhaps increase it modestly) with a controlled seasonal schedule. Seasons could be set so as to produce this yield (about 13,000 bushels per year), based on weekly reports of landings. The number of permits issued could also be determined based on this benchmark and allocated according to historical participation. Most of the permit holders usually do not fish and this procedure could help stabilize revenue projections for those participants traditionally dependent on this resource.

OFFSHORE FISH

Production (2.123 M pounds) was the lowest since the mid-1980's, prior to the discovery of the wreckfish resource, and the landed value ($3.923 M) was the lowest in 20 years (Fig. 15). The relative standing of landings by major fish group is shown in Fig. 16. Swordfish was the leading species in both weight and value, followed by gag grouper and vermilion snapper.

The principal gear contributor was the handline fishery. Its two components were 1) a deepwater reel fishery for wreckfish and 2) a snapper reel fishery directed at reef species.

Wreckfish landings were confidential, due to the small number of dealers and harvesters involved: only three vessels participated during 1998. The regional fishery is managed under an individual fishermen's quota system with an overall total allowable catch of 2.0 M pounds. In recent years, the total quota has not been approached as participation and effort have steadily declined. During 1997 and 1998, practically all of the catch was landed in South Carolina. The 1998 state catch was only 21% of the peak state catch reported in 1990. Length distribution was somewhat broader than in the early years of the fishery and the average size (101.6 cm total length) was slightly larger than in recent years. Despite the pronounced decline in landings, the stock is not considered overfished with the reduced effort and landings attributed partly to increased participation by shareholders in other fisheries.

The snapper reel fishery historically has been the largest offshore fishery in terms of landings and participation. Landings (1.392 M pounds valued at $2.580 M) were the second-lowest in the last decade (Fig. 17).

Aggregate grouper landings were 475,000 pounds, the lowest since 1986. Value was $1.189 M. Groupers accounted for 35% of the total volume of reef fish. The leading contributor was gag with 225,000 pounds, landed almost entirely by snapper reel. Although improved from the previous year, this production was well below

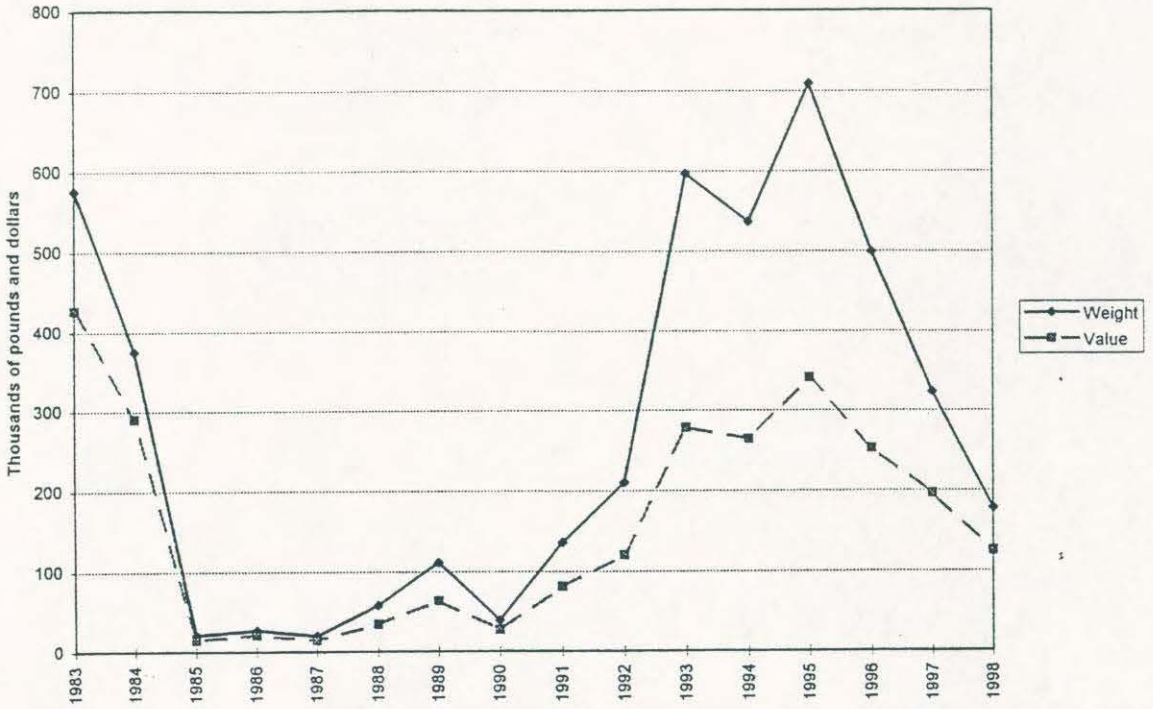

Fig. 14. Annual commercial production of whelks.

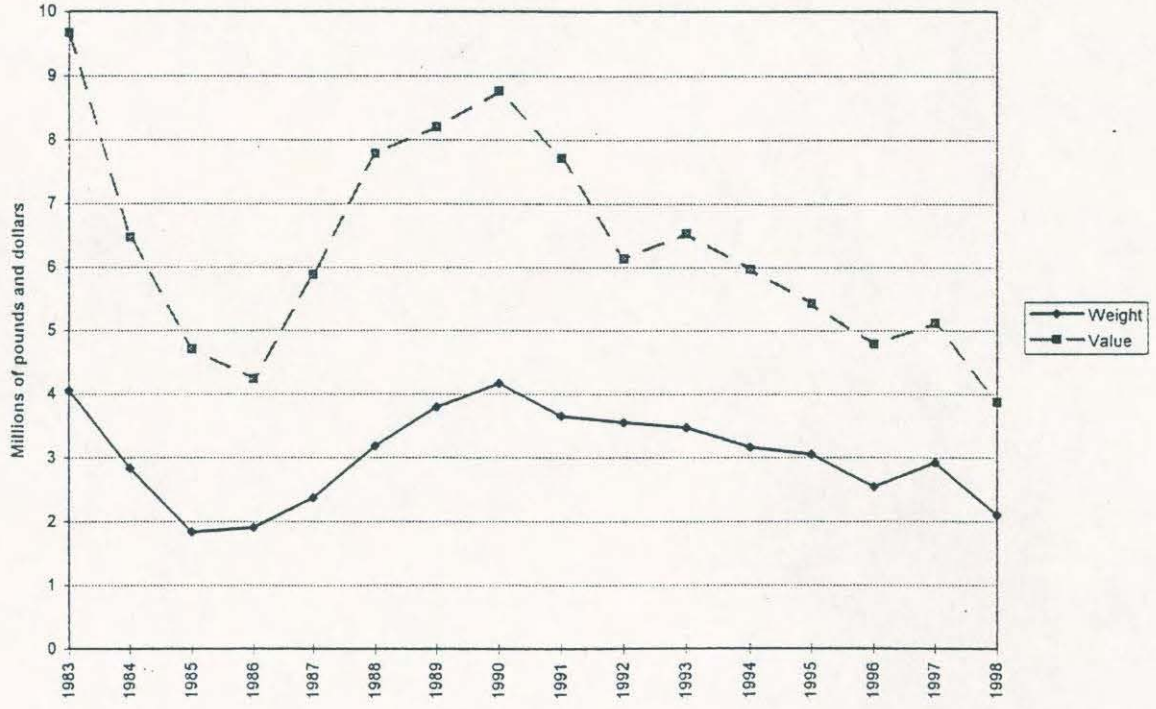

Fig. 15. Annual commercial production of offshore fish.

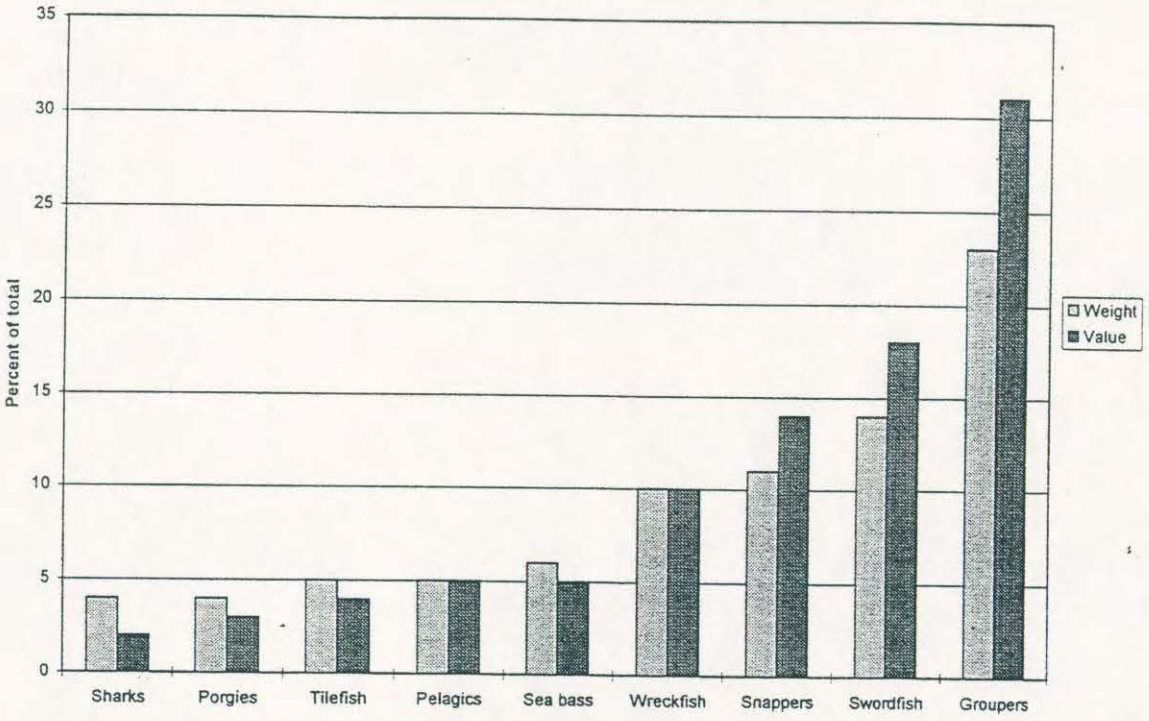

Fig. 16. Landings of major offshore fish groups.

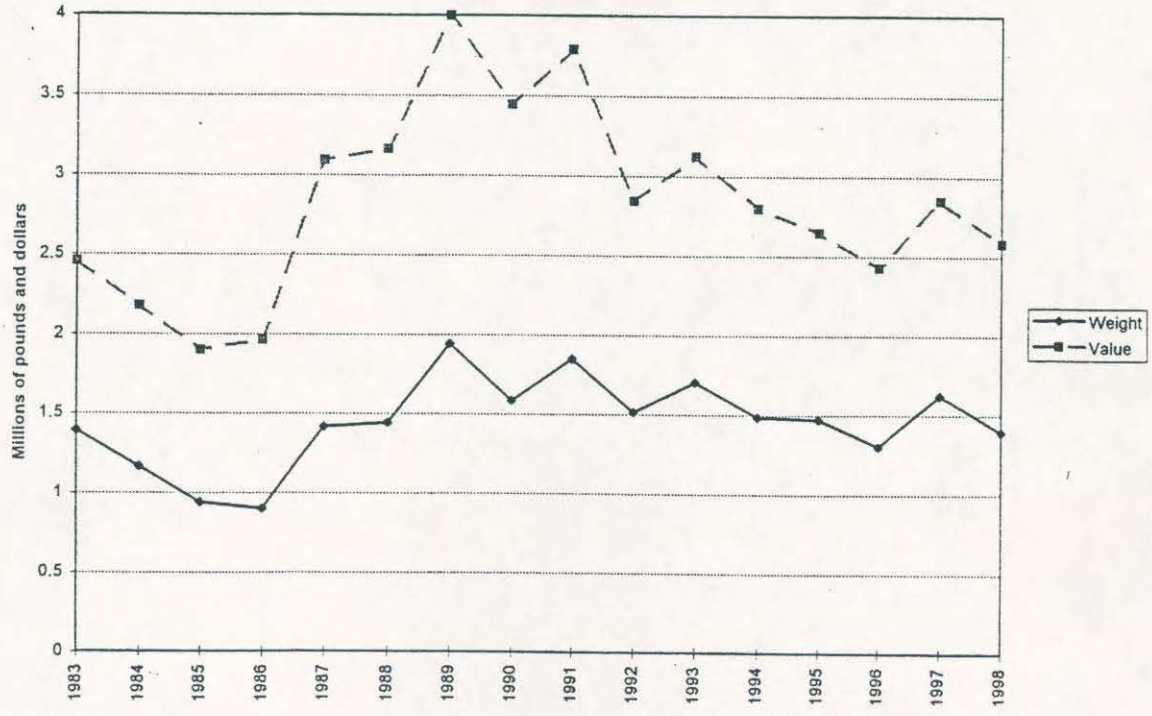

Fig. 17. Annual production of the snapper reel fishery.

historical standards (Fig. 18). Gag still remained the second leading species in offshore landings after swordfish. Landings of scamp (137,000 pounds) remained stable, while snowy production reached its lowest point.

Length distribution of gag is shown in Fig. 19. The relative scarcity of large (>90 cm) fish (i.e., mature males) continued to be cause for concern about potential recruitment overfishing. In 1998, 18.0% of the fish measured exceeded 90 cm. In contrast, 58.4% of the gag sampled in 1977 were >90 cm. The average size (81.9 cm total length) continued an upward trend (Fig. 20).

The length distribution of scamp (Fig. 21) continued to be heavily skewed toward smaller fish. The mean length, 54.4 cm fork length, was a little above the average of recent years (Fig. 22).

The NMFS closed the regional snowy grouper fishery shortly before the end of the year with the quota having been reached. South Carolina landings (58,000 pounds) were the worst on record. Length distribution (Fig. 23) was dominated by small fish with a relatively low average size of 51.6 cm total length (Fig. 24).

Snapper landings were relatively low (Fig. 25). The vermilion snapper catch (212,000 pounds worth $480,000), although low by historical standards, was sufficient to secure third place in the individual species landings, behind swordfish and gag. Most of the sampled vermilion snapper were close to the 30 cm (12 in) total length minimum size limit (Fig. 26) and there was little change in the average total length (35.3 cm, Fig. 27). Red snapper landings (12,000 pounds) were the lowest on record, continuing the severely depressed level of recent years. The few fish taken continued to be predominantly large with an average size of 63.8 cm total length. There has been no evidence of significant recruitment in the last few years.

Total porgy landings were 93,000 pounds valued at $126,000, the lowest volume production recorded in over 20 years. Snapper reel landings of the principal species, red porgy, were the lowest to date (Fig. 28). Twenty years ago, this species comprised over one-third of the total snapper reel landings by weight; in 1998, its contribution was only 5%. The catch of red porgy continued to consist largely of small fish (Fig. 29) and the mean total length (35.2 cm) was slightly lower than in recent years (Fig. 30).

Bottom longline production declined to 282,000 pounds worth $376,000 (Fig. 31). Production of all traditional components, e.g. golden tilefish, snowy grouper, and sharks was down. The largest volume contributor was golden tilefish with 82,000 pounds valued at $136,000. Landings of this species continued to be dominated by relatively small fish (Fig. 32), although the average size (59.3 cm fork length) was the largest since 1990 (Fig. 33).

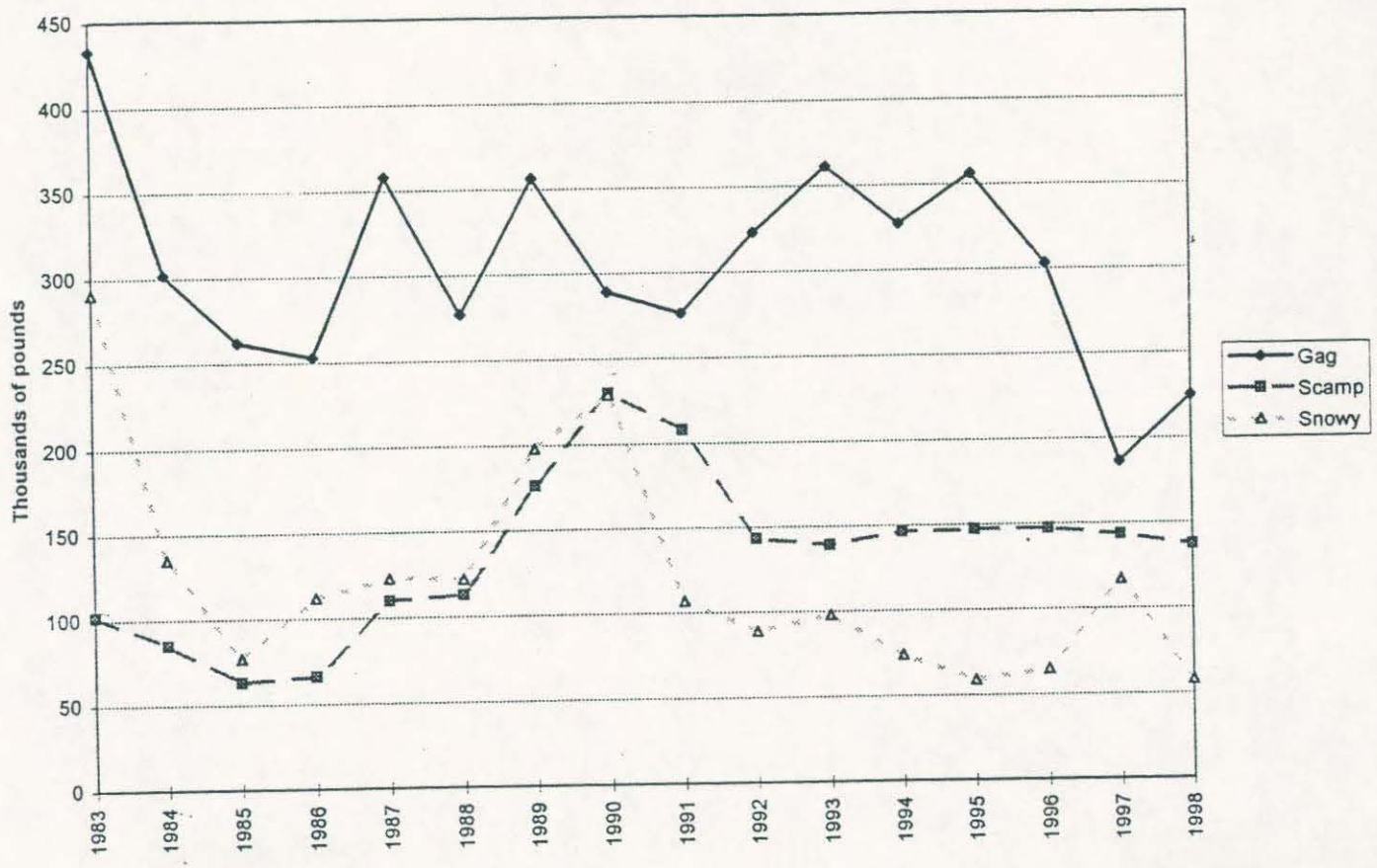

Fig. 18. Annual commercial landings of groupers.

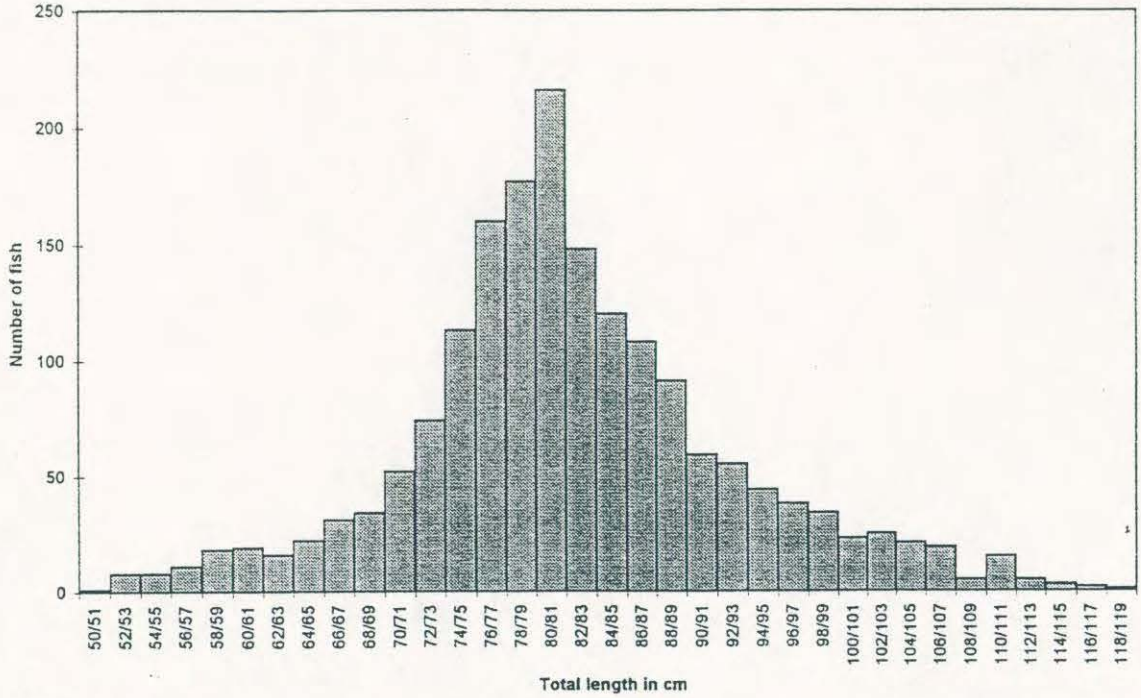

Fig. 19. Length distribution of commercially landed gag.

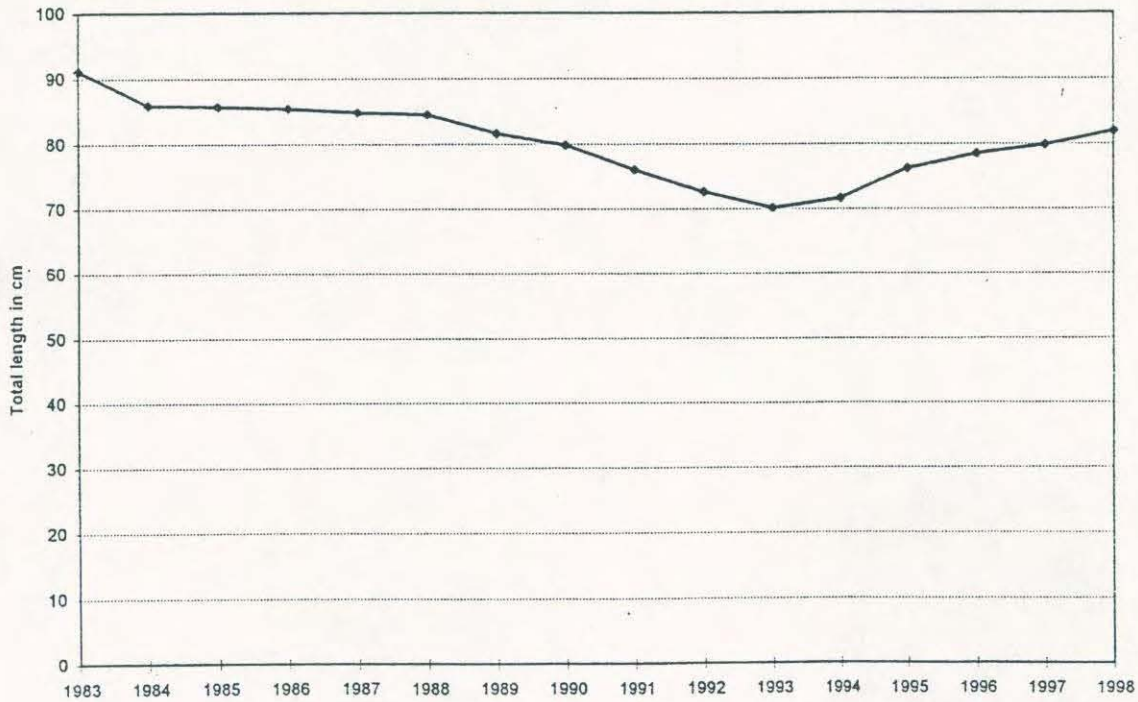

Fig. 20. Average length of commercially landed gag.

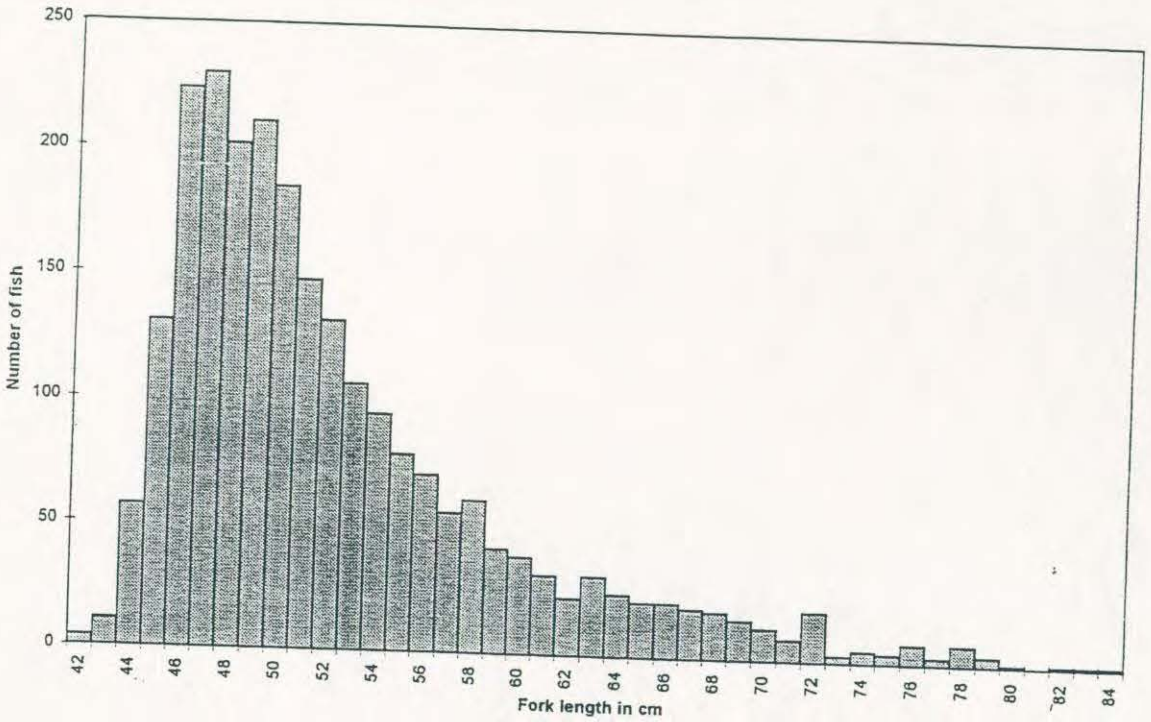

Fig. 21. Length distribution of commercially landed scamp.

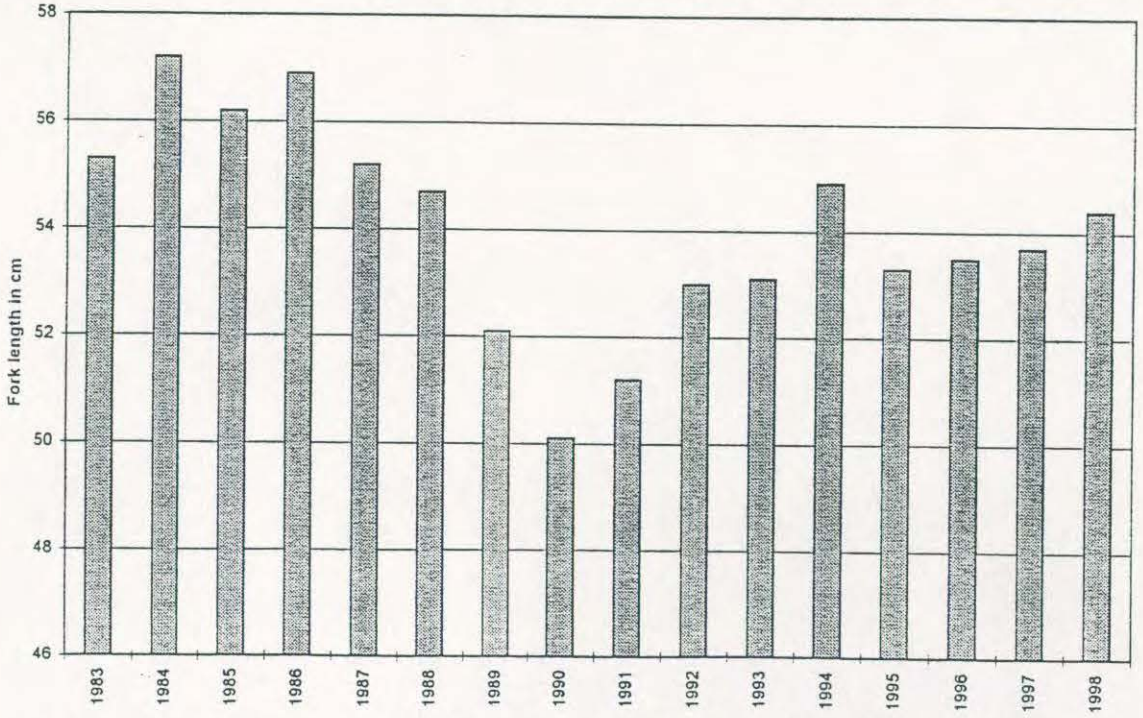

Fig. 22. Average length of commercially landed scamp.

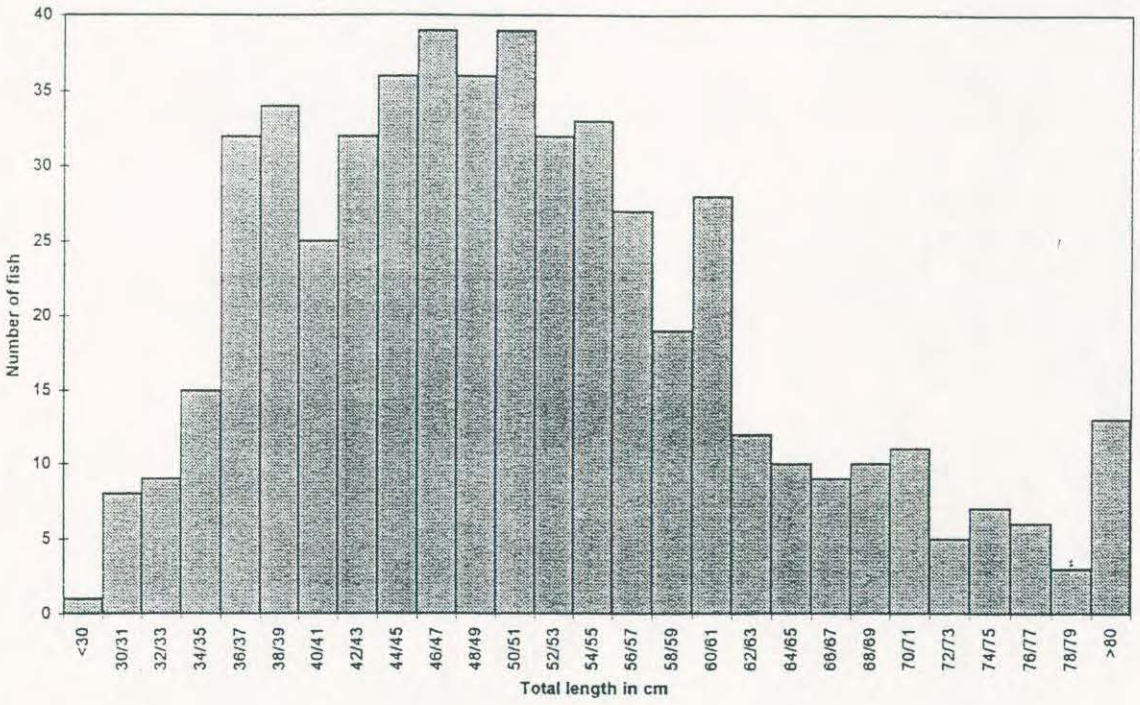

Fig. 23. Length distribution of commercially landed snowy grouper.

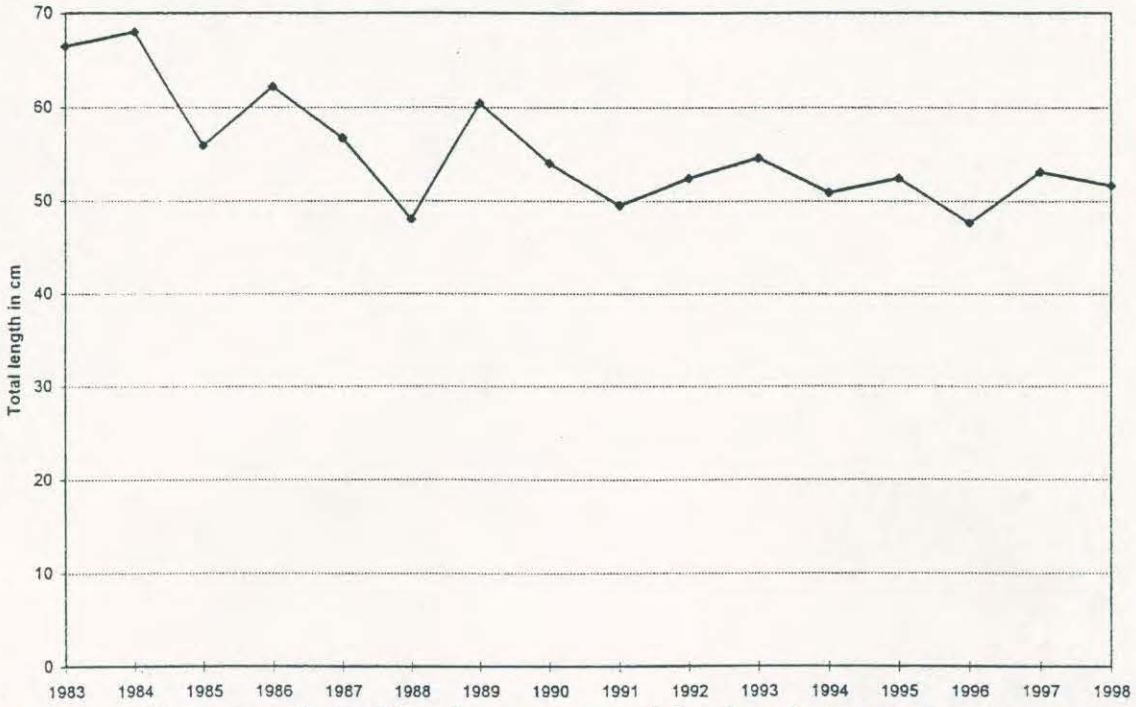

Fig. 24. Average length of commercially landed snowy grouper.

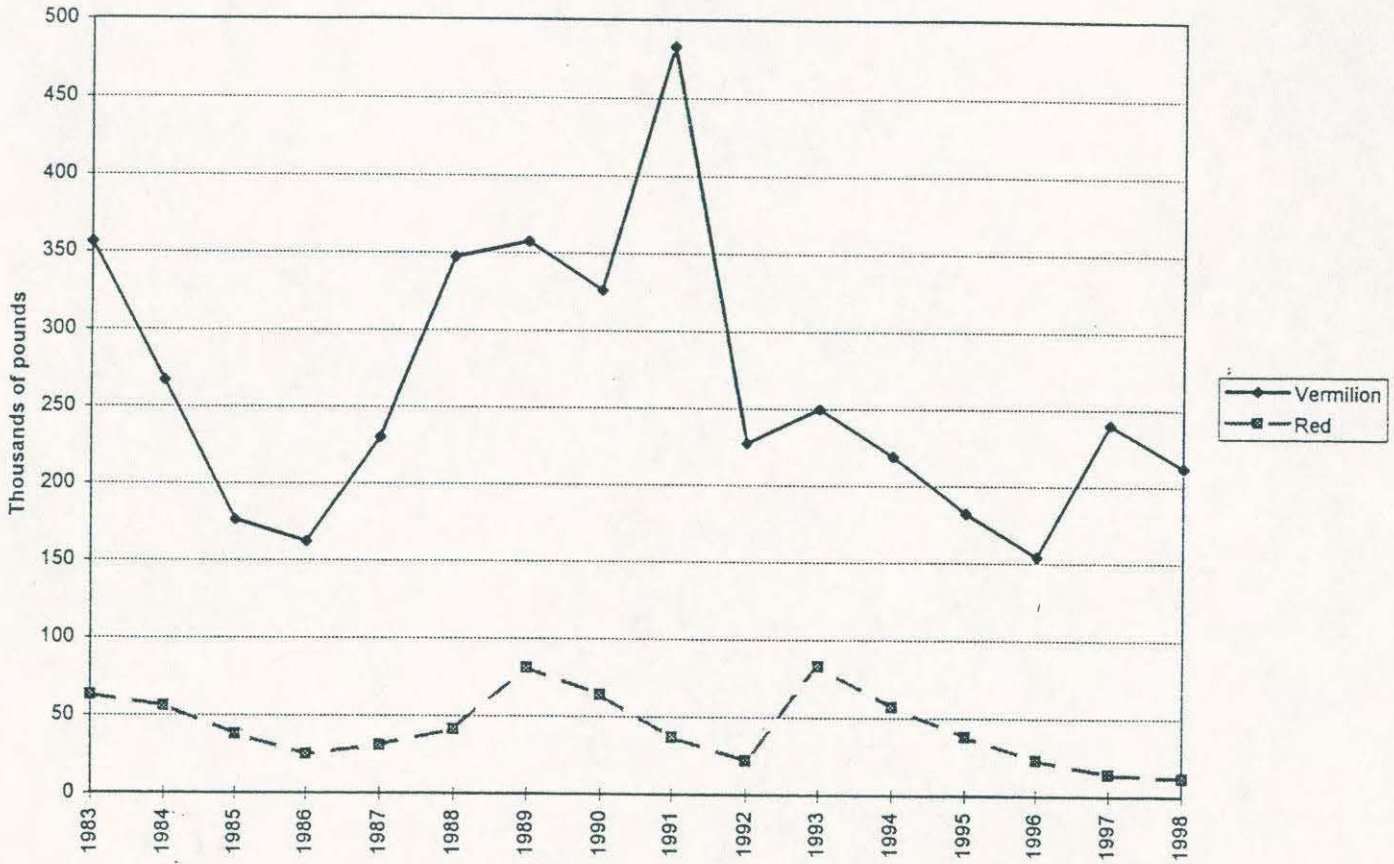

Fig. 25. Annual commercial landings of snappers.

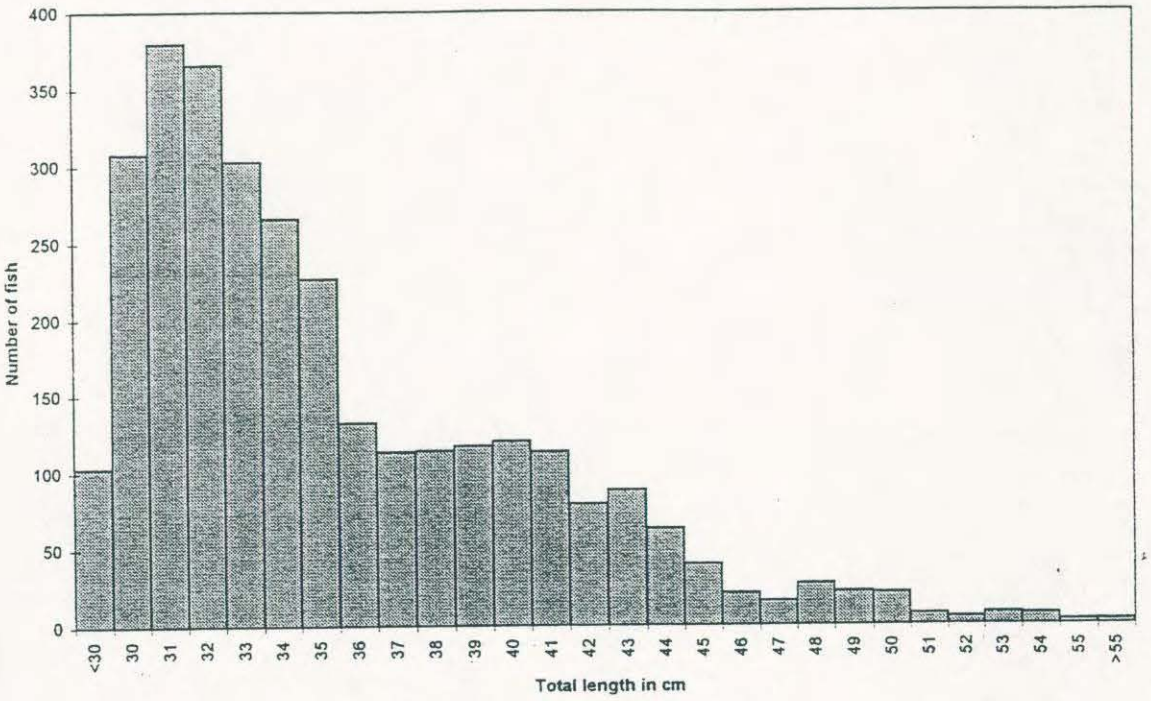

Fig. 26. Length distribution of commercially landed vermilion snapper.

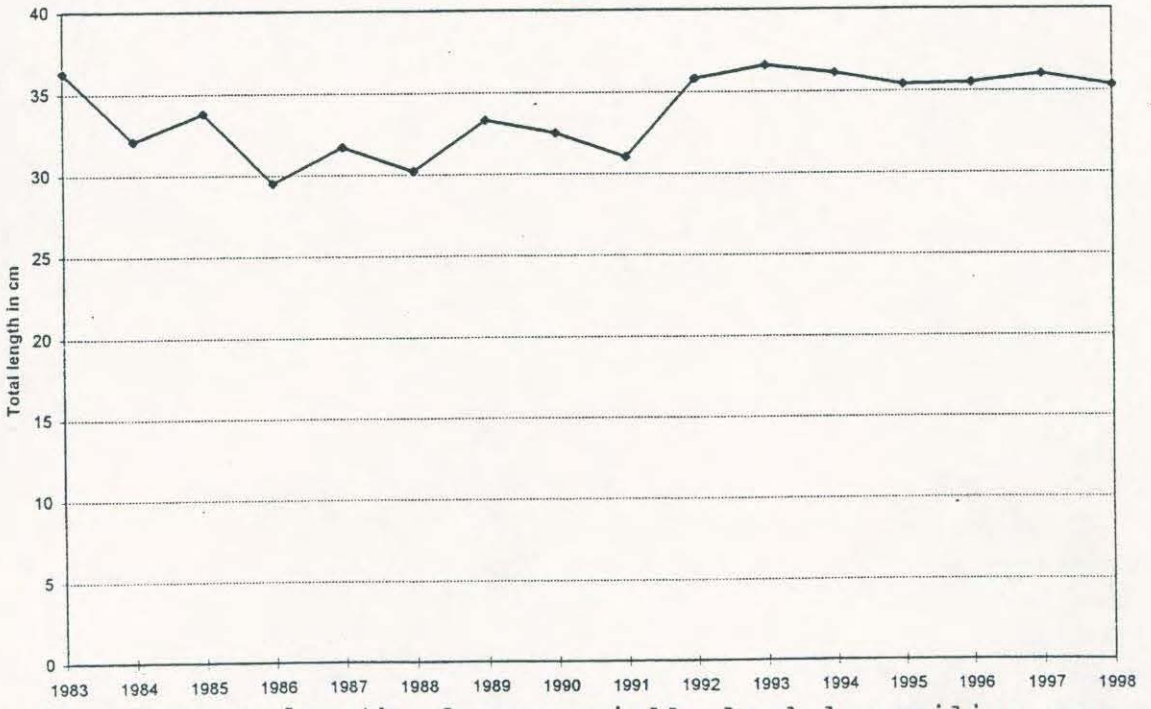

Fig. 27. Average length of commercially landed vermilion snapper.

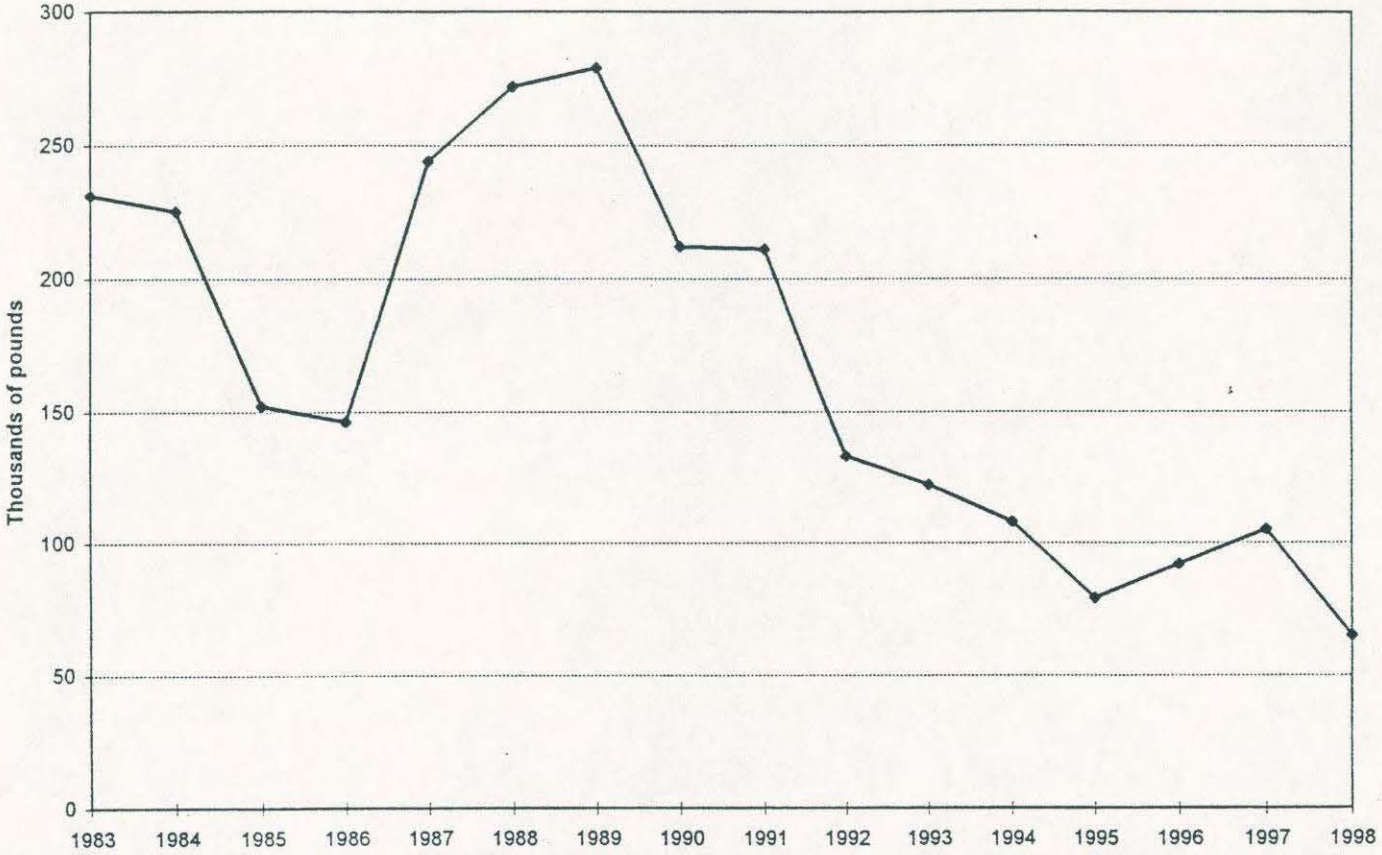

Fig. 28. Annual snapper reel landings of red porgy.

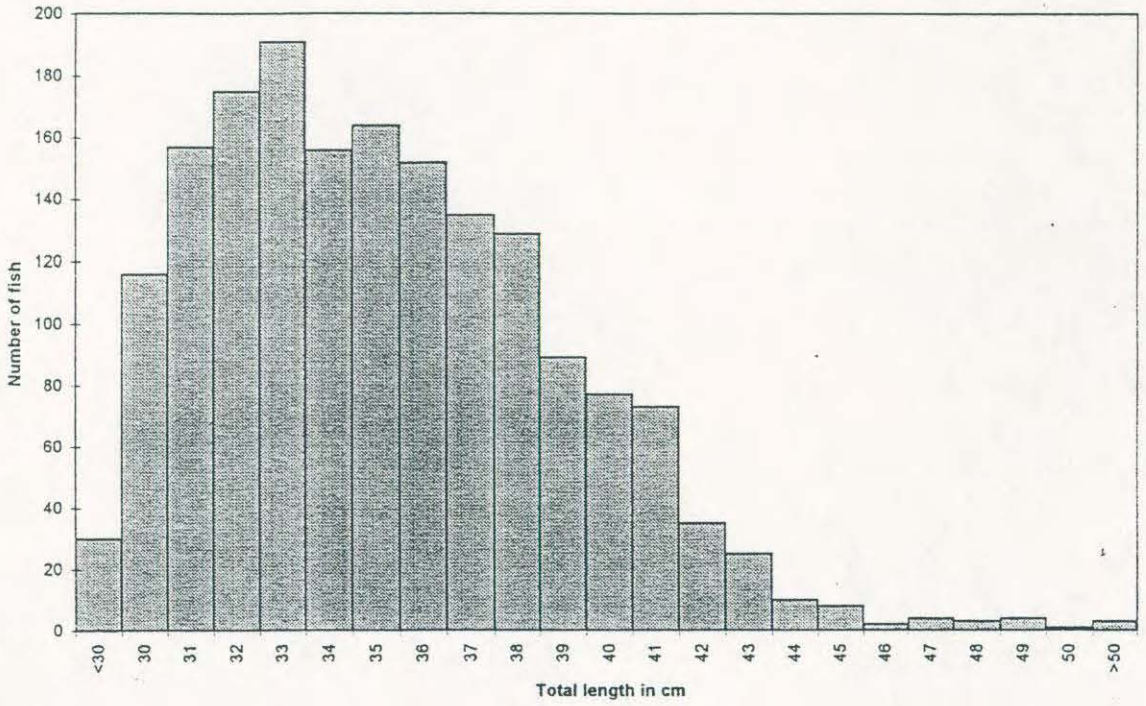

Fig. 29. Length distribution of commercially landed red porgy.

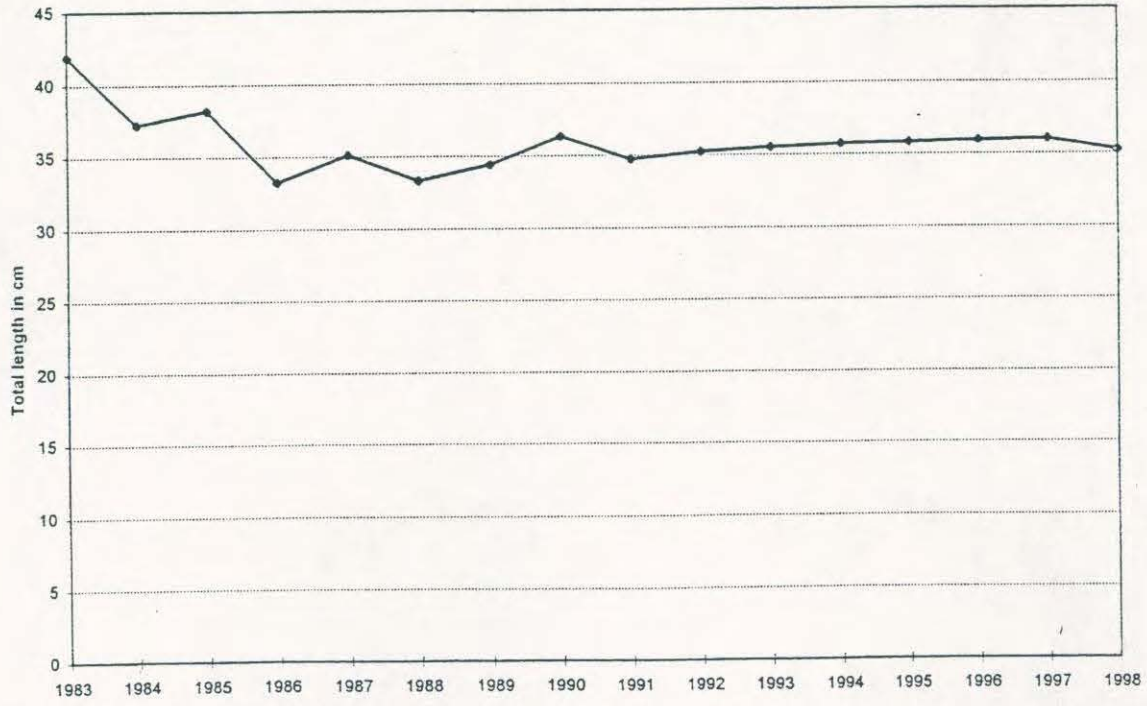

Fig. 30. Average length of red porgy caught on snapper reels.

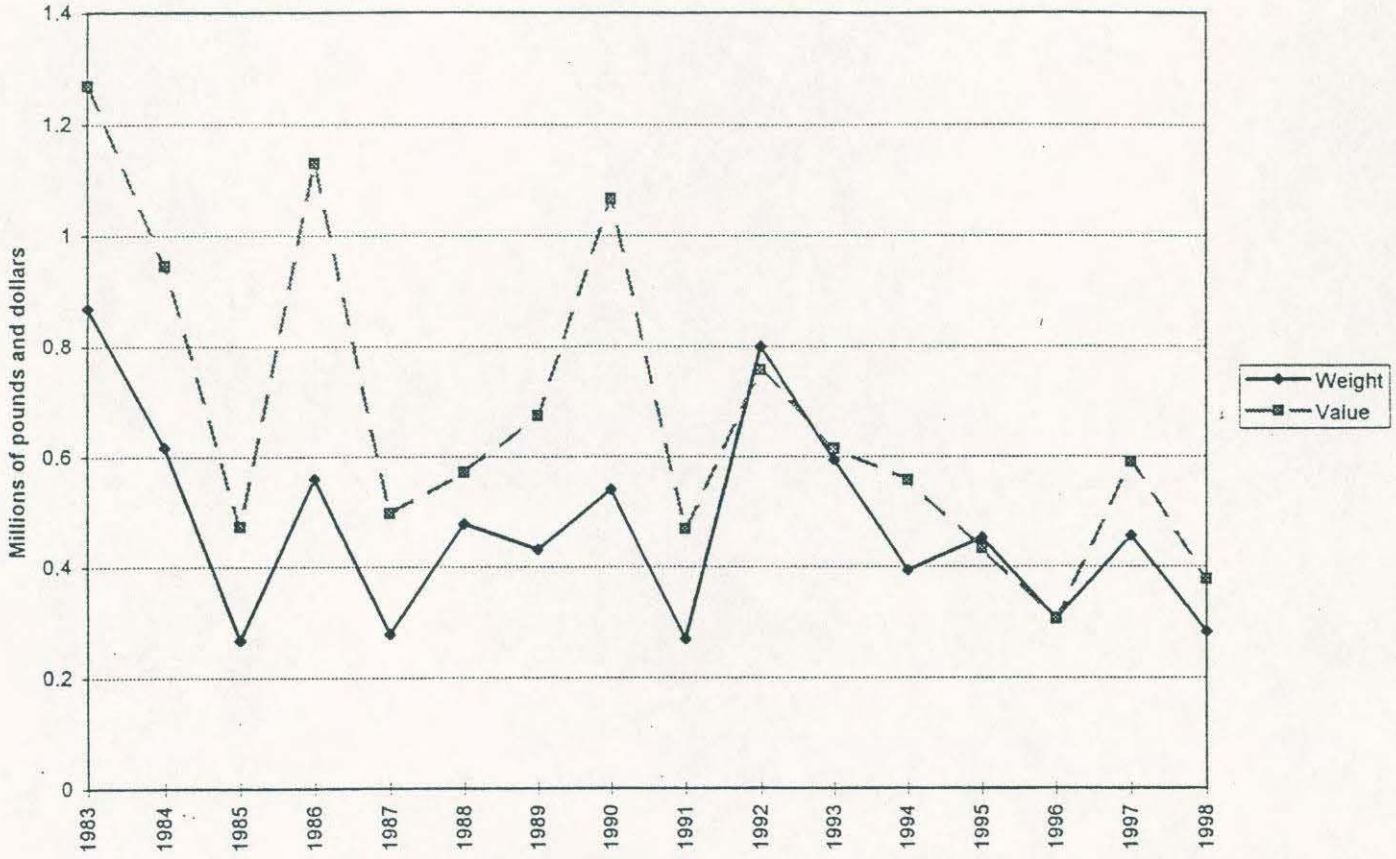

Fig. 31. Annual production of the bottom longline fishery.

Black-bellied rosefish, a species largely discarded prior to 1996, was the second leading volume component, as in 1997 (Fig. 34). The unit value of this small fish (average fork length 29.7 cm in 1998) is low relative to that of most other species taken in this fishery.

The low shark landings, made up primarily of species in the large coastal complex, were partly attributable to closures. In 1998, the semi-annual overall quota for this group was only 600 metric tons with the fishery closed during April 1-June 30 and August 5-December 31. Since 1986, offshore fisheries have provided the majority of the shark landings with the bottom longline fishery the leading producer (Fig. 35). Inshore landings have been negligible since the legislated phase-out of the gill net fishery in 1994. Total shark landings have been on a steep downward slide since 1992 (Fig. 36).

Landings of the pelagic longline fishery declined sharply with the lowest ex-vessel value since the beginning of the local fishery in 1977 (Fig. 37). Total volume was 359,000 pounds valued at $834,000. The swordfish catch (310,000 pounds) was the largest since 1990 with this the single-species leader among offshore fish in both weight and value ($764,000) landed.

In recent years, the non-swordfish component of the pelagic longline catch has steadily increased to a peak in 1997, when it represented 57% of the fishery's volume and 33% of the ex-vessel value. This situation did not occur in 1998, when swordfish comprised 86% of the weight and 92% of the value of pelagic longline landings. The timing of closures in waters fished by local fishermen probably influenced catch composition.

Most of the non-swordfish component, or incidental catch, consisted of sharks, dolphin, and tunas (primarily yellowfin). Pelagic longline landings of sharks in 1998 were sharply limited by quota-controlled closures and were 17,000 pounds vs 135,000 pounds in 1997. The first swordfish season closed on March 31, just prior to the peak availability of dolphin and yellowfin tuna off South Carolina. The dolphin landings were only 24,000 pounds, compared to 225,000 pounds the previous year.

Commercial landings of pelagic species, e.g. dolphin, tunas, and king mackerel, have been contentious with offshore anglers (although they typically have taken the majority of the combined catch). The dramatic increase in commercial dolphin landings (Fig. 38), primarily by pelagic longline fishermen, exacerbated this longstanding controversy. Events in 1998, however, were more typical of the historical pattern than those in the preceding three years. The total commercial dolphin landings were 48,084 pounds compared to 49,393 pounds reported by charterboat operators. Commercial yellowfin tuna landings were 11,371 pounds compared to the reported charterboat landings of 30,626 pounds.

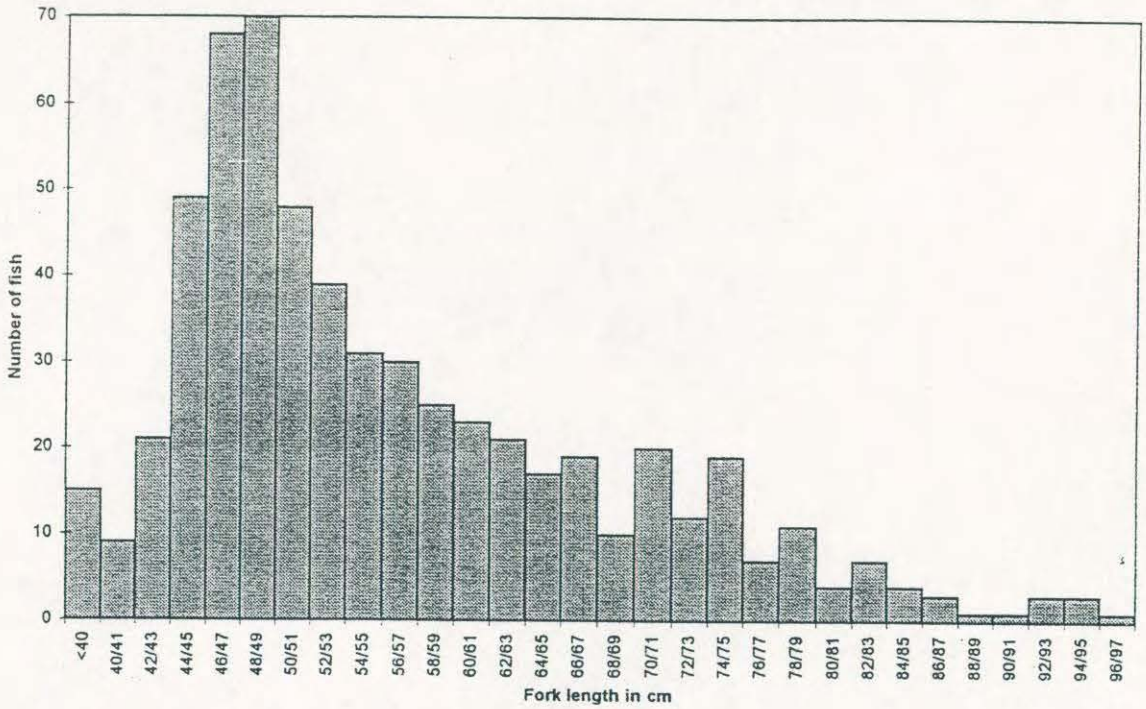

Fig. 32. Length distribution of golden tilefish.

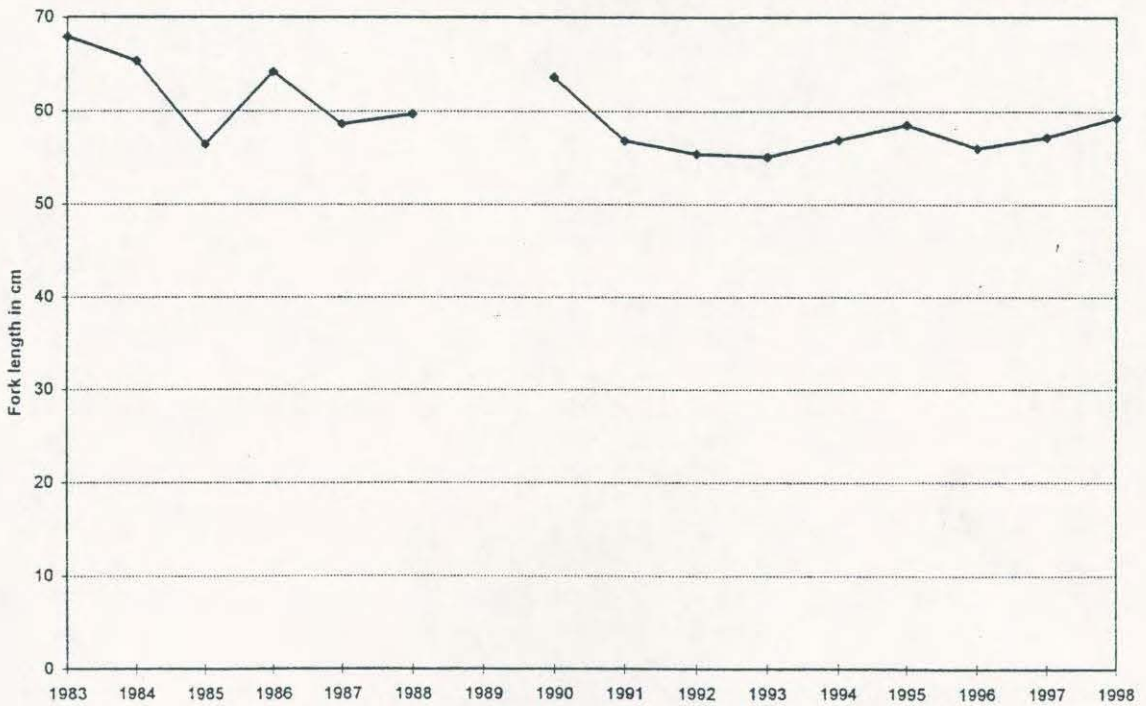

Fig. 33. Average length of golden tilefish.

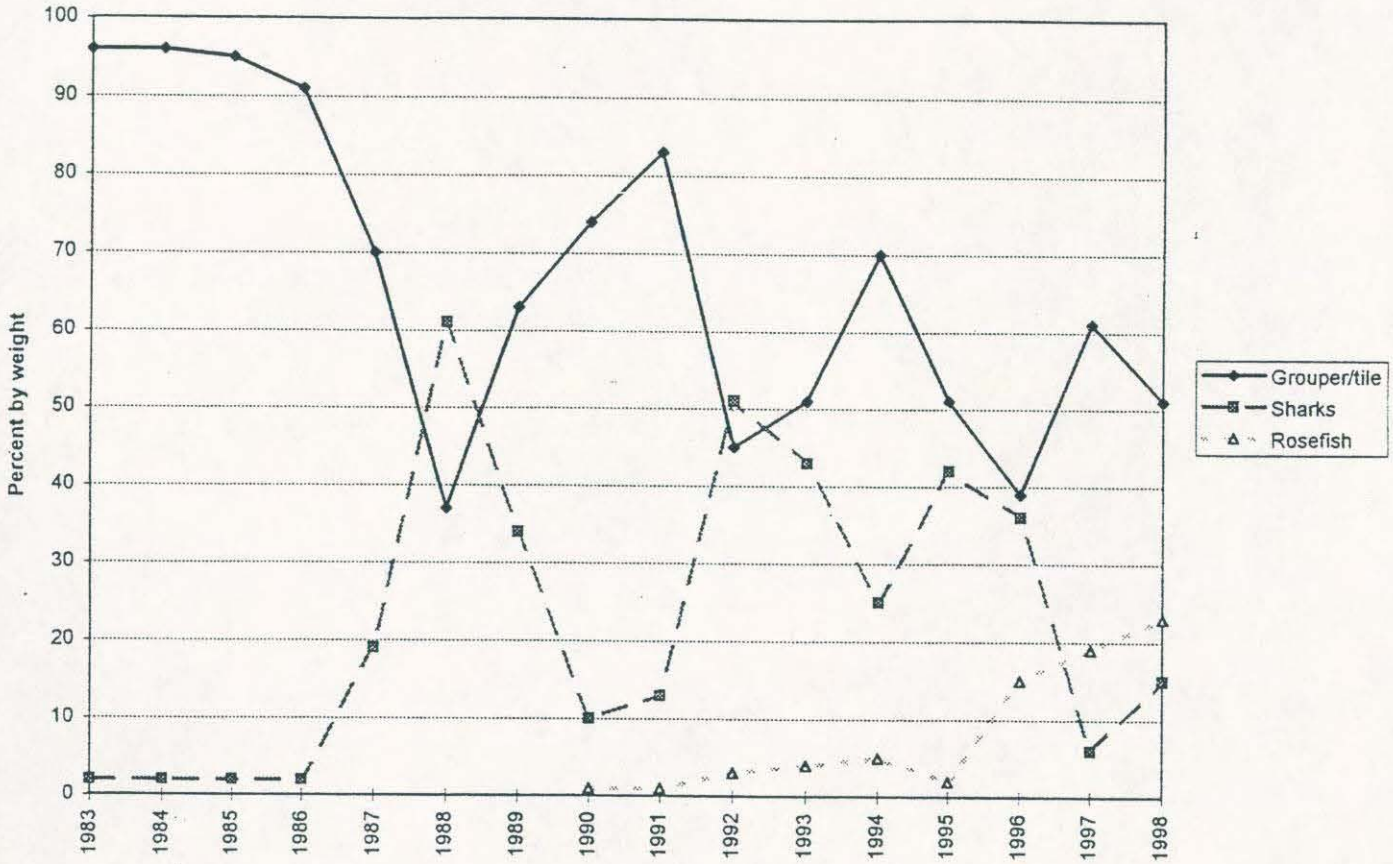

Fig. 34. Composition of bottom longline landings.

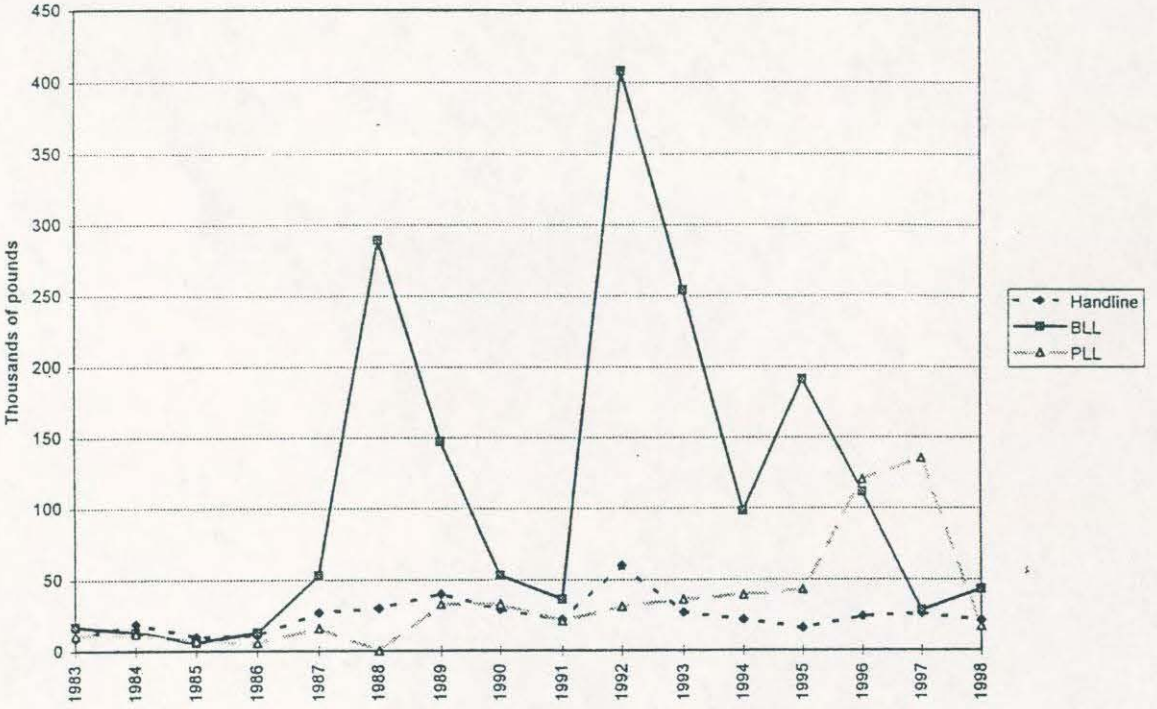

Fig. 35. Annual composition of offshore shark landings by gear.

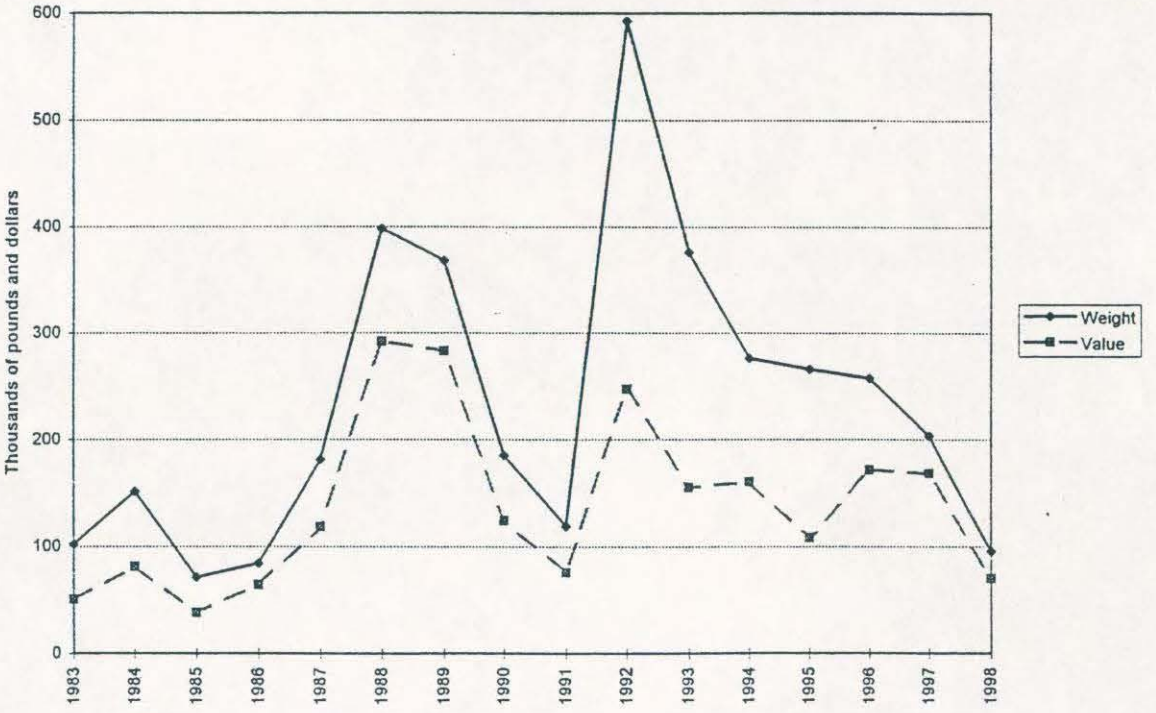

Fig. 36. Annual production of sharks.

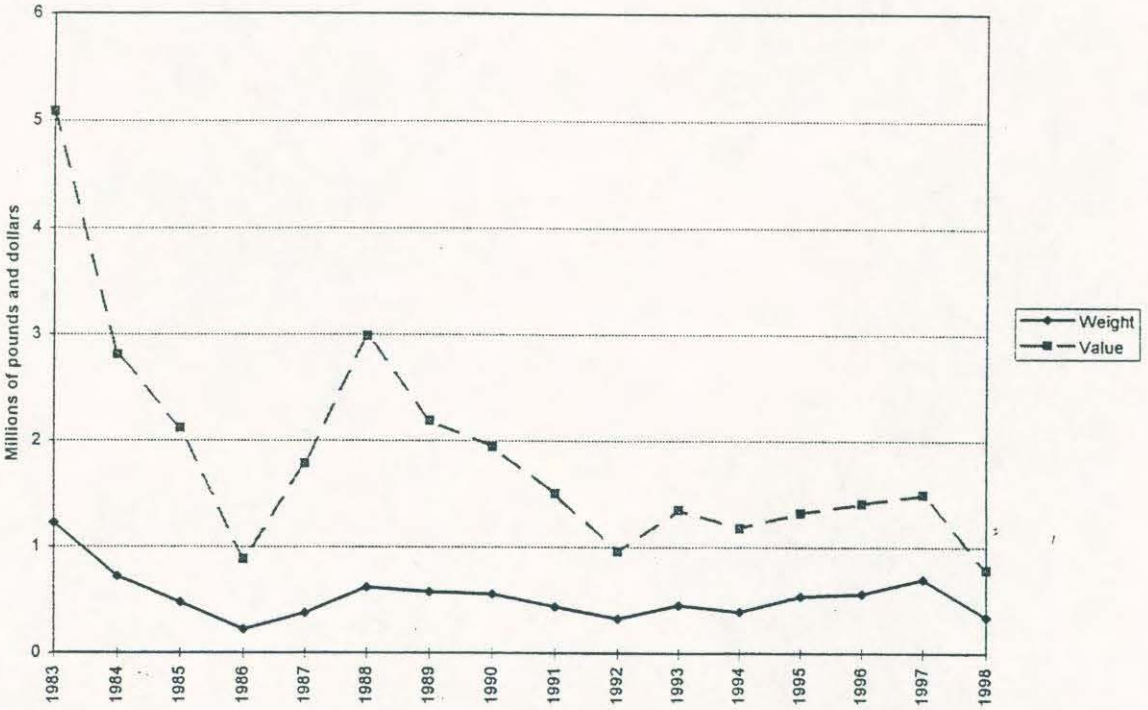

Fig. 37. Annual production of the pelagic longline fishery.

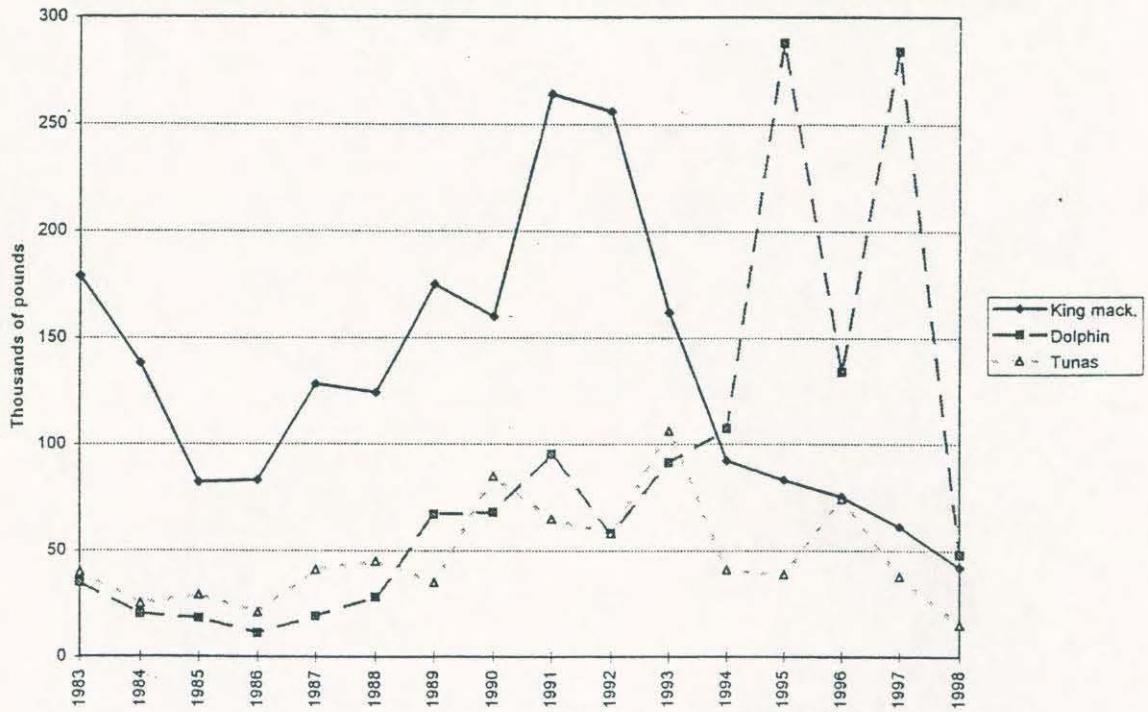

Fig. 38. Annual commercial landings of pelagic species.

Commercial king mackerel landings (Fig. 38) have declined steadily since 1991 with the 1998 catch (42,000 pounds worth $69,000) the lowest since 1978. In contrast, the reported charterboat landings were 70,000 pounds. The regional stock is considered to be not overfished with the decline in South Carolina commercial landings apparently due to reduced directed effort. Length distribution of the commercial catch is shown in Fig. 39. Average length has been variable, tending to be lower during years of higher landings (Fig. 40). This is not surprising, since school fish tend to be smaller and commercial effort increases when they are abundant.

The offshore trap fishery was directed at black sea bass. Reported landings (90,000 pounds valued at $135,000) were the lowest since 1979 (Fig. 41). The trend in trap landings of black sea bass has paralleled that of overall trap production, although appreciable quantities of other reef species were also landed during 1990-1991 before directed fishing for them with trap gear was prohibited.

The total catch of black sea bass by all gears was 119,000 pounds ($184,000), the lowest since 1978. Length distribution of fish taken with all gears (but predominantly trap) is shown in Fig. 42 . The minimum legal size throughout 1998 was 254 cm (10 in) total length. In 1997, nearly all of the trap catches were sampled before the new minimum size went into effect. About 22% of the sampled fish by number were <254 cm. Based on length-weight relationships, this was equivalent to a weight component of 11%. It therefore appears that the new minimum size reduced the 1998 trap landings of sea bass by at least 11%. Presumably as a result of the increased minimum size, the average size of commercially landed fish was appreciably larger than in recent years (Fig. 43).

COASTAL AND RIVERINE FISH

The 1998 catch of coastal fish was 162,000 pounds worth $76,000, the lowest in over 20 years (Fig. 44). Mandatory use of finfish excluders probably reduced the shrimp trawl landings, which were the lowest since 1977. The principal species, kingfish, landed by trawlers accounted for only 34,000 pounds, the lowest production since 1981. The haul seine fishery of the Grand Strand targets mullet and spot. Landings of both were among the lowest on record.

The 1998 riverine fish landings (397,000 pounds valued at $238,000) consisted entirely of American shad. Landings remained relatively high after a lengthy period of decline (Fig. 45). About 17% of the catch (67,000 pounds) was taken in the ocean and 12% (49,000 pounds) in Winyah Bay. Most (86%) of the riverine catch came from the Santee River.

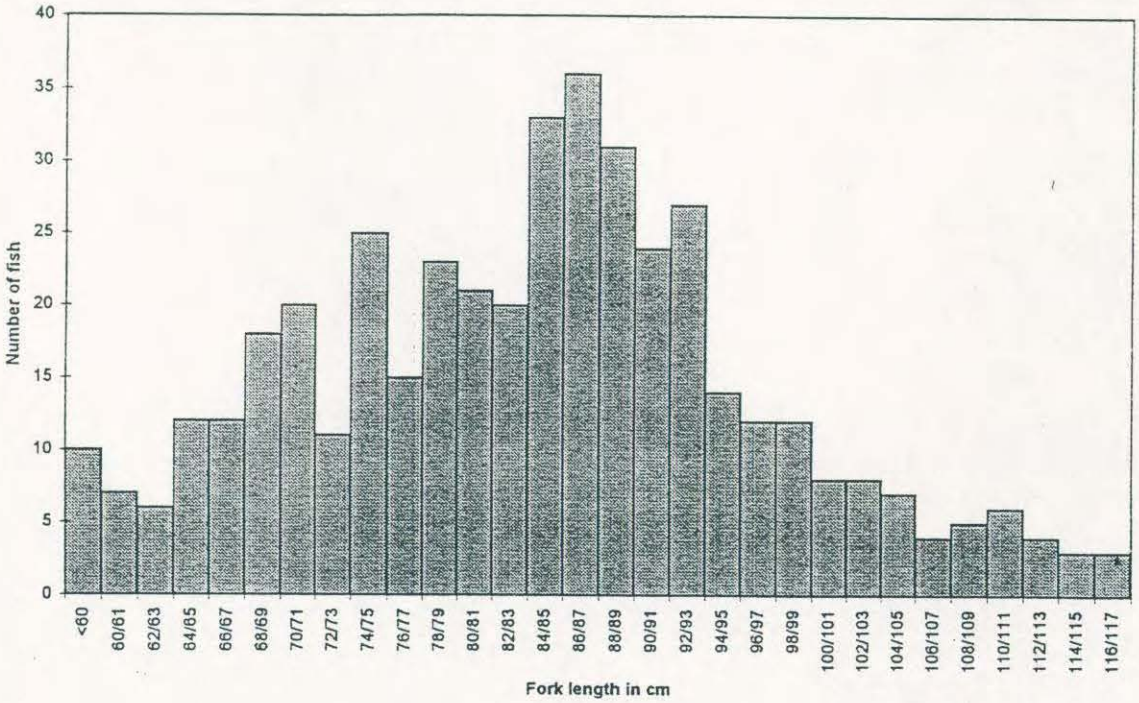

Fig. 39. Length distribution of commercially landed king mackerel.

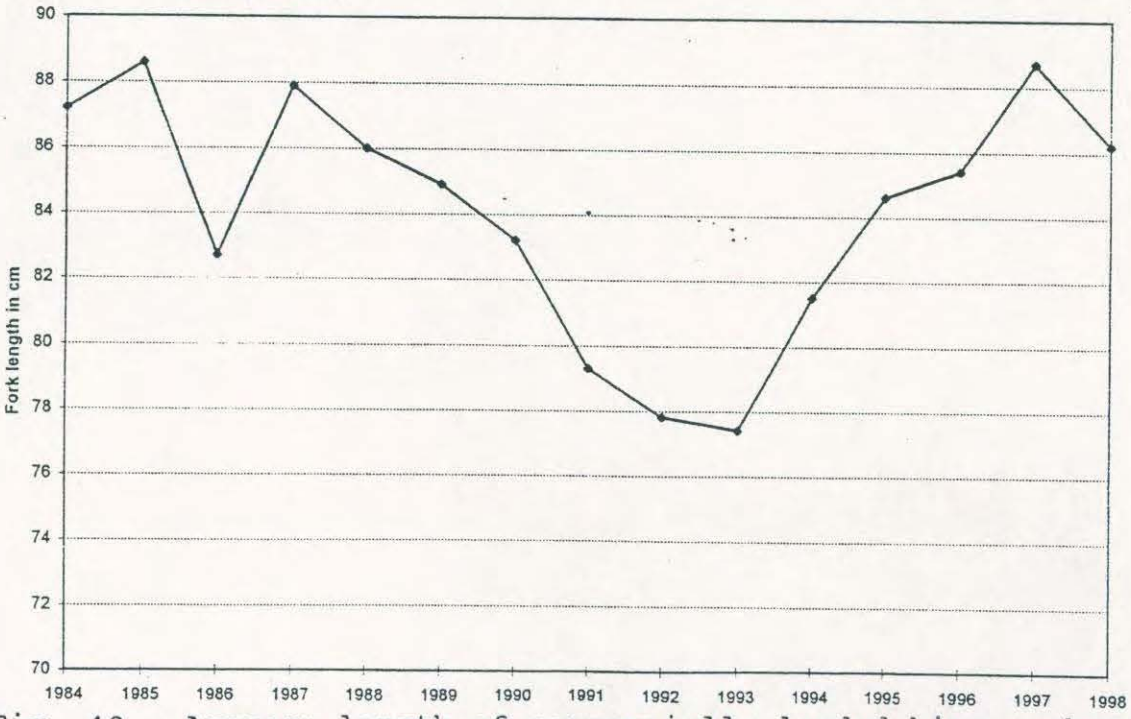

Fig. 40. Average length of commercially landed king mackerel.

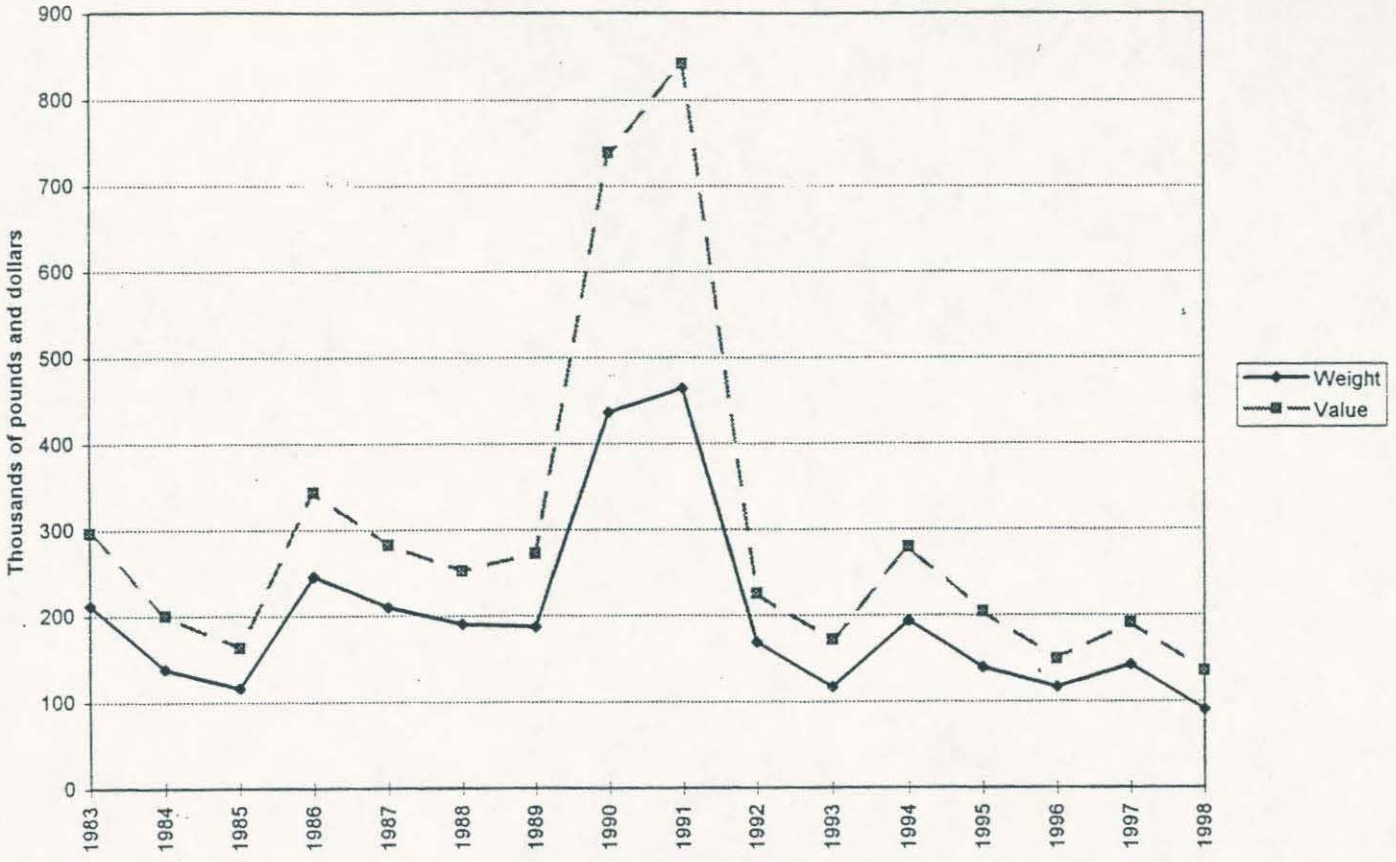

Fig. 41. Annual production of the offshore fish trap fishery.

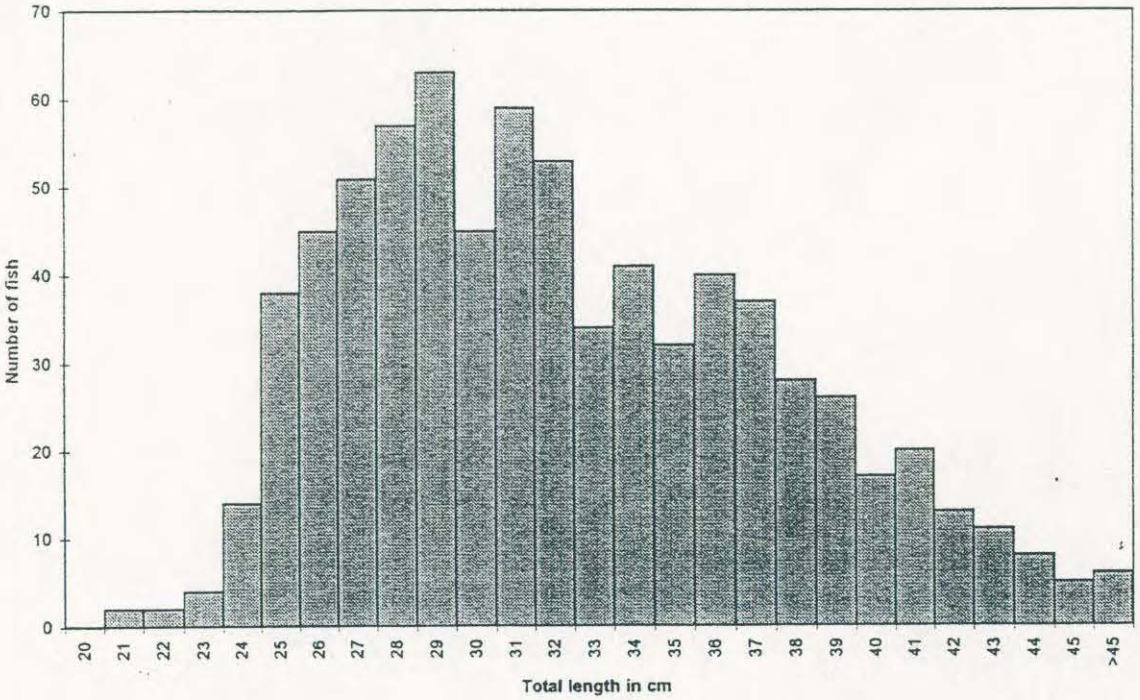

Fig. 42. Length distribution of commercially landed black sea bass.

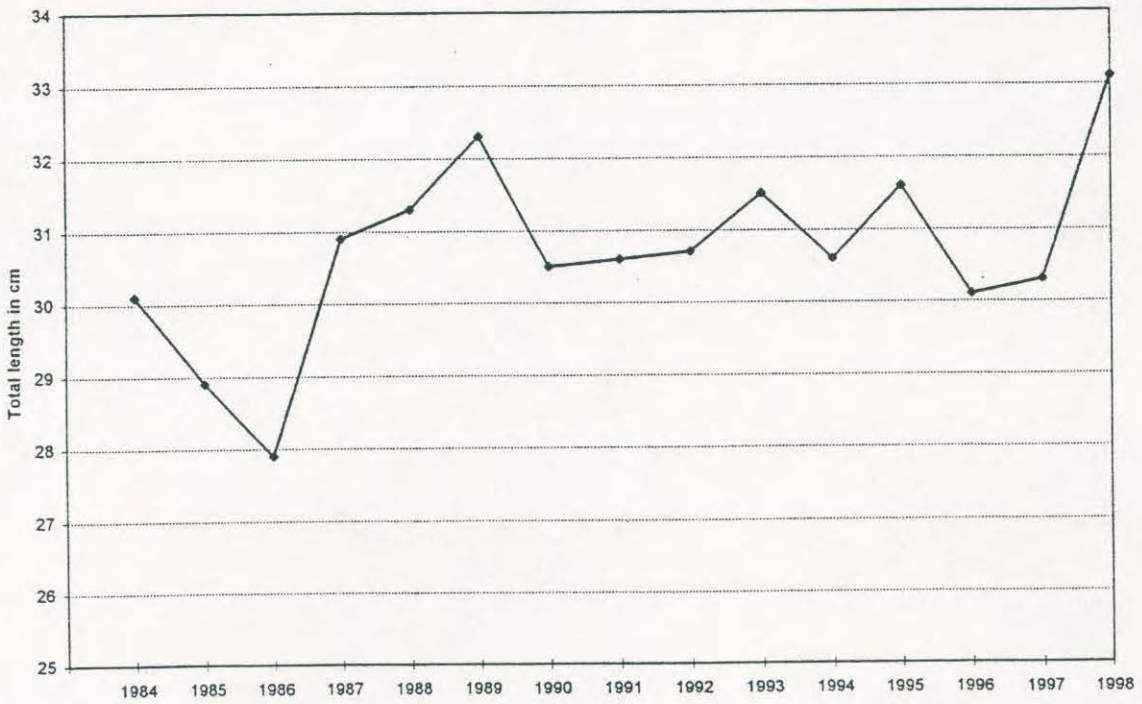

Fig. 43. Average length of commercially landed black sea bass.

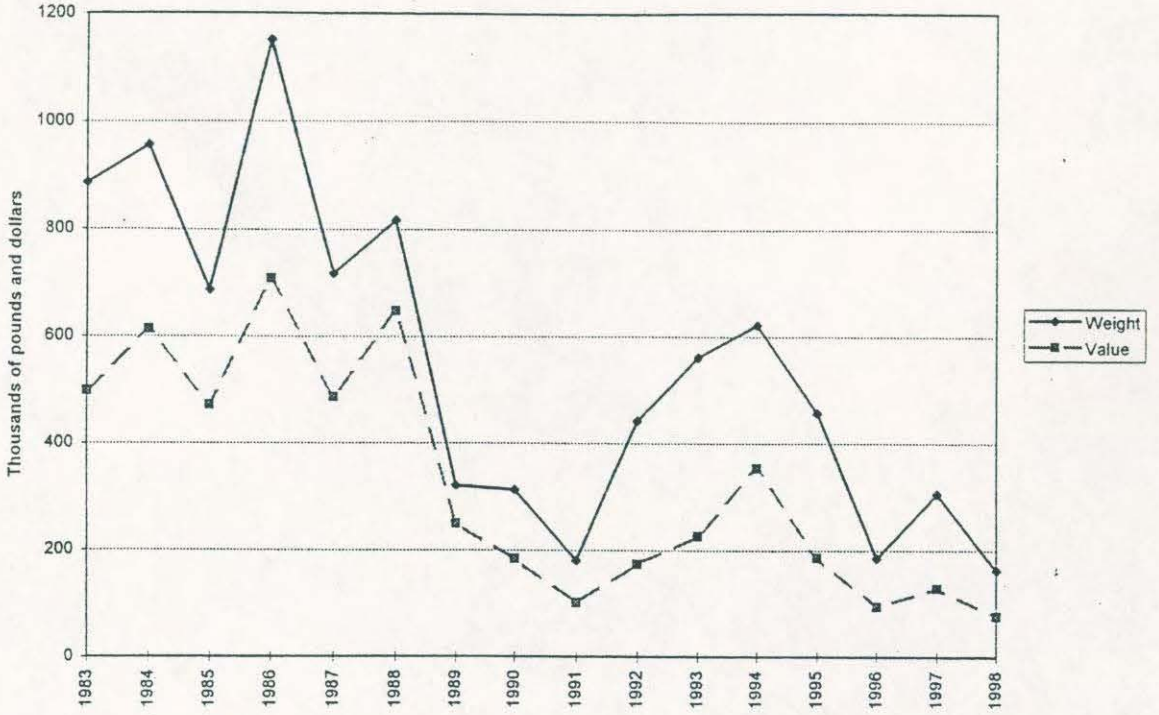

Fig. 44. Annual commercial production of coastal fish.

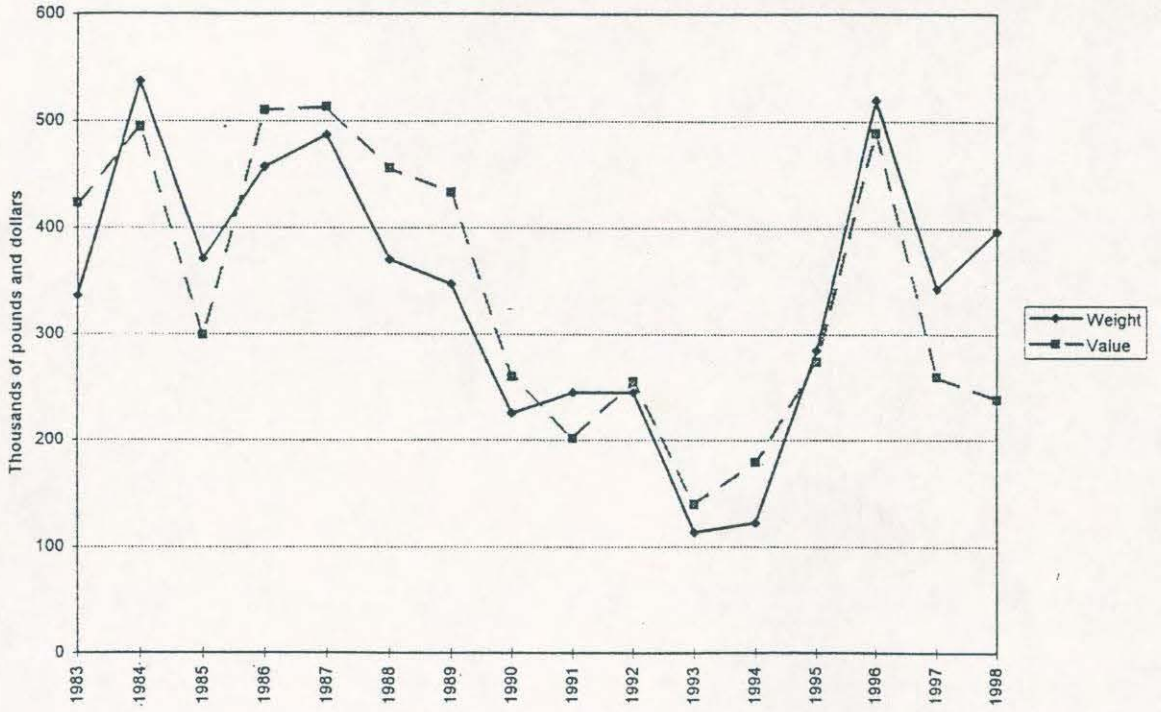

Fig. 45. Annual commercial production of American shad.

The above figures are based on dealer-provided landings. A new reporting system, based on information from individual fishermen, was implemented in 1998. Of the 407 fishermen who were issued permits, 335 (82%) submitted the required reports with 195 reporting some catch. The total catch reported from this source was about 446,000 pounds of shad.

RECREATIONAL FINFISH FISHERIES

Total participation (excluding headboat fishermen) was estimated by the NMFS at 638,790 fishermen. Out of state residents (N=416,341) comprised 65%, coastal residents (N=137,344) represented 22%, and noncoastal residents (N=85,104) accounted for 13%.

Trends in participation are shown in Fig. 46. The number of coastal resident anglers has been relatively stable during the last eight years, despite a steadily increasing overall coastal population. Most of the recent increase in total participation has been attributable to fishermen from out of state.

The sales (to fishermen) of marine recreational fisheries stamps, purchased largely by coastal residents, are compared below with the NMFS estimates of coastal participants (in thousands of units) and in Fig. 47. One would expect the trends to be more similar than indicated, since coastal residents (as defined in the MRFSS) comprise at least 75% of the annual stamp sales.

Year	1992	1993	1994	1995	1996	1997	1998
Stamps sold	81	87	90	90	87	93	100
Participants	124	131	146	91	111	150	137
Ratio with stamp = 1.00	1.53	1.51	1.62	1.00	1.28	1.62	1.37

Total effort was estimated at 1,714,087 angler-trips by the NMFS, distributed by residence classification and two-month interval (wave) as follows:

	Wave					
Residence	**2**	**3**	**4**	**5**	**6**	**Total**
Coastal	96,635	246,478	249,108	128,620	82,041	802,882
Noncoastal	26,068	97,084	50,416	33,148	19,092	225,808
Out of state	75,212	301,931	186,300	90,952	31,002	685,397
All	197,915	645,493	485,824	252,720	132,135	1,714,087

The trends in overall effort and that by coastal and out of state residents are shown in Fig. 48. Effort in 1989-1990, particularly by residents in Charleston and Berkeley Counties, was substantially reduced by the impact of Hurricane Hugo.

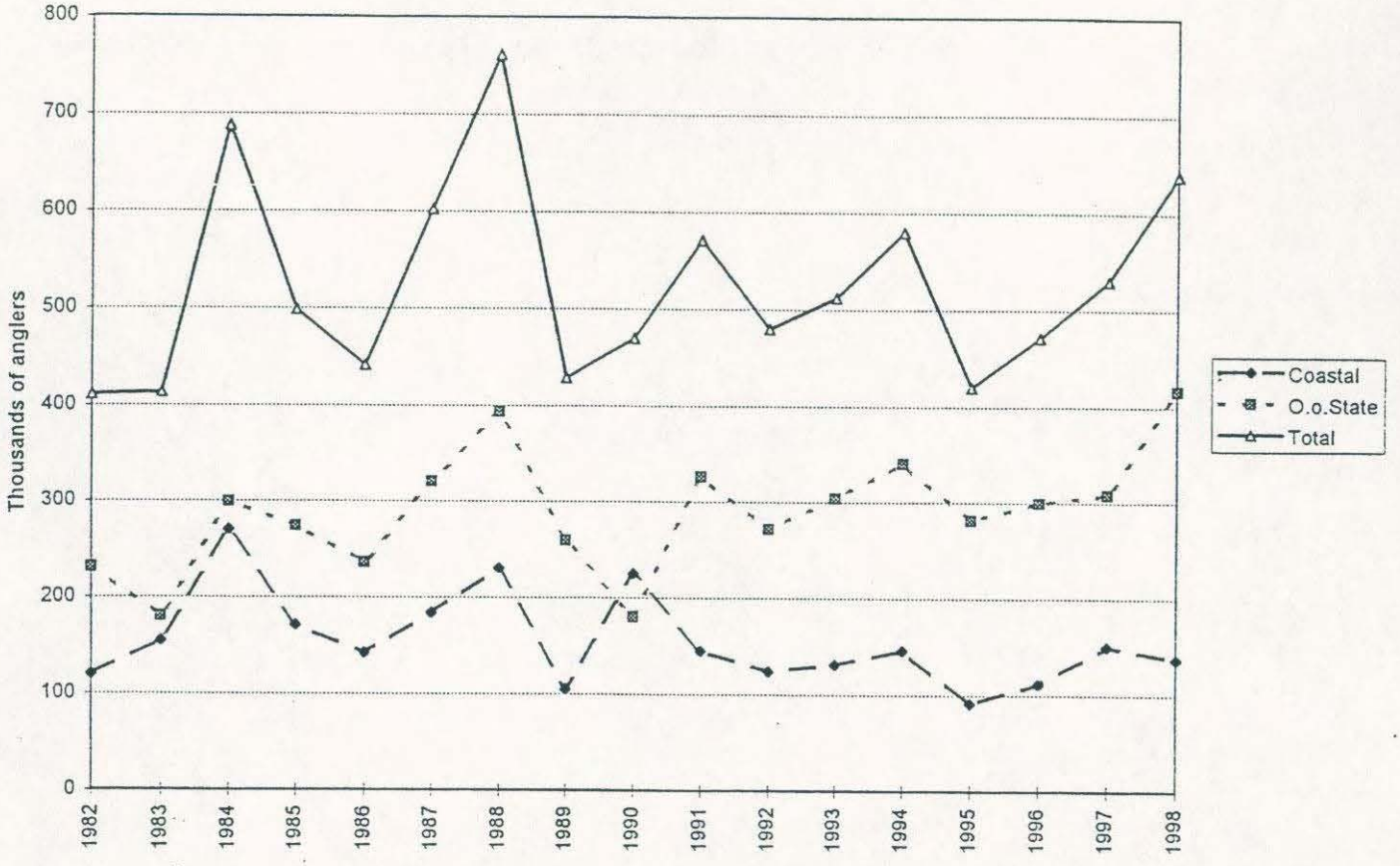

Fig. 46. Estimated participation in the recreational hook and line fishery (excluding headboat anglers).

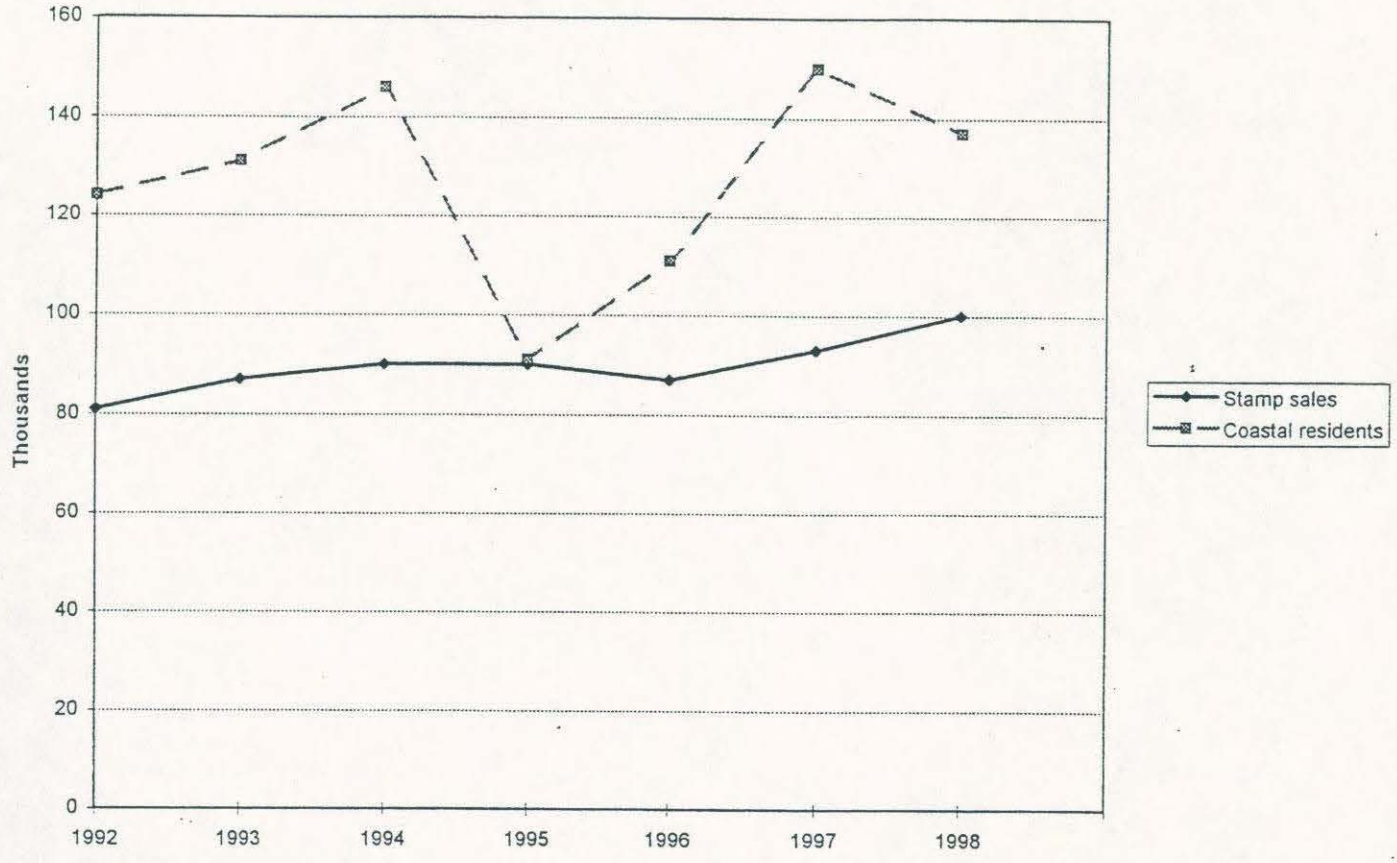

Fig. 47. Stamp sales vs MRFSS estimates of coastal resident anglers.

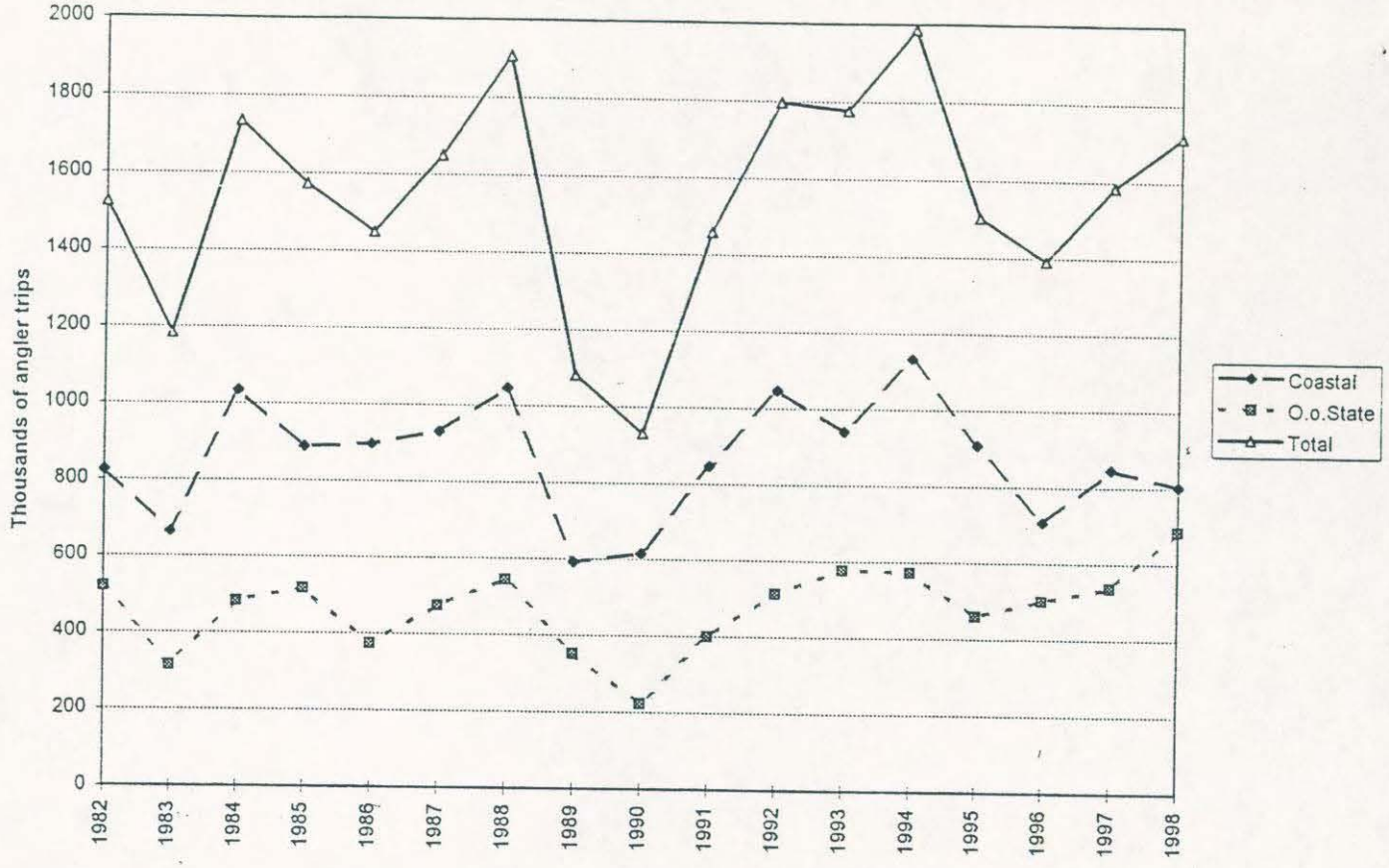

Fig. 48. Estimated effort in the recreational hook and line fishery (excluding headboat trips).

There has been no long-term directional trend in effort by coastal residents, although effort in the last three years has been below long-term averages. For example, the effort by coastal residents in 1998 was about 7% below the 1988-1997 average (14% if the two hurricane-effected years' figures are not included). Effort by anglers from out of state reached a record high in 1998, capping a general upward trend since the hurricane years. The out of state contribution has largely been responsible for the recent increase in total effort, which in 1998 was about 11% above the ten-year average.

Table 2 lists the total estimated catches by species/group with those from the previous five years included for comparison. Comments regarding particular species are included in the mode sections. There are many anomalies that appear to be attributable largely to sampling errors. These are also discussed under the appropriate modes.

CHARTERBOAT FISHERY

During the calendar year, permits were issued to 216 vessels (excluding those designated as headboats by the NMFS). This is the most boats since permits were required and represented an 11% increase over the 1997 figure. The NMFS designated all boats carrying more than six passengers as headboats.

A total of 184 boats reported making at least one trip (including guest trips), making the active component 85% of the total permitted fleet. The number of boats active in each quarter is shown below.

	Active vessels					
Quarter	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
Winter(Jan-Mar)	27	29	42	52	62	68
Spring(Apr-Jun)	98	121	119	135	131	150
Summer(Jul-Sep)	110	130	125	134	138	156
Fall(Oct-Dec)	87	89	104	111	98	132
Total	126	147	153	166	158	184

Fleet distribution by boat length and homeport location was as follows.

	Length (ft)					
Counties	**<20**	**20-26**	**27-31**	**32-40**	**>40**	**Total**
Beau/Coll/GA	14	20	5	10	5	54
Chs/Bk/Dor	32	16	12	16	26	102
Georgetown	6	6	5	12	8	37
Horry/NC	-	1	6	11	5	23
Total	52	43	28	49	44	216

Compared to 1997, the number of boats permitted in each area increased everywhere except in Horry County/NC. There was little change in the Beaufort area. In the central coastal area, there was a 16% increase, while the number of boats in Georgetown County

Table 2. Estimated total catch by recreational hook and line anglers, excluding headboat catches. Source: NMFS MRFSS.

Group/species	1993	1994	1995	1996	1997	1998
Oceanic pelagics						
Dolphin	35,023	6,932	6,582	16,178	16,903	19,382
Wahoo	4,005	1,947	509	799	1,562	4,149
Yellowfin tuna	14,039	5,573	0	541	784	11,379
Reef fish						
Blk. sea bass	417,339	601,796	616,938	206,145	616,262	275,954
Gag	19,567	1,411	6,446	6,451	4,262	1,036
Scamp	0	0	4,074	0	5,399	9,080
Red snapper	4,496	702	0	1,052	34,550	6,871
Vermilion sn.	3,483	2,161	19,376	16,300	35,465	49,982
Red porgy	6,360	8,422	53,206	45,831	3,238	2,796
Other porgies	2,522	2,779	0	7,887	22,617	3,462
White grunt	13,487	19,883	3,613	8,032	21,082	12,488
Other grunts	45,381	21,684	25,461	31,730	13,899	3,064
Triggerfish	5,853	2,409	2,825	5,460	28,154	15,037
Spottail pin.	7,003	225,021	32,575	14,744	73,989	28,541
Spadefish	27,935	5,777	6,060	39,286	73,120	28,468
Sheepshead	78,153	126,517	126,818	172,202	52,051	28,906
Amberjack	5,784	6,543	509	3,462	10,694	348
Coastal pelagics						
King mackerel	56,141	73,693	58,644	62,296	99,067	123,390
Spanish mack.	108,587	321,046	39,837	215,886	160,842	97,671
Bluefish	136,799	258,395	371,685	137,462	282,485	370,846
Crevalle jack	4,250	8,647	3,541	21,293	8,365	14,526
Barracuda	8,571	18,373	5,961	14,570	34,633	12,973
Cobia	0	3,193	1,382	4,841	4,506	3,202
Bonito/tunny	1,491	3,632	20,936	6,761	18,282	4,875
Inshore sportfish						
Red drum	265,513	454,221	597,566	305,775	301,189	130,783
S. seatrout	314,246	360,493	442,284	245,872	198,443	276,973
Weakfish	7,627	46,858	32,013	5,516	4,904	16,167
Flounders	133,121	252,817	215,416	163,033	236,509	269,127
Inshore bottomfish						
Kingfish	171,041	281,108	489,033	355,855	851,074	556,065
Spot	1,568 K	1,651 K	1,197 K	1,617 K	916,364	796,548
Croaker	49,649	330,033	182,055	99,417	252,073	436,596
Black drum	18,511	14,290	31,765	29,798	49,358	15,621
Sharks						
Blacktip	276	1,935	7,127	56,331	51,776	151,224
Sharpnose	11,560	58,703	44,001	41,608	11,022	16,855
Other	175,206	305,247	215,366	257,878	335,854	824,672

increased by 42%.

The numbers of boats fishing in various zones are shown below. The figures are not additive, because many boats fished in more

	Fishing area				
		Ocean <3 mi.		Ocean >3 mi.	
Year	Inland	natural	manmade	natural	manmade
1993	39	58	19	113	47
1994	55	71	17	126	59
1995	65	63	18	114	53
1996	70	74	19	122	54
1997	63	76	20	116	41
1998	84	93	16	129	54

than one zone. The largest increase in participation has occurred in state waters. Despite the increase in manmade facilities, there has been no corresponding growth in the numbers of charterboats utilizing them.

The total number of anglers was 28,581, about 9% greater than the previous record set in 1994. Seasonal distribution is shown below.

	Number of anglers					
Year	Jan/Feb	Mar/Apr	May/June	Jul/Aug	Sep/Oct	Nov/Dec
1993	94	1437	6600	10348	3826	642
1994	106	2326	7606	10999	4199	939
1995	174	2901	7561	8891	3650	851
1996	327	2264	8485	8854	3151	835
1997	254	2004	7184	9436	3671	1054
1998	315	2421	9604	9829	4879	1533

The weather after a very wet winter and early spring was relatively favorable for outdoor activity and probably contributed to the increased participation.

Charterboat operators reported 7,811 boat trips (including a small number of guest trips), distributed by season and fishing zone as follows. The total number of trips easily surpassed last

	Boat trips				
Area	Winter	Spring	Summer	Fall	Total
Inland	246	847	847	695	2635
Ocean <3 mi.					
natural	14	447	835	155	1451
manmade	7	23	58	8	96
total	21	470	893	163	1547
Ocean >3 mi.					
natural	49	1508	1323	349	3229
manmade	10	147	166	77	400
total	59	1655	1489	426	3629
Total	326	2972	3229	1284	7811

year's record, increasing by nearly 26% with new highs in every quarter except the winter. Inland effort increased by 43% and has more than doubled during the last five years (in numbers of boat trips). There have been modest increases in ocean effort over natural habitat, while trips to manmade facilities have declined overall.

Distribution of boat trips by vessel length categories and homeport locations was as follows. Homeport and/or length were

	Boat trips					
	<20	**20-26**	**27-31**	**32-40**	**>40**	**Total**
Beau/Coll/GA	633	1331	405	1025	43	3437
Chs/Bk/Dor	1349	364	205	230	482	2630
Georgetown	167	92	114	302	249	924
Horry/NC	-	30	355	251	176	812
Total	2149	1817	1079	1808	950	7803

unknown for eight trips. Compared to the previous year's distribution, the number of trips increased in each length category except the 20-26 ft one. The number of trips by boats <20 ft nearly doubled with modest increases in other classifications. Each geographic category reported an increase.

In terms of annual effort by individual vessels, the distribution was as indicated below. About 57% of the operators

	Number of trips/year						
	0	**1-25**	**26-49**	**50-74**	**75-99**	**100-125**	**>125**
Number of boats	32	91	36	22	14	6	15
Percent	15	42	17	10	6	3	7

reported making <26 trips during the year, nearly the same as in the previous three years. About 26% of all permitted boats reported making at least 50 trips.

The number of anglers reported by boat captains was equivalent to the number of angler trips estimated by the NMFS MRFSS. As noted for all years since mandatory reporting began, the number of angler trips reported to the MRD was a great deal less than estimated from the MRFSS:

	Estimated angler trips by wave						
Source	**1**	**2**	**3**	**4**	**5**	**6**	**All**
MRFSS	0	8702	23006	21454	30989	5587	89738
MRD	315	2421	9604	9829	4879	1533	28581

Table 3 summarizes the distribution of annual effort by fishing area, method, and target species. Trends in directed effort for major groups or species are indicated in Table 4. It should be kept in mind that substantial amounts of effort were not specifically directed at any particular group. This is especially

Table 3. Charterboat participation and effort (angler-hours inland, boat-hours ocean). Source: MRD logbooks.

Area	Method	Target species	Boat trips	Anglers	Hours
Inland	Any	Red drum	1263	2551	10571
		Spotted seatrout	400	894	3848
		Cobia	118	305	1286
		Tarpon	96	206	1229
		Sharks	94	349	968
		Bluefish	64	160	636
		Spanish mackerel	53	118	616
		Flounder	34	72	431
		Sheepshead	20	57	209
		Crevalle jack	11	16	86
		Weakfish	10	20	82
		Kingfish	9	36	128
		Black sea bass	3	10	40
		Striped bass	2	4	18
		Any	458	1196	4438
		Total	**2635**	**5994**	**24586**
Ocean, 0-3 mi. natural	Troll	Spanish mackerel	186	771	614
		King mackerel	100	387	347
		Bluefish	5	18	18
		Any	4	14	16
		Total	**295**	**1190**	**995**
	Non-troll	Sharks	458	2001	1521
		Tarpon	138	379	571
		Red drum	111	323	412
		Cobia	51	126	229
		Spotted seatrout	21	46	107
		Sheepshead	19	61	59
		Flounder	11	23	61
		Bluefish	8	21	25
		Black sea bass	8	67	29
		Weakfish	8	23	41
		Kingfish	3	15	6
		Spadefish	2	11	10
		Black drum	1	1	5
		Spanish mackerel	1	2	3
		Rays	1	6	3
		Any	315	1164	1125
		Total	**1156**	**4269**	**4207**
Ocean, 0-3 mi. manmade	Troll	King mackerel	26	92	110
		Spanish mackerel	24	112	77
		Total	**50**	**204**	**187**

(Table 3, cont'd.)

	Non-troll	Sheepshead	14	58	47
		Weakfish	8	25	26
		Sharks	4	14	17
		Black sea bass	1	3	4
		Red drum	1	2	3
		Spotted seatrout	1	3	3
		Any	17	58	64
		Total	**46**	**163**	**164**
Ocean, > 3 mi. natural	Troll	King mackerel	966	4431	4600
		Spanish mackerel	314	1456	881
		Dolphin/wahoo/tuna	148	720	1003
		Billfish	125	534	918
		Bluefish	1	2	3
		Any	534	2690	3791
		Total	**2088**	**9833**	**11196**
	Non-troll	Sharks	165	808	597
		Grouper	127	612	609
		Black sea bass	107	547	385
		Sheepshead	52	228	176
		Tarpon	35	119	136
		Red drum	19	88	89
		Cobia	6	24	35
		Rudderfish	1	6	4
		Spadefish	1	6	2
		White grunt	1	5	3
		Red porgy	1	3	7
		Black drum	1	4	4
		Any	625	2837	2912
		Total	**1141**	**5287**	**4959**
Ocean, > 3 mi. manmade	Troll	King mackerel	185	787	858
		Spanish mackerel	104	422	373
		Barracuda	5	20	31
		Any	9	46	55
		Total	**303**	**1275**	**1317**
	Non-troll	Sheepshead	21	87	77
		Black sea bass	9	39	37
		Red drum	4	8	26
		Cobia	3	6	14
		Grouper	2	8	11
		Spadefish	2	7	9
		Sharks	2	8	8
		Bluefish	1	2	5
		Tarpon	1	4	6
		Weakfish	1	3	4
		Any	51	194	252
		Total	**97**	**366**	**449**

Table 4. Directed charterboat effort for principal species.
Source: MRD logbooks.

Target group	1993	1994	1995	1996	1997	1998
			Inland angler-hours			
Red drum	1359	2918	6934	9122	8910	10571
Spotted seatrout	1509	1302	1426	1004	1468	3848
Sharks	2403	2987	1033	1236	1394	968
Tarpon	923	1185	1537	1596	1691	1229
Cobia	596	581	334	141	458	1286
			Ocean 0-3 mi. boat-hours			
Sharks	1095	1885	2263	1636	1398	1538
Spanish mackerel	316	436	464	772	800	694
King mackerel	73	248	316	480	729	457
Tarpon	28	661	384	325	156	571
			Ocean >3 mi. boat-hours			
King mackerel	4149	6047	5454	5363	5740	5458
Spanish mackerel	931	1336	746	921	717	1254
Dol./wahoo/tunas	1029	1272	749	546	928	1003
Billfish	516	323	400	586	532	918
Reef fish	973	1091	749	1057	953	1063

true for the ocean non-troll and offshore troll fisheries.

Total inland effort continued the substantial expansion of recent years with red drum the principal targeted species. Effort directed at spotted seatrout was also markedly higher than in previous years. After two years of very poor cobia fishing, the normal availability of this species appeared to return and with it a restoration of the spring fishery in the Beaufort area.

Sharks and mackerels were the principal targets of inshore ocean charterboat anglers. The allocation of effort for each group has been rather variable with no obvious directional trends.

Much of the offshore ocean fishing was non-specific, consisting either of generalized trolling or bottomfishing. No obvious major trends in species preferences have been apparent.

Landings data reported to the MRD are summarized in Table 5. Based on these data, the following comments apply to the indicated major species groupings.

Oceanic pelagics

Although directed effort was appreciably higher than in the previous five years, catches were generally unremarkable. The weather during May and June, the peak months for this group, was very dry and hot with water temperatures above normal. Fishing reportedly was generally slow for oceanic pelagics. The dolphin CPUE was the lowest in six years. Upon superficial inspection, the yellowfin tuna catch seemed to increase markedly. Closer evaluation showed an unusually large amount of fish reported during the spring by one boat with a CPUE (>20 fish/trip) that appeared to be unrealistic. The above-average billfish catch included 80 sailfish, the most abundant billfish taken off South Carolina.

Reef fish

Landings of most major species were average. It should be noted that the charterboat catch of this complex is small compared to the headboat landings and probably are not very indicative of abundance.

Coastal pelagics

After the spring fishery for oceanic pelagics tapers off, the offshore fleet shifts its directed effort mainly to king mackerel. Barring unusually stormy weather, the king mackerel catch typically peaks in July. In 1998, the spring run was the best in several years with the monthly peak occurring in June. Subsequent catch rates, however, were average (Fig. 49). Catch rates for Spanish mackerel were lower than those in the past two years (Fig. 50), although operators reported above-average sized fish. The spring cobia fishery in Port Royal Sound/Broad River continued to recover and was exceptionally productive. Operators reported many small fish released.

Table 5. Charterboat catch (numbers of fish). Source: MRD logbooks.

Group/species	Retained	Released	Inland	0-3 mi.	>3 mi.
Oceanic pelagics					
Dolphin	3434	198	-	-	3632
Wahoo	555	6	-	-	561
Yellowfin tuna	935	43	-	-	978
Blackfin tuna	231	6	-	-	237
Skipjack tuna	16	5	-	-	21
Bonito	12	5	-	-	17
Blue marlin	1	32	-	-	33
White marlin	-	19	-	-	19
Sailfish	2	78	-	-	80
Reef fish					
Black sea bass	16778	9323	175	2583	23343
Gag	1582	349	-	2	1929
Scamp	606	558	-	-	1164
Red grouper	82	25	-	1	106
Snowy grouper	10	8	-	-	18
Speckled hind	20	-	-	-	20
Grouper, unc.	6	1	1	-	6
Red snapper	223	181	-	-	404
Vermilion snapper	4545	1238	-	-	5783
Red porgy	2805	213	-	-	3018
Whitebone porgy	255	63	-	1	317
Porgy, unc.	261	79	-	1	339
White grunt	2708	355	-	126	2937
Grunt, unc.	821	1437	1	48	2209
Triggerfish	1927	70	-	1	1996
Spottail pinfish	302	1840	-	35	2107
Spadefish	182	50	2	91	139
Hogfish	4	-	-	-	4
Amberjacks	170	394	7	-	557
Rudderfish	96	21	-	-	116
Sheepshead	736	872	288	268	1052
Coastal pelagics					
King mackerel	6586	1001	11	540	7036
Spanish mackerel	9504	3110	1701	3681	7232
Bluefish	1243	4421	2797	1576	1291
Crevalle jack	44	2190	557	508	1169
Blue runner	10	135	29	62	54
Barracuda	167	1780	-	22	1925
Cobia	213	641	479	275	100
Little tunny	330	728	-	94	964
Inshore sportfish					
Red drum	1000	7486	7547	764	175
Spotted seatrout	2500	7991	9923	548	20
Weakfish	622	863	821	571	93

Group/species	Retained	Released	Inland	0-3 mi.	>3 mi.
Flounders	445	747	1043	116	33
Tarpon	7	370	124	185	68
Striped bass	-	1	1	-	-
Inshore bottomfish					
Kingfish	875	764	771	798	70
Spot	84	-	-	84	-
Croaker	48	25	24	49	-
Black drum	142	138	147	83	50
Sharks					
Unclassified	462	3152	824	1698	1092
Blacktip	327	1831	340	1178	640
Sharpnose	1199	3378	917	2247	1413
Other					
Rays	-	159	99	57	3
Skates	-	1	1	-	-
Catfishes	1	128	60	36	33
Toadfish	-	71	3	44	24
Pinfish	3	139	134	5	3
Unclassified	52	1947	1510	280	209

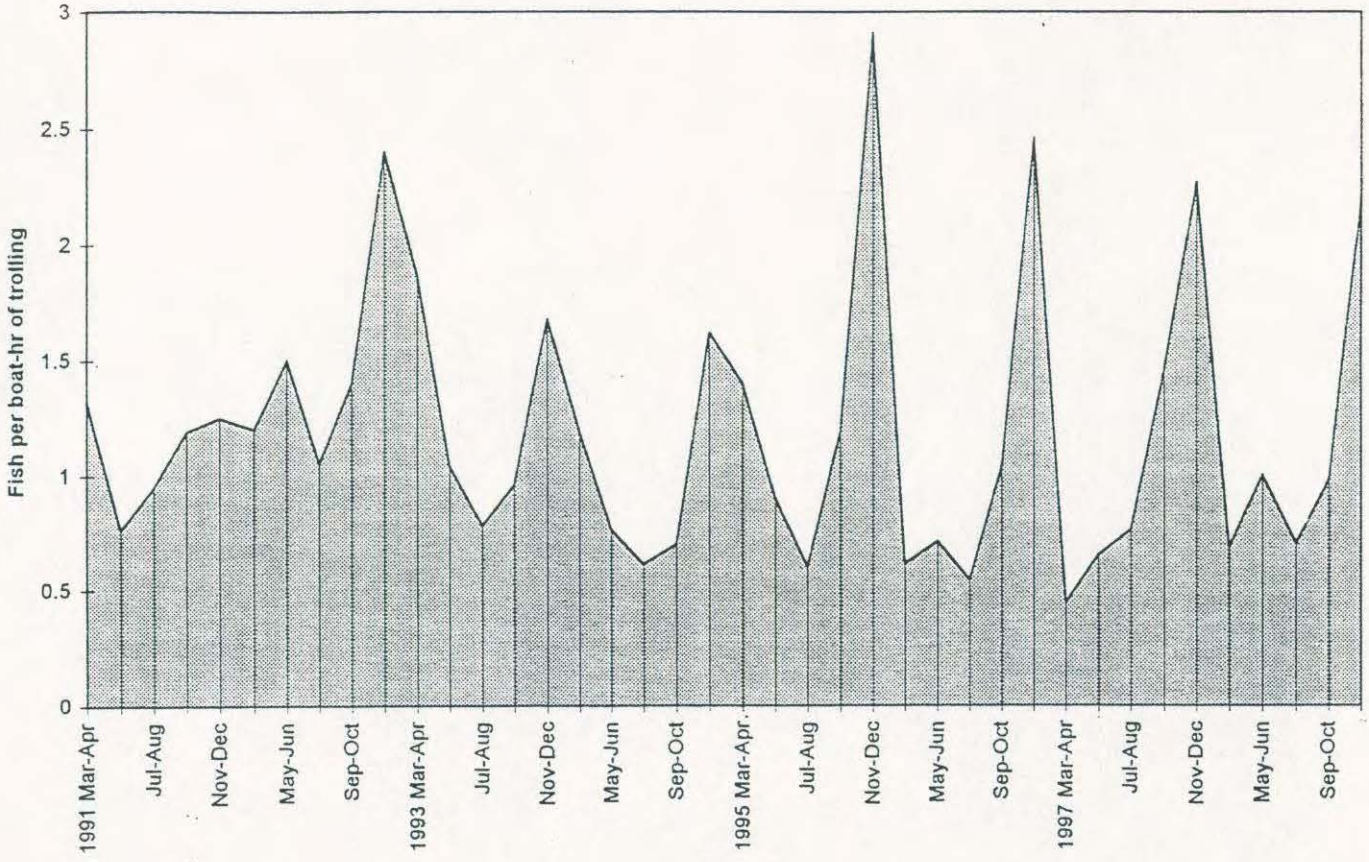

Fig. 49. SC charterboat CPUE for king mackerel.

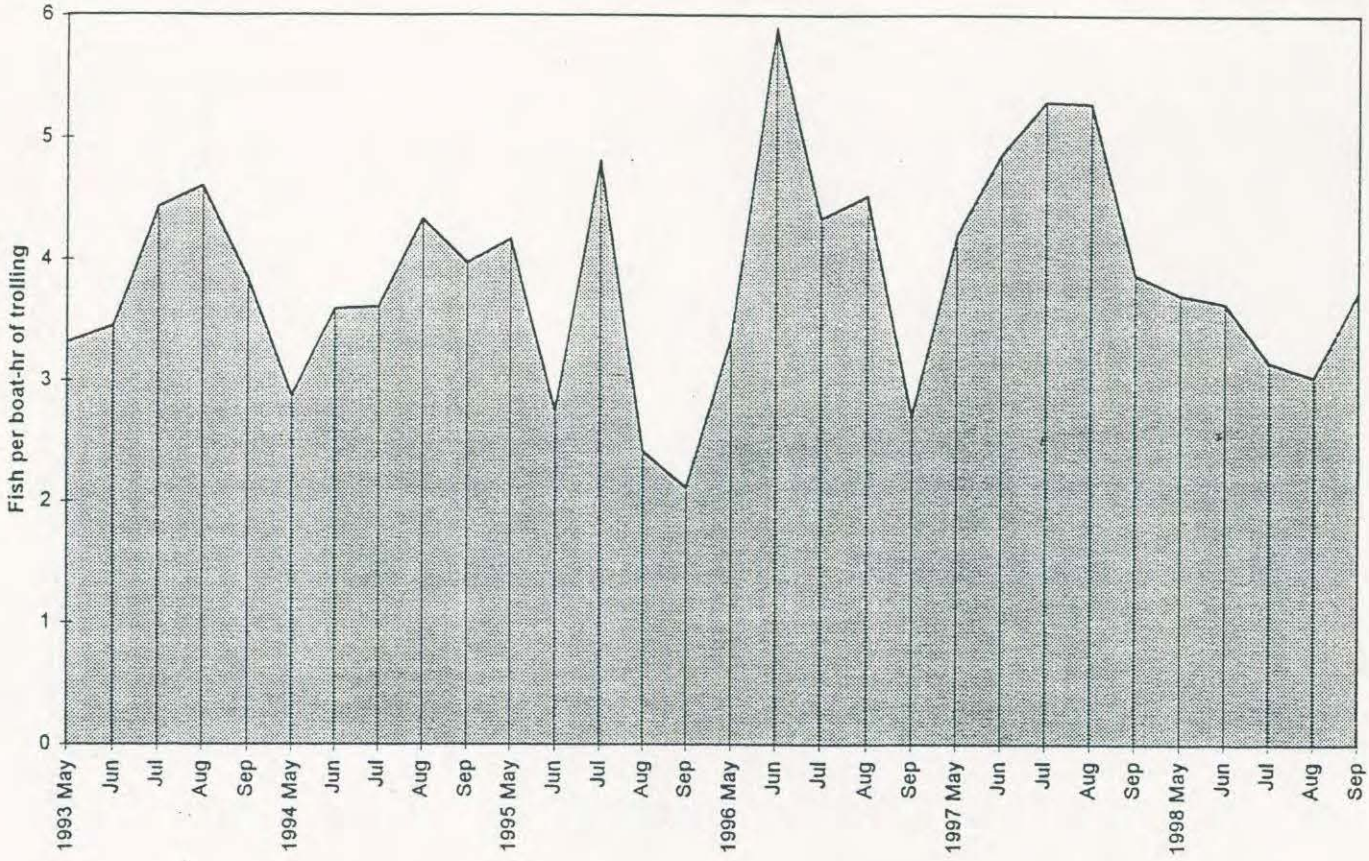

Fig. 50. SC charterboat CPUE for Spanish mackerel.

Inshore sportfish

Red drum was the most sought-after species on a year-round basis. The annual catch continued the upward trend after slipping slightly last year. CPUE during the peak fall season was a little below average. The spotted seatrout catch was well above average. The catch of tarpon, a popular summer target, was well above that in previous years with a pronounced increase in CPUE. This probably reflected continued progress along the learning curve of how to catch these fish locally, although the unusually warm weather may have attracted more fish from Florida.

Sharks

Catches of sharpnose were the largest reported to date, while the catch of large coastal species was average.

Landings estimated by the NMFS are compared in Table 6. As in previous years, there are enormous differences between the MRD figures and MRFSS estimates for several important species/groups, e.g. dolphin, yellowfin tuna, several reef species, and mackerels. Some examples are rather ludicrous. For example, the MRFSS estimated retained catch of red snapper was 2,622 fish weighing 2,150 pounds, or an average weight of less than one pound per fish. With the current minimum size limit, the average weight of a just-legal fish is about four pounds. In most cases, the MRFSS estimates are much higher than the MRD figures and can be attributed to the higher effort estimates.

PRIVATE BOAT FISHERY

The NMFS estimated effort (in angler trips) as follows:

	Wave					
Residence	**2**	**3**	**4**	**5**	**6**	**All**
Coastal	48,420	125,717	150,420	88,193	47,256	460,007
Noncoastal	4,504	15,164	32,536	14,444	7,223	73,871
Out of state	23,647	26,905	56,584	17,726	2,683	127,545
Total	76,572	167,786	239,540	120,363	57,161	661,423

The trend in annual statewide effort (Fig. 51) has closely paralleled that of coastal resident anglers with considerable fluctuation and no unidirectional trend in the last decade.

Historically, most of the private boat effort has been expended in inland (estuarine) areas (Fig. 52). In the last three years, the amount of effort expended inland has dropped substantially, while effort in coastal ocean (<3 miles) waters has expanded greatly. This probably is a sampling artifact, since there appears to be no other logical explanation for this development, nor does it appear obvious from observation. It may be partly due to the fact that the MRD terminated its participation in the on-site intercept portion of the MRFSS in May 1996 and the distribution of intercepts may have shifted since then.

Table 6. Charterboat catches as estimated from the MRFSS vs those reported to the MRD.

Group/species	Total number		Pounds landed	
	MRFSS	MRD	MRFSS	MRD
Oceanic pelagics				
Dolphin	18,403	3,632	109,547	49,393
Wahoo	3,659	561	81,242	16,686
Yellowfin tuna	11,379	978	203,225	30,626
Bonito	7,203	17	661	53
Marlins	0	52	0	350
Sailfish	348	80	0	82
Reef fish				
Black sea bass	76,296	26,101	61,428	17,181
Gag	1,036	1,931	0	16,515
Scamp	8,617	1,164	31,256	3,927
Other groupers	10,927	152	3,207	935
Red snapper	4,924	404	2,150	1,622
Vermilion snapper	41,285	5,783	35,965	5,494
Red porgy	2,593	3,018	2,820	4,921
Other porgies	3,258	658	0	836
White grunt	7,436	3,063	9,117	4,186
Other grunts	0	2,258	0	1,295
Triggerfish	12,848	1,997	28,432	3,950
Spottail pinfish	3,775	2,142	880	190
Sheepshead	5,287	1,608	4,907	3,690
Amberjacks	348	564	0	4,483
Coastal pelagics				
King mackerel	41,045	7,587	240,162	70,029
Spanish mackerel	22,338	12,614	12,646	18,944
Bluefish	2,087	5,664	360	2,554
Crevalle jack	1,588	2,234	1,436	287
Barracudas	7,186	1,947	9,638	2,882
Cobia	365	854	6,610	5,907
Little tunny	4,875	1,058	0	1,823
Inshore sportfish				
Red drum	11,533	8,486	8,728	3,367
Spotted seatrout	8,674	10,491	1,495	4,150
Flounders	755	1,192	0	1,045
Tarpon	543	377	0	612
Inshore bottomfish				
Kingfish	0	1,639	0	1,028
Spot and croaker	0	157	0	79
Black drum	661	280	372	927
Sharks				
Blacktip	2,347	2,158	0	14,873
Sharpnose	1,282	4,577	4,749	8,725
Other sharks	9,497	3,614	0	6,972

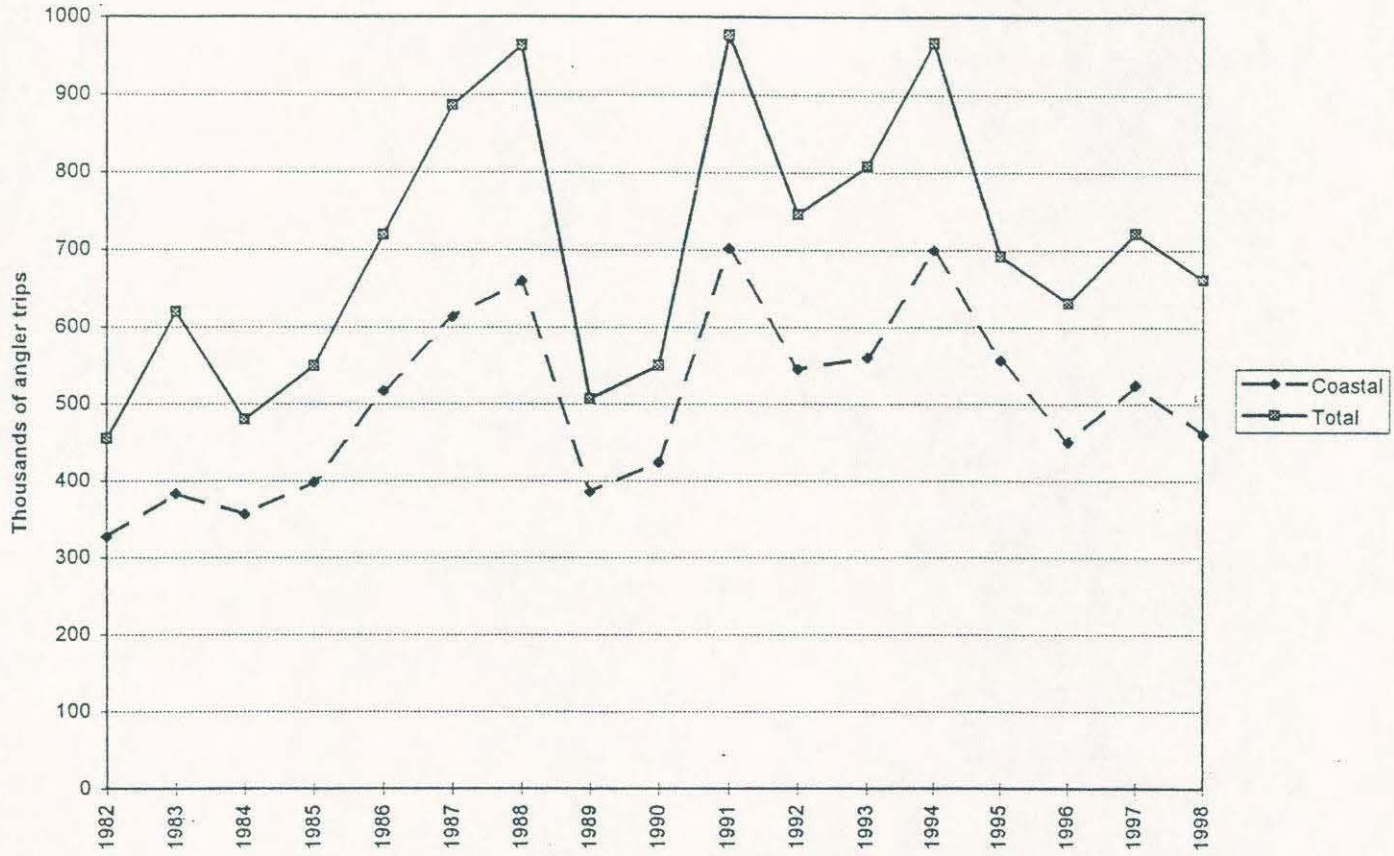

Fig. 51. Effort in the private boat mode by residence.

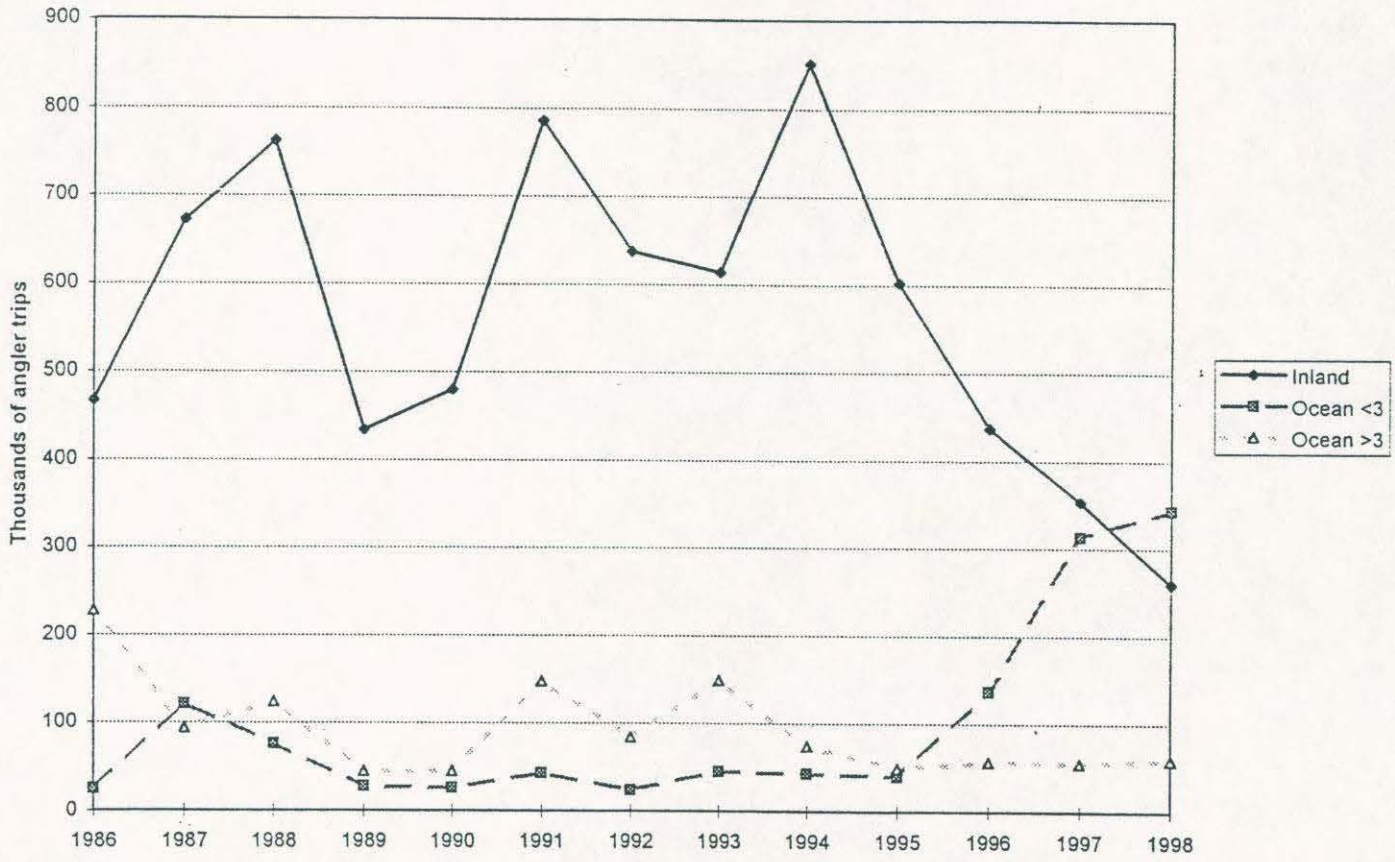

Fig. 52. Effort in the private boat mode by fishing zone.

Catches as estimated by the NMFS from MRFSS data are listed in Table 7. These estimates were typical of those generated from the MRFSS in that they were vulnerable to large sampling errors for many species, due to low frequencies of intercepted catches and highly variable numbers of fish in them. Misidentifications and confusion over common names contributed to unreliability, particularly where a large percentage of total catch of a species was reported released. The correct identity of such fish obviously could not be verified. These figures must therefore be regarded as speculative for most species.

There are several particularly obvious anomalies. The grouper catches show no fish caught in offshore ocean waters, where virtually all of the legal-sized fish occur, yet a portion (apparently all caught inland) was retained. Any groupers taken in estuarine areas were bound to have been sublegal fish. Similarly, virtually no red or vermilion snappers occur in nearshore (0-3 mi.) ocean waters, yet the entire reported catch came from this zone. The zonal distribution of the southern flounder catch is also highly suspect, since this species occurs mainly in inland areas. A sampling artifact attributable to the disproportionate amount of survey effort assigned to Murrells Inlet is probably implicated.

Catch-per-unit-of-effort (CPUE) data are based on trips in which the species was either the designated target or at least one such fish was caught. Nearly all data are from inland private boat trips. In the tabular summaries, South refers to Beaufort County. Central is predominantly Charleston County with very small occasional contributions from Colleton and Berkeley Counties. North refers to Georgetown and Horry Counties.

CPUE has been calculated as the number of fish caught per angler-trip, the basic index used in the MRFSS to estimate catches. Theoretically, the angler-hour is a more preferable unit of effort. In practice, the trends are very similar regardless of the effort unit selected, in part because there is not much variability in average trip duration. The 1996-1998 figures were based on data from the State Finfish Survey only, since state participation in the MRFSS field survey was terminated at the end of wave 2 (May) in 1996.

Catch-related data are probably the most reliable for the principal inshore sportfish targeted and taken by private boat anglers, i.e., red drum and spotted seatrout. Trends in private boat landings (fish retained or discarded) are shown in Fig. 53. Landings of red drum remained nearly constant for nine years prior to declining sharply to a record low level in 1998. The total catch for all modes was also among the lowest ever recorded.

The apparent trend in red drum private boat catch and landings contradicts that in CPUE shown in Fig. 54. There has been a slight upward trend in the mid-1990's that now appears to be leveling off.

Table 7. Private boat catch (in numbers of fish).
Source: NMFS MRFSS.

Group/species	Landed	Released	Inland	0-3 mi.	> 3 mi.
Oceanic pelagics					
Dolphin	978	0	0	0	978
Reef Fish					
Black sea bass	37,952	138,621	21,565	85,966	69,041
Groupers	463	641	463	641	0
Red snapper	480	1,468	0	1,948	0
Vermilion snapper	5,762	2,935	0	8,697	0
Red porgy	203	0	0	0	203
Other porgies	203	0	0	203	0
White grunt	5,052	0	0	2,864	2,188
Other grunts	0	3,064	2,845	219	0
Triggerfish	2,188	0	0	0	2,188
Spottail pinfish	3,100	19,126	-	-	-
Spadefish	17,267	10,350	-	-	-
Sheepshead	12,197	7,832	2,940	14,633	2,456
Coastal pelagics					
King mackerel	7,718	961	0	3,804	4,874
Spanish mackerel	30,582	22,357	14,883	19,879	18,176
Bluefish	47,722	66,906	26,462	72,392	15,774
Crevalle jack	7,322	4,765	10,716	1,371	0
Barracuda	0	4,936	0	1,415	3,521
Cobia	1,405	1,432	-	-	-
Inshore sportfish					
Red drum	43,344	71,464	80,918	32,475	1,415
Spotted seatrout	103,410	127,683	214,710	16,383	0
Weakfish	5,059	219	2,609	2,669	0
Southern flounder	102,297	13,210	17,623	97,413	472
Striped bass	652	1,094	-	-	-
Inshore bottomfish					
Kingfish	93,682	57,067	66,615	84,134	0
Spot	300,466	88,817	69,576	317,768	1,939
Croaker	117,177	71,069	96,565	89,795	1,886
Black drum	13,963	438	5,507	5,374	3,520
Sharks					
Blacktip	1,930	52,642	-	-	-
Sharpnose	3,833	11,740	-	-	-
Other sharks	20,698	188,438	114,945	110,572	53,765

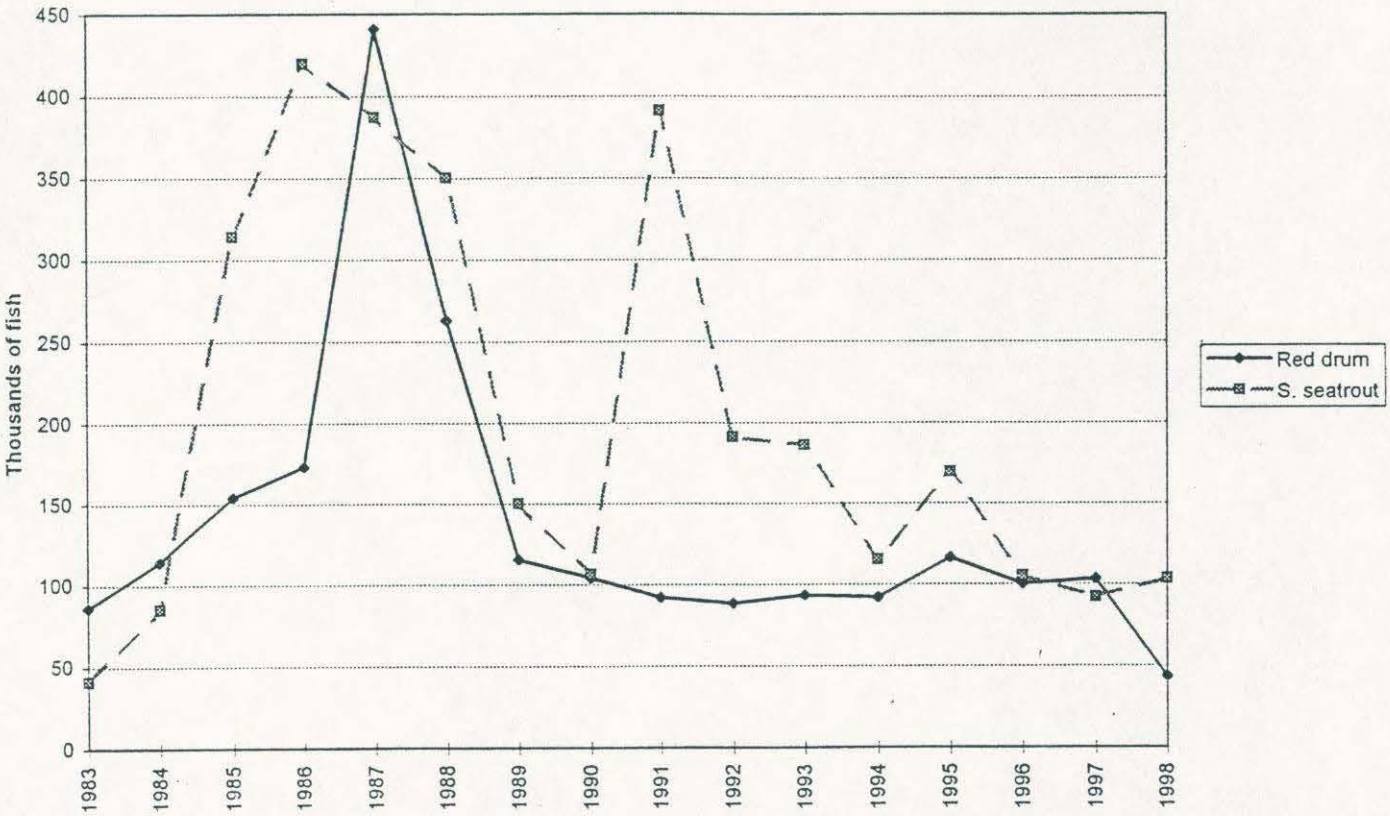

Fig. 53. Private boat landings of red drum and spotted seatrout (landings include fish retained or discarded).

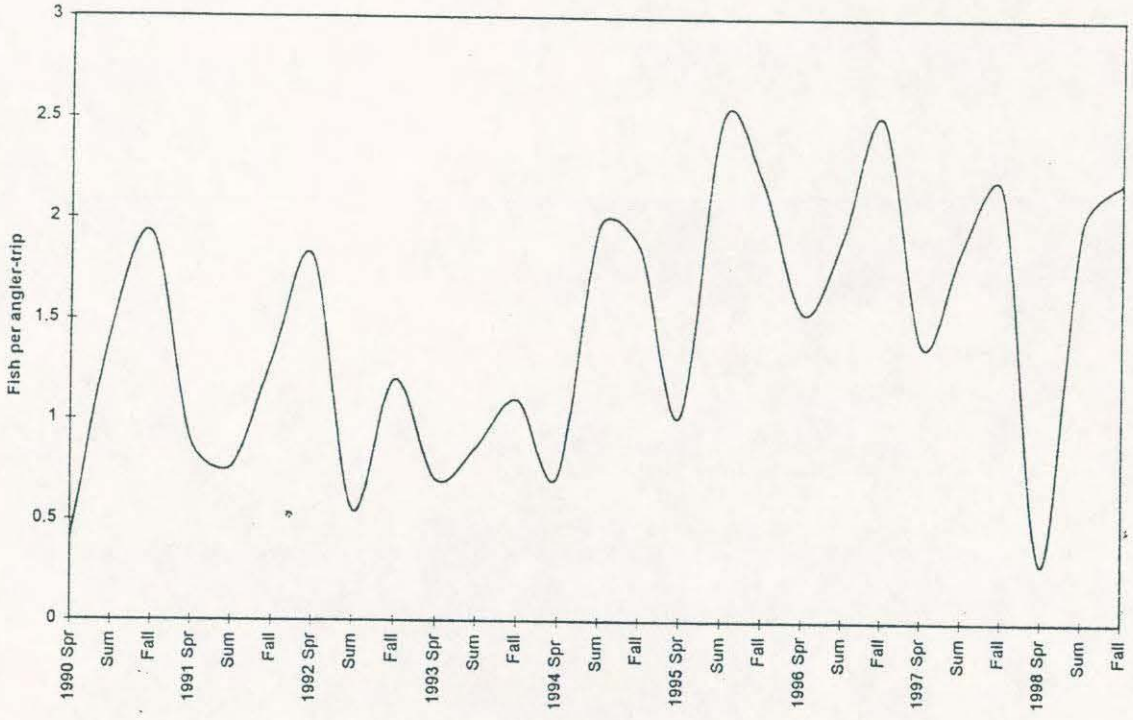

Fig. 54. Statewide CPUE for red drum by season.

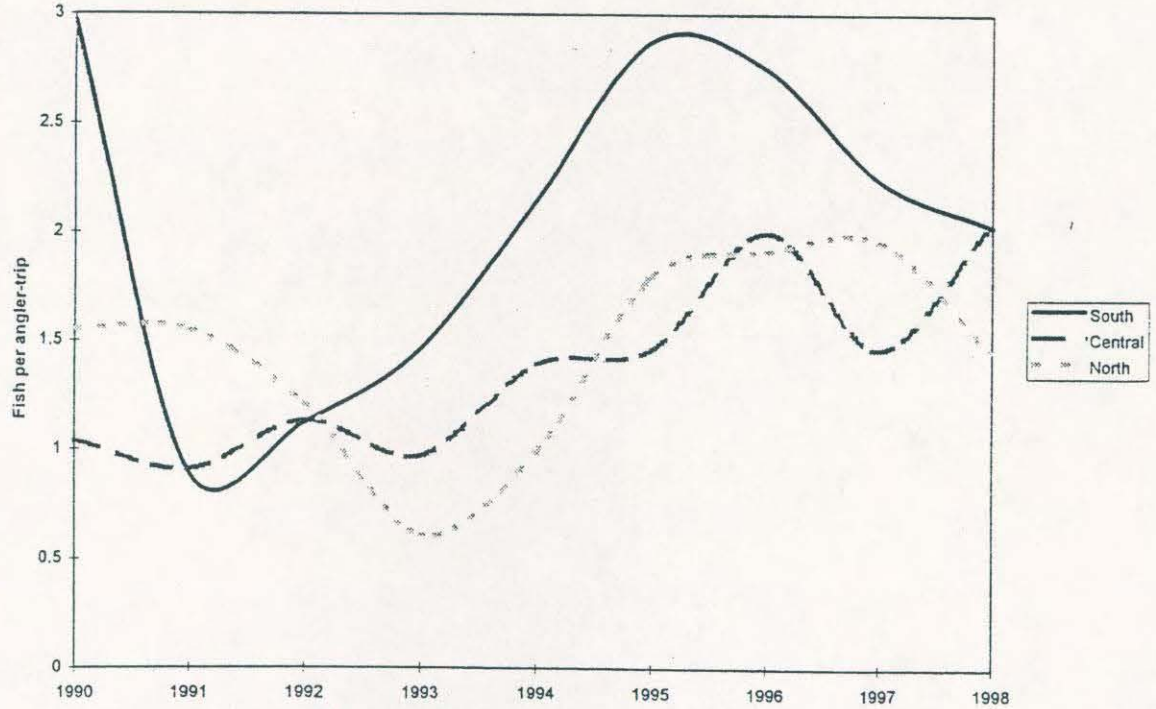

Fig. 55. Red drum CPUE by area.

The area trends are shown in Fig. 55. CPUE in 1998 was relatively good with a statewide value moderately above the eight-year average.

Data by area are summarized below. Sample sizes have typically been largest in the South and Central areas and much smaller in the northern counties.

Year	Source	South	Central	North	Statewide
1990	MRFSS,SFS	2.97	1.04	1.55	1.53
1991	MRFSS,SFS	0.89	0.91	1.55	1.06
1992	MRFSS,SFS	1.12	1.13	1.21	1.15
1993	MRFSS,SFS	1.46	0.97	0.61	0.90
1994	MRFSS,SFS	2.15	1.39	0.99	1.67
1995	MRFSS,SFS	2.88	1.46	1.80	1.94
1996	SFS	2.75	2.00	1.91	2.10
1997	SFS	2.24	1.46	1.96	1.69
Mean		2.06	1.30	1.45	1.51
1998	SFS	2.03	2.05	1.46	1.81

Wave data are shown below. Sample coverage has tended to be

	Wave					
Year	1	2	3	4	5	6
1990	NA	0.40	0.31	2.20	1.20	2.44
1991	NA	0.89	0.58	0.85	1.28	1.32
1992	1.53	2.00	0.40	0.61	1.11	1.25
1993	0.75	0.69	0.84	0.87	1.23	0.88
1994	NA	0.72	1.13	2.16	1.87	1.77
1995	1.20	0.79	1.71	2.78	2.42	1.34
1996	1.54	NA	1.61	2.28	2.80	1.87
1997	1.39	1.38	1.43	2.72	2.35	1.69
1998	0.56	0.22	0.76	2.70	2.06	2.41

greatest during waves 4-6, particularly in the earlier years. In the figures, wave data have been pooled as follows: 1) spring includes waves 1 and 2, 2) summer contains waves 3 and 4, and 3) fall consists of waves 5 and 6.

Private boat mode landings of spotted seatrout also declined sharply in the hurricane-impacted years. Unlike those of red drum, however, they rebounded sharply in 1991 to the pre-hurricane level. Since then, there has been a general downward trend (Fig. 52.) The long-term trend in seasonal CPUE is shown in Fig. 56 and area trends in Fig. 57. After above-average years in 1995/1996, the Cpue in 1998 was average except in the southern area. After a slow start, the fishing in 1998 was a little improved over that in 1997.

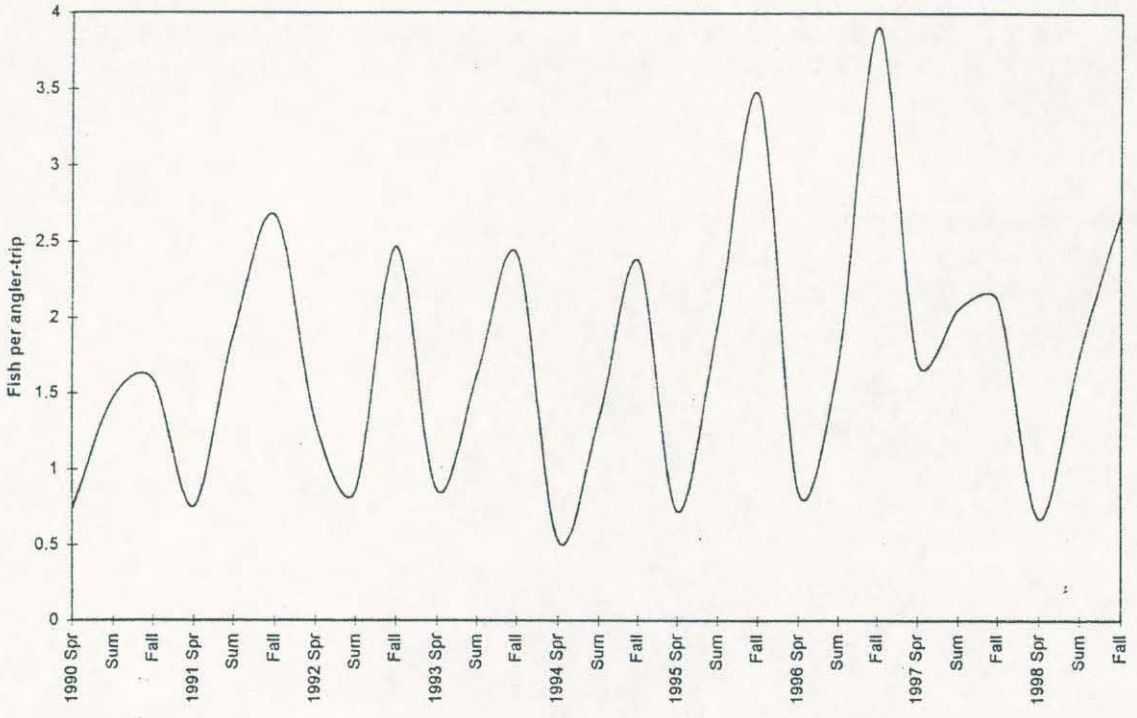

Fig. 56. Statewide CPUE for spotted seatrout by season.

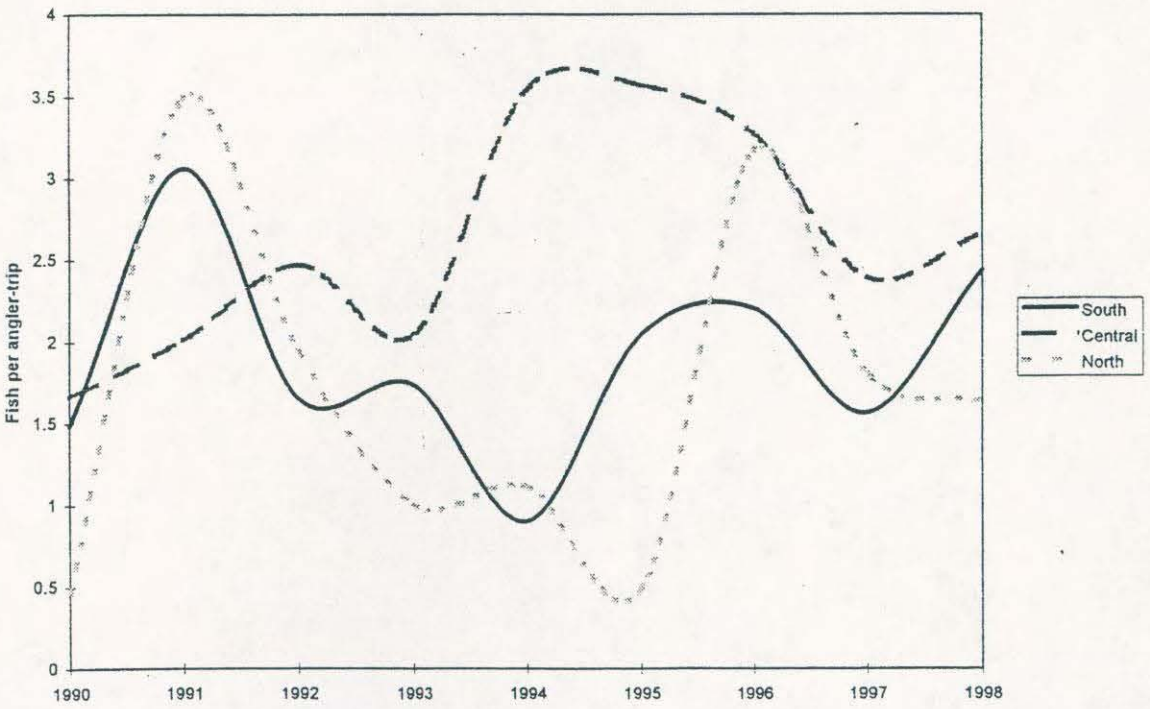

Fig. 57. Spotted seatrout CPUE by area.

The area data for spotted seatrout are summarized below.

Year	Source	South	Central	North	Statewide
1990	MRFSS,SFS	1.48	1.66	0.46	1.44
1991	MRFSS,SFS	3.06	2.01	3.49	2.34
1992	MRFSS,SFS	1.65	2.47	1.94	2.27
1993	MRFSS,SFS	1.73	2.04	1.00	1.91
1994	MRFSS,SFS	0.90	3.54	1.11	1.74
1995	MRFSS,SFS	2.04	3.57	0.49	2.68
1996	SFS	2.20	3.27	3.17	2.99
1997	SFS	1.56	2.39	1.80	1.95
Mean		1.83	2.62	1.68	2.17
1998	SFS	2.44	2.66	1.63	2.18

Sampling coverage in the northern counties had been very limited prior to 1998 with Charleston County generally contributing the largest number of observations.

Wave data are listed below. Catch rates have usually been

	Wave					
Year	1	2	3	4	5	6
1990	NA	0.73	0.91	2.14	1.62	1.58
1991	NA	0.75	0.64	2.50	2.58	2.72
1992	2.43	0.68	0.74	0.90	2.98	2.36
1993	0.96	0.69	1.82	1.36	2.35	2.47
1994	NA	0.53	1.07	1.41	2.68	1.33
1995	1.00	0.25	1.16	2.61	2.43	4.63
1996	0.85	NA	1.80	1.65	4.67	3.04
1997	1.93	1.54	2.29	1.65	1.30	2.81
1998	0.36	0.73	1.98	1.65	2.82	2.62

highest during October through November, as has been the sampling coverage.

Prior to the imposition of minimum size and bag limits in 1986, the release rate of spotted seatrout taken by private boat anglers had generally been much higher than that of red drum. Since then, the percentage of catch released has usually been appreciably greater for red drum (Fig. 58). In recent years, sight-fishing for large red drum has become a popular activity in this mode with many of the fish so taken exceeding the maximum size limit.

The estimated private boat catches of flounder are problematic. Species identification is complicated by the fact that a large portion of the total catch of "flounders" is released;

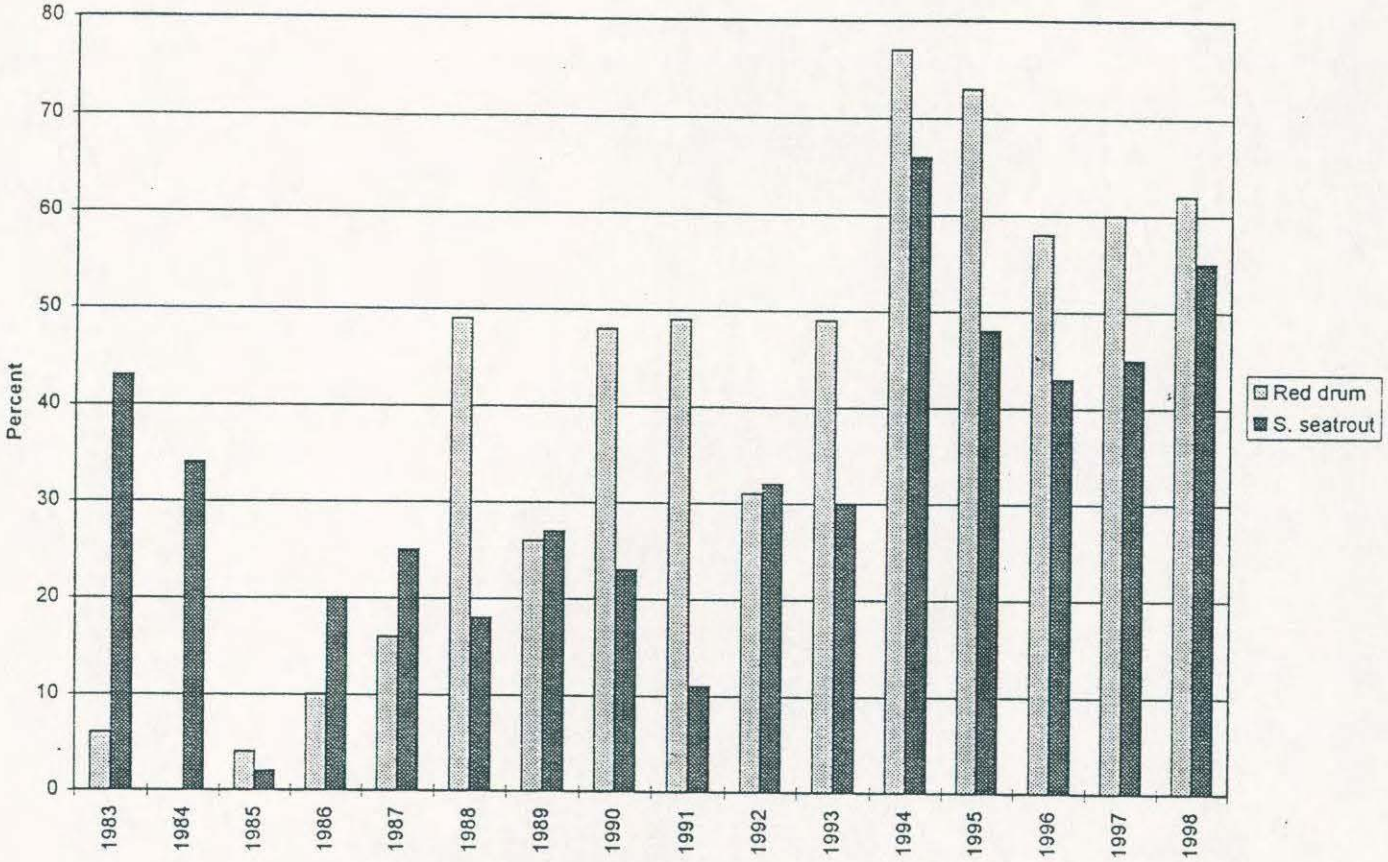

Fig. 58. Percentages released of private boat catches of red drum and spotted seatrout.

the identification of this component cannot be verified and so it is assigned to the "other flounder" category. No distinction is therefore made between species in the calculation of CPUE data. Except in the northern counties, southern flounder probably comprise practically all of the catch. Even there, this species predominates, although a few summer flounder are taken in the inlets.

The long-term trend in statewide CPUE is shown in Fig. 59. The recent catch rates in each area (Fig. 60) have been among the highest reported since monitoring began. Recruitment may be improving as a result of the use of excluder devices in shrimp trawls, which appear to have substantially reduced bycatch of flounder.

It is also possible that much of the apparent improvement in flounder catches reflects sampling distribution. A large percentage of the private boat on-site intercepts originates at the DNR ramp at Murrells Inlet, where flounder are a predominate preference of anglers. The CPUE here also tends to be higher than elsewhere. It is therefore quite likely that the expanded estimates for the mode statewide are biased upward by these factors.

CPUE data for flounder by area are listed below. Data were unavailable for 1991. Most of the sampled directed effort

Year	Source	South	Central	North	Statewide
1990	MRFSS,SFS	0.64	0.58	1.56	1.14
1992	MRFSS,SFS	0.87	0.87	1.27	1.07
1993	MRFSS,SFS	NA	0.88	0.86	0.86
1994	MRFSS,SFS	1.00	0.63	1.01	0.95
1995	MRFSS,SFS	0.67	0.84	1.31	1.06
1996	SFS	1.39	1.69	1.41	1.46
1997	SFS	0.79	1.69	2.58	1.59
Mean		0.89	1.03	1.43	1.16
1998	SFS	1.24	1.59	1.75	1.71

occurs in the northern counties, particularly around Murrells Inlet.

Wave data are shown as follows. The directed fishery occurs

	Wave				
Year	2	3	4	5	6
1990	1.94	1.05	0.81	0.95	0.60
1992	0.60	1.06	1.38	1.18	0.55

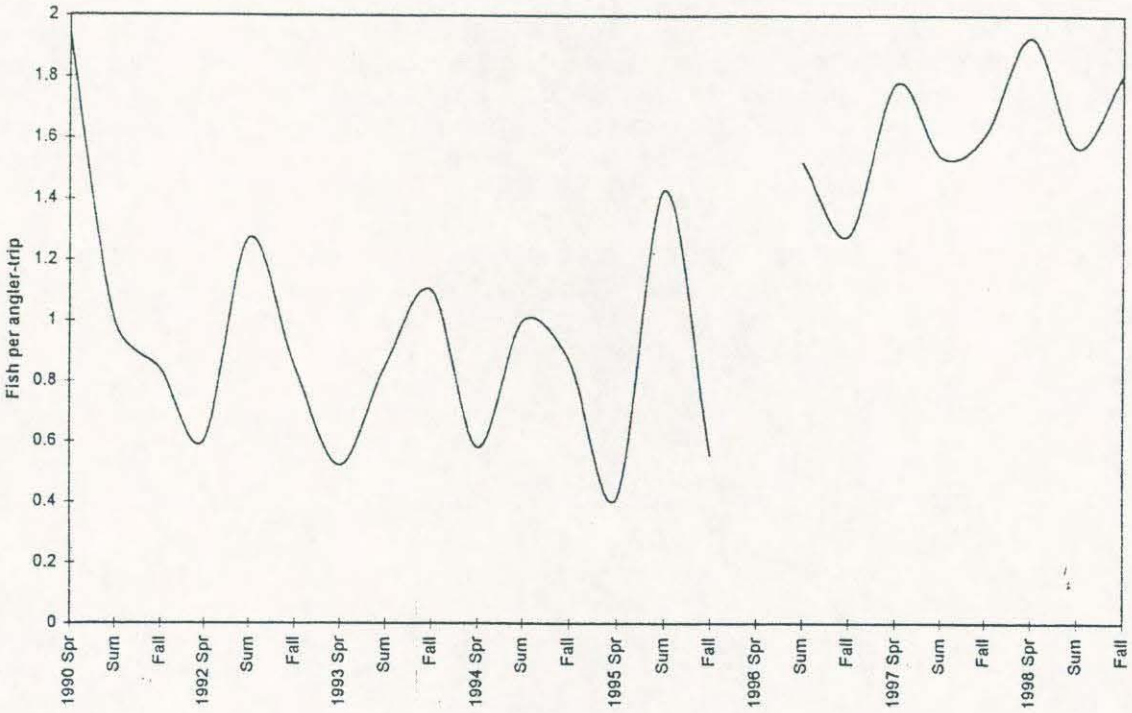

Fig. 59. Statewide CPUE for flounder by season.

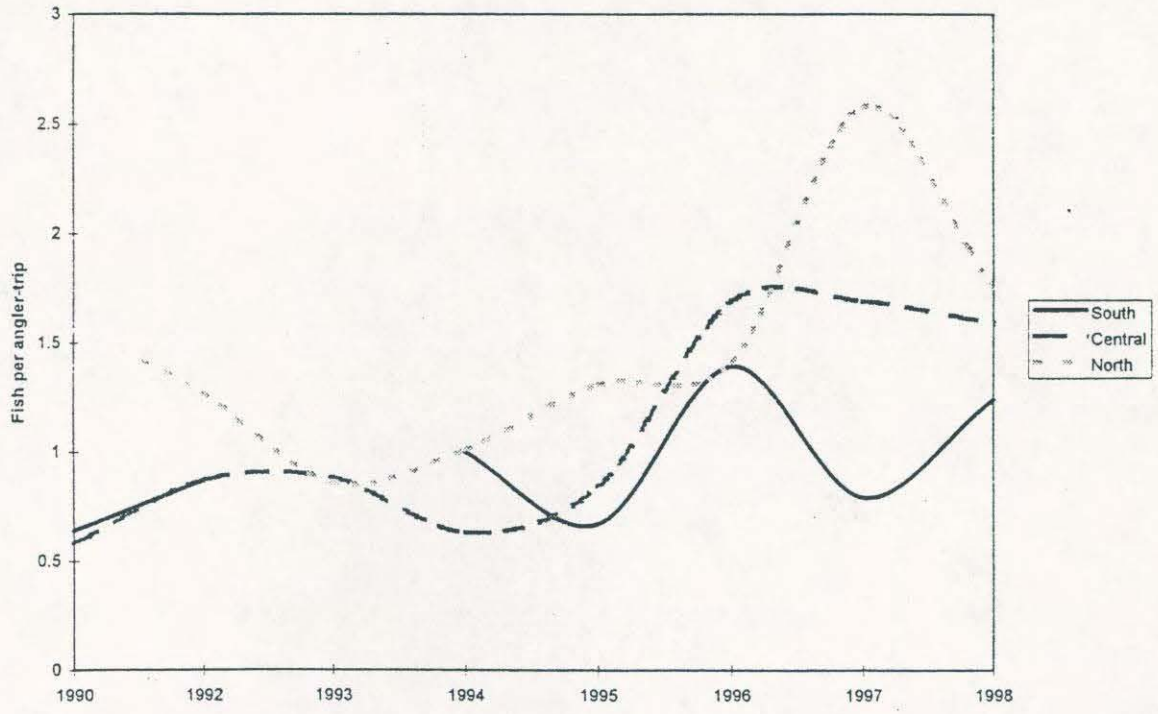

Fig. 60. Flounder CPUE by area.

1993	0.52	0.69	1.13	1.09	1.14
1994	0.58	0.87	1.07	0.86	1.00
1995	0.41	1.46	1.37	0.50	0.68
1996	NA	1.60	1.39	1.36	0.67
1997	1.82	1.79	0.87	1.68	0.75
1998	1.93	1.53	1.65	1.62	2.39

mainly during waves 3 and 4.

Although the interest of private boat anglers in sheepshead has been gradually increasing, the database for this species is limited. Relatively few fishermen targeting it are intercepted and it is unlikely to be caught while fishing for other species. In most years, the sample sizes by area have been too small to permit meaningful evaluation. Although sheepshead are caught year-round, spring is generally the time during which the most observations have been obtained. Annual statewide CPUEs are listed below.

Year	Source	Statewide CPUE
1993	MRFSS,SFS	2.58
1994	MRFSS,SFS	1.48
1995	MRFSS,SFS	2.66
1996	SFS	2.85
1997	SFS	2.25
Mean		2.36
1998	SFS	1.60

Relatively few fishermen with sheepshead catches were intercepted in 1998.

SHORE-BASED FISHERY

Distribution of effort by residence classification and wave was as follows:

	Wave					
Residence	**2**	**3**	**4**	**5**	**6**	**All**
Coastal	47,153	116,851	96,234	37,816	33,015	331,068
Noncoastal	20,957	78,747	16,181	15,757	11,751	143,393
Out of state	44,533	259,103	112,414	47,795	24,621	488,468
Total	112,643	454,701	224,829	101,368	69,387	962,928

The 11 permitted piers reported a total of 216,962 angler-trips, virtually identical to the reported effort in the previous year. Attendance by wave was as follows:

1	2	3	4	5	6
2,397	16,719	56,383	64,368	54,867	22,228

Roughly 40% of the shore mode interviews in the MRFSS historically have come from fishermen on the Grand Strand piers. One would therefore expect some similarity between estimated effort in the ocean 0-3 mi. zone and pier attendance. The trends are compared in Fig. 61. As with the marine fisheries stamp sales, the MRD data show much less fluctuation and a more stable trend than do the MRFSS estimates.

Catch statistics are listed in Table 8. Inshore bottomfish, primarily spot and kingfishes, were the most popular targets of shore-based anglers, especially those fishing from the ocean piers. As usual, some estimates appear to be extremely suspect. The most obvious example is the reported catch of king mackerel, which exceeded that of the charterboat and private boat modes combined. The 73,667 "king mackerel" reported landed weighed an aggregate of 47,813 pounds, or an average weight below that for the minimum legal size and well below the average ten pounds per fish for this species.

LENGTH COMPOSITION

Red drum Distribution of sample sizes has been as follows.

Year	Source	Percent South	Central	North	Statewide number
1990	MRFSS, SFS	12	45	43	154
1991	MRFSS, SFS	5	47	48	232
1992	MRFSS, SFS	26	50	24	576
1993	MRFSS, SFS	17	60	23	598
1994	MRFSS, SFS	63	25	12	302
1995	MRFSS, SFS	36	47	17	470
1996	MRFSS, SFS	26	61	13	1251
1997	SFS	48	41	11	485
1998	SFS	25	35	40	536

The mean lengths (TL cm) of legal-sized fish (36-69 cm) have been as shown below.

Year	South	Central	North	Statewide
1988	NA	NA	NA	43.5
1989	NA	NA	NA	46.7
1990	46.4	42.9	50.0	46.3
1991	42.1	44.8	42.6	43.6
1992	42.4	43.0	44.6	43.2
1993	42.4	45.3	51.2	46.2
1994	42.6	43.9	47.5	43.5
1995	41.2	48.8	46.6	45.7
1996	42.2	45.8	48.0	45.1
1997	38.5	47.8	45.6	43.1
Mean	42.2	45.3	47.0	44.6
1998	41.9	47.2	50.0	47.0

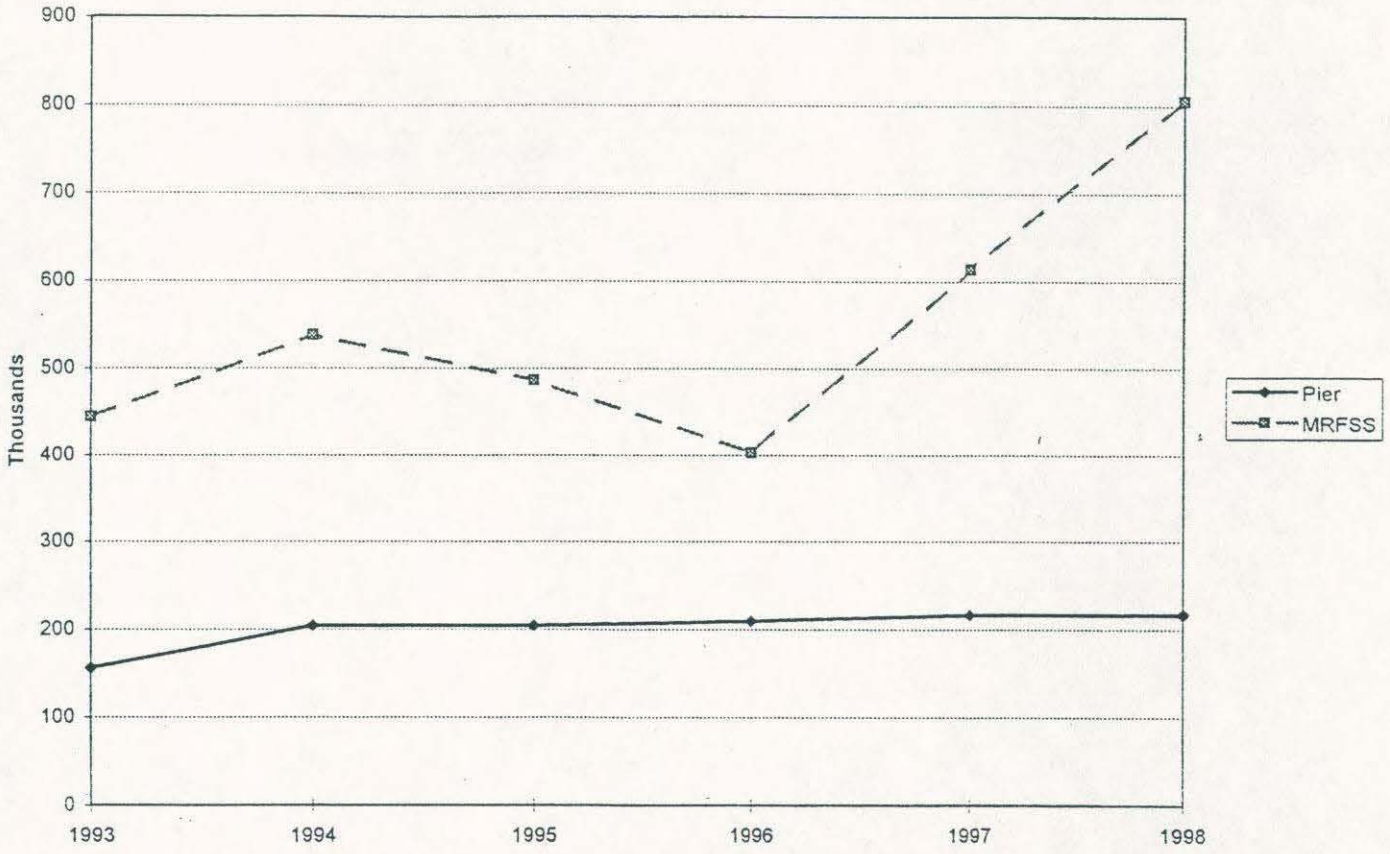

Fig. 61. Reported pier attendance vs estimated (MRFSS) trips in the ocean 0-3 mi. zone.

Table 8. Shore-based catch (in numbers of fish). Source: NMFS MRFSS.

Group/species	Landed	Released	Inland	0-3 mi.
Reef fish				
Black sea bass	5,640	17,445	8,146	14,939
Spottail pinfish	0	2,540	-	-
Spadefish	0	851	-	-
Sheepshead	1,050	2,540	0	3,590
Coastal pelagics				
King mackerel	73,667	0	0	73,667
Spanish mackerel	17,672	4,727	0	22,399
Bluefish	122,306	254,131	39,821	214,310
Crevalle jack	852	0	852	0
Inshore sportfish				
Red drum	525	3,917	1,377	3,065
Spotted seatrout	20,130	17,075	10,247	26,958
Weakfish	10,779	0	0	10,779
Southern flounder	14,404	12,929	12,915	14,419
Other flounder	3,605	4,442	0	8,048
Inshore bottomfish				
Kingfish	221,686	183,630	89,298	316,018
Spot	188,602	218,663	11,555	395,710
Croaker	53,351	194,998	852	247,498
Black drum	0	560	0	560
Pompano	1,902	19,158	0	21,060
Sharks				
All	25,476	674,869	160,196	540,149

The geographic distribution of the annual samples has been highly variable, although Charleston County has usually been the major source. Location has had some influence on annual overall length distribution, since the fish typically have been slightly larger in the northern counties. This probably reflects the area of fishing to some extent with a higher percentage of the fish there coming from the ocean. The amount of estuarine fishing area in Horry County is very limited and most of the Georgetown County sampling has been done at the Murrells Inlet DNR ramp.

While the seasonal distribution of the samples has also been rather variable, this appears to have had less effect on length distribution, as indicated below in data for 1990-1998.

	Waves					
	1/2	3	4	5	6	Total
Number of fish	564	519	619	1619	1086	4407
Mean TL (cm)	47.1	45.3	45.6	44.0	44.0	

Length composition of red drum sampled in 1998 is shown in Fig. 62. The sample was typical in terms of overall sample size, although the contribution from the northern counties was greater than in the previous six years. This probably contributed to the above-average annual statewide mean length. Nearly half of the fish reported in the SFS were released with about 38% of the total catch being either below or above the 14-27 in TL slot limit.

	Catch disposition (1998) Percent		
	Released		
Area	legal	illegal	Retained
South	9	39	52
Central	14	47	39
North	8	25	67
Statewide	11	38	51

Spotted seatrout

Mean size has tended to increase from south to north in most years. With the exception of 1998, the sample size in the northern counties has been very small. A creel clerk from this area was hired in 1998, which significantly increased the survey coverage there. The slightly above average statewide annual mean size in 1998 probably reflected the geographic composition of the sample. Another factor was the change in minimum size (from 12 in or 30 cm to 13 in or 33 cm) effective on 28 May, 1998. About 91% of the 1998 sample was obtained after the new minimum went into effect.

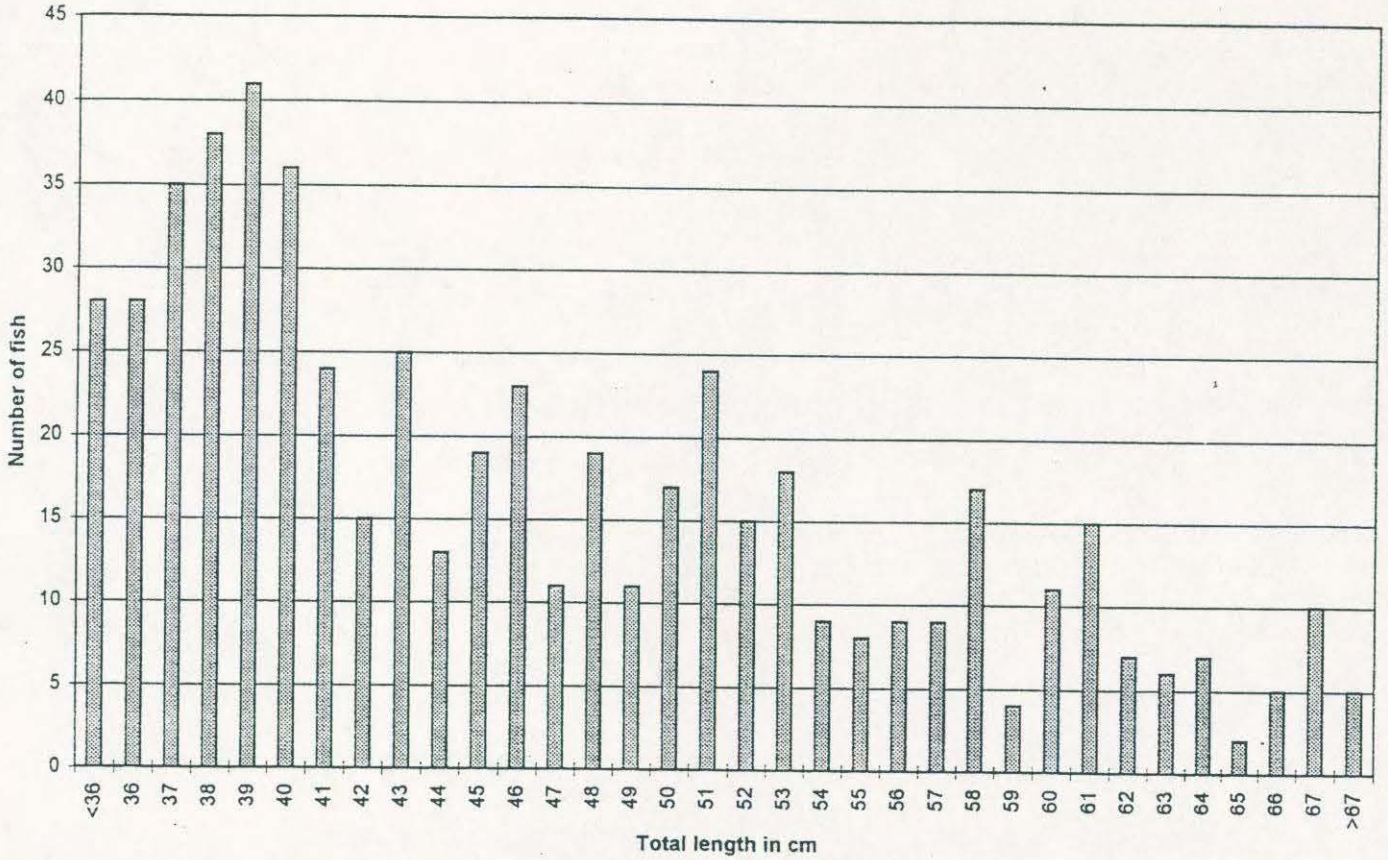

Fig. 62. Statewide length distribution of red drum.

Distribution of sample sizes is shown below.

Year	Source	Percent South	Central	North	Statewide number
1990	MRFSS, SFS	-	100	-	193
1991	MRFSS, SFS	17	66	17	576
1992	MRFSS, SFS	22	69	9	852
1993	MRFSS, SFS	13	81	6	1194
1994	MRFSS, SFS	49	46	5	367
1995	MRFSS, SFS	39	58	3	456
1996	MRFSS, SFS	22	72	6	1345
1997	SFS	43	55	2	511
1998	SFS	21	37	42	744

The mean lengths (TL cm) of legal-sized fish were as follows.

Year	South	Central	North	Statewide
1988	NA	NA	NA	36.5
1989	NA	NA	NA	37.7
1990	-	37.1	-	37.1
1991	35.3	35.4	35.9	35.5
1992	38.5	36.6	38.4	37.2
1993	36.9	36.7	38.6	36.8
1994	36.7	36.9	38.1	36.9
1995	35.7	36.2	37.1	36.1
1996	37.3	38.8	41.2	38.6
1997	34.4	40.0	41.3	37.6
Mean	36.4	37.2	38.7	37.0
1998	36.4	38.2	40.7	38.9

Length composition in 1998 is shown in Fig. 63. Fig. 64 contrasts the 1998 distribution (with the 13 in minimum size in place) with that of the preceding five years with the 12 in limit. The most apparent difference is in the percentage of large fish (50 cm - 20 in - or larger). The figure in the preceding five years was 1.2% compared to 5.8% in 1998. The change in geographic composition was partly responsible. During 1993-1997, only 5% of the fish were from the northern area, compared to 42% in 1998. In 1998, 28 fish from there were 50 cm or larger, compared to only 15 from the central and southern counties combined.

Seasonal distribution has not had much impact on the mean size of the overall annual sample, as indicated below in data for 1990-1998.

	Wave 1/2	3	4	5	6	Total
Number of fish	480	474	642	1970	2496	6062
Mean TL in cm	37.9	38.6	36.6	37.1	37.6	

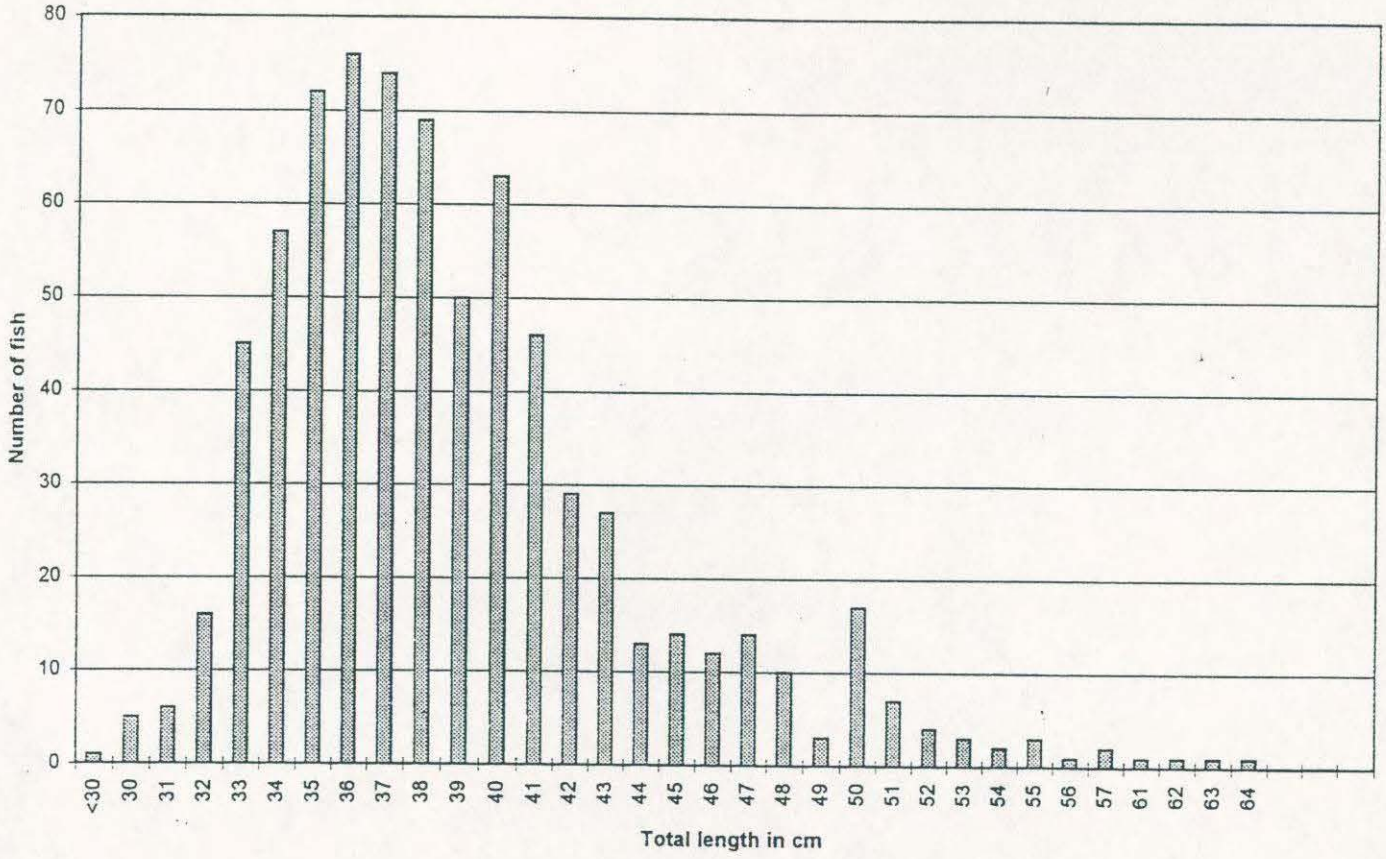

Fig. 63. Statewide length distribution of spotted seatrout.

Fig. 64. Length distribution of spotted seatrout, 1993-1998.

Disposition of the 1998 catch as reported in the SFS was as follows.

Area	Percent Released legal	Released illegal	Retained
South	-	46	54
Central	2	49	49
North	5	16	78
Statewide	3	38	59

The effect of the change in minimum size on the percentage of catch retained was least apparent in the northern counties. During 1990-1997, 9.7% of the legal catch was <33 cm (13 in), compared to about 15% in the other areas.

Southern flounder Distribution of sample sizes has been as indicated below:

Year	Source	Percent South	Central	North	Statewide number
1993	SFS	6	38	56	338
1994	SFS	51	4	45	124
1995	MRFSS, SFS	11	28	61	215
1996	MRFSS, SFS	17	39	44	628
1997	SFS	30	25	45	295
1998	SFS	8	10	82	776

Since most of the directed flounder effort occurs in the Murrells Inlet area, the impact of the new creel clerk on sample size and distribution was most pronounced for this species.

Mean lengths (TL in cm) of legal fish are shown below.

Year	South	Central	North	Statewide
1988	NA	NA	NA	34.6
1989	NA	NA	NA	35.0
1990	NA	NA	NA	35.6
1991	NA	NA	NA	35.4
1992	NA	NA	NA	38.6
1993	35.6	37.1	37.2	37.1
1994	36.7	-	37.3	36.9
1995	37.3	38.6	40.0	39.3
1996	37.2	38.9	38.6	38.5
1997	34.1	38.5	37.9	36.9
Mean	36.2	38.3	38.2	36.8
1998	35.2	39.6	36.5	36.7

Historically, most of the catch has been taken during waves 3, 4, and 5 with little seasonal variation in average size.

Length composition of the 1998 sampled catch is shown in Fig. 65. Disposition of reported catch in the SFS was as follows.

Area	Percent Released legal	Released illegal	Retained
South	-	-	100
Central	5	36	59
North	2	45	53
Statewide	2	42	56

Sheepshead Distribution of annual samples has been as follows.

Year	Source	Percent South	Central	North	Statewide number
1993	SFS	12	75	13	600
1994	SFS	24	65	11	86
1995	MRFSS, SFS	28	57	15	165
1996	MRFSS, SFS	19	66	15	817
1997	SFS	47	48	5	556
1998	SFS	32	2	66	189

Sample sizes and distribution obviously have been highly variable from year to year.

Annual mean sizes have been as shown below.

Year	South	Central	North	Statewide
1988	NA	NA	NA	32.6
1990	NA	NA	NA	34.2
1991	NA	NA	NA	32.2
1992	NA	NA	NA	31.9
1993	30.3	31.8	32.6	31.5
1994	33.5	34.0	30.9	36.4
1995	46.5	35.2	34.7	38.2
1996	42.3	33.2	33.4	34.9
1997	31.5	34.7	33.7	33.1
Mean	36.8	33.8	33.1	33.9
1998	29.7	-	33.3	32.1

A factor is the inland/ocean distribution of the samples, since fish from the offshore areas (mainly artificial reefs) tend to be

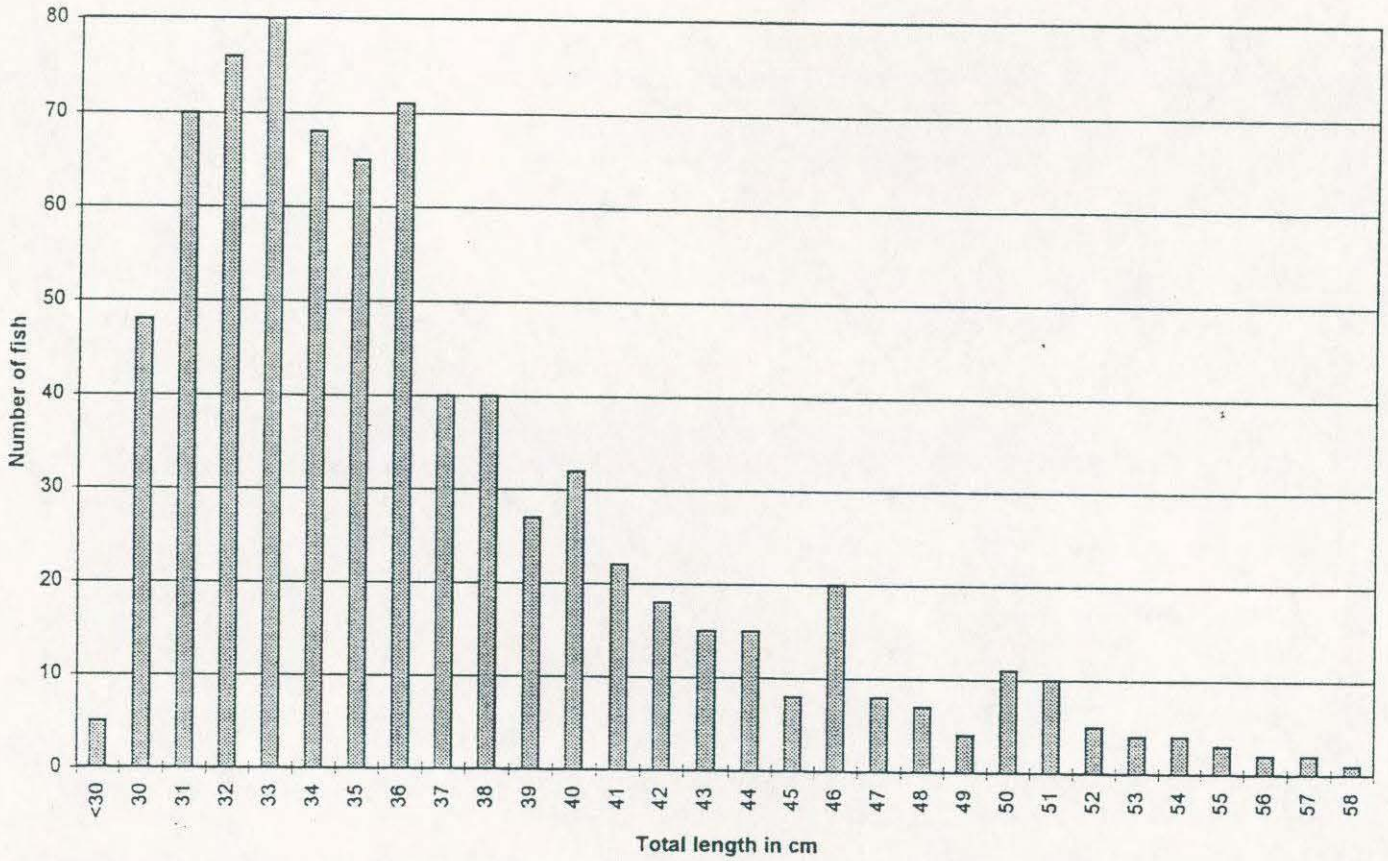

Fig. 65. Statewide length distribution of southern flounder.

larger. The SFS samples are primarily from inland and near-shore (0-3 mi.) ocean waters. In some years, a large component of the MRFSS sample consists of fish taken from offshore artificial reefs by Beaufort area charterboats.

The length composition of the 1998 sample is shown in Fig. 66. Since there is no minimium size limit, most of the catch (92% in 1998) was reportedly retained.

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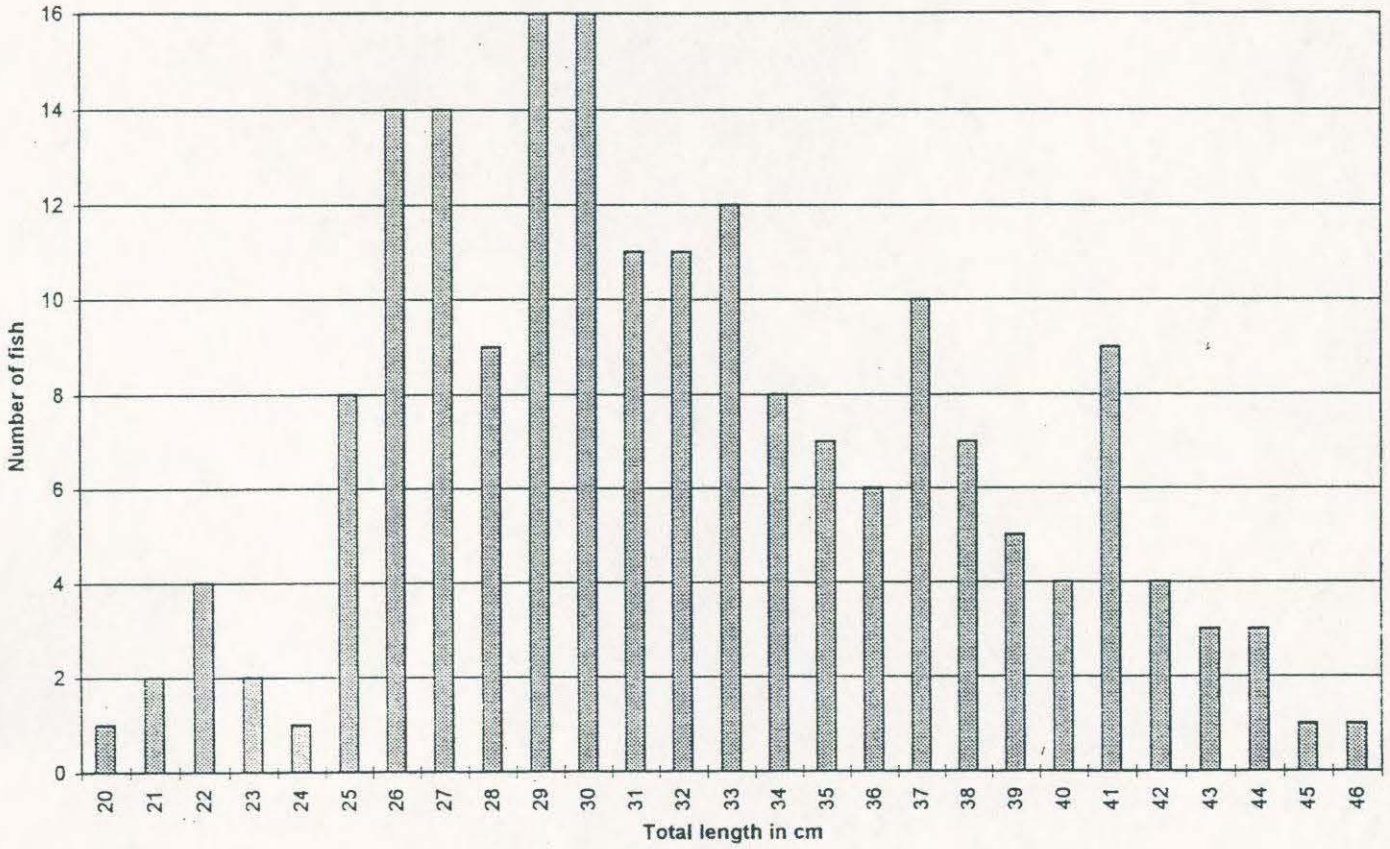

Fig. 66. Statewide length distribution of sheepshead.