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North Carolina

CAPE HATTERAS

CAPE LOOKOUT

SOUTH CAROLINA MARINE FISHERIES, 1997

WILMINGTON

South Carolina

CHARLESTON

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Office of Fisheries Management

Georgia

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JACKSONVILLE

Florida

ST. AUGUSTINE

DAYTONA BEACH

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80°

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36°

34°

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INTRODUCTION

This report is a summary of significant events in South Carolina's marine fisheries during 1997. 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.

Annual fishing effort by gear type was usually estimated by dividing total landings compiled from all sources by the average catch per unit of effort (CPUE) calculated from tickets or harvest reports. The percentages of total landings so reported, and thus the accuracy of the overall effort estimates, varied considerably by gear type.

Commercial landings statistics applied to wild stock fisheries only. The mariculture industry experienced difficulties, but produced \$2.9 M worth of product. In 1997, a virus again caused heavy mortalities at shrimp farms with their production only 175,000 pounds heads-off worth \$971,000. The largest clam operation continued to have financial problems that affected production.

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. This has made estimation of effort (based on ticket data) speculative for most of these fisheries.

Landings for 1997 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. Upriver shad landings have been largely undocumented with the reported shad catches (mostly from dealers handling ocean and lower river fish) representing an unknown percentage of the total harvest. It was probable that incidental catches of (coastal) fish attributable to shrimp trawlers were under-reported. These customarily were part of the crews' compensation and were not handled by wholesale dealers.

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 measurements 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. To avoid duplication of effort, the MRD relied on summary information provided by their staff.

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. Results permitted some rough estimates of statistics for recreational crabbing during July-October and 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 1997 survey are described in MRD Data Report Number 29. 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 all penaeid species (rock shrimp landings were negligible). Crab landings included live weight of blue 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 ground-

fishes, e.g. spot, whiting (kingfish), and flounders. Riverine fish in 1997 were exclusively American shad, although in other years blueback herring have been included in this category.

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 by weighting factors based on the annual Consumer Price Index (CPI). All figures shown are expressed in 1997 dollars.

South Carolina is not a major producer of seafood. In 1996, the most recent year for which figures are available, the state ranked 20th in volume and value of overall production (including mariculture) among the coastal states. Most of the landings were shipped out of state as raw or unprocessed product.

The state's seafood industry consists largely of harvesting with little processing to add value to the raw product. In FY 1996/1997, there were 257 licensed wholesale seafood dealers (the lowest since 1989). A detailed description of operating characteristics is contained in the 1994 report; there have been few changes since then.

Processing was largely limited to initial handling, such as shrimp heading, oyster shucking, crab picking, and fish filleting. An annual survey has been conducted to obtain approximate employment figures. The 1997 survey included the large wholesale dealers only. Many other operations were limited to the dealer himself and one or two part-time employees. Complete figures for 1997 were not available at the time this report was prepared, but probably were not substantially different from those listed 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 changed so that a Trawler Captain's license could only be used to sell trawl-caught product; a Land and Sell license was required for all other gears). In FY 1996/1997, there were 988 Trawler Captain and 590 Land and Sell licenses issued. Additional licenses were required for units of gear and/or participation in various fisheries; for example, 272 shellfish harvester and 428 crab pot licenses were sold. 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 17.129 M pounds (Fig. 1). Although slightly below the 15-year average, this volume appreciably exceeded that in 1996 with increases in every category except shellfish (-31%) and riverine fish (-62%). Fig. 2

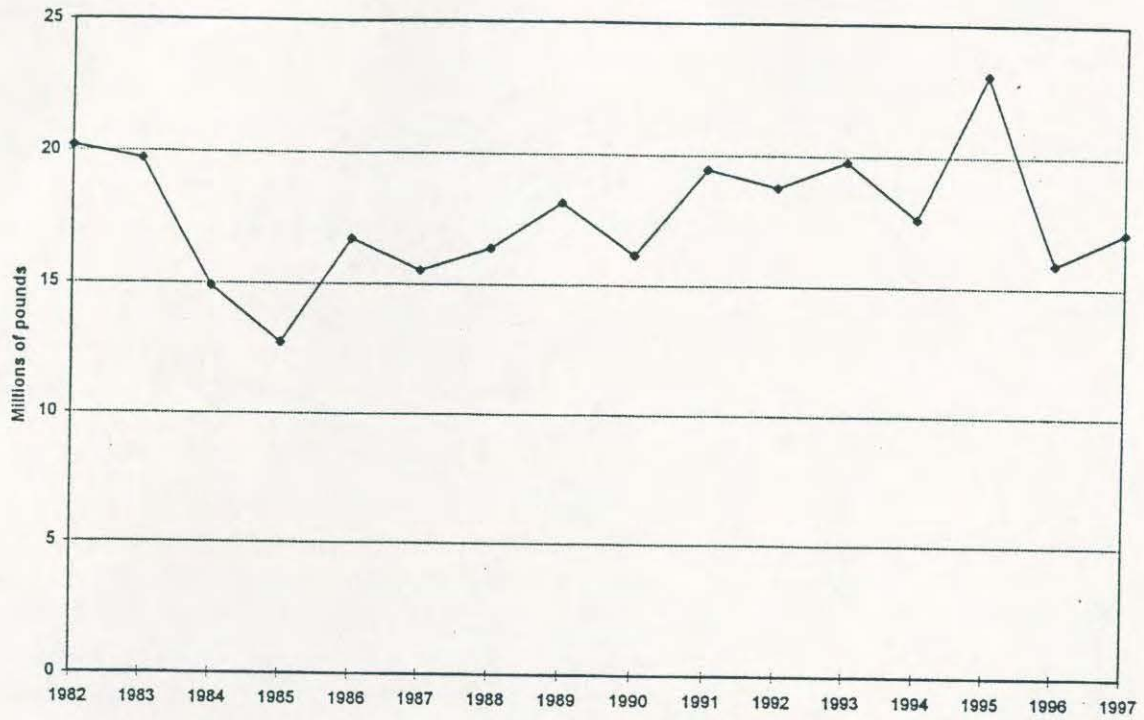


Fig 1. Total weight of commercial marine fisheries products.

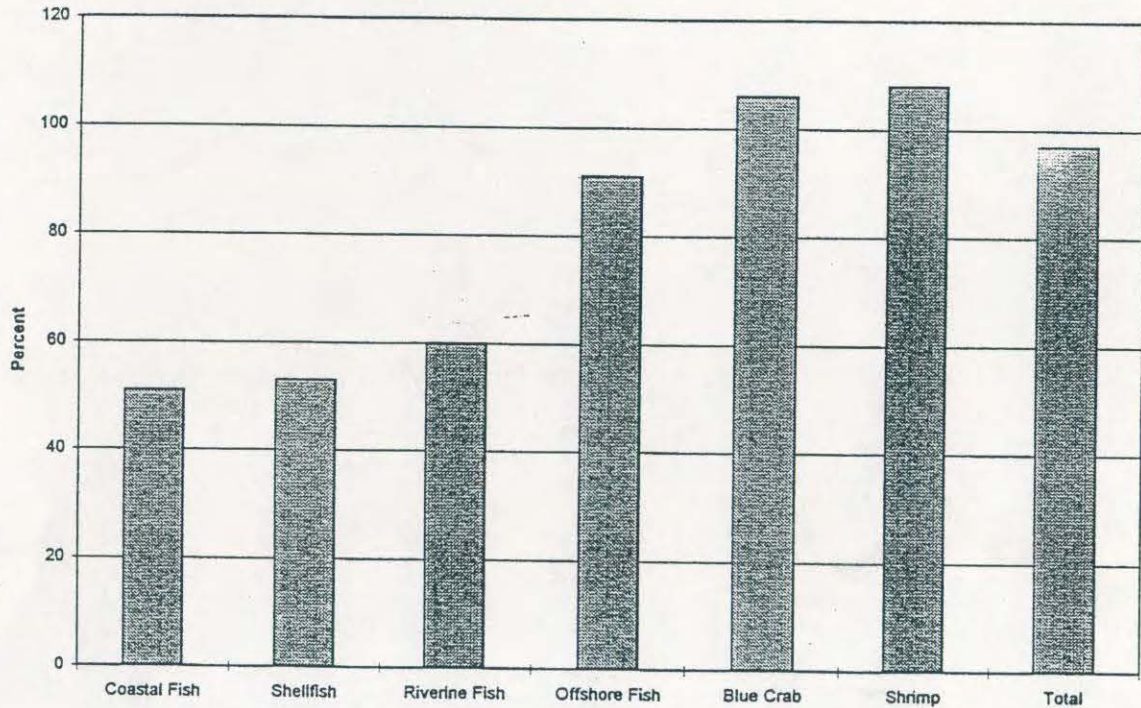


Fig. 2. Production in 1997 expressed as percentages of the 15-year averages.

illustrates the status of the 1997 landings vs the 15-year averages. The state's two major inshore fisheries (shrimp and blue crab) both produced above-average landings.

Total landings were worth \$29.72 M, 97% of the 15-year average (Fig. 3). Shrimp was the leading component in both volume and value (Fig. 4).

Charleston County was the leading producer with 48% (\$15.59 M) of the total landed value, including mariculture (Fig. 5, Table 1). The county led in shrimp landings with 1.80 M pounds heads-off of wild production worth \$7.58 M. Total fish landings were 1.11 M pounds worth \$1.96 M. Nearly all of the wreckfish and swordfish were landed here. Blue crab production (all categories) was 2.78 M pounds valued at \$2.18 M. The county was the leading shellfish producer with \$2.95 M in landed value (including mariculture). This included 37,208 bu. of oysters worth \$471,000. Charleston County operations accounted for practically all of the state's mariculture production.

Beaufort County produced \$9.27 M. The leading contributors were shrimp (1.44 M pounds heads-off worth \$6.94 M) and blue crab (3.00 M pounds at \$1.79 M). Although more crab was landed in Beaufort County, the unit value (\$0.51/lb) was substantially less than in Charleston County (\$0.66/lb). Shellfish landings included 20,942 bushels of oysters (\$250,000) and 5,366 bags (250-count) of clams (\$136,000).

Georgetown County fishermen accounted for \$5.47 M in landings with shrimp (\$2.70 M) and fish (\$2.36 M) the major components. Horry County harvesters contributed \$0.99 M in landings, mostly of offshore fish.

SHRIMP

Penaeid shrimp landings were 6.62 M pounds heads-on worth \$18.29 M. Above-average white shrimp catches compensated for the lowest brown shrimp harvest in a decade (Fig. 6).

A total of 887 trawler licenses was issued for FY 1996/1997, 12% more than in the previous year. The number of resident licenses (558) increased slightly, while the number of nonresident licenses (329) was the largest in five years.

The winter was relatively mild with moderate quantities of white shrimp overwintering following closure of the trawling season on January 15. Based on the moderate abundance of roe white shrimp and adequate spawning, the trawling season in state waters opened on May 14. By-catch reduction devices (BRDs) were required in all trawls having head rope lengths exceeding 16 ft.

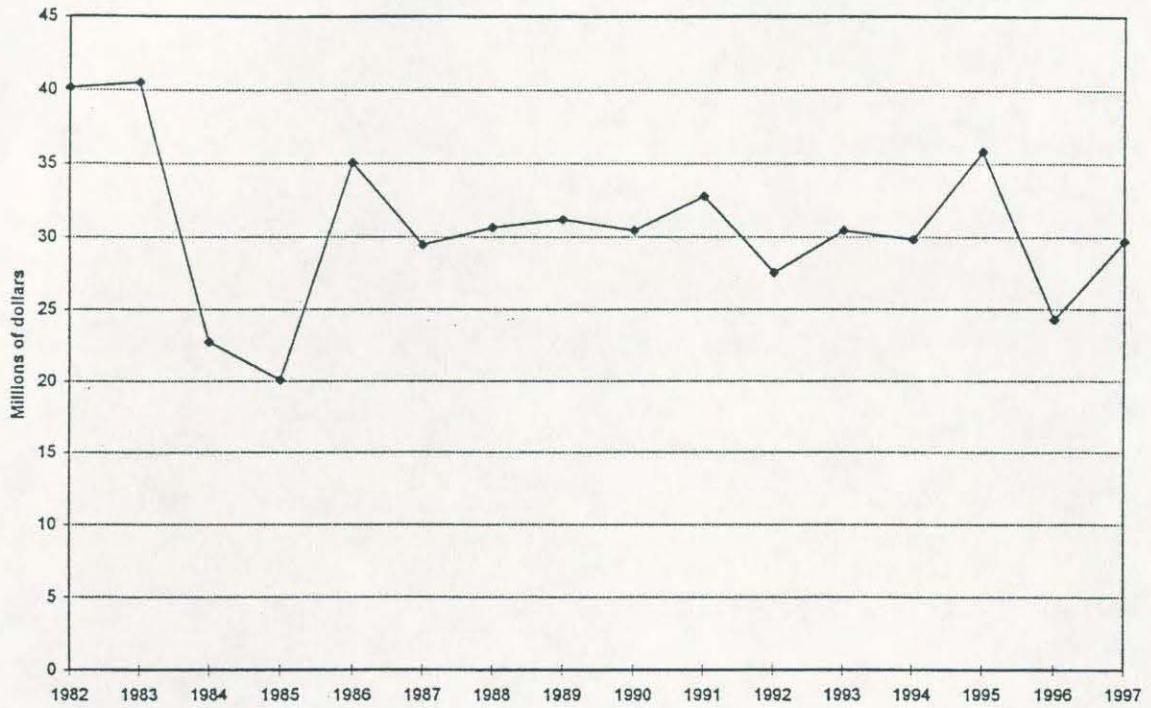


Fig. 3. Total ex-vessel value adjusted for inflation in 1997 dollars.

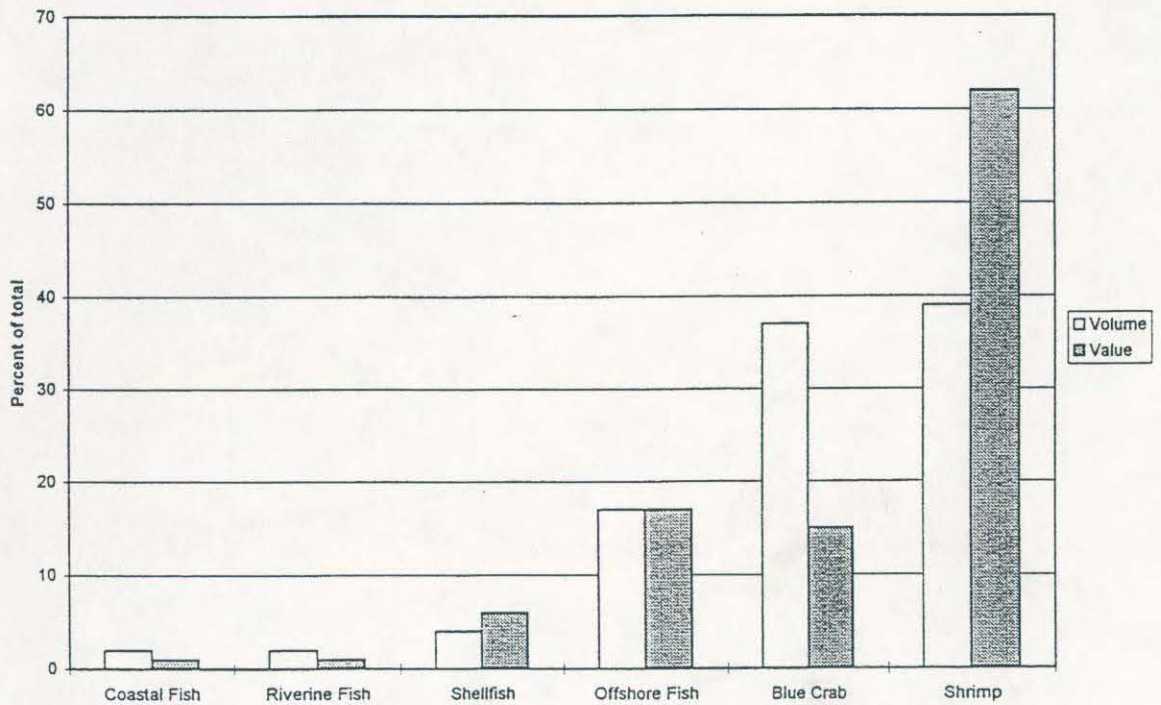


Fig. 4. Weight and value composition of commercial landings.

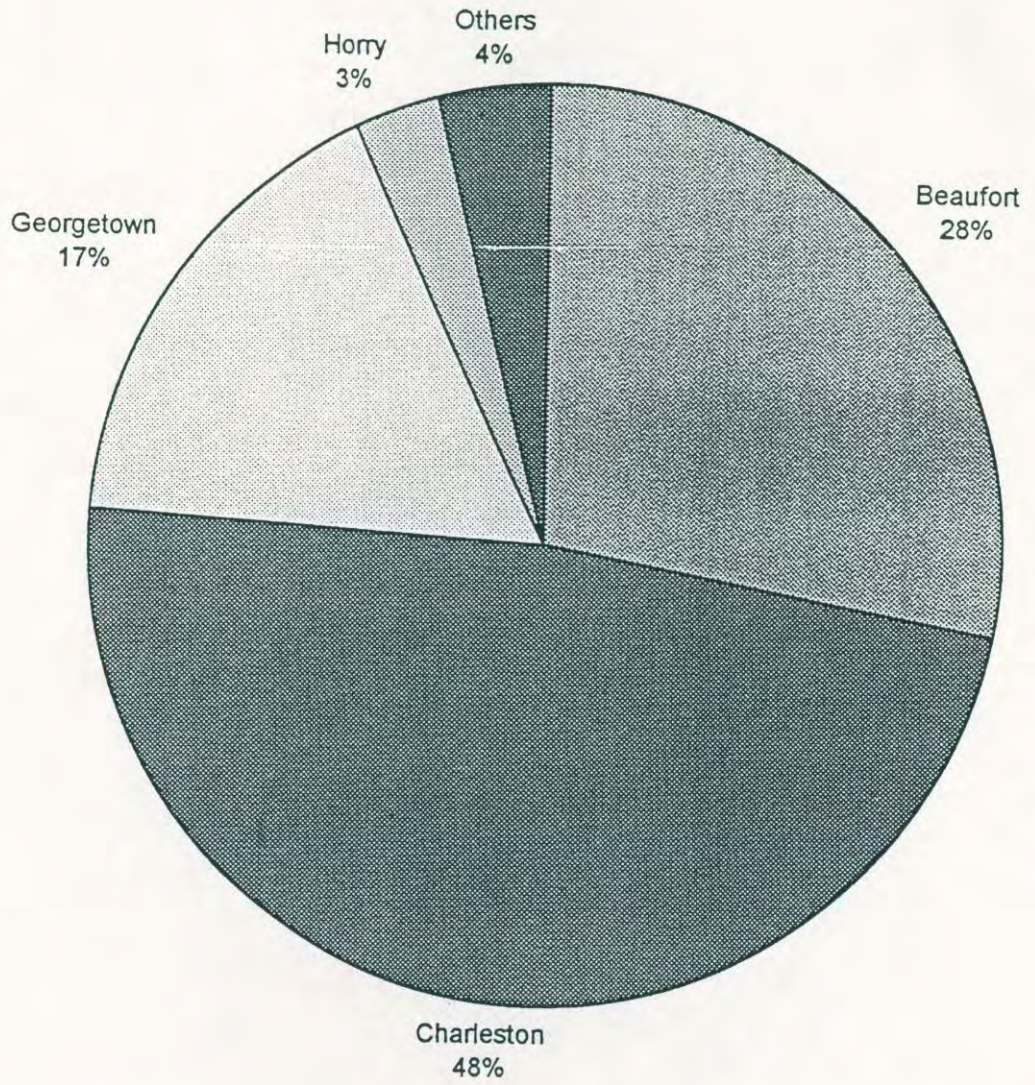


Fig. 5. County distribution of landed value.

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

County	Shrimp	Blue crab	Shellfish	Fish		
				Offshore	Coastal	Riverine
Volume						
Beaufort	1,443	3,003	250	6	28	16
Charleston	1,963	2,776	520	921	87	99
Georgetown	797	396	23	1,352	14	143
Horry	2	8	< 1	606	160	90
Value						
Beaufort	6,943	1,787	483	9	24	11
Charleston	8,484	2,180	2,950	1,835	62	66
Georgetown	2,697	303	107	2,240	5	118
Horry	8	5	< 1	884	37	60
		Total volume		Total value		
Charleston		6,371		15,591		
Beaufort		4,750		9,265		
Georgetown		2,726		5,472		
Colleton				1,086		
Horry		867		995		
Berkeley				133		
Jasper				88		
Others				34		

Only 1.11 M pounds heads-on of brown shrimp were landed with an ex-vessel value of \$2.72 M. A fairly cool spring may have contributed to low abundance, since summer weather conditions were not unusual. Brown shrimp comprised just 17% 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. Growing conditions during the summer were nearly ideal. August was drier than normal, which tended to delay outmigration. Unlike in the previous two years, there were no significant storms to interrupt the fishery. Late season weather was unusually wet, but mild, and the season continued until January 5, 1998 north of Fripp Island and January 27 south of there. Total white shrimp landings in 1997 were 5.50 M pounds heads-on worth \$15.53 M. Inflation-adjusted value was among the highest in recent years (Fig. 7). The average price for shrimp (\$2.85/pound heads-on) was also among the best in ten years.

The number of trawler licenses (resident and nonresident) sold annually has been relatively stable for over a decade. Annual production (see Fig. 7) has trended upward slightly. Fig. 8 shows the trends in number of licenses and average vessel income, where average income has been calculated as total trawler-caught ex-vessel value in 1997 dollars divided by the number of licenses. The 1997 income figure was \$20,189, compared to a 20-year average of \$18,370. There has been no relationship between average income and number of licenses or average unit price. Average income has been most closely associated with total production ($r = 0.77$, 20df), presumably a proxy of shrimp abundance. The obvious implication is that, from the individual vessel owner's perspective, the most important determinant of his success is abundance of shrimp, not its unit value or the number of competitors.

The channel net/trawl season in North Santee Bay and Winyah Bay was opened on September 22 and closed on November 30. Channel net landings were relatively good at 338,000 pounds heads-on worth \$378,000, although the catch consisted mainly of small shrimp. 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 9.4% to a record 15,488. Participation (N= 48,544 individuals) exceeded the previous record set in 1995 by 16%. Good weather and abundance of shrimp were both contributing factors with both the percentage of active permit holders and average number of assistants/permit holder above average.

Total effort (N= 94,154 trips) also surpassed the previous record set in 1995. Except for the Charleston and Georgetown areas, the 1997 effort appreciably exceeded previous levels. Since

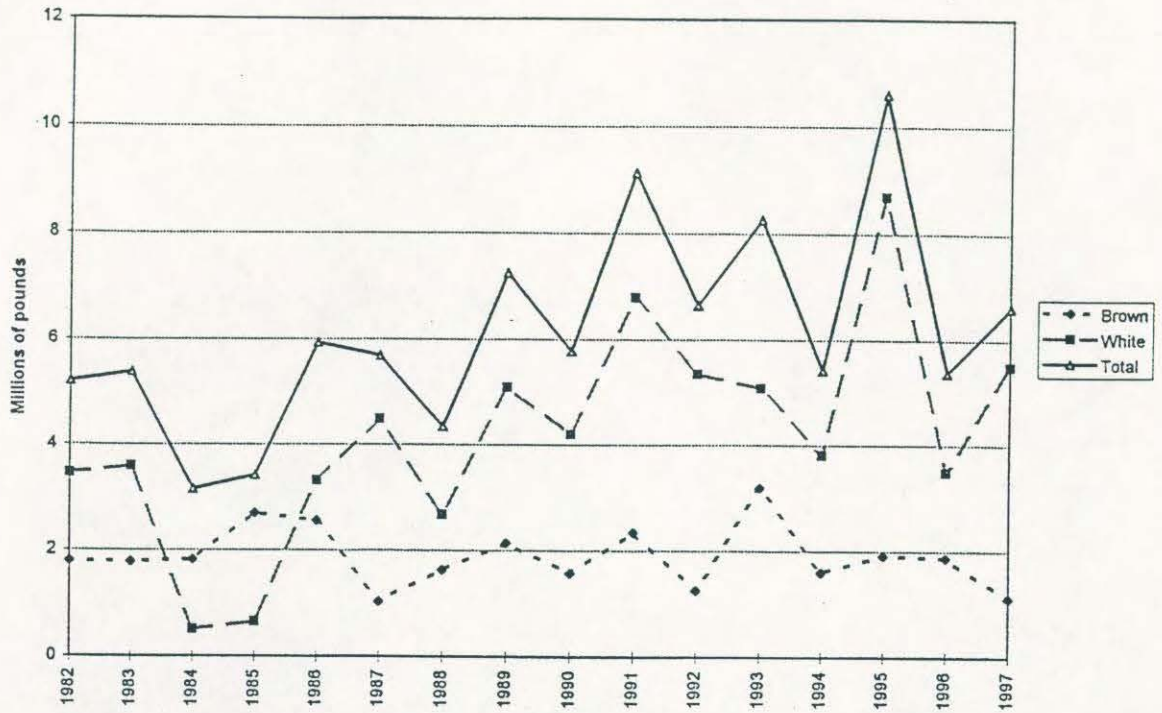


Fig. 6. Annual commercial landings (heads-on) of shrimp.

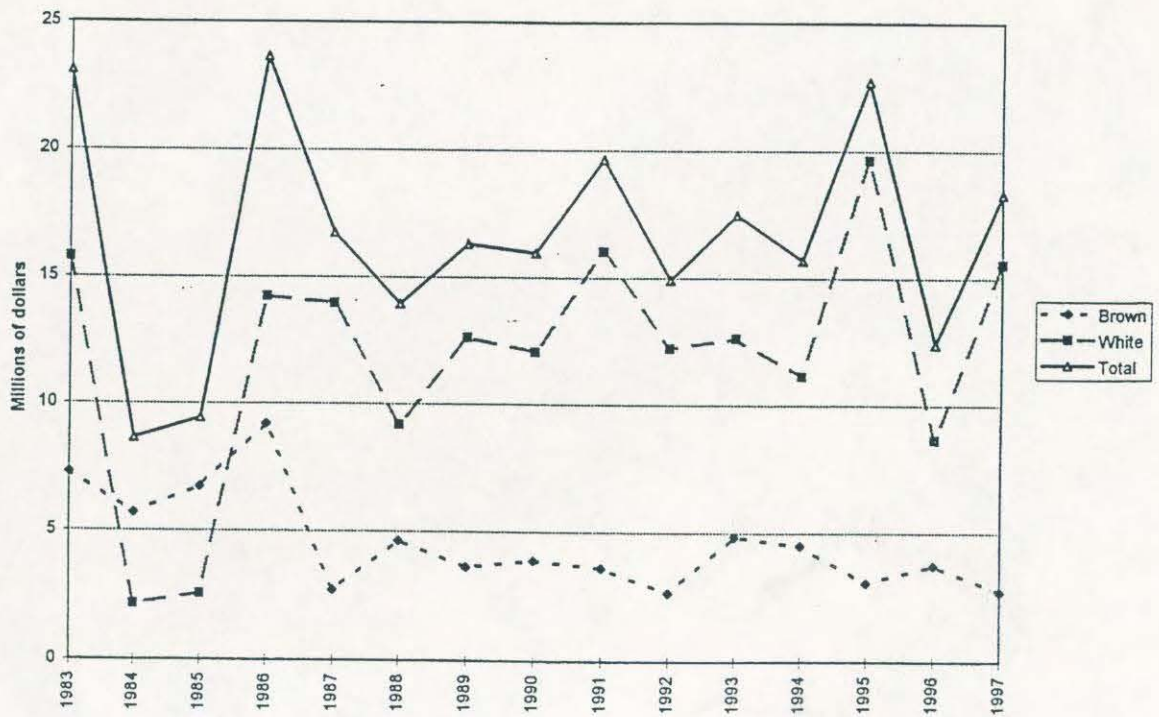


Fig. 7. Annual value of shrimp landings.

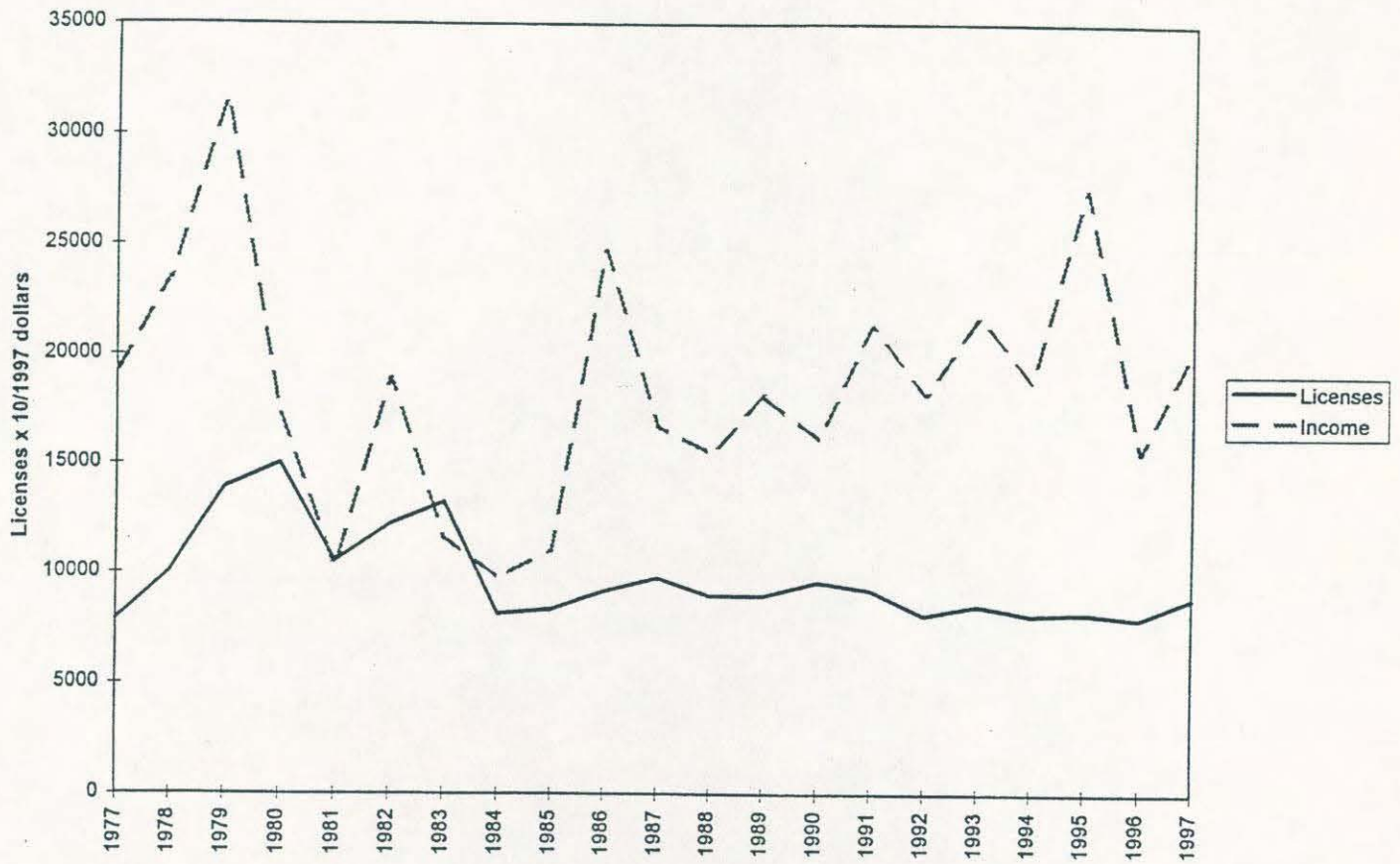


Fig. 8. Number of trawl licenses and annual average vessel income.

1993, the greatest increases in effort have occurred in Bulls Bay and the St. Helena Sound area.

Catch rates in all areas were good, setting a record in the Beaufort area. CPUEs were relatively high in the St. Helena Sound area and Bulls Bay as well. Shrimp in these areas were large. Those in the Charleston area were mixed, while shrimp in Winyah Bay were small. The estimated total catch (3.63 M pounds heads-on) slightly exceeded the previous record catch in 1995.

The recreational shrimp baiters' share of the total fall harvest was 43%. There has been no obvious trend in the relationship between the baiters' percentage and total landings. Environmental conditions appear to be the principal factor affecting the distribution of fall white shrimp landings with conditions in 1997 especially favorable to the baiters. Statewide during the past five years, there has been roughly an even split during the baiting season of landings between baiters and commercial shrimpers.

CRAB

Total blue crab production was 6.268 M pounds with potters landing 6.117 M pounds of hard crab and 132,000 pounds of peeler/soft crab. Minor quantities were taken as incidental catch and in the winter trawl fishery. Total blue crab landings were slightly above average, while the number of crab pot licenses (N=428) leveled off (Fig. 9). Landed value of blue crab remained relatively high (\$4.322 M), although the unit price of hard crab declined for the third consecutive year (Fig. 10).

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. This group made about 133,500 trips during July-October, landing approximately 857,000 pounds of blue crab. This equalled 31% of the commercial landings during the same period.

The blue crab laws were changed in 1997 in several ways. The most significant provisions dealt with licensing and fees for residents vs nonresidents. Buoy and boat marking requirements were also revised and restrictions imposed on hauling of pots and possession of crabs at night. After November 15, 1997, commercial pots used during the period June 1 through March 14 were required to have escape rings to facilitate release of crab < 5 inches. A Louisiana study in the late 1980's had demonstrated that traps so equipped caught 80% fewer undersized crab with no significant change in the catch of legal crab.

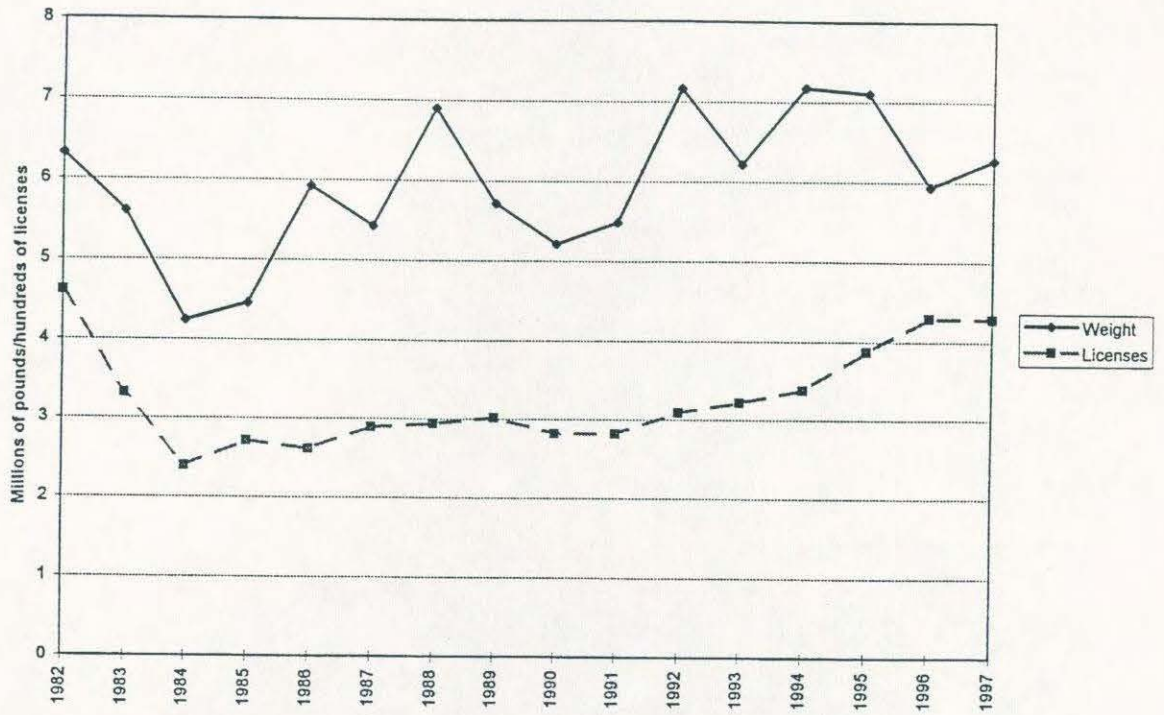


Fig. 9. Annual commercial landings of blue crab and number of crab pot licenses.

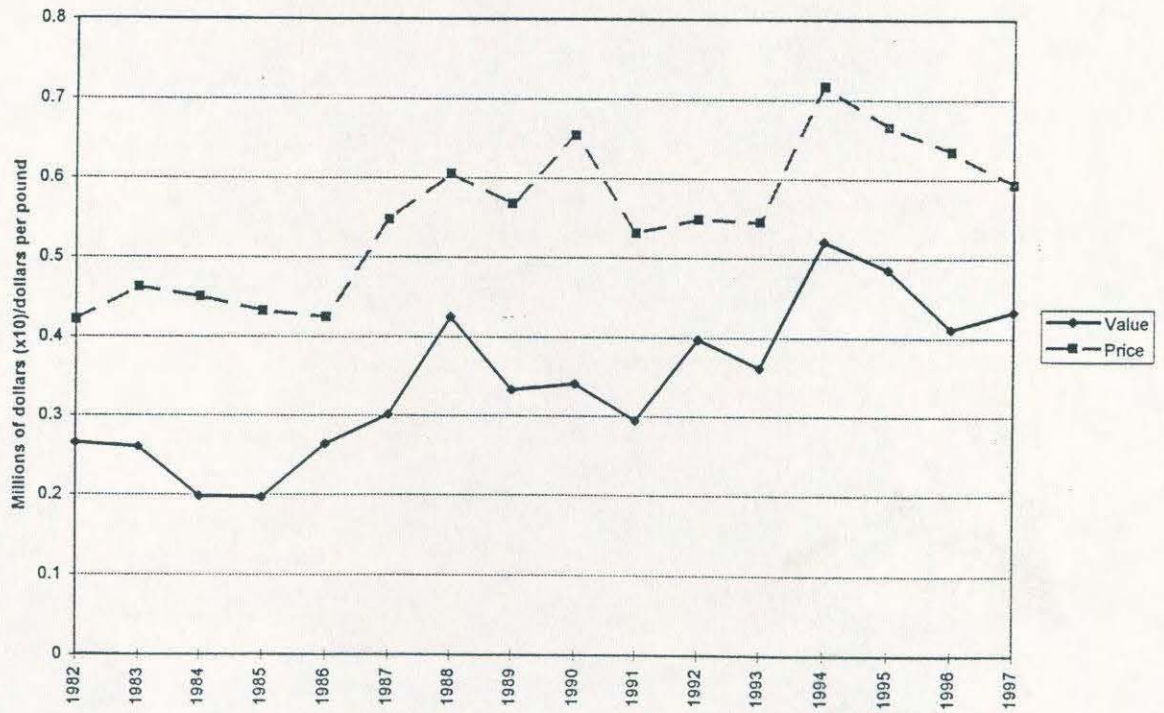


Fig. 10. Annual value and unit price of blue crab.

SHELLFISH

Landings data are for calendar year 1997. Most production came from culture permit areas. In late fall, heavy rains caused numerous closures for health safety reasons.

Oyster production was a record low 62,721 bushels valued at \$0.771 M (Fig. 11). Most of the harvest consisted of intertidal "cluster" oysters retailed locally. Recreational harvest was estimated at roughly 40% of the commercial landings, based on 1994 survey results. Early in the year, rapid growth of oysters since the previous fall was reported along the entire coast. Shortly prior to opening of the fall season, however, large-scale mortalities of primarily larger oysters occurred, particularly south of Charleston. No cause was identified.

Clam production was 24,774 bags (250-count) worth \$0.689 M (Fig. 12). Escalator landings were relatively low and the hand harvest was the lowest in nearly 20 years. Unit price was essentially unchanged with littlenecks in the 11-12 cents apiece range. Recreational landings were estimated at approximately 30% of the hand harvest as indicated in 1994 survey findings.

The whelk trawling season was opened on January 16 and closed on March 31. Both the unusually early closure and its issuance on short notice, due to turtle sightings, were unpopular with the industry. There were 88 permits issued. Total harvest in the directed fishery was 15,631 bushels. The annual catch was valued at \$193,000 (Fig. 13).

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. The 20-year average annual yield was 262,800 pounds of meats, equivalent to 13,140 bushels of whole product. Seasons could be set so as to produce this yield, 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 (2.916 M pounds worth \$5.037 M) increased slightly, ending a long, gradual decline (Fig. 14). Pelagics and groupers were the largest components and the only groups to account for >10% of both volume and value (Fig. 15). Aggregate reef fish (mainly groupers, snappers, porgies, sea bass, and tilefishes) landings were 1.724 M pounds worth \$2.876 M.

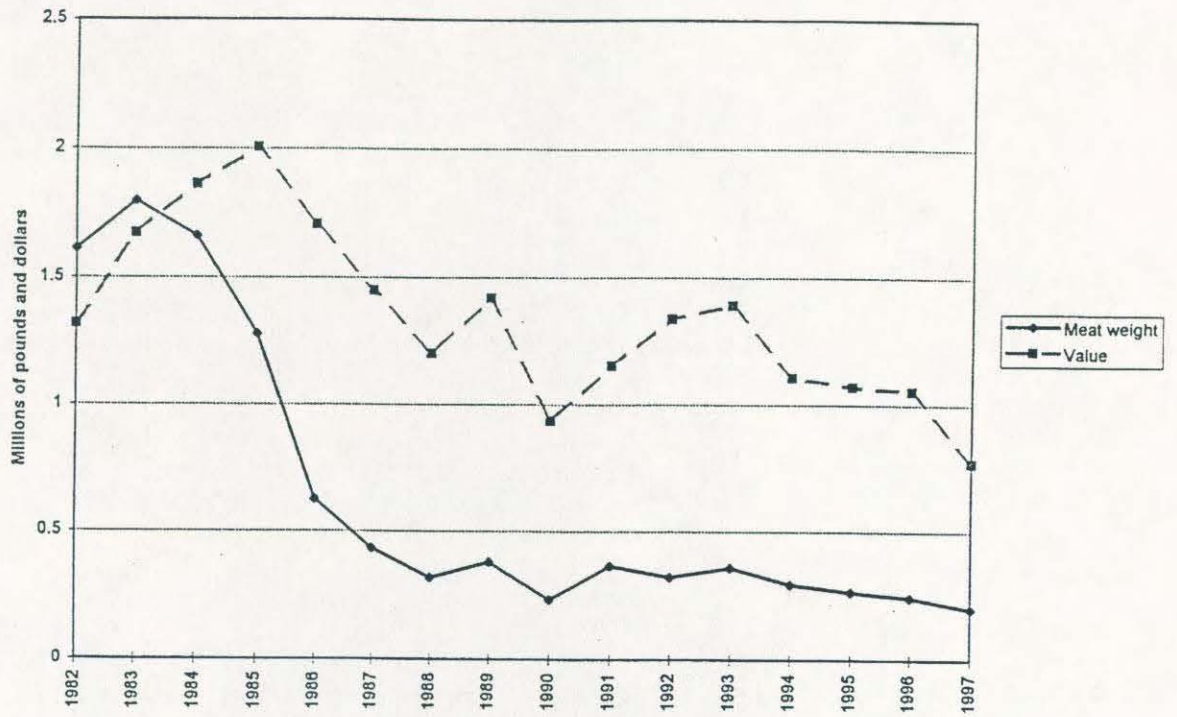


Fig. 11. Annual commercial production of oysters.

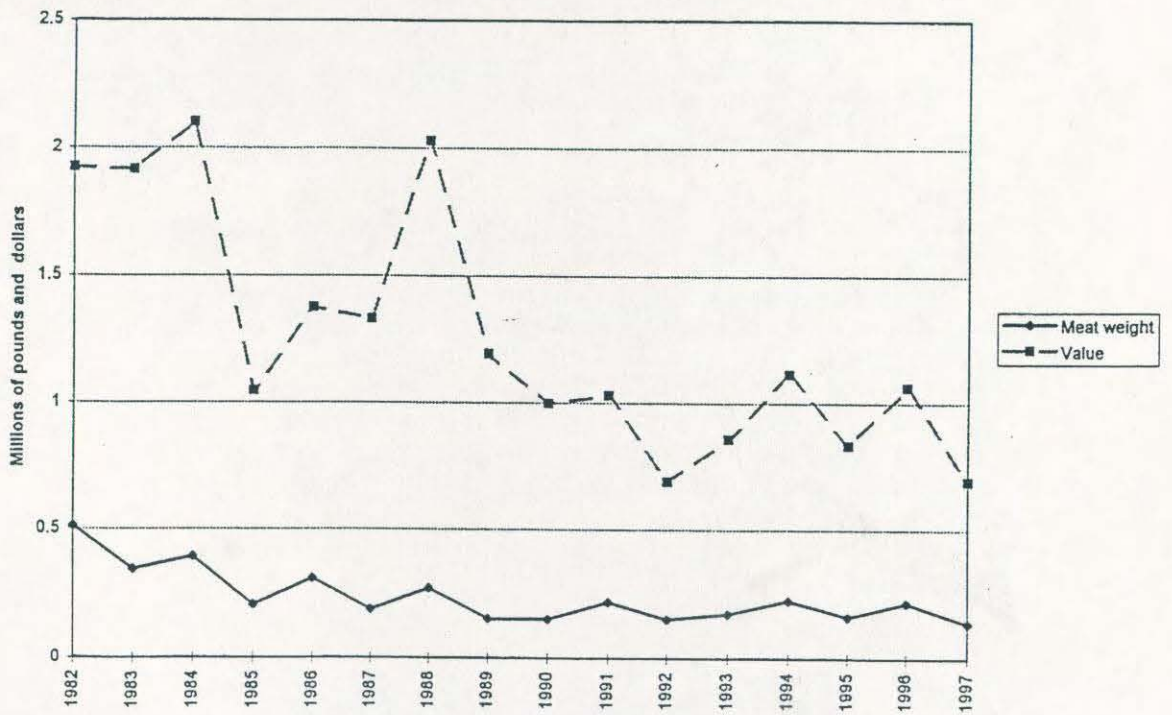


Fig. 12. Annual commercial production of clams.

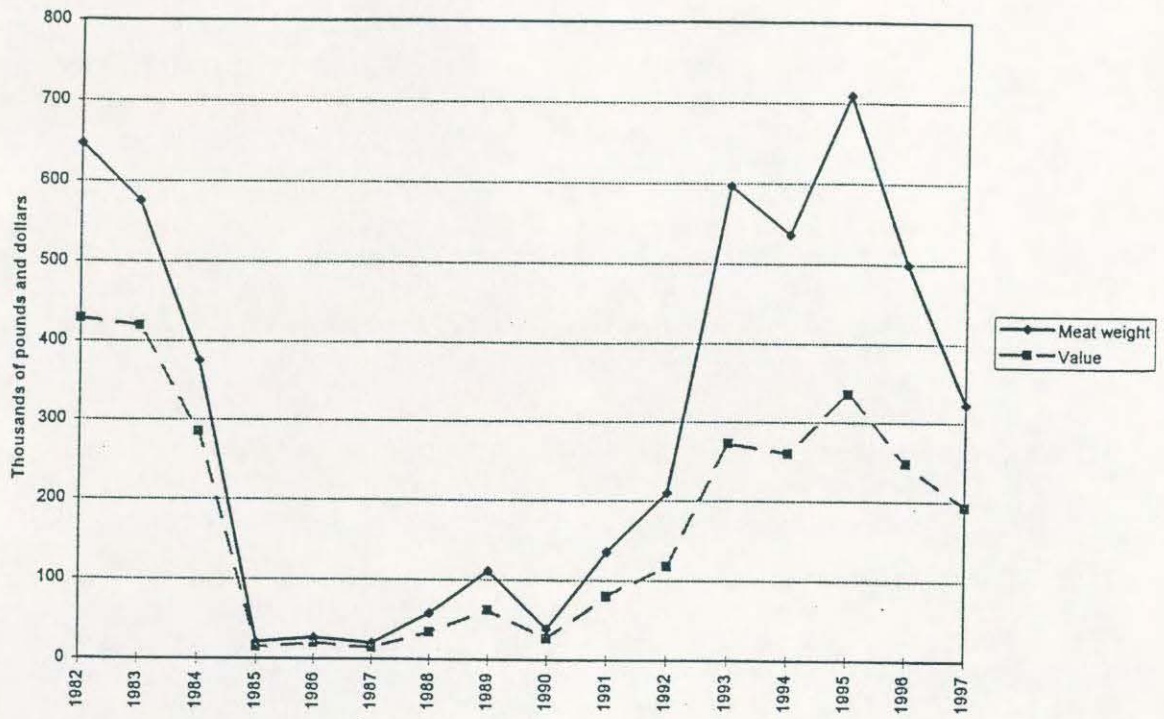


Fig. 13. Annual commercial production of whelks.

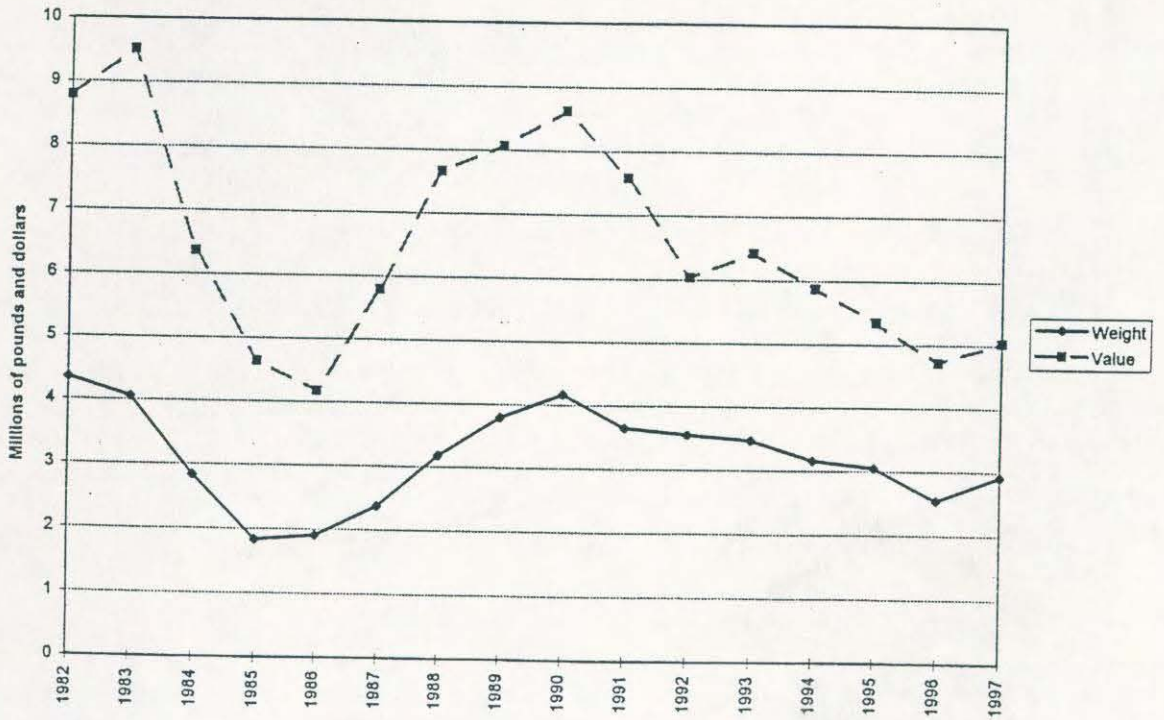


Fig. 14. Annual commercial production of offshore fish.

The principal 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 (confidential) continued a steep downward trend and comprised only 23% of the state's peak catch landed in 1990. The fishery was closed from January 15-April 15 to protect spawning stocks. Length distribution (Fig. 16) was similar to that in prior years with the average size (97.8 cm) essentially unchanged in the last three years.

The snapper reel fishery historically has been the largest offshore fishery in terms of landings and participation. Landings (1.622 M pounds valued at \$2.802 M) reversed the decline evident in recent years (Fig. 17).

Aggregate grouper landings were 518,000 pounds, the lowest in ten years. Value was \$1.240 M. Groupers accounted for 30% of the total volume of reef fish. The leading contributors were gag (186,000 pounds) and scamp (143,000 pounds), both landed almost entirely by snapper reel. Gag landings declined appreciably to the lowest level on record, while scamp landings remained nearly constant (Fig. 18).

Length distribution of gag is shown in Fig. 19. Although the relative scarcity of large (>90 cm) fish (i.e., mature males) continued to be cause for concern about potential recruitment overfishing, the average length (79.8 cm) continued to increase (Fig. 20), as did the contribution of fish >90 cm. In 1997, 18.7% of the fish measured exceeded 90 cm. In contrast, however, 58.4% of the gag sampled in 1977 were >90 cm.

The length distribution of scamp (Fig. 21) was heavily skewed toward smaller fish. The average length was 53.7 cm fork length and comparable to that in recent years (Fig. 22).

The regional snowy grouper quota of 344,508 pounds was projected by the NMFS to be attained in mid-December with the trip limit lowered from 2,500 pounds to 300 pounds for the last ten days of the year. South Carolina landings (117,000 pounds) improved considerably and represented 34% of the quota. Length distribution (Fig. 23) was dominated by small fish with an average size of 53.1 cm (Fig. 24).

Snapper landings (Fig. 25) showed mixed trends. The vermilion snapper catch (240,000 pounds worth \$561,000) increased after three years of decline. Most of the sampled vermilion snapper were close to the 30 cm (12 in) minimum size limit (Fig. 26) and there was little change in the average length (36.0 cm, Fig. 27).

Red snapper landings (14,000 pounds) were the lowest recorded, but consisted of large fish (Fig. 28). In years of high

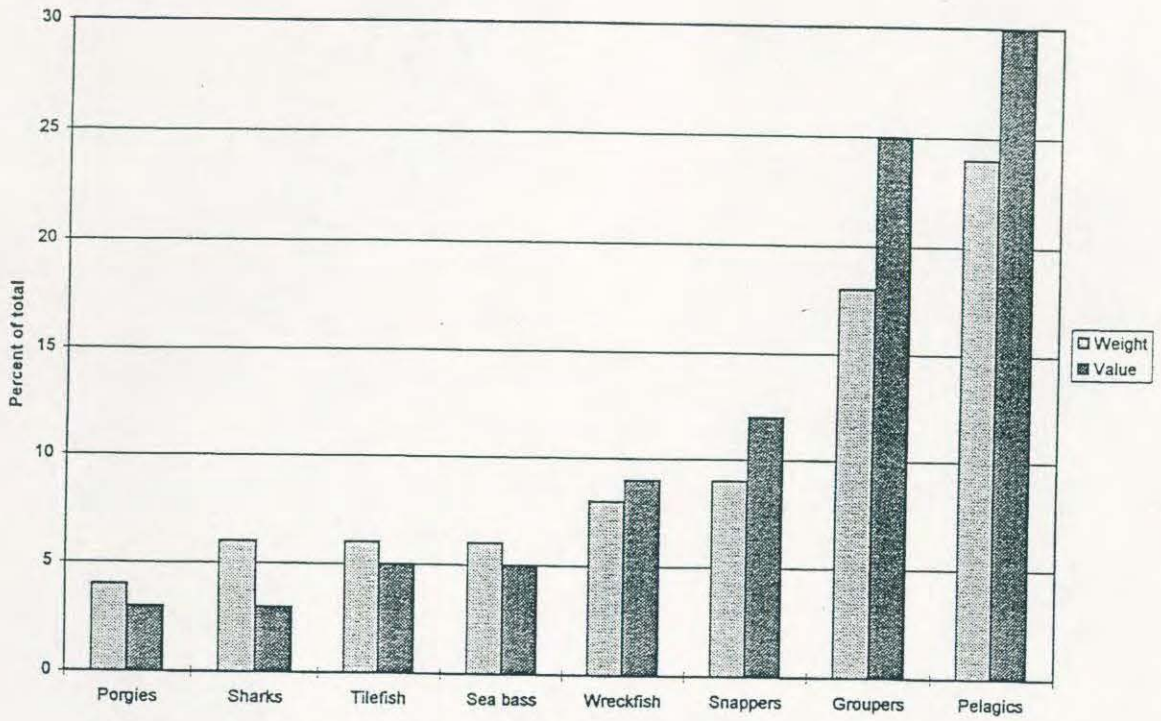


Fig. 15. Landings of major offshore fish groups.

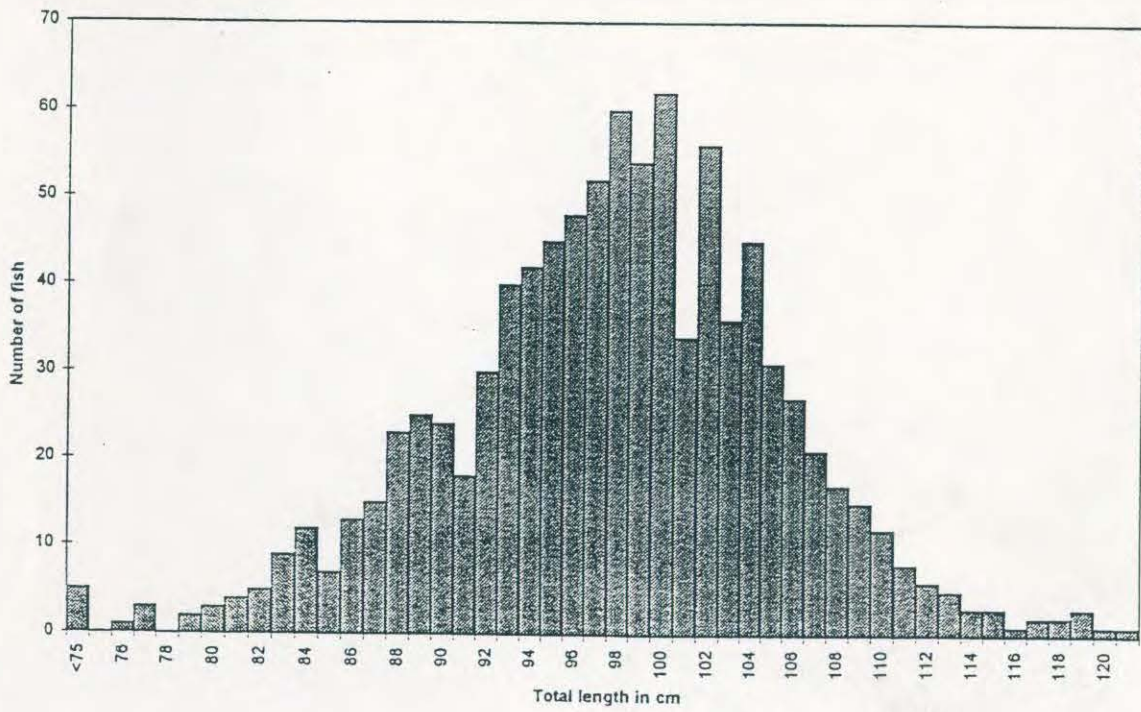


Fig. 16. Length distribution of wreckfish.

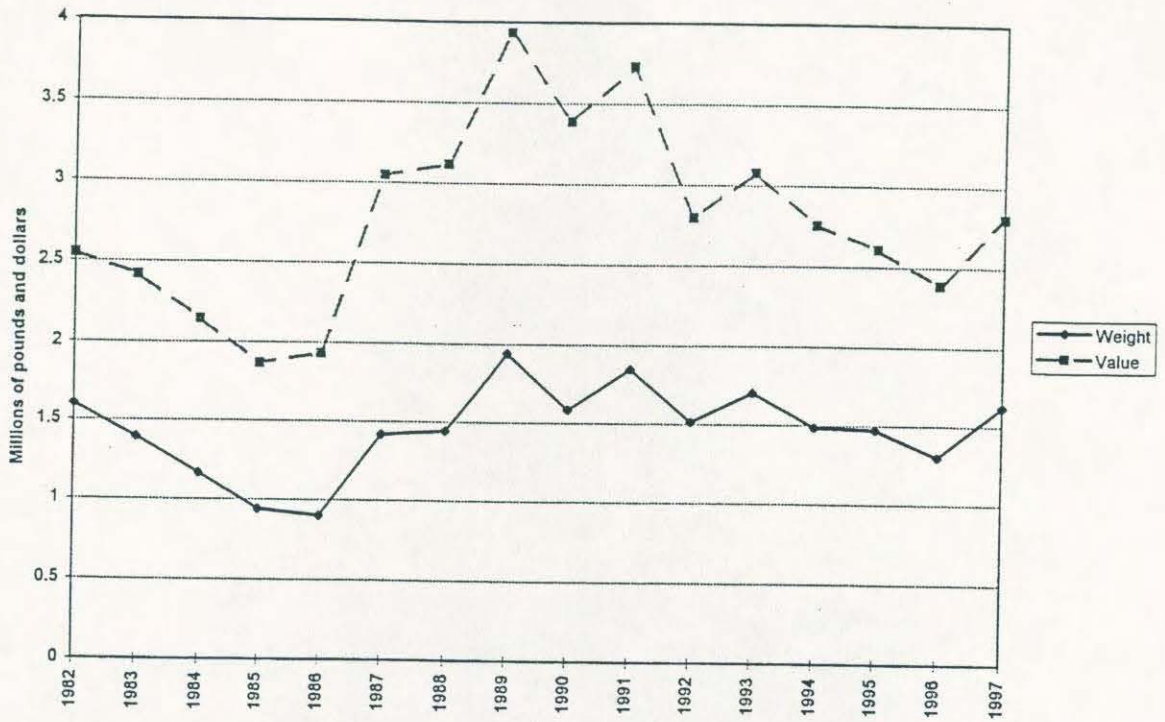


Fig. 17. Annual production of the snapper reel fishery.

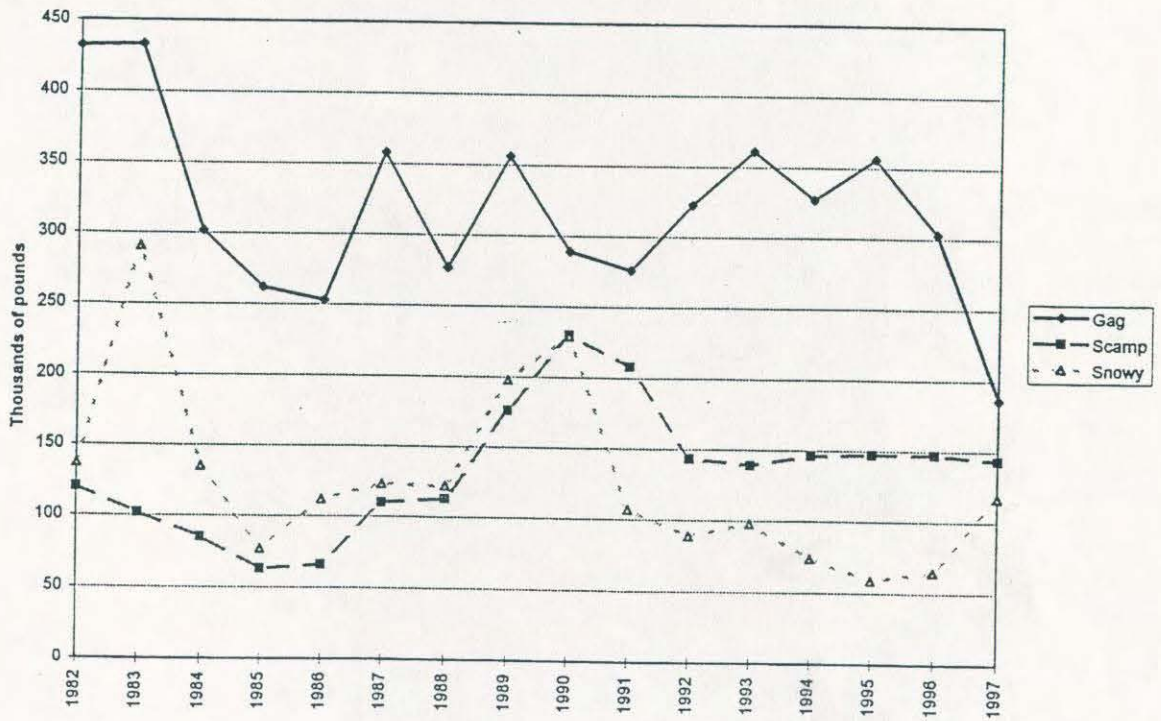


Fig. 18. Annual commercial landings of groupers.

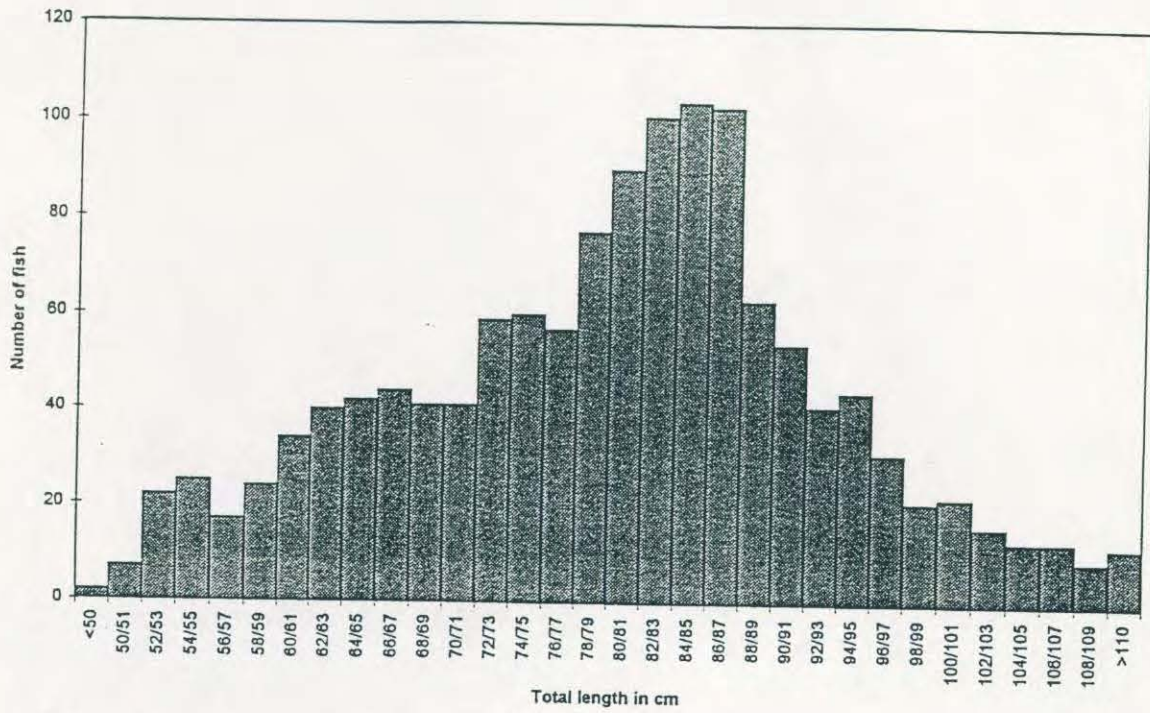


Fig. 19. Length distribution of commercially landed gag.

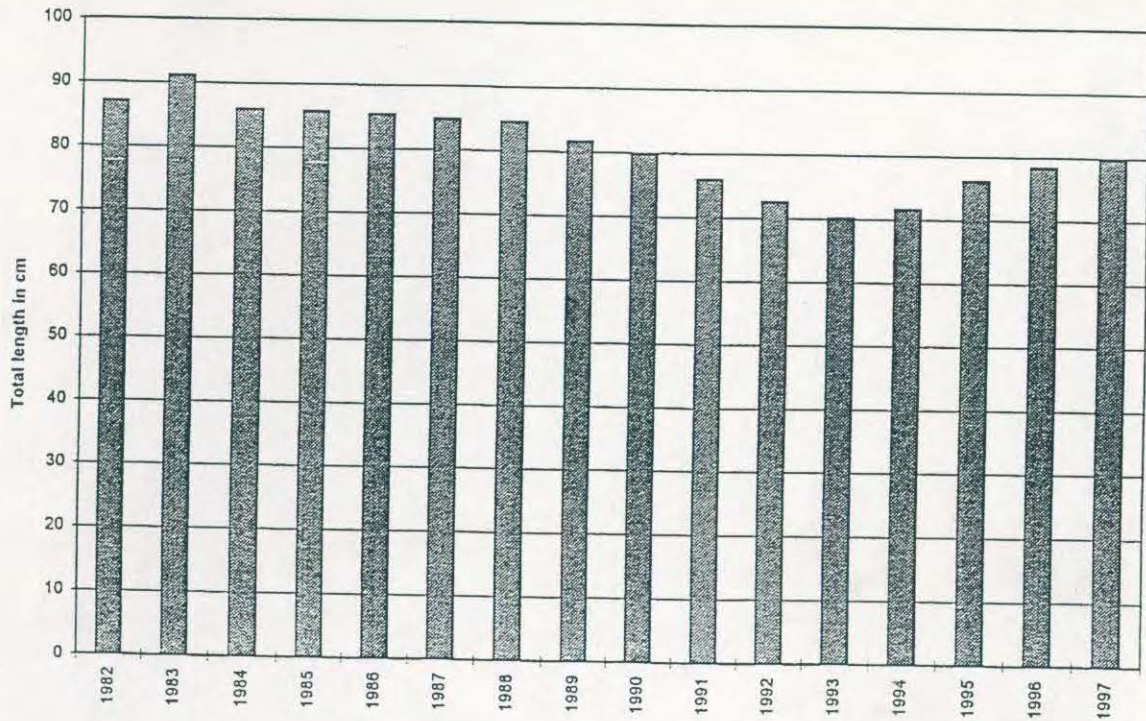


Fig. 20. Average length of commercially landed gag.

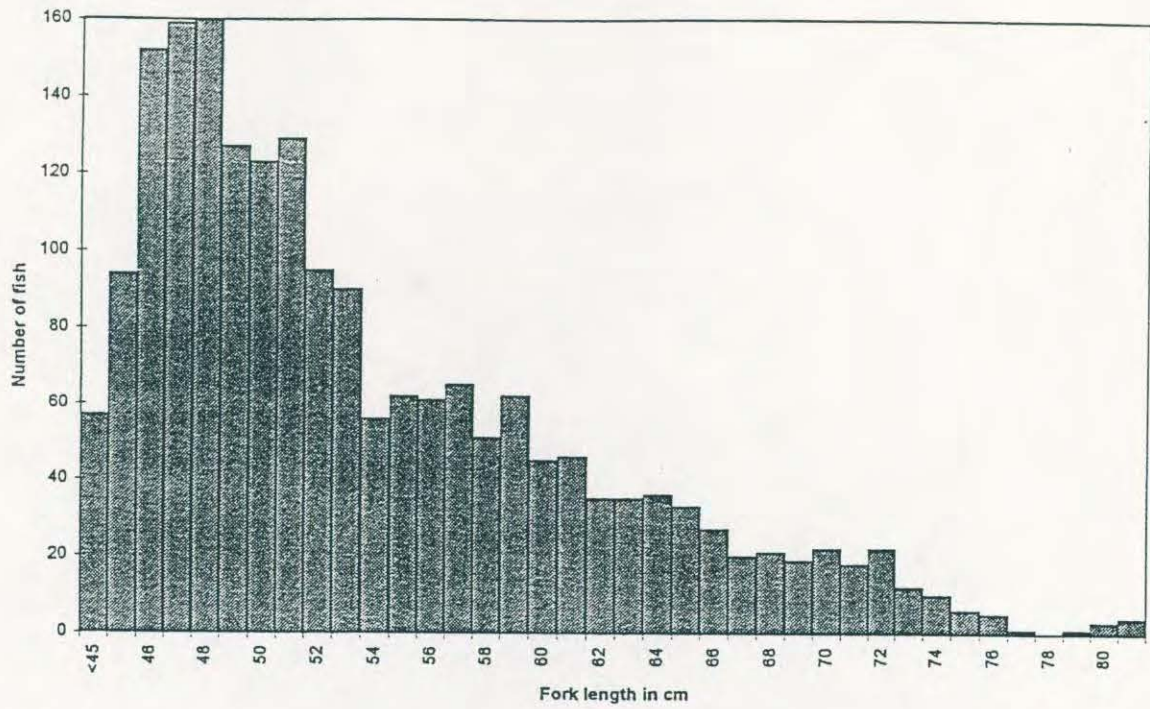


Fig. 21. Length distribution of commercially landed scamp.

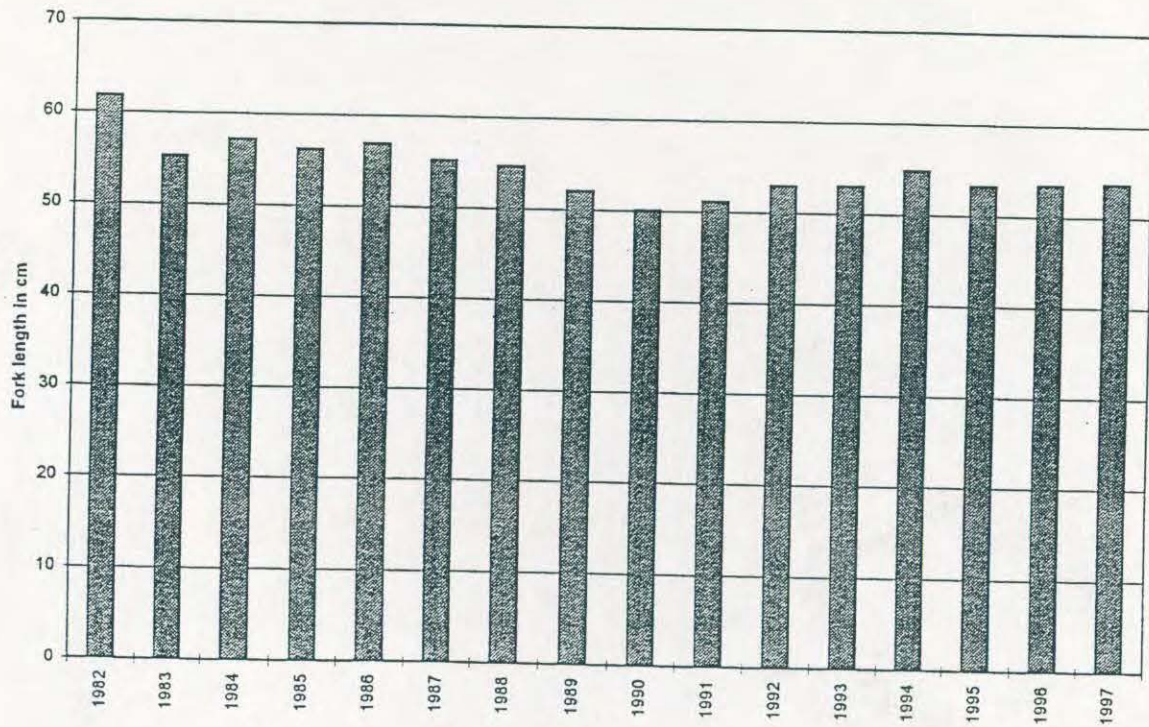


Fig. 22. Average length of commercially landed scamp.

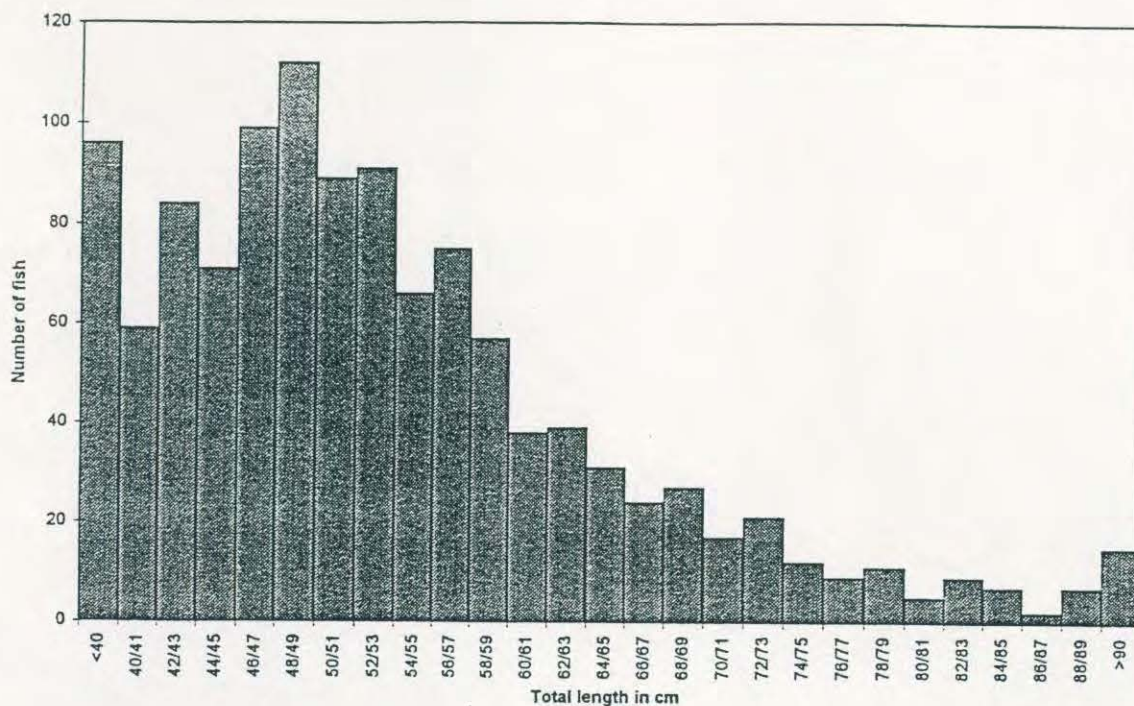


Fig. 23. Length distribution of commercially landed snowy grouper.

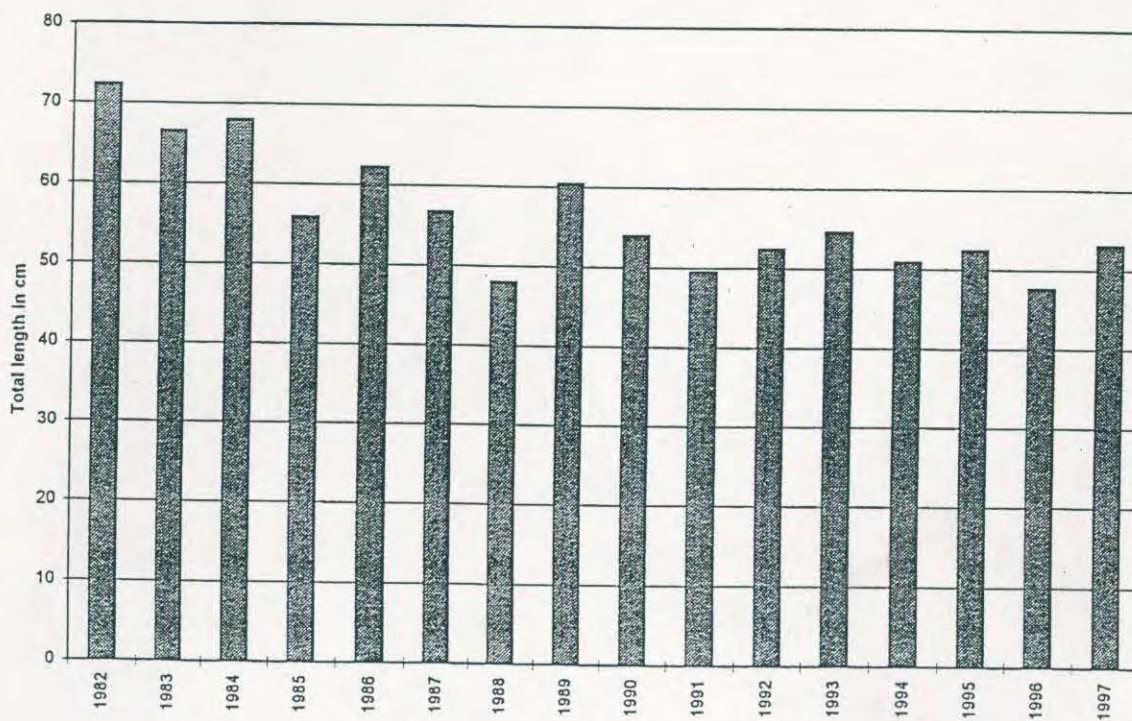


Fig. 24. Average length of commercially landed snowy grouper.

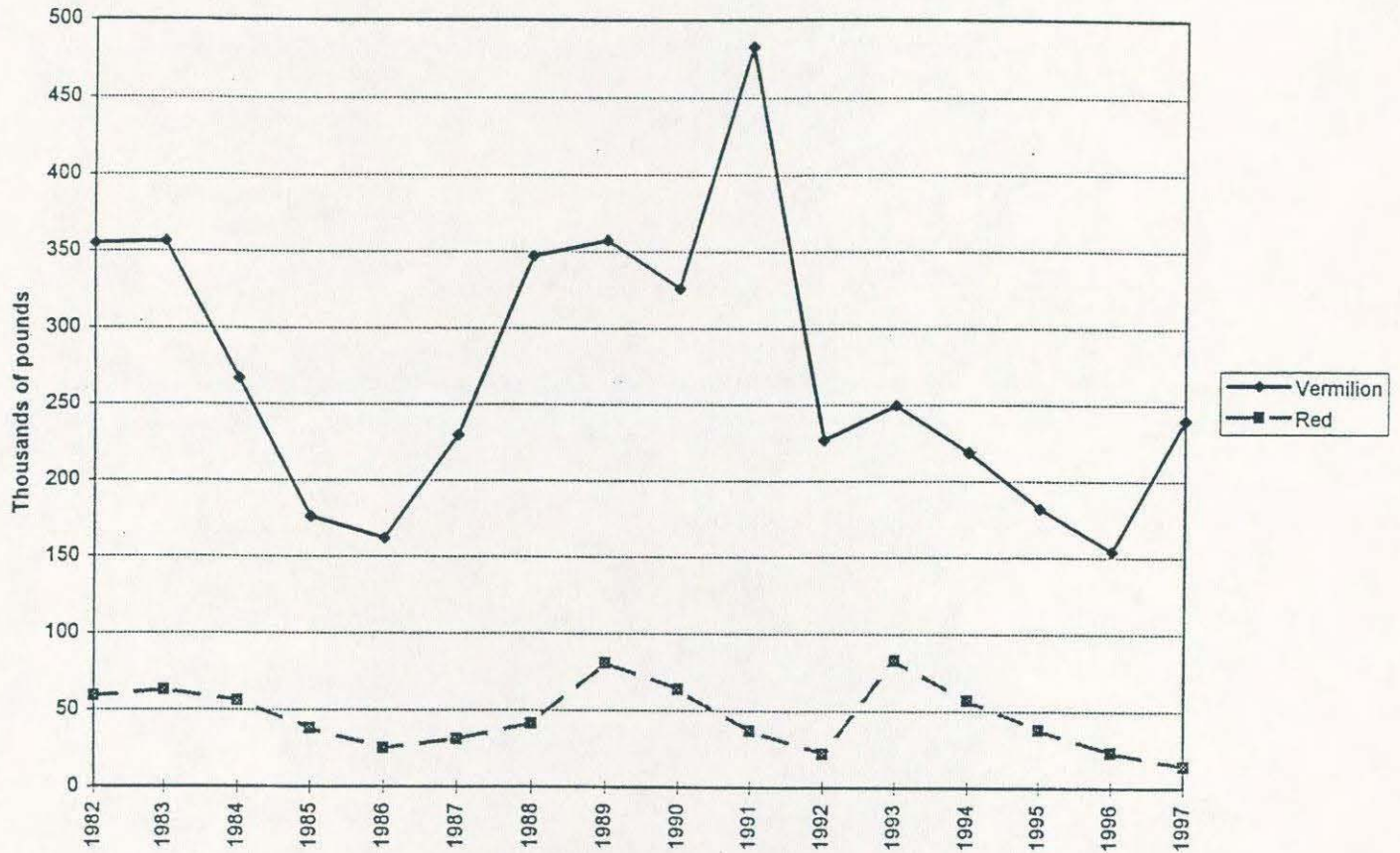


Fig. 25. Annual commercial landings of snappers.

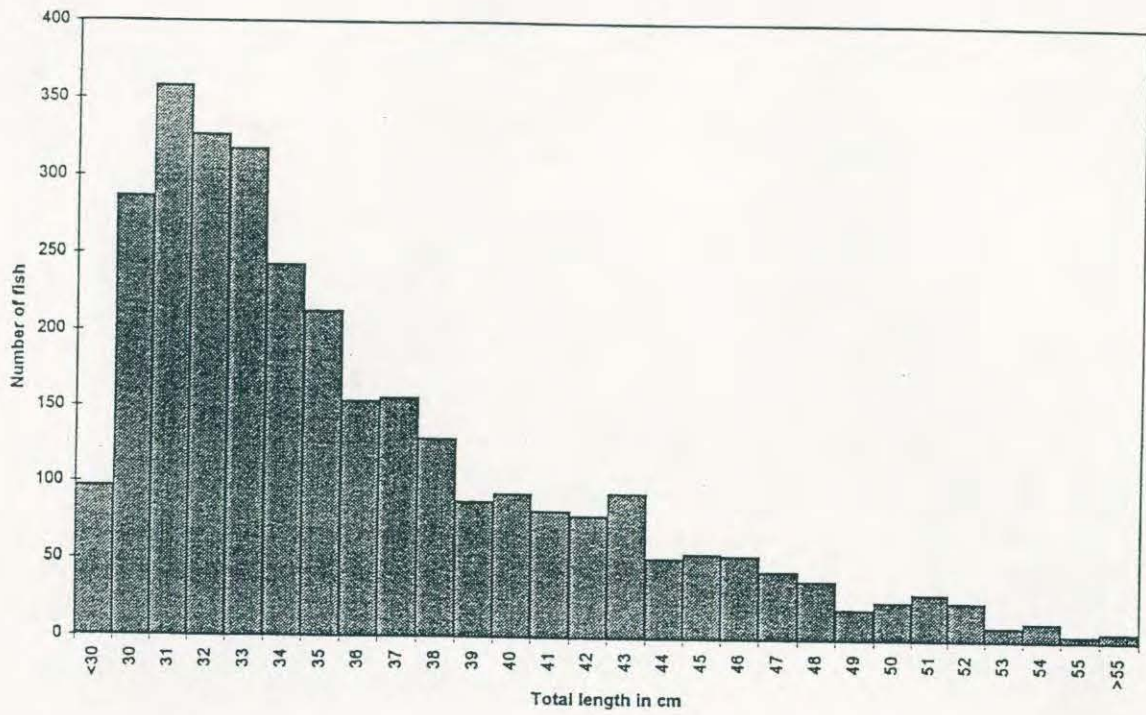


Fig. 26. Length distribution of commercially landed vermilion snapper.

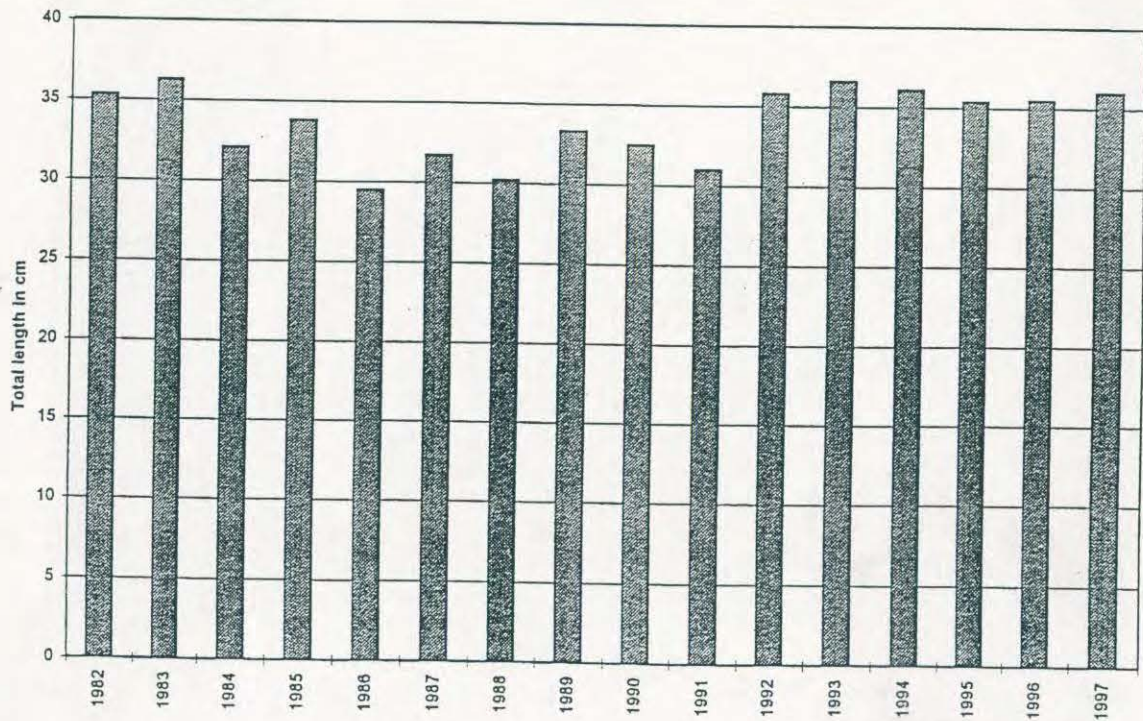


Fig. 27. Average length of commercially landed vermilion snapper.

production, much of the catch has been composed of new recruitment, fish just over the legal minimum size (now 50 cm). Average length was 67.2 cm, the largest on record, and reflected the continued absence of significant recent recruitment (Fig. 29).

Total porgy landings were 123,000 pounds valued at \$172,000 with most of the catch consisting of snapper reel landings of red porgy. After a lengthy decline, snapper reel landings of red porgy continued to improve slightly (Fig. 30). Both length distribution (Fig. 31) and average size (36.0 cm, Fig. 32) of red porgy remained essentially unchanged.

Bottom longline production increased moderately to 455,000 pounds worth \$580,000 (Fig. 33). Value has reflected species composition with overall value tending to be lower in those years with large landings of sharks (Fig. 34). In 1997, the shark component was the lowest in a decade, due largely to quota-related restrictions. Landings of black-bellied rosefish (86,000 pounds), a species largely discarded until a few years ago, nearly doubled. Landings of golden tilefish (136,000 pounds) also nearly doubled those in the previous year, but continued to consist mainly of small fish (Fig. 35). The average length (57.2 cm) remained small by historical standards (Fig. 36). Snowy grouper landings (82,000 pounds) were triple the 1996 catch.

Total shark landings were 203,000 pounds worth \$165,000 (Fig. 37). For most of the last ten years, the bottom longline fishery has been the principal source of shark landings, particularly after the ban on the directed inshore gill net fishery after 1994 (Fig. 38). The bottom longline fishery targets the large coastal group (e.g. sandbar and dusky sharks), managed under regional quotas since 1993, when the fishery was closed for 1.5 months. Closures have increased in duration as quotas have been filled more quickly. In 1997, the fishery for large coastals was open for only four months with a reduced quota.

The pelagic longline fishery landed 696,000 pounds of product worth \$1.464 M in 1997, continuing the modest upward trend of the past few years (Fig. 39). Although swordfish (303,000 pounds and \$980,000) have remained the preferred target by virtue of their high unit value, the percentage contribution of other species has been steadily increasing (Fig. 40). In 1997, the non-swordfish component of the catch accounted for 57% of the volume and 33% of the landed value.

The major components of this bycatch are dolphin, sharks, and tunas (mainly yellowfin). Landings of dolphin and sharks have increased sharply in recent years (Fig. 41), while yellowfin tuna landings have not. The declining unit value of swordfish (Fig. 42), due largely to ready availability of imported product, has also increased the incentive for domestic fishermen to land other species. Their "incidental" status has therefore become

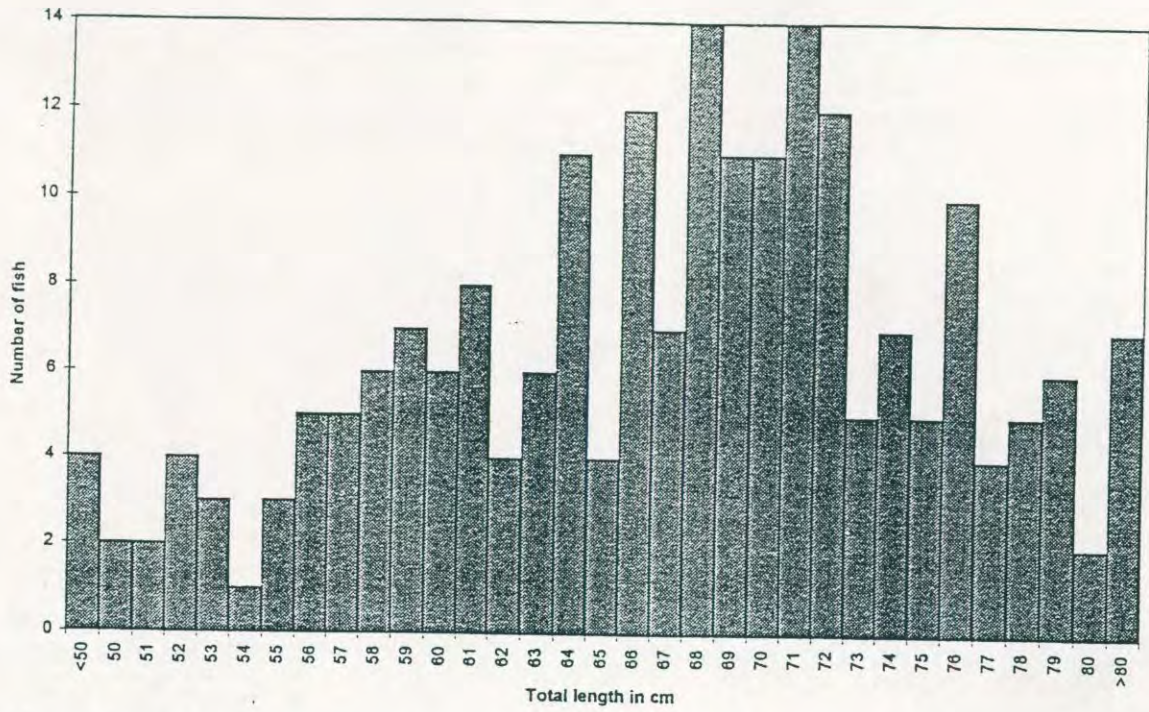


Fig. 28. Length distribution of commercially landed red snapper.

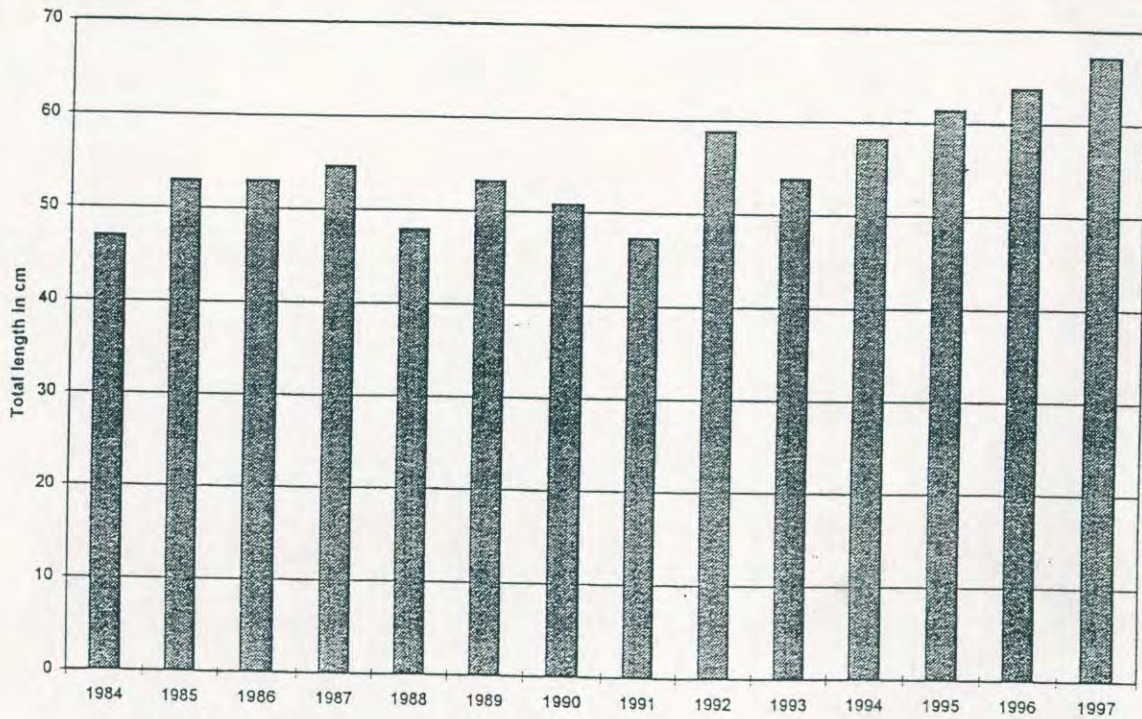


Fig. 29. Average length of commercially landed red snapper.

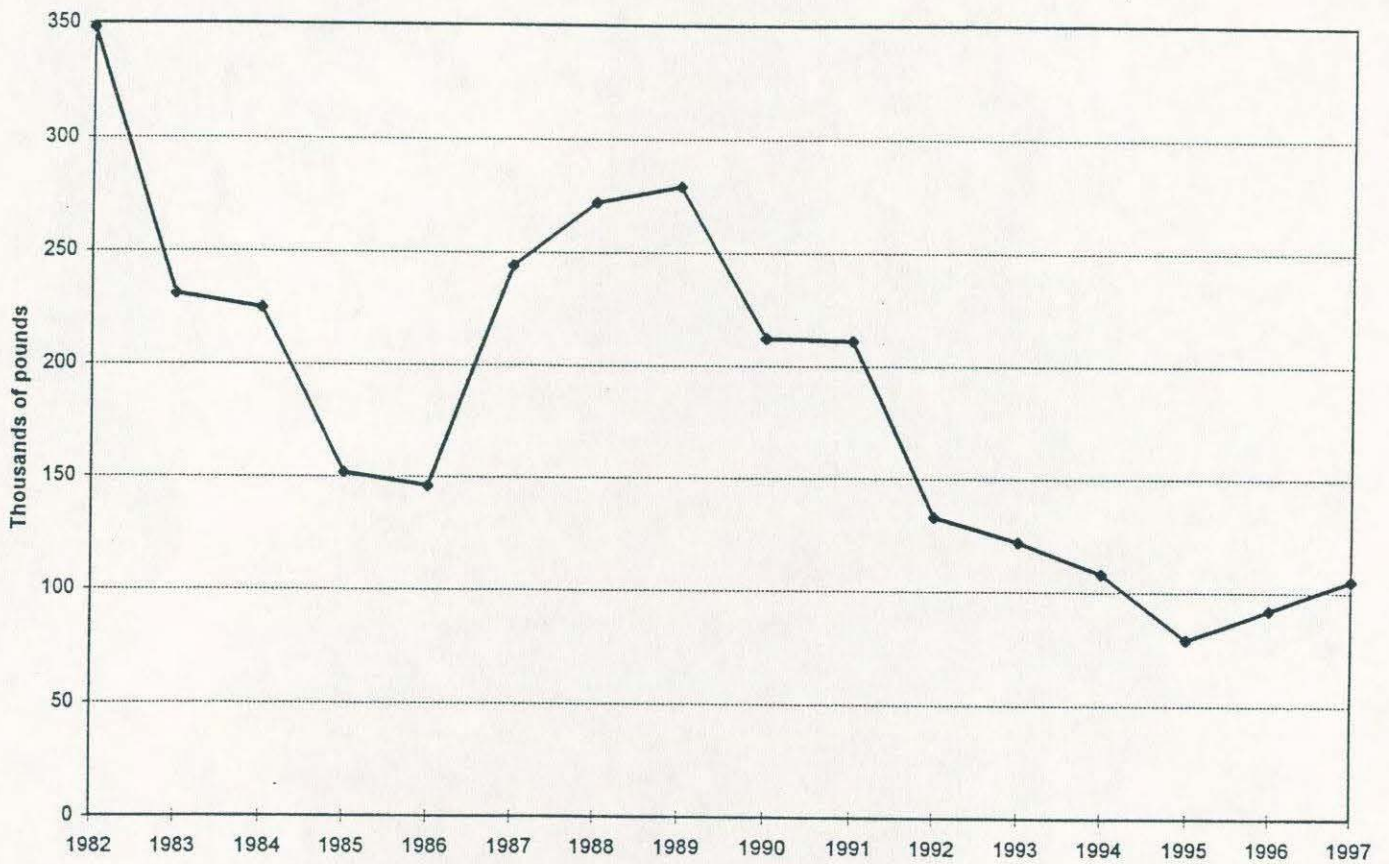


Fig. 30. Annual snapper reel landings of red porgy.

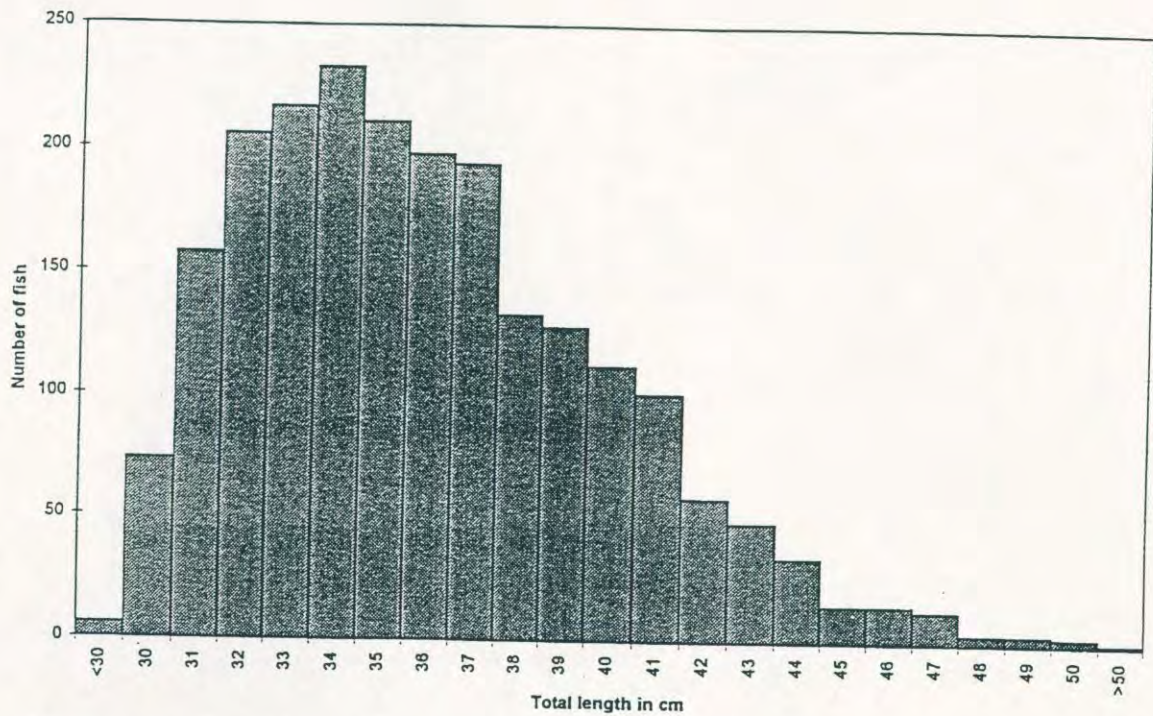


Fig. 31. Length distribution of commercially landed red porgy.

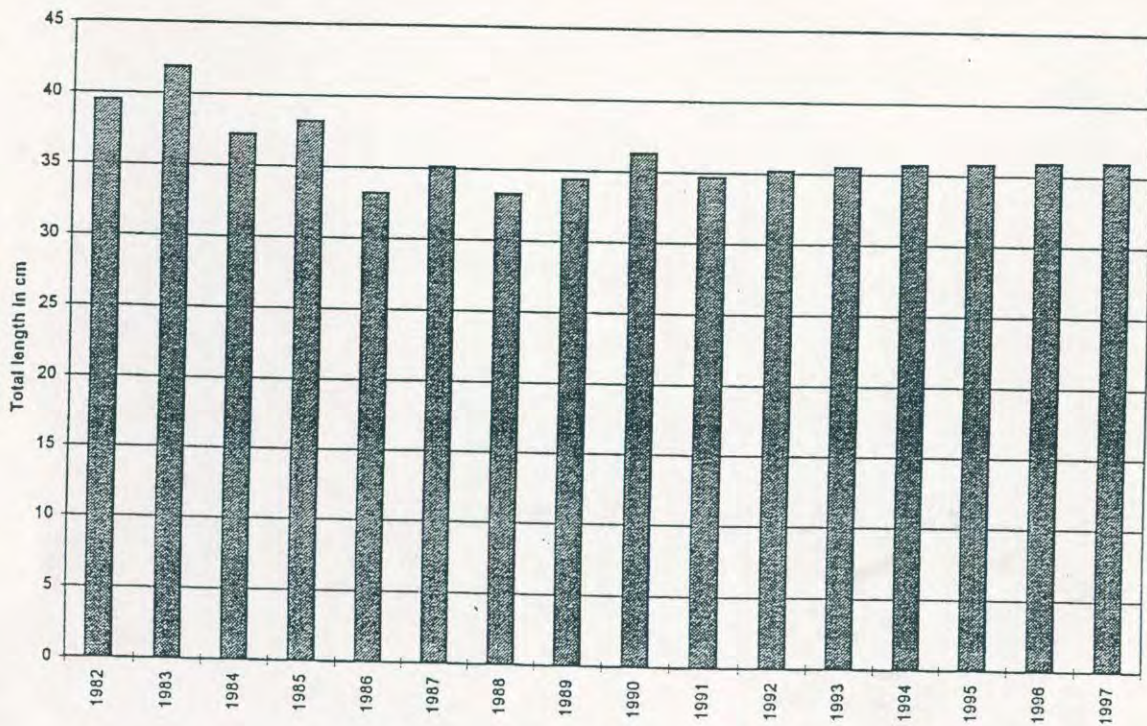


Fig. 32. Average length of red porgy caught on snapper reels.

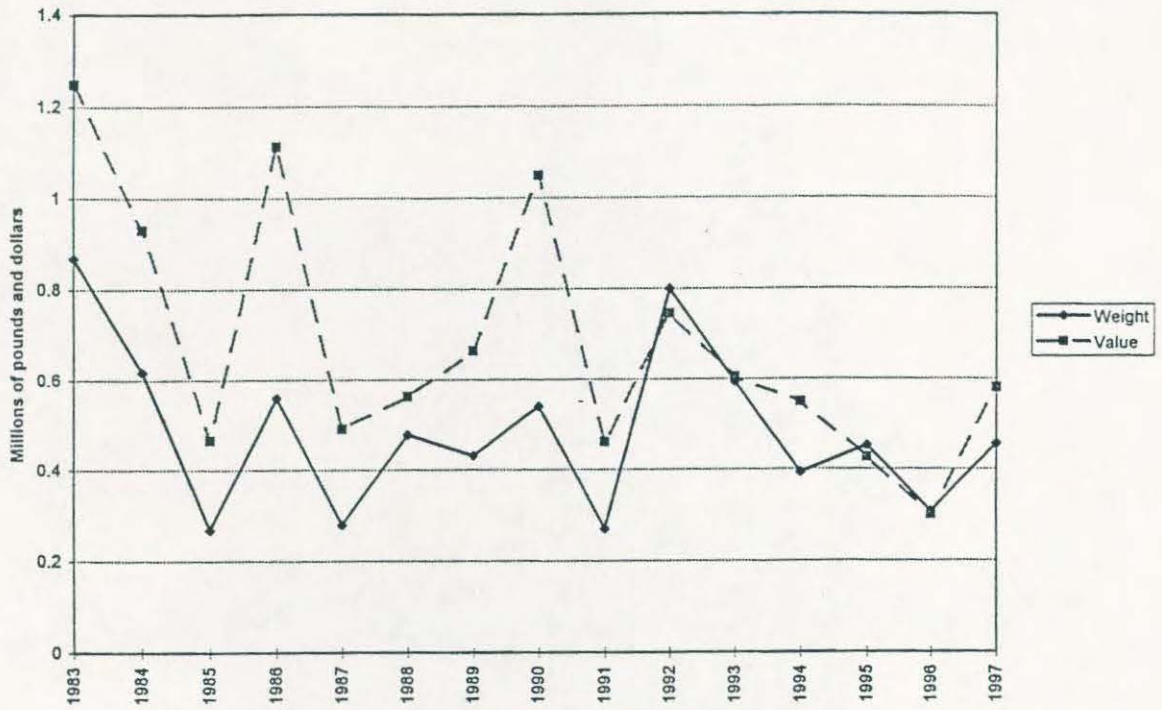


Fig. 33. Annual production of the bottom longline fishery.

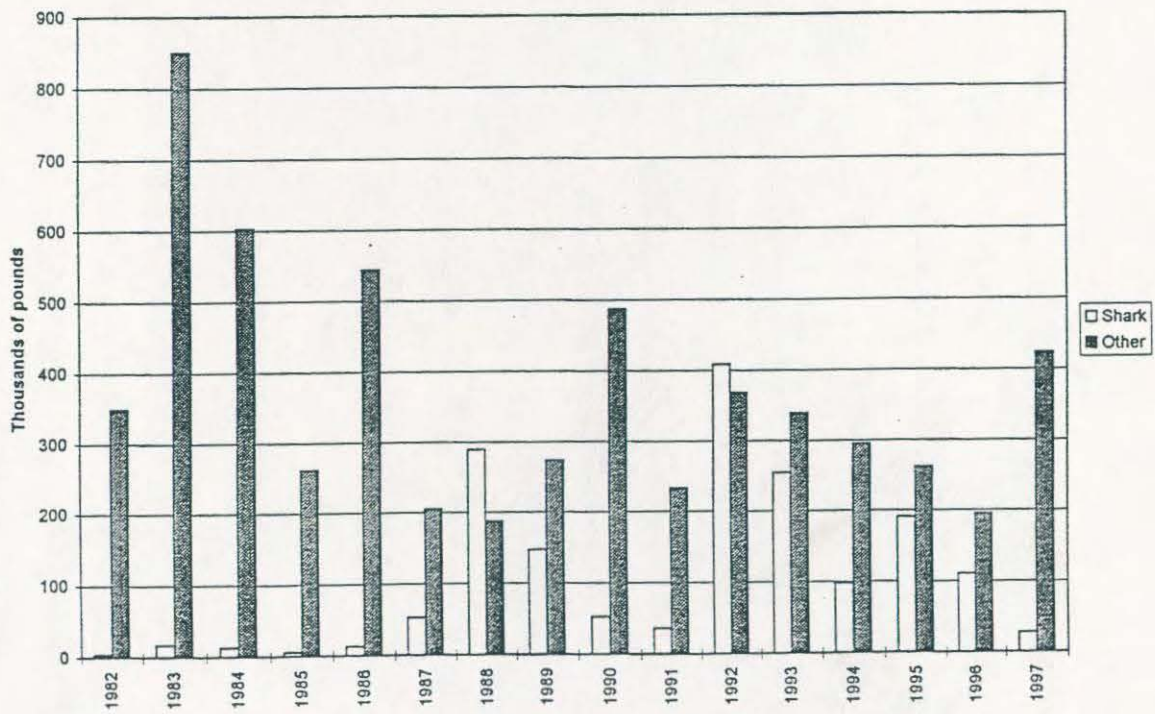


Fig. 34. Composition of bottom longline landings.

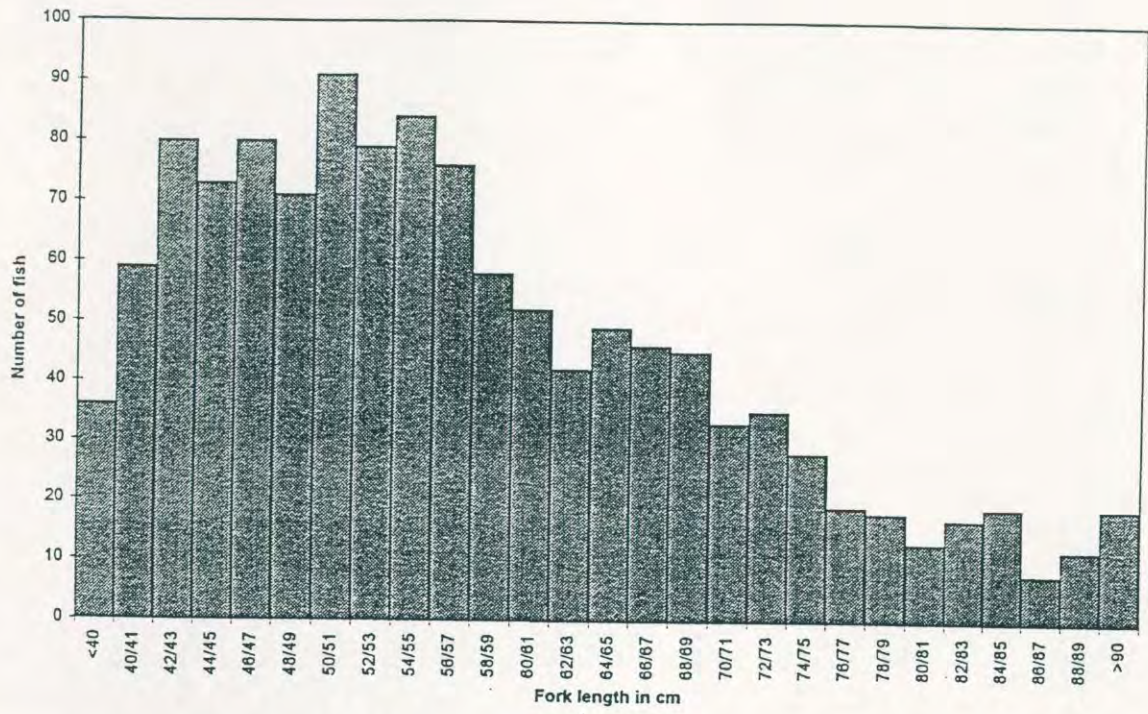


Fig. 35. Length distribution of golden tilefish.

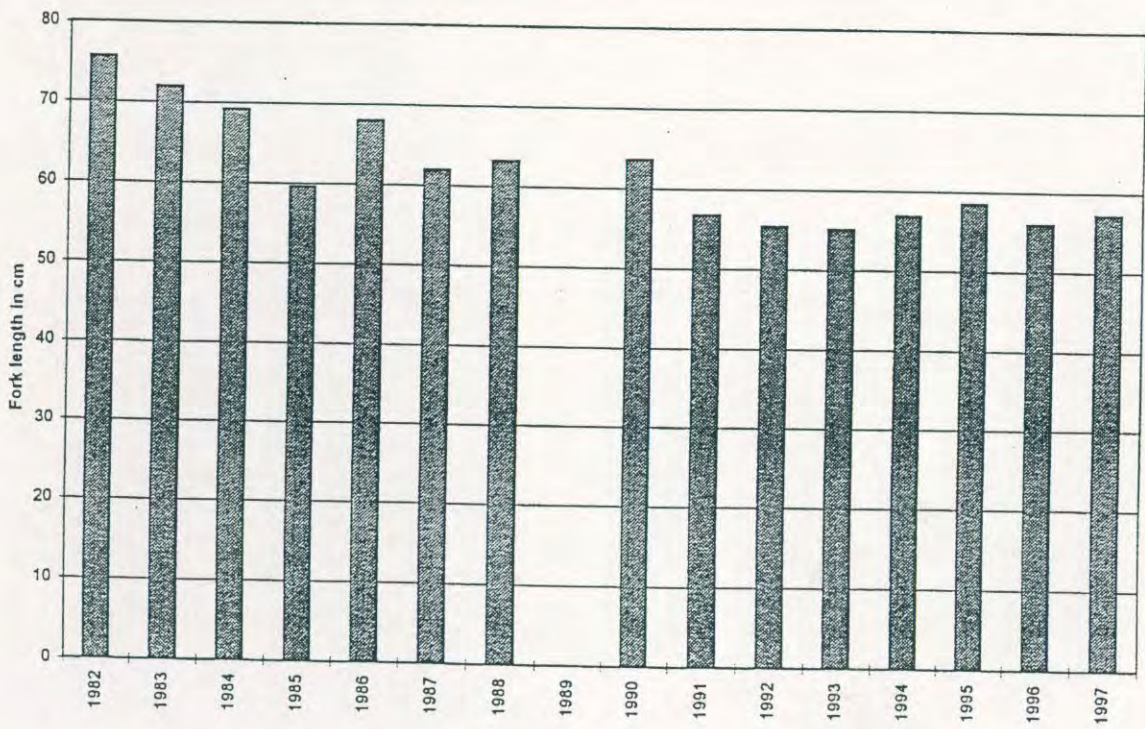


Fig. 36. Average length of golden tilefish.

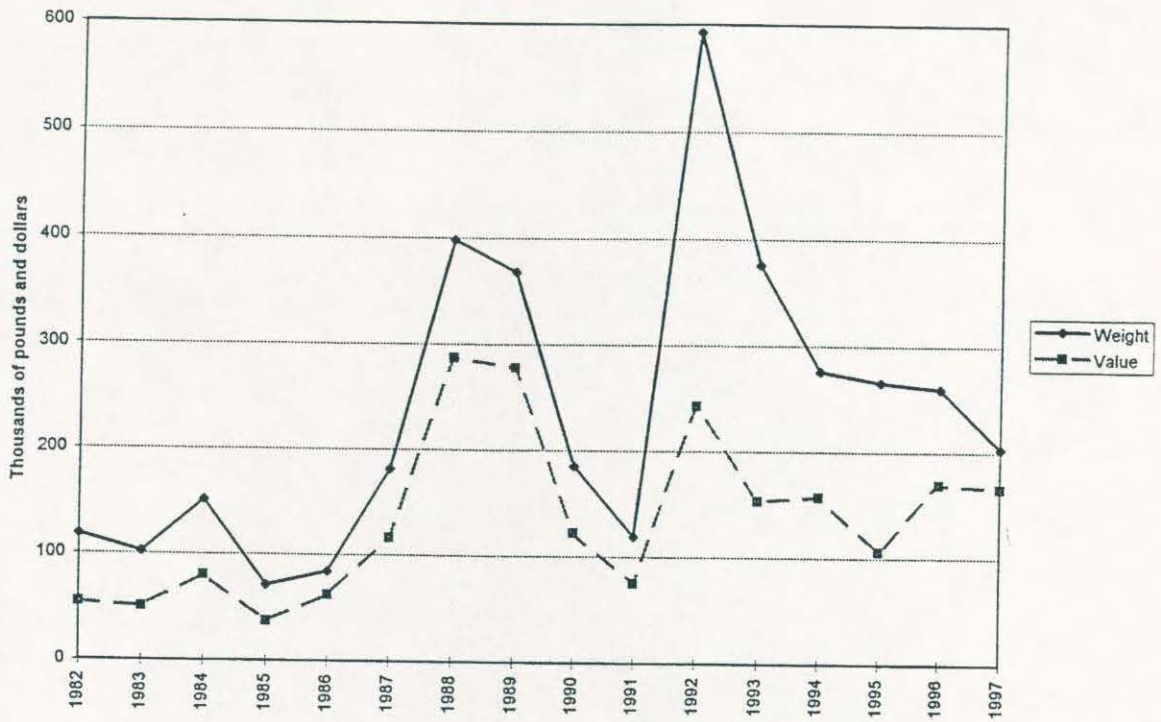


Fig. 37. Annual production of sharks.

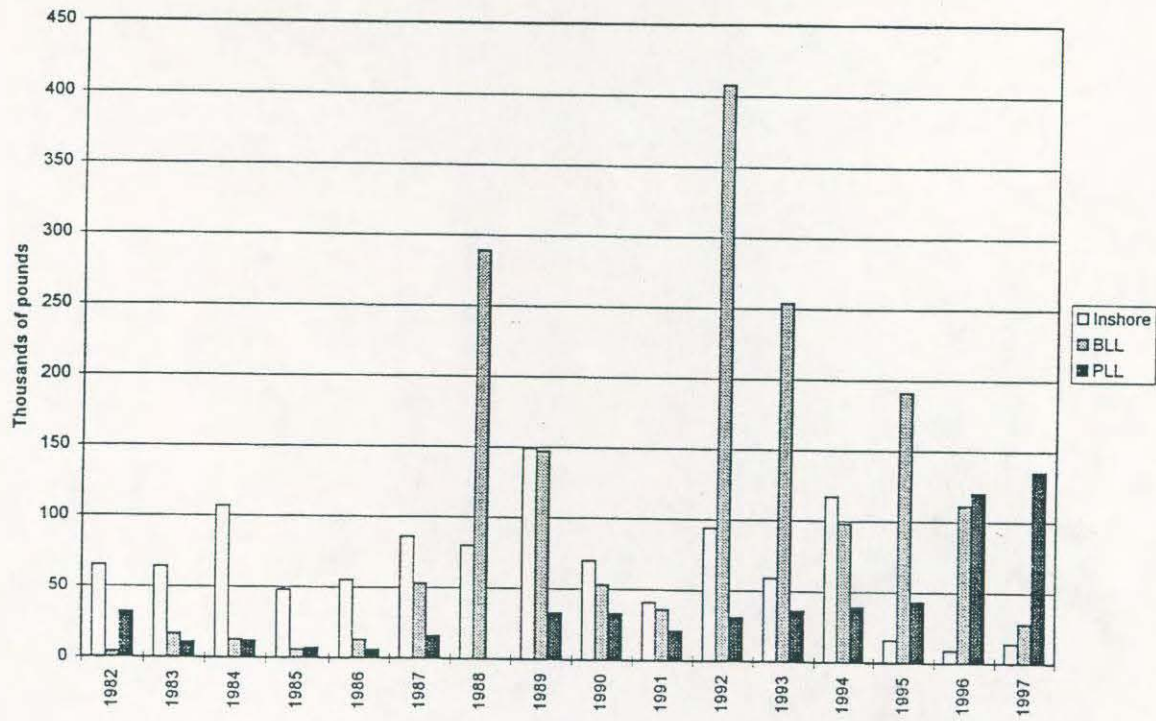


Fig. 38. Annual commercial landings of sharks.
 BLL - bottom longline PLL- pelagic longline

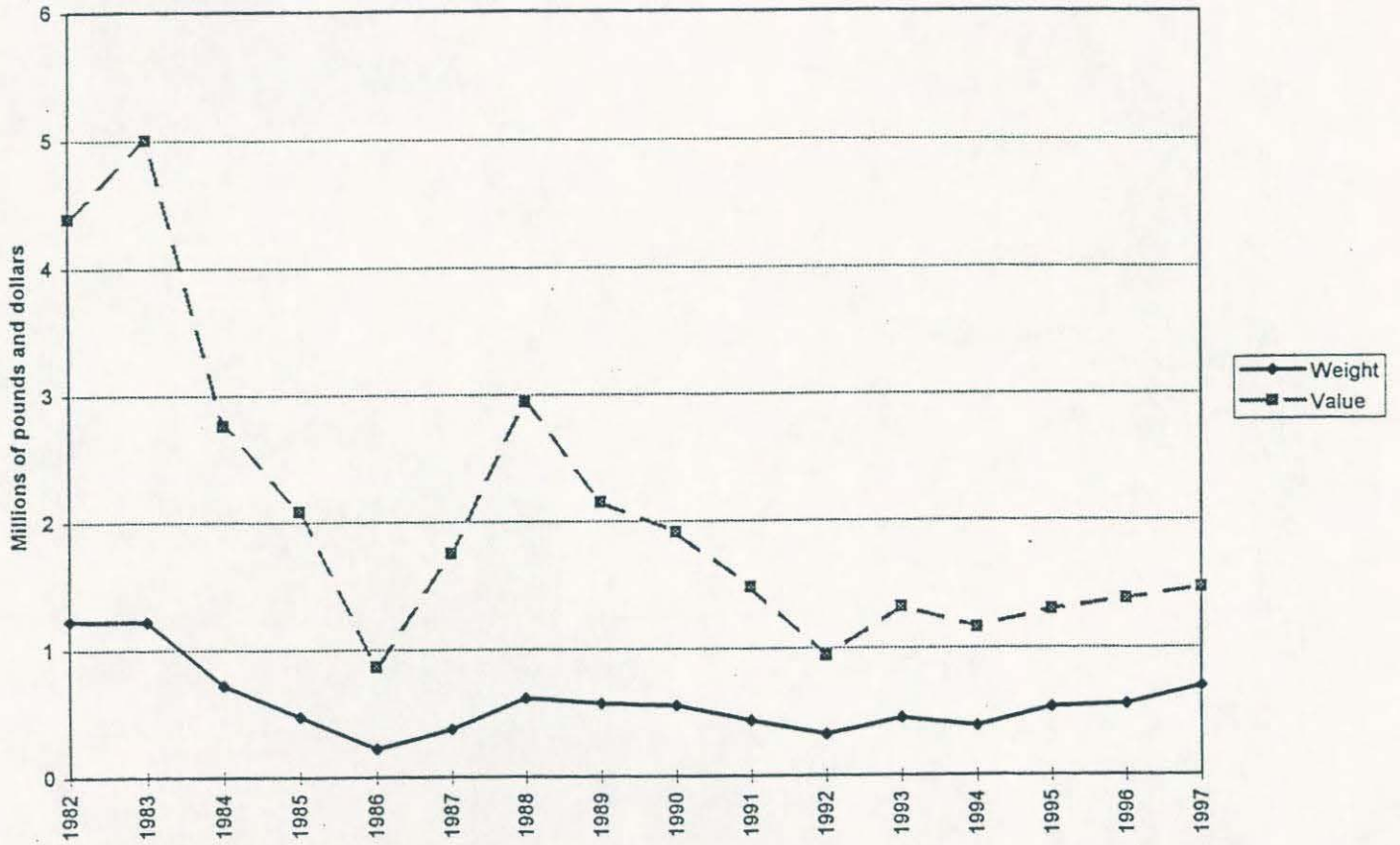


Fig. 39. Annual production of the pelagic longline fishery.

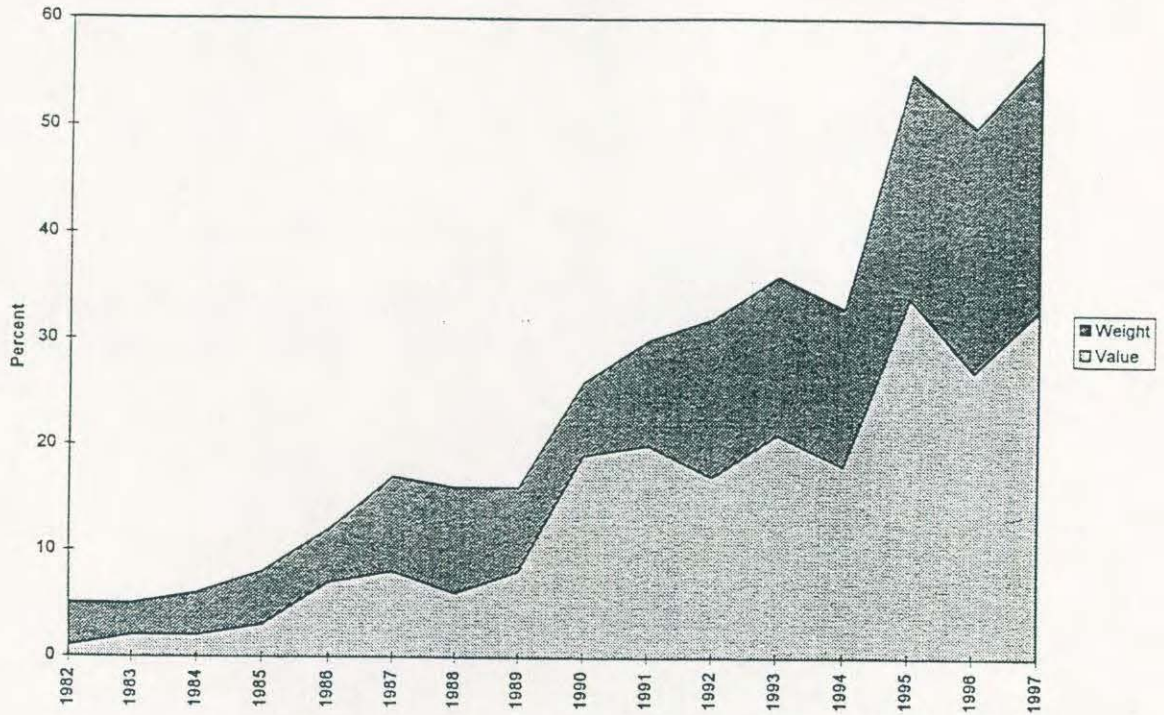


Fig. 40. Annual contribution of incidental landings to the pelagic longline fishery.

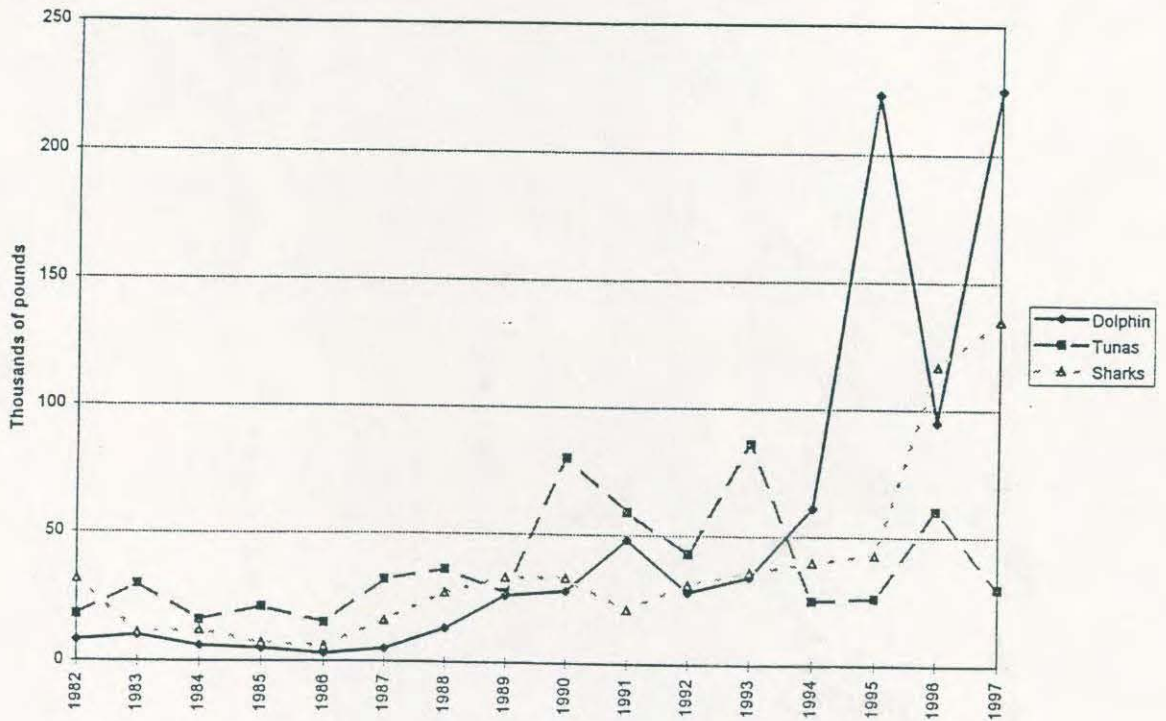


Fig. 41. Annual incidental species landings by the pelagic longline fishery.

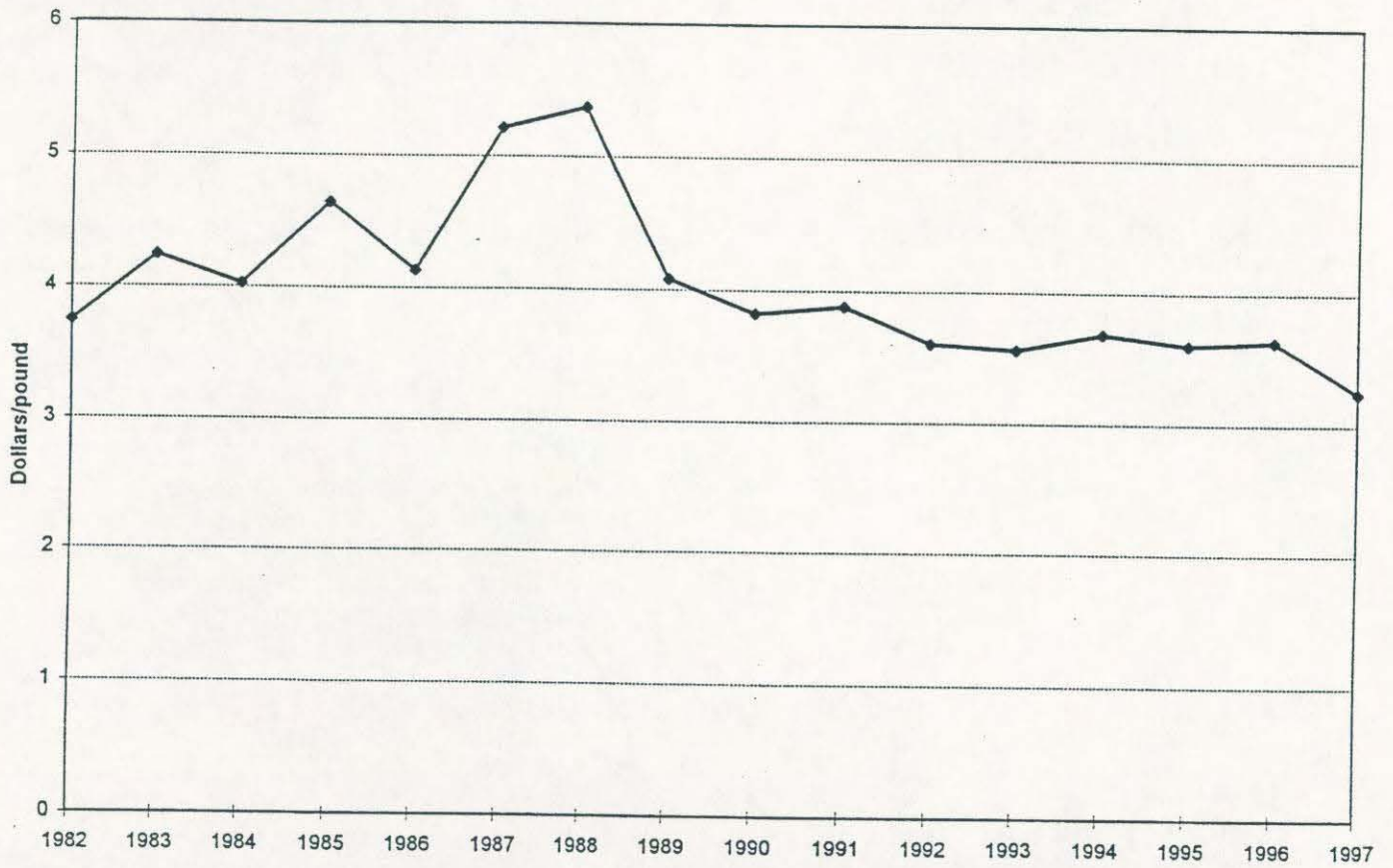


Fig. 42. Annual ex-vessel price of swordfish.

conjectural. The major industry group (Blue Water Fishermen's Association) has acknowledged the importance of the "bycatch" in terms of overall landed value. With the continuing decline in swordfish abundance, this fishery has evolved from one directed at a single species with associated incidental landings into a multispecies targeted fishery.

Swordfish are fished at night and the accompanying shark catches have always been considerable. Previously, these were largely discarded, due to handling problems, low value, and space constraints. Growing demand for fins and quota fulfillments for the large coastal group appear to have produced a higher retention rate of pelagic sharks.

Dolphin landings have been relatively high since 1994 in other fisheries besides the pelagic longline fishery. Longliners maintain that dolphin have been much more abundant in their customary fishing areas and that they therefore have had higher incidental landings. Concurrent success in other fisheries tends to support this assertion. There also appears to have been more effort directed at dolphin inshore of the swordfish grounds.

Commercial king mackerel landings have declined steadily since 1991 with the 1997 catch (61,000 pounds worth \$85,000) the lowest since 1978 (Fig. 43). The length distribution is shown in Fig. 44. Average length has been variable, but has increased in recent years (Fig. 45). In 1997, it was 88.7 cm, the largest reported in many years. The landings decline off South Carolina in recent years reflects the trend in regional abundance, which last peaked in the early 1990's, although the stock is not considered to be overexploited by the NMFS.

The offshore trap fishery was directed at black sea bass. Landings (142,000 pounds valued at \$188,000) improved slightly, but remained below average (Fig. 46). 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 was 166,000 pounds (\$230,000). Length distribution of trap-caught sea bass is shown in Fig. 47. The contribution of small (<0.75 pound) fish was about average at 49% (of graded landings by weight). The average size of fish taken with all types of gear was 30.3 cm. Although state law increased the minimum size limit from 8 in to 10 in total length in mid-year, this had a negligible impact on commercial landings, since most of the trap catch was made prior to its imposition.

COASTAL AND RIVERINE FISH

Most coastal species have low unit value. The 1997 catch was

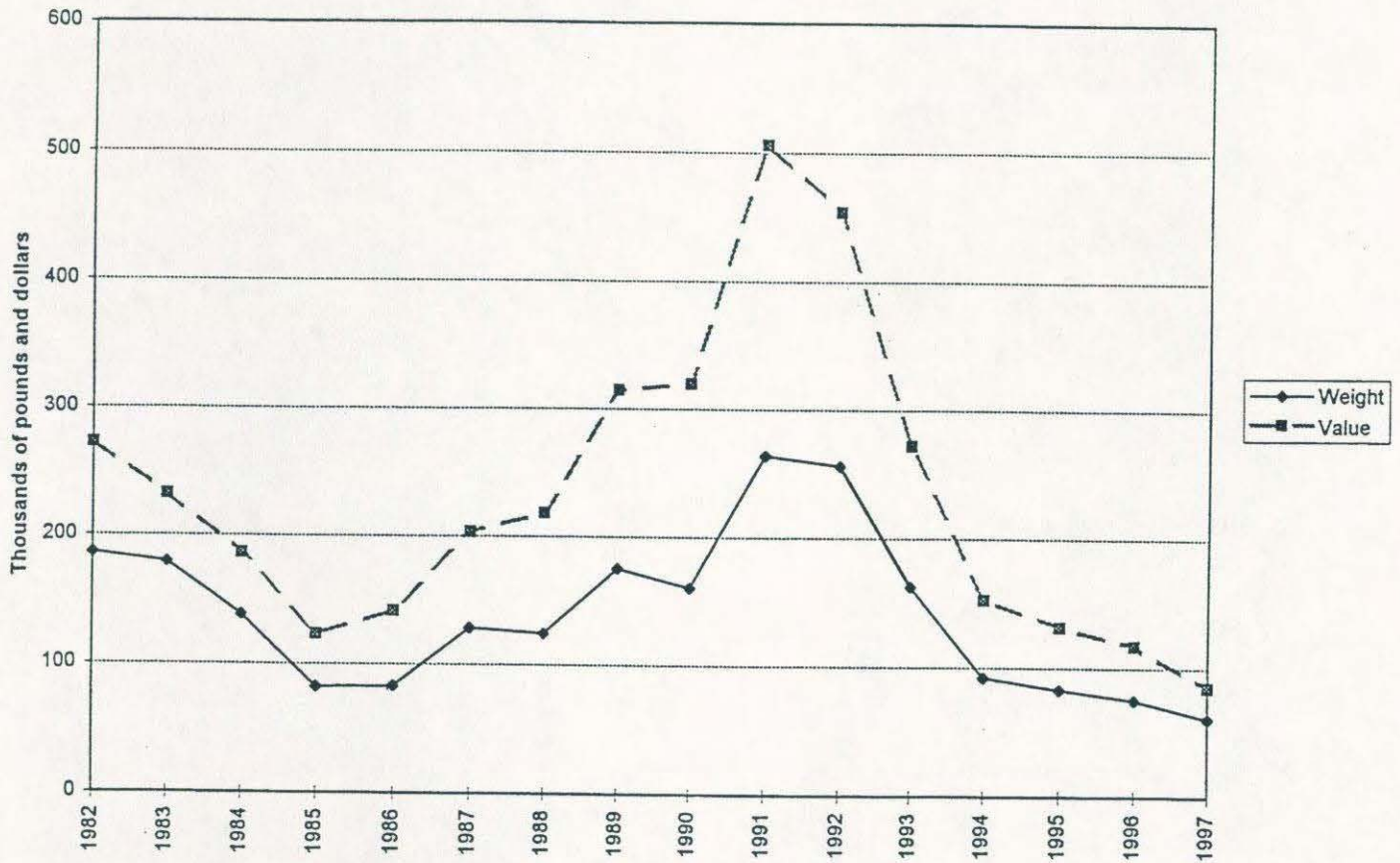


Fig. 43. Annual commercial production of king mackerel.

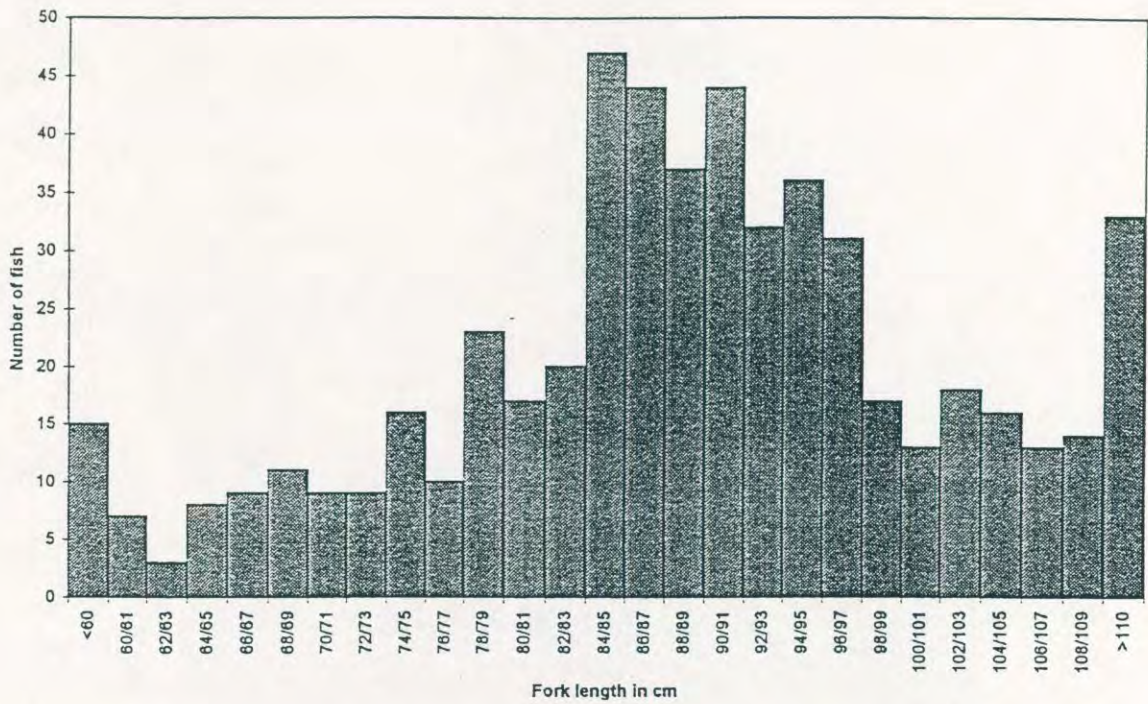


Fig. 44. Length distribution of commercially landed king mackerel.

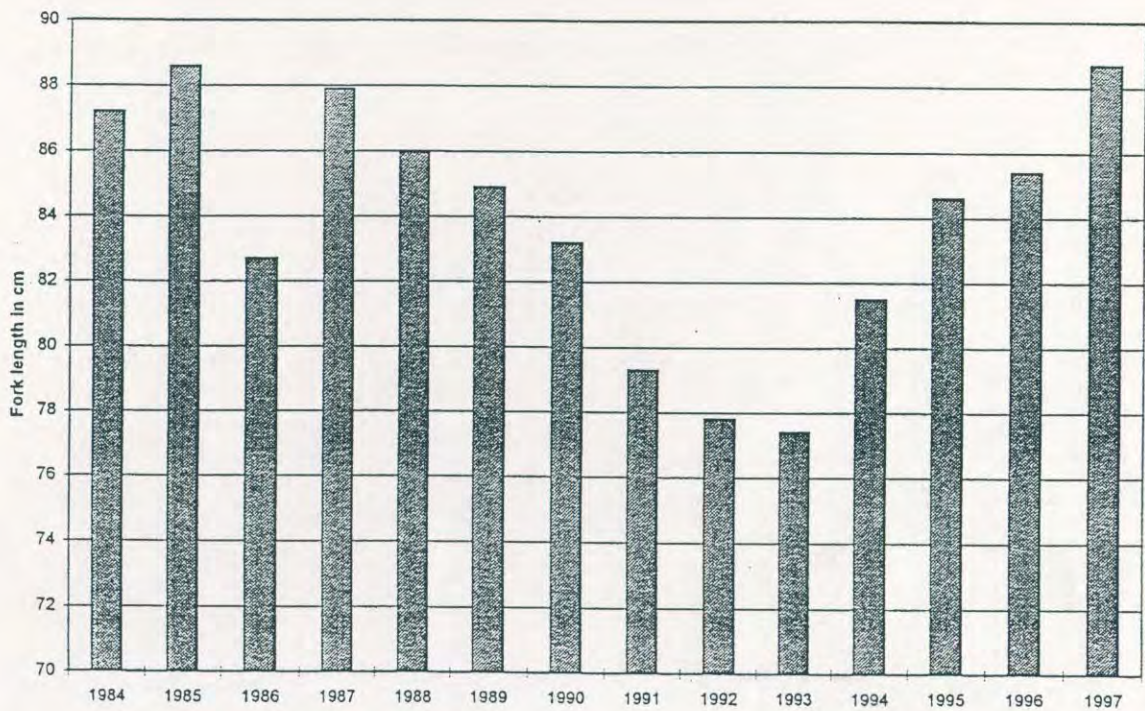


Fig. 45. Average length of commercially landed king mackerel.

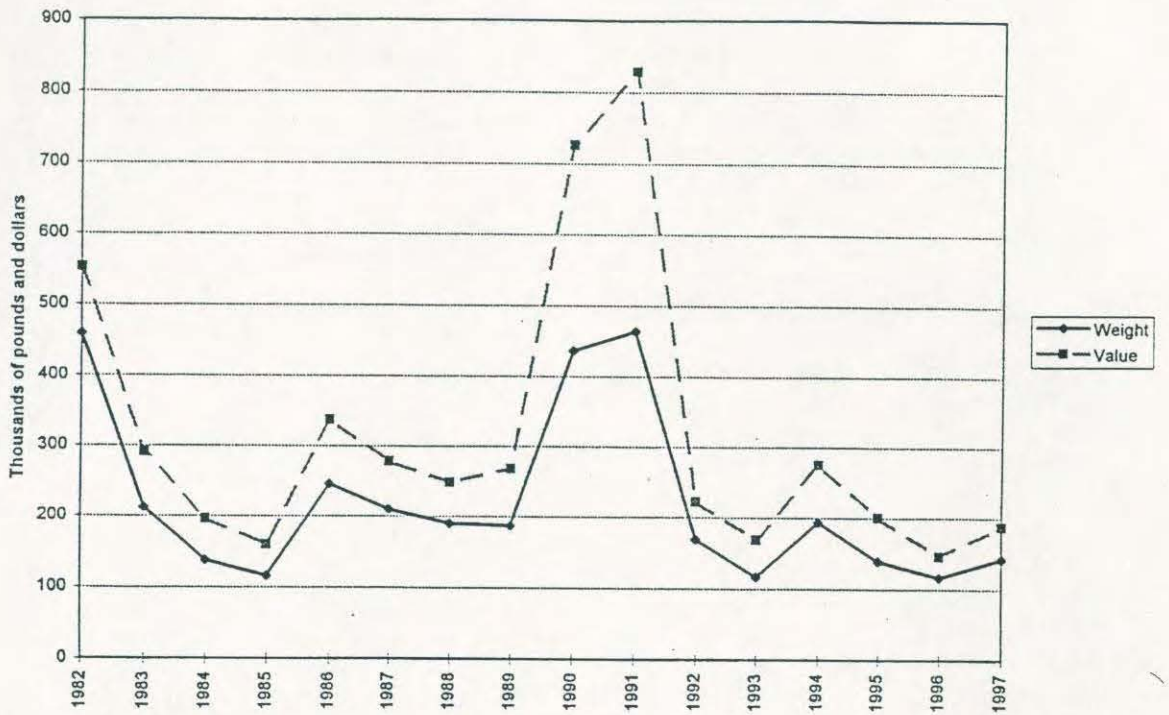


Fig. 46. Annual production of the offshore trap fishery.

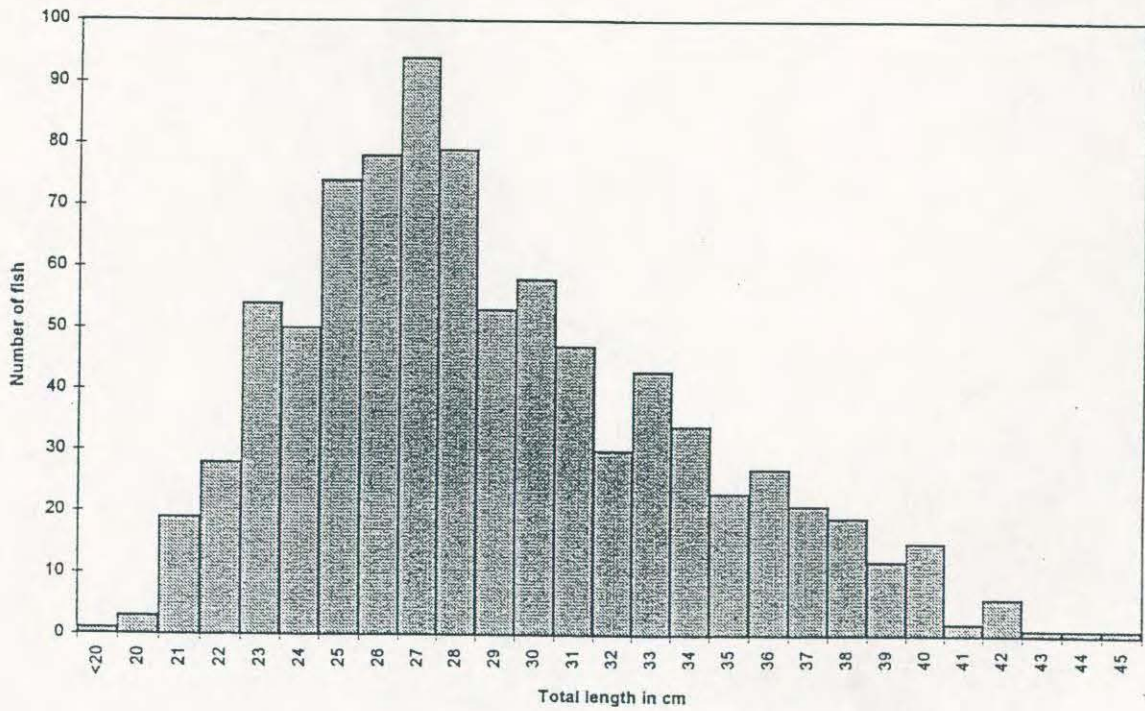


Fig. 47. Length distribution of trap-caught black sea bass.

304,000 pounds worth \$126,000, among the lowest on record (Fig. 48). Mandatory use of BRDs probably reduced the shrimp trawl landings. Mullet (102,000 pounds), spot (87,000 pounds), and kingfish (74,000 pounds) were the principal contributors. The 1997 riverine fish landings (343,000 pounds valued at \$256,000) consisted entirely of American shad. Production declined sharply after a dramatic increase in 1996 (Fig. 49).

RECREATIONAL FINFISH FISHERIES

Total participation (excluding headboat fishermen) was estimated by the NMFS at 529,505 fishermen. Out of state residents (308,434) comprised 58%, coastal residents (150,108) represented 28%, and noncoastal residents (70,963) accounted for 14%.

The trends in total participation and that by coastal residents are shown in Fig. 50. The estimated number of coastal resident anglers was the highest since that in 1990. During the previous six years, participation by coastal residents ranged from 91,000-146,000 anglers. The 1997 estimate represents a 20% increase over the average of 125,000. During 1990-96, the annual percentage contribution of coastal residents was 22-26%, compared to 28% in 1997. 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).

Year	1992	1993	1994	1995	1996	1997
Stamps sold	81	87	90	90	87	94
Participants	124	131	146	91	111	150

The average ratio of stamps:participants during the previous five years was 1:1.39, compared to 1:1.60 in 1997. The increase in 1997 coastal participants was 35% compared to 8% in stamps.

Total effort was estimated at 1,583,698 angler-trips by the NMFS, distributed by residence classification and two-month interval (wave) as follows:

Residence	Wave					Total
	2	3	4	5	6	
Coastal	83,089	196,214	258,311	176,095	133,654	847,363
Noncoastal	11,436	62,436	67,656	37,192	21,330	200,049
Out of state	38,483	176,158	193,120	88,327	40,198	536,286
All	133,008	434,808	519,087	301,614	195,182	1,583,698

The trends in overall effort and that by coastal residents are shown in Fig. 51. Total effort in 1997 was slightly above the ten-year average, while effort by coastal residents was 3% below it. No increase in effort proportional to that indicated in participation was evident.

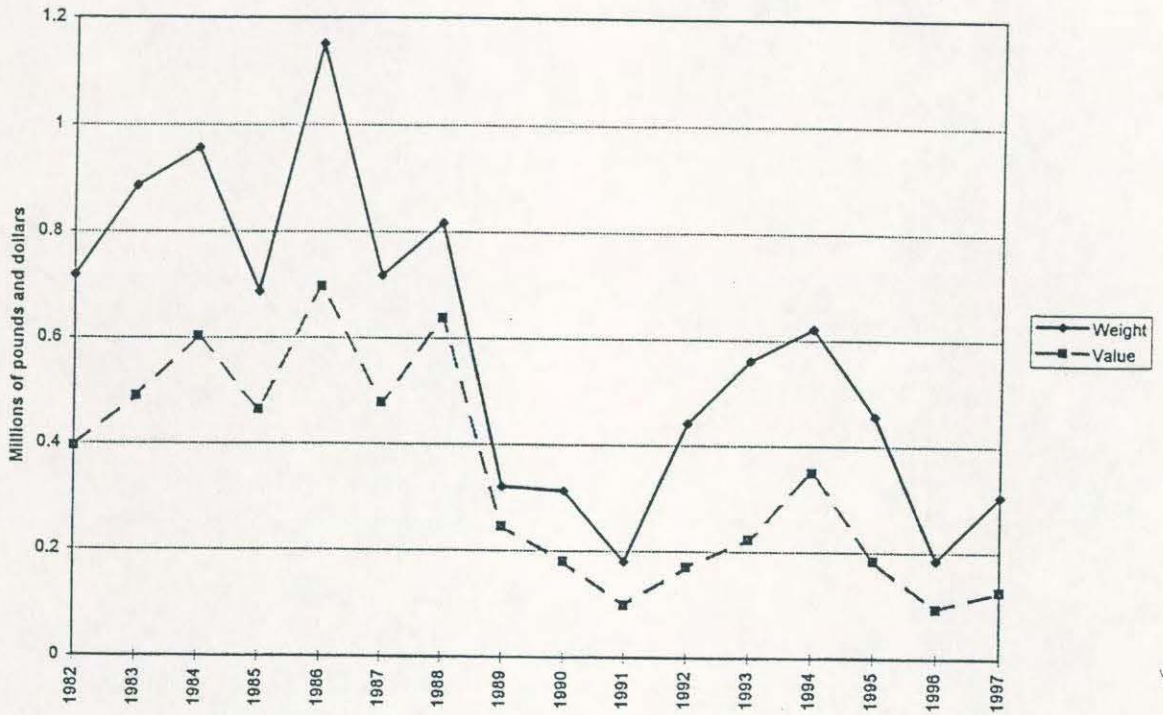


Fig. 48. Annual commercial production of coastal fish.



Fig. 49. Annual commercial production of American shad.

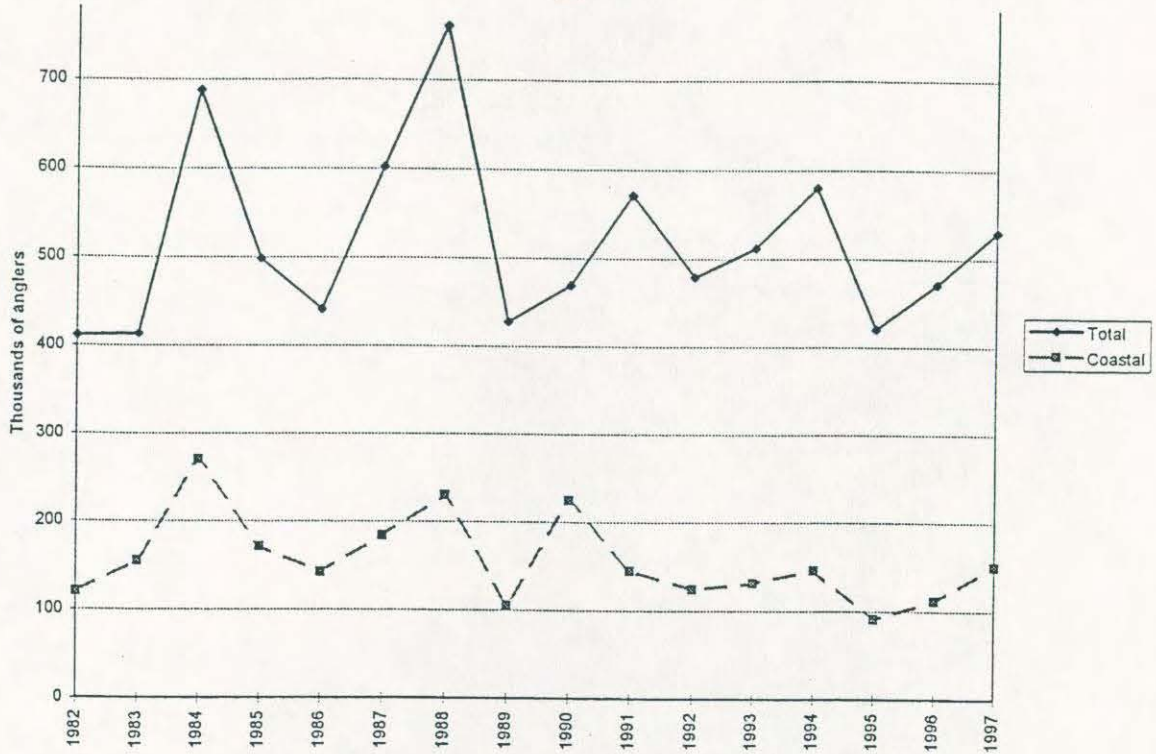


Fig. 50. Estimated participation in the recreational hook and line fishery (excluding headboat anglers).

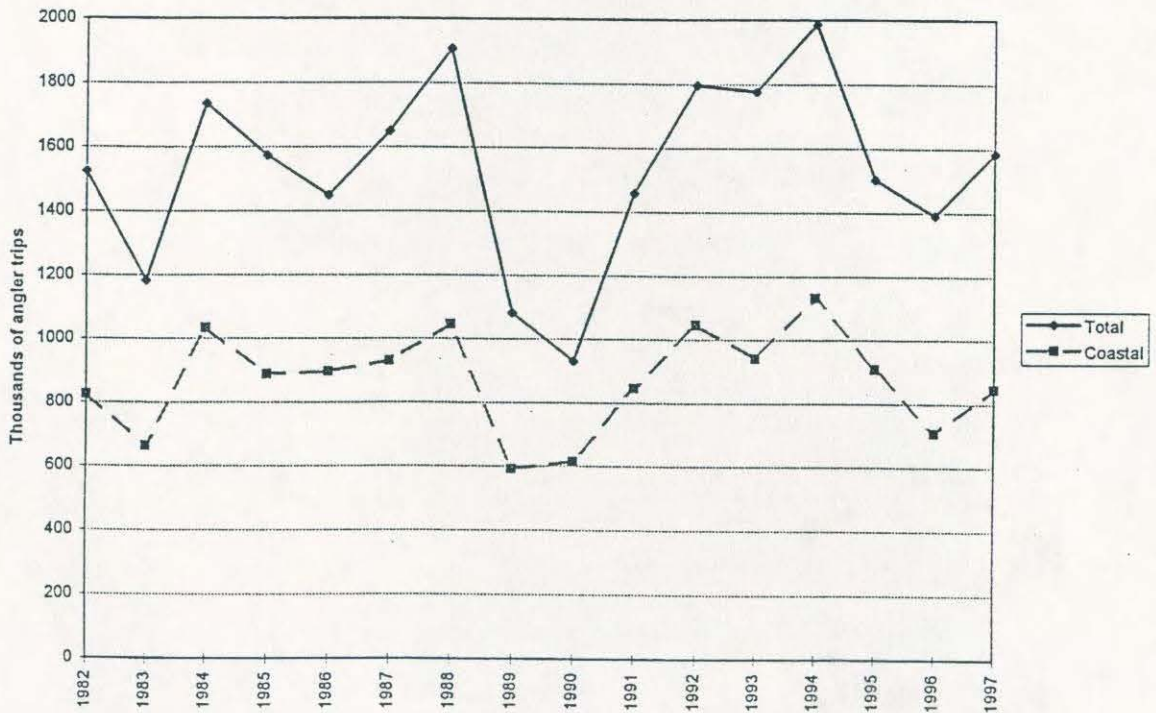


Fig. 51. Estimated effort in the recreational hook and line fishery (excluding headboat trips).

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. As usual, there are many anomalies that appear to be attributable largely to sampling errors, such as misidentification of released or discarded (therefore unverified) fish.

HEADBOAT FISHERY

The NMFS classified 19 vessels as headboats during 1997. Under the new classification system, any vessel licensed for more than six passengers was designated as a headboat. Six former charterboats were reclassified as headboats. Most of the reclassified boats did not operate on a regular basis or target reef fish as did the "true" headboats.

Three boats operated from Little River. One formerly fishing from Little River relocated to Calabash, North Carolina. Four ran out of Murrells Inlet. Six boats were located in the Charleston area and five fished from Hilton Head. None of the boats south of Charleston routinely fished offshore for reef fish and several limited their operations largely to state waters.

Effort and catch data are summarized in Table 3. Total effort was 60,150 angler-days, a modest improvement from the near-record low level of the previous year (Fig. 52). An angler-day represented the effort of one angler for one full day, usually 10-12 hours, including travel time. While part of the increase was attributable to the addition of boats, the major factor appeared to be the improved summer weather in 1997 (Fig. 53).

Total landings (539,456 fish weighing 634,241 lbs), while comparable to those in recent years, were relatively low by long-term historical standards (Fig. 54). All headboat catch data refer to fish retained with released or discarded fish not included. Species composition has remained similar during the last four years. Vermilion snapper contributed 30% of the landed weight, black sea bass 14%, and groupers (principally gag and scamp) 12%. No other species or group accounted for >10%.

Landings of black sea bass, formerly the mainstay of the fishery, have declined almost continuously since the late 1970's with the 1997 catch little improved (Fig. 55). Part of the decline has been attributable to the reduction in inshore effort with headboat operators complaining of poor fishing year after year. Some have blamed commercial trap fishermen for the depressed inshore fishery. There is little direct competition, because the trap fishermen fish mainly during the colder months when there is little or no headboat activity. Historically, the headboat landings generally exceeded trap catches by a considerable margin and it has been only recently that the catch shares have been

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

Group/species	1992	1993	1994	1995	1996	1997
Oceanic pelagics						
Dolphin	5,139	35,023	6,932	6,582	16,178	16,903
Wahoo	1,653	4,005	1,947	509	799	1,562
Yellowfin tuna	3,170	14,039	5,573	0	541	784
Other tunas	573	607	2,235	4,649	546	1,644
Reef fish						
Blk. sea bass	382,386	417,339	601,796	616,938	206,145	616,262
Other sea bass	4,475	3,042	20,740	47,244	12,928	105,506
Gag	9,395	19,567	1,411	6,446	6,451	4,262
Scamp	3,086	0	0	4,074	0	5,399
Other groupers	979	1,264	0	0	1,622	12,191
Red snapper	0	4,496	702	0	1,052	34,550
Vermilion sn.	22,710	3,483	2,161	19,376	16,300	35,465
Other snapper	0	0	0	0	11,460	12,164
Red porgy	46,720	6,360	8,422	53,206	45,831	3,238
Other porgies	9,486	2,522	2,779	0	7,887	22,617
White grunt	3,284	13,487	19,883	3,613	8,032	21,082
Other grunts	8,656	45,381	21,684	25,461	31,730	13,899
Triggerfish	5,356	5,853	2,409	2,825	5,460	28,154
Spottail pin.	40,557	7,003	225,021	32,575	14,744	73,989
Spadefish	24,515	27,935	5,777	6,060	39,286	73,120
Amberjack	1,851	5,784	6,543	509	3,462	10,694
Coastal pelagics						
King mackerel	220,111	56,141	73,693	58,644	62,296	99,067
Spanish mack.	78,061	108,587	321,046	39,837	215,886	160,842
Bluefish	49,252	136,799	258,395	371,685	137,462	282,485
Crevalle jack	3,381	4,250	8,647	3,541	21,293	8,365
Barracuda	9,489	8,571	18,373	5,961	14,570	34,633
Cobia	5,285	0	3,193	1,382	4,841	4,506
Bonito/tunny	6,732	1,491	3,632	20,936	6,761	18,282
Inshore sportfish						
Red drum	158,803	265,513	454,221	597,566	305,775	301,189
S. seatrout	297,844	314,246	360,493	442,284	245,872	198,443
Weakfish	28,099	7,627	46,858	32,013	5,516	4,904
Flounders	69,714	133,121	252,817	215,416	163,033	236,509
Sheepshead	380,196	78,153	126,517	126,818	172,202	52,051
Tarpon	0	0	0	0	5,287	690
Inshore bottomfish						
Kingfish	237,154	171,041	281,108	489,033	355,855	851,074
Spot	1,470 K	1,568 K	1,651 K	1,197 K	1,617 K	916,364
Croaker	100,780	49,649	330,033	182,055	99,417	252,073
Black drum	13,600	18,511	14,290	31,765	29,798	49,358
Sharks						
Blacktip	3,606	276	1,935	7,127	56,331	51,776
Sharpnose	26,215	11,560	58,703	44,001	41,608	11,022
Other	129,408	175,206	305,247	215,366	257,878	335,854

Table 3. Reported headboat catch (numbers of fish) and effort (angler-days). "Other" includes numerous minor species. Source: NMFS Beaufort Lab.

Category	JAN-MAY	JUN-AUG	SEP-DEC
Red porgy	8,818	11,255	4,462
Other porgies	4,497	13,266	5,121
White grunt	3,913	9,984	4,310
Other grunts	11,011	27,649	11,409
Red snapper	139	57	361
Vermilion snapper	54,409	121,331	42,595
Other snappers	63	734	57
"E" grouper	1,403	3,786	966
"M" grouper	3,689	6,304	1,632
Triggerfish	5,551	16,165	10,867
Sea basses	45,859	68,459	18,532
King mackerel	132	1,256	1,103
Sharks	714	2,115	636
Other	4,275	8,023	2,548
Angler-days	12,329	37,288	10,533

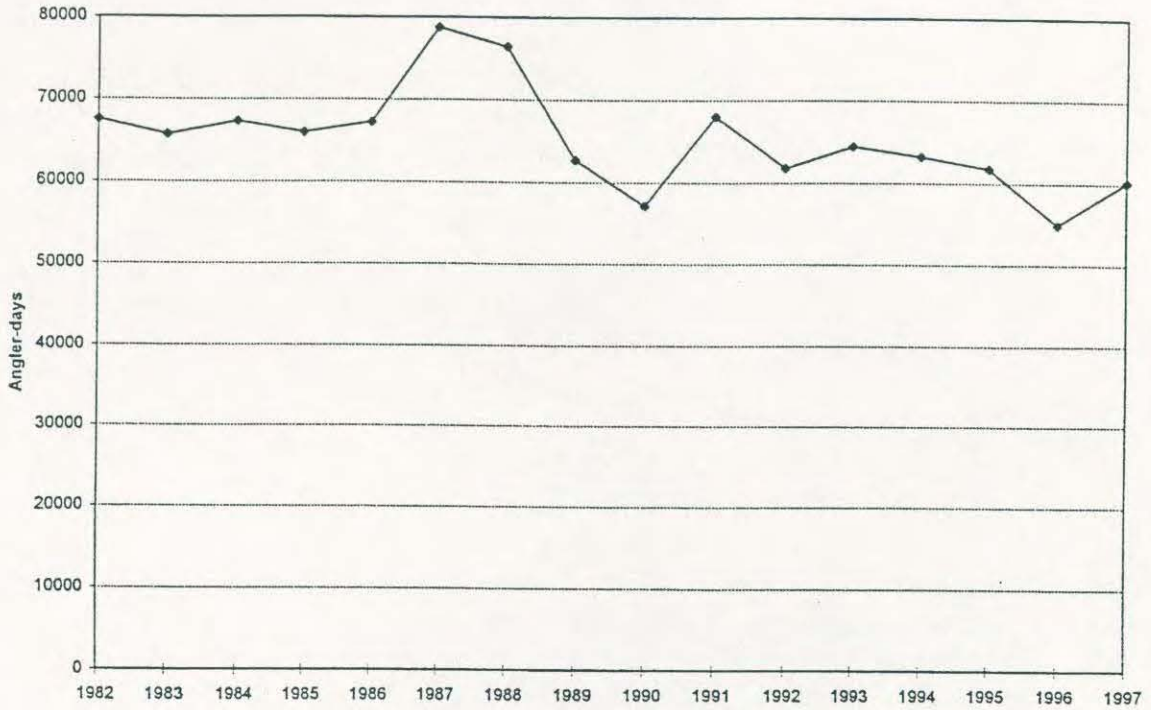


Fig. 52. Reported effort in the headboat fishery.

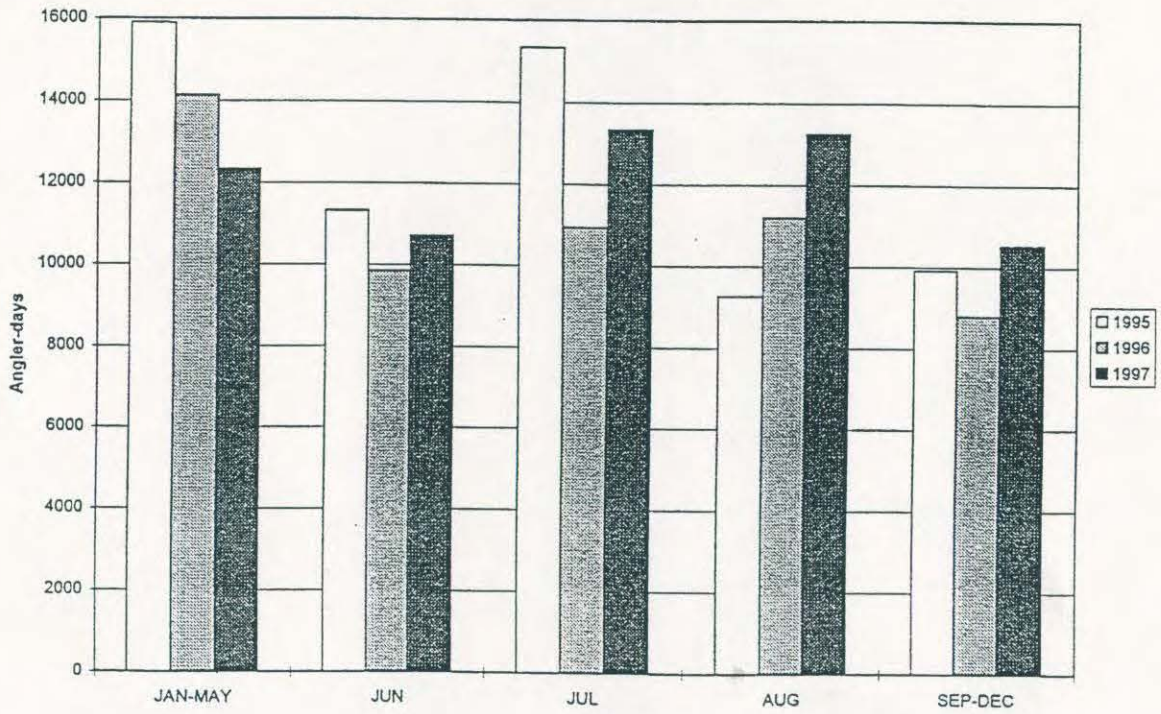


Fig. 53. Seasonal effort in the headboat fishery.

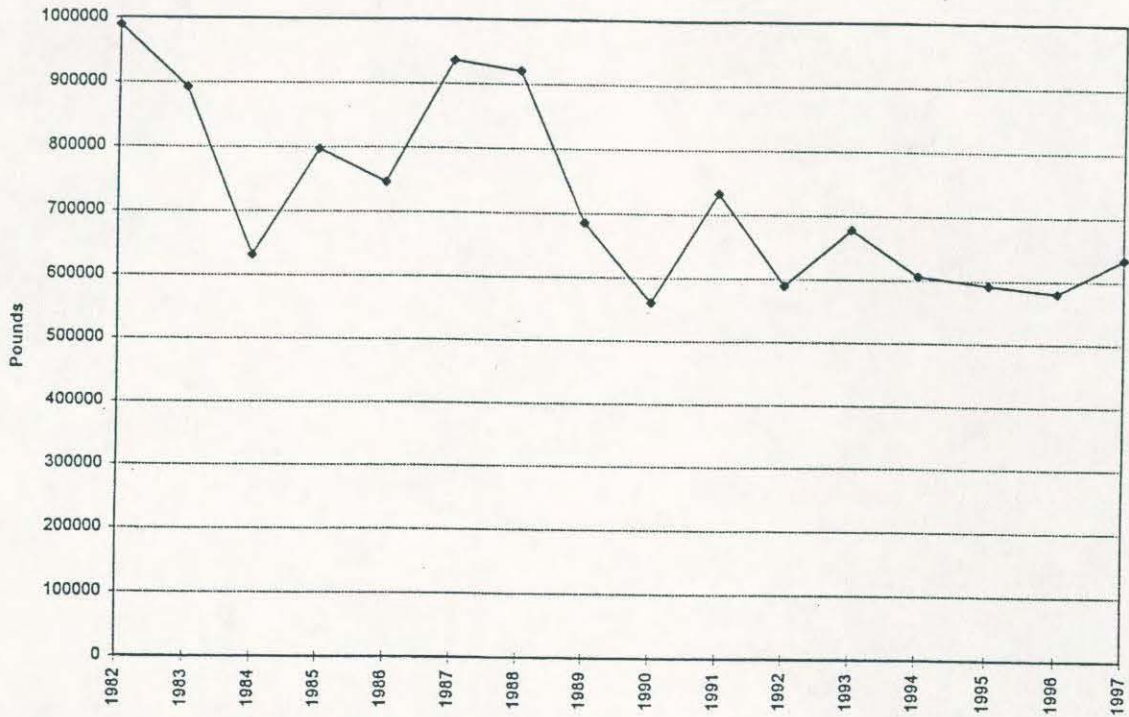


Fig. 54. Reported landed weight of the headboat catch.

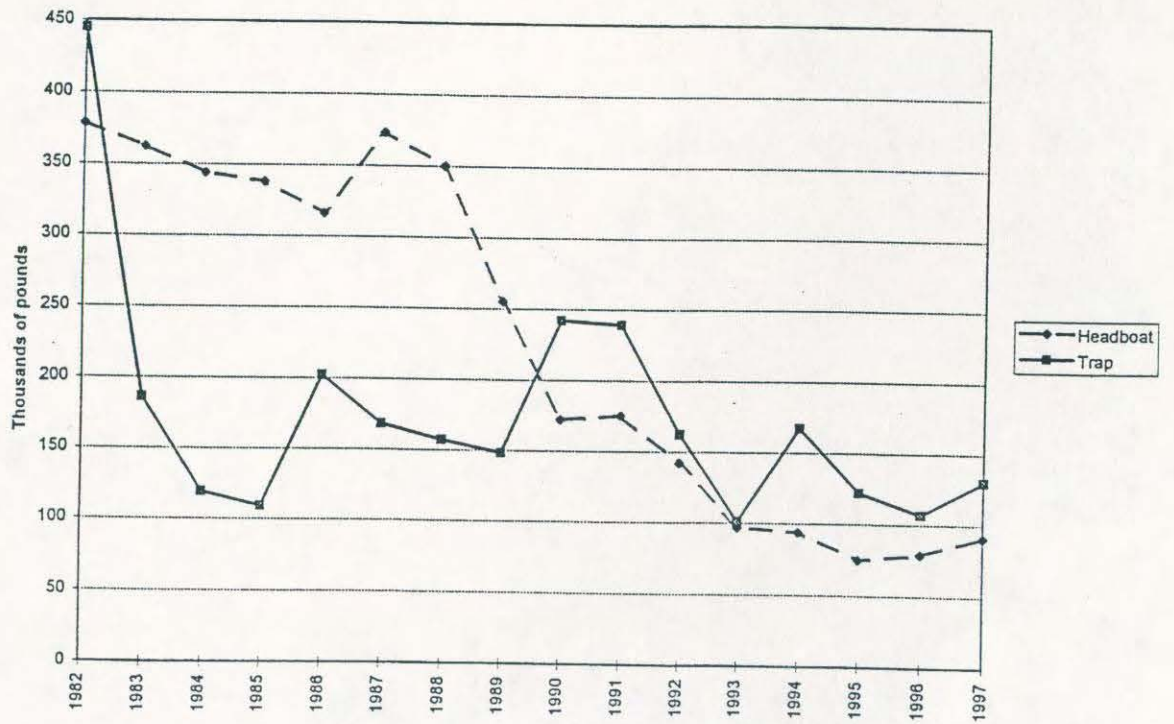


Fig. 55. Division of black sea bass landings.

reversed (Fig. 55). The annual overall recreational catch (including landings by charterboat fishermen and private boat anglers) has nearly always been appreciably greater than the commercial harvest.

State legislation increased the minimum size limit of black sea bass to 10 in total length (from 8 in) at the start of the peak summer season in 1997. With the smaller limit, the inshore release rate was typically 40-50% and the offshore rate <10%. Release rates by area (as reported on headboat logbook forms) were as follows.

Area	Jul-Dec 1996	Jan-Jun 1997	Jul-Dec 1997
Hilton Head	58%	61%	72%
Charleston	27%	20%	28%
Murrells Inlet	33%	22%	50%
Little River	19%	16%	45%
Statewide	29%	22%	46%

The July-December 1997 catch at Hilton Head was made entirely inshore. About 70% of the Charleston catch was from inshore areas. In Murrells Inlet, 73% was from inshore, while at Little River the figure was 67%. Statewide, 73% of the July-December 1997 catch came from inshore, where the impact of the increased size limit presumably would have been most noticeable.

Several Little River captains complained about the new size limit, claiming it significantly reduced their retainable catches. It appears that the change in release rates (from 19% to 45%) resulted in almost a one-third decrease in the Little River retainable catch after July 1997. Estimated decreases by area were as follows:

Area	%(-) change
Hilton Head	33
Charleston	2
Murrells Inlet	26
Little River	32
Statewide	22

Landings of red porgy also remained near the lowest level recorded to date (Fig. 56). This species represented 5% of the total landings by weight in 1997, compared to 30% twenty years ago. Average size (1.27 lb/fish) remained little changed over the last five years.

Landings of vermilion snapper continued the long-term upward trend and reached a record high (Fig. 57). Captains of several boats consistently reported limit catches (10 fish/angler) with many additional fish released. The average size (0.86 lb/fish) was the largest since 1985. In recent years, headboat landings have approached the commercial catch (with the headboat anglers allowed to retain smaller fish, 10 in vs 12 in). Combined landings have fluctuated widely with no apparent directional trend (Fig. 58).

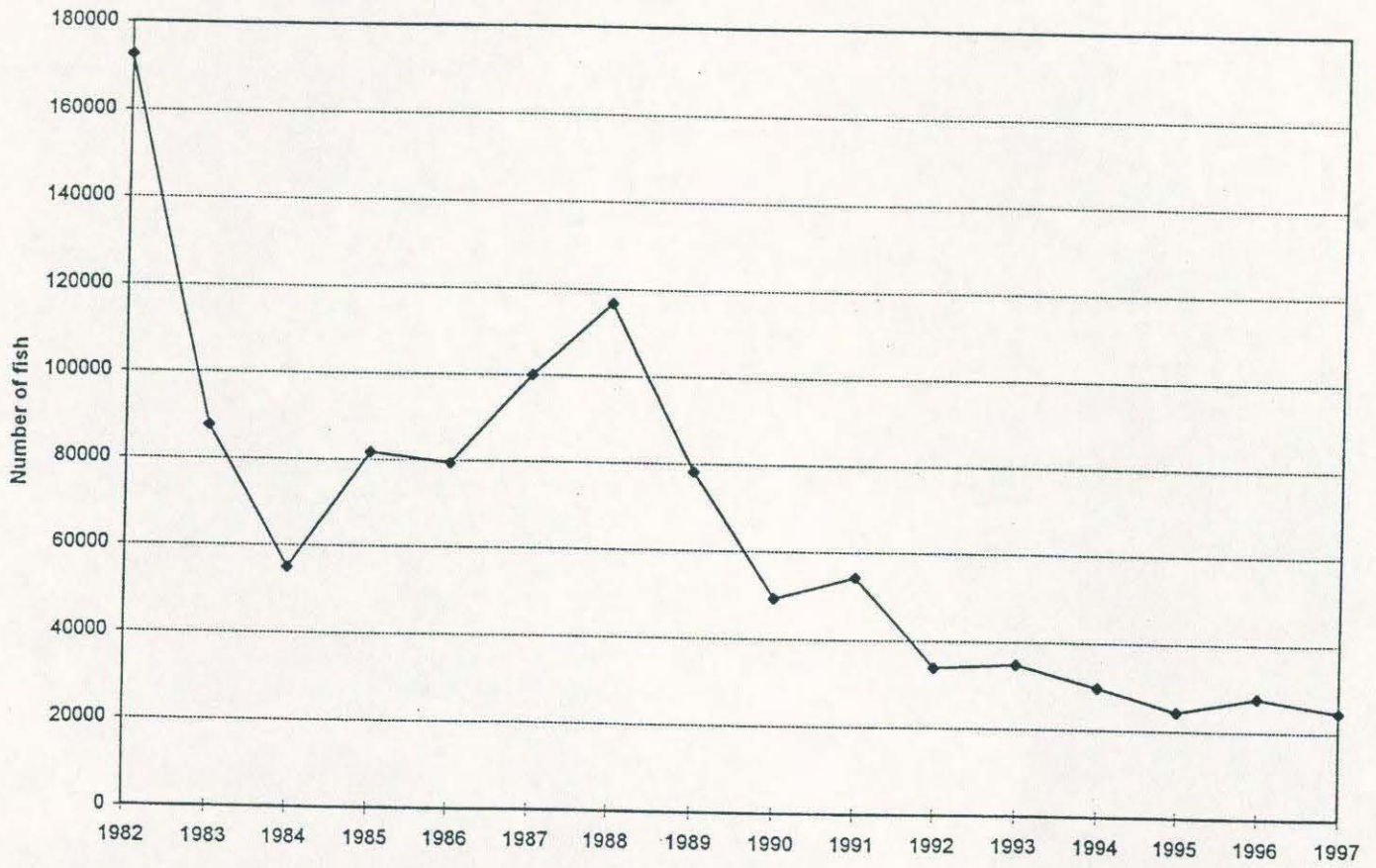


Fig. 56. Reported headboat landings of red porgy.

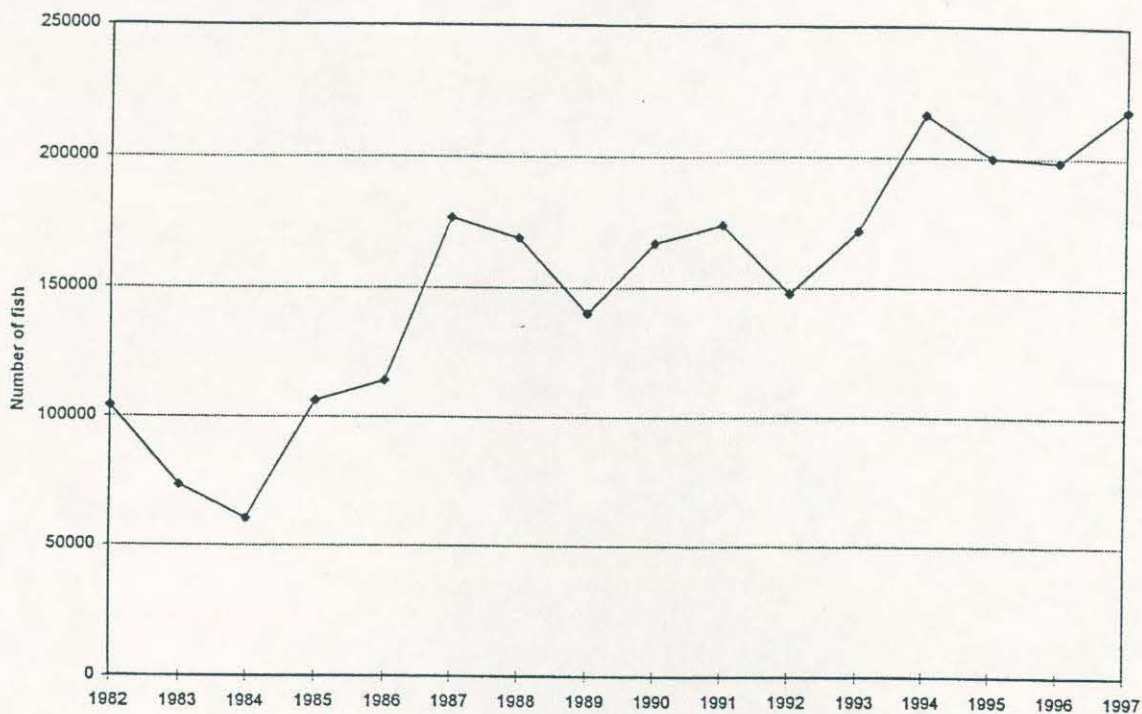


Fig. 57. Reported headboat landings of vermilion snapper.

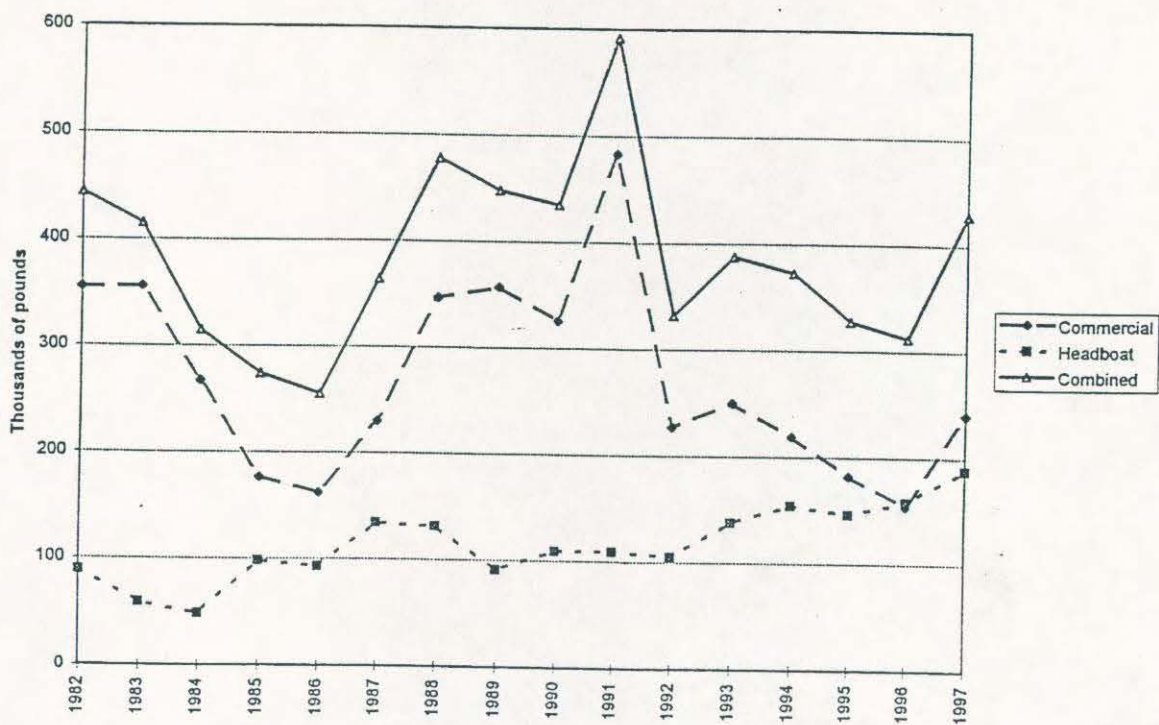


Fig. 58. Division of vermilion snapper landings.

Grouper landings of *Mycteroperca* spp. have been quite variable in recent years (Fig. 59). Scamp have comprised most of the *Mycteroperca* catch in the last few years, contributing to the relatively low individual weight (5.33 lbs in 1997). Captains reported releasing many undersized scamp.

The *Epinephelus* catch has been somewhat more consistent, but relatively low (Fig. 60). The 1997 landings consisted of small fish (mainly red and rock hinds and little snowies) with an average weight of only 1.80 lbs, the lowest on record.

CHARTERBOAT FISHERY

During the calendar year, permits were issued to 193 vessels (excluding those designated as headboats by the NMFS). All were licensed for six passengers or less. The NMFS designated all boats carrying more than six passengers as headboats.

A total of 158 boats reported making at least one trip (including guest trips). The number of boats active in each quarter is shown below.

Quarter	Active vessels				
	1993	1994	1995	1996	1997
January-March	27	29	42	52	62
April-June	98	121	119	135	131
July-September	110	130	125	134	138
October-December	87	89	104	111	98

The steady increase in winter (January-March) participation continued, primarily attributable to small boats targeting red drum in inland areas.

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

Counties	Length (ft)					Total
	<20	20-26	27-31	32-40	>40	
Beaufort/Colleton	9	22	6	13	2	52
Charleston	23	12	13	14	26	88
Georgetown	5	5	2	9	5	26
Horry	0	0	6	15	6	27
Total	37	39	27	51	39	193

Compared to 1996, fleet size was unchanged in Charleston County with declines of one to three vessels in each of the other areas.

The numbers of boats fishing in various fishing areas are shown below. The figures are not additive, because many boats fished in more than one area. Except for a decline in boats fishing the offshore artificial reefs, there have not been substantial changes in this distribution during the last few years.

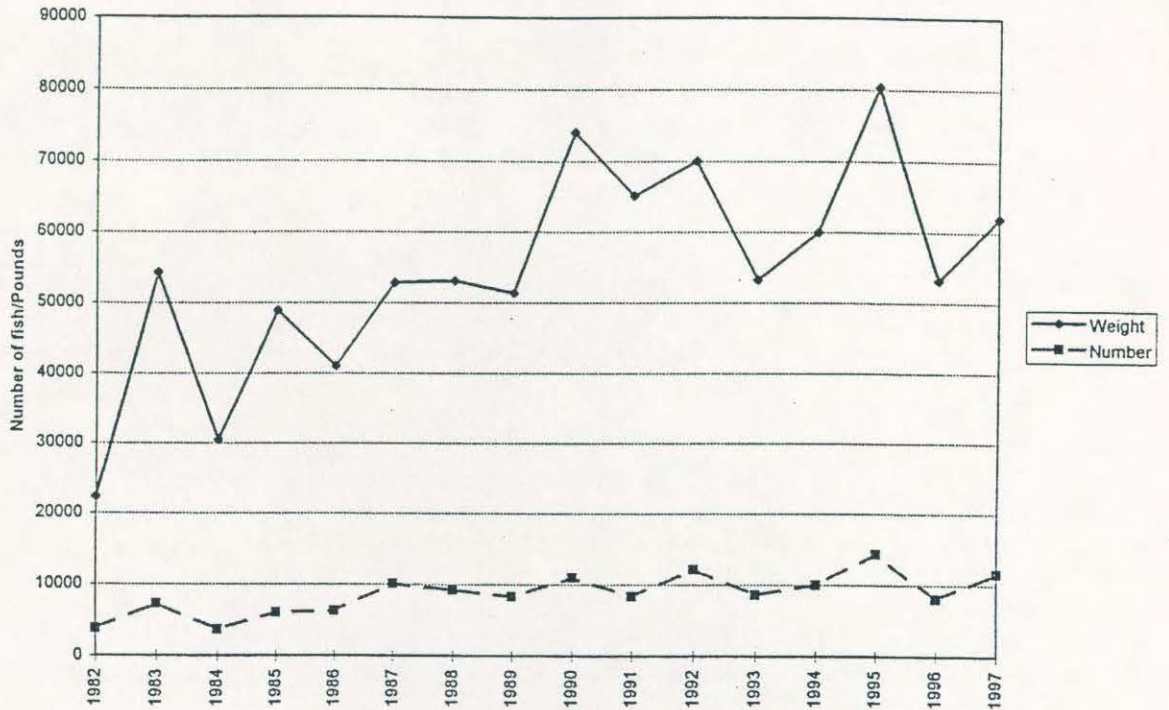


Fig. 59. Reported headboat landings of *Mycteroperca* groupers.

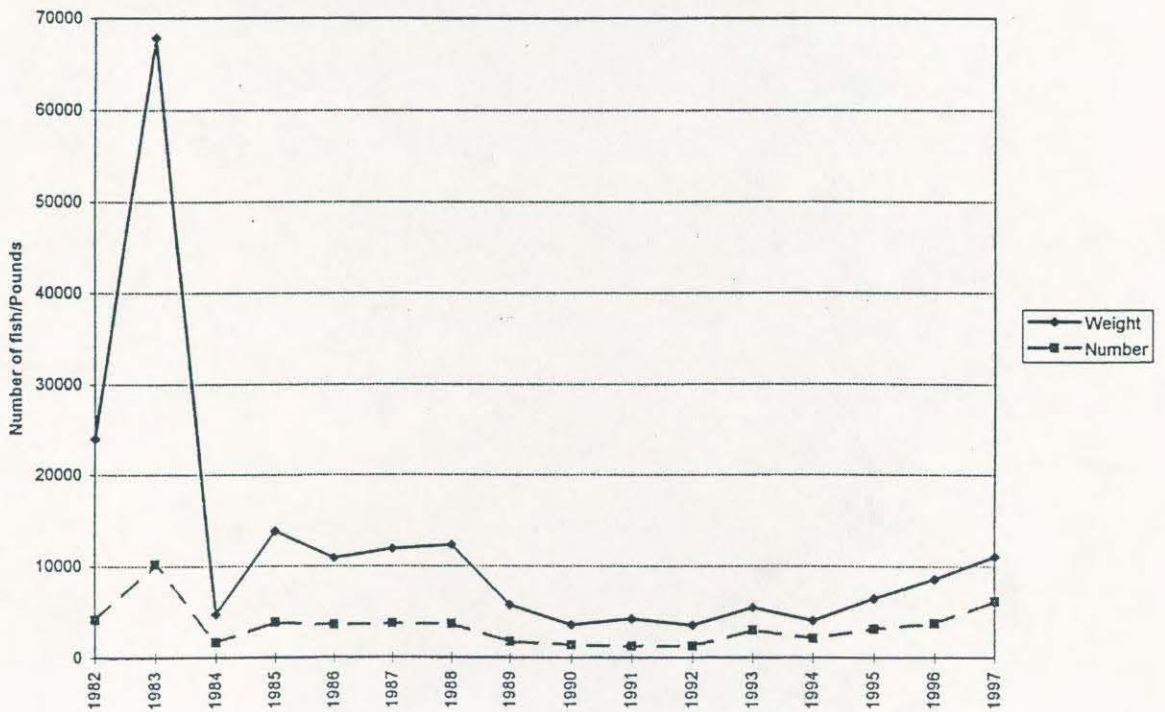


Fig. 60. Reported headboat landings of *Epinephelus* groupers.

Year	Fishing area				
	Inland	Ocean <3 mi.		Ocean >3 mi.	
		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

The total number of anglers was 23,603, slightly less than reported in 1996. Seasonal distribution is shown below.

Year	Number of anglers					
	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

Better weather during the second half of the year than in 1995/1996 presumably contributed to the higher 1997 count.

Charter captains reported making 6,222 boat trips (including a small number of guest trips), distributed by season and fishing area as follows. During the last five years, the number of boat trips on inland waters has steadily increased with variable trends in other fishing zones. The numbers of trips to offshore artificial reefs have been relatively low during the last three years.

Area	Boat trips					Total
	Jan/Mar	Apr/Jun	Jul/Sep	Oct/Dec		
Inland	211	481	652	500		1844
Ocean <3 mi.						
natural	35	378	680	64		1157
manmade	22	22	21	9		74
total	57	400	701	73		1231
Ocean >3 mi.						
natural	62	1074	1426	246		2808
manmade	25	143	146	25		339
total	87	1217	1572	271		3147
Total	355	2098	2925	844		6222

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

	Boat trips					Total
	<20	20-26	27-31	32-40	>40	
Beaufort/Colleton	275	1471	295	940	19	3000
Charleston	771	260	226	132	421	1810
Georgetown	59	158	65	185	177	644
Horry	0	0	272	349	131	752
All	1105	1889	858	1606	748	6206

unknown for 16 trips. In terms of annual effort by individual vessels, the distribution was as indicated below. About 59% of

	Number of trips/year						
	0	1-25	26-49	50-74	75-99	100-125	>125
Number of boats	34	86	23	18	18	9	5
Percent	18	45	12	9	9	5	2

the operators reported making <25 trips during the year. Fifty boats, about one-quarter of the number permitted, reportedly made at least 50 trips in 1997.

The reported number of charterboat anglers declined for the third consecutive year. 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:

Source	Estimated angler trips by wave						
	1	2	3	4	5	6	All
MRFSS	0	12,802	38,446	29,431	28,730	13,011	122,421
MRD	254	2,004	7,184	9,436	3,671	1,054	23,603

Table 4 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 5.

Inland effort for red drum, after several years of rapid expansion, appeared to be leveling off. Overall effort for tarpon has been rather stable in the last four years. Part of the apparent decline in inland effort for sharks reflected the redesignation of some larger vessels as headboats.

Sharks and mackerels were the principal targets of inshore ocean charterboat anglers, although a substantial portion of the overall effort was diversified among many species/groups, according to seasonal availability. Part of the apparent decline in effort targeted at sharks was attributable to the NMFS vessel reclassification. Inshore ocean effort for both Spanish and king mackerel continued a steady expansion. To some extent, the increasing level of inshore effort for Spanish mackerel has been offset by corresponding declines in offshore effort. As a result, there has been no pronounced increase in overall effort directed at this species.

Inshore ocean effort directed at king mackerel has also increased steadily, while offshore effort has remained relatively stable during the last three years. Directed offshore trolling for other species, e.g. billfishes, dolphin, etc. has fluctuated with no obvious trend. Bottomfishing effort has remained fairly stable.

Table 4. 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	1070	2170	8910
		Spotted seatrout	147	333	1468
		Sharks	135	443	1394
		Tarpon	135	320	1691
		Cobia	47	100	458
		Spanish mackerel	20	39	180
		Crevalle jack	16	28	114
		Flounder	12	23	145
		Sheepshead	8	26	71
		Bluefish	8	24	72
		Black drum	6	16	64
		Weakfish	3	5	24
		Spot	2	6	33
		Striped bass	2	4	12
		Kingfish	1	5	10
		Any	232	823	2405
	Total	1844	4365	17051	
Ocean, 0-3 mi. natural	Troll	Spanish mackerel	227	1004	765
		King mackerel	191	677	726
		Red drum	1	1	1
		Any	6	33	22
		Total	425	1715	1514
Ocean, 0-3 mi. manmade	Non-troll	Sharks	402	1734	1392
		Tarpon	37	107	156
		Red drum	18	57	70
		Black sea bass	11	49	35
		Flounder	11	30	45
		Sheepshead	6	20	21
		Cobia	6	13	26
		Bluefish	5	17	16
		Spotted seatrout	3	5	12
		Black drum	3	8	15
		Kingfish	1	6	4
		King mackerel	1	6	3
		Spanish mackerel	1	1	4
		Crevalle jack	1	1	3
		Any	226	823	817
			Total	732	2877
Ocean, 0-3 mi. manmade	Troll	Spanish mackerel	7	30	31
		King mackerel	6	20	31
		Total	13	50	62

Area	Method	Target species	Boat trips	Anglers	Hours
	Non-troll	Sheepshead	27	114	82
		Red drum	3	12	11
		Sharks	2	8	6
		Black sea bass	2	7	6
		Black drum	1	2	3
		Bluefish	1	2	3
		Flounder	1	2	3
		Any	24	60	89
		Total	61	207	203
Ocean,	Troll	King mackerel	1118	4938	5005
> 3 mi.		Spanish mackerel	195	893	522
natural		Dolphin/wahoo/tuna	152	740	928
		Billfish	76	363	532
		Any	388	1981	2834
		Total	1929	8915	9821
	Non-troll	Black sea bass	117	520	467
		Sharks	105	503	356
		Grouper	86	403	429
		Sheepshead	36	161	94
		Tarpon	20	85	61
		Cobia	16	60	56
		Red drum	10	44	41
		Spadefish	1	4	5
		Any	488	2294	2325
		Total	879	4074	3834
Ocean,	Troll	King mackerel	150	662	735
> 3 mi.		Spanish mackerel	68	279	195
manmade		Bluefish	4	10	16
		Barracuda	2	8	10
		Cobia	1	4	6
		Any	1	2	8
		Total	226	965	970
	Non-troll	Sheepshead	39	136	122
		Sharks	8	42	20
		Black sea bass	7	27	26
		Grouper	7	27	31
		Spadefish	7	34	26
		Cobia	3	10	21
		Red drum	3	8	12
		Tarpon	1	3	6
		Any	38	148	179
		Total	113	435	443

Table 5. Directed charterboat effort for principal species.
Source: MRD logbooks.

Target group	1993	1994	1995	1996	1997
		Inland angler-hours			
Red drum	1359	2918	6934	9122	8910
Spotted seatrout	1509	1302	1426	1004	1468
Sharks	2403	2987	1033	1236	1394
Tarpon	923	1185	1537	1596	1691
		Ocean 0-3 mi. boat-hours			
Sharks	1095	1885	2263	1636	1398
Spanish mackerel	316	436	464	772	800
King mackerel	73	248	316	480	729
Tarpon	28	661	384	325	156
Red drum	127	230	260	179	82
Sheepshead	66	259	162	339	103
		Ocean >3 mi. boat-hours			
King mackerel	4149	6047	5454	5363	5740
Spanish mackerel	931	1336	746	921	717
Dolphin/wahoo/tunas	1029	1272	749	546	928
Billfish	516	323	400	586	532
Reef fish	973	1091	749	1057	953
Sharks	222	249	330	305	376

Landings data reported to the MRD are summarized in Table 6. Based on these data, the following comments apply to the indicated major species groupings.

Oceanic pelagics

The peak season for this group is April through June. Landings of dolphin, the most numerous species, continued the strong showing of recent years and annual CPUE (1.16 fish/boat-hour) was well above average. The wahoo catch was also relatively good. In contrast, the billfish catch (mainly sailfish) was well below average and yellowfin tuna landings continued to decline sharply.

Reef fish

Landings of most major species were below the average levels of recent years. It should be noted that the charterboat catch of this complex is small compared to the headboat landings.

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, such as occurred in the previous year, the king mackerel catch peaks in July. The 1997 July catch was the best in five years and landings remained well above average through October. Peak seasonal CPUE (Fig. 61) was the highest since 1992 and the annual catch was the best since 1993. The directed fishery for Spanish mackerel occurs in both coastal and offshore ocean waters and peaks during July and August. The catch was the largest in five years with above-average monthly CPUEs during most of the season (Fig. 62).

Inshore sportfish

Red drum was the most sought after species. It attracted appreciable directed effort throughout the year and was the principal species sought by charterboat anglers during the winter. Effort and catches usually are greatest during October and November. Annual catch and effort were slightly less than in 1996. The spotted seatrout catch was above average, following a mild winter. The tarpon catch remained practically the same as in the two previous years with nearly the same CPUE since 1994.

Sharks

Catches of sharpnose were the largest in five years, while those of blacktip and the unclassified group were slightly below average. In April, the daily bag limits were changed to two sharpnose per angler and two large coastal sharks per boat.

Landings estimated by the NMFS are compared in Table 7. As in previous years, there are enormous differences between the MRD figures and MRFSS estimates for several important species, e.g. dolphin, black sea bass and several other reef species, king and Spanish mackerels, red drum, spotted seatrout, and sheephead.

Table 6. Charterboat catch (numbers of fish). Source: MRD logbooks.

Group/species	Retained	Released	Inland	0-3 mi.	>3 mi.
Oceanic pelagics					
Dolphin	5103	282	-	1	5330
Wahoo	505	19	-	-	524
Yellowfin tuna	261	7	-	-	268
Blackfin tuna	103	2	-	-	105
Skipjack tuna	1	-	-	-	1
Bonito	-	23	-	-	23
Blue marlin	4	12	-	-	16
White marlin	-	11	-	-	11
Sailfish	1	32	-	-	33
Reef fish					
Black sea bass	16380	8894	44	1491	23739
Gag	1153	342	-	9	1486
Scamp	475	714	-	-	1189
Red grouper	15	32	-	-	47
Snowy grouper	42	6	-	-	48
Speckled hind	32	3	-	-	35
Red snapper	44	37	-	-	81
Vermilion snapper	3810	1167	-	-	4977
Snapper, unc.	27	27	-	-	54
Red porgy	2623	245	-	-	2868
Whitebone porgy	306	18	-	1	323
Porgy, unc.	312	52	-	5	359
White grunt	3316	230	10	15	3541
Grunt, unc.	977	546	12	29	1482
Triggerfish	1433	176	-	-	1608
Spottail pinfish	1045	1189	-	76	2158
Spadefish	252	180	5	11	416
Hogfish	1	-	-	-	1
Amberjacks	161	214	5	7	363
Coastal pelagics					
King mackerel	6270	907	37	631	6509
Spanish mackerel	9265	3158	574	5207	6509
Bluefish	848	2077	740	1198	987
Crevalle jack	61	1474	318	378	839
Blue runner	27	119	10	68	68
Banded rudderfish	43	-	-	-	43
Barracuda	110	1321	-	5	1426
Cobia	86	130	81	43	92
Little tunny	166	496	-	26	636
Inshore sportfish					
Red drum	810	6302	6714	294	104
Spotted seatrout	1479	2425	3758	120	25
Weakfish	197	317	262	201	51
Flounders	208	363	428	121	22
Sheepshead	597	518	172	284	669
Tarpon	5	177	93	53	35

Group/species	Retained	Released	Inland	0-3 mi.	> 3 mi.
Striped bass	7	-	7	-	-
Inshore bottomfish					
Kingfish	394	444	498	331	9
Spot	297	55	347	5	-
Croaker	78	59	34	103	-
Black drum	176	161	195	81	61
Sharks					
Shark, unc.	455	2477	887	1233	857
Blacktip	314	1801	681	958	474
Sharpnose	888	2655	844	1927	772
Other					
Rays	-	68	47	17	4
Catfishes	-	67	46	21	-
Toadfish	-	1	-	-	1
Pinfish	1	127	127	-	1
Pigfish	-	31	11	-	20
Unclassified	80	1001	784	198	107

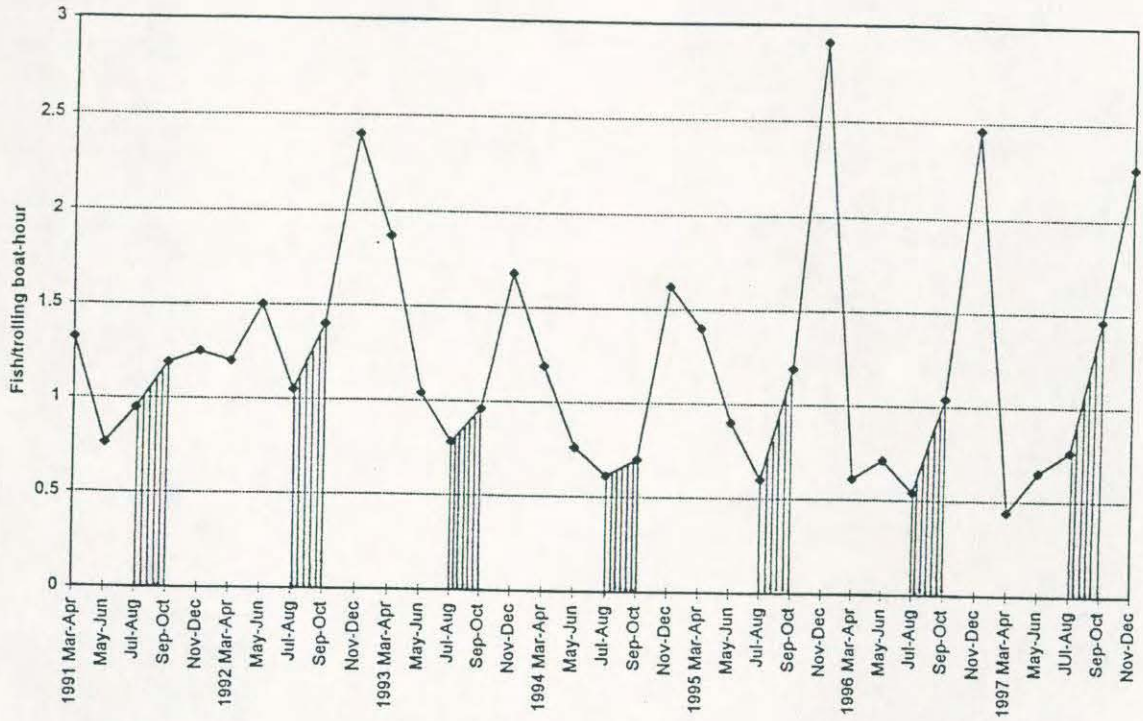


Fig. 61. SC charterboat CPUE for king mackerel.

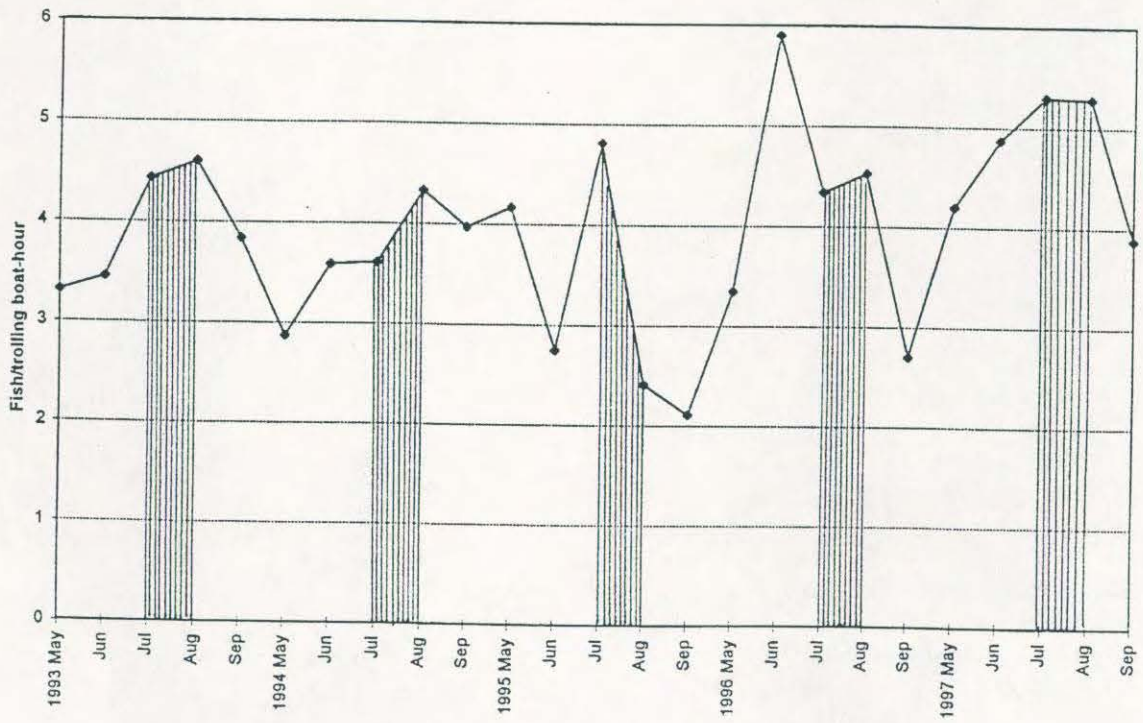


Fig. 62. SC charterbot CPUE for Spanish mackerel.

Table 7. 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	16,480	5,385	171,883	68,868
Wahoo	1,562	524	30,594	14,651
Yellowfin tuna	784	268	17,496	10,184
Other tunas	1,644	106	13,245	1,900
Bonito	12,339	23	5,639	0
Marlins	0	27	0	1,519
Sailfish	373	33	0	50
Reef fish				
Black sea bass	97,609	25,274	30,855	16,365
Gag	488	1,495	0	11,535
Scamp	5,399	1,189	25,748	3,129
Other groupers	10,389	130	3,708	487
Red snapper	34,550	81	52,309	405
Vermilion snapper	30,429	4,977	15,763	4,565
Other snappers	6,346	54	7,730	104
Red porgy	324	2,868	399	4,696
Other porgies	1,977	688	2,265	1,015
White grunt	11,172	3,546	16,416	5,006
Other grunts	6,286	1,523	0	1,491
Triggerfish	28,154	1,609	73,312	2,517
Spottail pinfish	2,263	2,234	1,288	692
Amberjacks	4,392	375	27,825	3,809
Coastal pelagics				
King mackerel	62,497	7,177	587,376	73,414
Spanish mackerel	34,201	12,423	6,173	15,120
Bluefish	15,110	2,925	5,961	1,390
Crevalle jack	2,905	1,535	0	402
Barracudas	22,157	1,431	2,735	1,734
Cobia	761	216	19,877	2,539
Little tunny	1,530	662	11,318	1,275
Inshore sportfish				
Red drum	33,011	7,112	23,201	2,985
Spotted seatrout	18,520	3,904	7,171	2,564
Flounders	1,964	571	607	477
Sheepshead	11,366	1,115	28,054	2,531
Tarpon	690	182	0	315
Inshore bottomfish				
Kingfish	739	838	0	416
Spot and croaker	0	489	0	222
Black drum	416	337	562	769
Sharks				
Blacktip	5,380	2,115	0	12,536
Sharpnose	5,996	3,543	0	7,286
Other sharks	8,208	2,932	4,395	10,148

PRIVATE BOAT FISHERY

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

Residence	Wave					All
	2	3	4	5	6	
Coastal	49,884	100,075	159,113	117,939	96,995	524,006
Noncoastal	3,946	24,825	27,713	18,010	13,587	88,081
Out of state	9,582	23,273	34,403	24,692	17,361	109,311
Total	63,412	148,173	221,229	160,642	127,943	721,398

The trend in annual statewide effort (Fig. 63) has closely paralleled that of coastal resident anglers with considerable fluctuation and no unidirectional trend in the last decade. Both total effort and that by coastal residents was about 6% below the average for the previous ten years. Most of the private boat effort is expended inland. Fig. 64 illustrates the trends in effort for inland and ocean offshore fishing areas. Inland effort was the lowest since 1983. Offshore effort remained comparable to that in recent years.

Catches as estimated by the NMFS from MRFSS data are listed in Table 8. 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.

The catch data are probably the most reliable for the principal inshore sportfish targeted and taken by private boat anglers, i.e., red drum, spotted seatrout, and flounders. Catch rates (CPUE) were based on trips during which the species was either the designated target or at least one such fish was caught. CPUEs are in numbers of fish caught per angler (equivalent to an angler-trip). It is important to note that CPUE includes released fish, whereas the landings do not. The CPUE data are considered to be the best index of overall abundance.

Trends in private boat landings (fish retained or discarded) are shown in Fig. 65. Of the three groups, red drum are generally considered to be in the best shape. Private boat landings of this species have been nearly constant for almost a decade. CPUE for red drum, shown in Fig. 66, has been trending upward during the last five years (the 1996 and 1997 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 in 1996).

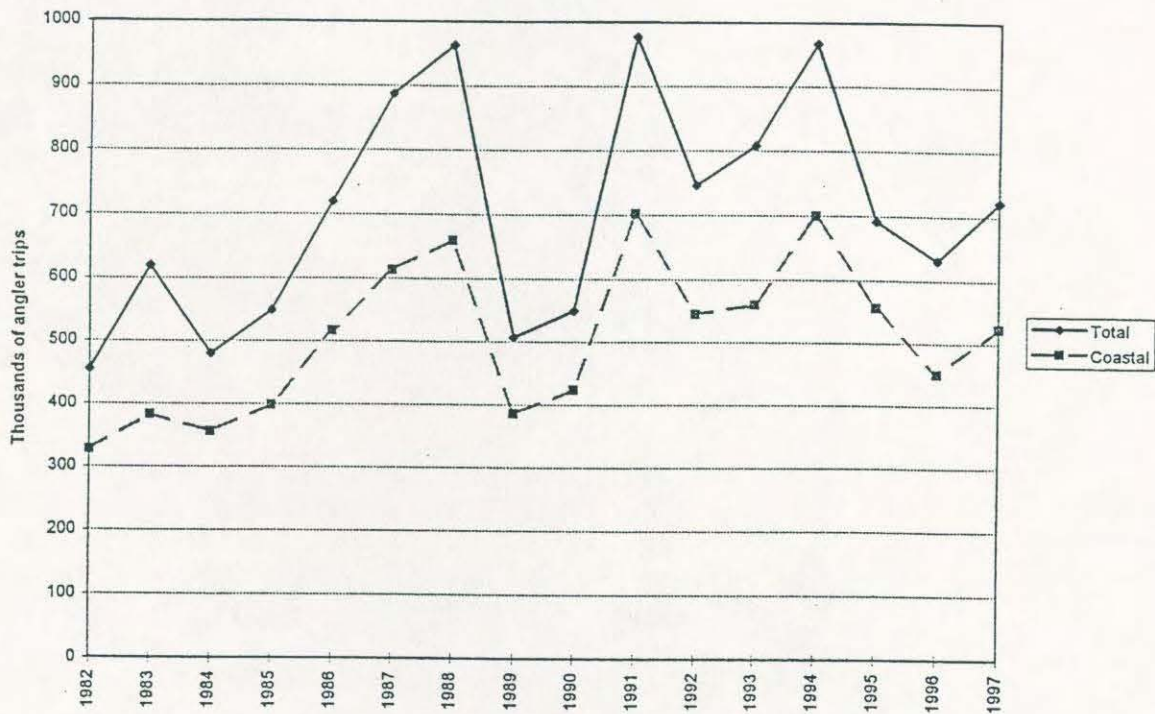


Fig. 63. Effort in the private boat mode by residence.

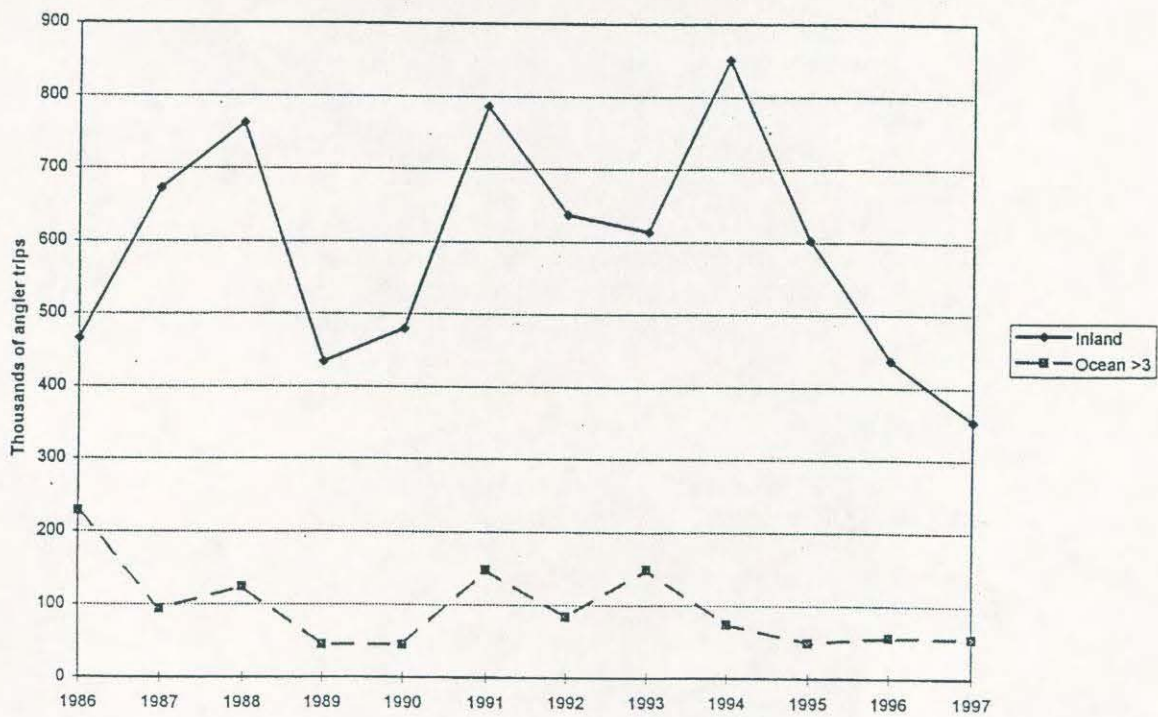


Fig. 64. Effort in the private boat mode by fishing zone.

Table 8. Private boat catch (in numbers of fish).
Source: NMFS MRFSS.

Group/species	Retained	Released	Inland	0-3 mi.	> 3 mi.
Oceanic pelagics					
Dolphin	423	0	0	0	423
Reef Fish					
Black sea bass	116,413	373,654	47,431	255,762	186,875
Other sea bass	1,397	14,022	3,035	7,799	5,637
Groupers	755	3,019	0	0	3,774
Snappers	5,036	5,818	0	1,157	9,697
Red porgy	1,787	1,127	0	0	2,914
Other porgies	9,858	10,467	952	9,515	4,264
White grunt	3,905	6,005	6,095	2,961	854
Other grunts	0	7,612	0	0	7,612
Spottail pinfish	0	9,986	0	0	9,986
Spadefish	31,550	5,624	NR	NR	NR
Amberjacks	388	6,185	0	476	6,097
Coastal pelagics					
King mackerel	11,359	5,833	2,096	2,781	12,315
Spanish mackerel	43,741	5,358	0	45,443	3,656
Bluefish	40,823	67,825	54,326	50,095	4,227
Crevalle jack	0	4,017	3,726	290	0
Other jacks	0	776	0	776	0
Barracuda	0	12,475	0	0	12,475
Cobia	381	1,920	NR	NR	NR
Little tunny	0	476	0	0	476
Inshore sportfish					
Red drum	102,634	153,335	198,459	56,796	714
Spotted seatrout	92,159	75,954	135,705	32,407	0
Weakfish	2,018	0	1,155	863	0
Southern flounder	107,025	6,156	46,435	66,745	0
Other flounders	24,013	59,718	34,747	48,983	0
Sheepshead	25,461	6,565	15,332	16,404	290
Striped bass	1,044	2,264	2,553	755	0
Inshore bottomfish					
Kingfish	228,724	75,694	199,239	92,262	12,917
Spot	299,981	69,369	191,720	168,708	8,921
Croaker	110,696	75,845	104,646	77,137	4,758
Black drum	40,475	6,316	7,128	39,663	0
Sharks					
Blacktip	8,749	29,955	NR	NR	NR
Sharpnose	3,980	1,045	NR	NR	NR
Other sharks	28,452	148,763	NR	NR	NR
All	41,181	179,763	138,851	68,342	13,750

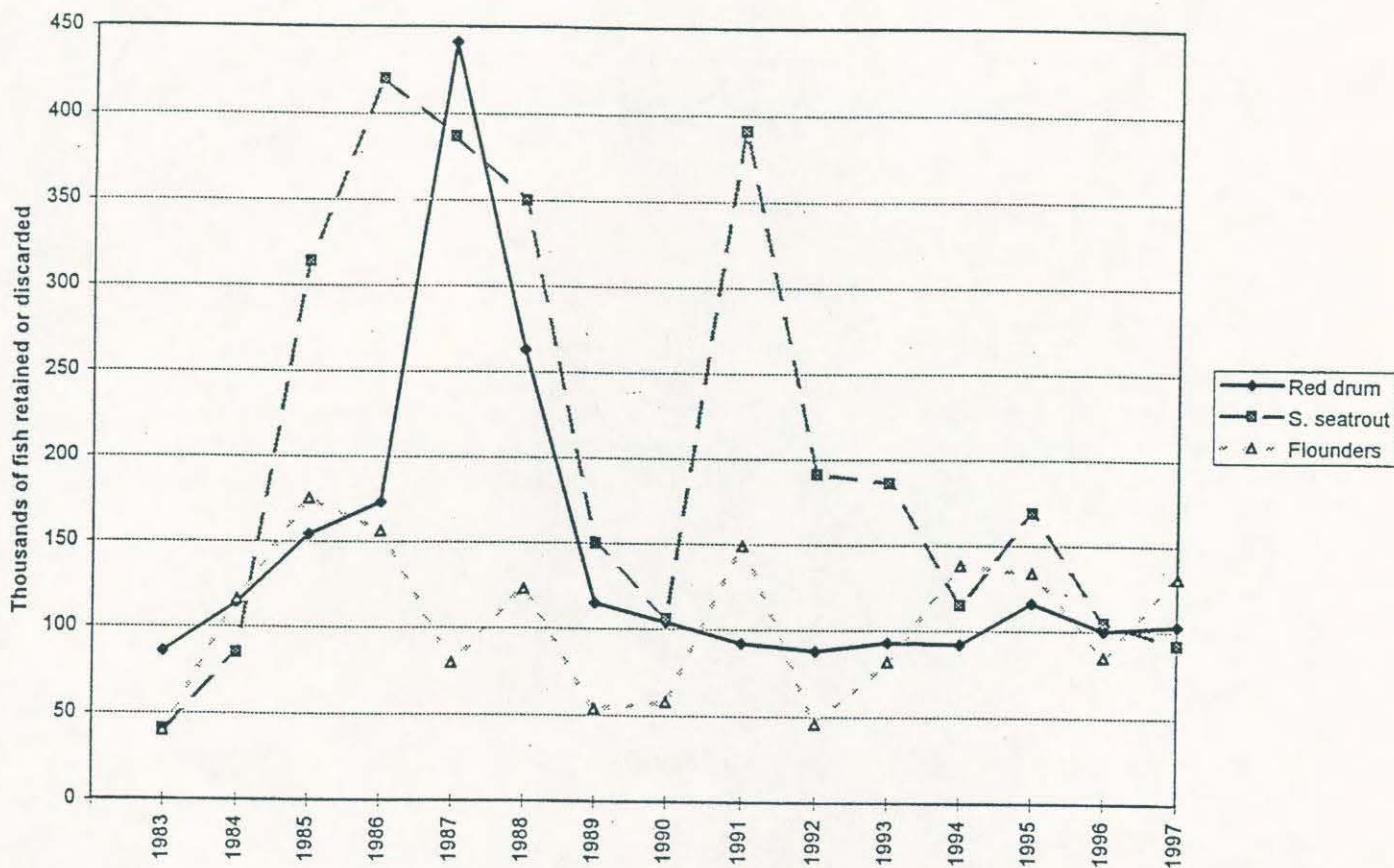


Fig. 65. Private boat landings of inshore sportfish.

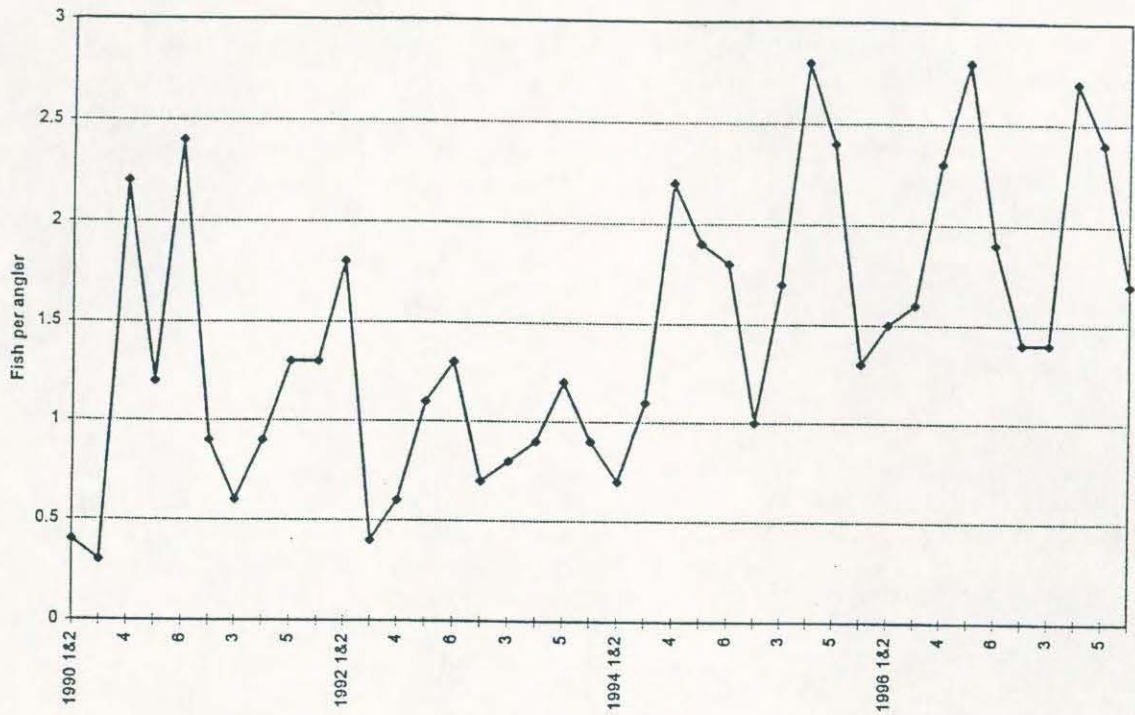


Fig. 66. Statewide CPUE for red drum by wave.

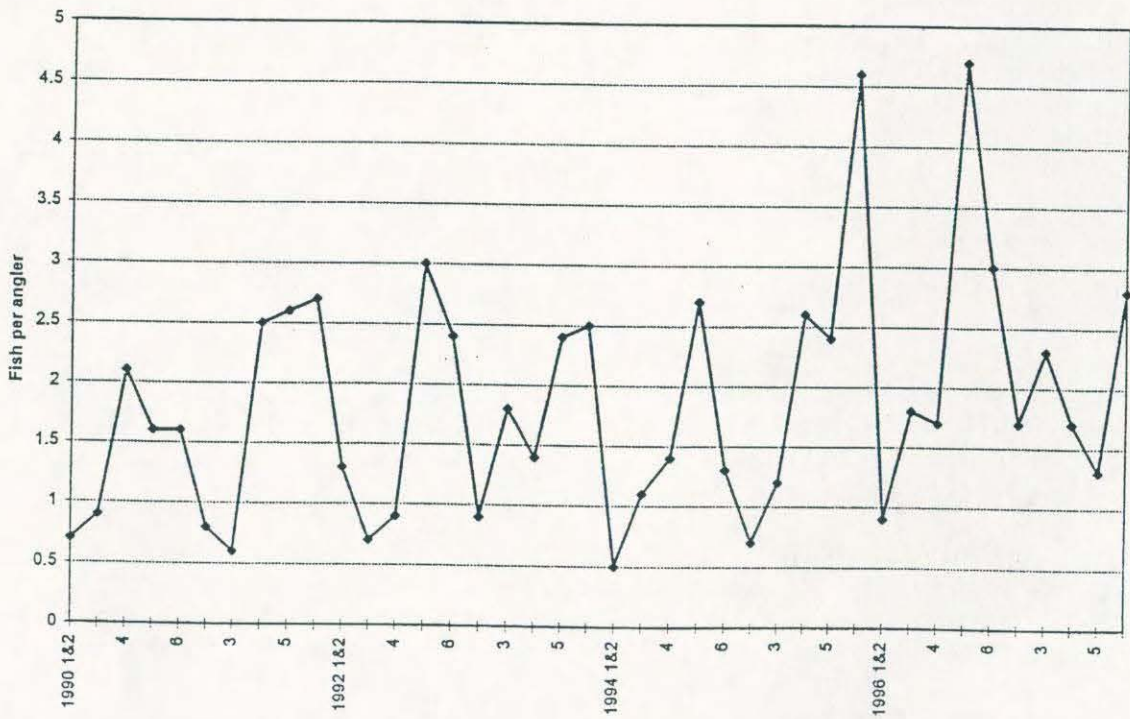


Fig. 67. Statewide CPUE for spotted seatrout by wave.

Red drum CPUEs have tended to be highest during waves 4 (July-August) and 5 (September-October), when yearlings first recruit to the fishery. The 1997 indices during this period were among the highest observed since the SFS began. The percentage of anglers who caught no fish (30%) was the second-lowest since 1990 (compared to 26% in 1996, the year with the best statewide CPUE):

	1990	1991	1992	1993	1994	1995	1996	1997
Statewide CPUE	1.5	1.1	1.2	0.9	1.7	1.9	2.1	1.7
% without fish	47	47	49	55	35	35	26	30

The status of spotted seatrout has been controversial: a poll of stampholders indicated that roughly equal percentages of them believed that there was little change vs a decline during the early 1990's. Computer models based on MRFSS catch data have suggested that the percentage of females surviving to spawn should be increased. The numbers of fish landed by private boat anglers have generally declined, while percentages of fish released have risen markedly, in recent years. The estimated 1997 private boat catch in wave 6 was anomalously low, only 26% of the annual total compared to a ten-year average of 51%. Thus, the below-average annual catch may have been partly attributable to a sampling artifact.

The trend in wave-specific CPUE for spotted seatrout is illustrated in Fig. 67. Most of the directed effort and catch has occurred during waves 5 and 6 with samples predominantly from Charleston County. The 1997 sample sizes then were very limited and mainly from Beaufort County, where CPUE has usually been considerably lower than in Charleston County. This distribution should be considered when evaluating the slightly below average annual statewide CPUE (2.0) indicated for 1997:

	1990	1991	1992	1993	1994	1995	1996	1997
Statewide CPUE	1.4	2.3	2.3	1.9	1.7	2.7	3.0	2.0
% without fish	50	31	43	45	51	38	27	26

During waves 1-3, when the 1997 sample sizes were more adequate, the CPUEs were the highest observed during the last eight years. The percentage of anglers catching no spotted seatrout in 1997 was also the lowest observed to date.

Identification of flounder (two species occur in South Carolina, the summer flounder and the southern flounder) is somewhat problematic, since the identity of released fish cannot be ascertained. If listed as summer flounder, catches were not included in the CPUE calculations. (Released fish were reported simply as flounder and were included: summer flounder have rarely been observed except in Georgetown County and they have comprised only a small part of the verified landings there.) Although polled stampholders generally attributed a declining status to this group, private boat landings have been relatively high in recent years.

Directed effort for flounder has been greatest during waves 3 and 4 with Georgetown County generally the source of the largest samples. In 1997, the wave 4 sample size was quite small and the largest sample was obtained in Beaufort County. The 1997 CPUE during the peak fishing period (wave 3) was the highest observed to date (Fig. 68), as was the annual statewide CPUE:

	1990	1992	1993	1994	1995	1996	1997
Statewide CPUE	1.1	1.1	0.9	1.0	1.1	1.5	1.6
% without fish	57	31	58	45	46	33	29

Data were unavailable for 1991. The 1997 percentage of anglers catching no flounder was relatively low and CPUE in both Charleston and Georgetown Counties was the highest observed to date.

Sheepshead have not been as extensively targeted as the other species with comparatively small sample sizes until fairly recently. Data for years prior to 1993 are therefore unreliable. Most of the angler interest has occurred in the first half of the year, although CPUEs often have been higher later on (Fig. 69). Most of the samples have come from Charleston County, where CPUE has typically been the highest. The 1997 fishery appeared to be fairly typical with a relatively low percentage of anglers failing to catch any fish:

	1993	1994	1995	1996	1997
Statewide CPUE	2.6	1.5	2.7	2.9	2.3
% without fish	29	38	34	25	19

SHORE-BASED FISHERY

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

Residence	Wave				
	2	3	4	5	6
Coastal	31,707	91,578	95,248	55,170	33,065
Noncoastal	6,620	33,180	37,522	17,122	7,495
Out of state	18,467	123,431	135,656	39,951	13,667
Total	56,794	248,190	268,426	112,243	54,226

The ten permitted piers reported a total of 216,147 angler-trips with increased attendance, compared to that in 1996, during every quarter except the fall.

Catch statistics are listed in Table 9. Inshore bottomfish, primarily spot and kingfishes, were the most popular targets of shore-based anglers, especially those fishing from the ocean piers. Catches of both have been highly variable, as is typical for short-lived species.

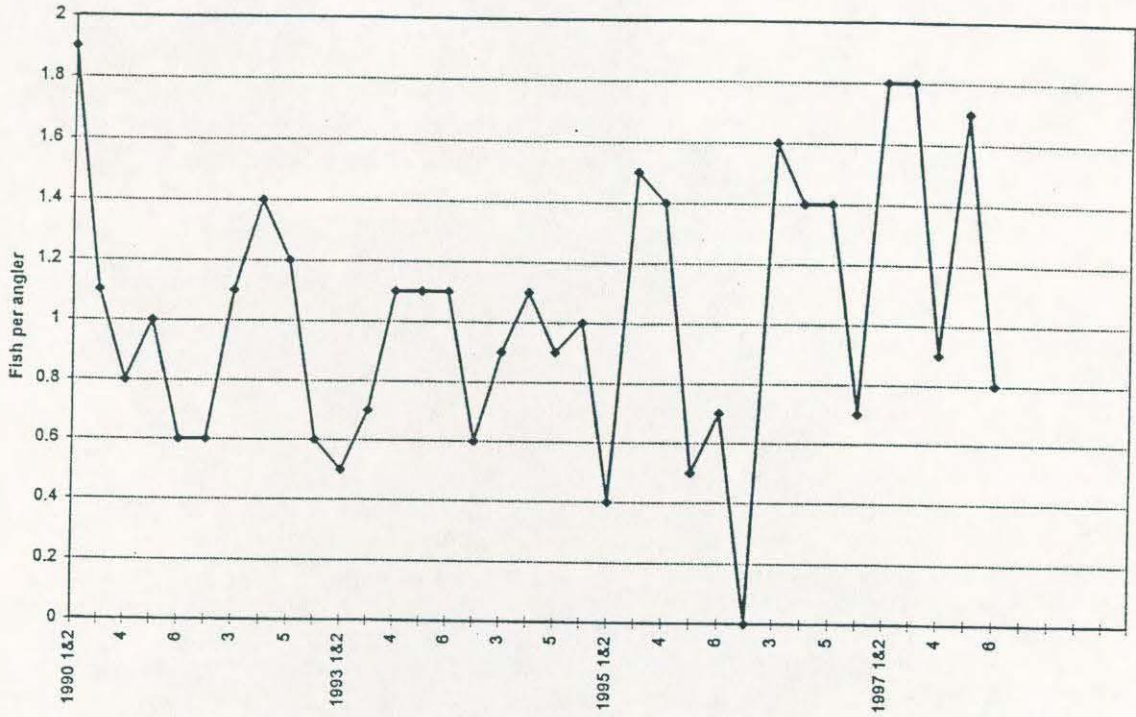


Fig. 68. Statewide CPUE for flounder by wave.

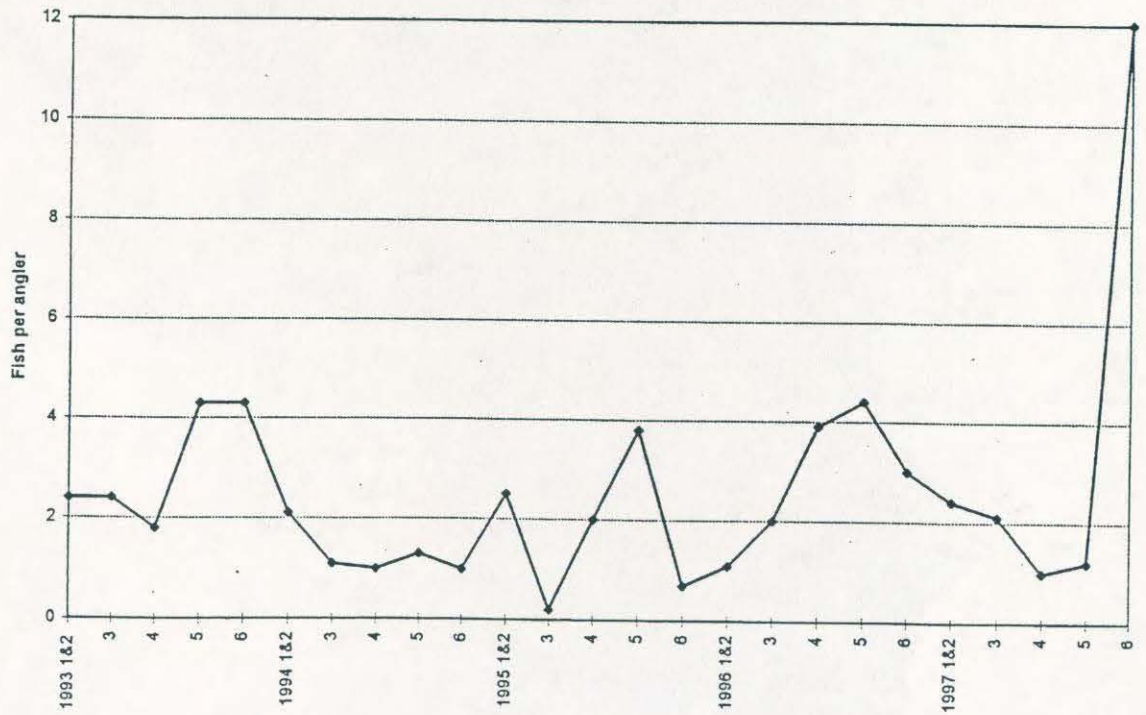


Fig. 69. Statewide CPUE for sheepshead by wave.

Table 9. Shore-based catch (in numbers of fish). Source: NMFS MRFSS.

Group/species	Retained	Released	Inland	0-3 mi.
Reef fish				
Black sea bass	1,884	26,701	7,249	21,337
Other sea bass	0	74,324	7,963	66,361
Groupers	1,327	0	0	1,327
Spottail pinfish	0	62,056	0	62,056
Spadefish	6,132	29,814	0	35,946
Amberjack	0	476	476	0
Coastal pelagics				
King mackerel	7,963	11,415	11,415	7,963
Spanish mackerel	31,593	45,949	0	77,542
Bluefish	38,753	119,974	6,376	152,351
Crevalle jack	0	1,443	1,443	0
Inshore sportfish				
Red drum	8,167	4,042	2,886	9,323
Spotted seatrout	6,878	4,933	697	11,114
Weakfish	0	2,886	2,886	0
Southern flounder	3,130	0	476	2,654
Other flounders	8,697	25,807	3,362	31,141
Sheepshead	1,443	7,216	1,443	7,216
Striped bass	0	6,636	0	6,636
Inshore bottomfish				
Kingfish	281,649	264,268	62,610	483,307
Spot	374,828	172,186	48,108	498,905
Croaker	5,687	59,845	37,395	28,137
Black drum	2,151	0	0	2,151
Pompano	13,721	15,756	0	29,478
Sharks				
All	9,007	149,116	19,625	138,499

There are several anomalies in the shore catch data. The most significant is the indicated catch for king mackerel. Although kings are taken from some of the ocean piers, it is highly unlikely that the retained catch was comparable to the charterboat landings (as reported to the MRD). Even more unlikely is the larger number of fish released, particularly from inland piers, where this species is virtually never seen. Since released fish could not be verified, this certainly reflects sampling error.

The other obvious errors are less significant. Striped bass rarely leave the rivers in South Carolina and were highly unlikely to have been taken from the ocean piers; again, the unverified (released) status seems to have been responsible for the error. Weakfish are commonly caught (and retained) on the ocean piers, although no such catch there was reported. The majority of the spottail pinfish reported were probably simply pinfish (*Lagodon*).

LENGTH COMPOSITION

The MRD has monitored the length composition of landings of popular inshore sportfish for over a decade. The vast majority of fish sampled have been landed by private boat anglers, who have accounted for most of the estimated landings of each species. Data have been obtained during both the MRFSS and SFS, although the 1997 figures shown are from the SFS only.

The length distribution of red drum from 1997 catches is shown in Fig. 70. Most of the fish were between the 14 in (36 cm) minimum size limit and 20 in (51 cm). The average size of retained fish in the 14-27 in range has remained rather consistent:

	1990	1991	1992	1993	1994	1995	1996	1997
Annual mean TL(cm)	46.3	43.6	43.2	46.2	43.5	45.7	45.1	43.1

The average size by area in 1997 was typical in that the fish were considerably smaller in Beaufort County (Fig. 71). The average size of legal fish in Beaufort County was 38.5 cm, unusually low. Mean lengths in Charleston (47.8 cm) and Georgetown (45.6 cm) Counties were in the intermediate part of their historical range. Anglers interviewed during the SFS reported releasing 24% of their total catch as legal-sized fish. The overall release rate (for all modes) reported in the MRFSS was 58%.

Length distribution of spotted seatrout is shown in Fig. 72. As usual, only a small portion (6.2%) exceeded 18 in. (45 cm). A much larger than usual percentage (56% vs a 1990-1996 average of 13%) of the 1997 sample was from waves 1-3, when the fish average about 2 cm larger than those caught later in the year. Beaufort County fish dominated the fall samples. The size in Beaufort County was unusually small (Fig. 73), while that elsewhere was a little above the average of recent years. The statewide annual average was typical:

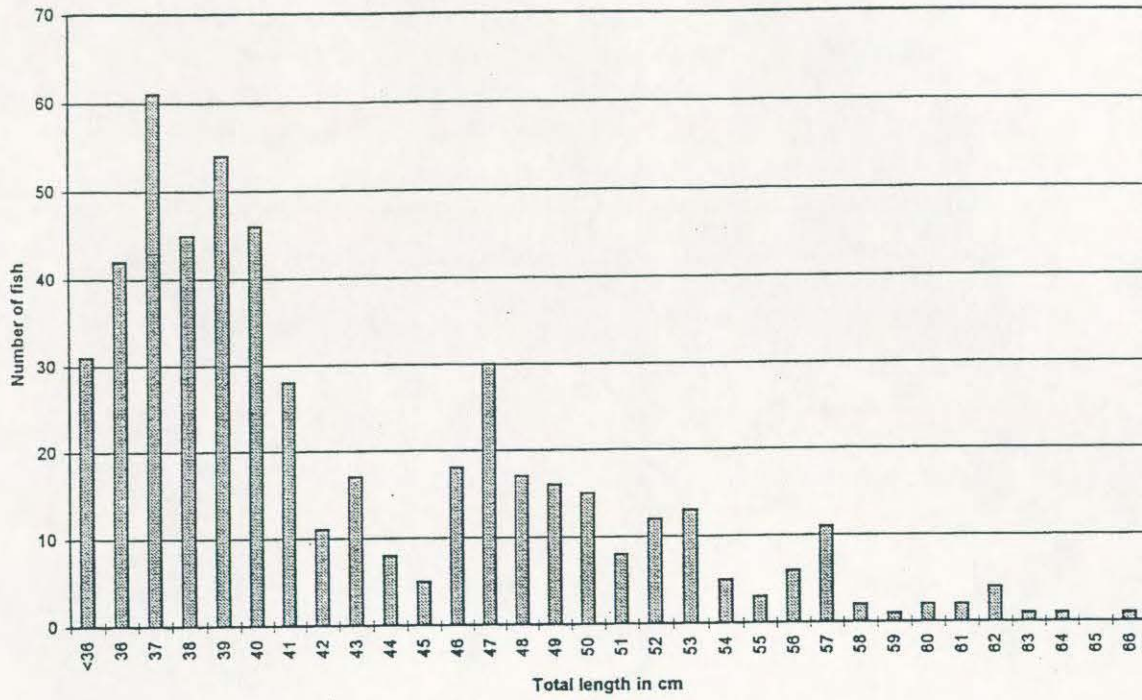


Fig. 70. Statewide length distribution of red drum.

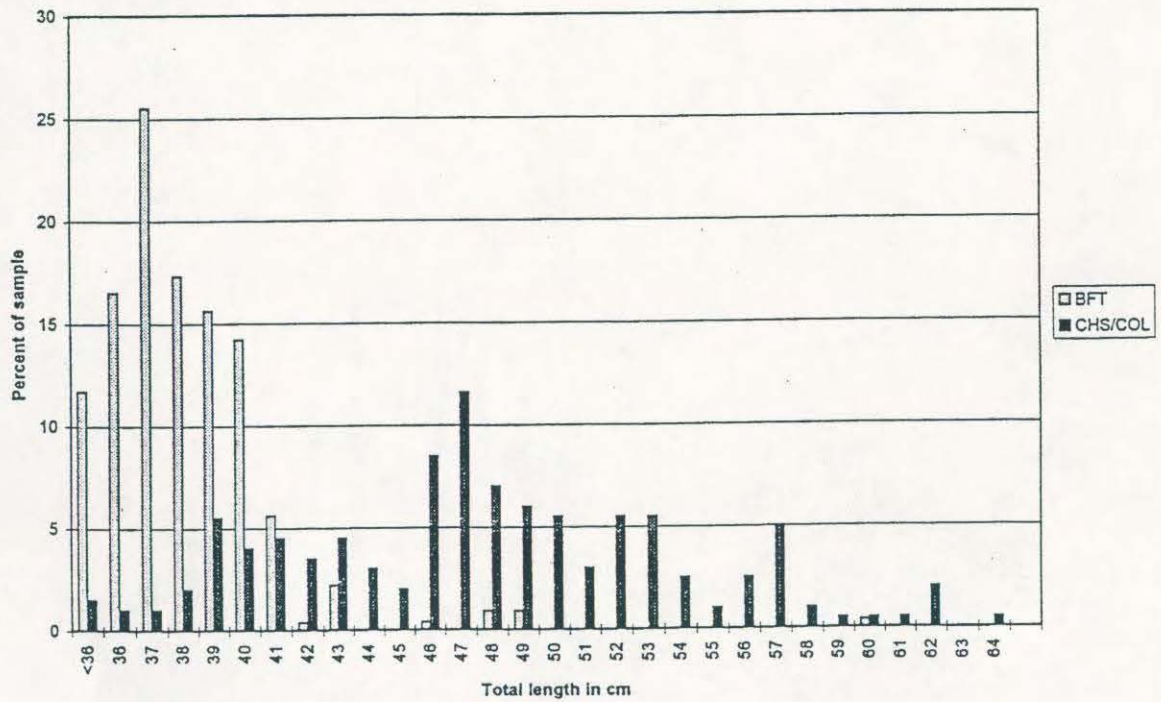


Fig. 71. Length distribution of red drum by county.

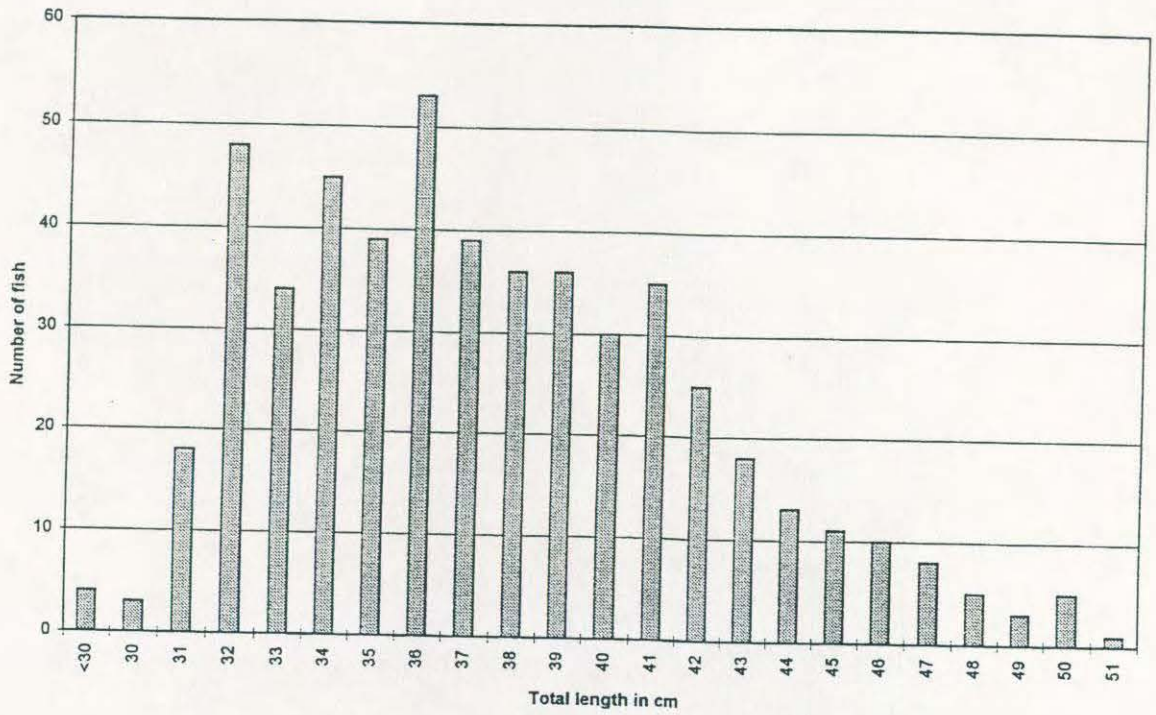


Fig. 72. Statewide length distribution of spotted seatrout.

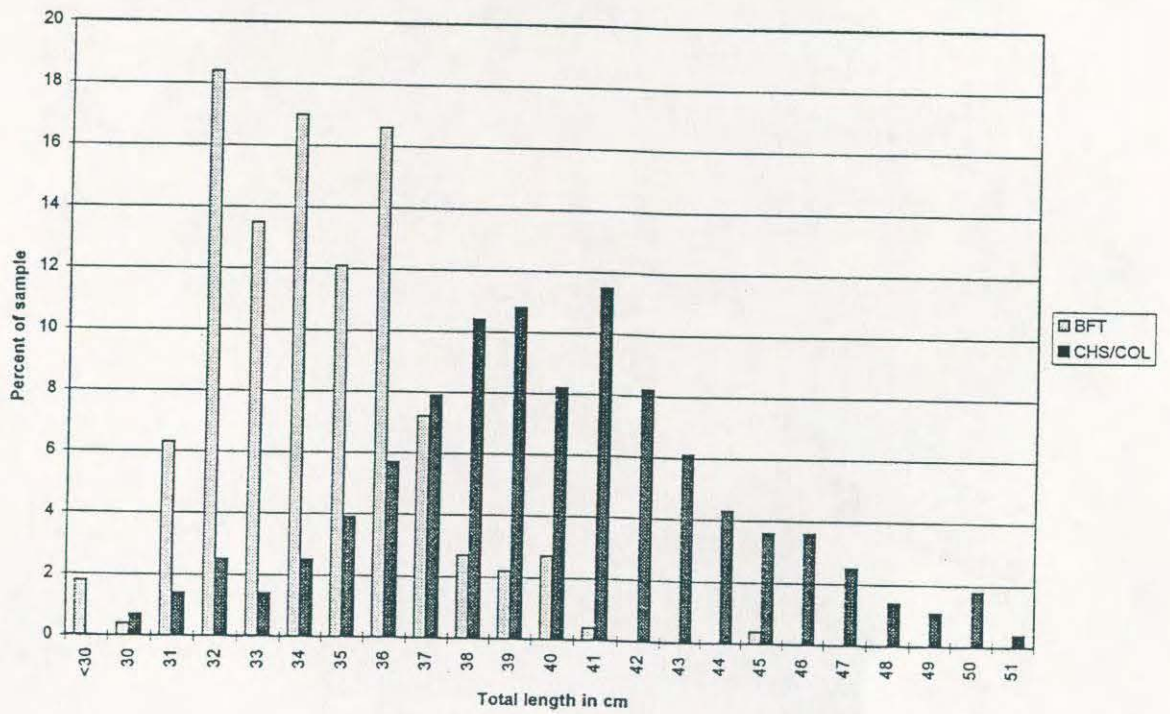


Fig. 73. Length distribution of spotted seatrout by county.

	1990	1991	1992	1993	1994	1995	1996	1997
Annual mean TL(cm)	37.1	35.5	37.2	36.8	36.9	36.1	38.6	37.6

About 13% of the statewide catch of legal-sized fish (i.e., those 12 in, 30 cm, or larger) were <13 in or 33 cm. In Beaufort County, 25% of the legal catch was <13 in or 33 cm, while in Charleston County only 5% were in this category. The overall release rate (all modes) in the MRFSS was 44%.

The statewide length distribution of southern flounder is illustrated in Fig. 74. Small fish dominated the Beaufort County landings (Fig. 75). The statewide mean length was within the range observed in recent years.

	1990	1991	1992	1993	1994	1995	1996	1997
Annual mean TL(cm)	37.1	35.4	38.6	37.1	36.9	39.3	38.5	36.9

The overall release rate (for all modes) in the MRFSS was 39%.

Length distribution of sheepshead is shown in Fig. 76. Fish observed in Beaufort County were rather spread out over a wide size range, while those seen in Charleston County landings were concentrated in the middle of the normal observed distribution (Fig. 77). The statewide average size was about 13 in or 33.1 cm. The overall release rate (all modes) reported in the MRFSS was 32%.

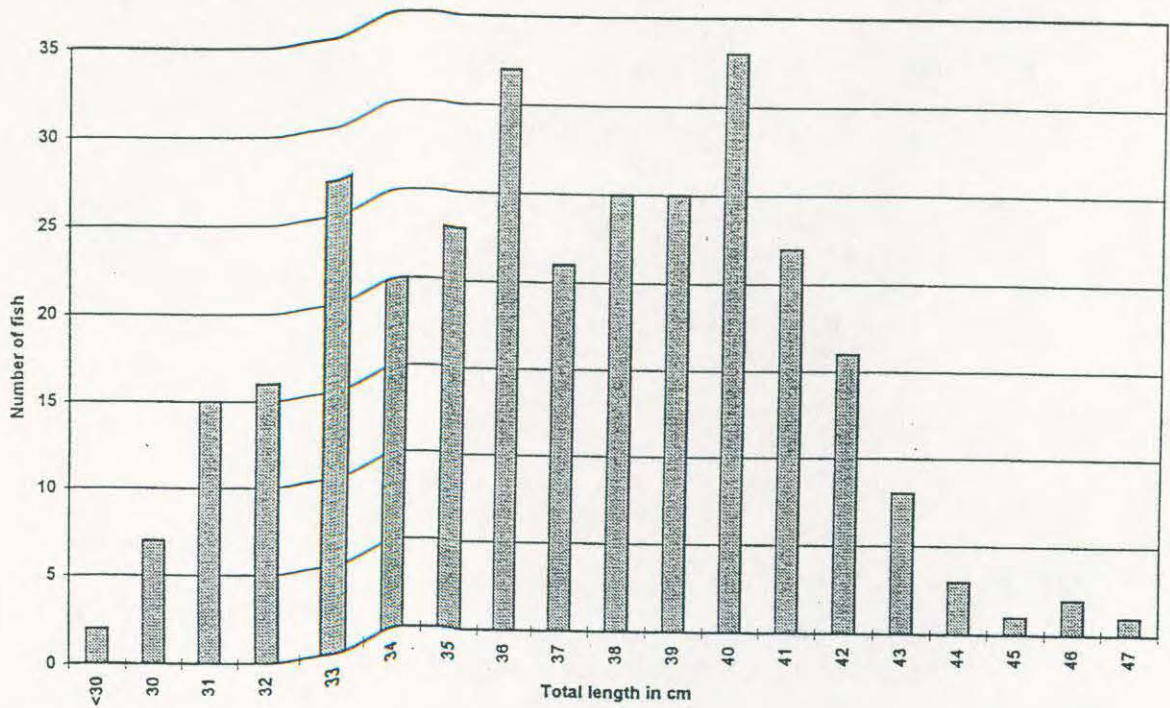


Fig. 74. Statewide length distribution of southern flounder.

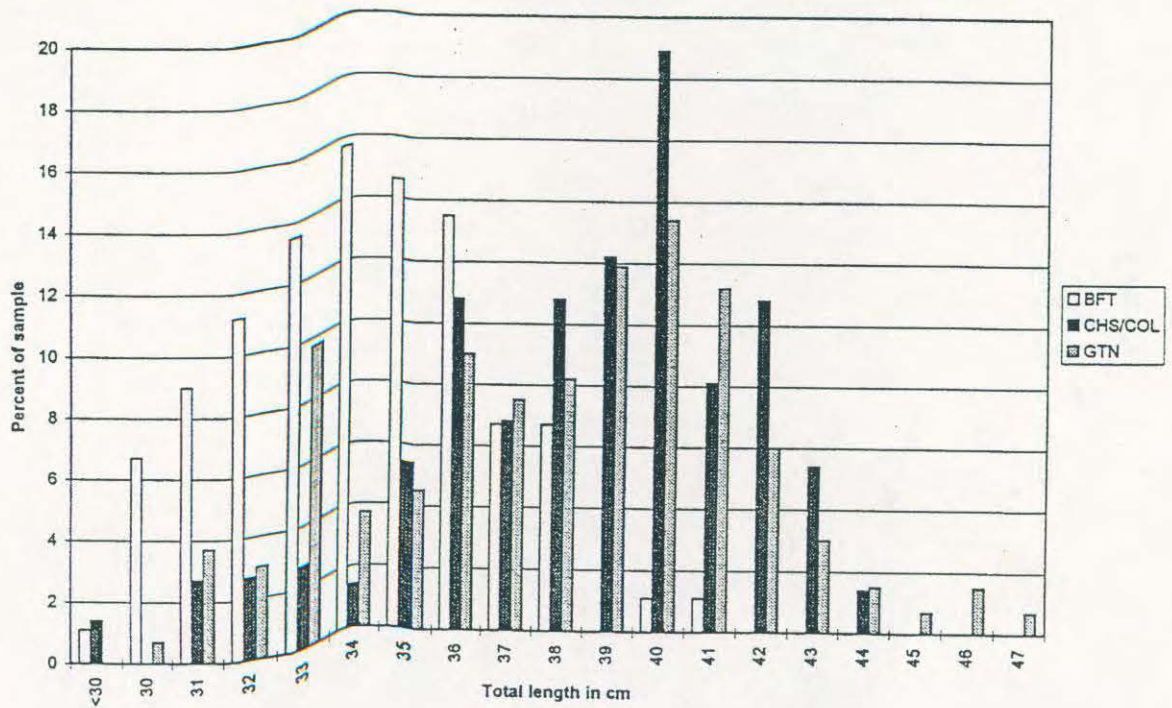


Fig. 75. Length distribution of southern flounder by county.

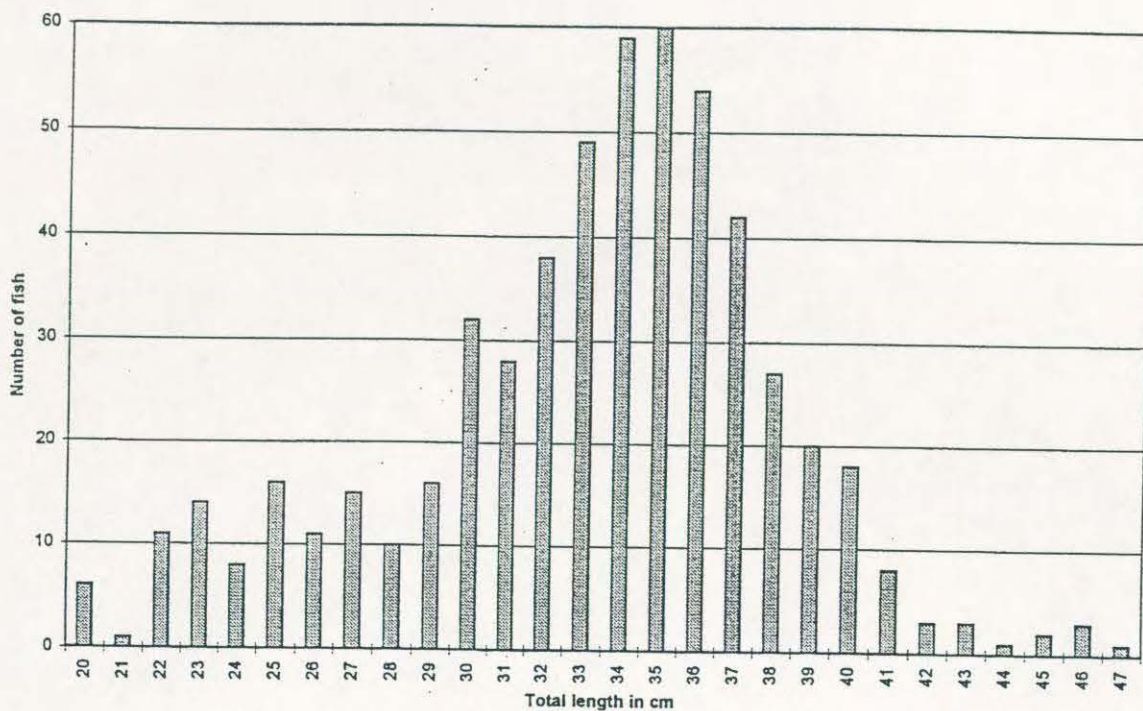


Fig. 76. Statewide length distribution of sheephead.

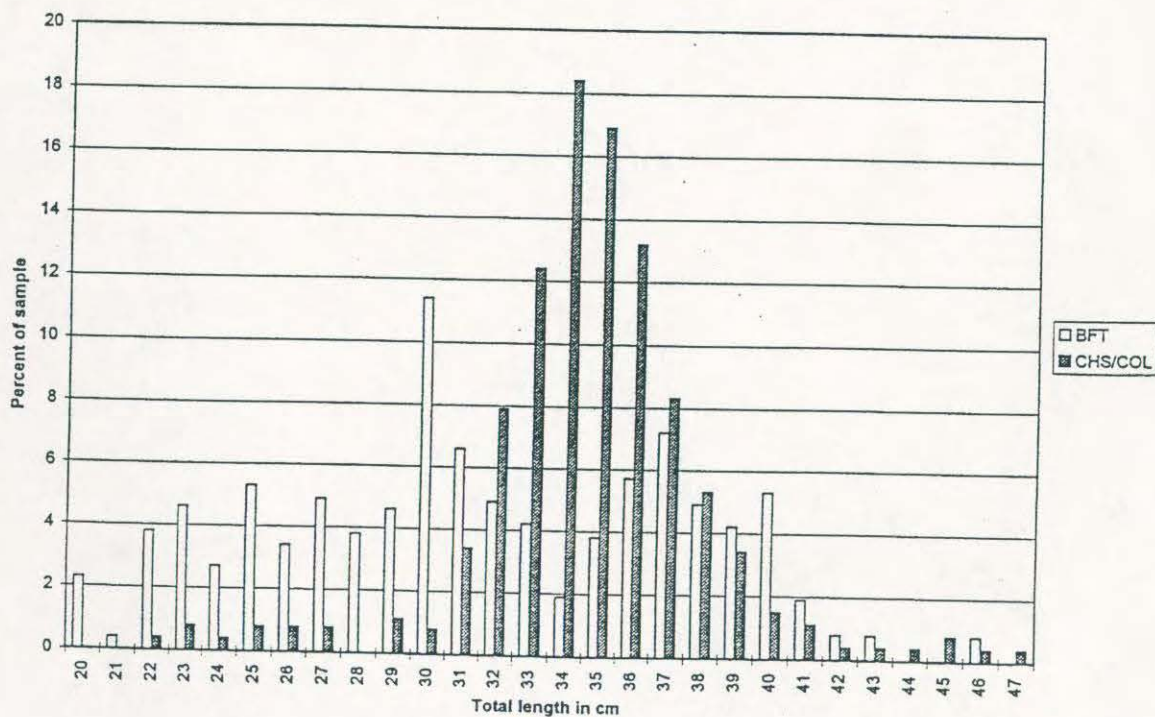


Fig. 77. Length distribution of sheephead by county.

