SECTION 9

COASTAL ZONE REGION / OVERVIEW

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SECTION 9

COASTAL ZONE REGION / OVERVIEW

POWER THINKING ACTIVITY - "Turtle Trot"

Two sea turtles start walking South Carolina's coastline in opposite directions. Turtle #1 starts from the Georgia state line and heads north. Turtle #2 starts from the North Carolina state line and heads south. Both turtles travel at the same speed, whether swimming or walking. However, neither turtle can swim more than one-half mile without resting on land and neither can walk more than one-half mile without taking a dip in salt water. Using the STATE BASE MAP #1, SHADED RELIEF, make a quick, but intelligent prediction about where the two turtles will meet. Mark this spot on the map with a wipe-off pen. Note that there is some overlap between the main map and the small insert map of the Hilton Head Island area. Next discuss within your group a strategy to determine a more accurate location for their meeting point. Carry out your strategy, mark this new location on the map, and compare it to your original prediction. Was your original prediction close? Why or why not?

PERFORMANCE OBJECTIVES

1. Compare and contrast physical and land-use characteristics of the three distinct South Carolina coastal landscapes.
2. Analyze the effect of ongoing geological, astronomical, and meteorological processes on the geometry of coastal landforms.
3. Examine how topography, abundance of natural resources, and favorable climate along the coast influenced the development of Native American, early Spanish, European, and African American cultures.
4. Compare and contrast the early development and later history of South Carolina's three major port cities.
5. Document, and recognize the importance of, efforts to preserve the heritage of African American culture in the state .
6. Determine and trace navigable channel course for ships using bathymetry data from topographic maps and channel dimensions from lithographs.
7. Assess the economic and environmental impact people have had on the Coastal Zone through the development of beach and resort areas.
8. Estimate dollar value and percentage of structures damaged from natural disasters occurring in the Coastal Zone.
9. Construct stories or tales which have Gullah proverbs or sea island traditions as their basis.
10. Examine critically and explain thoroughly the ecological significance of the ACE Basin watershed and wetland areas.

BACKGROUND INFORMATION

Description of Landforms, Drainage Patterns, and Geologic Processes

Characteristic Landforms of the Coastal Zone

The **Coastal Zone**, sometimes referred to as the tidewater area, extends from the coast inland about ten miles and covers approximately 1.2 million acres. Elevations range from sea level to 25 feet and local topographic **relief** is usually less than five feet. The water height and salinity of streams in the area are influenced by the daily cycles of the tides and most stream valleys widen into **estuaries** before they reach the ocean. Coastal beaches are fairly wide and slope gently. Parallel ridges of sand adjoin the coast. Beaches are interrupted by many inlets, bays, and islands along with wide expanses of **marshlands**, particularly south of the Santee **Delta**.

The South Carolina Coastal Zone is usually divided into three distinct geographic regions based on different **landforms** produced by different geological processes. Each distinctive area can be easily identified on maps or on aerial photographs. The first area is a long, crescent shaped beach referred to as the Carolina **Grand Strand** or Myrtle Beach Grand Strand. The second area is primarily the Santee Delta, the largest **cuspate delta** on the east coast. The third geographic area is composed of the Sea Islands and extends from the Santee Delta to the Georgia border. Some of these islands are referred to as **barrier islands** because they serve to protect the mainland from waves, tides, and hurricanes coming in from the Atlantic Ocean. Beaches of any kind protect inland areas by absorbing wave energy even though they may become eroded in the process. Formed through time by the steady transport of sand by water and wind, sand dunes serve as **reservoirs** of sand to replenish beaches during erosive events caused by storms.

South Carolina is fortunate to have an extensive 200-mile coastal area as one of its state boundaries. Including all of the bays, sounds, inlets, beaches, deltas, and marshes, the coastline is more than 3,000 miles long. Furthermore, the coast is within easy driving distance from all parts of the state. In comparing South Carolina with other states, only a few have the advantages of a coastal area, and none have one that is as diverse, intriguing, and delightful to explore as our Carolina coast.

Geographic Features of Special Interest

As mentioned before, the Santee Delta is the largest cuspate delta on the east coast. Only the Mississippi Delta is larger in the eastern states. The Santee Coastal Reserve occupies some of the wildest, most diverse delta **habitat** in the nation. Waterfowl impoundments are of particular interest. Some parts are managed intensively, others are left entirely alone.

The Grand Strand area is known for its spectacular tourist beaches, such as Myrtle Beach, but it also contains some other unique points of interest. Brookgreen Gardens,

near Murrell's Inlet, is the preserved plantation site of Joshua John Ward, one of the original rice planters. Georgetown has a rice museum and offers tours of the old docks in the historic district.

Most of South Carolina's barrier and sea islands are also well known as resort areas. Sullivan's Island, The Isle of Palms, Folly Island, Hunting Island, and Hilton Head Island are all centers of tourism. Other islands, like Daufuskie Island, Capers Island, and Pinckney Island, have been preserved pretty much in their natural state. The port cities of Charleston, Georgetown, and Beaufort have a variety of historical sites which are open to the public.

Carolina Grand Strand

The crescent-shaped beach (sometimes called an arcuate strand) stretching from the North Carolina border to Winyah Bay at Georgetown is often called the Myrtle Beach Grand Strand or South Carolina Grand Strand. It is characterized by a 100,000 year old sand barrier formation which parallels the Waccamaw River. Only a few **tidal inlets** cut through this barrier, namely Murrell's Inlet, Pawleys Island Inlet, and North Inlet. The stable Grand Strand landform has greatly influenced the location and direction of the Waccamaw River, creating the historic Waccamaw Neck, a narrow strip of land between the ocean and the river.

Santee Delta

The Santee Delta is a triangular or fan shaped deposit of sediment at the mouth of the Santee River. It is the largest pointed or cuspate delta on the east coast and is similar in shape to the Mississippi Delta in the Gulf of Mexico. The Santee River basin drains over 40% of South Carolina's land area and transports an incredible amount of sediment oceanward each year, contributing to the growth of the delta. Such deltas are also characterized by capes which jut out into the ocean and elongated spits (narrow peninsulas of sand) coming off the headlands. Behind the elongated sand spits is often located a series of marshes, which are very productive in terms of seafood and wildlife. In fact, the Santee Delta is considered to be one of the most magnificent waterfowl and bird rookeries on the east coast.

In 1942, a project, called the Santee Diversion Project, under the direction of the United States Corps of Engineers, diverted some of the water in the Santee River to the Cooper River by constructing a series of reservoirs connected by a canal. The project, consisting of Lake Marion, Lake Moultrie, and the Tailrace Canal, was intended to create hydroelectricity and provide a water transportation route to the port city of Charleston.

As a result of the Santee Diversion Project, much of the water from the Santee River flowed through Lake Moultrie into the Cooper River and on down to Charleston. With this increased water flow came an increase in sediment load in the Cooper River which resulted in the need for nearly continuous dredging in Charleston harbor. On the other hand, the decreased sediment load in the Santee River resulted in significant erosion of the Santee Delta because sedimentation could no longer keep pace with wave erosion rates. Recently, through the Re-diversion Project on Lake Moultrie, a large

channel now returns a significant amount of water into the Santee River channel, increasing the sediment load carried to the delta and partially reversing the recent loss of delta land.

Sea Islands

The Sea Island province, sometimes called the Barrier Island province, is characterized by islands and **salt marshes**. This area of the coast is made up of numerous inlets, bays, and islands. Two distinct island formations, differing widely in origin, use, and the effects of coastal processes, are found in this region: the **remnant islands** and the **transgressive barrier islands**. The remnant islands are thought to have been separated from the mainland by erosion. Coastal processes have had very little effect on the shape of these islands. Examples are St. Helena Island, Hilton Head Island, and Edisto Island. Sometimes referred to as beach ridge barrier islands, these islands contain interior wetlands and waterways, are several miles wide, and have mature **maritime forests** on the landward side.

The transgressive barrier islands slowly but continuously change shape because of winds, tides, wave action, storms, and currents. All transgressive barrier islands have very unstable coastlines. In most cases, the northern ends of the islands are eroding and the southern ends are experiencing deposition. Examples include Folly Island, Sullivans Island, Bull Island, and Hunting Island. Transgressive barrier islands can often be identified by their sparse vegetation, wash-over deposits from tides and storms, and frequently shifting offshore sandbar formations. The location and orientation of tidal inlets plays a major role in the erosion, deposition, and migration of barrier islands. People have attempted to influence the cycles of erosion and deposition by building **jetties**, **sea walls**, and **groins**.

Coastal Zone Attracts Settlers

South Carolina's coastline has an interesting cultural history because of its abundant coastal resources, natural harbors, and large river systems. Native Americans settled on the coast to take advantage of the plentiful fish, game, and shellfish. Later, Europeans landed on the coast and established settlements on several of the major rivers, which provided access into interior land areas. Rice plantations thrived on the natural tidal action in coastal fields and on the easy transportation of agricultural products. The port cities of Charleston, Georgetown, and Beaufort grew into major industrial and transportation centers. South Carolina's coast is again experiencing rapid cultural development with an emphasis this time on tourism and recreation.

Native American Coastal Cultures

The Carolina Coastal Zone was first occupied by people from several Native American Nations. The coast was well suited to their lifestyle because of the abundance of natural resources, ease of transportation, and the mild climate. Oyster shell mounds, called middens, found along the coast, are lasting evidence of their presence. In the 1700's, as many as twenty separate Native American Nations lived in the vicinity of the bays and sounds and along the coastal rivers. As a result, many coastal towns, rivers, and bays bear Native American place names, such as Winyah, Pee Dee, Waccamaw, and Sampit. Clashes with the European colonists, disease, and slavery all worked to displace or eliminate the native inhabitants within a two hundred year period.

Early Spanish Settlements

In mid-July 1526, Lucas Vasquenz de Ayllon, along with 500 Spanish colonists, including men, women, and children, a few slaves, and 89 horses, left Santo Domingo in six ships. They landed at the mouth of the Cape Fear River, North Carolina, which they called the River Jordan. From there the group traveled down the coast to settle at Winyah Bay. The exact location of the settlement, San Miguel de Gualdape, is unknown, but historical evidence points to the mouth of the Gualdape River, known today as the Pee Dee River, on the eastern shore of Winyah Bay. The settlers were threatened by disease, attacks from Native Americans, and a slave insurrection. Early in 1527, the colonists headed home for Spain with only 150 survivors. The revolt by the slaves at San Miguel de Gualdape was the first black slave revolt in North America. Apparently, most of the former slaves stayed behind, thus becoming settlers in the coastal area 144 years before the founding of Charles Towne (Charleston).

Establishment of Santa Elena

In 1521, Spanish explorer Francisco Gordillo had explored the area near present Beaufort, South Carolina, which he named Santa Elena because his ships reached land on the feast day of that saint. Pedro Menendez de Aviles, Captain-General in charge of protecting Spain's treasure fleets, obtained a contract from Philip II to establish settlements in "La Florida." He established the city of St. Augustine in 1565 and a fort on

Parris Island, South Carolina in 1566. The purpose of the Spanish settlement at Santa Elena was to protect the Spanish treasure ships which sailed up the coast of North America before picking up the prevailing westerly wind to carry them back across the Atlantic Ocean to Spain. Briefly, Santa Elena became the capital of Spanish La Florida. In 1576 the settlement at Santa Elena was destroyed in an attack by Native Americans, but the Spanish returned and rebuilt in 1577. When the English captain Sir Francis Drake burned St. Augustine, Florida, in 1586, the Spanish royal government realized that its colonial resources were stretched too thin for proper protection. Therefore, in 1587, the settlement at Santa Elena was abandoned--the same year that the first English attempts at settlement were being made on Roanoke Island, Virginia. However, the Spanish presence had briefly introduced not only a new culture, but also new diseases which would help to destroy many of the Native American Nations of South Carolina.

Charles Towne: First British Settlement

The English settlement of South Carolina began in 1670 when approximately 150 colonists, sent by the Lords Proprietors, settled on the west bank of the Ashley River. The settlement was named Charles Towne in honor of King Charles II of England. However, on December 17, 1679, the colony's Grand Council voted to move the settlement to Oyster Point, the site of present day Charleston. By 1700, a wall had been built around the entire town (because of expansion of the settlement, these walls were later removed). Several unexpected problems developed because of the wall. Ocean breezes could not penetrate the wall and so the town became extremely hot during the summer. The accumulation of sewerage and mosquitos caused the spread of diseases. A portion of the original wall can be seen today where it has been excavated in the basement of the Exchange Building. From this humble beginning, Charles Towne prospered and became the major port city in the colony of South Carolina.

Eliza Lucas Pinckney Introduces Indigo

Eliza Lucas Pinckney is given credit for successfully introducing the first major cash crop in the colony of South Carolina. Eliza Lucas was born in 1722 in the West Indies. With her family, she moved to a plantation her family had inherited on Wappoo Creek, near the Ashley River (about 17 miles from Charleston). Her father was a career military officer in the British army who had been recalled to duty. Since Eliza's mother was an invalid, Eliza took over management of the family's Carolina plantation.

Eliza experimented with various crops at Wappoo, attempting to find one which was commercially viable. Her father encouraged her to attempt to grow **indigo** and sent her some seeds. At the age of nineteen, she produced her first successful indigo crop in 1741. She then gave indigo seeds to other planters. By 1747, more than 100,000 pounds of indigo per year were being shipped from the colony. The British government encouraged its production by paying a bounty to planters for growing indigo. In 1744, Eliza married the prominent Charles Pinckney. The marriage produced two sons, Charles Cotesworth Pinckney and Thomas Pinckney, who each enjoyed a distinguished career in service to their country, and a daughter, Harriott Pinckney, who married into the famous Horry family.

President George Washington made a celebrated trip through South Carolina in 1791, riding four hours to arrive at Hampton Plantation, the home of Harriott Pinckney Horry. There Washington paid his respects to Eliza Lucas Pinckney. In 1793, Mrs.

Pinckney traveled to Philadelphia to receive medical treatment for cancer. She died in that city and President Washington served, at his own request, as a pallbearer at her funeral.

The expansion of indigo cultivation to the Port Royal Sound region led to the emergence of a plantation economy in the mid 1740's. The leaves and stems of the indigo plant were processed to produce a dark blue dye. Indigo cultivation was also the source of blue pigment, skimmed from the indigo pots, used by Sea Island Blacks to paint their doors and window frames. Doing this was believed to prevent "hags" (witches) from entering. The Revolution ended the commercial growing of indigo due largely to the fact that the British government was no longer willing to pay Americans a bounty for its production, making it no longer profitable.

Figure 9-1: Map of Colonial Agriculture
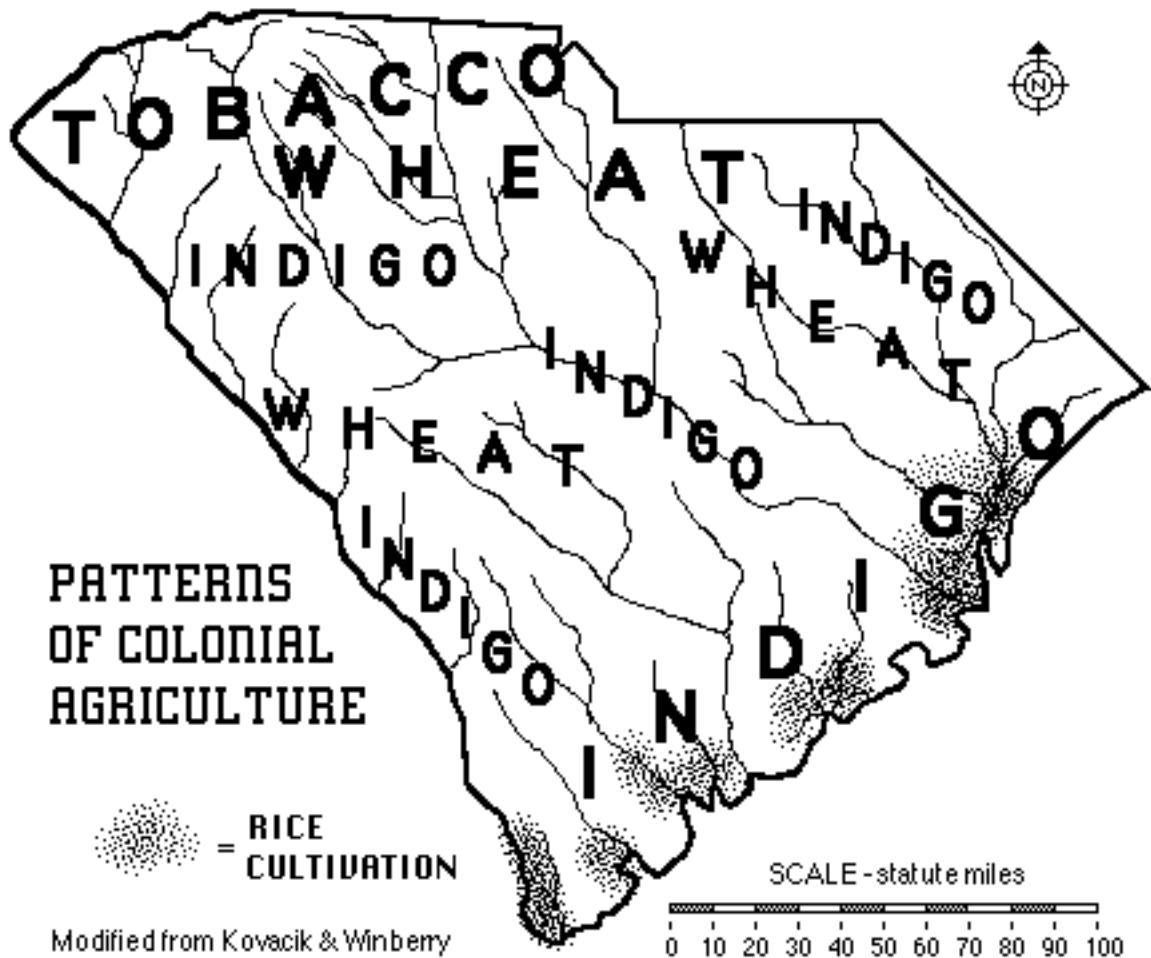
Pirates: A Coastal Zone Legacy

The Pirate Era is another Coastal Zone legacy in South Carolina. Piracy along the Carolina coast began soon after the first settlements were established and grew along with the prosperity of the colonial seaports. By the 1700's pirates were capturing British ships with a frequency that threatened English commerce. It has been estimated that in the early 18th century as many as 3,000 pirates operated out of the Bahamas alone. Charleston, as one of the busiest American ports, was plagued by some of the fiercest pirates in history. They used small, fast vessels to seize the larger, slower merchant ships. Then they would escape into the coastal shallow areas where heavy warships could not follow. The shallow creeks and inlets along the coast made ideal haunts for pirates. North Inlet and Murrells Inlet became favorite havens for pirates, for they could easily hide within range of abundant seafood and fresh water sources. Many tales have been told of pirates hiding treasures and never returning to claim their bounty. Many were killed in sea battles or captured and hanged in Charleston or other port cities.

Many stories about pirates have been handed down as part of South Carolina's history. Pirates came from all walks of life. Some were well-educated, while others were illiterate. Many were "ne're do wells" who just wanted to make a fast buck from their ships. They all hung gruesome flags that were designed to invoke fear. They also used aliases (false names) that were intimidating. Most were considered cruel and heartless, but one pirate did not fit the stereotype. He was a well-educated wealthy plantation owner from the Bahamas. He was given the nickname "Gentleman Pirate," as he bought his first ship and paid his crew wages instead of compensating them by sharing the booty. He was not a seaman, although he had served in the British Army. His name was Major Stede Bonnet, alias Captain Thomas. He is credited with the invention of "Walking the Plank" as a method of getting rid of his enemies. He raided the Carolina coastal areas for several years, but was finally hanged in Charleston while holding firmly to a flower bouquet given to him by a lady friend.

A famous woman pirate, Anne Bonny, called Charleston, South Carolina, her home. Born in Ireland, she had come with her father to the colony of South Carolina as a child. Her father was a lawyer who also became a successful merchant with a large plantation in the countryside. While growing into a young woman, Anne developed a reputation for being a spitfire. Against her father's wishes, she married a young sailor and went with him to Nassau. Once in Nassau, she abandoned her husband and took up with a colorful pirate captain known as Calico Jack Rackam. Joining the pirate's crew, she participated in the "sweet trade" (pirate slang for piracy) fighting alongside the male crew members. However, their luck ran out off the coast of Jamaica, and she and the crew were captured by a British royal sloop. Taken to Jamaica in chains, Anne was sentenced to be hanged. However, her father had influential business friends who managed to obtain a pardon for Anne. She returned to her father's South Carolina plantation and disappeared from the pages of history.

Of all the pirates that haunted the Carolina coasts, Captain Edward Teach, alias Blackbeard, was the most bloodthirsty and feared. With his forty cannon ship *Queen Anne's Revenge*, Blackbeard and his crew, called seahawks, preyed on coastal trade. On one raid, in June 1718, he captured a succession of nine ships and held a group of passengers hostage in exchange for medicine. In a message to South Carolina's Governor Robert Johnson, Blackbeard threatened to kill all of the passengers and raid Charleston if his demands were not met. Not surprisingly, his demands were met, and he sailed northward. Blackbeard was later killed by Virginia troops off the North Carolina coast. As a prize, his head was cut off and displayed, and his body was fed to sharks.

But because of the continued threat to coastal towns, Governor Johnson outfitted a strong naval force to pursue and apprehend the pirates. The golden era of piracy soon came to an end, but it remains an intriguing, and often romanticized, part of South Carolina's history.

Charleston Under Siege During the Civil War

At a meeting in Charleston on December 20, 1860, delegates from all over South Carolina voted to secede from the United States of America. Later, with six other states, they formed the Confederate States of America. As a result, South Carolina demanded the evacuation of all federal installations and forts in South Carolina, including Fort Sumter in the Charleston harbor. President Abraham Lincoln's decision to resupply the fort led Confederate officials to order a bombardment from Fort Johnson located on nearby James Island. After almost thirty-four hours of sustained artillery attack, Major Anderson was forced to surrender Fort Sumter to the Confederates. This battle constituted the first military action of the Civil War. Consequently, the Union government quickly moved to establish a blockade of Charleston's harbor and a siege of the city. In fact, the Union's siege of Charleston lasted 587 days, which was one of the longest sieges in the history of warfare.

The City of Charleston was physically and economically devastated by the war. Union artillery bombardment left the city in ruins below Calhoun Street. The news of Sherman's capture of Columbia panicked city residents and led to the evacuation of Charleston on the night of February 17-18, 1865. Union troops then occupied the city and engaged in widespread looting and destruction.

The Battle of Port Royal Sound

The Port Royal area played a significant, if now little known, role in the Civil War. Its capture was the first major Union victory of the war, providing the Union Navy with an excellent harbor which it used to supply and repair its fleet and maintain its blockade of the southern seacoast.

That specific course of action was recommended by President Lincoln's "Blockade Strategy Board" in an attempt to prevent the importation of supplies the Confederacy needed to wage war. On November 7, 1861, a Union fleet commanded by Commodore Samuel F. DuPont arrived off Port Royal Sound. Consisting of 15 warships and 36 troop transports, it was the largest fleet ever commanded by an American officer up until that time. The entrance to Port Royal Sound was guarded by only two dirt forts, one located on Hilton Head Island and the other on Bay Point Island. After a four-hour fight, the Confederate defenders abandoned both forts and withdrew. The fall of Port Royal led to the loss of one of the most strategically significant areas of South Carolina.

The Port Royal battle exemplified the Civil War's nickname of the "brothers' war." Brigadier General Thomas F. Drayton commanded the defending Confederate forces. His brother, Commander Percival Drayton, commanded one of the attacking Union warships.

Black Volunteers in Union Service on the Sea Islands

Because of the desperate need for troops in the Department of the South, the military district made up mainly of the captured Sea Islands, Union General David Hunter, in late 1861, organized a regiment composed of ex-slaves. However, because he had not received official authorization to do this, he was ordered to disband his "unofficial" black regiment. Later, in August, 1862, Union General Saxton finally was given such authority. Saxton chose Colonel Thomas Wentworth Higginson to command an all-black regiment, the First South Carolina Volunteers. This regiment later became the Thirty-Third United States Colored Troops and saw extensive duty on the Sea Islands. It was finally mustered out of service in February 1866 at Fort Wagner, on the site of the graves of Colonel Shaw and the men of the Fifty-Fourth Massachusetts Regiment, a Northern free black regiment that had participated in the attack on Fort Wagner on July 18, 1863.

The most famous black Union hero was Robert Smalls of Beaufort, South Carolina, the pilot and wheelman of the *Planter*, an armed transport boat used by the Confederates. Smalls, on the evening of May 12, 1862, commandeered the *Planter* with his family and some other slaves to the safety of the Union blockading fleet off Charleston's harbor. He later captained the *Planter* for the Union Navy. After the war, he entered politics and participated in the political convention that wrote a new state constitution in 1868. He also served in South Carolina's General Assembly and for several terms as a United States Congressman. His last public post was Collector of Customs for the port of Beaufort.

The following story by Dodie Marshall tells about the stealing of the steamship *Planter* and the resulting trial of its former captain. Marshall's story ends with the captain's being found guilty, but hers is not the real end of the story. While the captain and other officers of the *Planter* had been found guilty of violating a general order that required officers to remain on their ships at night, the Confederate commander of Charleston, Major General John C. Pemberton, remitted the sentences. He concluded that the general order had never been fully communicated to the officers in question. This story is an example of the revisionist history which occurs when a storyteller presents their own interpretation of what happened in a way which favors their particular bias. Dodie Marshall is the daughter-in-law of the granddaughter of the captain.

Robert Smalls and the Steamer
By Dodie Marshall

She was old and there were lots of statements that she made and stories that she told us over and over and over again. But there was one story that she told more often than all the others, about how her grandfather, the esteemed Captain Relyea, had his fabulous ship stolen from him during the Civil War by his trusted slave, Robert Smalls. That story recounted how Robert Smalls had tricked the sentry and traitorously turned her grandfather's ship over to the Yankee blockade just outside of the Charleston harbor and how he, the grandfather, had consequently been charged with dereliction of duty and court martialed by the Confederates, but had quite justly been found "innocent--innocent of all charges." Years later I would read in many different publications all about the true life hero, Robert Smalls, visit his grave and see the monument of him in the town of Beaufort. I would learn that he did, indeed, achieve freedom from enslavement

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for himself and his family by seizing the steamer *Planter* and masterminding a daring escape years before the Emancipation Proclamation and long before the end of the Civil War. I would learn that he later rendered valuable service to state and country in both the United States House of Representatives and the South Carolina State Legislature and that he is celebrated as an inspiration to all South Carolinians who love freedom and admire courage. But I never found anything written about the trial of Captain Relyea, my mother-in-law's much revered grandfather. This seemed odd to me and I wondered about it.

 It was several months after my mother-in-law died when my husband and I were gathering her personal items to distribute to her grandchildren that we stumbled upon the truth about Grandfather Relyea and of the steamboat *Planter*. Perhaps you can imagine how surprised we were when we discovered a portfolio of papers buried away deep inside a locked Samsonite suitcase on the top shelf of her closet. Handwritten in brown ink, the sheaf of papers was thin, discolored and deeply creased with age. Page corners were creased and powdery under our finger tips. Rusted grommets remained partially lodged along the top edges of each of the two long sheets from where they must have been held in a log book. They were dated, July 25, 1862 and they reported that Captain C.J. Relyea, Captain of the steamer *Planter,* had been arraigned and tried before a General Court Martial convened in Charleston, S.C. on May 21, 1862.   On this uncomfortably hot summer day in 1988, the court-martial's verdict we read was written perfectly clear. The decision reported, on what appeared to be official court documents, was that Captain C.J. Relyea had been found--Guilty--Guilty--Guilty of disobedience of orders and guilty of dereliction of duty.

The Future of the Coast

Along most parts of the South Carolina coast, a certain amount of tension exists between people who want to preserve the natural state of beaches and other natural coastal features and those who desire to profit economically from those beaches or that natural beauty. The crowding and clutter characteristic of many famous beaches is balanced by the carefully managed development of resorts like Kiawah Island, nationally famous for the successful effort to blend nature with human activities. Recent laws such as the Coastal Zone Management Act have attempted to permit reasonable development while considering the environmental implications of any construction which would interfere with normal marine processes. Some areas, like the Myrtle Beach tourist region, are growing so fast that they will soon have to make a decision whether to maintain a small town family atmosphere, or become a much larger, more impersonal, convention center. There are both benefits and drawbacks associated with each of these choices.

Climate and Water Resources

The Coastal Zone is almost always cooler and more pleasant than neighboring areas even a few miles inland. The contrast between land and sea temperatures creates almost continual land or sea breezes, and causes many convection current based thunderstorms to develop during the hot summer months. During the cooler months, fog sometimes envelopes shoreline areas and helps to distribute moisture.   Rainfall is abundant and temperatures usually moderate.

Although it would seem that the Coastal Zone has more than enough water, most of it is either salty or brackish. One of the major issues facing coastal South Carolina is how to acquire sufficient fresh water, for drinking and household use, to support the anticipated growth in both the resident population and in seasonal tourists. Coastal communities have traditionally handled this problem in one of two ways. Charleston, and a few other coastal cities, have constructed aqueduct systems to bring in large quantities of fresh water from upstate rivers and reservoirs, such as Lake Marion. The city also dug a tunnel to bring water eastward from the Edisto River.

However, most fresh water for coastal communities, especially in rural areas, comes from wells. Even Charleston, until 1883, got all of its city water from one public well. Although groundwater is plentiful, in many sections of the coast it is being used at a faster rate than can be replenished through natural geologic recharge. The result has been salt water incursion into many wells. Because fresh water is less dense, it forms a floating lens on top of the denser salt water. When wells are pumped too quickly, the freshwater lens thins to the point where salt water can enter the base of the well and contaminate the water supply.

Soil Resources of the Coastal Zone

The arable soils of the Coastal Zone, from three to twenty-five miles inland, are based on recent marine features.   Since soils in this area are so young, little development, or formation of distinctive layers, has occurred. A number of unusual soil types have developed in this region, including Spososols, which are usually characteristic of the boreal forests of Canada and northern New England, and Sulfaquents, the sulfurous rotten-egg smelling soils of the salt marshes.

Although overall climate is favorable along the coast for agriculture, soils tend to be the limiting factor in determining what can be grown.   Closest to the coast, unweathered minerals, which make poor soil, are often found in surface layers of the soil due to the very recent age of the coastal sediments. As one proceeds away from the coast, unweathered minerals are found at greater depth and the fertile soil thickness increases.   North of Charleston along the coast, poor drainage limits suitability for agriculture, but pine forests do very well. South of Charleston are better drained **loamy** soils which have been used successfully for truck farming. About four percent of the Coastal Zone Region is considered prime farmland and approximately nine percent of the area is actually used for farming. Fifty percent of the area is in forest.

Issues Related to Growth and Development

The Coastal Zone Management Act (CZMA), at least in part, was passed by the State Legislature in 1976 in order to regulate and control development in the area of the coast. The beaches and dunes of South Carolina's coast can only be protected with the aid of legislation, such as the CZMA, specifically designed for that purpose. The Act regulates what can be built along the coast, where it can be built, and what environmental engineering specifications must be met by builders. The operation and implementation of the Act has been controversial since the administrative apparatus was put into place in December 1977. However, the Act has prevented the type of excessive destruction that ravaged the Coastal Zone before the CZMA was enacted. Another law, the Coastal Barriers Resource Act, was passed in 1983. It removed previous subsidies and other incentives for commercial growth and set aside certain areas where further development was not permitted.

One of the most controversial issues facing Coastal Zone policy managers is the question of **beach renourishment**. Supporters stress the importance of wide, attractive beaches to the tourism industry and maintain that the cost will be recouped through increased revenue from vacationers and convention attendees. Detractors claim that beach renourishment is only a temporary solution and that in a few years, the procedure will have to be repeated at even greater expense. Recent renourishment initiatives have been completed at Myrtle Beach, Folly Beach, Hunting Island, Edisto Beach, and Seabrook Island.

The Folly Beach project was particularly controversial since geologic studies indicated that the island was eroding at the rate of almost five feet per year. The Folly Island shoreline has retreated over 800 feet since records were first kept. An 18 million dollar renourishment project, begun in October, 1991, put 2.5 million cubic yards of sand along 5.3 miles of beachfront near the center of the island. This amount of sand will widen the beach by 50-100 feet at high tide level and should last for at least ten years. The Federal Government paid 57 percent of project costs at Folly Beach, but any future renourishment projects will have to be paid from state, county, and local government sources.

Unique Habitats of the Coastal Zone

The Coastal Zone of South Carolina provides an endless variety of habitats and situations important to wildlife. Noteworthy areas indicative of Coastal Zone habitat diversity include: North Inlet Estuarine Reserve, Cape Romain National Wildlife Reserve, the ACE Basin Reserve, Santee Coastal Reserve, Hunting Island State Park, Yawkey Wildlife Center, and Bulls Island. Most of these sites include beaches, barrier islands, brackish and saltwater marshes, forested wetlands, and pine and hardwood upland areas. They also host a variety of wildlife resources including such threatened and endangered species as the bald eagle, woodstork, osprey, loggerhead sea turtle and the shortnose sturgeon. Publicly managed lands serve to maintain and enhance the present habitat diversity while improving recreational and educational opportunities for all citizens of the state. These unique resource components and critical habitats require continued intensive management and protection efforts if South Carolina's natural heritage is to be preserved.

Fisheries and the Seafood Industry

Part of the attraction of the coast to vacationers, convention planners, and other tourists is the availability of fresh seafood in markets and restaurants. Fishing is a multi-million dollar industry in South Carolina with shellfish accounting for about three quarters of that total. Not all coastal counties market the same products. Charleston and Georgetown are best known for fish, while Beaufort is the center of the crab and oyster industries. Charleston and Beaufort together supply about 80 percent of the state's shrimp harvest. At one time six oyster canneries operated in the Sea Islands although only one, near Beaufort, is still operating today. Overharvesting, loss of marshland, and pollution problems have reduced some seafood production in recent years.

The Intracoastal Waterway

The Intracoastal Waterway is made up of a series of connected natural and constructed water passages along the Atlantic and Gulf coasts that provides a protected navigational route for all types of ships. It stretches nearly 3,000 miles from Boston, Massachusetts to Key West, Florida and westward to the Rio Grande River in Texas. Of this total, 210 miles are in South Carolina. Although there have been discussions and plans for developing a water passageway along the Atlantic seaboard since colonial times when George Washington surveyed the area, true enthusiasm for construction did not begin until the World War I era when the Army Corps of Engineers began designating certain navigable waters for military maneuvers. In 1936, the last section between Little River and Winyah Bay, in South Carolina, was completed. The river-like characteristic of the Intracoastal Waterway offers a tremendous advantage to commercial, recreational, and military vessels which no longer have to venture into the Atlantic Ocean where open water conditions are much more likely to be stormy and dangerous.

Today, with the exception of the segment between Charleston and Beaufort which is used weekly by the Marine Corps training facility on Parris Island, and routine Coast Guard patrols, the Intracoastal Waterway is seldom used for military purposes. About 95% of all boat traffic is recreational with the remainder being commercial. Nearly four million tons of cargo is shipped annually through portions of the Waterway. Scrap metal, fertilizers, paper products, construction equipment, and pipelines for dredging projects are examples of the types of materials that can be transported more economically by water than by train or truck. The Intracoastal Waterway also provides the fishing industry with easy access to shellfish resources. Oysters and clams are usually able to establish themselves in the Waterway in spite of periodic dredging. A bigger problem is the suspended sediment in the water caused by boat traffic as passing vessels stir up mud from propellers. This makes it more difficult for these siphon and filter feeders to obtain food and oxygen from the water.

The Army Corps of Engineers maintains a minimum depth of twelve feet (based on low tide level) and a minimum width of ninety feet for all sections of the Intracoastal Waterway. These conditions can be maintained only through routine dredging of sediments, which usually must be repeated every two or three years. The Port of Charleston requires annual dredging because of the continuous influx of sediment from river and tidal sources. Dredge spoil is deposited in designated areas which usually show up as small, low-profile islands parallel to the main channel.

Summary

The South Carolina Coastal Zone is divided into three distinct geographic areas based on different landforms produced by different geological processes. The Grand Strand area, where Myrtle Beach is located, can be characterized as a relatively uniform, gently curving beach extending without major interruption from the North Carolina border to Winyah Bay. Much of this area is highly developed with vacation homes and resorts, and beach erosion and rising sea levels are significant continuing concerns. South of the Grand Strand lies a large deposit of sediment known as the Santee Delta. This delta, formed by the Santee River, is a complex of marshland and islands stretching from South Island to Cape Romain. South of this point lies the Sea Island region, a string of islands and estuaries making up the majority of South Carolina's coast.

A distinction is made between the remnant islands and the transgressive barrier islands found in this region. Remnant islands are thought to have been formed by erosion of the mainland, and undergo very little additional change. Transgressive barrier islands, in contrast, are thought to be relatively mobile sediment deposits which are constantly being changed by wind, tidal action, storms, and currents.

The history of settlement in the Coastal Zone of South Carolina is long and varied. The natural bounty was especially important to the Native American peoples who inhabited the area until diseases introduced by European settlers and direct conflict with the newcomers caused the demise of the native population. There was, during the early colonial period, a competitive free-for-all by several nations to establish settlements and claim stretches of the Coastal Zone. In the area of Beaufort, for example, Spanish, French, and English colonies or forts were established, accounting for the multi-lingual place names of that region. But the British eventually solidified their claims in South Carolina, and the first permanent British colony was established in 1670 at Charles Towne. Indigo was the first successful cash crop of the Coastal Zone and by 1750 had shifted the economy of this area from trade to agriculture. Since the days of indigo production, rice, cotton, and other crops have supported the Coastal Zone economy.

However, peace and prosperity did not reign uncontested in the Coastal Zone. Pirates were a continuing problem off the coast of South Carolina, raiding merchant ships and holding hostages for ransom. Parts of the Coastal Zone were ravaged by British troops and loyalists during the Revolutionary War and, only 80 years later, by fighters on both sides of the Civil War. In the late 1800's, a new economy was required, both because labor for agriculture and industry would no longer be supplied by slaves and because increased mechanization was rendering labor-intensive practices obsolete. After weathering a long period of economic doldrums (with some exceptions like port activities) the Coastal Zone is once more reborn as a tourism and recreation mecca. Protecting the natural resources that attract the visitors to the Coastal Zone is, here as well as in other parts of the state, a problem of overwhelming importance and exceptional complexity.

PLACES TO VISIT ☎

Huntington Beach State Park. On Highway 17 across from Brookgreen Gardens. Murrells Inlet, SC. For information call 803-237-4440.

St. Christopher Camp and Conference Center. Located on Sea Brook Island. For information call 803-768-0429.

Myrtle Beach State Park. Grand Strand SC. For information call 803-238-5325.

Edisto Beach State Park. 50 miles southeast of Charleston on SC 174 and 22 miles off of US 17 at 8377 State Cabin Road. For information call 803-869-2156.

Edisto Memorial Gardens. Orangeburg, SC. For information call 803-534-6376.

Cape Romain National Wildlife Refuge. North of Charleston. Call 803-928-3368.

Pinckney Island National Wildlife Refuge. Located west of Hilton Head Island. For information call 912-944-4415.

Huntington Beach State Park. 3 miles south of Murrells Inlet on US 17. For information call 803-237-4440.

Westvaco Bluff Trail. On SC 66 just south of US 17A in Hendersonville. For information call 803-538-8353.

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STUDY AREA 9: COASTAL ZONE OVERVIEW

Activity 9-1: Overview

Materials		
6	STATE BASE MAP #1, SHADED RELIEF	1 : 500,000
6	STATE BASE MAP # 2, WITH HIGHWAYS	1 : 500,000
6	LAND USE/LAND COVER MAP	1 : 500,000
6	COASTAL SATELLITE LITHOGRAPH	1 : 332,640
6	ACE BASIN TOPOGRAPHIC MAP	1 : 100,000
1	Map of Colonial Agriculture	Figure 9-1
6	Wipe-off Pens	

PERFORMANCE TASKS
(Icon Key) Overview = ✈; Science = ✿; Math = 🖳; History = 📖; Language Arts = ✍

1. **Describe topography of Coastal Zone.** ✈
   Using the <u>STATE BASE MAP #1, SHADED RELIEF</u>, trace with a wipe-off pen the boundaries of the Coastal Zone Region. Explain the criteria you used to separate the Coastal Zone from the Coastal Plain. Describe the typical landscape appearance of the Coastal Zone. Identify major bays, inlets, sounds, harbors, islands, and urban areas in the Coastal Zone Region of South Carolina. Do any rivers originate in the Coastal Zone? Explain your answer.

2. **Identify three shoreline types found in South Carolina.** ✈
   Use the <u>STATE BASE MAP #2, WITH HIGHWAYS</u>, to identify the three types of shoreline which make up South Carolina's coast: the Grand Strand, Santee Delta, and Sea Islands. Itemize and discuss the similarities and differences among these three shoreline types. Using the scale bar, determine the distance in miles covered by each type of shoreline.

3. **Examine land use in Coastal Zone.** ✈
   Trace the Coastal Zone boundaries onto the <u>LAND USE/LAND COVER MAP</u>. What land use is concentrated near rivers and harbors? What major land uses characterize the Grand Strand? The Santee Delta? The Sea Islands? Examine several sea islands. Do you notice any difference in land use on the seaward versus landward side of the islands? Explain possible reasons for such differences. Is there a difference in land use between the transgressive barrier islands and the remnant islands?

4. **Analyze the three shoreline types.** ✈ ✿
   Each group will use the <u>COASTAL SATELLITE LITHOGRAPH</u>, the <u>BASE MAP #2, WITH HIGHWAYS</u>, and a wipe-off pen to complete the following exercises. Prepare a group report on your shoreline category and present it to the rest of the class.

   Group I   Grand Strand Area
   Examine carefully the Grand Strand shoreline area of South Carolina. What is the general shape of the strand? List any other names given to the strand. Why was this called the "long beach" in George Washington's day? Name the three tidal inlets

found along the Grand Strand. How have geologic processes and the location of Grand Strand beach ridges affected the drainage pattern of the Waccamaw River? What are the other major rivers that drain into Winyah Bay? Are they affected the same way as the Waccamaw River? What percentage of the Grand Strand area is beach sand? What percentage is salt marsh or tidal flat? How can you distinguish those two environments on the lithograph?

Group II   Santee Delta
Locate the Santee Delta at the mouth of the Santee River at Santee Point. Trace all the possible courses of the Santee River as it goes through the delta area. How many channels does the river use to empty into the ocean? Identify features that are characteristic of a typical delta, including elongated spits or narrow peninsulas of sand and capes which jut out into the ocean. How do you think these elongated spits formed? Do you think they are stable or susceptible to change? Compare the Santee Delta to the mouths of other South Carolina rivers. How high above sea level do you think the islands in the Santee Delta are? How would you describe the landscape between the North and South Santee Rivers? In which direction has most of the delta sediment been moved along the shore by longshore currents? What percentage of the Santee Delta is beach sand? What percentage is salt marsh or tidal flat? How can you distinguish these two environments on the lithograph?

Group III Sea Islands
Identify on the map the following transgressive barrier islands: Folly, Seabrook, Hunting, and Isle of Palms. All have been developed commercially. Identify the barrier islands that have remained virtually untouched, such as Bull and Capers. How might you account for the differences in developmental trends between these two groups of barrier islands? Other islands in this region have been formed by erosion from the mainland and are called remnant islands. Locate St. Helena, Hilton Head, and Edisto islands on the base map. How do the shapes and sizes of the remnant islands compare with the barrier islands? What percentage of each type of island is beach sand? What percentage is salt marsh or tidal flat? How can you distinguish these two environments on the lithograph?

5. **Trace Intracoastal Waterway route. ✿**
   Use a wipe-off pen to trace the path of the Intracoastal Waterway on the STATE BASE MAP #1, SHADED RELIEF. Start at the North Carolina State Line, near the town of Little River, and head southward toward Savannah, paralleling the coast. This is part of the regional transportation system used for maritime travel along the eastern seaboard. Use the scale bar to determine the approximate length of the Intracoastal Waterway in South Carolina. Use your information from the shaded relief base map to trace the Intracoastal Waterway with a wipe-off pen, on the COASTAL SATELLITE LITHOGRAPH. Which parts of the Waterway are hardest to trace? Why? What types of watercraft might use this system? What types of commodities might be shipped by water? Why not by truck? Why do you think the waterway was built in the Coastal Zone, and not further inland? Do you think any portion of the waterway is man-made? If so, where? How can you tell? Why do you think ships need an inland route instead of using the open ocean? Refer to the Background Information on page 9-14.

6. **Compare and contrast major South Carolina port cities.** ✈
   Locate, on the STATE BASE MAP #2, WITH HIGHWAYS, the three major South Carolina port cities. Select one of these ports and trace, with a wipe-off pen, the surrounding rivers, inlets, bays, sounds, and/or estuaries. Explain the different characteristics of each of these features. Identify the names of all the natural features that you traced.

   Group I   Port Royal (Beaufort)
   Group II Charleston
   Group III Georgetown

   After you have completed this assignment, compare your results with teams that have completed tracings of the other two ports. As a class, construct a Venn diagram, which separates characteristics shared by all three ports from characteristics common to one or two ports. Why do you think a major port city did not develop at the mouth of the Santee River?

7. **Locate de Ayllon's settlement and trace his travel route.** 📖 ☼
   Although the exact location is not known, de Ayllon is believed to have established the first European settlement in the United States at the mouth of the Pee Dee River (known then as the Gualdape River) along the eastern shore of Winyah Bay. Locate the approximate site for this settlement on the STATE BASE MAP #2, WITH HIGHWAYS. Which modern city is located nearest to this area? On de Ayllon's trip from the Cape Fear River, North Carolina, he followed the coastline southward to Winyah Bay and then sailed up the Waccamaw River. Indicate on the map the route that de Ayllon traveled after leaving North Carolina's Cape Fear River. What compass direction best describes his heading? In what compass direction did travel after he reached Winyah Bay? Why do you think he traveled up Winyah Bay before stopping? What attraction might Winyah Bay have had that convinced de Ayllon to establish his settlement in this area? List the geographic features that made Winyah Bay a good location.

8. **Identify places named for English proprietors.** 📖
   Many of the places in the Low Country are named for the Eight Lords Proprietors, who were given the original land grants in South Carolina by King Charles II of England. Locate and mark, on the STATE BASE MAP #2, WITH HIGHWAYS, as many places as you can that bear the names of these English founders of the Carolina Colony.

Edward Hyde, Earl of Clarendon	Lord John Berkeley
George Monck, Duke of Albemarle	Sir George Carteret
Sir John Colleton, Baronet	William, Earl of Craven
Lord Anthony Ashley Cooper	Sir William Berkeley

9. **Evaluate offensive and defensive strategies for pirates and colonists.** 📖 ✍
   Divide into teams that will be either Pirates or Colonists. Using the ACE BASIN TOPOGRAPHIC MAP, the Pirates must develop and write a plan for raiding ships and cutting off trade to Port Royal Sound. The Colonists must develop and write a plan for protecting their shipping from pirates. Share your results by comparing the strengths and weaknesses of each plan. As a class, evaluate the effectiveness of each plan and vote to determine who would have been victorious, the Pirates or the Colonists. Each group could develop a short skit about either Pirates or Colonists to

present to the class. Use the <u>STATE BASE MAP #1, SHADED RELIEF</u>, to illustrate escape routes and hiding places that pirates might have used along the coast.

10. **Design and draw a treasure map.** ✍
Divide into groups representing pirate bands. After a successful raid on a British merchant ship in Port Royal Sound, you must hide the treasure chest quickly before you are discovered by naval patrols. You must pick a safe spot to bury the treasure and design a treasure map with enough detail that one of your crew can find the treasure if you are unable to return to the area.

Use the <u>ACE BASIN TOPOGRAPHIC MAP</u> and your map reading skills to locate a secret hiding place, and leave directions for finding it again, by writing down distances, place names, descriptions of the terrain, or coordinate points. Remember that pirates generally did not want just anyone to be able to use their treasure maps to find their hidden treasure; draw your map in such a way that only your own group members will be able to use it. (For example, if your treasure is buried near Frogmore, you could draw several small frogs.) When you have completed your map, exchange maps with another group and see if you can follow their directions to find their treasure.

11. **Contrast Native American shell mounds with modern landfills.** ✡
It was part of the Native American culture to make mounds, called middens, of discarded oyster shells along various bays and inlets. Contrast their method of disposing of oyster shell garbage by making mounds to solid waste disposal methods used today. How are these methods the same? How are they different? How do you think oyster shells are disposed of today? How might oyster shells be used?

12. **Identify counties where indigo was planted.** ✡ 📖
Indigo became an important crop in the Coastal Zone during the colonial period. Using Figure 9-1, "Map of Colonial Agriculture," indicate with a wipe-off pen on the <u>STATE BASE MAP # 1, SHADED RELIEF</u>, the counties where indigo was planted. Look at the <u>LAND USE/LAND COVER MAP</u>. What is the major land use in each of these regions today? Why do you think indigo is no longer planted there?

13. **Explain the military importance of the Sea Islands.** 📖
The Sea Islands played an important part in the Union Military strategy during the Civil War. Using wipe-off pens and the <u>STATE BASE MAP #1, SHADED RELIEF</u>, identify the Sea Islands located near South Carolina's major port cities. Why do you think these islands had a military importance. Why did the Union want to control seaports in South Carolina? Do you think these islands were still major strategic positions in later wars such as the Spanish American War, World War I, World War II, the Korean War, the Vietnam War, or the Gulf War? Why or why not?

14. **Contrast modern drug trafficking with colonial piracy.** 📖
    Use a Venn diagram to compare and contrast various characteristics of piracy in the 18th Century versus drug trafficking today. Focus on human characteristics and personalities as well as strategic and geographic descriptions. Include comments related to public opinion. Locate several sites on the <u>STATE BASE MAP #2, WITH HIGHWAYS</u>, which might be selected as drop-off points by drug traffickers. Explain your choices.

15. **Write letter describing view of the Battle of Port Royal Sound.** ✍
    Experiment with creating historical fiction by analyzing different points of view during the Civil War. In order to understand the conflict of feelings, select one of the following people; write a letter explaining and defending his or her point of view after witnessing the battle of Port Royal Sound.
    a) A Confederate soldier defending Port Royal Sound,
    b) A Union sailor aboard one of the attacking ships, or
    c) A slave having observed the battle, from a distance, including the retreat of the Confederate soldiers and the exodus of planters from the region.

ENRICHMENT

1. **Investigate Coastal Zone Management Acts.** ✿
Explore recent legislation such as the 1977 Coastal Zone Management Act, the Barrier Island Act, and the 1988 Beach Front Management Act. What is the intent of the legislation and how will it affect coastal development? What have been some of the initiatives people have taken to alter the natural processes of coastal erosion and deposition? Explain the effect of jetties, sea walls, and beach renourishment. What is meant by the "dead zone"?

2. **Identify goods exported and imported through ports.** ✿ 📖
South Carolina is fortunate to have a coastline with many bays and harbors. How have such natural landform features stimulated the development of port cities? What goods are exported and imported to South Carolina? What natural resources within the state have contributed to this thriving shipping economy? Identify spin-off economic business and industries that have benefited from the shipping industry. A large paper mill and a large steel mill are located along Winyah Bay. For each of these industries, list the raw materials needed for production, the reasons each needs accessibility to shipping, and other economic factors that have contributed to the prosperity of the area. What are the environmental issues facing the Winyah Bay area? How can a balance between economic values and environmental concerns be achieved?

3. **Create illustrated timeline for Robert Smalls.** 📖 ✎
Research the story of Robert Smalls, who became a hero both during the Civil War and following the war during Reconstruction. Use a variety of sources so that various perspectives are considered. Find out how ships like the *Planter* figured in the defense of strategically important ports like Charleston. Prepare to discuss the significant ways you believe the story, "Robert Smalls and the Steamer" starting on page 9-10, would be different if it had been told by a descendant of Robert Smalls instead of by a descendent of Captain Relyea. Explain how this illustrates revisionist history. Using a map of the Charleston harbor, research the route of Robert Smalls as he made his historic escape from the Charleston harbor and mark this route on a map of the harbor. Create an illustrated timeline for Robert Smalls including all major events of his life.

4. **Research indigo and dye making.** ✿ 📖
Research the process of making indigo dye. Illustrate the steps in producing and processing indigo. Present your findings to the class in the form of a poster. Is indigo still used as a dye? If so, where is it grown today? Create an illustrated timeline of Eliza Lucas Pinckney's life. Why were her interests and activities unusual for Colonial times?

5. **Research impact of the greenhouse effect.** ✿
Research the impact of the greenhouse effect on global sea level rise and predict how such changes would effect the three major categories of shoreline along South Carolina's coast.

The State

May 12, 1995

Long Lost Confederate Sub Found off Charleston

Staff Report

On a February night in 1864, nine Confederate sailors climbed into the submarine CSS Hunley and steered toward a picket line of Union ships blockading Charleston Harbor.

The sub, powered by a propeller turned by a hand crank, rammed 100 pounds of black powder on the end of a wooden spar into the stern of the Union frigate USS Housatonic. A thunderous explosion broke the night and the modern age of submarine warfare dawned.

The Housatonic went down, the first warship in history sunk by a submarine. But the Hunley and its crew never returned, and for more than 130 years, researchers and relic hunters scoured the silty depths off Charleston.

The quest ended when researchers announced they had found the encrusted iron shell of the Hunley in about 20 feet of water a couple of miles offshore. "This is without a doubt the greatest underwater find since the Monitor was located" (in 1973 off the North Carolina coast), said Clive Cussler, a best-selling author who devoted 15 years and $130,000 to the search.

Divers found the submarine, about 40 feet long and 6 feet around, intact, lying on its side and covered in silt. Cussler said the exact location would not be released to the public for fear of souvenir hunters.

Mark Newell, at the University of South Carolina, said, "This is the single most important artifact in the history of submarine warfare. We have nine gallant men in that vessel."

Cussler hopes the state and city will raise and preserve the vessel, which he said would cost about $200,000.

The Hunley apparently did not get blown up in the explosion that sank the Housatonic as some have theorized. Cussler and Newell said that when the sub sank, it was some distance from the Housatonic.

Newell said there were reports from Union sailors that the Hunley signaled Confederate shore batteries on its way back. The submarine was not submerged but was riding with its top just above the water.

Cussler said the explosion might have popped some rivets and the Hunley began leaking, becoming a water-filled coffin. "Perhaps we'll never know," he said.

RATIONALE

The Charleston Study Site highlights South Carolina's most historic port city. For the greater part of the state's history, politics, commerce, and cultural activity have all revolved around this well known metropolitan hub. Charleston has both prospered and suffered in her role as the Queen City, and later the Holy City. Seven great fires, seven great hurricanes, an earthquake, two occupying armies, and countless boom/bust economic cycles have affected the city since its founding in 1680. Charleston (Charles Towne until 1782) served as the first capital of South Carolina and has always been its primary seaport. It presents an excellent example of the tension that exists between progress, defined as development and industry, and the more picturesque qualities that attract tourists. The conflict is most visible between people who want to preserve the special atmosphere created by the historical areas and those who desire to profit from that historical quality by building restaurants, hotels and other special attractions.

Land Reclamation

The peninsula upon which Charleston was established was originally a low-lying area with a twisting shoreline broken by many creeks and marshes. In its natural state, the peninsula was divided into a number of smaller peninsulas by tidal creeks that penetrated the area. For instance Water Street was, as its name implies, an actual creek until after the Revolutionary War, and the north end of State Street was still planted in rice as late as the middle of the eighteenth century.

However, as Charleston continued to grow, and demands for space increased, many of the city's numerous marshes and creeks were filled in. Debris generated by the city's local industries as well as wreckage from numerous fires and storms provided a variety of materials for landfill. Large sections of the modern city occupy land built up through a succession of these reclamation projects. For example, as early as 1717, the city filled in the moat that had been in front of part of the old city wall. Land where the City Market now stands was filled in during the early 1800's. Additional land reclamation operations have expanded the shorelines along both the Ashley and Cooper rivers.

Figure 9A-1: Early Map of Charleston, 1680
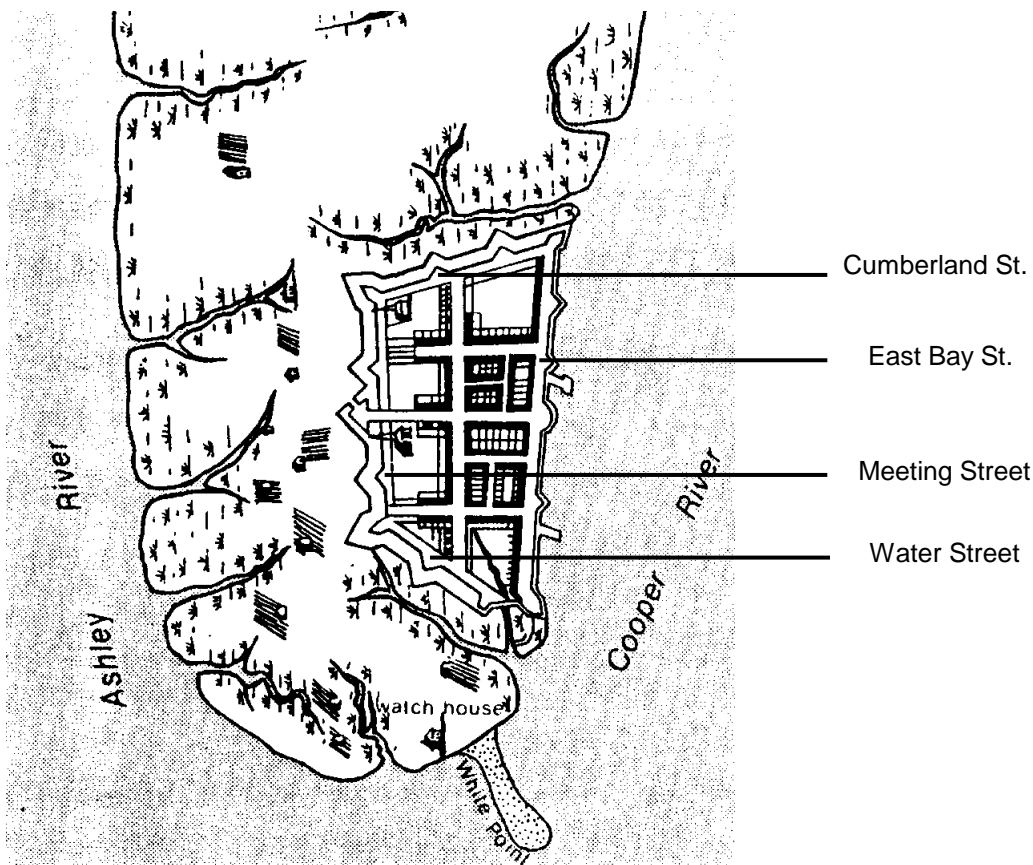
* Note: The double lines indicate the boundaries of the old city walls.

Market Vultures and the Plantation Era

One unique feature of the City Market was the presence of flocks of buzzards called turkey vultures. These big ugly birds freely roamed the market, eating garbage and keeping walkways clean. They were so highly valued as scavengers that a fine of ten dollars was the penalty for harming them.

Charleston in the American Revolution

During the American Revolution, Charles Towne was the focal point of many significant events. On June 28, 1776, Colonel William Moultrie's colonial troops successfully defended a fort constructed only of Palmetto logs and prevented an invading British fleet from capturing the city. This victory preserved the important trade link with other colonies through which vital war materials entered South Carolina. But British forces again besieged the city and forced American General Benjamin Lincoln to surrender on May 12, 1780. Lincoln's entire army of approximately 5000 troops surrendered, making it the worst defeat for the Patriots in the entire Revolutionary War. Near the end of the war, in December of 1782, the British finally evacuated the city for good. The next year Charles Towne became incorporated and officially changed its name to Charleston.

Charleston's Unique Architecture: The "Single House"

Charleston contains several examples of unique architecture. One example, the so-called Single House, reflects a West Indies influence. These rectangular houses were constructed close to the street, with their narrow gable end facing the street. They were constructed just one room wide in order to allow any breeze which might be present to blow through the entire length of the house. Another reason residents built this style of house was that local property taxes were based on the amount of street frontage. The main entrance was actually on the side of these houses, while a street door opened into a piazza (long porch). These piazzas were usually placed on the south or west sides of the houses to catch the prevailing sea breezes. Later on, houses were built larger and often contained two-story piazzas.

The Battery

At the tip of the Charleston peninsula, where the Ashley and Cooper rivers converge, there was originally a shell beach known as Oyster Point. Eventually, this area became enclosed by the construction of two sea walls and was referred to as the White Point Gardens. The east sea wall was built of ballast rocks carried by trading ships. Ballast rocks were used to weight down the sailing vessels to increase their stability on the high seas. White Point Gardens achieved special notoriety when the infamous pirate Stede Bonnet was executed there. This area acquired the name "the Battery" when cannons were placed there during the War of 1812. During the Civil War, cannons were again placed along the sea wall, and today a collection of artillery from various periods is permanently displayed in the Park.

Free Persons of Color

Contrary to popular belief, not all blacks were slaves in **antebellum** South Carolina. For many years, there existed a class of free blacks referred to as "free persons of color." It should be noted, however, that these free blacks did not have full civil rights. Charleston had by far the largest community of free blacks in South Carolina. They earned their living in a number of different occupations, including carpenters and coopers (barrel makers). Jehu Jones, one of the best known of these free blacks, ran a very successful hotel in Charleston for many years.

Earthquakes

Although Charleston has experienced numerous fires, floods, and hurricanes throughout its long history, its greatest natural disaster was a single earthquake. On the evening of August 31, 1886, the greatest earthquake ever to be recorded in the eastern part of the United States struck just north of the city. It killed sixty people and caused six million dollars in damages. Clara Barton, who later founded the American Red Cross, assisted in relief efforts.   To poor to replace many of the damaged buildings, Charlestonians repaired many by running long tie rods all the way through the buildings, actually bolting the damaged walls together again. These tie rods are still visible on the exterior walls of a number of historic buildings in the old section of Charleston today.

Harbor Dredging and Spoil Areas

Natural harbors like Charleston are very important to the economy of South Carolina. But as larger and larger ships began to enter Charleston, it became more and more difficult to reach the docks without running aground on sand bars or scraping the bottom in shallow water areas. The United States Army Corps of Engineers was given the task of keeping shipping channels open, in Charleston and other coastal cities, by dredging sediment from the designated shipping channels and dumping it on the shoreline. The dredging must be repeated at regular intervals because sediment from the Ashley and Cooper Rivers tends to accumulate in these channels. Most of the channels in Charleston Harbor are kept clear to a depth of 35 feet. Channels in the Ashley River and the Intracoastal Waterway seldom exceed a depth of 20 feet. The dumped material is referred to as 'spoil'. Drum Island, just east of the city in the middle of the Cooper River, is a prime example of a spoil area still in use.

Charleston Navy Base

Because of dissatisfaction with its Port Royal Naval Station, the United States Navy relocated its main Navy Yard to Charleston in 1901. This relocation provided a major boost to the economy of Charleston, which had still not fully recovered from the effects of the Civil War. In 1916, the naval base became the headquarters of the entire Sixth Naval District. During World War I, the Charleston Navy Yard's facilities were expanded even further, and the shipyard's first warships were completed.

World War II brought many changes and additional expansions, such as South Yard and the Naval Air Station. As a result, the United States Navy became the state's largest employer. From 1939 to 1945, the Navy Yard constructed a total of 216 vessels and repaired hundreds of other ships. With the end of World War II and the emergence of the Cold War, the Naval Shipyard became the East Coast Submarine Overhaul Complex. In the 1960's, the shipyard serviced and modernized nuclear submarines. With the addition of the Navy Hospital in 1970, Charleston became the home of the nation's third largest naval base.

However, with the end of the Cold War and the downsizing of the United States Navy, activities at the Charleston base were cut back. Finally, in 1993, the United States Base Closure and Realignment Commission recommended the closure of most of the naval facilities at Charleston. Despite strong objections from South Carolina's elected officials, President Clinton accepted the Commission's recommendations. Undoubtedly, the closing of the naval facilities at Charleston will have a long-term impact on both the local and state economy. In 1995, the United States Defense Department made the announcement that a United States Navy Submarine Training Station would be located at the Charleston Naval Facility.

Charleston Today

Heritage and tradition have always been important to the people of Charleston. Even though the city endured a long period of economic stagnation from the Civil War until World War II, the people were unwilling to sacrifice their distinctive architectural, cultural, and historic traditions for the promise of a quick profit. When progress threatened this heritage in the 1920's, the city became the first in the country to pass legislation concerning the preservation of its historic buildings. In 1920, Charleston's Society for Historic Preservation was born. It not only inspired other preservationist groups around the country to adopt similar laws and ordinances, but it laid the groundwork for the substantial tourism that is so profitable for Charleston today. Although formerly known as the "Queen City," Charleston today is better known as the "Holy City" because of its great number of churches. Since World War II, Charleston has made a remarkable comeback as a seaport, in addition to its continuing role as a home for numerous military installations.

Activity 9A-1: The Historic District

Materials			
6	STATE BASE MAP #1, SHADED RELIEF	1:	500,000
6	STATE BASE MAP #2, WITH HIGHWAYS	1:	500,000
6	LAND USE/LAND COVER MAP	1:	500,000
6	GENERAL SOIL MAP	1:	594,000
6	GEOLOGIC AND MINERAL RESOURCE MAP	1: 1,000,000	
6	CHARLESTON TOPOGRAPHIC MAP	1:	24,000
6	CHARLESTON LITHOGRAPH	1:	12,000
1	Early Map of Charleston, 1680	Brief Site Description	
6	Transparent Grid Overlays		
6	Wipe-off Pens		

PERFORMANCE TASKS
(Icon Key) Overview = ✈; Science = ✿; Math = ▬; History = 📖; Language Arts = ✍

1. **Locate the study site.** ✈ ✿
   Locate the Charleston Study Site on the <u>STATE BASE MAP #2, WITH HIGHWAYS</u>, on the <u>LAND USE/LAND COVER MAP</u>, on the <u>GEOLOGIC AND MINERAL RESOURCE MAP</u>, and on the <u>GENERAL SOIL MAP</u> by drawing a small box around the correct site on each map using a wipe-off pen. Briefly summarize the one or two most important land uses at this site, the age (Geologic Period), the type of rock at the site, and the predominant soil type at the site. Use the scale bar on the base map to estimate the straight-line distance between this study site and your school. In which local river drainage basin (watershed) is this site located? Through which of the major river systems, Savannah, Santee, Pee Dee, or Coastal Plain does this site drain?

2. **Identify famous landmarks and natural features** ✈ ✿
   Identify the following famous landmarks on the <u>CHARLESTON TOPOGRAPHIC MAP</u> or the <u>CHARLESTON LITHOGRAPH</u>. Locate the US Custom House, Market Street, The Battery (White Point Gardens), the Yacht Club, the docks with three cargo ships (one empty and two loaded), the Medical College of SC, The Citadel, The College of Charleston, Charles Towne Landing (Old Town), the spoil area on Drum Island, and the wastewater treatment plant at Plum Island at the west end of Charleston Harbor. Locate and name several rivers and their tributaries. In what direction is each of these rivers flowing? Compare the sediment load of these bodies of water by the differences in the intensity of their blue color on the lithograph. What and where is the highest point above sea level in Charleston? During high tide cycles, sea level is much higher than normal. Speculate as to what might happen to Charleston during times of extreme high tides, especially when these coincide with episodes of heavy rainfall. Identify the ribbon of major highways entering Charleston. Traveling from your school, what highways would you use to you enter downtown Charleston?

3. **Analyze changes through time.** ✈
   On the <u>CHARLESTON TOPOGRAPHIC MAP</u> notice the features shown in purple. These represent new developments or other changes which have occurred between 1958 when the topographic map was first printed and 1983 when the photorevised version was printed. Identify major new features not present on the original map. What section of the map area has experienced the most change? How many of

these changes are manmade? How many have occurred naturally? Why do you think these changes have occurred? How many of these changes can you recognize on the CHARLESTON LITHOGRAPH? In what year was the aerial photograph taken? Circle and explain any additional changes which occurred between the time the map was revised and the time the photograph was taken. Does the difference in scale make it easier to recognize changes on the lithograph or the map? Explain. Take special note of the James Island Connector Expressway, under construction between the City of Charleston and James Island, visible only on the lithograph. Compare the topographic map with the lithograph and document all changes which had to take place along the route to make this highway possible.

4. **Trace boundaries of original walled city of Charleston.** ✿ 📖
   Use Figure 9A-1: Early Map of Charleston, 1680, on page 9A-2, as a reference to trace with a wipe-off pen on the CHARLESTON TOPOGRAPHIC MAP the approximate location of Charleston's early city wall. Start at East Bay Street and Cumberland (not marked on the Charleston topographic maps). This intersection is located between BM 11 (Benchmark 11) and the letter "C" in the word "Customhouse." East Bay Street served as the eastern boundary of the wall running north-south. Extend the wall south on East Bay Street to Water Street. Even though it is not marked on the map, it can be identified as the street just south of the Yacht Club running northwest. Trace Water Street two blocks to Meeting Street. The wall followed Meeting Street north to Cumberland Street forming the western boundary. Cumberland Street forms the northern boundary. It can be identified as the street just past the area marked by four crosses, the symbol for churches. The intersection of Cumberland and East Bay Streets completes the area enclosed by the wall. As closely as you can, transfer these boundaries of the old Charles Towne city wall onto the CHARLESTON LITHOGRAPH. Use the transparent grid overlay to determine the area enclosed by the Charles Towne wall. How many feet of wall did they have to build to completely enclose the town?

   Why would the people living in Charles Towne feel the need for a wall, when other colonial cities did not have one? What geographic features might have influenced the decision to build a wall around the original colonial town? What new problems did the wall create for the early colonists? How would tearing down the wall solve these problems? All things considered, would you consider the building of the Charles Towne wall a success or failure? Explain.

5. **Compare modern Charleston boundaries with original peninsula.** ✿ 📖
   Use Figure 9A-1 "Early Map of Charleston, 1680", for reference as you trace, with a wipe-off pen, the approximate boundaries of the original Charleston peninsula onto the CHARLESTON TOPOGRAPHIC MAP. Transfer this information to the CHARLESTON LITHOGRAPH. By comparing these two maps, identify and list at least ten landmarks on the charleston topographic map where land alterations have made it possible to build these structures. How have such landfill projects dramatically changed land use, landscape, and the geography of the peninsula? How do you think these areas were filled? What materials might have been used? Can you identify any reclamation projects taking place in Charleston today? If so, list them.

6. **Analyze the newspaper article.** 📖 ✍
   Read the newspaper article found in the Brief Site Description for Study Site 9A, "Long Lost Confederate Sub Found off Charleston." Explain how the story relates to the Coastal Zone Landform Region. Identify on the <u>CHARLESTON TOPOGRAPHIC MAP</u> and the <u>CHARLESTON LITHOGRAPH</u> where the places and events named in the story might be located. Explain why the publisher thought this story might be of interest to newspaper readers. Using the same references and location as your setting, write another newspaper article related to the same situation, but date it far enough in either the future or the past so that you will have some changes to report. Choose an appropriate title (headline) and draw an appropriate picture to illustrate your main point.

7. **Determine navigational bearings in harbor.** ✿ 🖥
   Some topographic maps include bathymetric data (contour lines which indicate variations in water depth). Using the <u>CHARLESTON TOPOGRAPHIC MAP</u>, which does have bathymetric information, divide into groups and write out a set of directions for navigating through your assigned channel. Be sure to refer to compass direction and straight line distances relative to your ship when listing bearings. Identify all channels, creeks, and other landmarks you will have to pass through or by to get to your destination. Chart your course with a wipe-off pen on the map. Then exchange your set of navigational directions with a set from another group and try to plot their navigational route based on their list of bearings and other directions. How deep do you think the channel would have to be to get you to your destination safely?

   Group I You are the captain of a submarine entering Charleston Harbor from the Atlantic Ocean headed to the United States Naval Reservation dry-dock area up the Cooper River

   Group II You are the leader of a group of early settlers who have gotten lost in Charleston Harbor off of White Point, now known as The Battery. You need to plot a course back up the Ashley River to Old Town, by Oldtown Creek.

   Group III You are the captain of a British merchant ship bringing supplies across the Atlantic Ocean to Charleston to support the Confederate cause during the Civil War. You must plot a course up the Cooper River to the docks on East Bay Street.

8. **Determine distance cannonball traveled to Fort Sumter.** 🖥
   The first shots of the American Civil War were fired from Fort Johnson on James Island to Fort Sumter, the Union outpost. Using the scale bar on the <u>CHARLESTON TOPOGRAPHIC MAP</u>, find the distance that the cannon balls traveled from James Island to Fort Sumter, which is just partly visible at the bottom right corner of the map - look for the word "FORT." Find the distance in both feet and meters.

9. **Evaluate actual cost of earthquake damage.** 🖥
   Mark on the <u>CHARLESTON LITHOGRAPH</u>, with a wipe-off pen, your best estimate of the city limits of Charleston in 1886. What information did you use to determine the size of the city at that time? The great Charleston Earthquake of 1886 caused a total of 6 million dollars in damages. Since 1886, inflation has increased dramatically and caused the value of the dollar to decline. Assume that $1 in 1886 was worth $100 today. Using this information to set up a ratio, calculate the cost of the 1886 earthquake in terms of current dollars. Assuming that Charleston in 1886 was 50%

as big as today, calculate the total dollar value of the damage expected if another earthquake of similar magnitude were to strike the city. Justify your numbers. Are there any ways you could think of to lessen the damage in the city?

10. **Recreate an interview with hotel owner Jehu Jones.** 📖 ✍
As a "free person of color" residing in Charleston in the early 1800's, hotel owner Jehu Jones led a unique lifestyle. Locate on the <u>CHARLESTON TOPOGRAPHIC MAP</u> where you think Mr. Jones' hotel might have been. Explain why you selected that particular location. Pretend you are a Charleston newspaper reporter interviewing this successful businessman. In your group, come up with five questions you would like to ask Mr. Jones. Exchange lists with another group and try to answer their five questions from Mr. Jones' perspective. Conduct a class discussion about which group responses are most authentic and why. Publish the best questions and answers in your school newspaper as an example of historical fiction.

11. **Locate physical features with specific geometric shapes.** 💻
On the <u>CHARLESTON LITHOGRAPH</u> and <u>CHARLESTON TOPOGRAPHIC MAP</u>, locate places or features with the following geometric outlines, patterns, or shapes. As you find these shapes, outline them with a wipe-off pen on both the lithograph and the topographic map. Are there any features which are shaped differently on the map than on the lithograph? Explain any examples you find.

Triangle	Circle	Rhombus	Perpendicular segments
Right triangle	Ellipse	Trapezoid	Parallel segments
Obtuse angle	Square	Pentagon	Cloverleaf
Acute angle	Rectangle	Octagon	Parallelogram

12. **Measure size of Charleston rivers and Intracoastal Waterway.** 💻
Divide into groups to determine the size for three Charleston rivers, the Ashley, Cooper, and Wando. Take at least five measurements of your assigned dimension, at five different locations on each river, and calculate the average value for each river. Report back to the class which river is greatest in dimension, which is least, and which is in the middle.

Group I   Length - use <u>STATE BASE MAP #1, SHADED RELIEF</u>

Group II   Width - use <u>CHARLESTON TOPOGRAPHIC MAP</u>

Group III   Depth - use <u>CHARLESTON TOPOGRAPHIC MAP</u>

Use a wipe-off pen to mark the course of the Intracoastal Waterway on the <u>CHARLESTON TOPOGRAPHIC MAP</u>. Which rivers does it use for part of its channel? Where is the Intracoastal Waterway the shallowest? How deep is it there? Where is it the narrowest? How wide is it there? What do you think is the maximum length and width of a ship that would be able to use the Intracoastal Waterway? Explain and justify your answer.

13. **Select suitable location for a commuter bridge to Daniel Island.** ✿
Developers are planning to build a subdivision on Daniel Island, visible on the northeastern section of the <u>CHARLESTON TOPOGRAPHIC MAP</u>. You have been asked to determine the best location for a new bridge between the Charleston peninsula and Daniel Island to serve the new residents. Outline your plans on the topographic map with a wipe-off pen. Check your route into the city on the <u>CHARLESTON LITHOGRAPH</u>. Considered all necessary information. Be sure to connect your new bridge to existing streets in Charleston. What buildings, if any, would need to be removed or relocated? Be prepared to defend your choice of sites for this new bridge. Compare your selection with the selections of other groups and debate the pros and cons of each plan.

14. **Estimate roof damage to Charleston.** ⌨
In 1989, Hurricane Hugo swept through the city of Charleston causing roof damage to about 80% of all buildings. Use the <u>CHARLESTON LITHOGRAPH</u> to estimate the total number of buildings in Charleston that had to be reroofed after Hurricane Hugo. Limit your estimate to the buildings located south of Interstate Hwy. 26 and US Hwy. 17 all the way to the Battery. Use the transparent grid overlay to determine the number of buildings per square grid inch. Then set up a proportion to estimate the total number of buildings in the designated area. Compare your answer with answers of other groups. Why does each group get slightly different answers? Can they all be correct?

15. **Plan an evacuation route for an approaching hurricane.** ✿
Charleston's location makes it prone to hurricane damage. Pretend you are a member of a municipal planning commission. Use the <u>STATE BASE MAP #2, WITH HIGHWAYS</u>, to plan a set of evacuation routes for all the people living in the Charleston metropolitan area. Where will you send them? How far away from the city will they have to go? What facilities will you have to prepare for them? When will you let them return to their homes? Compare your routes with the routes of other groups. How many different routes are really needed? Can you have too many evacuation routes? Explain.

ENRICHMENT

1. **Investigate relationship between English Lords Proprietors and the King.** 📖
   Using a South Carolina history textbook or other library resources, find out how each of these men became friends of King Charles. Why did he owe them favors?

Sir William Berkeley	Edward Hyde, Earl of Clarendon
Sir John Colleton, Baronet	George Monck, Duke of Albemarle
Sir George Carteret	William, Earl of Craven
Lord Anthony Ashley Cooper	Lord John Berkeley

2. **Research and report on Charleston Single House.** ✿ 📖
   Research the Charleston Single House by obtaining a floor plan. Identify the piazza (long porch), front door, garden area, and gable end. Note the orientation of the house to take advantage of the sea breeze, and describe its appearance from the street. Use drawings, photos, or a video to learn about the interior and exterior of a Single House. Or, construct a small cardboard scale model of a Charleston Single House. Why would the local Charleston and distant West Indies environments both have an influence on the design of these houses?

3. **Compare advantages of original and present sites of Charleston.** 💻
   Research both the original 1670 site for Charles Towne at Old Town and the later 1680 site at White Point (The Battery).   Compare access to ocean and rivers, availability of farmland, probability of disease and other health problems, and protection from enemies. Use a Venn diagram to compare and contrast these two sites relative to the listed factors.   Do you think the present site was a good choice? Explain your answer.

Greenville News

September 10, 1989

Myrtle Beach vs. the Sea

by Jenny Munro

A rising Atlantic Ocean is eating away at Myrtle Beach, where coastal development could literally go under during the next century if plans are not made to move it back, according to a new Clemson University study.

By the year 2025 the ocean could be 39 to 89 feet farther inland at Myrtle Beach if the sea level continues to increase at the expected rate, said Jim London, associate professor of planning at Clemson. By 2100, the shoreline could be anywhere from 182 to 960 feet farther inland. That would place the water between Ocean Boulevard and U. S. 17 in some areas. But "Myrtle Beach will still exist if they adjust to the sea rise and adopt some flexible land use policies," London said.

Although the magnitude of the increase is uncertain, "the atmospheric science community has come close to a consensus that the greenhouse effect is upon us," London said. As the earth warms, the polar ice caps will begin melting, causing an increase in the sea level, and the ocean water will warm, causing an expansion of the water.

London said, "The options are to fortify the beach with sea walls or to make a gradual retreat." Different areas along the coast will require different decisions. In Myrtle Beach, where the attraction is the beach, London said retreating from the advancing sea is probably the answer. Sea walls would cause problems. "Eventually, what happens is you lose the public beach," he said. "We're going to have to

build a little smarter and adapt to a dynamic, moving shoreline. But the planning will not be easy", said London. "The public probably does not yet realize the sea level is increasing."

Myrtle beach officials already have begun building smarter, according to Jack Walker, planning director. The city has a mandatory construction setback from the oceanfront, based on a 50-year erosion rate. Also, the city has no sea walls and other hard erosion devices. "Basically, sand is about the only thing we can use in that zone," Walker said.

"We pushed the ocean away from the city by renourishing the beach with sand," he said. If the city has to fight a rising sea as well as erosion, "we will not only extend the beach out but raise the beach up."

RATIONALE

Travel and tourism has become an increasingly important component of South Carolina's economy over the last thirty years. Tourism contributes both directly and indirectly to the state's economy. About fifty percent of tourist dollars are spent on food service and about twenty percent on lodging. The remainder generates employment in various service related industries, including transportation, recreation, entertainment, and retail trade. Although beaches have always been attractive to tourists, more and more visitors are looking for additional attractions such as amusement parks, theaters, golf courses, campgrounds, and convention facilities. The Myrtle Beach area has expanded to offer many of these extra features while still maintaining the family atmosphere that continues to draw millions of tourists from both in and out of state. Almost forty percent of all tourist dollars generated in South Carolina come from the Myrtle Beach area. Almost one-fifth of all State Park visits are recorded at Myrtle Beach State Park.

Myrtle Beach, 200 Years Ago

Two hundred years ago, Myrtle Beach was separated from pine forests only by sand dunes, sea oats, scrub oaks, and evergreen myrtle bushes (the origin of the name Myrtle Beach). During George Washington's tour of South Carolina in 1791 (refer to pages 1-19 to 1-28), he entered the state on the King's Highway (now US Hwy. 17) and visited with many influential and prominent families living in the Myrtle Beach area. At Little River, he dined with James Cochran and went on to lodge at Jeremiah Vereen's house near Long Beach, as the Myrtle Beach area was called in that day. He gave the beach at Windy Hill its name, because his hat was blown off as he walked along the ocean. From there, he was piloted across Singleton's Swash by Mr. Vereen and traveled south along the road which parallels the ocean. He dined at George Pawley's house just north of present-day Myrtle Beach. While traveling, he was met by Dr. Henry Collins Flagg, who invited him to spend the night at Brookgreen Plantation. George Washington continued on to Georgetown, where he was welcomed by a Salute of Cannons by the local infantry dressed in their most handsome uniforms.

Myrtle Beach, 100 Years Ago

Walking along the Long Beach (Myrtle Beach) a hundred years ago, you would have seen the large expanse of the Atlantic Ocean to the east. Looking north and south, you would see a long crescent-shaped beach covered with beautiful white sand. For miles inland, you would still see sand dunes covered with picturesque sea oats, scrub oaks, and wax myrtle bushes. Franklin G. Burroughs, a Conway businessman, was the first to see the potential for these beaches to become a major resort area. His company, Burroughs and Collins, acquired a vast amount of timberland which included the beach front all the way from Murrells Inlet to Little River.

About the turn of the century, his company started construction of a railroad line to transport tourists from Conway to the ocean. Once the railroad opened, the company built its first resort hotel, the Sea Side Inn. The company later sponsored a contest to select a name for its new resort. A popular suggestion was "Edgewater"; however, the name "Myrtle Beach" won the contest mainly because of the abundance of the evergreen aromatic plant called wax myrtle (*Myricaceae cerifera*) growing along the Grand Strand.

Myrtle Beach, Today

Currently the area is crowded with tourists and their vehicles, heading to and from the many golf courses, hotels, motels, condominiums, specialty shops, and restaurants that have developed along the Grand Strand, as the area is called today. However, a more serious problem than traffic jams or over-development threatens the future of the tourist industry at Myrtle Beach. Beach erosion has become a major concern. Since the late 1970's, when the city first began to study the problem, it has been determined that the ocean encroaches the shoreline at Myrtle Beach by approximately a foot per year due to normal erosion (not including additional damage caused by storms). To combat this problem, South Carolina has carried out several expensive beach renourishment

projects where more sand was added to beaches and dunes. These projects do not halt beach erosion but do slow the effects. Beach erosion will continue to present a threat to coastal development and tourism and will also continue to generate public debate on the best way to maintain and protect coastal development.

A Common Species: Touroid

Touroids, also known as Spuds or Gringos, are people who visit the beach on vacation. Local residents may make up funny stories about Touroids, but locals look forward to their arrival because of the strong boost they provide to the economy of Myrtle Beach and other resorts. Touroids are seasonally abundant on the Carolina coast; they gather in greatest numbers between Memorial Day and Labor Day. No single characteristic absolutely identifies a Touroid, but one or more of the following signs suggests a positive Touroid sighting:

Signs of a Touroid Sighting
Exerpted from Peter Meyer's book, Nature Guide to the Carolina Coast, page 136.
Note: The author "freely admits to being a Touroid on many occasions."

Walking to the beach overburdened with towels, blankets, beach umbrellas, cookers, rafts, chairs, beach balls, radios, shovels, buckets, etc.

Letting beach towels get soaked by waves (from placing them too close to the surf during an incoming tide.)

Spending endless hours walking up and down the beach, collecting worthless shells.

Wearing loud Hawaiian print shirts, funky shorts, and weird hats.

Wearing socks with sandals, or socks with any type of shoes during the summer.

Talking with a foreign-sounding accent; inability to understand local beach dialect.

Buying or sending multiple sets of postcards.

Asking directions for the fourth time to the same destination.

Driving down one-way streets the wrong way.

Driving 10 MPH (the speed of a turtle) in a 35 MPH zone, gawking at the sights.

Buying shells, trinkets, and souvenirs in tourist-trap shops.

Invariably ordering seafood platters in restaurants.

Appearing in the evening with a lobster-red sunburn (after roasting on the beach all day long.)

Not all touroids are equally well received by the local population or by law enforcement agencies. Large crowds sometimes create lots of noise and traffic, which can disturb residential areas of the city, and generate lots of trash. Conflicts can arise between vacationers who are looking for a good time and who tend to stay up late, and residents who have to go about their normal workday tasks and who have to get up early the next day.

The Myrtle Beach Railroad

In 1901, Myrtle Beach was considered "an uninhabited wasteland." But it had long been the dream of the Burroughs family in Conway to build a railroad to the beach. About that time, an old locomotive called the "Black Maria," which was originally designed to pull logs out of the swamp, began taking beach-goers from Conway to the ocean. At first, the track ran from Conway to Pine Island, the site of a huge lumber mill near present day Waccamaw Pottery (where Highway 501 meets the Intracoastal Waterway). From there the train had to be ferried across the Waccamaw River, which is now part of the Intracoastal Waterway. The tracks extended all the way to 9th Avenue which is the present location of the Myrtle Beach Pavilion parking lot. In 1904, a railway drawbridge was built across the river so regular runs could be made from Conway to the beach without interruption. Shortly after the Burroughs and Collins Company had laid the tracks and welcomed their first vacationers for day trips to the beach, they began construction on the first resort hotel, called the Seaside Inn.

Travel on the wood-burning Black Maria with its shrill whistle and smoke streaming out from the engine must have been quite an adventure. Sparks from the smokestack often set the neighboring woods on fire. Every time this happened the engineer would stop the train so the crew could jump off to put out the fire. That was not the only hazard, however. Cattle and hogs usually had free run of the countryside. Often these animals became confused and frightened by the smoke and noise and would charge the train. Later, after the cows became used to the noise and confusion, they would lay down on the warm sandy track beds. If the train killed the animals, a six dollar per animal fee was charged. To avoid this fine, the engineer would stop the train long enough to shoo the cattle off the tracks. Later, cowcatchers were added to the front of the engine. At top speed, the train hurtled along at twenty-five miles per hour. Passengers felt like they were riding in the wind. After serving beachgoers for four years, the Black Maria was replaced with a coal-burning engine which eliminated most of the cinders and sparks.

Atlantic Beach Set Aside for African Americans

For a long time, in the segregated South, a large percentage of the population, the Black residents of South Carolina, were not permitted to use the beaches in the town of Myrtle Beach. The Atlantic Beach Company wanted to provide a vacation opportunity for African Americans and at the same time boost their own local economy. So they set aside a portion of their oceanfront property, about sixteen miles north of Myrtle Beach, for the exclusive use of Blacks. This beach is currently owned and operated by African Americans. However, the expected influx of tourists never materialized, probably because of the onset of Civil Rights legislation. Once court-ordered integration opened public beaches to all citizens, regardless of race, color, or creed, African Americans had many more choices and were no longer limited to one particular resort.

Activity 9B- 1: The Tourist District

Materials		
6	STATE BASE MAP #2, WITH HIGHWAYS	1: 500,000
6	LAND USE/LAND COVER MAP	1: 500,000
6	GENERAL SOIL MAP	1: 594,000
6	GEOLOGIC AND MINERAL RESOURCE MAP	1: 1,000,000
6	MYRTLE BEACH LITHOGRAPH	1: 12,000
6	MYRTLE BEACH TOPOGRAPHIC MAP	1: 24,000
1	State Map of Major Drainage Basins	Figure 1-2
6	Wipe-off Pens	
6	Transparent Grid Overlays	

PERFORMANCE TASKS
(Icon Key) Overview = ✈; Science = ✿; Math = 🖥; History = 📖; Language Arts = ✍

1. **Locate the study site.** ✈ ✿
   Locate the Myrtle Beach Study Site on the <u>STATE BASE MAP #2, WITH HIGHWAYS</u>, on the <u>LAND USE/LAND COVER MAP</u>, on the <u>GEOLOGIC AND MINERAL RESOURCE MAP</u>, and on the <u>GENERAL SOIL MAP</u> by drawing a small box around the correct site on each map using a wipe-off pen. Summarize the one or two most important land uses at this site, the age (Geologic Period), the type of rock at the site, and the predominant soil type at the site. Use the scale bar on the base map to estimate the straight-line distance between this study site and your school. In which local river drainage basin (watershed) is this site located? Through which of the major river systems, Savannah, Santee, Pee Dee, or Coastal Plain, does this site drain? Refer to Figure 1-2, "State Map of Major Drainage Basins."

2. **Identify land use features and the locations of landmarks.** ✈
   Using the <u>MYRTLE BEACH TOPOGRAPHIC MAP</u> and the <u>MYRTLE BEACH LITHOGRAPH</u>, identify the Myrtle Beach Grand Strand, US Hwy. 501, US Hwy. 17, the shopping mall along US Hwy. 17, the Myrtle Beach Pavilion, the Intracoastal Waterway, the Myrtle Beach Air Force Base runway (now part of the Myrtle Beach Jetport), a golf course, Myrtle Beach State Park, the Waccamaw Pottery Shopping Complex at the intersection of US Hwy. 501 and the Intracoastal Waterway, the sewage disposal ponds along the Intracoastal Waterway, the Sewage Disposal Pond along Withers Swash, the Seaboard Coast Line Railroad track, and the power line corridor paralleling US Hwy. 501. Which features are easier to identify on the topographic map? Which features are easier to identify on the lithograph? Why? Which features are not visible on both map products?

   On the <u>STATE BASE MAP # 2, WITH HIGHWAYS</u>, locate Myrtle Beach. Give several descriptive names for this area. Explain how each name describes something about the area. Name several other beaches along this coastline.

3. **Analyze changes through time.** ✈
   Compare the <u>MYRTLE BEACH TOPOGRAPHIC MAP</u> with the <u>MYRTLE BEACH LITHOGRAPH</u> to discover any features that appear on one and not the other. First, use a wipe-off pen to outline the boundary of the lithograph on the topographic map. Then carefully compare the same area on both and use the pen to mark any features that don't appear on both. Check the dates of both the map and the lithograph. Which one shows newer features? List any new features you find. Why do you think

these changes have occurred? How will these changes affect the environment and the scenic features of the Myrtle Beach area?

4. **Analyze the newspaper article.** ✍
   Read the newspaper article on page 9B-1, "Myrtle Beach vs. the Sea." Explain how the story relates to the Coastal Zone landform region. Identify on the MYRTLE BEACH TOPOGRAPHIC MAP and the MYRTLE BEACH LITHOGRAPH where the events mentioned in the story could have taken place. Explain why the publisher thought this story would be of interest to newspaper readers. Using the same people as characters and the same location as your setting, write another newspaper article related to this incident, but date it either before or after the given story occurred. Choose an appropriate title and draw an appropriate picture to illustrate your main point.

5. **Predict new shoreline position for Myrtle Beach.** ✿
   If beach erosion continues at its present rate, the Myrtle Beach shoreline will move inland a total of two miles during the next 10,000 years. On the MYRTLE BEACH TOPOGRAPHIC MAP, mark with a wipe-off pen the position of this new shoreline. Compare this new position with the pattern of contour lines shown on the map. Will the shoreline still be straight, or will it become more irregular? Refer to contour line information on the map to justify your answer. What is the current erosion rate in feet per year? How many years will it take for the new shoreline to reach the current position of the Intracoastal Waterway if that same erosion rate continues?

6. **Determine nature and extent of non-point source pollution.** ✿
   On the MYRTLE BEACH LITHOGRAPH, trace with a wipe-off pen all the surface drainage for the area. Refer to the MYRTLE BEACH TOPOGRAPHIC MAP as needed. Consider adjacent land uses to predict the type and extent of non-point source pollution which might be found in these drainage areas. Identify places on the beach where drainage enters the ocean. What pollutants would you expect to find here? Where do the fertilizers and pesticides used on the golf courses end up? How do you think this type of pollution can be prevented or reduced? Explain.

7. **Relate landforms to land use.** ⌨
   Find a golf course on the MYRTLE BEACH LITHOGRAPH. Use the transparent grid overlay and the scale bar to determine the area of the golf course in square feet. Convert this number to acres. (Recall that there are 43,560 square feet in one acre.) Refer to the MYRTLE BEACH TOPOGRAPHIC MAP to determine what landforms exist at the golf course. Do you think these landforms increase the value of the golf course, or are they more of a problem which had to be solved before the course could be built? Locate the Waccamaw Pottery shopping complex at the intersection of US Hwy. 501 and the Intracoastal Waterway. Calculate its area and analyze the landforms present at this site using the topographic map. Select at least one other example of a tourist-based land use and determine its area and its relationship to underlying landforms. Compare how the developers worked with the existing landforms in the three sites you analyzed. Do you think the landforms in an area are always assets or liabilities to a developer?

8. **Contrast sediment load in different bodies of water.** ✿

   Use the <u>MYRTLE BEACH LITHOGRAPH</u> to locate and mark with a wipe-off pen each of the following bodies of water: The deep Atlantic Ocean, the surf zone along the beach, the Intracoastal Waterway, and the settling ponds north of the Intracoastal Waterway. Compare and contrast the amount of suspended sediment in each, using the infrared blue color signature, and explain what geologic and other factors produced that difference.

9. **Design plan for future use of Air Force Base site.** ✿✍

   Using the scale on the <u>MYRTLE BEACH TOPOGRAPHIC MAP</u>, find the length of the runway at the Myrtle Beach Air Force Base in feet, then convert your answer to miles (1 mile = 5,280 feet). Myrtle Beach Air Force Base was on the closure list for the United States Department of Defense. The airfield will continue to be used as part of the Myrtle Beach International Jetport. However, this leaves the future use of the 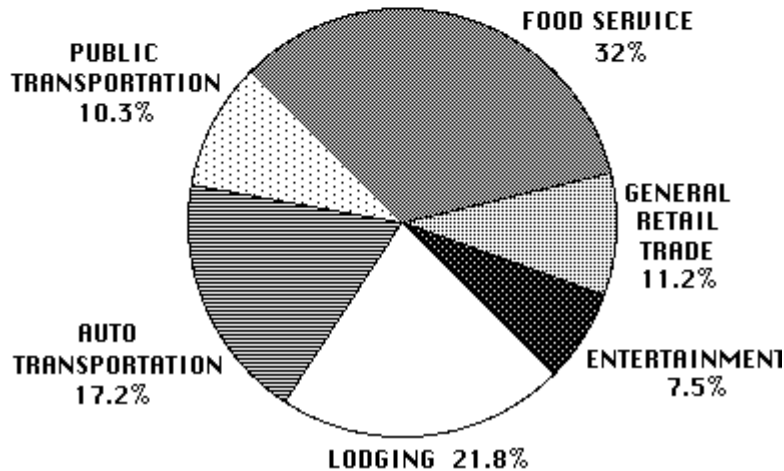area enclosed by the black dotted/dashed line to be decided by Myrtle Beach civic leaders. You and your group have been asked to design a plan for the future use of this land. There are several special interest groups that are very vocal about their desires to influence your decision; therefore, you must consider these groups as you design your plan. These groups are conservationists, land developers, tourism promoters, and business owners. Design a plan and present it to the class. Be ready to defend your plan against attacks by the special interest groups.

10. **Develop a class list of Touroid characteristics.** ✍

    Expand Peter Meyer's list of Touroid characteristics. Make posters illustrating some of the new characteristics and share them with the rest of the class. How do wise sayings such as "When in Rome do as the Romans do" and "One man's trash is another man's treasure" relate to the behavior of tourists? Develop a list of helpful hints for Touroids visiting either the Grand Strand or the town nearest your school. Develop a dictionary of local lingo for tourists to use.

11. **Tell a funny story about being a Touroid.** ✍

    Divide into groups. Tell a story to your group about a time when you behaved as a Touroid or sighted a Touroid in your neck of the woods. As a group, select your favorite story and choose a pair of group members to present it to the class. Tell the story together, with one student acting as the Touroid, and one acting as a local resident. Make sure that the story includes a number of specific references to known Touroid habits and characteristics. You may wish to wear Touroid garb while performing the story, and allow classmates in the audience to give a sign, such as the sign of the "T" for Touroid when the story includes a Touroidism. Or you may simply have them count the number of Touroidisms. This will work best if your group determines what sign the audience gives.

12. **Compare Florida and South Carolina tourism and spending habits.** 🖥

    In the fall of 1989 and the winter of 1990, a total of 18,400 people participated in a project called Longwoods TRAVEL USA, the largest and most comprehensive study ever undertaken of the United States leisure traveler. Use the top pie chart below to find out how many more people in the survey chose Florida rather than South Carolina as the beach resort area they decided to visit. The bottom pie chart indicates that in 1992, a total of $4.6 billion was spent in South Carolina by travelers. How much was spent in each of the areas of Food Service, Lodging, and Entertainment, according to the chart? Round off each result to the nearest whole-

number amount of money. The average size of a group of visitors to South Carolina in 1993-1994 was reported to be 3.5 people. How can you have a group with 3.5 people? What are some possible combinations of group sizes which could produce this average?

BEACH RESORTS - TOP DESTINATIONS
1989-1990

FL 21.0%
CA 7.4%
SC 11.7%
NJ 6.9%
NC 6.5%
HI 6.1%
FOREIGN 18.8%
OTHER U.S. 21.6%
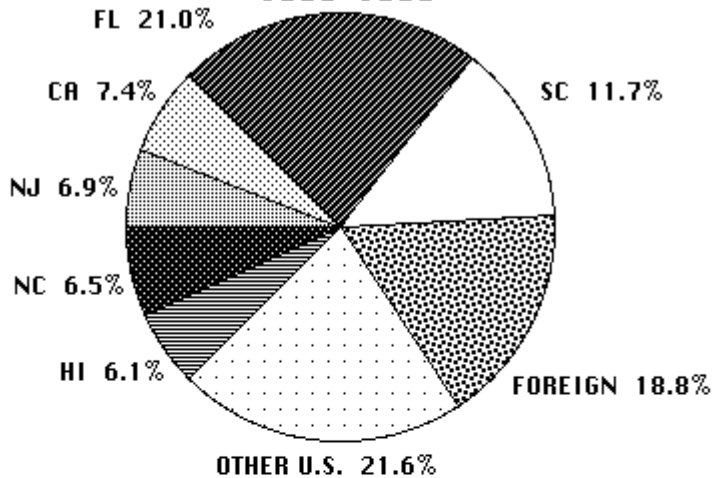
SOUTH CAROLINA EXPENDITURES
BY TRAVELERS - 1992

PUBLIC TRANSPORTATION 10.3%
FOOD SERVICE 32%
GENERAL RETAIL TRADE 11.2%
AUTO TRANSPORTATION 17.2%
ENTERTAINMENT 7.5%
LODGING 21.8%

13. **Estimate capacity for tourists and parking.** 🖥
   Divide into groups and locate Ocean Boulevard on the <u>MYRTLE BEACH TOPOGRAPHIC MAP</u>. Mark this road on the <u>MYRTLE BEACH LITHOGRAPH</u> with a wipe-off pen. Choose a four-inch segment of land between Ocean Boulevard and the beach and count the buildings in this area. Estimate the number of tourists vacationing on your chosen area. In order to do this, assume that 90% of the buildings are hotels or motels, that the average number of rooms per hotel is 100, and that an average of three people stay in each room. Then estimate the capacity of parking lots on your chosen segment by using the transparent grid overlay. Assume that each car needs 100 square feet to park. Compare the number of

people to the number of parking places. Are there enough spaces to accommodate the tourists? Next, use the lithograph and grid overlay to determine the maximum number of cars that could be parked at the Myrtle Beach Mall (in the northeast corner of the lithograph). Also estimate parking capacity at the Waccamaw Pottery Outlet Park (intersection of US Hwy. 521 and the Intracoastal Waterway). How do you think an architect plans the size of a parking lot?

14. **Design a brochure for a Myrtle Beach resort.** ✍
Find a vacant lot somewhere on the <u>MYRTLE BEACH LITHOGRAPH</u> where your group would like to construct a tourist business, such as a hotel, restaurant, amusement park, etc. Design and produce a brochure to advertise your business as outlined in the procedure below. Divide up the responsibility within your group so that each person is in charge of a specific task; but be sure to consider suggestions from all group members. Display your results on a bulletin board.

First, name your facility and write an exciting description of the facility that will make tourists want to visit. Then draw a simple map and write easy to understand directions so that tourists will know how to get there and where to park their vehicles. Next, determine how much your facility will cost to construct. What prices must you charge to insure a fair profit without being much higher than your competitors? Finally, organize all the parts into an attractive format and add the necessary artwork to make your brochure one that people will notice, pick up, and read.

15. **Estimate time of day by angle of shadows.** ✿
Locate several tall buildings on the <u>MYRTLE BEACH LITHOGRAPH</u> and outline the position of their shadows with a wipe-off pen. Assume that the shadows will point exactly north at 12:00 noon, and that north is toward the top of the lithograph. Estimate as closely as possible the time of day the photograph was taken. Explain how you determined that time. How accurate do you think your answer is?

16. **Analyze impact of Myrtle Beach railroad line.** 💻
The railroad line that used to bring vacationers to Myrtle Beach from all over the country can be seen, running along the northern side of U.S. Highway 501, on both the <u>MYRTLE BEACH LITHOGRAPH</u> and the <u>MYRTLE BEACH TOPOGRAPHIC MAP</u>. How close to the ocean could you get if you traveled by train? Why was the train station not located right at the beach? Locate the turnaround track on the lithograph near the intersection of Harlem Street and 8th Avenue North. Railroad workers call this track configuration a "wye" (pronounced like the letter "Y"). How do you think it got that name (Hint: look carefully at the shape of the track)? Assume that each railroad car, including the engine, is 100 feet long. What is the maximum length of a train that could turn itself around by using the Myrtle Beach wye, without uncoupling any cars? How many cars would such a train be pulling?

Passenger train coaches can hold different numbers of passengers depending on the size of the coach and the spacing of the seats, but a typical carrying capacity is 80 passengers per coach. On a typical summer weekend in 1940, approximately 2,000 vacationers arrived at Myrtle Beach and about half of these traveled by train. How many coach loads of passengers does this number represent? Do you think they all arrived at the same time on the same train? How many trains per day do you think would be needed to transport that many passengers economically?

What impact do you think the railroad had on turning Myrtle Beach into a prime tourist destination? If passenger rail service to Myrtle Beach were to start up again, how many people do you think would use it on an average summer weekend? What are some advantages of traveling to the beach by rail? What are some disadvantages? Refer to the paragraph titled "The Myrtle Beach Railroad," on page 9B-4 for ideas.

ENRICHMENT

1. **Research pros and cons of resort development. ✿ ✍**
   There are always pros and cons to be considered when developing beach resorts. Divide a piece of paper into two columns. Label one column Pros and the other Cons, under the major heading Developing Beaches. Refer to a variety of library resources in addition to your own opinions to fill in the chart.

2. **Research beach erosion and implications for tourism. ✿**
   Research the problems associated with beach erosion. Discuss the implications of beach erosion on tourism. Brainstorm possible solutions to this problem.

3. **Collect brochures from tourist attractions. ✍**
   Collect brochures from tourist attractions at a variety of beach resorts. These are usually easy to obtain from the lobbies of restaurants or by mail from the city's Chamber of Commerce. Select one of these brochures and plan a fictional group vacation to that resort or attraction. Group members should each make up a story about how they spent their vacation time. Read your story to the rest of your group and decide whether the attraction is a tourist trap or not.

4. **Locate other tourist beaches in South Carolina. ✿**
   Locate other resort beaches that contribute to the state's flourishing tourist trade. Estimate the quantity and quality of tourist attractions found in these areas, compared to those of the Grand Strand area. What information did you use to make your estimation? Locate as many State Parks as you can in the Coastal Zone area. List those you or someone in your group has visited which have beaches.

Savannah Morning News

April 20, 1992

Uncovering a Piece of History:
Archeologists Excavate 16th Century Spanish Settlement
Colony Founded as Spanish Florida Capital

by John C. Williams

At Parris Island, where Marine Corps recruits learn survival skills today, archeologists are learning how New World settlers survived more than 400 years ago at the 16th century Spanish capital of Santa Elena. Pedro Menendez de Aviles founded Santa Elena in 1566 as the capital of Spanish Florida, a claim that extended from the Florida Keys to Newfoundland. Menendez is credited for the 1565 killing of Jean Ribault, a Frenchman who founded Charlesfort in the Beaufort County area probably near the modern-day town of Port Royal, in 1562.

The Spanish occupied Santa Elena and its two forts, San Marcos and Fort San Felipe, from 1566 until 1587 with 100 to 300 people, most of them soldiers, said Chester DePratter, an archeologist and co-director of the excavation. After years of attacks by Indians and Sir Francis Drake's raid on the Spanish colony at St. Augustine, Fla., the Spanish decided in 1586 to abandon Santa Elena to consolidate their forces at St. Augustine.

The Santa Elena settlement was known only through historical accounts until 1979, when Stanley South, an archeologist with the South Carolina Institute of Archeology and Anthropology, rediscovered the forts and town on Parris Island. Work in this phase of the excavation concentrates on a 24-foot room - with a center post, thought to have been part of a house because of the nearby garbage remains.

Garbage pits provide important clues to the past, DePratter said, such as what the residents ate, what they ate it in, and what they wore, because at some point most of those items were thrown away. "By studying the garbage, we can tell if it was somebody important living there because if it was, there may be Ming porcelain (shards)," he said. "If it was a soldier or a servant, the pottery probably was Indian."

Other items recovered include Spanish brass and copper ball buttons, tools, bullet molds, pieces of crossbows, brass thimbles and jewelry, he said.

RATIONALE

The ACE Basin area has been designated a high-priority habitat under the North American Waterfowl Management Plan because of its importance to migrating birds and a variety of threatened and endangered animal species. In addition to the ecologically significant features of the ACE Basin, which include both freshwater and saltwater marshes, a rich historical tradition is still preserved which includes old plantation homes, Civil War forts, historic graveyards and churches, and a thriving Low Country culture. The coast around the ACE Basin preserves remains of the earliest settlements in the state and highlights the significant contributions of the black culture which dominated the area in the past and continues today as an influential part of South Carolina society.

The ACE Basin as an Important Ecological Site

The ACE Basin derives its name from the Ashepoo, Combahee, and Edisto rivers, which all empty into the Atlantic Ocean along St. Helena Sound. It consists of a 350,000 acre estuarine wetland which is mostly undeveloped. The area teems with wildlife and offers a diversity of habitat types, including upland pine forest, bottomland hardwoods, freshwater wetlands, and tidal salt marshes. Although it is managed primarily as a waterfowl preserve, many other animals, in addition to ducks and geese, take advantage of this largely undeveloped estuarine system. Loggerhead turtles lay their eggs on local beaches, bald eagles and osprey nest in the tall pine trees, and wood storks have returned to the area, for the first time since the 1800's, to establish rookeries and raise their young.

A coalition of agencies, including the South Carolina Department of Natural Resources, the United States Fish and Wildlife Service, the Nature Conservancy, and Ducks Unlimited, has joined with private citizens to protect and enhance the traditional uses of the ACE Basin. The area is owned primarily by private citizens who manage their property for agricultural, forestry, and wildlife purposes. It would be prohibitively expensive to purchase such a large area for public ownership, so instead the partnership with landowners encourages private ownership while protecting the area and enhancing current, environmentally sound, land use practices.

Sea Island Cotton

The search for a new cash crop led to the introduction of a particular type of cotton cultivation--so-called Sea Island cotton. The early variety of Sea Island cotton, called black seed cotton, produced a long staple fiber measuring 1.5 to 2.5 inches. It required a long growing season and drier conditions than some other varieties, which limited cultivation to the Coastal Zone of South Carolina. Sea Island cotton bolls tended to rot in the moister inland areas, but thrived in the salt air along the coast. About the end of the 18th century (1700's), green seed cotton, a shorter staple cotton measuring 0.5 to 0.75 inches, was introduced. It had a much shorter growing season and could be cultivated in the interior of the state. Consequently, cotton cultivation spread rapidly across South Carolina. Several factors influenced the increase in cotton production. The plantation system, already in place with indigo and rice, provided the necessary labor. The Industrial Revolution in England encouraged textile manufacturing resulting in a ready market for cotton. Eli Whitney invented the cotton gin, eliminating the old problem of separating seed from the cotton fibers. Internal improvements in transportation allowed cotton bales to be brought quickly to the Charleston market, where there was a successful marketing system already in place. Over the next century cotton became known as "King Cotton," and a one-crop agriculture economic system spread over much of South Carolina.

The Gullah Language

In the rice fields of South Carolina, a creolized African-American folk culture developed as the expanding rice culture caused a great increase in the importation of slaves from West Africa. These enslaved Africans spoke diverse languages and were under great pressure to understand their white masters as well as to communicate with each other. This situation forced the slaves to develop an alternate language called Gullah. This language, still spoken by some modern residents of the Sea Islands, is called a creole language because it is a blend of English and several languages used in West Africa, and is very similar to other creole languages which have developed along the West African Coast. A number of Gullah words have entered the everyday vocabulary of South Carolinians: tote: to carry; chigger: small flea; goober: peanut; and, nana: grandmother. In addition to words and phrases, many interesting beliefs and practices, such as the examples that follow, were handed down in Gullah folklore.

Gullah Beliefs and Folklore
Adapted from Reminiscences of Sea Island Heritage
Legacy of Freedman on St. Helena Island, by Ronald Daise.

The palmetto branch was used to discern whether a person had spoken untruthfully about theft. With two palmetto leaves placed on either side of the accused's neck, the person performing the ritual would command the fronds to "Tie, palmetto, tie" if a lie had been told. According to lore, the green blades would entwine around a liar's neck, beginning to choke him.

Whenever a family member died, survivors would mourn the death for a year by dressing only in black when appearing in public. Some dressed in black even in their homes. If a deacon died, a black bow was affixed somewhere in the church for one year. A deceased preacher's chair in the church was draped in black cloth. No one could be seated in it for a year.

The expression "let mornin' star greet you on yo' prayin' groun" began during slavery. Because they weren't allowed to worship openly, slaves sneaked to their "prayin' grounds" in the woods late at night. The morning star was their timepiece. When it started twinkling, slaves knew morning would soon follow. They then returned home before they were missed, to escape being whipped.

A fireplace at night was a common site for reliving local ghost tales. One favorite tale was about "the hag," which supposedly sat on people's faces at night as they slept, disorienting and terrorizing them.

Another popular belief among the Gullah peoples on St. Helena's Island is that the second belt a woman wore beneath her waist, to raise the level of her long skirts when working in the field, gave her extra strength. Students will recognize in this belief similarities with other notions of the source of personal strength including those popularized today with the icons of cartoon heroes.

Stories from the Sea Island Gullah Tradition

A long-standing tradition in the Sea Islands involves the practice of placing highly personal objects and favorite possessions on the graves of the departed at the time of burial. Practitioners also believed in the power of graveyard dirt to wreak havoc on the house of anyone who accidentally took it home with them. In this tradition, which can be traced to West Africa, it is considered extremely unwise and improper to tamper with possessions placed on the graves of the dead. It is believed that these possessions are needed by the departed in order to peacefully enter and live in the afterworld. Disturbing a grave will result in the tamperer's being pursued by a haint, the departed's angry, retaliatory spirit. The following story is a part of this tradition.

The Precious Brooch
Based loosely on a story shared by Mary Holmes

A so-called "friend" of my family was this lady named Mary Jane. Now Mary Jane used to visit my grandmother all the time and she always admired a beautiful brooch, a jeweled pin my Granny loved to wear. One day when Granny was very old and sick this lady, Mary Jane, came to visit her at her bedside. Soon after her visit, Granny passed away. Even before the undertaker got there Mama realized that the pin was missing and she was sure that Mary Jane had taken Granny's precious brooch. The years went by, but Mama never stopped worrying about the loss of Granny's precious brooch that should have been placed on her grave.

One day years later, after Mary Jane had died too, my brother and I were cleaning in the cemetery around our family members' graves when 'cross the way we spied this precious brooch in a box on Mary Jane's grave. We decided to take this brooch which we knew for sure was the very one that had been stolen from Granny.

We used our pitchfork so as not to pick up any graveyard dirt. You had to be sure NOT to take up any graveyard dirt back home with you! So slo-ooo-owly --slo-oo-owly, nervous, we balanced the fancy little box the pin lay in on the tines of our pitchfork. Carefully, carefully, carefully we placed it in a cotton sack we'd brought along and we took it on home with us in the trunk of the family car.

At suppertime that night we were scared that what we'd done would get us a beating. My brother and I looked back and forth at each other--scared to death to say what we'd done--that we had the box with Granny's pin in it. Mama knew right away from our faces that something was wrong. She said, "What's the matter with ya'll?" That's when we showed her the box. She opened it. She didn't let on to us that it was the pin that was missing.

My daddy stared at it and said, "Dog, ya'll done been to that graveyard!" That was all he'd say 'cause he always said Mama's side was crazy. Daddy didn't get into our family's attachment to this object.

Nevertheless, it would continue to trouble us for years to come, especially after it was returned to Granny's only son and then mysteriously disappeared again. To this day I still think about that brooch and wonder what really happened to it. It's a shame that such a precious thing could be lost again! What do ya'll think happened to my Granny's brooch?

For a wonderful description of the African tradition of grave decorating, refer to Chapter 9 of <u>African-Americans and the Palmetto State</u>, a large, green, paperback volume to be found in all South Carolina middle school media centers and eighth grade social studies classes. It is advisable to use discretion and sensitivity in making assignments about graves, graveyards, burial practices, etc. Some students may be a part of a tradition which considers these topics taboo. Alternative assignments may be given to students who find these subjects objectionable.

The Port Royal Experiment

When Confederate defenders and planters abandoned the Port Royal area during the Civil War they left approximately 10,000 slaves. These ex-slaves (or freedmen) soon became part of an **abolitionist** effort that came to be known as the Port Royal Experiment, an experiment in educating ex-slaves so that they could be self-sufficient. Missionaries, dubbed "Gideon's Band," arrived to establish several schools and "to raise up the slaves of the Sea Islands."

A major issue that arose during the early days of the Port Royal Experiment was the struggle of the freedmen to obtain their own land. The Federal government decided to sell the abandoned land on the Sea Islands for nonpayment of a special federal tax passed in 1861. Some of the freedmen were able to purchase some small tracts of this land, but most of the land offered was purchased in large tracts by Northern whites. In addition, General Sherman issued Field Order 15 in January, 1865, which set aside all the Sea Islands from Charleston to Port Royal, including all land within a distance of 30 miles from the coast, for the freedmen.

Later, during Reconstruction, President Andrew Johnson ordered all lands not sold directly by the Federal Tax Commission to be returned to their prewar owners. The only postwar land claims upheld were those purchased as a result of the tax sales on St. Helena and other islands in the Port Royal area. The United States Supreme Court later upheld the legality of these sales. In the end, the Port Royal Experiment was considered a failure because many of the freedmen were left without land and few had the means to be economically self-sufficient, despite being better educated.

The Penn School and Penn Center Resource Site

An enduring feature of the Port Royal Experiment is the Penn Center, located five miles from Beaufort on St. Helena Island. This island was captured at the beginning of the Civil War by Northern troops resulting in the freeing of 10,000 slaves who had worked on the local plantations. A year later, Laura Towne and Ellen Murry, northern missionaries, arrived on St. Helena Island from Philadelphia, supported by the Pennsylvania Freedman's Relief Association. Together they established the Penn School, taking its name from their support organization. Shortly afterwards, Charlotte Forten, the first black teacher, arrived from Massachusetts. On donated land, a prefabricated building from Philadelphia was erected as their first school house. These three ladies worked diligently the rest of their lives teaching the local families basic skills in reading and writing.

About the turn of the century, the emphasis of the Penn School shifted toward a more industrial education, and the name was changed to the Penn Normal Industrial

and Agricultural School. The school continued to be a private institution until 1948, when the Beaufort County School District extended public education to this remote island. In 1953, when it was no longer part of the county school system, the Penn Center, as it now is called, shifted its focus to community service.

During the 1960's, the Penn Center facilities were used by civil rights workers as a training center. Dr. Martin Luther King, Jr. and his Southern Christian Leadership Conference staff, including Andrew Young, Ralph Abernathy, John Lewis, and Jesse Jackson, held retreats at Penn Center while planning their civil rights strategies. Many conferences continue to take place on the Penn School Campus, which, in 1974, was designated a National Historic Landmark District.

The scope of the Penn Center now includes, day care services, establishing and maintaining a rural water system, organizing a cooperative marketing system, helping land owners to understand their rights, and advocating better health care practices. Today, Penn Center serves as a cultural and environmental center for preserving Sea Island history and establishing sound conservation practices.   The Penn Center's Mission Statement declares its goal "to preserve the Sea Islands' history, culture, and environment through serving as a local, national, and international resource center, and by acting as a catalyst for the development of programs for self-sufficiency."

Activity 9C-1: The Wildlife District

Materials		
6	STATE BASE MAP #1, SHADED RELIEF	1 : 500,000
6	STATE BASE MAP #2, WITH HIGHWAYS	1 : 500,000
6	LAND USE/LAND COVER MAP	1 : 500,000
6	GENERAL SOIL MAP	1 : 594,000
6	GEOLOGIC AND MINERAL RESOURCE MAP	1: 1,000,000
6	COASTAL SATELLITE IMAGE	1 : 332,640
6	ACE BASIN TOPOGRAPHIC MAP	1 : 100,000
6	Transparent Grid Overlays	
6	Wipe-off Pens	

PERFORMANCE TASKS
(Icon Key) Overview = ✈ Science = ✿ Math = 🖳 History = 📖 Language Arts = ✍

1. **Locate the study site.** ✈ ✿
   Locate the ACE Basin Study Site on the <u>STATE BASE MAP #2, WITH HIGHWAYS</u>, on the <u>LAND USE/LAND COVER MAP</u>, on the <u>GEOLOGIC MAP AND MINERAL RESOURCE MAP</u>, and on the <u>GENERAL SOIL MAP</u> by drawing a small box around the correct site on each map using a wipe-off pen. Briefly summarize the one or two most important land uses at this site, the age (Geologic Period), the type of rock, and the predominant soil type at the site. Use the scale bar on the base map to estimate the straight-line distance between this study site and your school. In which local river drainage basin (watershed) is this site located? Through which of the major river systems, Savannah, Santee, Pee Dee, or Coastal Plain, does this site drain?

2. **Describe river systems draining through ACE Basin.** ✈ ✿
   On the <u>ACE BASIN TOPOGRAPHIC MAP</u> identify St Helena Sound and Port Royal Sound. Use the <u>STATE BASE MAP # 1, SHADED RELIEF</u>, to compare the two sounds and trace the Coastal Zone rivers flowing through this region. St Helena Sound serves as the mouth of the ACE Basin (which is an acronym for Ashepoo, Combahee, and Edisto rivers). Port Royal Sound is the mouth for the Beaufort, Coosawatchie, and Colleton rivers. Using the wide point wipe-off pen, outline the watershed area for each of these river basins. Use the transparent grid overlay to compare the relative size of watershed areas. Which river has the largest watershed area? Examine the drainage patterns on the map to fill in the information requested on the chart. Notice how the extensive floodplain areas, shown on the satellite image, affect the placement of highways. Towns and cities appear blue on infrared satellite images. Identify the counties, towns, and cities drained by these rivers. Are there many towns located along any of these rivers? How do you account for this fact?

ST. HELENA SOUND		
NAME OF RIVER	**COUNTIES DRAINED**	**TOWNS ON RIVER**

PORT ROYAL SOUND		
NAME OF RIVER	**COUNTIES DRAINED**	**TOWNS ON RIVER**

3. **Analyze changes through time.** ✈
   First, use a wipe-off pen to outline the boundary of the ACE BASIN TOPOGRAPHIC MAP on the COASTAL SATELLITE IMAGE and the STATE BASE MAP #2, WITH HIGHWAYS. Then compare the study region on the coastal satellite image with the base map to discover any features that appear on one and not the other. Use the wipe-off pen to mark any features that don't appear on both. Check the dates of both the map and the satellite image. Which one shows newer features? List any new features you find. Why do you think these changes have occurred? How will these changes affect the environment and the scenic features of the ACE Basin area?

4. **Analyze the newspaper article.** ✎
   Read the newspaper article found in the Brief Site description for Study Site 9C, "Uncovering a Piece of History: Archeologists Excavate 16th Century Spanish Settlement Colony Founded as Spanish Florida Capital." Explain how this story relates to the Coastal Zone Landform Region. On the ACE BASIN TOPOGRAPHIC MAP, locate the places where the events mentioned in the story might have happened. Explain why the publisher thought this story might be of interest to newspaper readers. Using the same references and location as your setting, write another newspaper article related to the same situation, but date it far enough in either the future or the past so that you will have some changes to report. Choose an appropriate title (headline) and draw an appropriate picture to illustrate your main point.

5. **Develop criteria for picking Spanish landing site.** 📖 ✎
   You are part of a group of Spanish officials in the mid 1500's who have been given the task of selecting a site for a settlement in the Santa Elena (Beaufort) region. Develop appropriate criteria you would use for selecting a site. Use the ACE BASIN TOPOGRAPHIC MAP to find and mark, with a wipe-off pen, a suitable location that best meets your criteria. Prepare a statement explaining and defending your choice. Present your criteria and site selection process to the class.

6. **Locate position of two forts protecting Port Royal.** 📖 ☼
   On the ACE BASIN TOPOGRAPHIC MAP, identify and mark the approximate location of the two earthen forts that protected Port Royal Sound before the Civil War. One was Fort Walker, which was constructed on Hilton Head Island, near the present site of Hilton Head Airport. The other earthen fort was called Fort Beauregard and was constructed on the end of Bay Point Island. Use the scale bar on the map to determine the approximate distance between these forts. Geography played a major role in the Civil War as both sides planned battle strategies for defending their own posts and attacking the enemy forces. In your group, discuss how geography might

have presented possible defensive problems for the Confederate forces and how geography might have influenced the Union invasion plans for Port Royal Sound.

On the same map, locate St. Helena Island and the community of Frogmore, where the Penn Center is located. Describe the terrain of this island. How would you get to the Penn Center (Frogmore) from your school? Is it on a barrier or remnant island? What is its height above sea level? Find as many of these features as you can on the <u>COASTAL SATELLITE IMAGE</u>. Can you find Penn center on the image? Why or why not?

7. **Identify where long staple black seed cotton could grow.** ✿ ▣
   Use the <u>ACE BASIN TOPOGRAPHIC MAP</u> to identify possible areas where long staple black seed cotton could be planted in the Beaufort area. Refer to the section titled "Sea Island Cotton" in the Brief Site Description for Study Site 9C. What landform characteristics were necessary for this particular type of cotton to have bountiful harvests? Outline possible cotton growing areas and use the transparent grid overlay to estimate the total possible cotton growing area in square miles. Estimate the percentage of the map area which is suitable for long staple black seed cotton production.

8. **Write follow-up to "The Precious Brooch."** ✍
   Write a follow up story to "The Precious Brooch" explaining the second time it disappeared. Locate a cemetery on the <u>ACE BASIN TOPOGRAPHIC MAP</u> where you think the events of this story could have taken place. Justify your selection. Make sure your follow-up story uses the same cemetery. Make a list of the objects you would like placed on your own grave and share the list with your group. Tell about any prized possessions, celebrations or remembrances of ancestors that are traditions in your family.

9. **Tell story about a Gullah tradition and relate to historical context.** 📖 ✍
   Read through the background information section "Gullah Beliefs and Folklore"; select one of the listed Gullah beliefs/practices and develop a short story based on that tradition. Use several landscape references in your tale, being sure to be consistent with landform data and historical context. Conclude your tale with one of the following Gullah proverbs. Have someone from your group read your story to the class. Select the best stories to be printed as an anthology and published in your school newspaper.

Group I	**A ounce of mough (mouth) shut, worth pound explainin'.**
Group II	**Empty sack can't sand upright alone.**
Group III	**Heart don't mean every thing mough say.**
Group IV	**Sad we got to burn fore we learn.**
Group V	**Ompossible to get straight wood from crooker (crooked) timber.**
Group VI	**Most (almost) hook fish don't help dry hominy.**

10. **Explain contour interval anomalies on map.** ✿
    Examine the ACE BASIN TOPOGRAPHIC MAP carefully and identify several obvious differences between the top half and bottom half of the map (note from the legend that the Ace Basin map is really a composite of two different USGS maps). Look specifically at the contour lines where the two maps join, on Port Royal Island just north of the Naval Reservation, Marine Corps Air Station (western edge of the map). What is the contour interval for the upper half of the map? What is the contour interval for the lower half of the map? Why do you think the mapmakers used different contour intervals in this area?

ENRICHMENT

1. **Research current wetlands legislation.** ✿
    Wetlands include the state's marshes, swamps, bogs, and Carolina Bays. Wetlands legislation has been a prime issue for groups desiring to protect these fragile areas from development, agriculture, and forestry. Wetlands provide flood control, ground water recharge, wildlife shelter, recreation opportunities and a breeding ground for a diversity of organisms. Research recently passed legislation and monitor the progress of pending wetlands legislation.

2. **Research wildlife habitat and seafood industry.** ✈ ✿
    Research the ACE Basin's role in wildlife habitat, the seafood industry, and recreation in the Coastal Zone Region of South Carolina.

3. **Research wood duck habitat.** ✿✍
    The wood duck is a colorful native bird inhabiting the wooded swamps and rivers of South Carolina. The type of habitat required for wood ducks is decreasing due to logging activities, creation of open water reservoirs, and conversion of forested wetlands to agriculture. Research the habitat requirements for wood ducks, including food, nesting habits, and protection from predators. Make a list of recommendations to protect their habitat. Have these recommendations printed in your school or local newspaper. Note that Ducks Unlimited, South Carolina Water Fowl Association, and the South Carolina Department of Natural Resources all have programs protecting and enhancing native wood duck populations. In many cases, you can request a speaker to come to your school to give a program.

4. **Research origin of Gullah language and culture, relate to own family.** 📖 ✍
    Research the origin of the Gullah language and culture in South Carolina. Illustrate on a posterboard various Gullah cultural contributions such as crafts, language, folklore, and tales. Report your findings to the class in an oral report.

    Research Charles Joyner's book, Down by the Riverside: A South Carolina Slave Community, to find out how tales and superstitions of the Low Country played a part in the beliefs and practices of the families who lived there.

    Have students share any favorite proverbs used or quoted by their parents or grandparents. Relate a family story to its historical context. Do some independent research to check the facts of the story as they have been told to you. Share the story using the original voice or voices in which the story has been told to you and then again in your own voice. Try to highlight any differences between and among the different versions of your story.