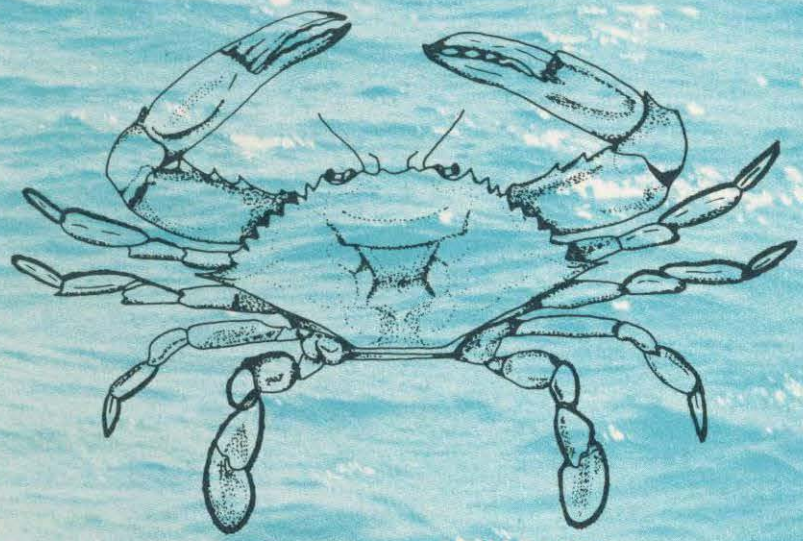

Observations on the Commercial Fishery for Blue Crabs *Callinectes sapidus* in Estuaries in the Southern Half of South Carolina

Peter J. Eldridge and Wayne Waltz

South Carolina Marine Resources Center
Technical Report Number 21
March, 1977

South Carolina Wildlife and Marine Resources Department

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

OBSERVATIONS ON THE COMMERCIAL FISHERY FOR BLUE CRABS, *CALLINECTES SAPIDUS*, IN ESTUARIES IN THE SOUTHERN HALF OF SOUTH CAROLINA

Peter J. Eldridge
Marine Resources Research Institute
South Carolina Wildlife and Marine Resources Department
Charleston, South Carolina 29412

Wayne Waltz
Marine Resources Research Institute
South Carolina Wildlife and Marine Resources Department
Charleston, South Carolina 29412

INTRODUCTION

The fishery for the blue crab, Callinectes sapidus Rathbun, is the second most valuable in South Carolina. In addition to its commercial value, the blue crab is an important constituent of estuarine fauna, being both a predator and a scavenger. Its diet consists mainly of crustaceans, mollusks, and detritus (Darnell 1958), and it is the prey of larger fishes (Darnell 1961). Parasites including the fungus, Lagenidium callinectes; the amoeba, Paramoeba sp.; the microspore Nosema sp.; the sacculinid barnacle, Loxothylacus texanius; and the leech, Myxobdella lugubris, (Couch 1942; Sprague, Beckett, and Sawyer 1969; Sprague 1965; Reinhard 1950; Meyer and Barden 1955) utilize the blue crab as host. Other organisms including the commensal nemertean, Carcinonemertes carcinophila, (Hopkins 1947) the commensal barnacle, Octotasmis mulleri, (Humes 1941) and the epizoan barnacle Chelonibia patula, have been reported in association with blue crabs.

In August 1972 the Marine Resources Research Institute (MRRI) instituted a program to sample the commercial catch of blue crabs in order to obtain baseline information concerning the fishery. Parameters of particular interest were the size, sex ratio, location and seasonality of catch. The study was designed to provide insight into the general condition of the resource, particularly regarding the present state compared to the late 1960's when landings throughout the South Atlantic region were at depressed levels (Mahood, McKenzie, Bollar, and Davis 1970).

MATERIALS AND METHODS

Sampling was conducted at the Blue Channel Corporation processing plant located in Port Royal, South Carolina. Approximately 70% of the commercial catch is sold to buyers located in the southern statistical district of South Carolina which includes Port Royal (Rhodes 1973). The Blue Channel Corporation purchases about one half of all crabs reported for South Carolina (Rhodes 1974). Commercial crabbers were interviewed concerning type of gear used and fishing locations. A random sample of fifty crabs from each catch was measured and sexed. The incidence of shell disease and presence or absence of barnacles on the carapace were also noted. Larger samples were taken during periods of lower catches and from vessels trawling crabs during winter months.

Although every effort was made to collect a random sample, it is likely that some samples were biased because fishermen often remove larger males for sale to other buyers (Rhodes 1974). The effect of this bias would be to decrease the average size of males in the commercial catch and to change the sex ratio. The effect of the latter event would be relatively minor because fishing appears to occur primarily in areas which are inhabited chiefly by males.

Fischler and Walburg (1962) reported that blue crabs of commercial size generally do not migrate between estuaries in South Carolina. Because of this situation and to facilitate analyses, data were grouped by major fishing location and gear. Crabs caught in a large sound or its tributaries were grouped under the name of that sound. St. Helena Sound, Port Royal Sound, Calibogue Sound, and the North Edisto River were classified as major locations and are located in the southern part of the state where the study occurred (See Figure 1).

RESULTS AND DISCUSSION

Investigators sampled 23,183 crabs from August 1972 to November 1974 (Table 1). Catches from pots accounted for 21,115 crabs, whereas 2,068 crabs were taken by trawl gear. Numbers of crabs sampled from each major location appear to reflect the

relative number of fishermen that exploited the area rather than actual catches from those locations. Most samples were taken from June to November which corresponds to peak pot catches (Table 14). Similarly, trawl caught crabs were sampled from December through March, the open season for trawling of crabs.[1]

SEXUAL COMPOSITION OF COMMERCIAL CATCHES

Table 2 shows the sexual distribution of blue crabs taken by pots for all areas combined. Two salient features are that (1) males contributed over 72% of the catch and (2) immature females contributed very little to the catch - some 3.5%.

Table 3 shows the sexual composition of commercial crab pot catches by major fishing areas. The proportion of catches composed of males was highest in the North Edisto River and St. Helena Sound and lowest in Port Royal Sound. The composition of males from Calibogue Sound was intermediate. Because most immature females are less than 5 inches in carapace width (lateral spine to lateral spine), few were observed in catches.[2]

Mature females form the bulk of crabs caught incidentally by shrimp trawling operations which are conducted primarily within ½ to 3 miles of the coast of South Carolina (Unpublished Data).

Table 4 gives the sexual composition of trawl caught crabs. In contrast to pot catches, females comprised 84.1% of the trawl catch. Trawl catches are taken from the more saline areas of sounds and indicate that mature females congregated in those areas during the winter.

SHELL DISEASE

Shell or burn spot disease has been reported for several crustacean species (Rosen 1970). The disease is characterized by the presence of necrotic pits and/or lesions on the exoskeleton. Rosen (1967) reported the disease on the blue crab and observed that it seldom penetrated the shell or infected the soft tissue, but tended to spread out affecting only the outer calcified layers of the shell. Rosen (1970) suggested that the disease was initiated by mechanical abrasion of the exoskeleton. Although the cause of the disease is not known conclusively, Cook and Lofton (1973) tentatively identified a bacterium, Beneckea Type I, as being the causative agent.

The disease is definitely contagious (Rosen 1970), making it a potential problem in areas where animals are crowded together, such as blue crab shedding operations and lobster holding areas. Although the disease is not fatal, high mortalities of captive diseased lobsters have been reported (Taylor 1948, cited by Sinderman 1970). Sawyer and Taylor (1949, cited by Rosen 1970) found that the disease could destroy gill membranes of a lobster and when additional stresses such as ecdysis or increased temperature were encountered death occurred. Sandifer and Eldridge (1974) noted the possibility of the invasion of virulent forms of bacteria, such as Vibro parahaemolyticus in diseased blue crabs.

TRAWL OBSERVATIONS

Table 5 gives the incidence of disease for trawl caught crabs. The reader should note that only 1,050 crabs were examined for disease. Of those, 2.50% of males and 3.99% of females were infected. The incidence of disease from samples ranged from less than 1% to 26.47%. The incidence of disease for trawl data did not differ significantly from pot data (Males: Chi-Square value = 1.83, df = 1; Females: Chi-Square value = 0.68, df = 1). Because pot and trawl disease observations did not vary significantly and trawl data were relatively sparse, the remaining discussion will be limited to catches from the pot fishery.

POT OBSERVATIONS

In pot catches for all areas combined 4.8% of males and 3.4% of mature females had obvious cases of shell disease (Table 6). Incidence of disease for pot catches for all areas combined varied significantly between sexes (Chi-Square value = 12.4, df = 1). When data were examined by major fishing areas, the percent of infected mature females appeared similar. A Chi-Square test (value = 2.8, df = 3) indicated that shell disease did not vary significantly between major fishing areas for mature females. Conversely, the incidence of shell disease for males did vary significantly between fishing areas (Chi-Square value = 126.0, df = 3).

Monthly infection levels varied considerably between fishing locations, time of year, and sexes (Table 7). Although incidence of disease was < 5% in most samples, it reached 19.6 percent in Port Royal Sound during one period (Sandifer and Eldridge 1974) and 22.9 percent in Calibogue Sound in September 1974. The highest incidence of disease was observed from October to March. This was tested for males and females respectively by grouping data for two time periods; namely, October through March and April through September. Chi-Square tests indicated that incidence of disease varied significantly between time periods (Males: Chi-Square value = 304.15, df = 1, $P < 0.005$; Females: Chi-Square value = 4.85, df = 1, $P < 0.05$). These results indicated that the disease was most prevalent during colder months when crabs molt less frequently.

Results of this report agree with Sandifer and Eldridge (1974) in that shell disease was observed

[1] Crab trawls must have a mesh of not less than four inches in South Carolina. (Marine Fisheries Laws, Ch. 7, Article 8, Sec. 28-874.

[2] Crabs less than 5 inches in width are illegal (Marine Fisheries Laws, Ch. 7, Article 8, Sec. 28-873).

most frequently in winter months. Although Sandifer and Eldridge (1974) reported that the incidence of disease observed in commercial catches was similar when sexes were combined for all locations, the increased quantity of data in this study indicated that the incidence rate was significantly different. This supports the earlier field survey results of Sandifer and Eldridge (1974) and is attributed to the larger set of data and the fact that the present data better represented the annual cycle. Another difference in results between Sandifer and Eldridge (1974) and the present more complete data set is that although the incidence of shell disease for males varied significantly between major fishing grounds that for females did not.

In summary, the present report and Sandifer and Eldridge (1974) indicate that (1) male blue crabs in South Carolina have a significantly higher incidence rate of shell disease than do females and, (2) the disease for both sexes is most prevalent during the cooler months of the year.

APPEARANCE OF BARNACLES

The incidence of barnacles on blue crabs was generally quite low (Tables 7, 8). The North Edisto River had the lowest incidence (1.1%) and Calibogue Sound the highest (3.2%). Chi-Square tests revealed that barnacle incidence varied significantly between areas by sex (Males: Chi-Square value = 41.87, df = 3, $P < 0.005$; Females: Chi-Square value = 42.34, df = 3, $P < 0.005$). The reason for this is unknown.

In an attempt to determine if differences in incidence of barnacles were related to seasonal factors, observations from Port Royal and St. Helena Sounds separated by sex were arbitrarily divided into 2 time periods (November-March and April-October) and tested by Chi-Square analyses. Significant differences in seasonal incidence of barnacles were noted for each sex, but in opposite order. Males in both sounds experienced a greater incidence of barnacles between November-March, whereas, females had a greater rate during April-October (St. Helena Sound Males: Chi-Square value = 15.20, df = 3, $P < 0.005$; Females: Chi-Square value = 19.39, df = 3, $P < 0.005$: Port Royal Sound Males: Chi-Square value = 10.32, df = 3, $P < 0.025$; Females: Chi-Square value = 14.94, df = 3, $P < 0.005$) (Table 9).

MEAN SIZE OF BLUE CRABS IN COMMERCIAL FISHERY

TRAWL FISHERY

Mature females taken by trawl in St. Helena and Port Royal Sounds were generally larger than males (Table 10). Variation in carapace width was greater for males than females and this is not unexpected because of the terminal molt in females.

MEAN SIZE OF CRABS IN POT FISHERY

Mature female crabs captured in the pot fishery exceeded males in size (Table 11) as they did in trawl catches. Apparent differences in mean sizes were examined with the Student-Newman-Keuls (SNK) procedure (Sokal and Rohlf 1969). Results are given in Table 12 and are shown graphically in Figure 2. Only data from March 1973 through November 1974 were used because only this time interval provided sufficient data for the procedure. The four main results were (1) carapace widths of mature females did not vary significantly between fishing areas, (2) carapace widths of males did not vary significantly between fishing areas, (3) carapace widths of males from all locations were not significantly different from females taken from Calibogue Sound, and (4) with the exception of Calibogue Sound mature females were significantly larger than males for all areas.

EFFECT OF CULLING LARGER MALES FROM COMMERCIAL POT CATCHES

As previously mentioned, some fishermen cull the larger males from their catch before selling to Blue Channel Corporation. This may have contributed to differences in mean sizes between males and females in the commercial catch. In an attempt to estimate the effect of culling, weighted mean widths of males were calculated for two time periods for three locations (Table 13). Crabs sampled from Whale Branch, which drains into St. Helena Sound, were known to be unculled, thus, they were considered as a control. Culling was assumed to occur in crabs taken from other areas. Unfortunately, results were inconclusive. Although males taken in other areas from August to November 1972 were about 3.5% smaller than those in Whale Branch, males taken from May to December 1973 were slightly larger than those in Whale Branch. The results did show that crabs taken in 1973 were smaller than those in 1972. More research must be conducted before the effect of culling larger males can be accurately estimated.

SIZE DISTRIBUTION OF IMMATURE FEMALES IN COMMERCIAL POT CATCHES

Figure 3 shows the size distribution of immature females taken in commercial pot catches.

Approximately 85% were below the minimum legal size of 5 inches (127 mm). The largest immature female was taken from Saint Helena Sound and measured 154 mm. These results indicate that the taking of immature females should be discouraged in order to conform to the minimum size limit.

SEASONAL CHANGE IN SIZE DISTRIBUTION OF MALES TAKEN IN POT FISHERY

Figure 4 shows the size distribution of males taken in the pot fishery (all areas combined) from August 1972 to November 1974. In general, the modal size of males changed from 120-139 mm in May and June to 139-159 mm in September and October. The change in modal size of crabs in catches may simply correspond to increased growth of males during the summer or it may be an indication of seasonal

recruitment.

MANAGEMENT IMPLICATIONS

SEXUAL COMPOSITION OF COMMERCIAL POT CATCHES

As discussed earlier only 28% of pot catches are females. Although this estimate may be slightly low because ovigerous females can not be taken legally, it would appear that pot catches of females could be increased if more fishermen fished in higher salinity areas where mature females are concentrated (Churchill 1919; Gunter 1950; Lunz 1951; Van Engel 1958; Tagatz 1968; More 1969; Jaworski 1972).

IMMATURE FEMALES

Because immature females are easy to recognize, fishermen should release all less than the legal size. The small number of immature females in commercial catches suggests that their capture is not adversely affecting the resource at this time.

DISEASE OBSERVATIONS

The general incidence of shell disease on mature crabs appears less than 5%. The disease does not appear to cause high mortalities although fishermen have reported that crabs with shell disease may die more quickly after capture than those free of disease. In essence, shell disease does not appear to be a management problem, although the incidence of disease should be monitored to ensure that it does not become a problem.

BARNACLE OBSERVATIONS

Williams and Porter (1964) used the presence of a large barnacle to estimate the age of a female blue crab. Perry (1975) reported that during August 1972, hundreds of spent female crabs littered the Gulf beach of Cat Island and most were heavily fouled with barnacles. These reports suggested that the presence of many crabs with large barnacles could indicate an older (second) year class in the fishery. This was not the case in this study, suggesting that the bulk of the commercial catch was comprised of only one year class. The number of year classes or cohorts that comprise the commercial catch remains unknown because it is not possible to age blue crabs at this time. However, commercial catch statistics indicate that there is little relationship between annual catches; hence, the blue crab fishery can be treated essentially as an annual crop although the time of recruitment may vary from year to year.

The difference in seasonal incidence rate of large barnacles on males (highest incidence in winter) and females (highest incidence April -October) may be due to the molting schedule. Females, which appear to experience their terminal molt mainly in August and September (after which they are first recruited to the fishery) and gradually gain barnacles cumulatively until they leave the fishery in the late summer of the following year. Conversely, it is suggested that commercial size males (> 5 inches in carapace width) molt less frequently in the November to March period; hence, have a higher incidence rate of large barnacles in that period.

WINTER TRAWL FISHERY

Precise landings data for the winter trawl fishery for crabs are not available, however, it is known that trawl caught crabs are taken during the months of December through March. Total crab landings for December through March have varied from 10 to 27 percent of annual landings for the 1965-66 to 1974-75 period. For that 10 year period 18.79% of crab landings occurred in the December through March period (Table 13). It is estimated that 1/3 to 1/2 of these landings were taken by pots. If one assumes that the trawl fishery accounted for 2/3 of landings from December through March, it follows that the trawl fishery produced about 12% of annual landings on the average. This suggests that the trawl fishery has had no significant effect upon the blue crab stock or stocks in waters of South Carolina. Moreover, recent increases in price of fuel may have made winter crab trawling less desirable.

TRENDS IN BLUE CRAB LANDINGS

ANNUAL

Table 14 gives landings by month for the 1957 to 1976 period. Several points are evident. The first is that landings for the 1957-1962 and 1966-1968 period are markedly lower than those for the 1963-1974 period (less 1966-1968). It is not known why landings were low in the 1957 to 1962 period; however, it is possible that demand for South Carolina crabs was relatively low due to an abundance of crabs in Chesapeake Bay. The decline in landings in the 1966-68 period has been discussed by Mahood et al. (1970) and was probably due to several factors including "gray crab disease" caused by Paramoeba periciosa and the widespread use of pesticides in the coastal area during that time. Unfortunately, the full explanation for high mortalities of blue crabs during the late 1960's remains unknown (Mahood et al. 1970).

Landings of blue crabs for the 1969-1974 period appear to be normal and in any event are almost twice those experienced in the 1966-68 period. Landings for 1975 were down approximately 1,000,000 pounds from 1974 and 1976 landings were the lowest since 1968. The significance of the lower 1975 and 1976 landings is not clear. In particular, it is not known whether the depressed level of landings for October through December 1976 was due to the entrance of a weak year class or to the unusually cold weather during that period.

SEASONAL

As mentioned previously, crab catches are lower during the months of December through March because colder weather makes crabs less available. Catches generally are also poor in April. Fishermen have attributed the April low to the high incidence of females carrying egg masses, "sponges", and the lack of males available to the fishery. Catches generally increase from May to October with peak catches occurring from July to October. An exception to this general pattern occurred in 1973 when large catches occurred in May and June. This phenomenon may have been caused by the entrance of a cohort of crabs into the fishery. However, our observations indicate that recruitment to the fishery normally occurs in September and October.

Our interpretation of female recruitment is that juvenile females that have been cohabiting lesser salinity areas with males undergo their terminal molt mainly in August and September and then migrate to higher salinity waters where they become available to the pot fishery in October and November. With the advent of cooler water temperatures the newly mature females migrate to deeper water where some are exploited by trawl gear. When water temperatures increase in the spring females "sponge" in March and April and then migrate to nearshore waters along South Carolina beaches where some are taken by vessels trawling for shrimp. Ovigerous females are found constantly from May through August with an apparent peak of spawning occurring in late May and early June. Ovigerous females appear relatively rare in late August and September and it is suggested that this is due at least in part to older females dying at this time. This is consistent with Perry's observation in the Gulf of Mexico. Palmer (1974) reported in Georgia that there were two distinct peaks of sponging, one in spring and the other in late summer. He also stated that no sponge crabs were taken from October through January in a three year study.

Male recruitment appears to generally occur in September and October and with lower water temperatures males become unavailable to the fishery. Males do not appear to become fully available to the fishery until the following May and form the basis of the pot fishery until succeeded by another cohort in September and October. As noted previously, recruitment of males in 1973 may have occurred both in the spring (May-June) and the fall (September-October). However, more research must be undertaken before the timing of recruitment is fully understood.

It should be noted that a substantial, but unknown, quantity of crabs are taken by recreational fishermen along South Carolina beaches. Most crabs are taken along beaches from May through August and are mature females (Unpublished Data). None of the recreational catch is reported. Thus, commercial landings must be considered only as a minimum estimate of true landings of crabs in South Carolina.

Finally, it should be noted that, if our recruitment hypothesis for females is correct, females experience commercial exploitation mainly from September through November by pots, minor exploitation by trawl gear in the winter, and are then relatively unexploited the following spring and summer except by recreational fishermen along beaches.

LITERATURE CITED

Churchill, E. P., Jr. 1919. Life history of the blue crab. Bull. U. S. Bur. Fish. 36: 95-128.

Cook, D. W. and S. R. Loften. 1973. Chitonoclastic bacteria associated with shell disease in Penaeus shrimp and the blue crab (Callinectes sapidus). J. Wildl. Dis. 9: 154-159.

Couch, J. N. 1942. A new fungus on crab eggs. J. Elisha Mitchell Sci. Soc. 58: 158-162.

Darnell, R. M. 1958. Food habits of fishes and larger invertebrates of Lake Pontchartrain, Louisiana, an estuarine community. Publ. Univ. of Texas, Inst. of Marine Science 5: 353-416.

_____. 1961. Trophic spectrum of an estuarine community, based on studies of Lake Pontchartrain, Louisiana. Ecology 42 (3): 553-568.

Fischler, K. J. and C. H. Walburg. 1962. Blue crab movement in coastal South Carolina, 1958-59. Trans. Am. Fish. Soc. 91 (3): 275-278.

Gunter, G. 1950. Seasonal population changes and distributions as related to salinity, of certain invertebrates of the Texas coast, including the commercial shrimp. Publ. Univ. of Texas, Inst. of Marine Science 1 (2): 7-51.

Hopkins, S. H. 1947. The nemertean Carcinonemertes as an indicator of the spawning history of the host, Callinectes sapidus. J. of Parasitology 33 (2): 146-150.

Humes, A. G. 1941. Notes on Octolasmis mulleri (Coker), a barnacle commensal on crabs. Trans. Am. Mic. Soc. 60 (1): 101-103.

Jaworski, E. 1972. The blue crab fishery, Barataria estuary, Louisiana. Sea Grant Publ. No. LSU-SG-71-01: 112 pp.

Lunz, G. R. 1951. Investigations of trawling for crabs in inshore waters of South Carolina. Report to S. C. Board of Fisheries. Bears Bluff Lab, Wadmalaw Is., S. C.: 12 pp.

Mahood, R. K., M. D. McKenzie, S. J. Bollar, J. R. Davis, and D. Spitsbergen. 1970. A report on the cooperative blue crab study - South Atlantic States. Ga. Dept. Nat. Res. Game and Fish. Div. Coastal Fish. Off. Contrib. Ser. No. 19: 32 pp.

Meyer, M. C. and A. A. Barden, Jr. 1955. Leeches symbiotic on Arthropoda, especially decapod Crustacea. Wasmann J. of Biology. 13 (2): 297-311.

More, W. R. 1969. A contribution to the biology of the blue crab (Callinectes sapidus Rathbun) in Texas, with a description of the fishery. Texas Parks & Wildl. Dept. Tech. Ser. 1: 1-31.

Palmer, B. A. 1974. Studies on the blue crab (Callinectes sapidus) in Georgia. Ga. Dept. Nat. Res. Game and Fish Div. Coastal Fish. Off. Contrib. Ser. No. 29: 59 pp.

Perry, H. M. 1975. The blue crab fishery in Mississippi. Gulf Res. Reports 5 (1): 39-57.

Reinhard, E. G. 1950. An analysis of the effects of a sacculinid parasite on the external morphology of Callinectes sapidus Rathbun. Biol. Bull. (Woods Hole), 98 (3): 277-288.

Rhodes, R. J. 1973. Development of an expanded commercial fisheries statistics program for South Carolina. Ann. Rpt. on Project 2-137-D-2 in coop. with Natl. Mar. Fish. Serv., Dept. of Commerce. Under Public Law 88-30 9: 80 pp.

_____. 1974. South Carolina's blue crab catch and effort system: A fisheries management aid for industry and government. Proc. Gulf and Caribbean Fish. Inst. 26: 149-157.

Rosen, B. 1967. Shell disease of the blue crab Callinectes sapidus. J. Invert. Path. 9 (3): 348-353.

_____. 1970. Shell disease of aquatic crustaceans. Pages 409-415 in S. F. Sniesyka, ed. A Symposium on Diseases of Fishes and Shellfishes. No. 5. American Fisheries Society.

Sandifer, P. A. and P. J. Eldridge. 1974. Observations on the incidence of shell disease in South Carolina blue crabs, Callinectes sapidus. Proc. Gulf Coast Regional Symposium on Disease of Aquatic Animals: 161-184.

Sawyer, W. H. and C. C. Taylor. 1949. The effect of shell disease on the gills and chitin of the lobster Homarus americanus. Maine Dept. Sea Shore fisheries, Res. Bull. 1: 1-10.

Sinderman, C. J. 1970. Principle diseases of marine fish and shellfish. Academic Press, New York. 369 pp.

Sokal, R. R. and F. J. Rohlf. 1969. Biometry. The principles and practice of statistics in biological research. W. H. Freeman and Co., San Francisco: 239-246.

Sprague, V. 1965. Nosema sp. (Microsporida, Nosematidae) in the musculature of the crab Callinectes sapidus. J. of Protozoology. 12 (1): 66-70.

_____ R. L. Beckett, and T. K. Sawyer. 1969. A new species of Paramoeba (Amoebida, Paramoebidae) parasitic in the crab Callinectes sapidus. J. of Invert. Path. 14 (2): 167-174.

Tagatz, M. E. 1968. Biology of the blue crab, Callinectes sapidus Rathbun, in the St. Johns River, Florida. U. S. Fish and Wildl. Serv., Fish. Bull. 67 (1): 17-33.

Taylor, C. C. 1948. Shell disease as a mortality factor in the lobster (Homarus americanus). Maine Dept. Sea Shore Fisheries Fish. Cir. 4: 1-8 (mimeo).

Van Engel, W. A. 1958. The blue crab and its fishery in Chesapeake Bay. Part 1. Reproduction, early development, growth, and migration. Comm. Fish. Rev. 20 (6): 6-17.

Williams, A. B. and H. J. Porter. 1964. An unusually large turtle barnacle (Chelonibia p. patula) on a blue crab from Delaware Bay, Ches. Science 5 (3): 150-151.

ACKNOWLEDGEMENTS

We are grateful to all fishermen who cooperated with us in this study and particularly to Blue Channel Corporation for allowing us to use their facilities to sample the commercial blue crab catch. Thanks are also due to Paul Sandifer, Jim Bishop, and Ray Rhodes, who reviewed the manuscript and Mrs. Patricia DuPree, who typed the manuscript.

Appreciation is also due to Mrs. Evelyn Myatt, who prepared the figures.

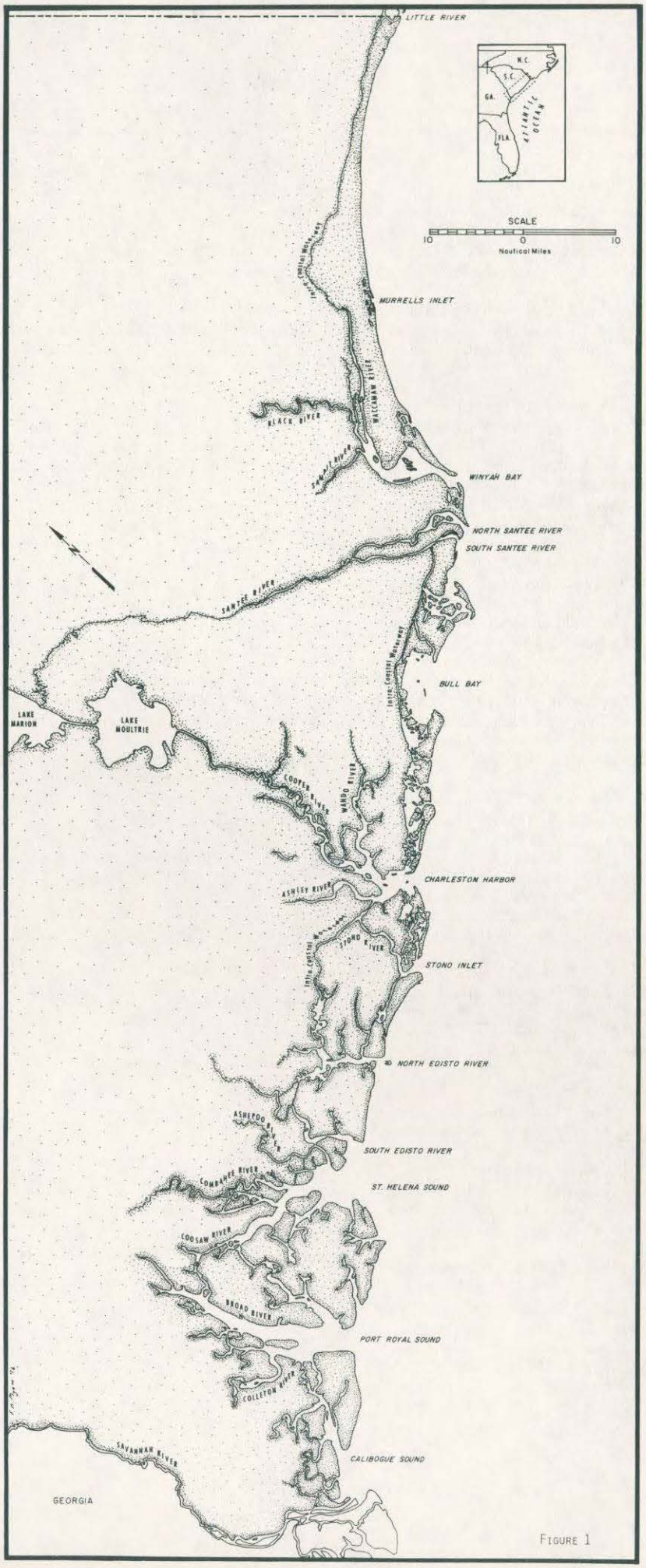
LITTLE RIVER
N.C.
S.C.
GA.
FLA.
ATLANTIC OCEAN
SCALE
10 0 10
Nautical Miles
Intra-Coastal Waterway
MURRELLS INLET
WACCAMAW RIVER
BLACK RIVER
SAMPIT RIVER
WINYAH BAY
NORTH SANTEE RIVER
SOUTH SANTEE RIVER
SANTEE RIVER
Intra-Coastal Waterway
BULL BAY
LAKE MARION
LAKE MOULTRIE
COOPER RIVER
WANDO RIVER
CHARLESTON HARBOR
ASHLEY RIVER
Intra-Coastal Waterway
STONO RIVER
STONO INLET
NORTH EDISTO RIVER
ASHEPOO RIVER
SOUTH EDISTO RIVER
COMBAHEE RIVER
ST. HELENA SOUND
COOSAW RIVER
BROAD RIVER
PORT ROYAL SOUND
COLLETON RIVER
SAVANNAH RIVER
CALIBOGUE SOUND
GEORGIA

FIGURE 1

Figure 2. Results of Student-Newman Keuls (SNK) procedure comparing mean widths of male and female blue crabs by major fishing areas.

Location	Sex	Mean Size
Calibogue Sound	♂	135.5
North Edisto River	♂	135.8
Whale Branch	♂	136.6
Port Royal Sound	♂	137.6
Saint Helena Sound	♂	137.9
Calibogue Sound	♀	148.0
Port Royal Sound	♀	149.7
Saint Helena Sound	♀	150.4
North Edisto River	♀	152.0
Whale Branch	♀	154.0

FIGURE 3. SIZE DISTRIBUTION OF IMMATURE FEMALE BLUE CRABS, CALLINECTES-SAPIDUS, SAMPLED IN COMMERCIAL POT CATCHES (CARAPACE WIDTH IN MM).

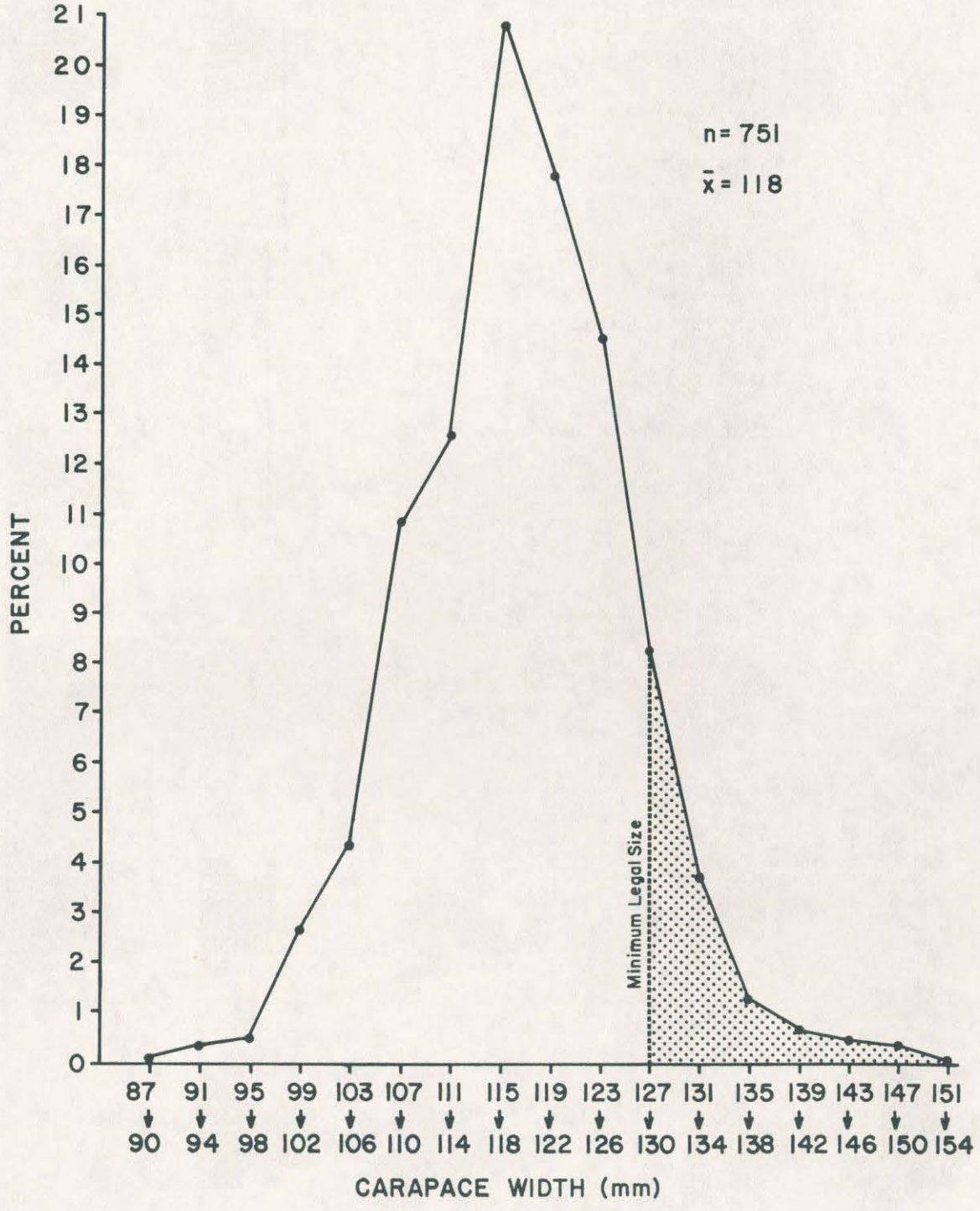

FIGURE 4. MEAN SIZE OF MALE BLUE CRABS TAKEN IN THE COMMERCIAL POT FISHERY (ALL AREAS COMBINED) FROM AUGUST 1972 TO NOVEMBER 1974.

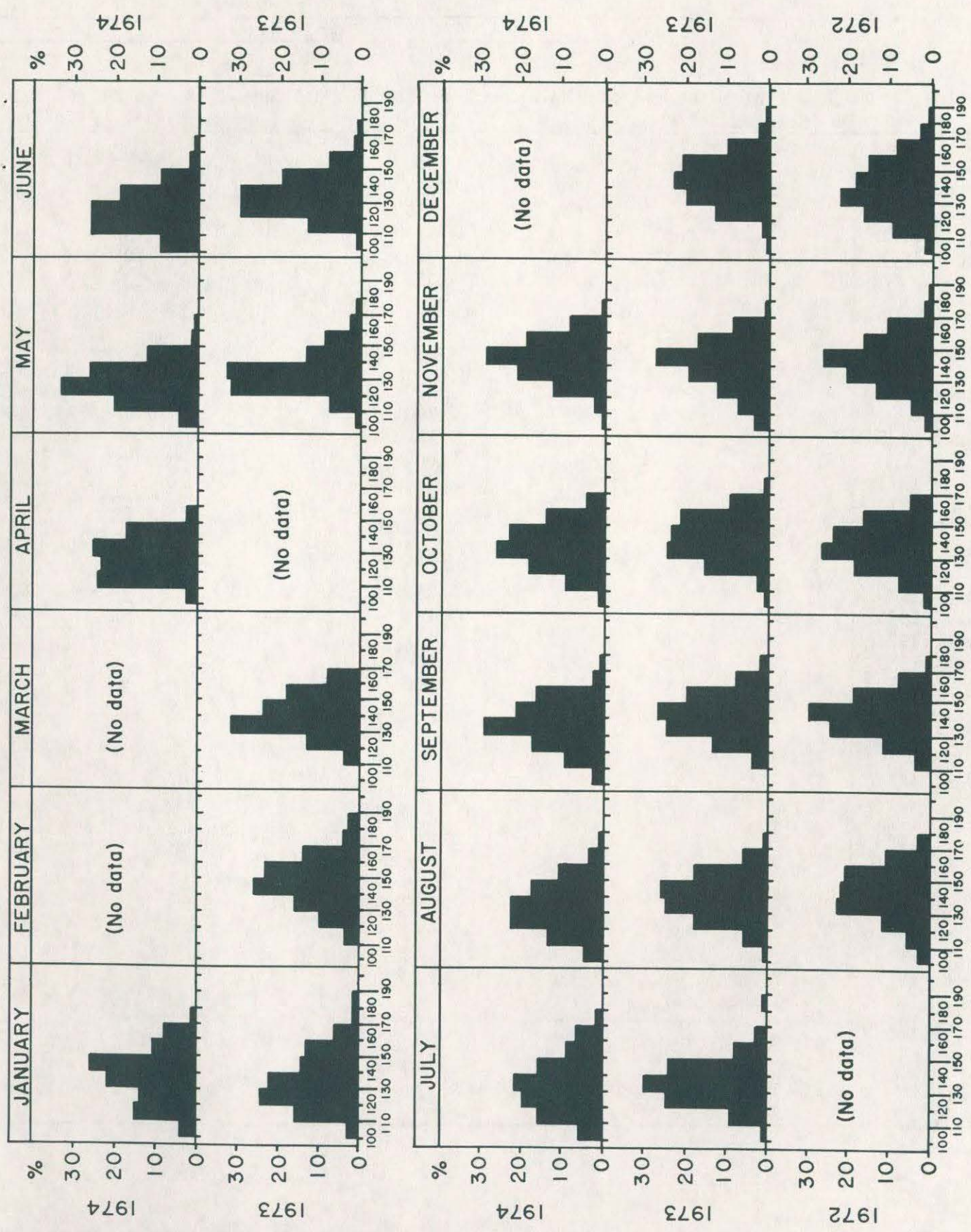

Table 1. Data collected during sampling of commercial crab catches from August 1972 to November 1974.

Sampling Period	No. of Samples	Gear	Sample Size: St. Helena Sound	Port Royal Sound	Calibogue Sound	North Edisto River	Total
Aug. 1972	9	Pot	150	100	100	150	500
Sept. 1972	22	Pot	500	553	101		1,154
Oct. 1972	18	Pot	800	350	50		1,200
Nov. 1972	25	Pot	650	599	50	50	1,349
Dec. 1972	14	Pot	563	300		100	963
	3	Trawl		300			300
Jan. 1973	7	Pot	250	200			450
	1	Trawl	200				200
Feb. 1973	3	Pot		200			200
	2	Trawl		200			200
Mar. 1973	4	Pot	159	168			327
	8	Trawl		1,068			1,068
Apr. 1973	0						
May 1973	15	Pot	576	265		100	941
	1	Trawl		50			50
June 1973	28	Pot	1399	309	50	100	1,858
	2	Trawl		100			100
July 1973	28	Pot	1,117	352	200		1,669
Aug. 1973	33	Pot	897	401	200	151	1,649
Sept. 1973	26	Pot	950	247	50	100	1,347
Oct. 1973	28	Pot	900	400			1,300
Nov. 1973	11	Pot	350	150			500
Dec. 1973	6	Pot	100	200			300
Jan. 1974	5	Pot	100	150			250
	2	Trawl	150				150
Feb. 1974	0						
Mar. 1974	0						
Apr. 1974	3	Pot	50	100			150
May 1974	13	Pot	200	307	151		658
June 1974	13	Pot	150	250	249		649
July 1974	4	Pot	100	50	50		200
Aug. 1974	25	Pot	650	150	450		1,250
Sept. 1974	14	Pot	350	300	50		700
Oct. 1974	20	Pot	750	251		100	1,011
Nov. 1974	8	Pot	200	200		50	450
TOTAL	401		12,261	8,270	1,751	901	23,183

Table 2. Sex distribution of blue crabs sampled from commercial pot catches from major South Carolina fishing grounds.

Location: All areas combined

Sampling Period	Males		Mature Females		Immature Females	
	Number	%	Number	%	Number	%
Aug. 1972	440	88.0	56	11.2	4	0.8
Sept. 1972	871	75.5	258	22.3	25	2.2
Oct. 1972	667	55.6	516	43.0	17	1.4
Nov. 1972	987	73.2	333	24.7	29	2.1
Dec. 1972	644	66.9	281	29.2	38	3.9
Jan. 1973	218	48.4	210	46.7	22	4.9
Feb. 1973	183	91.5	10	5.0	7	3.5
Mar. 1973	220	67.3	104	31.8	3	0.9
Apr. 1973	NS*					
May 1973	619	65.8	305	32.4	17	1.8
June 1973	1,485	79.9	351	18.9	22	1.2
July 1973	1,366	81.9	291	17.4	12	0.7
Aug. 1973	1,502	91.1	62	3.8	85	5.1
Sept. 1973	1,064	79.0	212	15.7	71	5.3
Oct. 1973	1,000	76.9	275	21.2	25	1.9
Nov. 1973	423	84.6	65	13.0	12	2.4
Dec. 1973	258	86.0	31	10.3	11	3.7
Jan. 1974	93	37.2	147	58.8	10	4.0
Feb. 1974	NS*					
Mar. 1974	NS*					
Apr. 1974	88	58.7	29	19.3	33	22.0
May 1974	294	44.7	349	53.0	15	2.3
June 1974	291	44.8	335	51.6	23	3.6
July 1974	128	64.0	65	32.5	7	3.5
Aug. 1974	1,004	80.3	124	9.9	122	9.8
Sept. 1974	434	62.0	170	24.3	96	13.7
Oct. 1974	637	57.9	423	38.4	41	3.7
Nov. 1974	343	76.2	103	22.9	4	0.9
TOTAL	15,259	72.3	5,105	24.2	751	3.5

*NS - No Sample

Table 3. Sexual compositon of blue crabs in commercial pot catches from major South Carolina fishing grounds.

Location: North Edisto

Sampling Period	Males		Mature Females		Immature Females	
	Number	%	Number	%	Number	%
Aug. 1972	132	88.0	18	12.0	0	0.0
Sept. 1972	NS*					
Oct. 1972	NS*					
Nov. 1972	48	96.0	2	4.0	0	0.0
Dec. 1972	55	55.0	41	41.0	4	4.0
Jan. 1973	NS*					
Feb. 1973	NS*					
Mar. 1973	NS*					
Apr. 1973	NS*					
May 1973	87	87.0	11	11.0	2	2.0
June 1973	99	99.0	1	1.0	0	0.0
July 1973	NS*					
Aug. 1973	142	94.1	5	3.3	4	2.6
Sept. 1973	73	73.0	20	20.0	7	7.0
Oct. 1973	NS*					
Nov. 1973	NS*					
Dec. 1973	NS*					
Jan. 1974	NS*					
Feb. 1974	NS*					
Mar. 1974	NS*					
Apr. 1974	NS*					
May 1974	NS*					
June 1974	NS*					
July 1974	NS*					
Aug. 1974	NS*					
Sept. 1974	NS*					
Oct. 1974	21	21.0	76	76.0	3	3.0
Nov. 1974	47	94.0	3	6.0	0	0.0
TOTAL	704	78.2	177	19.6	20	2.2

*NS - No Sample

Table 3 (continued)

Location: Port Royal

Sampling Period	Males		Mature Females		Immature Females	
	Number	%	Number	%	Number	%
Aug. 1972	88	88.0	12	12.0	0	0.0
Sept. 1972	388	70.2	142	25.7	23	4.1
Oct. 1972	136	38.8	206	58.9	8	2.3
Nov. 1972	375	62.6	210	35.1	14	2.3
Dec. 1972	112	37.3	168	56.0	20	6.7
Jan. 1973	34	17.0	159	79.5	7	3.5
Feb. 1973	183	91.5	10	5.0	7	3.5
Mar. 1973	66	39.3	100	59.5	2	1.2
Apr. 1973	NS*					
May 1973	123	46.4	138	52.1	4	1.5
June 1973	195	63.1	108	35.0	6	1.9
July 1973	190	54.0	159	45.2	3	0.8
Aug. 1973	331	82.5	38	9.5	32	8.0
Sept. 1973	191	77.3	44	17.8	12	4.9
Oct. 1973	316	79.0	77	19.3	7	1.7
Nov. 1973	104	69.3	46	30.7	0	0.0
Dec. 1973	168	84.0	26	13.0	6	3.0
Jan. 1974	36	24.0	112	74.7	2	1.3
Feb. 1974	NS*					
Mar. 1974	NS*					
Apr. 1974	64	64.0	11	11.0	25	25.0
May 1974	113	36.8	191	62.2	3	1.0
June 1974	54	21.6	186	74.4	10	4.0
July 1974	14	28.0	36	72.0	0	0.0
Aug. 1974	109	72.7	30	20.0	11	7.3
Sept. 1974	161	53.7	104	34.6	35	11.7
Oct. 1974	169	67.3	75	29.9	7	2.8
Nov. 1974	131	65.5	68	34.0	1	0.5
TOTAL	3,851	58.8	2,456	37.5	245	3.7

*NS - No Sample

Table 3 (continued)

Location: St. Helena

Sampling Period	Males		Mature Females		Immature Females	
	Number	%	Number	%	Number	%
Aug. 1972	143	95.3	7	4.7	0	0.0
Sept. 1972	425	85.0	74	14.8	1	0.2
Oct. 1972	511	63.9	281	35.1	8	1.0
Nov. 1972	524	80.6	121	18.6	5	0.8
Dec. 1972	477	84.7	72	12.8	14	2.5
Jan. 1973	184	73.6	51	20.4	15	6.0
Feb. 1973	NS*					
Mar. 1973	154	96.9	4	2.5	1	0.6
Apr. 1973	NS*					
May 1973	409	71.0	156	27.1	11	1.9
June 1973	1,177	84.1	206	14.7	16	1.2
July 1973	1,063	95.2	47	4.2	7	0.6
Aug. 1973	849	94.6	7	0.8	41	4.6
Sept. 1973	768	80.8	132	13.9	50	5.3
Oct. 1973	684	76.0	198	22.0	18	2.0
Nov. 1973	319	91.1	19	5.5	12	3.4
Dec. 1973	90	90.0	5	5.0	5	5.0
Jan. 1974	57	57.0	35	35.0	8	8.0
Feb. 1974	NS*					
Mar. 1974	NS*					
Apr. 1974	24	48.0	18	36.0	8	16.0
May 1974	81	40.5	115	57.5	4	2.0
June 1974	121	80.7	24	16.0	5	3.3
July 1974	76	76.0	17	17.0	7	7.0
Aug. 1974	555	85.4	69	10.6	26	4.0
Sept. 1974	232	66.2	59	16.9	59	16.9
Oct. 1974	447	59.6	272	36.3	31	4.1
Nov. 1974	165	82.5	32	16.0	3	1.5
TOTAL	9,535	80.0	2,021	17.0	355	3.0

*NS - No Sample

Table 3 (continued)

Location: Calibogue

Sampling Period	Males		Mature Females		Immature Females	
	Number	%	Number	%	Number	%
Aug. 1972	77	77.0	19	19.0	4	4.0
Sept. 1972	58	57.4	42	41.6	1	1.0
Oct. 1972	20	40.0	29	58.0	1	2.0
Nov. 1972	40	80.0	0		10	20.0
Dec. 1972	NS*					
Jan. 1973	NS*					
Feb. 1973	NS*					
Mar. 1973	NS*					
Apr. 1973	NS*					
May 1973	NS*					
June 1973	14	28.0	36	72.0	0	0.0
July 1973	113	56.5	85	42.5	2	1.0
Aug. 1973	180	90.0	12	6.0	8	4.0
Sept. 1973	32	64.0	16	32.0	2	4.0
Oct. 1973	NS*					
Nov. 1973	NS*					
Dec. 1973	NS*					
Jan. 1974	NS*					
Feb. 1974	NS*					
Mar. 1974	NS*					
Apr. 1974	NS*					
May 1974	100	66.2	43	28.5	8	5.3
June 1974	116	46.6	125	50.2	8	3.2
July 1974	38	76.0	12	24.0	0	0.0
Aug. 1974	340	75.6	25	5.5	85	18.9
Sept. 1974	41	82.0	7	14.0	2	4.0
Oct. 1974	NS*					
Nov. 1974	NS*					
TOTAL	1,169	66.7	451	25.8	131	7.5

*NS - No Sample

Table 4. Sexual composition of blue crabs sampled from commercial trawl catches in St. Helena and Port Royal Sounds, South Carolina.

Sampling Period	Males		Mature Females		Immature Females		
	Number	%	Number	%	Number	%	Location
Dec. 1972	23	7.7	275	91.7	2	0.6	PR*
Jan. 1973	10	5.0	190	95.0	0	0.0	SH**
Feb. 1973	30	15.0	164	82.0	6	3.0	PR*
Mar. 1973	168	15.7	893	83.6	7	0.7	PR*
Apr. 1973							
May 1973	16	32.0	34	68.0	0	0.0	PR*
June 1973	21	21.0	79	79.0	0	0.0	PR*
Jan. 1974	40	26.7	104	69.3	6	4.0	SH**
TOTAL PR*	258	15.0	1,445	84.1	15	0.9	
TOTAL SH**	50	14.3	294	84.0	6	1.7	
TOTAL SH&PR	308	14.9	1,739	84.1	21	1.0	

* Port Royal Sound
** St. Helena Sound

Table 5. Total incidence of shell disease by sex for blue crabs in commercial trawl catches in St. Helena and Port Royal Sounds, December 1972 to January 1974.

Date	Males			Mature Females			Immature Females			Total		
	Number	% Infected	% Infected	Number	% Infected	% Infected	Number	% Infected	% Infected	Number	% Infected	% Infected
December 1972*	23			275			2			300		
January 1973	10	0	0	190	2	1.05	0	0	0	200	2	1.00
February 1973	30	0	0	170	2	1.18	0	0	0	200	2	1.00
March 1973	43	0	0	301	10	3.32	6	0	0	350	10	2.85
March 1973*	75			642			1			718		
May 1973	16	1	6.25	34	9	26.47	0	0	0	50	10	20.00
June 1973	21	2	9.52	79	12	15.19	0	0	0	100	14	14.00
January 1974	40	1	2.50	104	0	0	6	0	0	150	1	0.67
TOTAL	258	4	2.50	1,795	35	3.99	15	0	0	2,068	39	3.71

* Disease observations not noted.

Table 6. Total incidence of shell disease by sex and location among blue crabs in commercial pot catches, January 1973 to November 1974.

Location	Males			Mature Females			Total		
	Number	No. Infected	% Infected	Number	No. Infected	% Infected	Number	No. Infected	% Infected
North Edisto River	469	22	4.7	116	1	0.9	585	23	3.9
St. Helena Sound	7,455	249	3.3	1,466	53	3.6	8,921	302	3.4
Port Royal Sound	2,752	239	8.7	1,718	57	3.3	4,470	296	6.6
Calibogue Sound	974	48	4.9	361	14	3.9	1,335	62	4.6
GRAND TOTAL	11,650	558	4.8	3,661	125	3.4	15,311	683	4.5

Table 7. Incidence of shell disease and barnacles on blue crabs in commercial pot catches from major South Carolina fishing grounds.

Location: North Edisto

	Males			Mature Females			Total		
	Number	% with barnacles	% with shell disease	Number	% with barnacles	% with shell disease	Sample Size	% with barnacles	% with shell disease
Aug. 1972	132	0.0		18	5.6		150	0.7	
Sept. 1972	NS*								
Oct. 1972	NS*								
Nov. 1972	48	0.0		2	0.0		50	0.0	
Dec. 1972	55	5.5		41	4.9		96	5.2	
Jan. 1973	NS*								
Feb. 1973	NS*								
Mar. 1973	NS*								
Apr. 1973	NS*								
May 1973	87	1.1	2.3	11	0.0	9.1	98	1.0	3.1
June 1973	99	0.0	3.0	1	0 0	0.0	100	0.0	3.0
July 1973	NS*								
Aug. 1973	142	0.0	1.4	5	0.0	0.0	147	0.0	1.4
Sept. 1973	73	0.0	1.4	20	0.0	0.0	93	0.0	1.1
Oct. 1973	NS*								
Nov. 1973	NS*								
Dec. 1973	NS*								
Jan. 1974	NS*								
Feb. 1974	NS*								
Mar. 1974	NS*								
Apr. 1974	NS*								
May 1974	NS*								
June 1974	NS*								
July 1974	NS*								
Aug. 1974	NS*								
Sept. 1974	NS*								
Oct. 1974	21	9.5	19.0	76	0.0	0.0	97	2.1	4.1
Nov. 1974	47	2.1	21.3	3	0.0	0.0	50	2.0	20.0
TOTAL	704	1.0	4.7	177	1.7	0.9	881	1.1	3.9

*NS- No Sample

Table 7 (continued)

Location: St. Helena

	Males			Mature Females			Total		
	Number	% with barnacles	% with shell disease	Number	% with barnacles	% with shell disease	Sample Size	% with barnacles	% with shell disease
Aug. 1972	143	0.0		7	0.0		150	0.0	
Sept. 1972	425	4.7		74	0.0		499	4.0	
Oct. 1972	511	4.5		281	0.4		792	3.0	
Nov. 1972	524	2.5		121	0.0		645	2.0	
Dec. 1972	477	2.9		72	0.0		549	2.6	
Jan. 1973	184	3.3	0.0	51	3.9	3.9	235	3.4	0.9
Feb. 1973	NS*								
Mar. 1973	154	0.0	0.0	4	0.0	0.0	158	0.0	0.0
Apr. 1973	NS*								
May 1973	409	1.0	1.0	156	4.5	5.1	565	1.9	2.1
June 1973	1,177	0.3	1.9	206	5.8	7.8	1383	1.2	2.7
July 1973	1,063	1.7	3.1	47	6.4	2.1	1110	1.9	3.1
Aug. 1973	849	0.7	2.8	7	57.1	28.6	856	1.2	3.0
Sept. 1973	768	0.5	1.3	132	0.8	1.5	900	0.6	1.3
Oct. 1973	684	2.9	3.2	198	0.0	1.5	882	2.3	2.8
Nov. 1973	319	1.3	9.1	19	0.0	5.3	338	1.2	8.9
Dec. 1973	90	2.2	11.1	5	0.0	0.0	95	2.1	10.5
Jan. 1974	57	0.0	7.0	35	0.0	8.5	92	0.0	7.6
Feb. 1974	NS*								
Mar. 1974	NS*								
Apr. 1974	24	0.0	4.1	18	0.0	0.0	42	0.0	2.3
May 1974	81	0.0	4.9	115	0.9	3.4	196	0.5	4.0
June 1974	121	0.8	8.2	24	0.0	4.1	145	0.7	7.5
July 1974	76	0.0	11.8	17	0.0	0.0	93	0.0	9.6
Aug. 1974	555	1.6	4.5	69	2.9	1.4	624	1.8	4.1
Sept. 1974	232	0.4	5.6	59	0.0	3.3	291	0.3	5.1
Oct. 1974	447	3.4	16.1	272	0.4	2.2	719	2.2	10.8
Nov. 1974	165	1.2	10.3	32	0.0	3.1	197	1.0	9.1
TOTAL	9,535	1.7	3.3	2,021	1.7	3.6	11,556	1.7	3.4

*NS- No Sample

Table 7 (continued)

Location: Port Royal

	Males			Mature Females			Total		
	Number	% with barnacles	% with shell disease	Number	% with barnacles	% with shell disease	Sample Size	% with barnacles	% with shell disease
Aug. 1972	88	0.0		12	0.0		100	0.0	
Sept. 1972	388	9.5		142	0.0		530	7.0	
Oct. 1972	136	8.8		206	1.5		342	4.4	
Nov. 1972	375	2.1		210	0.0		585	1.4	
Dec. 1972	112	4.5		168	0.6		280	2.1	
Jan. 1973	34	0.0	2.9	159	0.6	5.0	190	0.5	4.7
Feb. 1973	183	3.8	0.5	10	0.0	0.0	193	3.6	0.5
Mar. 1973	66	0.0	1.5	100	1.0	0.0	166	0.6	0.6
Apr. 1973	NS*								
May 1973	123	2.4	1.6	138	1.4	2.2	261	1.9	1.9
June 1973	195	1.5	2.6	108	4.6	3.7	202	2.6	3.0
July 1973	190	2.1	4.7	159	6.9	6.9	349	4.3	5.7
Aug. 1973	331	1.2	1.5	38	2.6	0.0	369	1.4	1.4
Sept. 1973	191	0.5	2.6	44	0.0	0.0	235	0.4	2.1
Oct. 1973	316	2.5	9.5	77	0.0	2.6	393	2.0	8.1
Nov. 1973	104	1.9	13.5	46	4.3	0.0	150	2.7	9.3
Dec. 1973	168	5.4	22.0	26	0.0	3.8	194	4.6	19.6
Jan. 1974	36	8.3	25.0	112	0.0	0.9	148	2.0	6.8
Feb. 1974	NS*								
Mar. 1974	NS*								
Apr. 1974	64	0.0	1.6	11	0.0	0.0	75	0.0	1.3
May 1974	113	1.8	13.3	191	5.8	8.4	304	4.3	10.2
June 1974	54	1.9	3.7	186	0.5	1.6	240	0.8	2.1
July 1974	14	14.3	14.3	36	0.0	0.0	50	4.0	4.0
Aug. 1974	109	0.9	2.8	30	3.3	3.3	139	1.4	2.9
Sept. 1974	161	0.6	8.7	104	0.0	0.0	265	0.4	5.3
Oct. 1974	169	3.0	28.4	75	0.0	2.7	244	2.0	20.5
Nov. 1974	131	10.7	26.0	68	0.0	7.4	199	7.0	19.6
TOTAL	3,851	3.4	8.6	2,456	1.6	3.3	6,307	2.7	6.6

*NS- No Sample

Table 7 (continued)

Location: Calibogue

	Males			Mature Females			Total		
	Number	% with barnacles	% with shell disease	Number	% with barnacles	% with shell disease	Sample Size	% with barnacles	% with shell disease
Aug. 1972	77	0.0		19	0.0		96	0.0	
Sept. 1972	58	5.2		42	2.4		100	4.0	
Oct. 1972	20	5.0		29	0.0		49	2.0	
Nov. 1972	40	0.0		0	0.0		40	0.0	
Dec. 1972	NS*								
Jan. 1973	NS*								
Feb. 1973	NS*								
Mar. 1973	NS*								
Apr. 1973	NS*								
May 1973	NS*								
June 1973	14	0.0	0.0	36	2.8	2.8	50	2.0	2.0
July 1973	113	7.1	5.3	85	27.1	8.2	198	15.7	6.6
Aug. 1973	180	2.8	2.8	12	0.0	0.0	192	2.6	2.6
Sept. 1973	32	0.0	0.0	16	0.0	6.3	48	0.0	2.1
Oct. 1973	NS*								
Nov. 1973	NS*								
Dec. 1973	NS*								
Jan. 1974	NS*								
Feb. 1974	NS*								
Mar. 1974	NS*								
Apr. 1974	NS*								
May 1974	100	1.0	6.0	43	2.3	0.0	143	1.4	4.2
June 1974	116	1.7	7.8	125	0.8	3.2	241	1.2	5.4
July 1974	38	5.3	5.3	12	0.0	0.0	50	4.0	4.0
Aug. 1974	340	0.0	2.6	25	4.0	0.0	365	0.3	2.5
Sept. 1974	41	4.9	26.8	7	0.0	0.0	48	4.2	22.9
Oct. 1974	NS*								
Nov. 1974	NS*								
TOTAL	1,169	2.1	4.9	451	6.2	3.9	1,620	3.2	4.6

*NS- No Sample

Table 8. Total incidence of the barnacle, Chelonibia patula, on the carapace of blue crabs in commercial pot catches, August 1972 to November 1974.

Location	Males			Mature Females			Total		
	Number	No. Infected	% Infected	Number	No. Infected	% Infected	Number	No. Infected	% Infected
North Edisto River	704	7	1.0	177	3	1.7	881	10	1.1
St. Helena Sound	9,535	166	1.7	2,021	34	1.7	11,556	200	1.7
Port Royal Sound	3,851	132	3.4	2,456	40	1.6	6,307	172	2.7
Calibogue Sound	1,169	24	2.1	451	28	6.2	1,620	52	3.2

Table 9. Seasonal incidence of barnacles on blue crabs in commercial pot catches from St. Helena and Port Royal Sounds.

Location: Port Royal Sound

Time Period	Total Males	Percent Males with Barnacles	Total Females	Percent Females with Barnacles
November 1972	770	2.47	647	0.46
March 1973				
April 1973	1,346	1.71	564	3.37
October 1973				
November 1973	308	4.55	184	1.09
March 1974				
April	684	1.75	633	2.05
November 1974				

Location: St. Helena Sound

November 1972	1,208	2.73	247	0.81
March 1973				
April 1973	4,261	1.17	692	3.90
October 1973				
November 1973	326	1.84	50	0.00
March 1974				
April 1974	1,536	1.69	574	0.70
November 1974				

Table 10. Mean size of blue crabs from commercial trawl catches in St. Helena and Port Royal Sounds, South Carolina.

	Males			Mature Females			Immature Females			
	Mean Size	Standard Deviation	Number	Mean Size	Standard Deviation	Number	Mean Size	Standard Deviation	Number	Location
Dec. 1972	155	13.8	23	151	11.2	275	113	6.4	2	PR*
Jan. 1973	153	9.9	10	153	11.1	190			0	SH**
Feb. 1973	145	15.1	30	150	10.5	164	120	11.0	6	PR*
Mar. 1973	141	14.7	168	149	11.1	893	114	13.1	7	PR*
Apr. 1973										
May 1973	141	13.7	16	151	10.5	34			0	PR*
June 1973	130	10.2	21	145	9.9	79			0	
Jan. 1974	143	17.2	40	153	12.3	104	114	24.3	6	SH**

* Port Royal
** St. Helena Sound

Table 11. Mean carapace width in mm of blue crabs by location in commercial pot catches from major South Carolina fishing grounds.

Location: North Edisto River

	Males			Mature Females			Immature Females		
	Mean Size	Standard Deviation	Number	Mean Size	Standard Deviation	Number	Mean Size	Standard Deviation	Number
Aug. 1972	142	13.6	132	149	17.0	18			0
Sept. 1972	NS*								
Oct. 1972	NS*								
Nov. 1972	132	12.3	48	141	7.1	2			0
Dec. 1972	144	14.8	55	149	11.7	41	127	18.9	4
Jan. 1973	NS*								
Feb. 1973	NS*								
Mar. 1973	NS*								
Apr. 1973	NS*								
May 1973	131	10.0	87	153	11.5	11		11.3	2
June 1973	133	11.0	99	145		1			0
July 1973	NS*								
Aug. 1973	141	12.0	142	152	6.9	5	125	4.9	4
Sept. 1973	138	14.1	73	158	6.6	20	118	6.0	7
Oct. 1973	NS*								
Nov. 1973	NS*								
Dec. 1973	NS*								
Jan. 1974	NS*								
Feb. 1974	NS*								
Mar. 1974	NS*								
Apr. 1974	NS*								
May 1974	NS*								
June 1974	NS*								
July 1974	NS*								
Aug. 1974	NS*								
Sept. 1974	NS*								
Oct. 1974	140	14.7	21	153	8.9	76	111	4.6	3
Nov. 1974	144	10.4	47	155	15.9	3			0

*NS - No Sample

Table 11 (continued)

Location: St. Helena Sound

	Males			Mature Females			Immature Females		
	Mean Size	Standard Deviation	Number	Mean Size	Standard Deviation	Number	Mean Size	Standard Deviation	Number
Aug. 1972	142	16.2	93	116	6.9	7			
Sept. 1972	139	13.7	276	156	12.7	73	107		1
Oct. 1972	140	14.7	324	159	10.8	268	116	7.0	8
Nov. 1972	142	14.2	475	159	12.5	120	128	8.5	5
Dec. 1972	140	16.6	477	150	14.2	72	122	5.2	14
Jan. 1973	134	16.3	184	155	11.1	51	119	5.1	15
Feb. 1973	NS*								
Mar. 1973	142	13.9	72	141	10.2	4			
Apr. 1973	NS*								
May 1973	135	14.1	371	149	12.2	146	120	10.5	9
June 1973	135	13.4	1029	151	12.5	205	120	9.1	15
July 1973	136	12.4	915	145	13.3	45	117	10.2	7
Aug. 1973	139	13.2	752	142	4.5	7	120	7.8	38
Sept. 1973	142	13.7	622	161	11.9	129			
Oct. 1973	141	14.3	572	155	10.5	160			
Nov. 1973	137	17.0	227	150	9.6	12			
Dec. 1973	147	17.6	42	149	2.6	3			
Jan. 1974	132	14.5	57	158	8.6	35			
Feb. 1974	NS*								
Mar. 1974	NS*								
Apr. 1974	128	10.1	24	153	8.1	18			
May 1974	126	11.6	81	145	11.3	115			
June 1974	123	13.3	121	137	8.5	24	113	6.5	5
July 1974	142	16.7	76	154	10.2	17	112	7.5	7
Aug. 1974	135	15.3	555	153	10.3	69	117	9.0	26
Sept. 1974	134	13.8	232	154	10.4	59	117	6.1	59
Oct. 1974	137	13.6	447	155	10.0	272	120	10.2	31
Nov. 1974	141	14.9	165	157	10.5	32	120	9.9	3

*NS - No Sample

Table 11 (continued)

Location: Whale Branch

	Males			Mature Females			Immature Females		
	Mean Size	Standard Deviation	Number	Mean Size	Standard Deviation	Number	Mean Size	Standard Deviation	Number
Aug. 1972	157	10.0	50						
Sept. 1972	147	10.2	149	175		1			
Oct. 1972	144	10.3	187	162	9.3	13			
Nov. 1972	143	11.7	49	159		1			
Dec. 1972	NS*								
Jan. 1973	NS*								
Feb. 1973	NS*								
Mar. 1973	135	10.8	82				126		1
Apr. 1973	NS*								
May 1973	131	7.1	38	153	14.3	10	125	6.4	2
June 1973	125	8.7	148	151		1	116		1
July 1973	133	11.2	148	152	7.1	2			
Aug. 1973	138	13.0	97				123	4.4	3
Sept. 1973	144	12.6	146	155	4.2	3	145		1
Oct. 1973	140	11.3	112	158	11.0	38			
Nov. 1973	145	12.0	92	155	7.3	7	121		1
Dec. 1973	146	13.5	48	155	7.8	2			
Jan. 1974	NS*								
Feb. 1974	NS*								
Mar. 1974	NS*								
Apr. 1974	NS*								
May 1974	NS*								
June 1974	NS*								
July 1974	NS*								
Aug. 1974	NS*								
Sept. 1974	NS*								
Oct. 1974	NS*								
Nov. 1974	NS*								

*NS - No Sample

Table 11 (continued)

Location: Port Royal

	Males			Mature Females			Immature Females		
	Mean Size	Standard Deviation	Number	Mean Size	Standard Deviation	Number	Mean Size	Standard Deviation	Number
Aug. 1972	135	13.2	88	118	8.9	12			
Sept. 1972	141	12.8	388	156	8.0	142	122	6.1	23
Oct. 1972	139	13.6	136	154	10.3	206	117	6.8	8
Nov. 1972	142	15.6	375	150	10.8	210	117	10.3	14
Dec. 1972	137	16.7	112	150	10.4	168	117	7.9	20
Jan. 1973	142	16.9	34	151	11.0	159	123	13.9	7
Feb. 1973	136	15.2	183	149	10.4	10	120	7.7	7
Mar. 1973	145	12.9	66	154	10.0	100	129	5.7	2
Apr. 1973	NS*								
May 1973	133	11.5	123	145	9.8	138	116	6.2	4
June 1973	130	10.5	195	143	11.3	108	120	4.1	6
July 1973	136	10.3	190	141	11.1	159	117	12.8	3
Aug. 1973	140	14.4	331	149	12.3	38	122	8.1	32
Sept. 1973	142	13.3	191	158	10.4	44	123	6.9	12
Oct. 1973	143	13.1	316	157	9.6	77	115	5.7	7
Nov. 1973	139	15.1	104	156	9.1	46			
Dec. 1973	142	13.9	168	149	10.2	26	118	3.9	6
Jan. 1974	144	15.7	36	154	11.4	112	115	0.7	2
Feb. 1974	NS*								
Mar. 1974	NS*								
Apr. 1974	129	12.7	64	149	12.9	11	119	9.5	25
May 1974	126	11.1	113	145	12.2	184①	108	4.9	3
June 1974	127	13.2	54	138	11.1	186	105	4.1	10
July 1974	103	12.9	14	134	8.3	36			
Aug. 1974	130	13.9	109	138	11.1	30	113	12.9	11
Sept. 1974	138	13.1	161	153	8.5	104	118	6.6	35
Oct. 1974	138	14.1	169	153	9.7	75	112	3.3	7
Nov. 1974	144	12.7	131	151	8.9	68	118		

*NS - No Sample

① This is 191 in sex distribution table. In one sample 7 females were counted as part of the sample but not measured.

Table 11 (continued)

Location: Calibogue Sound

	Males			Mature Females			Immature Females		
	Mean Size	Standard Deviation	Number	Mean Size	Standard Deviation	Number	Mean Size	Standard Deviation	Number
Aug. 1972	132	16.3	77	117	6.9	19	115		4
Sept. 1972	143	10.7	58	153	8.3	42	127		1
Oct. 1972	138	14.5	20	153	9.3	29	112		1
Nov. 1972	139	18.9	40				113	3.2	10
Dec. 1972	NS*								
Jan. 1973	NS*								
Feb. 1973	NS*								
Mar. 1973	NS*								
Apr. 1973	NS*								
May 1973	NS*								
June 1973	129	13.3	14	142	12.0	36			
July 1973	130	11.8	113	141	11.9	85	113	6.4	2
Aug. 1973	140	13.5	180	148	7.3	12	125	4.0	8
Sept. 1973	144	12.8	32	161	11.2	16	123	3.5	2
Oct. 1973	NS*								
Nov. 1973	NS*								
Dec. 1973	NS*								
Jan. 1974	NS*								
Feb. 1974	NS*								
Mar. 1974	NS*								
Apr. 1974	NS*								
May 1974	128	12.5	100	143	10.2	43	109	6.5	8
June 1974	125	14.0	116	137	11.4	125	106	6.3	8
July 1974	123	11.3	38	138	12.4	12			
Aug. 1974	130	15.5	340	142	8.4	25	115	7.3	85
Sept. 1974	143	13.1	41	151	12.3	7	100	1.4	2
Oct. 1974	NS*								
Nov. 1974	NS*								

Table 12. Results of Student-Newman-Keuls (SNK) procedure on mean sizes of male and female blue crabs taken by pots from major fishing areas in South Carolina.

		RANK									
		1	2	3	4	5	6	7	8	9	10
	Location & Sex	CAL ♂	NE ♂	WB ♂	PR ♂	SH ♂	CAL ♀	PR ♀	SH ♀	NE ♀	WB ♀
		135.5	135.8	136.6	137.6	137.9	148.0	149.7	150.4	152.0	154.0
Rank	Means										
1	135.5										
2	135.8	0.3									
3	136.6	1.1	0.8								
4	137.6	2.1	1.8	1.1							
5	137.9	2.4	2.1	1.3	0.3						
6	148.0	12.5	12.2	11.4	10.4	10.1					
7	149.7	14.2*	13.9*	13.1*	11.9*	11.8*	1.7				
8	150.4	14.9*	14.6*	13.8*	12.8*	12.5*	2.4	0.7			
9	152.0	16.5*	16.2*	15.4*	14.4*	14.1*	4.0	2.3	1.6		
10	154.0	18.5*	18.2*	17.4*	16.4*	16.1*	6.0	4.3	3.6	2.0	

*Tested and found to be significant at P = 0.05

CAL = Calibogue Sound
NE = North Edisto River
WB = Whale Branch
PR = Port Royal Sound
SH = Saint Helena Sound

Table 13. Calculated weighted mean widths for Whale Branch, St. Helena Sound and Port Royal Sound (Means weighted by sample size).

Time Period	Whale Branch	Port Royal Sound	St. Helena Sound
Aug-November 1972	146	141	141
May-December 1973	137	139	138

Table 14. Commercial landings of blue crabs in South Carolina 1957-1976 in thousands of pounds (South Carolina Landings, Annual Summary, NMFS).

	1957	1958	1959	1960	1961	1962	1963
Jan.	194	20	165	477	95	409	219
Feb.	454	1	466	656	157	659	185
Mar.	374	617	658	452	516	460	1,147
Apr.	105	646	327	731	364	265	614
May	446	978	376	586	618	527	642
June	392	646	380	938	383	448	529
July	361	624	502	787	427	623	656
Aug.	492	438	648	748	415	773	859
Sept.	392	368	443	631	389	629	790
Oct.	219	156	162	450	479	719	1,108
Nov.	130	222	337	381	347	551	1,713
Dec.	26	123	309	283	482	275	378
TOTAL	3,584	4,839	4,772	7,121	4,672	6,338	8,839

	1964	1965	1966	1967	1968	1969	1970
Jan.	111	298	164	152	108	60	43
Feb.	282	337	137	402	81	223	173
Mar.	713	543	411	561	418	421	643
Apr.	520	274	275	281	190	292	196
May	741	524	703	387	354	720	553
June	844	593	611	412	162	834	643
July	1,341	839	519	362	256	1,011	840
Aug.	1,283	1,022	802	508	429	1,152	1,003
Sept.	1,107	1,131	716	530	673	1,227	886
Oct.	1,200	835	753	650	670	1,203	923
Nov.	740	612	443	464	417	829	678
Dec.	553	412	191	539	105	277	367
TOTAL	9,436	7,420	5,724	5,247	3,862	8,250	6,950

	1971	1972	1973	1974	1975	1976*
Jan.	200	570	232	622	256	71
Feb.	245	339	185	306	266	380
Mar.	737	550	495	294	69	178
Apr.	231	225	264	506	199	374
May	550	491	1,044	680	501	468
June	763	578	1,010	674	542	722
July	962	772	895	802	746	770
Aug.	934	959	975	850	707	742
Sept.	916	899	766	990	831	779
Oct.	926	993	1,067	929	1,290	730
Nov.	656	697	684	670	795	260
Dec.	386	349	335	224	364	72
TOTAL	7,508	7,422	7,952	7,548	6,566	5,547

*Preliminary statistics from Fisheries Statistics Section, S. C. Marine Resources Center.