

chapter 1  
the coast of  
south carolina

## A. INTRODUCTION

Because South Carolina has been slow to develop the large industrial base common to many other coastal states, it is blessed with vast unspoiled natural areas. However, increasing, and often conflicting, demands upon coastal resources have made it necessary to balance the needs created by burgeoning populations and concomitant development against those for preservation of the environment. South Carolina's General Assembly clearly recognized the need for such a balance when it passed an act designed "to protect the quality of the coastal environment and to promote the economic and social improvement of the coastal zone and of all the people of the State." (S.C. Coastal Management Act of 1977, Act 123)

One reason for the multitude of conflicting interests within the coastal zone is the fact that it is attractive – as a place to live and a place to play, as an industrial site and as the only possible location for occupations such as shipping and fishing. The coastal zone has played an important part in the State's cultural and historical development, and consequently contains a number of irreplaceable sites. The aesthetic and ecological resources found in the coastal zone are unique and equally irreplaceable.

South Carolina's coastal zone can be divided into three segments, based on both physical and sociological distinctions. The morphology of the coast represents a transition zone between the North Carolina and Georgia shorelines. From the North Carolina border to Winyah Bay, the coast forms a gentle crescent, called an arcuate strand. The coast in this section is characterized by broad sandy beaches, few tidal inlets, a well-developed dune system and generally sparse salt marshes. In contrast, the southern section of the coast from Bulls Bay to the Georgia border is fronted by a series of barrier islands separated from the mainland by a wide zone of salt marsh. Tidal inlets are more numerous, and in some areas there is little or no dune development. Extending thirty kilometers along the shore between the northern and southern coastal segments lies the Santee River Delta, the largest deltaic complex on the east coast. Unfortunately, this delta is eroding at a rapid rate due to damming and diversion projects which have cut down on the flow of fresh water and sediments.

The physical characteristics of each section of the coast have been important in determining the economic and social character which developed over time. The sandy beaches of the arcuate strand in Georgetown and Horry Counties have nurtured a thriving tourist economy centered around Myrtle Beach. Georgetown, the other principal center of population in the northern segment of the coastal zone, has an industrial economy. This is due in part to the abundant forests of the region, which supply the City's most significant industry – the pulp mills – with raw materials.

The central portion of the coast, dominated by the greater Charleston area, is the major permanent population center as well as industrial center in the coastal zone. Due to its natural harbor, Charleston has become a port of major importance and has attracted a number of industrial and manufacturing concerns. In addition to its importance as a center of commerce, Charleston possesses a number of cultural and historical attributes unequalled in the State or the nation. The Spoleto Festival celebrating the arts has become an annual event in the port city. During the colonial era, Charleston is said to have eclipsed even Boston as a city of consequence, and it remained an important center for social and intellectual life even after the devastation of the War Between the States.

The natural history of the lower part of the coast – Jasper, Beaufort and Colleton Counties – has had a great influence on the economic and social development of the area. Because of the extensive tracts of marsh, estuary and forest, population and industrial growth have been constrained to some degree. The numerous sea islands, often isolated, have given rise to a culture all their own. Beaufort and Port Royal are the principal population centers, although the development of exclusive resort property on Hilton Head Island has led to increased growth in nearby Bluffton. Fishing and leisure-related activities are the primary form of industry in the tri-county region.

The fact that much of South Carolina's coastal zone remains unspoiled may be attributed in large part to the plantation system and to the aftermath of civil war. The plantation system served to keep large tracts of land under single ownership and in non-commercial use at least until the time of the War Between the States. During Reconstruction, many old plantations were sold to hunt clubs or to large corporations whose owners allowed the fields and rice impoundments to revert to their natural state. This situation has served to protect much of the South Carolina coast from rapid development. Wise management and equitable resource allocation decisions will be necessary to provide for needed economic expansion while preserving a rich and unique heritage for future generations.

## B. LOW COUNTRY HISTORY

### The Indians

Any history of South Carolina's low country must necessarily begin with its first settlers, the Red Carolinians. Ethnologists have divided the American Indians living north of Mexico into some sixty stocks based on language. The stocks represented among the Indians who inhabited the South Carolina low country are the Muskogean, the Siouan and the Yuchi.<sup>1</sup>

Low country Indian tribes were numerous and small, and the earliest Indian inhabitants of this area consisted of wandering groups who lived in an area only as long as the game they depended on lasted. In time these tribes began to settle down and develop an agrarian lifestyle.<sup>2</sup>

All of the Indians in the low country and in South Carolina as a whole had certain things in common - "...even the most primitive among them had attained a fairly diversified agriculture; they all built permanent or semi-permanent houses; they were all village dwellers. Their culture, although subject to wide tribal variations, was based primarily upon the production of food crops and secondarily upon hunting."<sup>3</sup>

It is tragic that the growth of western civilization resulted in the demise of so many of the American Indian tribes. A few Catawba families living in York County (in the northcentral portion of the State) are the only remnant left of all the many tribes that once inhabited South Carolina.

The first white South Carolinians were indebted to many of the low country Indians for their friendship and generosity through the sharing of their food and their assistance against enemy attack. We shall always be indebted to them for the legacy they left us, part of which is evident today in the lovely names of many of our low country islands and rivers - names such as Waccamaw, Ashepoo, Bohicket, Edisto, Wadmalaw, Kiawah, Wando, Santee and Combahee.

### Spanish and French Attempts at Settlement

The first recorded visit of Europeans to South Carolina's coast was made by Spaniards from the Spanish colony of San Domingo (then called Hispaniola). Two ships met at sea - one dispatched by Judge Lucas Vasquez de Ayllon and which was returning from a voyage of exploration, the other headed out on a mission to capture Indians for slaves. The captains of the two vessels joined forces and headed for the continent where they made port on June 24, 1521, probably at Winyah Bay.<sup>4</sup> After enticing, under the pretext of friendship, some 150 Indians to come aboard the two vessels, they suddenly put to sea with their hapless "guests." One of the ships sank, and many of the enslaved Indians aboard the other vessel starved themselves to death after reaching San Domingo.<sup>5</sup>

In 1525, two ships were dispatched by de Ayllon to explore the coast of the continent and return those few Indians who had survived captivity.<sup>6</sup> In 1526, de Ayllon himself set out with a fleet of seven vessels and some 500 men and women. In August, 1526, they founded the settlement of San Miguel de Gualdape on what is thought to have been the shores of Winyah Bay. The settlement (the first European settlement in South Carolina), plagued by mutiny, fire, uncommonly cold weather and discouraged by the death of de Ayllon, was soon abandoned. The next attempt at settlement was to be made by the French thirty-six years later.<sup>7</sup>

In February, 1562, the Frenchman Jean Ribaut set sail with two ships and 150 persons, mostly Huguenots, to establish a French colony on the Carolina coast.<sup>8</sup> The purpose of this endeavor was two-fold: to found a religious asylum for the Huguenots and to further the cause of France against Spain by establishing an outpost in the New World.<sup>9</sup>

Ribaut crossed the ocean to Florida and proceeded along the coast to a place which he named Port Royal, the same as in present-day South Carolina.<sup>10</sup> There, on Parris Island, he established Charlesfort and left thirty men to protect it while he returned to France for supplies and reinforcements.<sup>11</sup> Upon his arrival there, Ribaut found France in the midst of religious wars. This and other complications prevented his return to the settlement at Charlesfort where life presented ever-increasing hardships for those left to protect it. A lack of food (in spite of the generosity of the local Indians), monotony and the merciless discipline of their commander resulted in their killing him and setting sail for France in a makeshift ship.<sup>12</sup> After suffering the hardships of bad weather and starvation which forced them to cannibalism, they were rescued through their chance encounter with an English ship. Thus ended French attempts at formal settlement in Carolina.<sup>13</sup>

In 1564, the French established Fort Caroline on the St. John's River in the present State of Florida.<sup>14</sup> This settlement led to Spanish massacre of the Frenchmen at Fort Caroline, bloody reprisal by the French and

the decision by Spain to build a series of forts along the coasts of South Carolina, Georgia and Florida to discourage further French activity.<sup>15</sup>

In 1566, Menendez established Fort San Felipe on Parris Island about two miles from the remains of Charlesfort. The settlement survived until 1576 when an Indian uprising forced the Spanish to abandon the fort and withdraw to St. Augustine. The following year, 1577, they rebuilt near the ashes of San Felipe which had been burned by the Indians. The new fort, San Marcos, lasted for ten years. In 1587, the Spanish withdrew after the English destruction of St. Augustine necessitated a reduction of their frontier posts. Spanish friars, however, continued their mission work for nearly one hundred years afterward in small outposts located in what is today North and South Carolina.<sup>16</sup>

### **The British**

In 1629, Charles I of England granted to Sir Robert Heath a charter to all America from ocean to ocean between north latitudes 36 and 31. No genuine attempts at settlement were made under this charter, and it was declared forfeited in 1663 when Charles II granted to eight of his most faithful supporters the ownership of the same territory. A second charter was granted, in 1665, to these eight Lords Proprietors, as they were called, because the Heath Charter had not been properly annulled. The chief difference between the 1663 and 1665 charters was an extension of the boundaries of the granted land to 36 degrees 30 minutes on the north and 29 degrees on the south, that is, from Virginia to a point 65 miles south of St. Augustine.<sup>17</sup>

The eight men chosen by King Charles to receive the enormous land grant were: the Earl of Clarendon, the Duke of Albemarle, Lord Craven, Lord Berkeley, Lord Ashley, Sir George Carteret, Sir William Berkeley and Sir John Colleton – with Lord Ashley (Anthony Ashley Cooper, Earl of Shaftesbury) taking far more interest in the venture than any of the others.<sup>18</sup> For the territory, the King was to receive certain returns on whatever profits were made from its development. The charter empowered the Proprietors to make laws, to establish (with popular consent) the Anglican Church as the official State Church, and to grant freedom of worship to all who would settle in whatever colony might be founded. The laws made by the Proprietors were to be approved by the people of the colony, thus a certain degree of self-government was to be allowed.<sup>19</sup>

In 1669, Lord Ashley assumed a leadership position among the group of Proprietors and began to make firm plans for a colony at Port Royal, South Carolina. Joseph West was appointed governor and commander-in-chief until an appointed fleet of three vessels should land in Barbados on the way to their final destination.<sup>20</sup> Thus, in August, 1669, three ships, the **Carolina**, the **Albemarle** and the **Port Royal**, under West's command, left England and headed for Barbados.<sup>21</sup> Arriving there in October, the ships encountered a storm which wrecked the **Albemarle** and necessitated its replacement by the **Three Brothers**.<sup>22</sup>

In mid-November the fleet set sail from Barbados, and after touching at the island of Nevis, the ships became separated by a storm. The **Port Royal** was wrecked in the Bahamas after six weeks of wandering, and many passengers died on shore before they were able to hire a ship to take them to Bermuda where the **Carolina** had already taken refuge. Months passed before news was received from the **Three Brothers**.<sup>23</sup>

In Bermuda Col. William Sayle was appointed governor (West's leadership having expired in Barbados), and, under his command, the **Carolina** and a new Bermuda vessel set sail for Port Royal. On their arrival in March, 1670, an Indian chief, the cacique of Kiawah, urged the newcomers not to settle at Port Royal but rather in his home territory of Kiawah which was on the banks of the Ashley River. The colonists took the chief's advice, and in early April they landed and chose a nine acre site on the western bank of the Ashley, a location invisible from the ocean and the topography of which allowed for easy defense from both the river side as well as landward. The colonists named their settlement Albemarle Point in honor of the eldest Proprietor, but the Proprietors later changed the name to Charles Town in honor of the king.<sup>24</sup>

The **Carolina** and its companion ship had entered Charleston harbor from Port Royal in April, 1670; on May 23 the **Three Brothers** finally made her arrival after surviving a storm which had driven her as far north as Virginia.<sup>25</sup>

### **Establishing the Colony**

The settlement at Charles Town began with about 148 persons, the majority of whom were English. There were, however, a few persons of Scotch and Irish background and, according to some accounts, three Negro slaves.<sup>26</sup> On completion of a protective palisade and temporary housing, the settlers began to clear ground

and to plant crops such as wheat, corn, peas, indigo, tobacco and cotton.

The need for protection from the Spanish as well as from hostile Indians (particularly the fierce Westos, said to have been cannibalistic) was of paramount concern during the early days of the colony, and with good cause, for in August, 1670, Spanish from St. Augustine, along with their Indian allies, came to destroy the settlement. Fortunately for the Charles Town settlers, the would-be attackers were caught in a hurricane and forced to retreat.<sup>27</sup>

It was during these early times that Dr. Henry Woodward became of invaluable service to the colony. Dr. Woodward had joined the passengers of the **Carolina** at Nevis and had accompanied them to help establish their settlement in the New World. Earlier, he had lived with the Indians at Port Royal, had learned their language and customs and had gained their friendship and confidence.<sup>28</sup> Through his assistance the Charles Town settlers were able to establish a flourishing trade with many of these people, a trade that was the key to the colony's early success and ultimate permanence.

In February, 1671, 106 settlers arrived from Barbados, and in time Barbadians came to compose about half the population. Because many of them were experienced with colonial life, they dominated the affairs of the colony for some time.<sup>29</sup>

With the increase in population, the threat of attack from the Indians and Spanish was lessened, and some people began to move out from their fortified village site onto farms and plantations.<sup>30</sup> Others established satellite towns such as James Town on James Island (1672-1674) and New London or Wiltown (near Edisto Island) which died out around 1800.<sup>31</sup> Indian trade, lumbering and naval stores soon brought considerable wealth into the young colony.

Although good relations had been established with many of the Indians, the settlers had their share of problems with some others. As early as 1671 a small expedition was sent out to chastise the Coosas who had been stealing hogs and provisions and had finally murdered some of the colonists. The expedition was a success, and a number of Indians were taken prisoner and made into slaves although Indian slavery had been forbidden by the Proprietors.<sup>32</sup>

### **The Move to Oyster Point**

Almost from the beginning of the settlement, plans had been made to eventually move the town from the west bank of the Ashley to the peninsula between the Ashley and Cooper Rivers, a place called Oyster Point.<sup>33</sup> At the end of 1679, the Lords Proprietors gave instructions that the official port town be moved to Oyster Point, and in 1680, the move to the new location was begun.<sup>34</sup>

The colony grew quite rapidly during the decade between 1680-1690. Many Dissenters from England and a large number of French Huguenots, all seeking religious freedom, found their way to Charles Town during this period.<sup>35</sup> By 1700 the colony contained even more of a mixture of peoples with the arrival of Dutchmen, Irish, Baptists, Sephardic Jews, Quakers, and a few privateers turned planters.<sup>36</sup> Indian trade and naval stores continued to bring wealth into the colony.

### **Development of the Plantation System**

No longer feeling the need for living close together in one place, some people moved out of town and took up land along the rivers. The resulting system of large plantations soon became an established way of life, and Charles Town's well-being was dependent upon and virtually inseparable from their prosperity.

Although plantations were begun with the founding of the colony, it was the successful planting of rice that was responsible for the rapid spread of the plantation system<sup>37</sup> and its attendant institution of slavery. The plantations thus flourished at the expense of the Negro as well as the Indian, whose land was continuously encroached upon.

Three great crops – rice, indigo and cotton – were responsible for the accumulation of tremendous fortunes by Carolina low country planters. The first of these staple crops was rice, planted as early as 1672. A new strain, brought in from Madagascar in the early 1690's, increased the quantity and quality of the crop which virtually became the money of the Province.<sup>38</sup> "...for over two hundred years its characteristics and requirements molded Low Country life as did nothing else."<sup>39</sup>

The second staple crop, indigo, although grown as early as 1670, became of importance after its successful culture and processing by a precocious young girl, Eliza Lucas. Her father, Governor of Antigua, brought his family to the Carolina low country and placed Eliza in charge of his plantations while he returned to his duties

in Antigua.<sup>40</sup> When she was only eighteen years old, Eliza began experimenting with various types of indigo seed sent to her by her father. After a successful growing season, an assistant was hired to help her learn the difficult and complicated technique of processing the plant. Miss Lucas, despite her assistant's deceiving her and sabotaging the process, mastered the art of producing the valuable dye and shared her knowledge with her neighbors. By the late 1740's, indigo was bringing great wealth into the South Carolina low country.<sup>41</sup>

The planting of indigo ceased during the Revolution, and with the loss of the subsidy from the British government following the Revolution, the revival of the crop, as one of commercial importance, never occurred.<sup>42</sup>

Grown all during the Colonial era, the third great crop, cotton, became "king" in parts of the low country after 1793, the year in which Eli Whitney invented the cotton gin.<sup>43</sup> "In the Low Country itself cotton built new regions of plantations and made over old ones left derelict by indigo, doing for sections like Upper St. John's, Berkeley, and the Sea Islands what rice had done for the Santee and the Combahee."<sup>44</sup>

So integral a part of low country history were the plantations that some space must be allowed here to discuss the type of life they supported. Charles Town's primacy over other colonial towns was insured by the business of the Indian trade but "was further developed by the steady interchange of life as well as business between it and the plantations."<sup>45</sup> South Carolina became a sort of City-State, and the name of Charles Town became interchangeable with its surrounding territory. Many prosperous Charles Town merchants were also prominent planters, and an aristocracy was formed among families of prominence and wealth.<sup>46</sup>

Fortunes made by the planting of rice enabled the building of fine new plantation houses or the addition of fine wings and porticoes to older structures. For some time, colonial era plantation families stayed in the country during the summer and spent much of the winter social season in Charleston.<sup>47</sup>

About the time of the Revolution and sometime after, the rise of malaria caused plantation families to move during the warm months (May - October) from their mosquito-infested plantations to little villages set in the pine lands and along the coast. "Sea-Island people chose the beaches for themselves, inlanders the pine lands, and lightly built, airy little houses with many piazzas were spotted along the sand dunes or scattered among the pines, where the breezes of the ocean or the terebinthine odors of the pines would protect the plantation people from the night miasmas."<sup>48</sup> Thus came into being villages or towns such as Summerville, Pineville, McClellanville, Plantersville, Pinopolis, Mt. Pleasant, Walterboro, Jacksonboro, and Rockville. Some of those families of greatest wealth went into the Piedmont and mountain area of South Carolina as well as into North Carolina, Virginia, New York and New England. "Newport was made fashionable largely by South Carolinians who summered in the neighborhood,...."<sup>49</sup>

### **The Yemassee War, 1715 - 1717**

From 1715 - 1717 the low country experienced the Yemassee War, spearheaded by the Yemassee Indians and including most of the tribes over which the settlers had exercised sway. "The conspiracy involved so many Indian nations . . . extending from the coast to the middle of the present State of Alabama, that only lack of Indian cooperation saved the whites."<sup>50</sup>

This war, caused by "Indian resentment of long-standing abuses by traders, followed by settlers' taking up Yemassee lands," resulted in the death of some 400 colonists and left South Carolina impoverished.<sup>51</sup> Stoney relates that the Indians "destroyed or looted some two hundred houses throughout the Low Country, driving even the prosperous Goose Creek people away from their plantations."<sup>52</sup> The salvation of the colony was due to the decision of the Cherokees to ally themselves with the South Carolinians. In November, 1717, the war was formally brought to a close, but its aftermath was felt for years to come.<sup>53</sup>

### **Royal Rule, the Revolution and After**

One good outcome of the Yemassee War was the change, in 1719, from proprietary rule to that of the Crown.<sup>54</sup> "Proprietary government had numerous faults, often magnified by lengthy and uncertain communications which delayed vital decisions for months and permitted minor irritations to accrue into major problems."<sup>55</sup>

One unforgiveable insult to the colonists came during the Yemassee War when the proprietors "not only neglected to send aid to the colony . . . , but even refused to ask assistance from the King. . ."<sup>56</sup> In 1719, through a bloodless revolution, the majority of the colonists deposed their proprietary governor, formed a

new Assembly and waited for the royal government to take charge. Finally, in 1721, a provisional royal governor arrived to take charge, and the colony began its period of royal rule which lasted until 1776.<sup>57</sup>

Although Charles Town was the cultural and political center of colonial South Carolina, two other low country towns, Beaufort and Georgetown, became of importance in colonial times. Beaufort (located approximately midway between Charleston and the South Carolina-Georgia border) and Georgetown (located midway between Charleston and the South Carolina-North Carolina border) are the second and third oldest cities in South Carolina, and are the only colonial towns other than Charles Town which survived. Founded in 1710, Beaufort was wiped out five years later in the Yemassee War.<sup>58</sup> Almost immediately the town was rebuilt and "in time it became a small metropolis for great indigo and sea island cotton plantations surrounding it. By the 1850's it was one of the most fortunate and delightful communities of the state, the center of an affluent and cultivated society."<sup>59</sup>

By 1723 the people living in the Winyah area had petitioned the colonial government to establish a port of entry in their vicinity to avoid freight charges to Charleston and so that local produce could be shipped directly to foreign destinations.<sup>60</sup> Thus, the port of Georgetown, third town in the province, was eventually established. There is some difference of opinion as to the time of its beginning; McCrady states that the town was laid out shortly before 1734.<sup>61</sup> In time, Georgetown became a busy shipping point for rice, the cultivation of which dominated life in that area for some two hundred years.

The French and Indian War (1754-1763), the culmination of a long struggle between England and France for dominance in the New World, ended with victory for England. It was during and after this war that antagonism arose between the thirteen colonies and their mother country. Before the war there had been no centralized body with authority to make and enforce colonial policy. However, after 1763, England began to reform and tighten the machinery for administration and enforcement of the Acts of Trade and Navigation, and the colonies stoutly resisted.<sup>62</sup>

The low country saw the arrival of the Revolution in 1776 with the British attack on Fort Moultrie, and in 1780 Charles Town and the surrounding area were taken by the British. The end of the war left the low country devastated. "Great areas of land were so fought over that not even wild animals survived in them..."<sup>63</sup> The low country was further hurt by the loss of living men as well as those who died, for many prominent Loyalists left the area and never returned. In addition to all the other losses was that of the British market for indigo, and plantation communities were abandoned, and many plantation houses simply fell to pieces.<sup>64</sup>

Soon after the Revolution the name of Charels Town was changed to Charleston, and the seat of government was transferred to Columbia; county seats became established, and South Carolina ceased to be a City-State. Gradually economic growth began again in the low country. Once again rice brought great wealth to this area - this time through the new method of **tidal culture** which set water to work cultivating rice on the richest type of soil.<sup>65</sup>

Before the tidal culture method was used, rice was grown as an upland crop, without irrigation. Then as the advantages of flooding became known, early in the 18th century, cultivation was moved into cleared swamp lands fed by freshwater streams<sup>66</sup> so that water could be impounded and applied to the fields. Rain water was also impounded in "reserves" and used for flooding the crops. Flooding the rice greatly promoted its growth and killed the weeds and grass which formerly had to be cleared by hoeing.

Soon after the Revolution the tidal culture of rice was developed and was so effective that enough rice was produced to be shipped from South Carolina to England and the West Indies and all over Northern Europe and the Mediterranean. Consisting of a system of banks, ditches, floodgates and trunks, tidal culture provided a method whereby the rice fields could be kept as dry or as wet as the crop required. The following is a simple explanation of what was involved.

Great acreages of land beyond the salt water reach of high tide were cleared along the coastal rivers, and with enormous labor, thousands of acres were diked by digging canals or ditches along the edges of the rivers and creeks and using the excavated mud to make an enclosing bank. Within this enclosed or impounded area, a network of smaller ditches was cut and cross banks were formed to divide the area into a number of fields and provide a means of drainage and irrigation.<sup>67</sup>

To control the systematic, precise flooding and subsequent draining of the fields for the maximum yield of rice, floodgates and trunks were installed perpendicular to the rivers and creeks and the adjacent canals. A trunk was essentially a rectangular wood box with a floodgate at either end. As the flood tide flowed in from

the ocean and pushed the fresh water back up the distant reaches of the coastal rivers and creeks, the outside floodgate on the trunk was manually opened, allowing fresh water to flow in through the trunk and force the inside gate to swing open for the flooding of the fields. As the tide began to ebb, the lower water level in the creeks caused the water in the fields to begin flowing out and in so doing automatically forced the inner floodgate to swing shut, holding the water in the fields until such time as the rice was ready for a drying period. At this point, the inner gate was manually opened, on an ebb tide, to allow for drainage.

The zenith of rice planting in South Carolina was reached between 1850 and 1860, and its demise occurred during the late 19th and early 20th centuries. Several factors contributed to the death of this great industry: 1) several devastating hurricanes which severely damaged the rice field dikes, 2) a lack of capital required for the expensive recovery from these storms, 3) a loss of much of the labor force which turned to other industries and 4) most especially, the introduction of rice into Louisiana and other states which had land capable of supporting heavy machinery and thus were able to produce rice much more cheaply than South Carolina.<sup>68</sup>

### **The Rise of Cotton**

In 1793, Eli Whitney invented the cotton gin, and the raising of cotton then became a profitable venture. Its effect on the South Carolina low country was almost immediate, and the planting of cotton spread the plantation system well into the Middle Country. The Sea Islands were especially blessed by this crop, and wealthy island planters became famous for their particular strains of the famous black-seed cotton of tropic origin.<sup>69</sup>

### **Natural Disasters**

More than once the South Carolina low country has bowed before the relentless hand of nature which has dealt the area powerful blows in the form of hurricanes as well as a terrifying earthquake. According to early writers the most severe hurricane in colonial times was the Great Hurricane of 1752 which apparently caused the greatest amount of devastation in the area of Charleston. Another memorable storm, that of 1822, struck the coast between Charleston and Georgetown. Its amazing energy caused a tremendous tide in that area and resulted in a high death toll on the plantations around Georgetown.<sup>70</sup> A third devastating hurricane occurred in 1893, resulting in great destruction and many deaths on the islands southwest of Charleston and near Beaufort.<sup>71</sup>

Perhaps the most terrifying natural disaster to befall the low country was the earthquake which struck on Tuesday, August 31, 1886, and was felt throughout the State. Great destruction and a number of deaths occurred in Charleston. The following description was written by Carl McKinley, an eyewitness, and was published in the City's **Year Book** of 1886.

The rising sun on Wednesday morning looked on empty and broken homes and on streets encumbered with continuous lines or heaped masses of ruins, amidst which the wearied and shelterless citizens gathered together in little groups, or picked their way from place to place wondering at the extent of the damage inflicted everywhere and with renewed thankfulness in view of the perils escaped.<sup>72</sup>

The ruins lay piled in the streets, yards and gardens, and the houses from which they had fallen seemed ready to crumble of their own weight. Travel was confined to the middle of the streets and was impeded there. It is impossible to estimate, even approximately, the amount of masonry that was thrown into the streets....<sup>73</sup>

Thousands of blacks and whites alike - no difference was recognized and no discrimination shown - were the recipients of the bounty of their more fortunate fellow-citizens, who proved to be neighbors indeed in the hour of misfortune.<sup>74</sup>

### **Growth of Transportation**

In the latter part of the 18th century and the first half of the 19th century, the low country and other areas of South Carolina turned their efforts towards increasing their means of transportation. In 1786 a company was formed to build a canal and locks to connect the Santee and Cooper Rivers, thus improving transportation and commerce between the coastal areas and the upland. Work was begun in 1793, using slave labor, and after six years the twenty-two mile long Santee Canal was completed and opened for general commerce. The canal

helped to encourage the commercial growth of South Carolina for nearly half a century.<sup>75</sup>

In 1828 a railroad from Charleston to Hamburg (on the Savannah River) was laid out, and another rail line was established from Charleston to Moncks Corner, St. Stephen and Florence. In 1860 the Charleston-Savannah Railroad was built. The coming of the railroads brought about a decrease in the dependence on roads and introduced a greater vitality to the economy of the low country area.<sup>76</sup>

### **Civil War and Its Aftermath**

The War Between the States marked the end of the great plantation era, and the period following the war was one of tremendous change for the low country. Many of the plantation houses, which had escaped the ravages of war, were abandoned, and farming continued largely under the share-crop system.<sup>77</sup>

The war brought an end to the repressive laws of slavery, and for the first time blacks were legally citizens. Many of them were sold land by their former owners. Others were given property by the Federal government.<sup>78</sup> Both blacks and whites, however, suffered greatly after the war, for "Grim poverty and wholesale demoralization"<sup>79</sup> held the area in a vice grip for some time.

In time rice and cotton again made money for the low country but never to the extent shown before the war. Gradually the crops had to be abandoned, the final blow to rice being several devastating hurricanes, and to cotton, the boll weevil.<sup>80</sup> The pesky boll weevil was a blessing in disguise, however, for low country planters were forced to diversify. Truck farming and tobacco cultivation subsequently brought prosperity to many areas that had depended on either rice or cotton.

The late 19th and early 20th centuries have seen the slow recovery of the low country from the disastrous effects of the War Between the States as well as the hardships of the great depression of the 1930's. In the Berkeley-Charleston-Dorchester area, phosphate mining and the building of fertilizer plants just to the north of Charleston helped the economic picture of the area as did lumbering before the beginning of the First World War. With the establishment of the Navy Yard, in 1901, Charleston and surrounding areas began a dependency on the military-related industry.<sup>81</sup> Since the 1930's, the port of Charleston has grown in importance both to the low country and the entire State as well. Historic Charleston has become a mecca for many tourists interested in seeing a city of living history, and today tourism is Charleston's second most important industry.

The Waccamaw region of the low country, with its tall stands of sturdy pine forests, has enjoyed the economic benefits of the pulpwood and logging industries.<sup>82</sup> The City of Georgetown has become an important port, and its lovely historic district is attracting a growing number of tourists. The fishing industry of the region continues to grow, and that area of the Waccamaw known as the Grand Strand has in recent years felt the prosperity of a rich and flourishing tourist trade.

The area of Colleton, Beaufort and Jasper counties has probably experienced the most difficult times of any area within the low country following the War Between the States and the great depression. Phosphate mining around Beaufort helped the economic picture prior to 1900, and during the first half of this century, truck farming, the fishing industry and the military bases have been the area's mainstay. Today the future of this area looks promising with the gradual influx of new industries and the increasing numbers of tourists who are attracted to the great beauty and charm of historic Beaufort and the lovely, modern-day resorts of Hilton Head and Fripp Islands.

The South Carolina low country is proud of its rich historic heritage which, along with a great natural beauty, makes the area a unique and desirable place in which to live. The low country today is an exciting place of growth and change. With proper respect for their rich cultural and natural heritage, low country citizens of present and future generations can enjoy the benefits of economic growth while protecting the precious and irreplaceable amenities that make this area so very special.

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## C. THE NATURAL ENVIRONMENT

### 1. Marshes and Wetlands

#### a. The Salt Marsh Ecosystem

South Carolina has been greatly blessed by possessing one of the richest and most nearly unique habitats on earth, that of the salt marsh and tidal estuaries of the low country. So familiar is the salt marsh to most of us who live in the low country, that we tend to take it for granted. Many of us, whether we come from the up-country of South Carolina or whether our homes are on or near the coast, have failed to educate ourselves to the importance of this tremendous natural resource.

The coastal zone of South Carolina is an area where land and sea meet, the place where fresh waters from inland lakes and streams join with inflowing salt water from the ocean. Estuaries, inlets or arms of the ocean, are formed at this meeting place, and alongside the intricate maze of estuaries and creeks flourish thousands of acres of salt marsh. South Carolina contains some 504,445 acres of coastal marshes, more than any other Atlantic coast state. Of this amount, 334,501 acres are classified as salt marsh.

The prominent species of salt marsh vegetation, *Spartina alterniflora* (smooth cordgrass), grows abundantly along our coast. This species is one of the most remarkable plants on earth because of its ability to live and thrive in salt water. So productive is the natural salt marsh that it manufactures as much or perhaps even more organic material than the richest, most productive wheat field. As strange as it may seem, a crop of salt marsh plants, especially smooth cordgrass, is extremely valuable even when dead and decaying. Each fall the grass dies and is decomposed by bacteria. The mixture of dead grass and bacteria is called detritus and has been referred to as a "rich soup" because it serves as a major source of food for many of the higher organisms in the salt marsh ecosystem. "Bacterial decomposition is a slow process, and although aided by mechanical wave action, it may take a year for bacteria to break down completely each season's crop of *Spartina*. Consequently, detritus is available as a food source year-round." ("Salt Marsh: A Question of Survival," Pete Laurie, *South Carolina Wildlife*, March-April, 1975, p. 27.)

Detritus provides nourishment not only for the microscopic zooplankton - including the larval stages of shellfish and fish - but for adult clams, mussels, oysters, crabs, shrimp and certain fish. (Plankton is the term for the small plants and animals that drift and float in the oceans and estuaries. **Zooplankton** refers to the tiny animal forms that are a part of plankton.) All these creatures serve in turn as food for various types of fish as well as countless shore birds such as gulls, terns, egrets, skimmers and oystercatchers. Thus, it can be seen that all creatures living in the salt marsh ecosystem depend either directly or indirectly on the marsh grasses for their food supply.

In addition to providing food, the salt marsh serves as a shelter and nursery grounds for many species, including shrimp. Without the shelter provided by the exposed root systems of the marsh, the larval stages of shrimp, crabs, oysters, clams, etc. would not be able to survive long enough to reach adulthood.

In addition to the creatures already mentioned, many mammals, as well, find shelter and food in the salt marsh and estuaries. One of these is the familiar raccoon which satisfies its appetite on fish, shellfish and crabs. The bottlenose dolphin, a marine mammal commonly referred to as the porpoise by South Carolina citizens, enters the estuaries, salt water rivers, and creeks from the ocean to feed on fish which are thought to be its main source of food.

The salt marsh, while serving as a tremendous source of food and shelter for many thousands of living creatures also provides a nesting place for birds such as the marsh wren, red-winged blackbird and clapper rail or marsh hen. Other creatures found within this complicated ecosystem are the diamondback terrapin, loggerhead sea turtle and, at times, even the alligator.

For many years the marshlands have made possible a vigorous sports fishery and a viable commercial fishery that have offered recreation and employment for many of South Carolina's citizens. As if all the above mentioned things were not enough, the salt marsh serves as a buffer area between the ocean and the inland. While the sand dunes of the beaches absorb the pounding of the ocean, the marshlands slow down and absorb the daily inrush of the ocean's flow thus preventing erosion of the coastline.

Still another service performed by the salt marshes is that of a filter. It is here that pesticides and other pollutants are broken down from dangerous compositions into forms which are less harmful to the environment. Thus it can be seen that without the salt marsh the shrimping and other fishery industries, and many of

the beauties and wonders of the marsh life would be drastically depleted.

#### **b. Brackish-Water and Tidal Freshwater Marshes**

In addition to the large acreage of salt marsh, coastal South Carolina contains 34,962 acres of brackish-water and 64,531 acres of fresh-water marsh. Situated between the salt and tidal fresh-water marshes, the brackish marsh represents a transition zone between those two wetland types and contains plant species characteristic of both.

Those **brackish marshes**, which are closer to the ocean than other brackish marsh areas, look very much like the high zone of the salt marsh and contain vast stands of black needlerush (*Juncus roemerianus*), which in some areas extend down to the edge of the creeks. Generally, however, smooth cordgrass (*Spartina alterniflora*) will be found along the water's edge. Among the other plants found in more seaward brackish marshes are the salt marsh bulrush, marsh elder, sea myrtle, marsh-hay cordgrass, and sea ox-eye.

Proceeding further up the tidal rivers and creeks away from the ocean, the black needlerush is replaced by giant cordgrass (*Spartina cynosuroides*), but other plants common to the high zone of salt marshes may still be found. In addition to these plants are found those which are typical of fresh-water marshes – cattails, sedges, wild rice, smartweeds, giant cutgrass, pickerel-weed, water parsnip, sawgrass, alligator-weed, etc.

**Tidal fresh-water marshes** are found along coastal rivers beyond the salt water reach of high tide where the water is fresh or relatively low in salinity. Here the diversity of plant species is greater than in either the salt or brackish marshes, and the predominant force governing plant distribution is the fresh-water river. There is no clearly defined boundary between the fresh and brackish-water marshes. The change is a subtle one whereby marsh plants found in the upper brackish marsh region gradually become more prominent in the fresh-water marsh. Both areas play an important role in their contribution of nutrients into the overall estuarine system and in the habitat they provide for numerous land and aquatic species.

#### **c. Coastal Impoundments**

Unique to South Carolina and several other South Atlantic coastal states are rice field impoundments dating back to times when rice culture was a source of great fortunes to low country planters. At first rice was grown as an upland crop, without irrigation. Then as the advantages of flooding became known, early in the 18th century, cultivation was moved into cleared swamp lands next to freshwater streams so that water could be impounded and applied to the fields. Flooding the rice greatly promoted its growth and killed the weeds and grass which formerly had to be cleared by hoeing.

Soon after the Revolution the tidal culture of rice was developed. Consisting of a system of banks, ditches, floodgates and trunks, creation of impoundments for tidal culture provided a method whereby the rice fields could be kept as dry or as wet as the crop required.

A complete description of rice cultivation appears in Chapter I (B) "Lowcountry History," p. I-6.

The coastal impoundments in existence today cover some 70,451 acres of land. The majority of these impoundments represent former rice fields which are being managed to attract waterfowl for hunting. Other uses made of impoundments include cattle pasturage, water reserves, wildlife sanctuaries and mariculture.

When used to attract waterfowl, impoundments are managed to encourage growth of desired vegetation for duck food by manipulation of water levels, marsh burning or a combination of these two practices. Depending on their location along the coastal creeks and rivers, impoundments may be flooded with either brackish or freshwater. Thus, the flooding of different impoundments results in an obvious difference in their plant communities.

Impoundments can be very rich in nutrients, and when properly managed and allowed to periodically drain into the open system, they can contribute to the nutrient supply. There are facts which some persons feel support a theory that properly managed impoundments may be more productive than an open, natural system. However, it is universally accepted that "proper management" is a subject about which there is a tremendous lack of knowledge. Great expenditures of money and many years of exacting, scientific research would be required to find out if this theory is correct. Because creation of impoundments destroys acreages of productive, natural marsh and converts the impounded areas into artificially managed environments, it is a questionable practice which must be approached with great care.

#### **d. Mud and Sand Flats**

Within the salt water rivers and creeks are found numerous mud and sand flats — long, essentially flat stretches of soft, dark silt (mud) and similar areas composed of sand. These areas are covered during high tide and become exposed when the tide is low.

The presence of either sand flats or mud flats along the shore of a river or creek is chiefly dependent on the shape or surface of the bottom and the speed of the water currents which carry suspended sediments. As currents slow down, the heavier sand particles drop to the bottom helping to form **sand** flats, leaving the clay and silt sediments in suspension. Only when the currents become very slow do the clay and silt settle out to form **mud** flats.

Although they may appear barren to the uninformed passer-by, the mud and sand flats are teeming with a rich variety of life. The animals which make up mud and sand flat communities may be divided into two main groups - permanent dwellers, which spend their entire adult lives on the flats, and temporary dwellers, which move on and off the flats in search of food during high and low tides. Permanent dwellers such as worms, crustaceans and certain types of clams obtain their food by ingesting sediment and utilizing the organic matter and bacteria which it contains. Most types of clams feed at high tide by extending their siphons up through the sediment, in which they remain burrowed, into the water column where they are able to filter out phytoplankton (microscopic plants) and detritus (decaying plant and animal matter). A variety of snails obtain their nourishment by scavenging for detritus along the surface of the sand and mud.

As the tide comes in and covers the flats, animals such as blue crabs and various species of fish arrive to feed on the worms, clams, snails and crustaceans. With the rhythmic change of the tide, the flats become exposed once more, and a new group of predators arrive - creatures such as shore birds, ducks, otters and racoons.

Perhaps the most important members of the mud and sand flat community are the bacteria which feed on dead plant and animal matter and recycle nutrients back into the water so that they can be used by the phytoplankton. Other small but important members of this community are the diatoms and blue-green algae, microscopic plants found in the surface sediments. These plants serve as a source of food for animals such as snails, certain clams and polychaete worms.

Because mud and sand flats provide essential habitat and food for a wide variety of animals as well as play an important role in the cycling of nutrients, they are an important resource of our coastal zone. Being close to man's activities (both those activities on the shore as well as those in the waters), they are vulnerable to shoreline development and different forms of pollution. Care must be taken to protect these areas so that they may continue to play their vital ecological role in the coastal environment.

#### **e. Oyster Reefs**

In many sections of coastal rivers and creeks are found clusters of oysters called reefs, bars or oyster beds. Oyster reefs are formed over a period of time as oyster larvae, carried by tidal currents, find and attach themselves to solid material or other suitable substrate. After attaching themselves to a substrate, the animals become sessile or immobile and mature into adults. Other oyster larvae continue to attach to the substrate as well as to the sessile adults, and a cluster of oysters or a reef evolves and increases in height, width and length.

Other organisms such as algae, sponges, bryozoans, barnacles, mussels and worms live on the reef surfaces, and still other animals find shelter in crevices formed by the reef growth. In time an entire balanced community of plants and animals evolves.

Oyster reefs are an important natural resource of South Carolina's coastal zone, and, like the mud and sand flats, they are very susceptible to man's activities, particularly the activities of overfishing, dumping of pollutants and dredging. Because oyster reefs are a unique habitat and are important from both an environmental and economic point of view, care must be taken to properly utilize them as renewable resources and to protect them from damage or destruction.

#### **f. Swamps and Bottomlands**

The meaning and connotation of the word "swamp" vary greatly from one region of the country to

another. The terms swamp, river bottom, bottomland, hardwood bottom, and floodplain forest are often used synonymously. Strictly speaking, however, swamps are permanently flooded areas whereas floodplain forests become flooded periodically when the rivers along which they lie swell from heavy rainfall and overflow their banks.

There are two main types of swamps in South Carolina's coastal zone - the river or alluvial swamp such as those occupying the floodplains of the Waccamaw, Pee Dee and Santee Rivers and the non-alluvial or inland swamp such as Four Holes located approximately thirty-five miles northwest of Charleston. A river swamp depends on the river for its existence. Occurring in bottomlands (floodplain forests), a river swamp either borders the river or is found between the floodplain forest and adjacent uplands. A non-alluvial or inland swamp does not occupy the floodplain of a river or stream that runs in a clear-cut bed. Non-alluvial swamps are fed by and owe their existence to springs and slowly meandering streams.

Only recently have the importance and vital ecological role of swamps been understood. Today we know that swamps are immensely important in the controlling of both floods and water pollution. When a flooding river spreads its waters into a bordering floodplain or bottomland forest and swamp, surrounding upland is buffered from the river's excess water, and people in the river's lower reaches experience considerably less danger from flooding. The excess water is absorbed by the forest and later released into aquifers, underground layers of porous, water-containing rock.

In addition to helping control floods, swamps act as nutrient traps, assimilating and using the nutrients deposited in them from the flooding of rivers and streams. Swamps also help control water pollution by serving as natural sewage treatment plants; the deposits of forest debris which accumulate on the swamp floor provide an effective form of filtration.

Swamps play a tremendously important role as preserves of animal life (their remoteness probably being the salvation of some species) and serve as marvelous tools for teaching, learning and research. Dr. Charles H. Wharton, biologist at Georgia State University, has made the following statement about river swamps. "The river swamps are ideal examples of what we mean by 'open space', 'green belts', and 'natural corridors'. They may function in many ways: sponges for regulation of the vital water cycle, giant kidneys for waste purification, convalescent wards for the esthetically ill, outdoor classrooms for school children and oxygen machines for air quality." In addition to all of these vital functions, swamps make a tremendous contribution to lumbering and other forest product industries through their sustained yield of many economically important tree species.

The river swamps and bottomlands of South Carolina's coastal zone contain a diverse representation of hardwoods including trees such as baldcypress, tupelo gum, sweetgum, blackgum, sycamore, southern hackberry, oaks, elms, ashes, hickories, red maple, American holly, red mulberries and others. Small trees and shrubs such as pawpaw, spicebush, blue beech, planer tree, blue-stem palmetto and strawberry bush are also found as well as numbers of woody vines.

The non-alluvial, black-water swamps, of which Four Holes is the most outstanding, are dominated by baldcypress, tupelo and black gum. The black water of the cypress swamps, feared by many people who think of it as dirty, disease-carrying and mosquito-infested, is, on the contrary, clear, potable, pure and free of fever-causing mosquitos. (Although clear, the water appears black due to the effect of tannic acid contained in the bark and leaf litter of the swamp floor.) It is only those swamps which are altered or virtually destroyed by man which tend to fit the former description.

Of concern to many citizens is the fact that in the past a considerable part of South Carolina's swamps has been significantly altered, destroyed or irrevocably damaged due to improper lumbering practices, dredging and the construction of impoundments behind hydroelectric dams. Our coastal zone is fortunate to contain a part of Four Holes swamp, bought by the Nature Conservancy and the National Audubon Society in 1971. This 3,415 acre black-water swamp contains 1,800 acres of virgin cypress and tupelo gum, thought to be the world's only remaining tract of virgin tupelo-cypress swamp. Today the swamp is a National Audubon Society sanctuary featuring an interpretive/visitors center and a 6,500 foot boardwalk through the forest.

#### **g. Savannahs**

Located within South Carolina's coastal zone are wetland areas known as savannahs. Savannahs are seasonally-flooded grasslands located in poorly-drained interstream flats or depressions within pine flatwoods.

A savannah originates after low pine woods are cut and the cut-over area is burned. If the area is not burned yearly or at least once every two years, the grasslands give way to other vegetation, and the communities such as evergreen shrub bogs come into being. Thus, fire is vital to the existence of the savannah type ecosystem.

Soil of savannahs is nutrient-poor and highly acid, thus the plants found in these areas are those which can tolerate harsh soil conditions - grasses, sedges, orchids and the fascinating "insect-eating" plants such as the sundews, pitcher plants and the famous Venus fly-trap.

Many savannahs have been protected from fire, and as a result they have disappeared along with their specialized flora. In order to protect these unique areas which provide habitat for both statewide and nationally endangered species such as the Venus fly-trap and white fringed orchid, savannahs must be properly managed to provide for the annual or semi-annual burning necessary for their existence.

#### **h. Pocosins**

Scattered throughout South Carolina's coastal zone are wetlands known as pocosins. A pocosin is a low, flat, swampy area located in a savannah type environment such as those found in the Santee Delta area and in the pine savannahs of the Francis Marion National Forest. Pocosins consist of water-logged, peaty soil and, in wetter sections, contain a ground cover of sphagnum moss. Generally characterized by dense broad-leaved shrubs, small evergreens and thorny vines, pocosins form nearly impenetrable thickets.

The water table of pocosins fluctuates considerably and enables them to maintain their special sort of ecosystem. Invading marsh plants are eliminated during dry periods, and many types of bacteria and fungi are destroyed in the surface soil layer during high water levels. The destruction of bacteria results in an absence of decay. Thus, leaves and other debris are preserved and become peat.

Common shrubs found in pocosins and adapted to long periods of waterlogging and drought are: fetterbush, ti-ti, honeycup, gallberry, shining inkberry, sweet pepperbush, Virginia willow, chokeberry, blueberry, and huckleberry. A number of endangered and threatened plants including the Venus fly-trap, green-fringed orchid and spring-flowered goldenrod occur in the pocosins of South Carolina's coastal zone.

#### **i. Carolina Bays**

Similar in many ways to pocosins, Carolina Bays are curious, elliptically-shaped depressions all of which are aligned in the same northwest-southeast direction. There is much speculation as to the geological origin of the bays which are found scattered throughout the coastal plains region of the Carolinas and northern Georgia. One theory, popular for many years, attributes their original formation to a shower of meteorites which hit the earth's surface thousands of years ago. Another theory has it that the bays were spawning beds for schooling fish at a time when the ocean covered much of the present-day coastal plain. Still another theory, which takes more factors into consideration than any of the others, is that Carolina Bays were formed by vast underground movements of water which resulted in sump action. In spite of much research and study, however, the geological phenomenon of the Carolina Bay remains a tantalizing mystery.

Biologically similar to pocosins, Carolina Bays differ mainly in their water depth, being generally deeper than pocosin communities. Whereas pocosins are relatively uniform and are usually covered by one particular community, Carolina Bays may have several different biological communities within a few yards of each other, and thus exhibit a remarkable range of habitats, for example - marsh, swamp, savannah and sand hills.

## **2. Barrier Islands and Beaches**

Parallel to South Carolina's shoreline lies a very important and dynamic coastal zone resource, the barrier islands and beaches. Called barrier islands because they form a barrier or protection for the mainland against the relentless action of the ocean, these islands are part of an immense chain which stretches from Maine, down the Atlantic coast and around the Gulf of Mexico to Texas.

Barrier islands are formed by various geologic processes - in most cases, through the transportation and deposition of sand by wind, tide, wave action and ocean flooding. Because they lie parallel to the shoreline and bear the brunt of the ocean waves, storms and flooding, barrier islands are constantly being shaped and reshaped, eroding (wearing away) and accreting (building up) in a dynamic, never-ending evolution.

A typical South Carolina barrier island is thin and elongate in shape, fringed with extensive salt marsh on the landward side and having a beach and sand dune system on the front side bordering the ocean. Most of the larger, forested islands contain interior waterways and wetlands.

Barrier islands are dominated by energy stresses, that is to say, by wave force, wind and tidal energies and ocean flooding which determine their constantly changing shape. Hurricanes as well as seasonal winter storms have a great impact on barrier islands and play an equally important role in shaping them.

An initial view of the barrier island system may result in the conclusion that barrier islands are very unstable. This is true in terms of human development which is not compatible with erosion and the devastating effect of hurricanes. However, in terms of ecology, the natural stresses brought to bear on barrier islands, by wind, tides, waves and flooding, are the very things which allow them to survive.

It is the dynamic nature of the barrier island system that makes it stable. The island beaches offer little resistance to storm waves, and effectively absorb and dissipate the tremendous forces which confront them.

In the natural system, storm waves frequently breach the island dunes and flood the island. As waves wash over the dunes during storms, they carry sand and shells onto the island and distribute them across the grasslands, marshes, and even into the estuary behind. Storm overwash, therefore, actually contributes new sediments to the islands. In this fashion, overwash serves to maintain the island by supplying sand from the beach and offshore areas for new dune growth, adding to the island's elevation, and extending the island laterally into the estuary. (**Barrier Islands and Beaches**, Technical Proceedings of the 1976 Barrier Islands Workshop, Annapolis, Maryland, May 17-18, 1976, p. 2.)

Larger barrier islands contain shrubs and forested woodlands, whereas smaller frequently flooded islands are devoid of trees and are dominated by hardy grasses such as sea oats (*Uniola paniculata*) and salt meadow cordgrass (*Spartina patens*). Barrier islands usually lack a complete representation of the fauna found on the mainland. This situation is the result of the distances between the islands and the mainland along with the inability of some species to cross salt water barriers. Characteristic of some barrier islands are special populations or subspecies of animals, especially mammals, which through their isolated situation develop characteristics which distinguish them from their relatives on the mainland.

Of absolute necessity to a barrier island's existence is its beach, dune and offshore sand bar system. The beaches protect and insure the existence of the highland area of the islands by absorbing and dissipating the tremendous forces exerted on them by waves and tidal currents. Just as the highlands depend on the beaches for stability, the beaches depend on the dunes for the replenishment of sand which is washed away from them by the stresses of waves, tidal currents and periodic storms and hurricanes.

Offshore sand bars play a very significant role in the "sand-sharing" system by providing sand for the replenishment of existing dunes as well as for the forming of new ones. As sand from the bars is washed ashore, it is blown inland where it builds up and strengthens existing dunes and thus lends more protection against hurricanes and storm tides. In areas where no dunes exist, they may begin to form where flotsam and jetsam, grasses or other obstructions on the beach block the wind and cause it to drop its load of sand. In a short time grasses such as sea oats take root and anchor the sand in place with their extensive root systems. Without the anchoring assistance provided by the grasses, dunes would not be able to build up or stay intact.

One of the most important benefits provided by barrier islands is their creation of the proper conditions necessary for the development and continuing existence of salt water wetlands and estuaries. By breaking the force of the ocean waves and creating behind them semi-enclosed, protected areas of low energy stresses, barrier islands permit the mixing of ocean and fresh waters necessary to the development and maintenance of the extensive network of estuaries and wetlands.

South Carolina has a total of some forty barrier islands along its coast. A few of these are protected, state and federally-owned lands set aside for conservation and preservation purposes. Some of the islands contain no development or very sparse development; others are heavily developed or are being heavily developed as exclusive, second-home/resort areas.

On islands where development has taken place without consideration or understanding of the natural

forces constantly at work, tremendous problems have arisen with erosion and accretion. Slowly we are coming to understand that the forces governing barrier islands are uncontrollable. They may be predicted, but they cannot be subdued, nor should they be. Man must learn to respect and to live in a design with them.

### 3. Forested Areas

Since the beginning of the first permanent European settlement in South Carolina our coastal zone forests have been of tremendous importance. In the early days of the colony, forest products such as lumber, masts for ships, turpentine, pitch and tar were manufactured for export, and considerable fortunes were made from the forest products industry.

The coastal zone's forests remain commercially important. With 19.2 percent of the forest lands of the State, the coastal zone produced 17.0 percent of the physical volume (cords) of pulpwood and 30.1 percent of the physical volume (board feet) of other forest products produced in South Carolina in 1975. The delivered value of these forest products (at rail yard, truck yard or mill site) was \$52.1 million or, 26.7 percent of the (\$195.1 million) value for the whole State.

In addition to their economic value, which can be established in dollars and cents, is their inestimable value as wildlife habitat, waste treatment plants, producers of oxygen, flood and erosion controllers, and havens where man can retreat from civilization to renew his senses and perhaps find his proper place in the scheme of living things.

The eight coastal zone counties contain a total land area of some 4,392,960 acres. The 1978 U.S. Forest Service statistics show that of this total land area, 2,961,876 acres are forested land, and of this total, 2,933,734 acres are commercial forest lands. The coastal zone is endowed with a wide variety and abundance of trees. Below is a list of some of the more important commercial species as well as others which are familiar to residents of the coastal zone.

**Baldcypress (*Taxodium distichum*):** Most often associated with very watery sites such as swamps. Trunk flares out at base into a swollen, deeply-lobed buttress-like structure. Roots send up woody growths called "knees" which protrude above water; exact function of knees is not known. Fibrous bark ranges in color from light gray to brownish red; its light green leaves are alternate, two-ranked and deciduous. Important commercially. Heartwood is very resistant to decay and is used for things such as docks, bridges, greenhouses, cooling towers, vats, boats and river pilings.

**Loblolly Pine (*Pinus taeda*):** Has pale green needles 6-9 inches long. Bark is thick and bright reddish-brown in color. Bark is divided by shallow fissures into broad, flat-topped plates covered with thin scales. Tree often reaches 100 feet in height. Has tall, straight trunk. Important commercially. Wood is used mainly for building materials such as framing, sheathing, subflooring, joists and interior finish. Also used for pilings, crossties, mine timbers, pulp and paper.

**Slash Pine (*Pinus elliottii*):** Has dark green, lustrous needles. Bark is gray to reddish-brown, rough, separating on the surface into large, thin scales. Commonly grows to 100 feet in height. Tall, straight, tapering trunk. Important commercially. Wood is heavy, hard, durable. Wood used for production of naval stores, pulp and paper.

**Sweetgum (*Liquidambar styraciflua*):** Has star-shaped leaves made up of 5 deeply separated, pointed lobes; round, bur-like, hard, woody fruit. Grows best on rich bottomlands reaching height of 120 feet. Its wood is used for veneer, plywood, boxes, baskets, crates, pulpwood, etc.

**Water Oak (*Quercus nigra*):** Has variably shaped leaves 2-4 inches long which are broader at apex than at base. Is a bottomland species but also grows on upland soils. Has slender, straight trunk. Important commercially. Wood is used for rough construction lumber.

**Red Maple (*Acer rubrum*):** Leaves 3-5 lobed and have coarsely-toothed margins. Leaves 2-6 inches long; turn brilliant scarlet, orange or bright yellow in autumn. Bark thick, dark gray on old trunks and is sep-

arated by vertical ridges into large plate-like scales. Tree may reach 120 feet in height. Often planted as an ornamental.

**Live Oak (*Quercus virginiana*):** Has widespreading crown and gnarled branches. Is one of the most characteristic trees of the coastal region of the Deep South. Seldom grows to more than 50 feet in height but may have crown-span of 150 feet or more. Wood is very difficult to saw and dry. Was prized for blocks on sailing ships.

**Southern Magnolia (*Magnolia grandiflora*):** An evergreen tree often planted as an ornamental. Leaves shiny bright green on upper surfaces, leathery, and covered on the lower surfaces with rusty-colored fuzz. Leaves oblong, 5-8 inches long, 2-3 inches wide. Tree has beautiful white, fragrant flowers 7-8 inches across. Tree often pyramidal with tall, straight trunk and is sometimes 100 feet or more in height. Bark varies from gray to brown. Wood is hard and heavy; used for crates, boxes, rough flooring.

**Flowering Dogwood (*Cornus florida*):** Is admired for the white drifts of flowers it adds to woodlands in spring; small tree, occasionally up to 40 feet in height. Dogwood berries provide a favorite food for deer, wild turkey, squirrels and songbirds.

**Palmetto (*Sabal palmetto*):** Is the official State Tree. Commonly known as the Cabbage Palmetto. Long associated with history of South Carolina. Is represented on State Flag as well as on the State Seal where it is symbolical of the defeat of the British fleet by the colonists stationed in a Palmetto fort on Sullivan's Island. Tree is an attractive feature of coastal S.C. Has long column-like stems with broad crown of leaves first growing upright, later spreading nearly at right angles with the stem, finally hanging downward before shedding. "Wood" made up of strands of heavy fiber cells with the strands scattered in a softer, pith-like tissue. Used for fences and underwater pilings. Leaves used for thatch, mats, brooms, brushes.

#### 4. Wildlife

The coastal zone contains a great variety and abundance of wildlife. Aside from hundreds of species of inconspicuous invertebrates, the fauna of the coastal zone is rich in fishes, amphibians, reptiles, birds and mammals.

South Carolina, and especially the low country, has produced and has been visited by eminent naturalists who have contributed much to the overall knowledge of the native fauna. In 1664 William Hilton, in his historic trek up the South Carolina coast, wrote the following: "The Country Abounds in Turkey, Quails, Curlews, Plovers, Teile, Heron; and as the Indians say, in Winter, with Swans, Geese, Craines, Duck and Mallard, and innumerable of other waterfowl, whose name we know not, which lie in the Rivers, Marshes, and on the Sands." The first true naturalist to study the fauna of South Carolina was Mark Catesby who in 1731 published **The Natural History of Carolina, Florida and the Bahama Islands**. William Bartram, another famous naturalist, traveled extensively through the Carolinas, Georgia and Florida from 1773 to 1778 making a study of the native fauna.

Born in 1785 in Saint-Domingue, John James Audubon, the great naturalist-artist, spent much time in the South Carolina low country studying its bird life, collecting specimens, sketching and painting. His friend, the Reverend John Bachman, an eminent Lutheran minister as well as a renowned scientist, supported Audubon by offering his home in Charleston as an ornithological research headquarters and by accumulating and writing descriptive material for Audubon's **Birds of America** as well as his later work, **Quadrupeds of North America**. The rare Bachman's Warbler is named after this unusual minister/scientist. Other well-known naturalists native to the South Carolina low country include E. Burnham Chamberlain (ornithologist), Alexander Sprunt, Jr. (ornithologist), E. Milby Burton (ornithologist, ichtheologist, historian), Arthur T. Wayne (ornithologist), Robert Hemphill Coleman (mammalogist, mathematician), and Dr. G. Robert Lunz (marine biologist). Botanists who have pioneered in describing the flora of South Carolina include Thomas Walter, **Flora Caroliniana**, 1740; Andre Micheaux, **Flora boreali Americana**, 1803; Stephen Elliott, M.D., **Sketch of the Botany of South Carolina and Georgia**, 1821; Henry William Ravenel, **Fungi of Carolina**, 1852; and Alvin W. Chapman, **A Flora of the Southern States**, 1860.

The following is a brief overview of wildlife resources, excluding fishes, found in South Carolina's coastal zone.

#### **a. Amphibians**

A total of five families of frogs and toads is found in the coastal zone of South Carolina - Spadefoot toads, "true toads," tree frogs, "true frogs" and narrow-mouthed toads. These five family groups are represented by a total of twenty-two species. Being among the more inconspicuous members of the fauna, these animals, including the green tree frog, the bullfrog, the spring peeper and the southern toad, are perhaps most familiar to the layman through their loud reproductive chorusing.

In addition to frogs and toads, the coastal zone amphibians include salamanders, more fishlike and less specialized creatures than frogs and toads and having primitive segmentation on their bodies and tails. A total of nineteen species, including mole salamanders, the red-spotted newt and the Congo eel, is found in the coastal zone.

#### **b. Reptiles**

The reptiles are represented in South Carolina's low country by turtles, lizards, snakes and one member of the crocodylian family, the American alligator.

1) **Turtles:** Turtles belong to one of the most ancient groups of animals in existence today. They are unique in that their bodies are encased in a bony, scale-covered shell to which their vertebral column and ribs are fused. Turtles have no teeth, but a horny beak with a strong cutting edge helps them obtain their food.

Turtles found in the coastal zone of South Carolina include amphibious and terrestrial species. Some of the more familiar species in the area are the snapping turtle, the yellow-bellied turtle, the mud turtle, the eastern box turtle, the diamondback terrapin, and the loggerhead sea turtle. The Atlantic loggerhead, a Federal threatened species, is the only sea turtle which nests on the South Carolina coast. (The Atlantic ridley, the Green sea turtle, the Hawksbill turtle and the Leatherback turtle are occasionally found in the State's offshore waters.) Mating occurs during April and May, and the females begin nesting on the beaches above the mean high tide line in late May or early June. Nesting usually continues until mid-August.

During the past century there has been a decline in the number of loggerheads, mainly due to the high mortality rate among the young and to nest predation by animals such as sand crabs, feral hogs and raccoons as well as by humans. The Atlantic loggerhead is protected by both Federal and State law. The capture or molesting of these animals and the predation of their nests is strictly forbidden.

2) **Lizards:** Closely related to snakes, the majority of lizards are easily distinguished from their relatives by their limbs, their visible external ear openings, and their movable eyelids. Fewer species of these animals are found in temperate areas of the world than in the tropics. Most familiar to coastal zone residents are the Green Anole (often misnamed Chameleon) which can change color, the various skinks and the glass lizard (sometimes called glass snake) which lacks legs and is often mistaken for a snake.

3) **Snakes:** The snake is a reptile characterized by the lack of external and internal ears, an absence of limbs, fixed eyelids, a left lung which is either reduced or absent and a forked tongue which is used in combination with its olfactory organs in the roof of the mouth and which enables the animal to smell its environment.

There is a total of ten families of snakes in the world. Three of these families are represented in South Carolina and the coastal zone. All of the harmless snakes in the coastal zone belong to Family Colubridae which contains the majority of the world's species. Perhaps the most familiar of these snakes to coastal zone residents are the kingsnake, the watersnakes, the garter snake, the grass snake, the yellow rat snake (chicken snake), the red rat snake (corn snake) and the hog nose snake, often called the spreading adder.

The poisonous snakes found in the coastal zone belong to two families, Family Elapidae and Family Viperidae. The former group is represented by the coral snake, probably the most brilliantly colored snake in North America as well as the most deadly. These snakes are fossorial or burrowing and are not readily observed. They are docile animals and are the least dangerous to man because of this trait as well as the method of injecting their poison. In order to inject a lethal dosage into a human, this small snake must get a good grip and actually chew into the flesh. The coral snake, along with the other members of its family, produces a neurotoxic poison which affects the nervous system.

All other poisonous snakes in South Carolina and the coastal zone belong to Family Viperidae. Those species found in the coastal zone are: the copperhead, the canebrake rattler, the pigmy rattler, the diamondback rattler and the cottonmouth moccasin. All of these snakes are known as Pit Vipers because of the heat-

sensitive pit located between the nostrils and the eye. This pit enables the animal to locate its warmblooded prey without depending on its eyesight.

Pit Vipers have long, hollow fangs on either side of the upper jaw. When not in use these fangs fold back in the snake's mouth. When striking, the snake opens its mouth, allowing the fangs to become erect. As it strikes its victim, haemotoxic poison, which destroys the red blood cells, is forced from the animal's poison sacs through the hypodermic-like fangs into the victim. Because of their highly specialized fangs, the Pit Vipers are much more dangerous to humans than the docile coral snake.

It is unfortunate that human beings seem to have an ingrained fear and hatred for snakes. Like all other creatures, snakes play an important role in the balance of nature. Non-poisonous snakes should never be killed. Unless a poisonous snake is found in an area inhabited or frequently used by humans, it also should be allowed to live and play its role in the natural scheme of things.

4) **Crocodylians:** Crocodiles and alligators are the only remaining members of the great subclass Archosauria, which includes dinosaurs, pterosaurs and others which became extinct more than 70 million years ago. The Family Crocodylidae is represented in South Carolina and the coastal zone by the American alligator. In the past this animal has been on the official United States list of endangered species. By receiving this protected status, the alligator has made a comeback in various parts of the country, including areas within South Carolina, and in those particular areas, its status has been changed from endangered to threatened. This change in status does not take away the animal's protection, however; it is still strictly forbidden to capture, molest or disturb these animals.

### c. **Birds**

Arthur T. Wayne, one of South Carolina's most eminent ornithologists, stated that South Carolina "stands easily first among the States of the Union in ornithological history." South Carolina truly does have an impressive ornithological record with seventy-seven birds having been made known to science for the first time from this state.

Approximately 300 species of birds have been recorded in South Carolina, and the majority of these can be seen in the State's coastal zone during the course of a year. Because of the conspicuousness of birds, more is known generally about them than most other animals.

Birds are unique among living creatures in that they are the only animals with feathers, and of all living creatures only birds and mammals are warmblooded, that is to say, capable of retaining a constant body temperature. Some of the other characteristics of birds are: 1) a lack of teeth, 2) an elongated mandible, 3) large, well-developed eyes, 4) hollow, air-filled bones for lightness, and 5) various other physiological adaptation which allow for and aid in flight.

Birds can be classified ecologically according to their season of appearance as follows:

**Permanent resident** - Can be seen at a location in any month of the year. Normally breeds in this locality.

**Winter resident** - Migratory. Present at locality only in winter. (Winter residents of the coastal zone arrive from the north in the early to late fall and leave the area in late winter or early spring.)

**Summer resident** - Migratory. (Coming from points farther south, summer residents arrive in the coastal zone in spring, breed in the area and leave in late summer or early fall.)

**Transient** - Migratory. Passes through a locality in fall and again in spring on its annual migration.

The coastal zone of South Carolina has an abundance of bird life, for a wide variety of habitats attracting a wide variety of species is found in this area, for example: beaches, mudflats, salt marshes, brackish and fresh-water marshes and ponds, swamps, woodlands and open spaces. Some of the best known species and the type habitat in which they are found are listed below.

<b>Habitat</b>	<b>Species</b>
Beaches	Laughing Gull, Herring Gull, Royal Tern, Eastern Brown Pelican, Common Tern, Willet, Western Sandpiper, Wilson's Plover
Mudflats	Black Skimmer, Willet, American Oystercatcher, Laughing Gull, Western Sandpiper, Ruddy Turnstone

Salt Marsh	Great Blue Heron, Green Heron, Little Blue Heron, Louisiana Heron, Snowy Egret, American Egret, Clapper Rail, Redwinged Blackbird
Brackish and Freshwater Marshes and Ponds	Anhinga, Pied-billed Grebe, Horned Grebe, Wood Duck, Ring-necked Duck, Canvas-back, Ruddy Duck, White Ibis, Mallard, Blue-winged Teal, Greater Yellowlegs
Swamps	Anhinga, Prothonotary Warbler, Swamp Sparrow, Red-eyed Vireo, Carolina Wren, Screech Owl, Pileated Woodpecker, Barred Owl
Woodlands	Turkey Vulture, Red-tailed Hawk, Red-shouldered Hawk, Bobwhite, Woodcock, Screech Owl, Chuck-Will's-Widow, Downy Woodpecker, Parula Warbler, Cardinal, Painted Bunting, Crow
Open Areas	Boat-tailed Grackle, Common Grackle, Rufous-sided Towhee, Starling, Cedar Waxwing, Robin, Catbird, Brown Thrasher, Mockingbird, Ground Dove, Eastern Bluebird

The Francis Marion National Forest contains several colonies of the endangered Red-Cockaded Woodpecker. Other endangered bird species found in the coastal zone are the Southern Bald Eagle, the Brown Pelican, and Bachman's Warbler. Several species of birds once abundant in the South Carolina coastal zone but extinct today are the Carolina parakeet, the Ivory-billed Woodpecker and the Passenger Pigeon.

#### d. Mammals

Mammals are divided into three main groups: **egg laying mammals**, which are the most primitive group and are restricted to the Australian Region of the world; **marsupials** (the pouched mammals), found principally in Australia but also occurring in South America and represented in North America by the opossum; and the **placental mammals** to which most living mammals belong.

The following characteristics distinguish mammals from all other animals:

**Mammary glands** — milk producing glands for feeding of the young.

**Hair.**

**Endothermy** — the ability to keep a constant body temperature. (This characteristic is also true of birds.)

The first reference to South Carolina's mammals was given by the young English naturalist, Mark Catesby (1743); however, very little material was published before 1830. In the period 1830-1860 the Reverend John Bachman, a Lutheran minister and distinguished scientist residing in Charleston, published several studies on South Carolina mammals. Bachman, who achieved worldwide acclaim as a mammalogist, collaborated with John James Audubon in the collection of specimens and the preparation of the text of their study, **Viviparous Quadrupeds of North America**, still referred to by present-day zoologists.

Relatively little study was undertaken in South Carolina from Bachman's time until the middle of the Twentieth Century. The most comprehensive, in-depth study on mammals in South Carolina was done by R. H. Coleman (1919-1954). Coleman studied all species but concentrated on the smaller animals. F. W. Sherman and E. B. Chamberlain have also contributed to the knowledge of South Carolina's mammal fauna.

South Carolina, including the coastal zone, contains mammals representing eleven groups called Orders which are distinguished mainly on the basis of differences in limb structure, form of the digits, and the teeth.

**Order Marsupialia** (Pouched Mammals) - This Order is represented by a single species, the opossum, one of the most interesting mammals in the State and related to the kangaroo, wallaby and other marsupials found in Australia and South America. Opossum young are born after a gestation period of about 12-13 days and, like all marsupials, are very poorly developed at birth. The new-born opossums are so small that 17-20 of them will fit in a teaspoon. In order to survive, the tiny babies must crawl into their mother's pouch where they attach themselves to her nipples and remain for three months.

**Order Insectivora** - This Order includes the moles and shrews whose main diet consists of insects. Moles are adapted to an underground existence by having a torpedo-shaped body, minute eyes and ears, broad forefeet for digging and scraping and an almost naked tail. The species which are found in the coastal zone are the Eastern Mole and the Star-nosed Mole.

Shrews are tiny, secretive animals found in damp, shady habitats with a thick cover of leaves and vegeta-

tion. They are aggressive little animals with a voracious appetite and a very high metabolic rate. A shrew lives for about one year, literally burning itself out in a never-ceasing search for food. Those species found in the coastal zone are the Southeastern Shrew, the Short-tailed Shrew and the Least Shrew.

**Order Chiroptera** - This Order is composed of the bats. Bats are known to have existed 50 to 60 million years ago and are the only mammals which can fly. Those found in South Carolina are insectivorous, but in other areas of the world, bats may eat fruit, nectar, fish or blood. Bats which feed on insects locate their prey by means of a highly sophisticated echo-location system.

Bats have drastically declined in South Carolina and other parts of the United States due to the widespread use of insecticides. Some of the bats found in the South Carolina coastal zone are: the Silver-haired Bat, the Big Brown Bat, the Red Bat, the Big-eared Bat and the Free-tailed Bat.

**Order Edentata** - This Order, which contains anteaters, sloths and armadillos, is represented in South Carolina's coastal zone by the Nine-banded Armadillo. This animal has been extending its range northward and eastward from Texas for several decades and has possibly reached South Carolina naturally; however, some records of its occurrence here have no doubt involved escaped or released pets.

**Order Lagomorpha** - Rabbits. Rabbits are one of the most plentiful animals in South Carolina and the coastal zone. Over 1.5 million were estimated to have been killed in the State by hunters in 1964. The two species occurring in the coastal zone are the Eastern Cottontail and the Marsh Rabbit.

**Order Rodentia** - Rodents. Rodents are the most abundant of the mammals. The characteristic shared by all members of this group is a single pair of chisel-like upper incisors which are used for gnawing. Some of the rodents found in South Carolina's coastal zone are the Gray Squirrel, the Fox Squirrel, the Flying Squirrel, Rice Rat, Eastern Harvest Mouse, Cotton Mouse, Golden Mouse, Cotton Rat, Pine Vole, Black Rat and House Mouse.

**Order Cetacea** - Whales. This group of mammals contains the largest living animal on earth, the Blue Whale, larger than any dinosaur known to have existed. The cetaceans or whales are included in this discussion because they may be observed swimming in the coastal waters and are occasionally found stranded on our beaches.

Most of the whales which have been observed off the South Carolina beaches are toothed whales. The following species are recorded from our state:

1. Atlantic Beaked Whale
2. True's Beaked Whale
3. Goose-beaked Whale
4. Pigmy Sperm Whale
5. Dwarf Sperm Whale
6. Sperm Whale
7. Common Dolphin
8. Short-finned Pilot Whale
9. Grampus or Risso's Dolphin
10. Killer Whale
11. False Killer Whale
12. Striped Dolphin
13. Long-beaked Dolphin
14. Spotted Dolphin
15. Bottle-nosed Dolphin - This is the common inshore dolphin of South Carolina's coastal waters. Most South Carolina residents refer to it as the porpoise.
16. Minke or Little Piked Whale
17. Sei Whale
18. Fin-backed Whale
19. Humpback Whale
20. Atlantic Right Whale

**Order Carnivora** - Carnivores. The name carnivore means meat eater. However, this term is not an entirely accurate description of the eating habits of all species in this order, for many carnivores are omnivorous,

eating both plant and animal food. The following carnivores are found in South Carolina's coastal zone.

**Red Fox** - This animal is probably not an original resident but was introduced into the State. It is omnivorous, consuming such food as rabbits, mice, rats, birds and berries.

**Gray Fox** - This animal occurs statewide. It eats a variety of plant and animal food.

**Black Bear** - The Black Bear, which may be black or brown in color, is found in coastal zone swamps as well as in other parts of the State. Bears are omnivorous, eating almost any type of food which is available to them.

**Raccoon** - This species occurs abundantly in the coastal zone and throughout the State. Raccoons are noted for their dexterity and curiosity. They are omnivorous animals and, in the coastal zone, find much of their food in the salt marshes.

**Long-tailed Weasel** - This secretive animal occurs statewide, but there are few records of its occurrence. Weasels feed on small animals such as rats, shrews, mice and rabbits, killing their prey by a well-placed bite on the base of the neck or skull.

**Mink** - This semi-aquatic mammal occurs statewide. In the coastal zone, it is found along the rivers and in the salt marshes. Its diet consists of rats, mice, fish, frogs, snakes, birds and aquatic insects.

**Striped Skunk** - This animal, rare in the coastal area, probably occurs throughout the State. It frequents open farm land and feeds on such items as small mammals, insects, carrion and fruit.

**River Otter** - This graceful swimmer occurs statewide, frequenting rivers, ponds, lakes and salt marshes. Its diet consists of fish, crustacea, clams, insects and birds.

**Cougar, Panther, Puma, Mountain Lion** - The outstanding characteristics of this mammal are its size, long tail and short head. A full-grown puma may reach 7 feet in length and may weigh 200 pounds. Although this beautiful cat is considered to be extinct in South Carolina, infrequent reports of sightings of this animal continue to be made. The Puma is on the official U.S. list of endangered species.

**Bobcat, Wildcat** - This cat probably occurs throughout the State but is found in greater numbers in the low country of South Carolina. It frequents swamps, bottomlands and densely wooded areas, feeding on rats, rabbits, grass and small birds.

The Red Wolf, once a part of the coastal zone's fauna, became extinct here by 1850. Found today only in the coastal areas of Louisiana and Texas, it is considered by some to be America's most rare mammal. In 1976 a pair of Red Wolves was brought to Bulls Island, South Carolina. Placed there by the U.S. Fish and Wildlife Service in an experiment aimed at saving this rare species, it is hoped that these animals will reproduce and provide offspring to be placed in other areas originally a part of their natural habitat.

**Order Pinnipedia** - Seals, Sea-Lions, Walruses. The term Pinniped means having finlike feet or flippers. Two pinnipeds have been recorded in South Carolina's coastal waters - the Harbor Seal and the California Sea Lion.

The Harbor Seal is an uncommon visitor to South Carolina's coastal waters. It has occasionally been seen on buoys in and near Charleston Harbor and has been recorded from Hilton Head Island and the mouth of the Santee River. The only other pinniped recorded from South Carolina's coast is the California Sea Lion. Three individuals appeared in the vicinity of Charleston, one being found in 1972 and the others in 1973. The animals had probably escaped or were released from captivity somewhere on the east coast.

**Order Sirenia** - Manatees. The Florida Manatee, an essentially fresh-water animal, occasionally appears in South Carolina's coastal waters. The manatee is a large aquatic mammal with small eyes and an absence of external ears. There is no visible separation of the head and body. Its fore flippers are paddle-shaped, and its tail is flattened laterally. Adults may weigh more than 1500 pounds and may exceed a length of 12 feet. This animal, which feeds on aquatic vegetation, moves north along the coast from Florida in the warmer months. The Florida Manatee appears on the official U.S. list of endangered species.

**Order Artiodactyla** - Even-toed Hoofed Animals. Today Feral Swine and the White-tailed Deer are the only artiodactyls of South Carolina and the coastal zone. Feral Swine are not native mammals like the White-tailed Deer, but they have been established in the coastal zone since the time of the first settlements. Frequenting bottomland swamps, they range into open country to feed at night.

The graceful and very beautiful White-tailed Deer is probably the best known mammal in the coastal zone. Officially designated in 1972 as the State Animal, the White-tailed Deer inhabits a variety of habitats from bottomland swamps to relatively open land. It is believed that this animal is more abundant today than when the State was first settled by Europeans.

Two other artiodactyls, now extinct in South Carolina, were a part of the coastal zone fauna during the colonial era - the Elk and the American Bison. Unfortunately, these magnificent animals were extirpated by hunting and the onward push of civilization.

5. **Marine Resources:** (See "Living Marine Resources," Chapter IV.)

6. **Soils**

Knowledge of underlying soil types is essential for wise land-use planning. It is widely recognized that not all soil types are suited to all land uses; at the same time, certain soil types are highly desirable for some activities, such as farming and forest production, and prudent resource management practices dictate that these soil types should be reserved for their most appropriate use.

Soils are produced by the interaction of natural processes such as wind and water action, temperature, and bioturbation (caused by plant and animal activity) with the underlying rock material. Except for a very small area in Berkeley County, soils in South Carolina's coastal zone fall within the Atlantic Coast Flatwoods land resource area. Soils in this vicinity are a mixture of sand and loam, and are moderately well to poorly drained. Drainage is an important factor to consider when development is undertaken, particularly if septic tanks are to be used. In the areas closest to the shore, soils tend to be poorly drained as a result of clay subsoils. Elevations range from sea level to only 100 feet above, meaning that much of the soil of the coastal zone lies in broad flats or shallow depressions. These depressions, known as Carolina Bays, contain very fertile deposits and are often used by farmers who "find the high organic content of the 'bay' floors highly desirable for farming and report yields to be fifty percent higher than in adjacent areas." (Kaczorowski, Raymond T., "Origin of the Carolina Bays" in **Terrigenous Clastic Depositional Environments**, Miles O. Hayes and Timothy W. Kana, Eds., Technical Report No. 11-CRD, Coastal Research Division, Department of Geology, University of South Carolina, Columbia, SC, 1976, pp. 11-19.) The fertility of the soil in the rest of the coastal zone ranges from low to medium, making it less than ideally suited for agriculture.

Like the inland soils, the sands of South Carolina's beaches vary depending upon the interaction of physical processes with various source materials. The arcuate strand area, stretching from the North Carolina border to Cape Romain, has the most stable structure at the moment, although erosion has been severe in the geologic past. The source of sand is ancient beach ridge, deposited by the oceans of the Pleistocene. The Cape Romain-Bull's Bay area sands are more coarse than most along the South Carolina coast since they are close to the Santee River system from which they are derived, and consequently have not been exposed to as much wave action. On the other hand, the sand of the barrier island systems to the south of Cape Romain is relatively fine. These sands are further removed from their sources and have undergone a great deal of reworking by wind and wave action. Unfortunately, because the barrier islands are receiving very little new sand, erosion is a problem along the southern portion of the coast.

7. **Geology**

South Carolina lies in three geographic provinces: 1) the mountainous Blue Ridge province of the northwestern edge of the State; 2) the Piedmont (foothills) province, which stretches from the Blue Ridge to the Fall Line; and 3) the Coastal Plain, reaching from the Fall Line to the seacoast. This Coastal Plain varies in width from 120-150 miles and covers an area of more than 20,000 square miles or nearly two-thirds of the State.

For millions of years this area was probably a part of the ancient continent of Appalachia whose eastern shore may have lain along the outer edge of the present Continental Shelf. It appears that during the Triassic (185 million years ago) the land was shattered by faults, and at the end of the Lower Cretaceous (125 million years ago) a continental warping formed the Appalachian Mountains and tilted down the land lying east, south and southwest of that area. With this downward tilting of land, the sea level rose in the present area of our Coastal Plain and possibly reached as far as the present Fall Line.

A study of the geologic history of South Carolina's Coastal Plain reveals numerous advances and retreats of the sea during which sediments were deposited and planed off over and over again. The entire Coastal Plain area consists of sedimentary deposits, ranging in age from Upper Cretaceous (65 million years ago) to Recent (2 million years ago), laid on top of ancient rocks such as granites, schists and other crystalline rocks. The numerous changes in sea level were partly due to tiltings of the land and partly to variation of world climate. During a series of "ice ages" when world climate was much colder than at present, the polar ice caps tied up

much of the ocean's water, thus causing a drop in sea level. When the climate gradually became warmer, much of the ice melted and returned to the ocean, causing substantial rises in sea level and inundating tremendous land areas.

Most of South Carolina's Coastal Plain deposits are unconsolidated and are soft or soluble. Therefore, they are most easily eroded than the hard crystalline rocks of the Piedmont region. As streams tumble off the more resistant rocks at the edge of the Piedmont into the softer sediments of the Coastal Plain, a series of rapids or falls is formed, thus the term, "Fall Line."

The Coastal Plain is divided into five geographic divisions as follows:

- 1) the marine coastal terraces or "low country,"
- 2) the Aiken Plateau,
- 3) the High Hills of Santee,
- 4) the Richland red hills, and
- 5) the Congaree sand hills.

Because the coastal zone, as defined in South Carolina's Coastal Zone Management Act of 1977, roughly composes the same area as the marine coastal terraces, the remainder of this discussion will be limited to an overview of the geology of that area.

The marine coastal terraces occupy more than two-thirds of the present Coastal Plain. For thousands of years the area of the terraces was a level plain. With the recurrent rising and falling of sea level, deposits were laid down; and during temporary stands of the sea, sand bars were built across mouths of bays. As the sea withdrew, the bars remained to mark the abandoned shoreline. The area between two successive shore lines is treated as a separate terrace, and seven of these terraces have been identified and named in South Carolina's Coastal Plain. They are, from the oldest to the most recent, the Pamlico, Talbot, Penholoway, Wicomico, Sunderland, Coharie and Brandywine.

The present shoreline, which forms the seaward boundary of the most recent terrace, has a total length of 1,241 miles, including 281 miles of mainland and 960 miles around islands. From Cape Fear, North Carolina, to South Carolina's Winyah Bay, the coast forms a great arc and is distinguished by miles of fine sand beaches broken by several inlets including Little River Inlet, Murrells Inlet and North Inlet. From Winyah Bay to the Savannah River, the coast line trends to the southwest and is broken by numerous barrier islands, sea islands, bays, inlets and rivers.

The Charleston area has a history of seismic activity. A major quake occurred in this area in 1886 (see page I-7) and is described in a 1977 report conducted by the U.S. Department of the Interior (**Studies Related to the Charleston, South Carolina, Earthquake of 1886 - A Preliminary Report**, Geological Survey Professional Paper 1028, Edited by Douglas W. Rankin, U.S. Department of the Interior, 1977.). No major seismic activity has occurred since 1886; however, the Middleton Place-Summerville area is still considered a geologically active zone.

## 8. Climate

The climate of South Carolina's coastal zone is referred to as a marine subtropical climate in which the winters are short and mild and the summers long, warm and humid. Proximity to the warm Gulf Stream waters which flow northward along the northeast coast of the United States helps to produce this type of climate and moderates temperature extremes of both summer and winter.

The coastal zone's summer season begins in May and lasts until the end of September. In the summer months, the land heats up more rapidly in the morning than the adjacent ocean water, and warm air masses begin to rise. By afternoon this rising, warm air begins to be replaced by the cooler, more dense ocean air, thus creating a sea breeze. In the evening, the reverse process occurs, creating a land breeze which blows out to sea. Further inland, summer temperatures are higher than those along the shore because the sea breeze's influence lessens with distance from the ocean. Rainfall is relatively heavy during the summer season, most of it coming as showers and thunderstorms. Occasional tornadoes, tropical storms and hurricanes add to the amount of rain received during the summer. The average air temperature along the coast in summer is around 80 degrees F. to 82 degrees F.

The months of October and November are known as "Indian Summer" and are characterized by warm, dry, sunny days and cool nights. Many persons find these months to be the most pleasant time of the year.

The winter months are characteristically mild with an average winter morning temperature of about 40 degrees F. and an afternoon maximum around 60 degrees F. About 18% of the annual precipitation falls in winter, and although frozen precipitation is fairly rare, it does occur occasionally.

March and April are a transition period during which rapid warming takes place. This period is marked by windy and occasionally cold weather in March to generally warm, pleasant weather in April. The ocean temperature during these months rises from 56 degrees F. to around 70 degrees F.

The coastal zone occasionally experiences tropical storms and hurricanes during the hurricane season which lasts from May to November. A hurricane is a well-developed cyclonic storm, usually of tropical origin. The characteristics of a hurricane are violent, counterclockwise winds that produce tremendous waves and surges and torrential rainfall. Each hurricane varies in size and duration. Generally, they extend over thousands of square miles, reach a height of 30,000 feet or more, and last from nine to twelve days.

Most of the hurricanes affecting South Carolina form west of the Antilles, but some form in the Caribbean. In most cases, as these hurricanes approach the Florida and Georgia coasts, they turn northeastward and remain over the ocean before landfall in South Carolina. Others make a limited penetration of the Florida and Georgia mainlands and then move parallel to the southeastern seaboard. The majority of hurricanes pass well offshore of South Carolina and inflict little damage.

The most damaging and memorable hurricanes to hit South Carolina's coast occurred in 1885, 1893, 1911, 1940 and 1959. These storms cost many lives and millions of dollars in property damage. Damage was caused by high speed winds, rainfall and flooding.

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## D. COASTAL ECONOMY

### 1. Introduction

The eight counties designated by the General Assembly as the coastal zone of South Carolina have a land area of 6,864 square miles, which is 22.7 percent of the total land area of the State. In 1975 this area was estimated to have 20.9 percent of the State's population, 18.5 percent of the civilian labor force, 18.6 percent of the civilian employment, and 16.8 percent of the State's unemployment. These data reveal that the coastal zone of South Carolina does not differ very much from the State as a whole with respect to population density, labor force participation, and percent of the labor force unemployed. These data also suggest that the coastal zone has sufficient unused human resources to provide a basis for substantial economic growth.

Principal economic activities within the coastal zone are agriculture, silviculture, fisheries, recreation and tourism, government and industry.

In spite of a significant recession in 1974-75, the economy of the State and its coastal zone has grown fairly steadily over the past decade, and indications are that it will continue to do so for at least the next several years.

### 2. Economic Characteristics

South Carolina's coastal zone is characterized by a very uneven distribution of population and employment opportunities. In 1975 Charleston County alone had 45.0 percent of the area's total population. The oceanfront counties (Jasper, Beaufort, Charleston, Georgetown and Horry) had 73.0 percent of the coastal zone population in 1976. The population is even more unevenly distributed during the week when there is a net flow of commuters from the remaining counties of the coastal zone.

For simplicity's sake, much of the discussion which follows will deal with South Carolina's coastal zone in terms of three broad regions: the Low Country (Jasper, Beaufort and Colleton Counties) the Greater Charleston Region (Berkeley, Charleston and Dorchester Counties) and the Waccamaw Region (Georgetown and Horry Counties). See Figure D-1.

### 3. Transportation and Utilities

South Carolina's coastal zone has 443.66 miles of main track railroad and is serviced by Amtrack, Seaboard Coastline and Southern Railways.

Major commercial air traffic in the coastal zone is handled by the Myrtle beach AFB/Jetport and the Charleston AFB/International Airport. In 1976 the Myrtle Beach facility recorded 72,043 total passenger emplanements, while there were approximately 400,000 emplanements at Charleston. Total commercial vehicle operations at the Charleston Airport in 1977 numbered 22,121, and of these, 2,017 were air taxi operations used to carry passengers over short distances. The Charleston Airport is serviced by Eastern, National, Delta, Southern and Piedmont Airlines.

The only major seaport in the coastal zone is the Port of Charleston which ranks twelfth in the nation in dollar value of general cargo handled (after ranking thirty-fifth in the 1930's). Much smaller port facilities are also operated by the South Carolina Ports Authority at Georgetown (Waccamaw Region) and Port Royal (Low Country Region). In the 1976-77 fiscal year, a total of 1,392,750 tons of cargo were received at South Carolina's ports. Cargoes ranged from waste materials to fresh fruit. During the same period, 2,259,445 tons were exported through South Carolina's ports.<sup>2</sup>

Charleston is the southeastern terminus of an interstate highway (I-26) which connects with a number of other interstate systems serving major population and industrial centers in the eastern half of the United States. Interstate 95, a major north-south route, passes west of Horry and Georgetown Counties in the Waccamaw Region and connects with a four-lane highway leading to Myrtle Beach. After passing through Dorchester County near St. George, it continues through central Colleton and Jasper Counties and on into Savannah, Georgia.

The South Carolina coastal zone is served by two investor-owned electric utility companies and by six electric cooperatives. The South Carolina Electric & Gas Company of Columbia serves all of the coastal zone counties except the northernmost - Horry - which is served by the Carolina Power and Light Company of Raleigh, North Carolina.

FIGURE D-1



#### 4. Economic Activities

##### a) Agriculture

A 1967 land-use survey identified 11.9 percent of the land in the coastal zone as cropland and 2.5 percent as pasture. Corresponding figures for the State as a whole were 20.0 and 5.4 percent respectively, indicating that agriculture is of relatively less importance in the coastal zone than in the State as a whole. However, in 1975 agriculture provided 3.3 percent of the total labor and proprietors' income in the coastal zone (see Table D-1), while farm income for the State as a whole was 3.2 percent of the total. The high coastal zone figure was due primarily to the Waccamaw area which derived 11.3 percent of its income from farm sources. The Low Country area obtained 3.2 percent of its income from agriculture, while the figure for the Greater Charleston Region was only .9 percent.

These percentages are likely to increase in the future. In the December 15, 1977, report to the State Budget and Control Board, the South Carolina Division of Research and Statistical Services noted that "with or without a farmers' strike, the long term trend of the decline in prices will keep pace with increases in the prices of other consumer goods and services."<sup>3</sup>

The Low Country coastal zone accounted for 22.5 percent of the cash receipts from marketing crops by South Carolina farmers in 1975, a share which is almost exactly the same as the coastal zone's 22.7 percent share of the total land area of the State. The State's most valuable crop, tobacco, was also the coastal zone's most valuable crop, with Horry County ranking first among all the counties of the State in tobacco sales. The farmers of the coastal zone marketed only 11.2 percent of the State's second most valuable crop, soybeans, and 20.7 percent of the corn crop, which ranked third in both the coastal zone and the State. In terms of cash value, vegetable crops (produced mostly in Charleston and Beaufort Counties) were second only to the tobacco profits of the norther coastal zone region.

The farmers of the coastal zone marketed 25.0 percent of the hogs and 10.2 percent of the cattle sold by South Carolinians in 1975. In all, the coastal zone's share of crops and livestock was 18.3 percent of the State total.<sup>4</sup>

##### b) Forestry (Silviculture)

As of 1967, 62.8 percent of the coastal zone was forested land. (See Table D-2.) The Waccamaw Region had by far the most forested land, with 72.0 percent of its total area falling into this category. The Greater Charleston Region had only 55.3 percent forest land, while the Low Country fell in between with 63.4 percent forest land. Presumably, the amount of forest land is lower now due to pressure from industrial and residential development. It is, however, important to bear in mind that much of the federally owned land in South Carolina is forest land, making the actual totals higher than they appear to be.

Although large, the quantity of forest in the coastal zone is only 19.2 percent of the total forest land of the State, based on 1975 figures. However, the income derived from coastal zone forests is 26.7 percent of the State's forest-derived income, indicating that silviculture plays a somewhat more important role in the economy of the coastal zone than it does in some other areas of the State.

The coastal zone produced 17.0 percent of the physical volume (cords) or pulpwood and 30.1 percent of the physical volume (board feet) of other forest products produced in South Carolina in 1975. The delivered value of these products was 52.1 million, or 26.7 percent of the value for the whole State.<sup>5</sup>

##### c) Fisheries

All commercial fish landings in South Carolina occur within the coastal zone. The total value of the 1976 catch was \$14,069,569, which can be broken down as follows:

	Volume (pounds)	Value (dollars)
Shrimp (heads on)	8,053,006	\$11,043,381
Blue Crabs, Hard	5,739,936	975,847
Clams, Hard (meats)	172,464	208,686
Oysters (meats)	1,187,077	759,063
Squid	12,454	3,311
All fin fish	5,713,661	1,079,281

**TABLE D-1**

**Labor and Proprietors' Income by Major Source,  
Three Economic Areas of South Carolina Coastal Zone, 1975<sup>a</sup>**

Source	Low Country		Greater Charleston		Waccamaw		Coastal Zone		State	
	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent
	(-----Thousands of Dollars-----)									(Millions)
Farm	\$ 11,587	3.2	\$ 12,843	0.9	46,892	11.3	\$ 71,322	3.3	\$ 325.6	3.2
Private										
Nonfarm	148,513	41.3	751,460	55.0	283,145	68.2	1,183,188	55.3	7,429.0	74.1
Government	199,881	55.5	601,599	44.1	85,262	20.5	886,742	41.4	2,271.1	22.7
Total	359,981	100.0	1,365,902	100.0	415,299	100.0	2,141,182	100.0	10,025.7	100.0

<sup>a</sup> Reported by place of work.

SOURCE: Regional Economics Information System, Bureau of Economic Analysis, U.S. Department of Commerce, Special Tabulation.

**TABLE D-2**

**Land Use in South Carolina Coastal Zone Counties, 1967**

County	Total land area <sup>1</sup>	Not inventoried		Cropland	Inventoried by Soil Conservation Service			
		Federal	Other <sup>2</sup>		Pasture	Forest	other land	
							Total	Non-farm
		(Thousands of acres)						
Beaufort	372.0	13.8	20.8	44.4	10.0	153.0	130.0	13.0
Berkeley	704.0	201.0	32.5	50.6	13.0	386.2	20.7	4.7
Charleston	605.0	101.0	49.2	42.8	18.9	260.0	133.3	59.9
Colleton	671.0	0.0	29.9	103.3	28.0	482.3	27.5	15.0
Dorchester	364.0	0.0	6.3	56.2	8.5	278.8	14.2	3.5
Georgetown	520.0	0.0	22.6	28.7	6.2	419.5	42.9	36.9
Horry	736.0	3.6	42.4	159.8	15.5	485.3	29.4	15.1
Jasper	428.0	6.6	14.2	36.2	12.0	297.8	61.2	3.7
Zone Total	4,400.0	326.0	217.9	522.0	112.1	2,762.9	459.2	151.8
State Total	19,338.3	1,042.7	1,141.2	3,865.4	1,037.7	11,427.1	824.3	291.4

<sup>1</sup> Excludes water areas larger than 40 acres and rivers wider than 1/8 mile.

<sup>2</sup> Urban and built-up areas, and small water areas.

SOURCE: South Carolina Soil and Water Conservation Needs Inventory, Soil Conservation Service, USDA Columbia, South Carolina, May 1970.

It is obvious that the shrimp fishery is by far the most important one in the State. It accounts for 41.0 percent of the volume and 78.0 percent of the ex-vessel value of all catches over the years 1974, 1975, and 1976. In descending order of importance, shrimp is followed by the blue crab, fin fish, and oyster/clam fisheries.

The majority of South Carolina-caught seafood is shipped out-of-state. In 1976 only six to eight percent of the total shrimp harvest was sold at dockside, while South Carolina retailers, chainstores and restaurants each received less than five percent of the harvest.<sup>6</sup>

The numerous recreational fishery resources of the coastal zone, including the nationally famous freshwater striped bass fishery of the Santee-Cooper Lakes, are of high quality and are used fairly heavily. In 1977 they included thirteen ocean fishing piers, sixty boat ramps, thirty-three marinas, four boat rental businesses, nine artificial fishing reefs, forty-nine charter boats (which usually carry four to six people) and nineteen "head boats" (which can carry up to 118 anglers). Recreational crabbing and shrimping are popular as is the recreational harvesting of oysters and clams.<sup>7</sup>

#### **d) Recreation and Tourism**

The most accessible beaches in South Carolina are located in Horry and Georgetown Counties. It is not necessary to cross extensive reaches of marshlands and islands to reach these beaches, as is the case for beaches in southern South Carolina and Georgia. Furthermore, these beaches are closer than others to the thickly populated and industrialized Piedmont region of North and South Carolina. As a result, there has been, and continues to be, substantial development of tourist and recreational facilities along most of the coast of Horry County and the northern half of Georgetown County.

When one considers the numerous attractions in South Carolina's coastal zone, it is not surprising that recreation and tourism-related activities make a significant contribution to the region's economy. Since much of the income derived from tourism comes from out-of-state, it may represent a more significant input into South Carolina's economy than at first appears to be the case. However, this is difficult to assess without detailed knowledge of how much is spent by South Carolinians in other states. In 1977, 36.1 percent of all travelers entering South Carolina were "visitors" whose primary destination was a location within the State. Of the 14,290,619 visitors to the State in 1977, 56.2 percent had destinations within the coastal zone. This figure may be low, however, as 12.2 percent of the destinations listed were in the undefined "Other" category. It is likely that at least some of the destinations listed in this category fell within the coastal zone.

Geographical breakdown reveals that 33.2 percent of the visitors to the coastal zone headed to the "Grand Strand" in Horry County, and 18.3 percent went to the Charleston Region, while only 4.7 percent listed destinations in the Low Country Region.

Expenditures by visitors to South Carolina in 1977 totaled \$1,085,332,894. The importance of tourism to the economy of the coastal zone is indicated by the fact that 77.6 percent of all visitor expenditures in the State were made within the coastal area. Again, geographical breakdown reveals that a disproportionate share of expenditures in the coastal zone (45.3 percent) were made in the Grand Strand area followed by 22.5 percent in the Charleston area and 9.8 percent in the Low Country area. Of this last category, 8.6 percent was spent at Hilton Head alone.

As might be expected, the largest expenditures are made for lodging (31.9 percent) followed closely by those for food (28.7 percent). Gifts and miscellaneous items account for 15.3 percent of the tourist dollar, while 13.6 percent is spent on auto-related needs, and only 0.5 percent is spent on entertainment. Since these figures apply to the entire State, the percentages may vary within the coastal zone, but the ranking of expenditures undoubtedly remains constant.<sup>8</sup>

Recreation and tourism depend to a large degree on a number of factors unrelated to the coastal zone *per se*, factors such as the weather, national economy, and the season. Seasonality in the coastal zone is fairly easy to predict: tourism peaks in the summer quarter and is at its lowest point in the winter quarter. The effect of seasonal changes on related industries should be kept in mind; although, in 1976 tourism and recreation showed such an upsurge that growth in lodging and recreational services continued after the close of the season.

#### **e) Industry and Government**

Employment in the six major industry groups plus government is reported in Table D-3. Total employment in the industries listed was 178,570 for the coastal zone. This figure is 18.3 percent of the total for the State.

**TABLE D-3**

Average Annual Nonfarm Wage and Salary Employment,<sup>a</sup> South Carolina Coastal Zone,  
by Economic Area and Industry Group, 1975

Industry Group	Low Country		Greater Charleston		Waccamaw		Coastal Zone		State	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Manufacturing	3,920	16.4	14,300	12.5	10,320	25.7	28,540	16.0	336,300	34.0
Contract Construction	1,730	7.3	9,000	7.9	2,220	5.5	12,950	7.3	61,800	6.0
Transp., com., & pub. ut.	810	3.4	6,700	5.8	1,100	2.7	8,610	4.8	40,300	4.0
Wholesale & ret. trade	4,290	18.0	24,400	21.3	9,030	22.4	37,720	21.1	175,600	18.0
Fin., ins. & real estate	1,890	7.9	4,900	4.3	1,470	3.7	8,260	4.6	39,100	4.0
Miscellaneous	4,200	17.6	16,100	14.1	9,290	23.1	29,590	16.6	124,600	12.0
Government	7,010	29.4	39,100	34.1	6,790	16.9	52,900	29.6	200,100	20.0
Total	23,850	100.0	114,500	100.0	40,220	100.0	178,570	100.0	977,800	100.0

<sup>a</sup> Employment reported by place of work.

SOURCE: South Carolina Statistical Abstract, 1976. S.C. Division of Research and Statistical Services, Columbia, S.C., p. 68.

**TABLE D-4**

Number of Establishments, Employment and Payrolls<sup>1</sup>  
South Carolina Coastal Zone, 1974<sup>a</sup>

Economic Area	Number of Estab.	Employees week of March 12, 1974		Annual Payroll, 1974	
		Number	Per Estab.	Total (\$1000's)	Per Worker (Dollars)
Low Country	1,568	17,172	11.0	107,775	6,276
Greater Charleston	5,966	76,207	12.8	533,528	7,001
Waccamaw	2,746	28,887	10.5	197,925	6,852
Coastal Zone	10,280	122,266	11.9	839,228	6,864
State	48,743	799,046	16.5	5,863,565	7,338

<sup>a</sup> Does not include: Self-employed persons, agriculture and domestic service, government and railroads.

SOURCE: U. S. Bureau of the Census, County Business Patterns, 1974: South Carolina. U. S. Government Printing Office, Washington, D. C., 1976, p. 63.

(The coastal zone has 20.9 percent of the State's population.) Worthy of special notice among the industry employment figures in the various regions is the relatively low level of manufacturing employment in all but the Waccamaw Region. Georgetown, with 41.4 percent employed in manufacturing, was the only coastal county which exceeded the State percentage of manufacturing employees. It was also the only coastal county for which the average annual wage (\$7,975 in 1974) was above the State's average.

Also noteworthy are the large percentages employed by government in the Low Country and Greater Charleston Regions. This is especially significant because the figures include only the civilian employees of military facilities. Large public sector employment may be both an advantage and a liability to the economy of the coastal zone. The coastal zone withstood the rather severe 1975 recession better than other areas of the State, yet remains highly vulnerable to economic shocks from political decisions regarding the nature, level, and location of government expenditures – especially military expenditures.

Data on 1974 employment, payrolls and numbers of establishments in the coastal zone and the State as a whole are summarized in Table D-4. The coastal zone had 21.2 percent of the establishments, 15.3 percent of the employees (in the week of March 12) and 14.3 percent of the payrolls of those industries covered by the survey. The average number of employees per establishment was considerably lower in the coastal zone than in the State as a whole, and only one county (Georgetown, with an average of 15.2 employees/establishment) was even close to the State average of 16.5. The coastal zone, therefore, is characterized by a number of small business establishments rather than by larger industrial centers.

### **3. Income and Employment Trends**

At the outset, it is important to note that any discussion of the economy of the coastal zone must include an awareness of the economy of the State as a whole as well as the national economy. South Carolina was identified as one of six states most sensitive to national economic developments by the Bureau of Economic Analysis and the Department of Commerce. This means that swings of the business cycle are larger in the State and the coastal zone than elsewhere.

Data on population, labor force, employment and unemployment in the coastal zone and its three major subdivisions are given in Table D-5. It should be noted that these data, unlike the employment data in Tables D-3 and D-4, are based on county of residence rather than place of work, and that agriculture, self-employed, unpaid family, and domestic workers are included. The data in Table D-5, therefore, are not strictly comparable with the data in Tables D-3 and D-4. Also, in 1975 (the year covered by Table D-5) there was a significant economic recession as compared with the previous year (covered by Table D-4).

South Carolina's economy has maintained a steady recovery rate since the 1974-75 recession, and a growth rate above that of the South Atlantic Region and the rest of the nation is predicted. According to the 1977 Economic Report prepared by the South Carolina State Budget and Control Board, "this trend is expected to continue for the next four years as South Carolina narrows the gap between the region and the nation in jobs and especially in incomes."<sup>10</sup>

#### **Unemployment**

The rate of unemployment for the State in 1975 was 8.7 percent as compared with 4.1 percent in 1973 and 5.9 percent in 1974. Thirteen of the forty-six counties had over 11 percent of their labor force unemployed, and in three, the rate of unemployment in 1976 was above 15 percent. In contrast, only two of the eight coastal counties had above 10 percent unemployment in 1975, and for the coastal zone as a whole, the rate was only 7.9 percent. It is clear from these figures that the relative impact of the recession was less in the coastal zone than in the rest of the State. Recent data from the Division of Research and Statistical Services indicate that the State unemployment rate in December of 1977, 4.7 percent, was the lowest since December of 1973. A downward trend in unemployment in South Carolina (which presumably would affect the coastal zone) may be underway, since the adjusted rate for 1977 was 5.4 percent, down from 6.9 percent in 1976.

#### **Labor Force Participation**

Labor force participation is defined as the percentage of the total population sixteen years of age or older in the labor force at a given point in time. Georgetown and Horry Counties had labor force participation rates more like those in the rest of South Carolina than the other coastal counties, both having over 40.0 percent

**TABLE D-5**

Estimated Average Annual Labor Force, Employment and Unemployment  
in South Carolina Coastal Zone Counties, 1975<sup>a</sup>

County	Population	Civilian labor force		Number employed	Number	Unemployed Percent
		Number	% of pop.			
Beaufort	53,100	18,050	34.0	16,640	1,410	7.8
Berkeley	64,400	21,700	33.7	19,700	2,000	9.2
Charleston	262,900	91,000	34.6	84,500	6,500	7.1
Colleton	28,700	11,100	38.7	10,080	1,020	9.2
Dorchester	44,300	14,600	33.0	13,500	1,100	7.5
Georgetown	37,800	15,180	40.2	13,540	1,640	10.8
Horry	85,100	41,300	48.5	38,200	3,100	7.5
Jasper	12,900	4,970	38.5	4,450	520	10.5
Zone total	589,200	217,900	37.0	200,610	17,290	7.9
State total	2,818,000	1,180,000	41.9	1,077,000	103,000	8.7

<sup>a</sup> Reported by place of residence. Total employment includes agricultural workers and non-agricultural self-employed, unpaid family and domestic workers.

SOURCE: South Carolina Statistical Abstract, 1976, S. C. Division of Research and Statistical Services, Columbia, S. C., p. 63.

**TABLE D-6**

Labor and Proprietors' Income by Industry Group,  
Three Economic Areas of South Carolina Coastal Zone, 1975<sup>a</sup>

Industry Group	Low Country		Greater Charleston		Waccamaw		Coastal Zone		State	
	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent
(-----Thousands of Dollars-----) (Millions)										
Farm	\$ 11,587	3.2	\$ 12,843	0.9	\$ 46,892	11.3	\$ 71,322	3.3	325.6	3.2
Manufact.	\$ 29,024	8.1	167,214	12.2	95,767	23.1	292,005	13.6	3,193.8	31.9
Construction	15,950	4.4	90,655	6.6	19,877 <sup>b</sup>	4.8	126,482 <sup>b</sup>	5.9	634.4	6.3
Mining	---	---	---	---	---	---	---	---	20.1	0.2
Trade	31,826	8.8	193,576	14.2	65,757	15.8	291,159	13.6	1,424.0	14.2
Fin., Ins. & Real Estate	21,600	6.0	46,913 <sup>c</sup>	3.4	12,707	3.1	78,220 <sup>c</sup>	3.7	401.2	4.0
Transportation & Pub. Util.	9,406	2.6	76,995	5.6	12,058	2.9	98,459	4.6	510.7	5.1
Services	36,688	10.2	168,739	12.4	66,280	16.0	271,707	12.7	1,211.5	12.1
Other Ind.	---	---	---	---	7,749	1.9	---	---	33.2	0.3
Government	199,881	55.5	601,599	44.0	85,262	20.5	886,742	41.4	2,271.1	22.6
Fed. Civil	23,656	6.6	241,537	17.7	11,195	2.7	276,388	12.9	461.7	4.6
Fed. Milit.	49,480	41.5	204,378	15.0	36,359	8.7	390,217	18.2	696.1	6.9
St. & Local	26,745	7.4	155,684	11.4	37,708	9.1	220,137	10.3	1,113.3	11.1
Total	\$359,981		\$1,365,902		\$415,299		\$2,141,182		\$10,025.7	
Fed %		48.1		32.7		11.4		31.1		11.5

<sup>a</sup> Reported by place of work.

<sup>b</sup> Includes \$2.4 million allocated to Georgetown.

<sup>c</sup> Includes \$2.0 million allocated to Berkeley and Dorchester Counties.

SOURCE: Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce Special Tabulation.

labor force participation. Horry County, with a labor force participation rate of 41.9 percent, exceeded the South Carolina rate of 40.5 percent. None of the other six coastal counties had as much as 39.0 percent of the population in the civilian labor force.

### Income

Income produced in South Carolina's coastal zone in 1975 was \$2.14 billion, which was 21.4 percent of the total produced in the State. The percentage increase from 1970 to 1975 (not adjusted for inflation) was somewhat higher for the coastal zone (61.7) than for the State (56.2) or the nation (55.0). Although these figures are in part a reflection of the relatively low levels of development in the coastal zone prior to 1970, they do demonstrate that the coastal zone economy is healthy.

The amounts and relative importance of income from farms, private non-farm enterprise and activities, and from government are summarized in Table D-1 for the State as well as the coastal zone and its three major regions.

A comparison of the income data in Table D-1 with the employment data in Table D-3 reveals that in the coastal zone, incomes per worker are much higher in government work than in the private sector of the economy.

The relative importance of government as a source of income is probably due to the large proportion of federal, as opposed to state or local, employers. (See Table D-6.) It also is a reflection of the seasonal and/or irregular nature of many recreation and tourism-related jobs. A third factor contributing to the relative importance of government employment is the low wage rate of many jobs in the private sector of the coastal zone.

A more detailed breakdown of the sources of income in the State, the coastal zone and its three major regions is presented in Table D-6. Except for the government-related distortion discussed above, industry groups in the coastal zone are similar in importance as employment and income sources. One major exception is wholesale and retail trade, which is less important as a source of income than as a source of employment. Presumably, this reflects the low wage structure of retail trade and the seasonality of some coastal zone enterprises.

The employment and income data presented in Tables D-1, D-3, and D-6 are based on the worker's place of employment, rather than place of residence. Such data may be a poor indication of the income and welfare of the residents of a particular county or area. This is true because workers commute across county lines to work, and because personal income includes income from capital and land (dividends, interest and rent) and "transfer payments" such as pensions, annuities (including Social Security) and welfare payments. All of these adjustments were made to produce the personal income data of Table D-7.

The State average per capita income was 84.3 percent of the national average of \$5,460 reported by the Department of Commerce in the Statistical Abstract of the United States, and the ratio for the coastal zone was approximately the same. For the various counties, the per capita incomes in 1976 were the following percentages of the U.S. average:

<b>Low Country:</b>	Beaufort	118.7%
	Colleton	66.3%
	Jasper	58.4%
<b>Greater Charleston:</b>	Berkeley	68.0%
	Charleston	90.1%
	Dorchester	76.7%
<b>Waccamaw:</b>	Georgetown	75.1%
	Horry	85.0%

When a large proportion of the total income goes to a relatively small percentage of the total population, the average income per person or per family is a poor indication of the welfare of most of the people. A much better indicator is the median family income, the amount which is midway between the lowest and highest incomes in the county. In 1969 (the most recent year for which such data are available) Beaufort County, with the highest average income per capita in the State, ranked only fourth among the eight coastal counties and twenty-sixth among the State's forty-six counties in median family income. For median family income of black families, Beaufort County ranked thirty-sixth in the State and fourth in the coastal zone. Thus, it is apparent that Beaufort County's unusually high per capita income is concentrated within a small segment of the population and cannot be viewed as typical.

**TABLE D-7**

**Personal Income<sup>a</sup> of Residents of South Carolina Coastal Zone,  
by Economic Area & Major Source of Income, 1975**

	Low Country		Greater Charleston		Waccamaw		Coastal Zone		State	
	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent
	-----Thousands of Dollars-----								(Millions)	
Labor & Proprietors	361,108	73.8	1,299,387	75.6	391,568	71.2	2,052,063	74.4	\$ 9,622.4	74.0
Div., Int. & Rent	63,350	13.0	182,560	10.6	75,788	13.8	321,698	11.7	1,502.5	11.5
Transfer Payments	64,657	13.2	236,385	13.8	82,693	15.0	383,735	13.9	1,881.4	14.5
Total	489,115	100.0	1,718,332	100.0	550,049	100.0	2,757,496	100.0	13,006.3	100.0
Population	94,700		371,600		122,900		589,200		2,818,200	
Income Per Capita	\$ 5,165		\$ 4,624		\$ 4,476		\$ 4,680		\$ 4,615	
Percent of U.S.	94.6		84.7		82.0		85.7		84.5	

<sup>a</sup> Reported by county of residence.

SOURCE: Regional Economics Information System, Bureau of Economic Analysis, U.S. Department of Commerce Special Tabulation.

## FOOTNOTES

From the **Charleston Air Force Base International Airport Yearly Report, 1976**, compiled by the South Carolina Aeronautics Commission.

2. From the **1977 South Carolina Statistical Abstract**, South Carolina Budget and Control Board. Prepared by the Division of Research and Statistical Services.
3. Division of Research and Statistical Services, **Report to the State Budget and Control Board**, December 15, 1977, p. 4.
4. These data were obtained from the S.C. Crop and Livestock Reporting Service in cooperation with the Department of Agricultural Economics and Rural Sociology, Clemson University.
5. These data were compiled by the Forestry Department of Clemson University.
6. Theiling, Dale, **Catch and Effort Data for Commercial Fisheries in South Carolina**, prepared for the National Marine Fisheries Service, January 4, 1978.
7. Data obtained from a 1977 report by David M. Cupka, Marine Resources Division, South Carolina Wildlife and Marine Resources Department, Charleston, S. C.
8. From data compiled by the South Carolina Department of Parks, Recreation and Tourism.
9. **Ibid.**
10. **Economic Report of the State of South Carolina**, prepared by the State Budget and Control Board, August, 1977, p. 23.
11. Division of Research and Statistical Services, **Report to the State Budget and Control Board**, February 16, 1978, p. 2.

## E. POPULATION CHARACTERISTICS

The coastal zone contains approximately one-fifth of the population of South Carolina. Table E-1 summarizes population data for the eight coastal counties, the coastal zone, and the State for census years 1960 and 1970, with provisional data for 1976. In 1960 the population of the coastal zone was 19.6 percent of the total population of the State, but by 1976, the coastal zone's share of the State population had risen to 21.2 percent. Fully 75 percent of this increase took place within the Charleston Standard Metropolitan Statistical Area.

In 1975 the Charleston SMSA (comprised of Berkeley, Dorchester, and Charleston Counties) had a slightly larger population than the mid-state Columbia SMSA, but a substantially smaller population than the Greenville-Spartanburg SMSA, located in the northwestern part of the State. The Charleston SMSA ranked 97th among the nation's 159 "large" Standard Metropolitan Statistical Areas (populations of 200,000 or more) listed in the 1977 **Statistical Abstract of the United States**.

### 1) Trends

As is evident from Table E-1, the population of Charleston County itself increased very little relative to that of Berkeley and Dorchester Counties, which showed increases of 44.9 percent and 25.2 percent respectively for the six year period. Horry County also showed a relatively large percentage of growth during this period (23.5 percent). In fact, only Charleston and Colleton Counties were below the State as a whole in their percentage of population increase between 1970 and 1976. Figure E-1 illustrates the changes in coastal county population relative to that of other areas of the State.

### 2) Age Structure

Table E-2 summarizes the age structure of the coastal counties based on the most recent (1970) census data available. Since the Census of Population counts people where they are living at the time of the census rather than where they make their permanent residence, the presence of large groups of military personnel and/or college students can noticeably distort the age distribution of the population. Thus, Beaufort County's unusually high percentage of eighteen to twenty year olds (15.9%) can be explained by the basic training facilities at Parris Island, which process large numbers of young adults. The Ship Yard and other U.S. Navy facilities in Charleston, on the other hand, include a larger percentage of mature adults. Like Beaufort County, Charleston County has a relatively high percentage of young adults (eighteen to twenty year olds). This is probably explained by the presence of the Medical University, the College of Charleston, Baptist College and the Citadel, all of which are located in Charleston County.

### 3) Sex-Race Distribution

Sex and racial distributions are presented in Table E-3. In 1970 the total State population of 2,590,516 included only 7,045 individuals who were not classified as either white or black. Therefore, the term "blacks" may appropriately be used to refer to the non-white population of the coastal zone and of South Carolina.

The male/female distribution within the coastal zone is, by and large, typical of the State as a whole. The only exception is the unusually high percentage of white males in Beaufort County, which is probably a result of Marine and Navy training facilities located there.

### 4) Geographical Distribution

Details of the geographical distribution of South Carolina's population are presented in Table E-4. In 1970 only Charleston and Beaufort Counties had an urban population greater than the State average of 47.6 percent, although Berkeley County was close, with 45.8 percent of its population classified as urban. Since Table E-4 is based on 1970 data, it does not take into account the recent population growth in Berkeley and Dorchester Counties; the present urban/rural ratios would undoubtedly be quite different from the 1970 data. This also holds true for the population density figures in Table E-4. The populations of Berkeley, Dorchester and Horry Counties, in particular, have increased dramatically since 1970, causing concomitant increases in the population per square mile.

**5) Housing**

The housing characteristics presented in Table E-5 reveal that in all but Charleston and Horry Counties, the population per occupied dwelling unit exceeds the State's mean. With the exception of Georgetown, Jasper and Colleton Counties, the median value for owner-occupied dwelling units exceeded the State average. As is to be expected, the values for Jasper and Colleton Counties are considerably lower than for the rest of the coastal zone, due to their rural character and relatively low per capita incomes.

**6) Education**

A final aspect of interest is the quantity and quality of education available to residents of the coastal zone. Table E-6 presents data on the number of schools in each county, total enrollment (excluding kindergarten), and the median school years completed by persons twenty-five years of age or older.

Unfortunately, the last category is based on 1970 census data and, as a result, is not strictly comparable with the rest of Table E-6. However, it does call attention to a serious disparity between the levels of education attained by blacks and whites in the coastal zone. While the gap between the two groups may have narrowed since 1970, it has not disappeared and is deserving of attention.

**TABLE E-1**  
Coastal County Population  
1960, 1970 and 1976<sup>a</sup>

County	1960 Number	1970 Number	1976			
			Number	Percent of Coastal Zone population	Percent of State population	Percent change in population 1970-1976
Jasper	12,237	11,885	13,800	2.3	0.5	16.3
Beaufort	44,187	51,136	58,400	9.7	2.1	14.3
Colleton	27,816	27,622	29,200	4.8	1.0	5.3
Dorchester	24,383	32,276	46,800	7.8	1.6	44.9
Berkeley	38,196	56,199	70,400	11.7	2.5	25.2
Charleston	216,382	247,650	260,200	43.1	9.1	5.1
Georgetown	34,798	33,500	38,000	6.3	1.3	13.3
Horry	68,247	69,992	86,400	14.3	3.0	23.5
Coastal Zone	466,246	530,260	603,200	100.0	21.2	13.8
South Carolina	2,382,594	2,590,516	2,848,000	—	100.0	9.9

<sup>a</sup> Provisional data.

SOURCE: South Carolina Statistical Abstract (1977), pages 10, 12.

**TABLE E-2**  
Coastal County Population by Age  
April 1, 1970

County	Total Number	Percent under 5 yrs.	Percent 5-13 yrs.	Percent 14-17 yrs.	Percent 18-20 yrs.	Percent 21-44 yrs.	Percent 45-64 yrs.	Percent over 65
Jasper	11,885	9.6	21.7	10.3	5.0	24.8	20.1	8.5
Beaufort	51,136	9.4	17.8	9.3	15.9	31.3	11.9	4.5
Colleton	27,622	9.4	20.5	9.6	5.0	25.9	20.2	9.3
Dorchester	32,276	9.9	22.3	9.3	4.5	30.4	17.5	6.1
Berkeley	56,199	11.8	24.8	9.1	4.8	31.6	13.8	4.1
Charleston	247,650	9.3	19.5	8.2	6.8	34.0	16.7	5.5
Georgetown	33,500	9.8	22.2	10.9	5.4	25.9	18.9	6.9
Horry	69,992	9.1	19.8	9.2	5.7	30.2	18.9	7.1
South Carolina	2,590,516	9.1	19.1	8.7	37.0	37.0	16.3	6.3

SOURCE: U. S. Bureau of the Census, Decennial Census of Population, 1970.

**TABLE E-3**  
Coastal County Population by Race and Sex  
April 1, 1978

County	All Races <sup>a</sup>			White			Black		
	Total #	Male %	Female %	Total %	Male %	Female %	Total %	Male %	Female %
Jasper	11,885	48.6	51.4	42.9	21.2	21.7	57.1	27.4	29.7
Beaufort	51,136	57.7	42.3	66.2	40.2	26.1	32.9	77.1	15.8
Colleton	27,622	48.3	51.7	52.8	25.6	27.3	46.8	22.5	24.3
Dorchester	32,276	48.9	51.1	64.4	31.8	32.5	35.1	16.8	18.3
Berkeley	56,199	49.2	50.8	69.5	34.5	35.0	29.7	14.5	15.5
Charleston	247,650	51.2	48.8	68.0	36.0	32.0	31.4	15.0	16.5
Georgetown	33,500	48.4	51.6	51.5	25.4	26.1	48.4	22.9	25.4
Horry	69,992	49.2	50.8	75.0	37.0	38.0	24.9	12.1	12.8
South Carolina	2,590,516	49.1	50.9	69.3	34.4	34.9	30.5	14.5	15.9

<sup>a</sup> "All races" includes 7,045 persons not classified as white or black.

SOURCE: U. S. Bureau of the Census, Decennial Census of Population.

**TABLE E-4**

**Coastal County Resident Population  
Rural and Urban, April, 1978**

County	Total Population	Population per sq. mi.	URBAN		RURAL	
			Number	Percent <sup>a</sup>	Number	Percent <sup>a</sup>
Jasper	11,885	18.2	—	—	11,885	100.0
Beaufort	51,136	88.3	25,657	50.1	25,479	49.8
Colleton	27,662	26.3	6,257	22.7	21,365	77.4
Dorchester	32,276	56.7	3,839	11.9	28,437	88.1
Berkeley	56,199	50.6	25,745	45.8	30,454	54.2
Charleston	247,650	263.7	202,654	81.8	44,996	18.2
Georgetown	33,500	41.3	13,280	39.6	20,220	60.4
Horry	69,992	60.7	20,551	29.4	49,441	70.6
South Carolina	2,590,516	85.7	1,232,195	47.6	1,358,321	52.4

<sup>a</sup> Percentages may not equal 100 due to rounding.

SOURCE: U. S. Bureau of the Census, Decennial Census of Population, 1970.

**TABLE E-5**

**Coastal County Housing Characteristics  
1970**

County	Total Year Round Housing Units	(-----Occupied Housing Units-----)				Pop. per occupied unit	Vacant year round housing
		(-----Owner Occupied-----)		(-----Renter Occupied-----)			
		No. of Units	Median Value (Dollars)	No. of Units	Median Contract Rent (Dollars)		
Jasper	3,660	2,229	7,600	1,053	30	3.6	378
Beaufort	13,854	7,077	14,100	4,896	91	3.5	1,881
Colleton	8,537	5,547	9,300	2,229	30	3.5	761
Dorchester	9,718	6,657	13,600	2,116	59	3.6	945
Berkeley	16,165	10,362	14,400	4,178	90	3.8	1,625
Charleston	75,882	39,330	16,400	28,773	71	3.4	7,779
Georgetown	10,306	6,265	11,100	2,497	38	3.8	1,544
Horry	24,259	12,336	14,300	7,675	59	3.4	4,218
South Carolina	17,495 <sup>a</sup>	10,553 <sup>a</sup>	13,000	5,412 <sup>a</sup>	50	3.4	1,530 <sup>a</sup>

<sup>a</sup> Average for all 46 South Carolina Counties.

SOURCE: U. S. Bureau of the Census, 1970 Census of Population and Housing.

**TABLE E-6**

**Coastal County Education**

County	Public Schools <sup>a</sup>		Private Schools <sup>a</sup>		Median School Years Completed <sup>b</sup>		
	Number	Enrollment	Number	Enrollment	All Races	White	Black
Jasper	4	3,080	2	474	8.5	10.6	6.2
Beaufort	19	9,562	6	1,104	12.0	12.5	7.5
Colleton	17	6,445	3	900	9.3	10.6	6.8
Dorchester	16	11,435	4	810	11.1	12.2	6.9
Berkeley	28	20,515	5	708	10.7	11.9	6.8
Charleston	84	52,265	28	7,577	12.0	12.3	8.2
Georgetown	20	9,127	6	918	9.2	10.8	6.3
Horry	38	18,819	4	702	10.4	11.1	7.3
South Carolina	1,168	620,003	197 <sup>c</sup>	44,111	10.5	11.4	7.6

<sup>a</sup> 1975 - 1976 scheduled year.

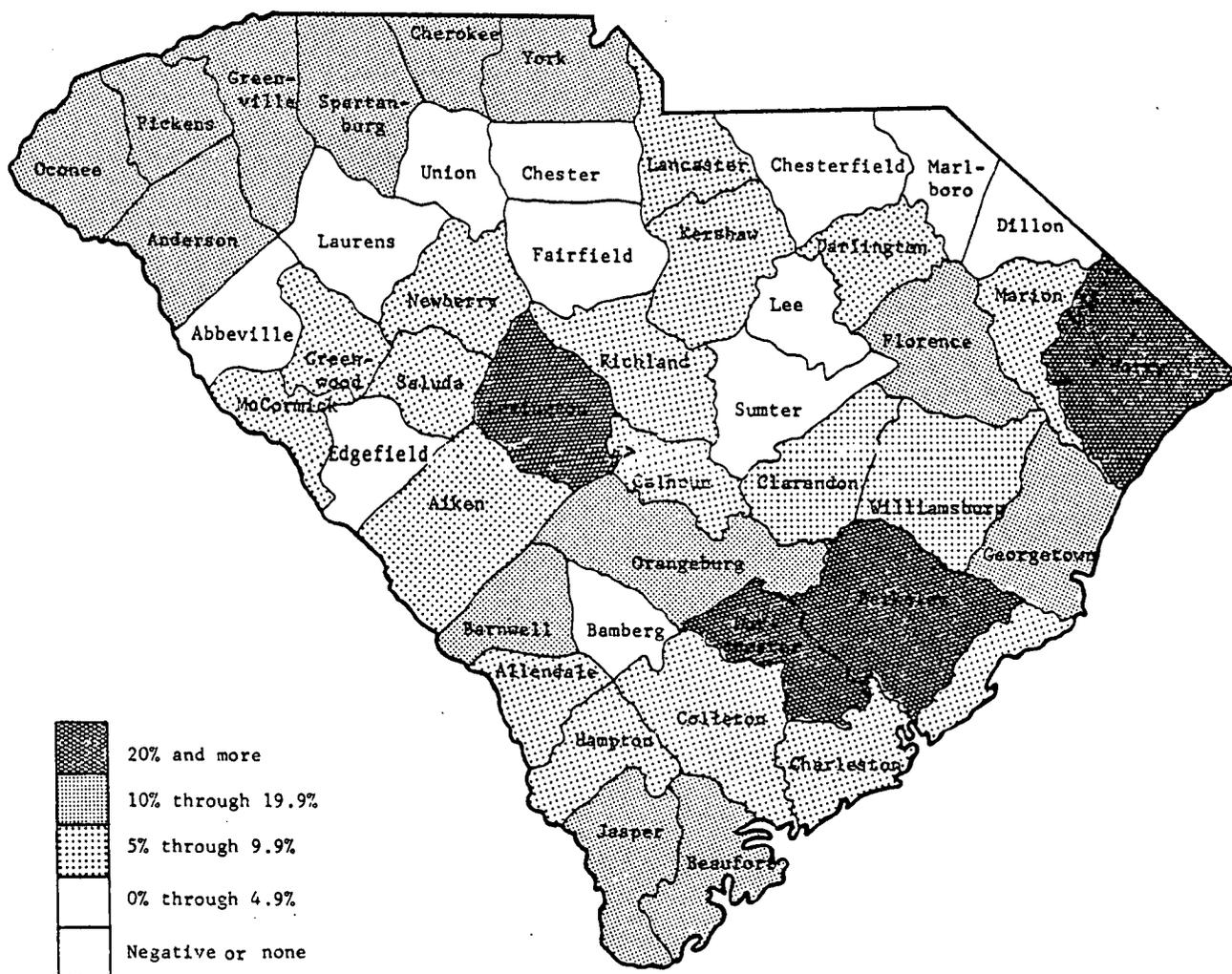
<sup>b</sup> by persons 25 years or older, based on 1970 census data.

<sup>c</sup> Those private schools from which reports were not received are not included.

SOURCES: S. C. Department of Education, **Annual Report of the State Superintendent of Education, 1976**;  
U. S. Bureau of the Census, **Decennial Census of Population, 1970**.

FIGURE E-1

PERCENT CHANGE IN SOUTH CAROLINA COUNTY POPULATION  
APRIL 1, 1970 TO JULY 1, 1977 (PROVISIONAL)



Source: South Carolina Statistical Abstract, 1978.

## F. COASTAL LAND USE

All of the coastal counties are beginning to develop comprehensive land-use plans. However, at the present time, existing land uses are of far greater importance than projected land uses, for in many cases they define the limits within which planning must occur. Land use in the coastal zone will be discussed in terms of the three regional planning districts — Lowcountry, Waccamaw and Berkeley-Charleston-Dorchester. Unfortunately, land-use categories are not strictly comparable for the three regions; therefore, care must be exercised in interpreting the land-use tables in this section.

### Low Country Region

Land use in the Lowcountry (Beaufort, Colleton and Jasper Counties), perhaps more than in any other region, has been shaped by the natural setting. Because much of the region's land is covered by marsh or dense forest, development of any kind is precluded. Added to this constraint is the fact that the region is criss-crossed by waterways, making transportation difficult. Thus, only agricultural enterprises (particularly timber farming) have been possible until very recently, when improved accessibility made economic development possible.

### Agriculture and Forestry

Approximately three-fourths of the land in the Lowcountry Region of the coastal zone is devoted to agricultural uses. Over 70% of the land in Colleton and Jasper Counties is timberland, and even Beaufort County, the most developed of the three, has over 40% forested land. Because of the extensive development of forestry, a number of related businesses have located in the vicinity. Agricultural development depends to a large degree on factors such as soil conditions, topography and drainage, as well as transportation. Unfortunately, some areas which are suitable for agricultural development are also prime sites for urbanization, leading to potential conflicts between interest groups.

### Residential

The Lowcountry Region is characterized by a large number of municipalities with very small populations. In fact, with the exception of three, all of the region's municipalities had populations under 2,500 in 1970. Port Royal's 1970 population was 2,865, while Walterboro and Beaufort are considerably larger, with 1970 populations of 6,257 and 9,434 respectively.

The Beaufort-Port Royal area is the largest industrial-population center in the region and has the greatest potential for future growth. Walterboro is also a potential center for rapid growth, as is Bluffton. Bluffton's potential, however, is dependent upon the ultimate development of the Victoria Bluff area as a deep water port. (The Victoria Bluff site has been called "the last natural deep water port on the east coast," but because of its extraordinary beauty it is also a prime site for preservation.) The completion of I-95 has opened the way for tourist-related development in the towns of Ridgeland, Hardeeville and Yemassee, although whether this actually occurs remains to be seen.

### Commercial and Industrial

Because of the importance of agricultural and forestry-related ventures, commercial and industrial development is limited. What little there is occurs primarily on the outskirts of the urban centers of Beaufort-Port Royal and Walterboro. Urban development related to the tourist industry has grown rapidly on several of the sea islands in recent years. Hilton Head and, to a lesser degree, Fripp Island are becoming prominent resort areas.

The Port Royal Sound area has been designated as the Growth Center for the Lowcountry Region, meaning that it will be the focal point for economic stimulus in the area. Thus, the Port Royal Sound area should provide new jobs and better services - commercial, industrial, educational and public. The City of Beaufort is at the hub of this activity, having the necessary population and services required by business. In the past four years, nine firms have located within the Growth Center, creating 500 new jobs. (The source of this information is **The Lowcountry Overall Economic Development Program Update: 1976-1980**, prepared by the Low-Country Council of Governments.)

## Public and Semi-Public

The Lowcountry Region has a great deal of public and semi-public land in three major categories: military, water and wetlands, and recreation, open-space and historic areas. All three of the area's military installations are in Beaufort County. They are the Parris Island Marine Base, the U.S. Marine Air Station and the U.S. Naval Hospital in the City of Beaufort. Although the hospital has a negligible effect on land use patterns, the remaining two installations are significant land users.

While only 8.5% of Colleton and 8.8% of Jasper County consist of wetlands, Beaufort County's wetlands cover 36.1% of the total land area. Obviously then, wetlands are a significant factor in development, especially in Beaufort County. Because they are extremely sensitive to disruption from development and attendant pollution, wetlands require special planning and preservation efforts so that their ecological, aesthetic and recreational values remain unimpaired.

The final category of public lands is a large and diverse one, encompassing recreation, open space, and historic sites. Many of the latter are centered around the Beaufort and Port Royal areas since that is where some of the earliest colonization took place. Beaufort boasts a specific district, Historic Beaufort, designed to protect sites of special historic significance within the city.

Open spaces within the region are extensive, due to the vast expanses of wetlands, timberland and land in agricultural production. Many large private land holdings have been designated as wildlife refuges or game management areas, adding to the quality as well as quantity of open space.

There are two state parks in the region: Hunting Island State Park in Beaufort County and the Colleton Wayside State Park in Colleton County. In addition, the James Webb Wildlife Refuge and the Savannah River Wildlife Refuge in Jasper County are publicly owned. Nearly thirty public boat landings and a number of privately owned concerns augment the recreation potential of the area.

**TABLE F-1**

1977 Existing Land Use Inventory by County  
Low Country Region  
(In acres)

	Beaufort	Percent of Total	Colleton	Percent of Total	Jasper	Percent of Total
Residential	20,160	5.4 %	9,734	1.4 %	5,326	12.7 %
Commercial	602	.16%	1,670		1,555	.37%
Industrial	798	.21%	576	.09%	403	.10%
Forestry	139,787	37.2 %	466,757	69.5 %	311,544	74.7 %
Agriculture	54,993	14.6 %	125,150	18.6 %	48,599	11.6 %
Public	21,160	5.6 %	8,128	1.2 %	9,535	2.3 %
Wetlands	135,816	36.1 %	56,893	8.5 %	36,673	8.8 %
Water	2,260	.60%	3,029	.45%	3,645	.87%
<b>TOTAL</b>	<b>375,576</b>	<b>100 %</b>	<b>671,937</b>	<b>100 %</b>	<b>417,280</b>	<b>100 %</b>

SOURCE: Lowcountry Council of Governments, 1977.

### Waccamaw Region

The Waccamaw Region, consisting of Horry and Georgetown Counties, is somewhat more developed than the Lowcountry Region, with most development centering around Myrtle Beach and Georgetown. Like the Lowcountry, the Waccamaw Region is dependent to a large degree on agriculture and the tourist industry, although there is far more manufacturing activity in this region than in the Lowcountry. (See Table F-2.)

#### Farm, Forest and Undeveloped Land

By far the greatest percentage of land in the Waccamaw Region is devoted to agricultural and forest uses or is left undeveloped. In Georgetown County approximately 97.6% of all land falls into this category, while in Horry County the figure is 94%. The greatest portion of this land is devoted to forestry. Georgia Pacific, International Paper Co., and Westvaco are engaged in profitable timber-producing ventures in the region. This land-use category also includes wetlands, which are particularly prevalent along the Waccamaw, Pee Dee and Santee Rivers. Beaches, dunes and vacant land all contribute slightly to the total in this category.

**TABLE F-2**

1977 Existing Land Use Inventory by County  
Waccamaw Region  
(In acres)

	Georgetown	Percent of County	Horry	Percent of County
Residential	9,245	2.0	13,956	1.9
Commercial	256	—	299	—
Industrial	1,803	.35	1,632	.22
Public or Semi-Public	1,022	.20	5,786	.78
Agricultural or Undeveloped	502,103	97.0	695,467	94.2
<b>TOTAL</b>	<b>519,680</b>	<b>100.0</b>	<b>738,560</b>	<b>100.0</b>

SOURCE: Waccamaw Regional Planning and Development Council, 1977.

#### Residential

There are nine incorporated areas within the Waccamaw Region, although most are small. All but three have (1975 estimated) populations of less than 3,000, and even the "large" cities are relatively small. Georgetown, with a population of 11,200, is the largest, followed by Myrtle Beach (10,370) and Conway (9,845) in Horry County. Conway, termed the "gateway to the Grand Strand," benefits greatly from its location on major thoroughfares and from the beach-bound tourist traffic which stops there. Georgetown is the county seat of Georgetown County and is also important as an industrial and historical site. Myrtle Beach is the focal point of the Grand Strand and is, in addition, one of the primary tourist centers in the Southeastern United States.

The majority of residential development consists of single-family units, although some condominium and apartment development has occurred. In addition, a number of mobile homes, most of which are on individual lots, are found in the region. The Grand Strand area, predictably, has a great deal of seasonal housing.

Residential development in Georgetown and Horry Counties is limited by a number of physical factors such as the large quantity of fresh and salt water present, poor drainage, and soil which is unsuited for foundations. Because of the drainage problems, septic tank use is curtailed; sewage treatment facilities are limited in rural areas, and as a result, housing construction is slowed.

### **Commercial - Industrial**

There is very little commercial development *per se* in the Waccamaw Region; in fact, "commercial" is the smallest category of developed land. With several exceptions (notably Myrtle Beach) commercial activity is widely scattered so as to serve the widely scattered population of the region. Neighborhood stores and highway related development make up the bulk of all commercial centers. Industrial development is not only more prevalent, but more concentrated. It represents the third largest land-use category in the Waccamaw Region, yet is confined almost entirely to the City of Georgetown and environs. Such a situation results from the availability of adequate water and sewage facilities, public utilities, and rail and highway transportation systems.

### **Public and Semi-Public**

As is the case in the rest of the coastal zone, much of the public and semi-public land in the Waccamaw Region is devoted to recreation. In Georgetown County the public is served by Brookgreen Gardens and Huntington Beach State Park as well as by a number of public boat landings and community recreational facilities. There are also a number of wildlife preserves and state game management areas. Finally, private facilities open to the public include Brown's Ferry Park, Rocky Point Park, and various golf courses. Horry County also has a number of golf courses, most of which are in the Grand Strand area. Myrtle Beach State Park is also located in Horry County.

Public and semi-public lands also include church-owned land and educational facilities. Churches and cemeteries make up the bulk of non-recreational public land in Horry County, followed by local parks, clubs and schools. Coastal Carolina College and Horry-Georgetown TEC are significant facilities in the Waccamaw Region as they generate secondary commercial and residential development in addition to providing educational opportunities.

### **Berkeley-Charleston-Dorchester Region**

Of the three major divisions in the coastal zone, the Berkeley-Charleston-Dorchester Region is the most highly developed. The peninsular portion of the City of Charleston is almost totally developed and is the focal point of the region for government, health, education, financial, legal, commercial and cultural activities. The tri-county area is anticipating rapid growth in the coming years, making land-use planning an essential task of local government.

### **Agriculture and Resource Production**

Nearly three out of every four acres in Charleston County are devoted to resource production, mainly in the form of forests or marshland. A great deal of this land lies within the Francis Marion National Forest. Dorchester County also has a large amount of marsh (25% of the total land area) and forestland, as well as a greater proportion of farmland than Charleston County. Most of the farms in Dorchester County are located in the northern half of the county, which is still predominantly rural. Berkeley County has less land available for development than either Charleston or Dorchester Counties - nearly 45% of the total land area is covered by water, wetlands, or National Forest. Of the country's total land area 13.2% is devoted to agricultural uses, which have long been the economic mainstay of the area. Primary products include tobacco, cotton, corn, soybeans, truck, timber, livestock and dairy products. As is the case in the rest of the Berkeley-Charleston-Dorchester Region, farms are becoming larger and fewer in number while the value of both investments and products sold is increasing.

### **Residential**

As in the rest of the coastal zone, construction in the Berkeley-Charleston-Dorchester area is limited by soil type and drainage. Residential development accounts for approximately 35% of all developed land in Charleston County, 30.2% in Dorchester and 25.0% in Berkeley County. Berkeley County residential development is centered around the Goose Creek and Hanahan areas, with some growth in and around Moncks Corner. Resort areas at Lakes Marion and Moultrie have attracted a large number of mobile home parks. Residential development in Dorchester County centers around Summerville, is largely suburban in character and generally blends into the Greater Charleston area. Greater Charleston, of course, is the major population

center in the region. In addition to the cities of Charleston and North Charleston, significant population centers are located in resort developments on some of the neighboring sea islands.

### Commercial and Industrial

The center of industrial development in the region is located along the deep water channels of the Cooper River on the Charleston peninsula. North Charleston is the largest employment source in the industrial area. In all, industrial/manufacturing, transportation, communication and utilities, and trade and services make up 4.6% of Charleston County's total land area. The corresponding figure for Dorchester County is 2.8%, while in Berkeley it is only 1.9%. Commercial uses in Berkeley County are concentrated in the Goose Creek, Hanahan and Moncks Corner vicinities, while industry is more scattered. Industrial usage in Dorchester County, on the other hand, is concentrated in the northwest portion of Summerville; commercial and service activities are also concentrated primarily in Summerville and St. George. In all cases, commercial activity tends to follow transportation corridors.

### Public and Semi-Public

Federal, State, municipal and county government entities own approximately 22% of all Charleston County land. This unusually high total can be explained by the presence of the Francis Marion National Forest, the Cape Romain National Wildlife Refuge, State-managed Capers Island and the Santee Coastal Reserve, military installations, a number of educational facilities including the College of Charleston, The Citadel, and the Medical University, and, finally, the State Ports Authority property.

Both Berkeley and Dorchester Counties lack a sufficient number of recreational facilities, particularly in rapidly growing urban areas. Thus, Dorchester County's .8% and Berkeley County's .3% of public and semi-public properties consist largely of schools, churches, libraries and the like. Berkeley County has a great deal of federally-owned land, some of which is as yet undeveloped.

**TABLE F-3**

1974 Existing Land Use — Berkeley County

#### DEVELOPED LAND

Land Use	Acreage	Percentage of County	Percentage of Developed Land Area
Residential	8,957.4	1.27	24.75
Commercial	694.2	0.10	1.92
Industrial	3,395.7	0.48	9.38
Public & Semi-Public	2,116.1	0.30	5.85
U.S. Government	12,250.0	1.74	33.85
Transportation	8,775.6	1.25	24.25
			100.00

#### UNDEVELOPED LAND

Land Use	Acreage	Percentage of County	Percentage of Developed Land Area
Agricultural	92,811.0	13.18	X
Marshes & Swamps	107,700.0	15.30	X
National Forests	143,500.0	20.38	X
Water Bodies	66,300.0	9.42	X
Vacant	257,500.0	36.58	X
	704,000.0	100.00	

SOURCE: Berkeley-Charleston-Dorchester Regional Planning Council. Based upon field survey, 1974, and resulting Existing Land Use Maps.

**TABLE F-4**

## 1974 Existing Land Use — Charleston County

Type of Use	Acres	% of County
Productive Land	514,300	77.8
Vacant Land	86,200	13.0
In-Land Water	60,200	9.1
<b>Total</b>	<b>660,700</b>	<b>100.0</b>
Productive Land	514,300	77.8
Developed	66,700	10.0
Resource Production	447,600	67.7
Developed Land	66,700	10.1
Residential	23,800	3.6
Industrial/Manufacturing	1,800	0.3
Trans., Comm. & Utilities	14,200	2.1
Trade & Services	14,400	2.2
Social & Cultural	12,500	1.9
Resource Production	447,600	67.7
Land Area	301,700	45.6
Marsh	145,900	22.1

SOURCE: Land Use Survey and Analysis, Charleston County, S.C., BCDRPC, 1975.

**TABLE F-5**

## 1974 Existing Land Use — Dorchester County

Land Use	Acreage	Percentage of County	Percentage of Developed Land Area
<b>Developed Land</b>			
Residential	5,719.0	1.57	30.23
Commercial	473.0	0.14	2.50
Industrial	818.7	0.22	4.33
Public & Semi-Public	2,876.0	0.80	15.20
Transportation	9,030.0	2.48	47.74
<b>Undeveloped Land</b>			
Marshes and Swamps	91,986.4	25.26	---
Agricultural	65,050.0	17.86	---
Vacant	188,186.9	51.67	---
	<b>364,140.0</b>	<b>100.0</b>	<b>100.0</b>

SOURCE: Berkeley-Charleston-Dorchester Regional Planning Council. Based upon field survey, 1974, and resulting Existing Land Use Maps.