

HISTORY OF THE SOUTH CAROLINA OYSTER



SOUTH CAROLINA
WILDLIFE AND MARINE RESOURCES DEPARTMENT

MARINE RESOURCES CENTER
CHARLESTON, SOUTH CAROLINA

Educational Report No. I.

March, 1972

INTRODUCTION

Within the borders of South Carolina are approximately 2,200 miles of salt water creeks, bays, sounds and rivers. Many of these bottoms support oyster beds. Some 7,059 acres of intertidal oyster grounds are either under private lease or included in Public Recreational Shellfish Grounds.

Oysters grew on this coast thousands of years prior to the coming of man. Upon his appearance this shellfish comprised a substantial portion of the early coastal-plains Indian diet. Numerous shell-middens survive to attest to many centuries of extensive Indian community usage.

Historically, the first European explorers and settlers were quick to discover and use the large quantities of oysters they found. The English, in particular, left numerous written accounts describing the oyster.

The modern oyster industry had its beginnings in the nineteenth century. Commercial production peaked shortly after the beginning of the twentieth century. Current harvesting problems hold annual production to about 250,000 bushels. However, in terms of dollar value the oyster in South Carolina is the second most valuable seafood product.

ACKNOWLEDGMENT

Special acknowledgment is due Mrs. G. Robert Lutz; Mrs. Marilyn L. Nelson, Reference Librarian, Department of the Interior Library Services; Mrs. Granville T. Prior, Director and staff, South Carolina Historical Society; Mrs. Virginia Rugheimer, Librarian and staff, Charleston Library Society; Dr. Robert L. Stephenson, Director, and Stanley South, Archeologist and staff, Institute of Archaeology and Anthropology, University of South Carolina; and John W. Walker, Archeologist, NPS, Southeast Archeological Center who provided the majority of the published historical data used in this report.

The authors are also grateful to all of the commercial fishermen who provided cooperation and timely information.

Front Cover—Painting by G. J. Maggioni owned by Mrs. G. Robert Lutz of Charleston, South Carolina. Photograph by Willis J. Keith.

Back Cover—Aerial view Fig Island Indian Shell-ring, North Edisto River, South Carolina. Photograph by Robert C. Gracy.

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* Photographer unknown. † By Waddell Robey.
All other photographs by the authors.

NATURAL HISTORY (The South Carolina Oyster)

Each year South Carolina produces a wide variety of popular seafoods. One of the most delicious among these is the oyster. It is readily available and can be served in a variety of appetizing ways—fried, roasted, steamed, or raw on the half-shell (Figure 1). Not only are they palatable, but contain a number of needed vitamins, minerals, carbohydrates and proteins.



FIGURE 1—Oysters on the half-shell.

The South Carolina oyster fishery is centered wholly around the American Oyster or, as it is called scientifically, *Crassostrea virginica*. Oysters are found in most of the estuarine areas of the State. They do not grow well in very fresh water, but prefer a moderate to high salinity.

Most oysters in our state grow intertidally in the zone between high and low tides. The tide range varies from an average rise and fall of about five feet near the North Carolina border to about seven feet upon nearing Georgia. Exposed by these tides are wide expanses of mud flats suitable for the growing of oysters. Only a very small percentage of our oysters grow below the low tide mark in subtidal regions.

In 1967 the value of oyster landings and processed products amounted to approximately 1.3 million dollars in South Carolina. The only seafood with a greater value was shrimp. National Marine Fisheries Service records reveal that South Carolina's oyster industry peaked in 1908 with 3,220,779 bushels harvested. By 1969 it had decreased to 599,620 bushels. This rather drastic decline probably can be attributed to a steady decline in the availability of hand labor for both harvesting and shucking, inadequate regulatory practices and poor management.

Oysters, clams and mussels are all members of the same family. Externally they are composed of two hinged shells called valves.

Although the oyster is not a highly complex animal, it is quite efficient. Upon viewing an open oyster from above (Figure 2), a mantle of tissue can be seen extending around the lips of the shell. This mantle secretes the shell-building calcium carbonate and also helps direct the food-bearing water to the gills. Numerous fine fringe-like whips, called cilia, cover the gills. These constantly beat back and forth, drawing water between the shell openings. Microscopic food particles, borne by the water, are filtered out. The water also brings in necessary oxygen; for, like all animals, oysters require life-giving oxygen.

Food is passed along the gills by the beating of the cilia until reaching the mouth near the hinges. Coarse non-food particles are separated and the food passes through the mouth by a short tube to the stomach. From the stomach runs a long rudimentary intestine which forms a loop and terminates in one side of the shell cavity near the shell closing muscle. Here waste products are expelled and washed from the oyster.

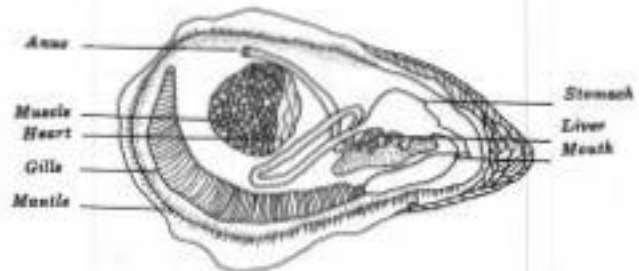


FIGURE 2—Diagram of an opened oyster showing its major parts.

The pumping capacity of a healthy oyster can be astonishing. If conditions are favorable, a single oyster can pump up to 100 gallons in 24 hours.

It has long been commonly believed that oysters are good to eat only in months that contain an "R" in their spelling. This belief probably arrived on these shores with the first colonists to North America since this does hold true for a species of oysters found on the coast of Europe. This European oyster retains larvae within its shell for about two weeks during the warm weather spawning season before releasing them into the water.

The tiny shells of the larvae are gritty like sand and therefore make the oyster inedible.

American oysters do not retain their larvae and are good to eat at anytime, although they prosper more in the cooler months when they add large amounts of animal starch. An oyster containing large amounts of this starch is generally said to be fat. In South Carolina, oysters are actually in their best physical condition in April and May. As the water temperature begins to rise, the oyster's energies turn to reproduction.

When the water temperature reaches about 70° F. the oyster begins to spawn. Both sperm and eggs are released directly into the water. Usually during the first two spawning seasons an oyster is a male; afterward it may become a female and continue to alternate sexes. This alternation of the sex is due primarily to the growing conditions that exist, since it requires more energy to produce eggs than sperm. This sexual fluxion is well known and is called "protandric hermaphroditism". Fertilization is by chance union between sperm and egg in the sea water. A single female may produce a hundred million eggs in one spawning. Undoubtedly many millions of these eggs fail to be fertilized and perish. One or two days after fertilization the egg develops into a baby oyster called a larva. The larva apparently floats and feebly swims near the surface. About two weeks later the larva has developed a pair of transparent shells called valves. At this stage it is now ready to find a clean, firm substance to which it will attach. If a place for attachment is not found, the larva soon sinks to the bottom and dies. If a suitable place is found, the larva ejects a sticky fluid that cements the left shell to the object. Here it will remain for the rest of its life. The attachment is known as a strike or set. At this stage, the young oyster becomes known as a spat.

In comparison to more northern areas of the Eastern Seaboard, South Carolina oysters grow very rapidly. In Long Island Sound, New York, an oyster requires about four to five years to reach its optimum size. In Maryland it takes from three to four years to reach the same size. On the South Carolina coast an oyster can attain a harvestable size in about two years. With proper management, this rapid growth provides the oysterman with the advantage of harvestable oysters at relatively short intervals.

Although most oysters grow to maturity in a few years, they can live in excess of twenty years and there have even been recorded instances of them attaining an age of forty years.

South Carolina oysters have a wide variety of shapes and sizes. This diversity of configuration (Figure 3) depends upon the place the set occurs,

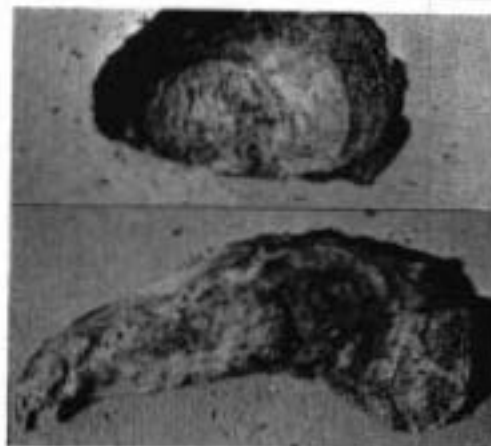


FIGURE 3—Shapes of oysters are influenced by growing conditions. The rounded configuration (top) is typical of subtidal growth. The elongated shell (bottom) denotes intertidal growth.

subtidal or intertidal, and the growing conditions present at the place of set.

The most common type of growth seen in our oysters produces groups known as the "cluster oyster". These oysters grow in the intertidal zone and are formed by successive yearly sets on the older oysters. As new sets are made the cluster grows, sometimes becoming quite large and taking the shape of a small bush. On occasion such clusters, when attached to a solid matrix, may reach a height of 18 inches or more (Figure 4). As new growth occurs, the added weight pushes the bottom oysters into the mud where they eventually suffocate. Only the outer and top-most oysters remain alive. Some oystermen will break up these clusters into single oysters and redeposit them in areas more advantageous to superior growth.

Steam canneries prefer the larger clusters which can be more economically harvested and processed by their automated methods. Also the smaller oyster meat is better suited for soups. Oyster-roast restaurants prefer smaller clusters contain-



FIGURE 4—Oysters clustered together in Clark's Sound.



FIGURE 5—Oyster rock near Otter Island, St. Helena Sound.

ing larger oysters that can be readily broken up and opened by hand.

Intertidal oysters are also found in groups known as "oyster rocks" (Figure 5). These oysters evidently grow on a firm foundation and probably initially start out as a very thick mat of cluster oysters. Successive sets are made each year and eventually the clusters join together to form a continuous group. Through a period of many years, tiers of oysters are laid one upon another. The lower-most oysters die of suffocation or starvation before they ever reach a harvestable size. Eventually the "oyster rocks" grow to be several feet thick. Only the uppermost oysters are alive and, due to their prolonged exposures to the elements, they remain of an unharvestable size. Locally these oysters are sometimes referred to as "coon oysters". Their only use is to be broken into seed and distributed to better growing areas.

Still another type of oyster is found in South Carolina. This is the subtidal or deep water oyster that spends its entire life submerged in water, never seeing sunlight, and feeding at its pleasure. Oysters which are grown in these areas are usually superior in size, shape, and taste to those grown between the tides. They tend to grow in groups of not more than three. In addition, they tend to develop the very deep cup so highly prized by gourmets. These oysters are considered quality table stock, suitable for serving on the half-shell. They are the premium product of the oyster industry, commanding high prices, and are in constant demand.

Due to adverse bottom conditions, subtidal beds comprise only a fraction of this State's oyster bottoms. While intertidal beds amount to many thousands of acres, subtidal acreage totals only slightly more than 700 acres.

Deep water oysters lead a rugged early life. By being continuously submerged they are subjected to a never ending attack of pests and predators. Boring sponge, oyster drills, star fish, blue crabs, stone crabs and others take a constant toll. These same creatures also attack intertidal oysters, but the daily exposures to sunlight tends to minimize heavy prolonged attacks.

To establish and begin growing these oysters require almost brackish water and a very firm bottom, free from silt or drifting sand. After they become about one year old, a much higher salinity is required to achieve maximum size and rapidity of growth. Few areas have the fluctuating salinities which are requisite to both the oyster's establishment and to later rapid growth. Usually it is more profitable to transport small subtidal "seed" oysters from established natural deep water beds to highly saline growing areas than to attempt to discover one optimum place for both a successful set and rapid growth.

Of these few natural subtidal areas one of the most productive is Alligator Creek, near McClellanville. Here are found all the conditions necessary for the oyster to set with a high chance of establishment and survival and then to grow at a maximum rate. Many of these superior oysters come from this small creek. Most of them enter the half-shell trade where they are much appreciated by the connoisseur of fine seafood. Early this past Spring, in an effort to enhance the productivity of this creek, the South Carolina Marine Resources Division carried out experimental seed planting (Figure 6) utilizing small oysters from the Wando River. It is anticipated that this planting will substantially increase production of these fine oysters in 12 to 18 months.



FIGURE 6—Wando River subtidal seed oysters being planted in Alligator Creek.

South Carolina's oysters are second to none. They generally have the desirable salty taste sometimes lacking in oysters from other regions. Our season is long (September to May), and, where the labor supply is adequate, there are few problems of supplying the demand.

While most persons might consider the oyster as somewhat of a delicacy, this is not necessarily true. Oysters are a popular food the world over. Here in South Carolina, fall and winter oyster roasts are popular, providing both good food and congenial gatherings.

PART II

THE PRE-HISTORIC PERIOD (The Oyster and the South Carolina Indian)

Not too surprisingly, the earliest users of seafood in South Carolina were the prehistoric Indians of the coastal-plain. A staple among the various types of seafood used was the American oyster. This shellfish, being immobile and usually exposed by low tides, was easy to gather and apparently a plentiful natural resource for thousands of years. Radio-carbon dating indicates that the earliest pottery-making Indians used oysters as food at least as early as 2000 B.C.

Ample evidence of Indian usage is relatively abundant, if not always immediately obvious, around the State's estuarine areas. Generally, the most prominent indication of Indian usage occurs in the form of indiscriminately heaped piles of oyster shells known as middens (Figure 7) or well-defined circular constructions called simply shell-rings. These sites usually lie in the marsh or in heavily wooded areas and are not always discernible.



FIGURE 7—Indian shell-midden on Big Bay Creek, Edisto Island.

A midden is composed of habitation refuse, merely a trash heap of an earlier age. A shell-ring is definitely something else. The shell-ring is uniform in height within a single site. They are both found in marshy areas and on high wooded

ground. Shell-rings are relatively large with rim diameters ranging from 130 feet to 300 feet with wall thicknesses of 25 feet to 70 feet. Shell-rings were obviously planned and required a great expenditure of time and labor and must have been of importance to their builders. Although constructed for a definite reason, the exact purpose of these structures is still open to conjecture. Archeological studies indicate they were probably used for some ceremonial, but not necessarily religious purpose. Although there are several divergent theories of utilization, such as their being utilized as "fish traps", few of these ideas stand the test of practical application or are not applicable to many of the known sites. It is thought that habitation was on or very near the perimeter of the ring, but no conclusive evidence has been found to support this theory. If shelters were present, they were lightly constructed and left no obvious indication of their existence.

Preliminary excavations of the open space at the center of the rings have revealed no conclusive evidence of habitation, although it is suspected that habitation may have occurred there also. Many of the shell-rings have low, muddy interiors, which hinder the type of excavation needed for the location of post-holes or other indicators of shelter construction.

All of the South Carolina coastal shell-rings and their associated shell-middens are prehistoric and were the dwelling sites of the earliest pottery-making inhabitants of the Southeastern Atlantic coastal plain. The shell-rings were probably abandoned about 2,000 years ago. Middens may be composed of shell collected up to about 300 years ago. All coastal Indians certainly utilized shellfish, to some degree, up until their eviction by encroaching European colonists in the late seventeenth and early eighteenth centuries.

Middens are found not only in the proximity of some shell-rings (Figure 8), but around most South Carolina estuaries. The northern extent of the shell-rings (Figure 9) is on the upper end of



FIGURE 8—Fig Island shell-ring and shell-midden on western shore of the North Edisto River.

Sewee Bay in the Francis Marion National Forest. This makes their range relatively limited, extending south only as far as Sapelo Island, Georgia, where the largest North American one is located. All known shell-rings in North America are located in the Sea Island section of the Southeast Atlantic coast. Only one other has been documented, and it is located in South America at Puerto Hormiga, Colombia. Although it is constructed of clam shell, its dating of about 2500 B.C. and the marked similarity in form to the Georgia-South Carolina rings have led some archeologists to strongly support the theory of the shell-rings being introduced into this region by early voyagers from South America. Although there are no known intervening archeological sites in Central America on the Gulf Coast, the theory is quite plausible but at this time lacks conclusive proof. The northern bound current of the Gulf Stream would have favored the passage of Indians from South America past the north-western tip of Cuba, through the straits of Florida, ultimately to a land-fall on the Sea Island coast.



FIGURE 9—Northernmost documented shell-ring, located on the upper end of Sewee Bay.

During the spring of 1970, the Institute of Archeology and Anthropology of the University of South Carolina, under the direction of Dr. Robert L. Stephenson, conducted a survey of about 150 miles of Georgia and South Carolina coast, specifically concerned with locating shell-rings. Dr. E. Thomas Hemmings was in charge of the field work and was assisted by Gene Waddell of the Florence Museum. A total of 18 shell-rings were located and examined. There are believed to be at least four others in this area, but their existence has not yet been confirmed.

At about the mid-point of their distribution is found the largest intact shell-ring in South Carolina. This excellent example is located near Fig Island on the west bank of the North Edisto River. Its diameter is about 250 feet, and it encompasses an area of approximately one-half an acre. Its height is 5 feet above the surrounding marsh and its rim base averages 35 feet. It is composed almost entirely of oyster shell, the volume of which is no less than 375,000 bushels. This ring was excavated during the 1970 studies (Fig. 10). There



FIGURE 10—Archeological excavation trench at Fig Island, dug during 1970.

is a second ring nearby, but over the years it has largely succumbed to erosion. Close by is a large midden probably containing, at one time, at least as many oyster shells as the intact shell-ring. However, the midden has been partially destroyed in historic times by ill-advised borrowing of shell for construction purposes. Before the Civil War, a type of building construction utilizing burnt shell called "tabby" was common. Use of shell as road fill or in tile drainage fields was extensively practiced until recent years.

While the bulk material of all the rings and most of the middens is the American oyster, the same that grows today, there is evidence of other animal remains. The remains of whelks, mussels, clams, oyster drills, turtles and crabs are homogeneously mixed with the oyster shells. Even

periwinkles are found in large numbers, perhaps indicating that they were the basic ingredient for some type of broth. Fish remains were quite plentiful, although they do not contribute much to the physical bulk of the shell piles. Black drum teeth and catfish earstones (otoliths) indicate that these fishes formed a prominent part of the coastal Indian's diet.

Mammal remains are not as common as those of molluscs, but raccoon, opossum, and deer remains have been recovered. Of the remains of different types of food, oyster shells have perhaps best withstood the ravages of time and present us with the most apparent visual evidence seen today. However, oysters apparently provided only a relatively small percentage of the actual protein intake. Dr. William E. Edwards, in a report on excavations conducted at the Sewee Ring in 1965, indicates that while oyster shells constitute some 98 percent of the molluscan remains, fish such as catfish and garfish constituted a significant portion of the Indian seafood diet. Snails, mussels, clams, and conchs make up the majority of the remainder of this ring's shell remains. Clams form less than one percent of the shell total, but several hundred yards east of this shell-ring is a midden composed almost entirely of clam shells. Interestingly enough, skate and alligator remains are found in significant numbers, but no shark teeth have been reported.

Bone and antler artifacts as well as pottery fragments (shards) (Figure 11) are found mixed throughout the shell. Artifacts of bone and antler are sometimes found inscribed with elaborate geometric designs. Stone artifacts are rarely found, but a stone projectile point known as the "Savannah River Stemmed Point" is discovered infrequently. These are spear points, as the bow and arrow were not developed until a later period.



FIGURE 11—"Stalling Punctate" pottery fragments collected from some of the Indian shell-middens on the South Carolina coast. These date from about 2,000 B.C. to 1,500 B.C.

Various shells were made into both decorative and utilitarian objects. Excellent examples of beads, cups, hoes, and scrapers have been recovered.

The superior quality of the Indian-gathered oyster shells, in both size and shape, is readily apparent to anyone familiar with the present-day state of the South Carolina oyster. In 1938, the late Dr. G. Robert Lutz, then with the Charleston Museum, conducted a survey of shell sizes at two prehistoric locations in Charleston County. He wrote of his findings: "On the west bank of the Ashley River, about eight miles above Charleston, South Carolina, there is a large shell heap containing over 3200 bushels of oyster shells. The geographic location of this shell pile is such that the oyster shells therein must have come from the nearby river. Practically all the oyster shells in the mound are over 3.50 inches from hinge to bill. Today, the Ashley River produces no oysters commercially, and even experimentally it is doubtful if any oysters could be gathered which would compare favorably with those from the Indian shell heap. Of course, the Ashley River is and has been for some years heavily polluted with sewage and mill waste. This pollution may have been the cause of the decrease in the size of the oysters of today.

In order to compare the size of pre-colonial oysters with present day oysters not affected by pollution, shells were collected from a large Indian shell heap on the edge of Sewee Bay . . . These shells came from oysters quite evidently gathered in the vicinity of Sewee Bay, which is far removed from any source of pollution."

Of the shell-ring samples examined at Sewee Bay, the average length proved to be 4.29 inches; the average length of the control group of living oysters picked nearby was 2.25 inches. Another group gathered from a more remote location, but still in Sewee Bay, averaged 2.67 inches. Observations made of other shell-rings and middens in later years south of Charleston tend to confirm Dr. Lutz's findings that the oyster of the period of Indian usage was generally much larger than those available today. Dr. Lutz surmised that the oyster has not become a smaller species over the years, but rather, the small size of today's oyster is the result of intensive commercial harvesting which does not allow it to grow to maximum size.

However, other factors may enter into the question of decreasing size as well. It is possible that biological conditions such as fluctuating or lower salinities in the estuaries may have been variable enough to promote rapid growth and at the same time inhibit oyster predators. Dr. Edwards took a different approach, and in the case of the Sewee shell-ring suggested that the large size of the

shell "probably indicates that conservation, by choosing only the larger individuals, was practiced for it seems very unlikely that the population of the site did not, by the middle of its occupation, reach the point at which small oysters would have been deemed worthy of collection if there had been no strong sanctions against such a practice." He estimated that this shell-ring was occupied from 150 to 400 years.

In the cases of the Fig Island and Sewee Bay shell complexes, the configuration of the shells (Figure 12) would indicate that the Indians of that time may have had access to shallow, but nevertheless, subtidal oysters which today are almost always superior in shape to the predominant intertidal oysters so common in the majority of the State's tidal areas. There are extremely few commercial quality subtidal oyster beds located anywhere in South Carolina today. There are no known subtidal oyster beds in the North Edisto estuary today and no evidence that there ever



FIGURE 12—Oyster shells from the Fig Island shell ring. Their configuration is typical of oysters grown subtidally.

were any, except for the Indian collected shells. However, early beds could have been easily destroyed by natural events such as hurricanes, or in more recent times by silting hastened through the interference of man by his tampering with the natural flow of waterways which causes an unnatural flow of currents and mixing of salinities.

Additional research is needed on the early shell collecting Indian cultures of the South Carolina-Georgia coast. Of particular interest to the archeologists are the shell-ring builders. The rings themselves may hold important keys for interpretation of emerging "formative-life" in the coastal Southeast where, prior to food producing, sea-oriented subsistence techniques may have permitted a high degree of sedentism. Because of this method of subsistence, perhaps introduced by early waterborne colonists from South America, the first forms of true village life were able to emerge in what is now the Southeastern United States.

Of special interest to the marine biologist is the need to gain insight into the local environment at the time of early occupation and the manner in which it was exploited. Knowledge of the percentage and types of primary food collected from the estuaries would give an indication of the changing conditions of our tidelands and allow new opinions to be formed concerning current prevailing trends. Data gained from the shell-rings and middens may be of importance in helping to evaluate the effectiveness of some present day management and conservation practices. Obviously, the critically poor condition of some of our tidelands today would have been quite appalling to the shell-ring builders.

PART III

THE HISTORIC PERIOD (The Development of the South Carolina Oyster Industry)

Before the English colonists landed in what was later South Carolina, oysters had been eaten and their shells utilized for many years in Europe. The early settlers on our shores were familiar with this shellfish, and early writings published in seventeenth century England evidenced a scientific interest in oysters. In 1665 a paper written by M. Azout, described "shinning worms in oysters." J. Worlidge authored a title in 1668 "describing the uses of oyster shells for agricultural purposes." A concise and descriptive article

concerning oysters was prepared in London by Thomas Spray in 1669, and published by the knowledgeable Royal Society. It described the biology of the oyster and the then current British management practices as well as the laws which governed the harvesting and planting of oysters. Peculiarly enough, these laws were administered by the powerful Admiralty Courts, and such actions as carrying cultch from the natural oyster beds, except during May, were punishable as a felony. Mention is made of other "great penalties

by the Admiralty Court" that may be laid upon those not abiding by the oyster laws. It would appear that the English held the oyster in high regard and were mindful of required conservation practices at this comparatively early date.

By 1666, the English had begun serious exploration of the Carolina coast. One of the earlier explorers was Robert Sanford. In his *A Relation of a Voyage on the Coast of the Province of Carolina*, he described a trip up the North Edisto River: "The next day I went some miles up the maine River and finding a creede (Leadenwah) alsoe on the East side . . .

We rowed a long way up the creede, and besides these swamps sawe and ranged through very spacious tracts of rich Oake land, and yett wee were not past the Oyster bankes and frequent heepes of shells, nor the salt water."

Sanford also writes about Calibogue Sound to the south: "It abounds besides with Oyster bankes and such heepes of shells as which no time cann consume, butt this benefitt it hath but in common with all the Rivers betweene this and Harvey Haven (North Edisto), which are stored with this necessary materiall for lime for many ages, and lying soe conveniently that whatever neer River or Creeke you cann thinke fitt to sett a house there you may place your lime kill alsoe . . .". During this time it would appear that oysters grew in great abundance. Sanford's reference to construction of a "lime kill" denotes an interesting aspect of utilization of oyster shells in the early days of South Carolina. Oyster shells were frequently burned to produce lime for use as a binder or cement for building purposes in the Southeastern coastal regions. A type of poured form fabrication, known as "Tapia", or now more commonly as "Tabby", became relatively common along the South Carolina coast from the early colonial period to the beginning of the Civil War. A description of a lime kiln in South Carolina has not come to light; however, archeological excavations at James Town, Virginia, have revealed lime kilns which were in use between about 1680 and 1720. There is no reason to believe that there was any significant difference in the early types in South Carolina, since they were probably constructed according to English precedents. Perhaps the simplest James Town kiln was constructed of brick and clay. It was small; the fire chamber being only four by two feet. In this type of kiln, the sides tapered upward. The fire was built on the floor beneath a rough arch of stones or oyster rock. The loose oyster shells were placed on top of this arch and continued up into the chimney. Wood was usually used as fuel although there is evi-

dence that coal was sometimes used in Virginia. The fire was allowed to burn until the shells were calcined, after which the kiln was allowed to cool and the burned lime removed; an operation requiring some care. Until ready for use, the finished product may have been stored in pits and covered with earth to prevent hardening.

Although now generally believed otherwise the making of Tabby and its use are not lost in the past insofar as to the availability of contemporary descriptions for its production and use are concerned. Certainly it is not beyond present technical capabilities to produce Tabby, but the labor costs would possibly be prohibitive. Well known descriptions for its manufacture and application are available, such as the one by Thomas Spaulding of Sapelo Island, Georgia, in 1844. Basically it is a mixture of sand, lime, oyster shells and water in equal portions by measure. Its decline in popularity can probably be attributed to the development of more efficient materials for hard form construction and also to the prohibitive, time consuming operation of producing the lime along with the relative long curing time of the material after it was poured. Tabby does not seem to have been used in South Carolina after the beginning of the Civil War.

Extensive use of tabby in colonial fortifications can readily be seen in several coastal forts which still stand; Fort Prince Frederick (1731) on the Naval Hospital grounds at Beaufort and portions of the defensible seawall at Fort Johnson (1759) on James Island. An outstanding example of this type of construction in coastal South Carolina is Fort Dorchester (1757) on the upper Ashley River. It is well preserved, administered by the South Carolina Department of Parks, Recreation and Tourism, and open to the public. Throughout the colonial period, oyster shells provided the basic raw material for "hard" construction in a coastal area devoid of readily available substitutes. Tabby was not only used in fortifications, but also for houses (Figure 13), foundations, cisterns, spillways and in almost any application where modern concrete is now utilized.

The English landed at Albermarle Point (Old Town) in 1670. Carteret left a detailed description of the country. His observations are recorded in his *Relations of Their Planting at Ashley River, 1670*. Contained in these writings is a description of a visit to Saint Helena Island. During this visit he observed, "Oysters in great plenty, all the island being wounded with banks of the kinde, in shape longer and scarcely see any one round, yet good fish though not altogether of soe pleasant taste as your Wallfleet



FIGURE 13—A portion of the tabby ruins located at Hague Point on Daufuskie Island.

oysters." Besides commenting on their great abundance, he is accurately describing the typical elongated configuration of South Carolina intertidal oysters. The European oyster, with which he was familiar, was more rounded in shape, and in his opinion those from the area in England known as Wallfleet had a more pleasant taste. This consistently elongated shape is also mentioned in Thomas Ashe's description of 1682 when he comments "... the Seas and Rivers of the same bounty equally participate in the Variety of excellent and wholesome Fish which it produces, Viz . . . Oysters of an Oblong or Oval Form; their number inexhaustible; a man may easily gather more in a day than he can well eat in a year; some of which are margiritiferous, yielding bright round Oriental Pearl".

From the time of the earliest English settlements the tidal creeks and rivers of South Carolina supplied large quantities of oysters to the colonists, their servants and slaves, and their descendants. Oysters in the early years of colonization were probably as important to the settlers as to the Indians who preceded them. Oysters

provided the colonists with a readily harvestable, and probably welcome, food supply. Excavations of kitchen middens, during the Charles Town archeological efforts preceding the South Carolina Tricentennial Celebration of 1970, provide evidence of oyster usage.

Even as the colony began to mature, there continued to be an interest in oysters. A description of distribution and typical appearance of the South Carolina intertidal oyster and bottoms appears more than 50 years after the coming of the first colonists. Recorded by the distinguished early naturalist Mark Catesby in his *Natural History of Carolina, Florida, and the Bahama Islands*, are his impressions of the oyster regions; "At low water there appear in the rivers and creeks immense beds of oysters, covering the muddy banks many miles together; in some great rivers extending thirty or forty miles from the sea, they do not lie separate, but are closely joined to one another, and appear as a solid rock a foot and a half to two feet in depth, with their edges upwards". It is interesting to note his claim of having observed oysters "thirty or forty miles from the sea", for today no oysters extend that distance up South Carolina rivers; however, as late as 1825, Robert Mills' map showing the Santee River denotes the upper limits of the "oyster shell region" as being far above their present extent.

Between 1830 and 1869 there were, on the east shore of the Ashley River, bordering the western side of Charleston, several tidal sawmill ponds ranging in size from about 30 acres to 1,000 acres. From these ponds came a quality oyster which became locally renowned as the "Mill Pond Oyster". These oysters were generally not sold, the owners of the ponds being wealthy, but were utilized by the owner or given to selected friends. The desirability of these oysters was such that the ponds were guarded at night to prevent their theft.

Some time in the late 1860's the steam-engine replaced the water-wheel, and the ponds were no longer used as a power source. In 1868-1869 a company was formed to cultivate oysters in these abandoned ponds. They secured the largest pond, removed the unused sawmill logs and stocked the pond with seed oysters from the nearby rivers. Within two years the company met with failure. Because of some biological reason, or combination of reasons, when the ponds ceased to be used for their original purpose, the native oysters did not reproduce. The transplanted seed oysters soon died, and by 1870 the venture was abandoned. Dr. C. B. Colson, writ-

ing in 1888, partially attributed the failure to the removal of the sawmill logs which, when waterlogged, settled to the soft silt bottom and provided a place for attachment of the oyster and prevented suffocation.

Though there was extensive home usage, a true oyster industry did not develop until about the last third of the 19th century. Probably the first beginnings were manifested in the taking of orders for specific quantities of oysters before actual harvesting was done.

Oyster shells were used for a number of years as a stabilization material for road construction. Many early coastal roads utilized crushed oyster shells. One of the longest, the one from Beaufort to Charleston, existed before the Civil War. In recent years the scarcity of raw shell has forced the curtailment of this practice.

The Oemler Oyster Company shipped oysters in barrels to Philadelphia from Savannah, Georgia, in about 1886. Boston received raw shucked oysters, in excess of 13,000 gallons, from Savannah in about 1892. It is said that in some months the demand exceeded the supply. Some of the oysters shipped from Savannah were actually harvested in South Carolina. Deep water oysters were taken from Tea Kettle Creek in Beaufort County and sold by Oemler under the trade name of "Colossus Brand". It was noted by Mr. Oemler that an oyster company located at Beaufort, South Carolina, had prior to this date, used a steam dredge extensively in this area to obtain these select oysters.

Canning of oysters apparently did not commence in South Carolina until about 1880. All the canneries but one are now closed. Shellmore, at Awendaw, the last to close, stopped its canning operations in the 1960's. Ocean, Lake & River Fish Company still maintains its canning operation on Ladies Island near Beaufort (Figure 14).



FIGURE 14—At Factory Creek on Ladies Island is located the only steam oyster cannery left in the state.

The gathering of oysters has undergone no basic changes since the early years of the industry and it is this lack of development of mechanization which tends to limit production.

In 1889 the State legislature granted, by special act (the only method to then gain control of bottoms) a lease to Messrs. Hazard, Alexander and Donaldson in Winyah Bay and vicinity for the purpose of oyster cultivation. These prospective oystermen contracted John D. Battle to undertake a resource assessment of their grounds, which was completed by 1890. In 1890-1891, Battle completed an oyster study of the entire coast of South Carolina for the United States Fish Commission. This was an extensive survey, probably the first sponsored in this State by a governmental agency. It was undertaken after similar earlier studies had been conducted in the neighboring States of Georgia and North Carolina. The major concerns of this study involved attempts to locate subtidal oyster beds and bottoms suitable for subtidal cultivation and mapping of intertidal growing areas.

By 1890 the Bull Bay and Edisto Fish and Oyster Companies had cultivated subtidal oysters growing in Santee Pass Creek and in Bull Bay. According to Battle's study, the "wild" oysters of the region were often superior to the planted subtidal ones of the Bay. Cultivation was practiced using seed oysters, and conchs, starfish and other predators were culled from the beds. Both companies sold oysters to dealers in Charleston and shipped oysters in barrels to Baltimore, Maryland.

Also in the late 1880's or early 1890's, Henry Merritt had planted oysters in Lighthouse Creek near Folly Island. It is interesting to note that he claims: "A scarcity of reliable labor interferes with the increase of business . . .", a problem apparently more prevalent now. These oysters were probably sold locally.

John Griffin, in Bailey Creek near Edisto Island, had his business of cultivating subtidal oysters underway in the 1880's. He usually had about 20 acres under cultivation and sold his total yearly output of about 1,000 bushels in Charleston for 75¢ (1890) per bushel.

About 1885 Elmo Cetchovitch is believed to have started the first raw shucking house in South Carolina. His operations were in the Beaufort area and also possibly in the vicinity of Daufuskie Island. His name appears on oyster leases in this area dating back to 1916. He also controlled bottoms near Bulls Island, Calibogue Sound, Cooper River and Bull Creek. He possibly

maintained an interest in the oyster business as late as 1935.

L. P. Maggioni & Company operated on Dauskie Island from about 1883 until 1902. They moved to Port Royal in 1903 and to Ladies Island in 1918, where they are still located (Figure 15).



FIGURE 15—The Ladies Island oyster cannery as it appeared before World War II. The oyster schooners were once a common sight along this coast.

This company bought, built and operated several canneries; among them were a cannery on Jenkins Island in 1920, the Von Platt cannery on Yonges Island in 1921, a cannery at Tom Fripp (Frogmore) about 1927, and still another at Sams Point in 1930. All but the Ladies Island plant have now ceased operation. Some of their plants were numbered among the 16 steam canneries reputed to have been in operation in South Carolina between 1890 and 1905. Today the Ladies Island plant is the only cannery still in operation. It is currently being managed by the grandson of the founder.

Shellmore Oyster Products, near Awendaw at Buck Hall, began canning operations about 1914 and continued until a fire destroyed the main plant building. A portion of the facilities was reconstructed, but canning operations were never resumed after the fire.

In 1922, Captain John Flowers sailed from Baltimore with his family and oyster harvesting equipment on two schooners. He had previously supplied labor from Baltimore for L. P. Maggioni and Co., and was apparently impressed with the extensive intertidal oyster beds he observed in South Carolina. His family settled on Edisto Island, and for several years they lived on one of the schooners. They immediately began raw shucking operations, and about 1930 a cannery was built on Fishing Creek. Oysters were canned during the winter under the trade name of "Lady Edisto". Along with several other oyster canneries, vegetables were canned in the summer, but

usually supplies did not meet the demand and the vegetable canning ventures were generally unsuccessful. Oyster canning operations ceased some time before World War II. Captain Flowers' two sons still continue in the oyster business with a raw shucking house.

Before 1940, raw shucked oysters from South Carolina were distributed through much of the Midwest. During World War II there was a drain on the hand labor supply so necessary for both harvesting and shucking. Production consequently suffered and has never recovered. Since about 1945 governmental, social, economic and welfare policies have apparently contributed to a further decline in the availability of the hand labor supply which at this time is still necessary to the oyster industry. The creation of newer occupations which offer non-seasonal employment, more security and sometimes higher pay have further drawn off manpower.

Harvesting techniques have changed very little since the beginnings of the industry. The oystermen still walk on the intertidal oyster banks, either filling a container to be emptied onto a small boat or loading directly into a wide flat-bottom boat, known locally as a "batteau", for transfer either directly to the dock or perhaps to a barge or self-propelled scow of larger capacity. This procedure is time consuming, requires many workers in relation to the quantities produced, and is inefficient from the standpoint of harvesting an area in a proper manner, since only the most accessible areas are picked. This tends to almost denude some shores while leaving others overpopulated.

According to the National Marine Fisheries Service records, oyster production in South Carolina has been on a steady decline since 1908.

The Little River area is entirely closed to shellfish harvesting because of pollution. Most of Murrells Inlet is open to harvesting, but few oysters are raw shucked. Restaurants and shell stock dealers handle the bulk of the oyster business in this area.

Winyah Bay and a portion of the Santee Rivers are also closed to commercial harvesting because of pollution. The area between Alligator Creek and Isle of Palms probably supplies the bulk of shell stock oysters harvested in South Carolina. Many oysters are shipped in the shell from McClellanville to areas as far north as New York. Alligator Creek produces some of the finest subtidal oysters in the State, as do some of the nearby creeks and Cape Romain Harbor. Selected subtidal oysters have recently brought in excess of \$6.00 per bushel.

Charleston Harbor and the surrounding areas are heavily polluted and closed to shellfish harvesting. Raw shucking houses (Figure 16) are fairly evenly distributed between Sol Legare Island on Folly Creek to Bluffton on the May River.



FIGURE 16—Southwest of Beaufort on the Okeete River is located one of the State's typical raw shucking houses.

Beaufort River and Port Royal are closed due to pollution, as is the lower Savannah River.

Canning is now carried on only at Ladies Island, and their 1970-71 production amounted to over half of the State's total production of oysters.

Pollution can readily be seen to be a major problem, not only for the oyster industry, but for all people living on the coast. Some 32,000 acres of water are now closed to shellfishing. In support of public health, the Shellfish Sanitation Laboratory of the South Carolina Department of Health monitors areas for pollution and enforces the prohibition on harvesting shellfish in restricted areas. Currently their shellfish laboratory and headquarters are located on Sullivans Island near Charleston.

The South Carolina Marine Resources Division of the Wildlife Resources Department implemented a study in 1970 of the State's oyster industry. From this study have come several recommendations for rehabilitation of the Industry. Among them are a simplified system of leasing north of Charleston, reducing the total number of leases in the State from 145 leases in 1970 to 97 in 1971. Further reduction involving the southern areas is anticipated in 1972. Suggestions for controlling poaching and enhancing public recreational oyster areas (Figure 17), established at 20 locations, have also been presented.

Besides the ever-encroaching pollution, the South Carolina oyster industry is confronted with other problems. Basic to all difficulties is the lack of hand labor for cultivation, harvesting and shucking. Production is directly proportionate to the number of harvesters available. Since 1945 the availability of hand labor has steadily de-



FIGURE 17—This type of sign marks the boundaries of South Carolina Public Recreational Shellfish areas.

creased. Hopefully, there is now under development, a mechanical harvester (Figure 18) with which it will prove practical to mechanically harvest intertidal oysters and circumvent much of the need for unavailable harvesters. It is most necessary that some device of this type be perfected if a true oyster industry is to continue.



FIGURE 18—Mechanical intertidal oyster harvester now under development by the Ladies Island oyster canning plant.

Today, many once productive areas have been taken out of production. Some 18% of the State's shellfish waters are closed due to pollution. Additional large acreages are now stripped bare either because of large scale poaching activities or through poor management practices.

The South Carolina oyster industry once produced in excess of three million bushels of oysters per year. It has been in a state of decline for several decades. A concerted effort must be made now to reverse this trend, for unfortunately, it is no longer true of oysters that "a man easily may gather more in a day than he can well eat in a year"!

REFERENCES

CATESBY, MARK

1771. *The Natural History of Carolina, Florida, and the Bahama Islands*, revised by Edwards, 1771.

COLSON, C. B.

1888. *History of the Mill Pond Oyster and Cause of its Disappearance* Proceedings of the Elliott Society of Science and Art of Charleston, South Carolina, March 1888.

DEAN, B.

1890. *The Physical and Biological Characteristics of the Natural Oyster Grounds of South Carolina*. Bulletin of the U. S. Fish Commission for 1890.

EDWARDS, W. E.

1965. *A Preliminary Report on the Sewee Mound Shell Midden, Charleston County, South Carolina*. The Institute of Archeology and Anthropology, University of South Carolina, 1965.

GALTSOFF, P. S.

1927. *An Investigation of the Coastal Waters of South Carolina with Reference to Oyster Culture*. Department of Commerce, Bureau of Fisheries, Economic Circular No. 61, April 1927.

GALTSOFF, P. S.

1964. *The American Oyster, Crassostrea virginica Gmelin*. U. S. Department of the Interior, Fish and Wildlife Service, Fisheries Bulletin 64, 1964.

HEMMINGS, E. T.

1970. *Preliminary Report of Excavations at Fig Island, S. C.* The Institute of Archeology and Anthropology Notebook, No. 9-12, University of South Carolina, December 1970.

HOUSER, L. S. & SILVERS, F. J.

1966. *National Registers of Shellfish Protection Areas*. Department of Health, Education and Welfare,

Public Health Service, Division of Environmental Engineering and Food Protection, Shellfish Branch, 1966.

KEITH, W. J. & COCHRAN, JR., H. S.

1968. *Charting of Subtidal Oyster Beds and Experimental Planting of Seed Oysters in South Carolina*. Bears Bluff Laboratories, Contribution No. 48, August 1968.

LUNZ, G. R.

1938. *Comparison Between Pre-Colonial and Present-Day Oysters*, Science, Vol. 87, April 1938.

LUNZ, G. R.

1943. *The Yield of Certain Oyster Lands in South Carolina*. American Midland Naturalist, Volume 30, 1943.

OEMLER, A.

1893. *The Past, Present and Future of the Oyster Industry of Georgia*. Bulletin of the U. S. Fish Commission, Vol. XIII, 1893.

SALLY, A. S., JR.

1911. *Narratives of Early Carolina 1650-1708*. Charles Scribner's Sons, New York, N. Y., 1911

SMITH, R. O.

1943. *The Oyster Canning Industry in South Carolina*. Fishery Market News, January 1943.

STEVENSON, C. H.

1894. *A Bibliography of Publications in the English Language Relative to Oysters and the Oyster Industries*. United States Commission of Fish and Fisheries, Part XVIII, Report of the Commissioner for the year Ending June 30, 1892.

