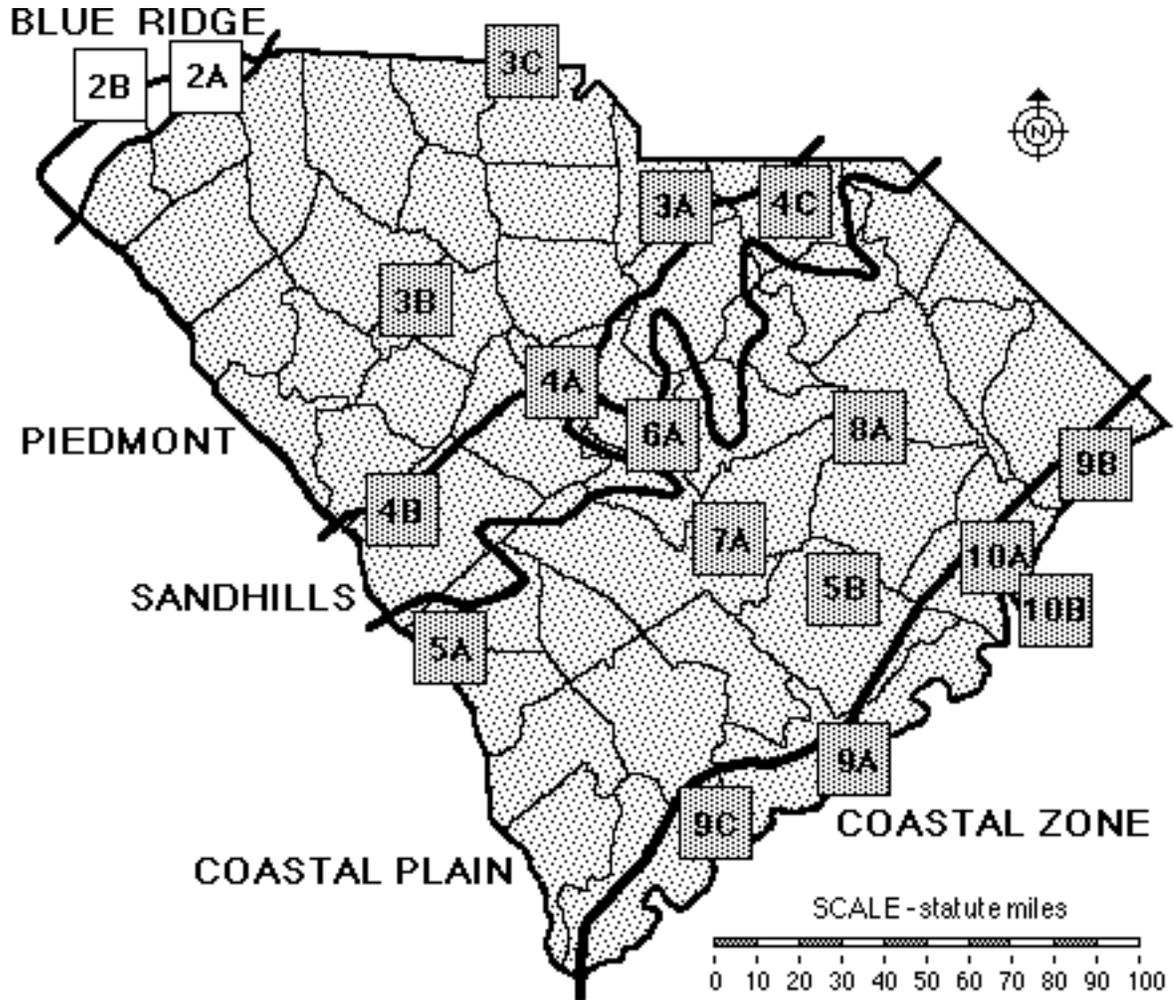


SECTION 2

BLUE RIDGE REGION



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2B	Lake Jocassee Region (Energy Production)	6A	Congaree Swamp (Pristine Forest)
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(ICONS) Overv = ➔ Sci = ⚙ Math = 📖 Hist = 📖 Lang

Arts = ✍

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- Materials

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mountain coves ⚙

p. 2-18 . . . . . 2. research mammal habitat in mountainous  
areas ⚙

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(ICONS) Overv = ➔ Sci = ⚙ Math = 📖 Hist = 📖 Lang

Arts = ✍

- Newspaper Article - "Teen Found at Table Rock; Family  
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- Rationale

- Brief Site Description

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p. 2A-2 . . . . . - Table Rock State Park Constructed by CCC

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- Materials

- Performance Tasks

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- p. 2A-5 . . . . .10. calculate slope of Table Rock Mountain ⚙️📄
- p. 2A-5 . . . . .11. construct mathematical models of Table Rock slopes
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- Performance Tasks

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- p. 2A-8 . . . . . 2. correlate land use to topography ⚙️
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- p. 2A-9 . . . . . 5. explain location of Greenville's water supply ⚙️
- p. 2A-9 . . . . . 6. write story about Pumpkintown history 📖✍️
- p. 2A-9 . . . . . 7. create a Venn diagram contrasting mountain land use ⚙️
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- p. 2A-10 . . . . . 9. calculate average field size 📖⚙️
- p. 2A-10 . . . . . 10. compare shapes and patterns of road intersections 📖

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- p. 2A-11 . . . . . 2. interview a forester →⚙️
- p. 2A-11 . . . . . 3. interview a former CCC member →⚙️

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(ICONS) Overv = → Sci = ⚙️ Math = 📖 Hist = 📖 Lang  
 Arts = ✍️

- Newspaper Article - "Trout Stream Affected by Bad Creek Development"

- Rationale

- Brief Site Description

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- Performance Tasks

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- p. 2B-12 . . . . . 7. write short story about travel down stream ✍
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- Enrichment

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- p. 2B-20 . . . . . 2. research advantages and disadvantages of coal-fired ener
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## SECTION 2

### BLUE RIDGE REGION

#### POWER THINKING ACTIVITY -"Mayday! Mayday! Mayday!"

You are an aircraft controller in the Greenville-Spartanburg Airport control tower, and you receive the following radio call. "MAYDAY! MAYDAY! MAYDAY! This is SC 320 (South Carolina Air National Guard Plane 320); I have just experienced engine failure and am losing altitude....just crossed over the North Carolina-South Carolina boundary line; my position is 35° 06' latitude and 82° 40' longitude and headed south....to my left barely passed over waterfalls, cliff, and mountain ridge oriented West Southwest to East Northeast...flying down a small creek valley...losing altitude....now 2,000 MSL (mean sea level)....now flying due South...see large lake, turning East. still losing altitude, now 1800 MSL, following river....looking for place to land."

Trace the path taken by the pilot on the Table Rock Topographic Map with a wipe-off pen. Locate the North Carolina-South Carolina boundary line. Name the waterfalls, cliff, and mountain ridge seen by the pilot. Identify the large lake mentioned by the pilot. Compare land terrain and features on the TABLE ROCK TOPOGRAPHIC MAP with the TABLE ROCK LITHOGRAPH. Locate and determine the latitude and longitude coordinate points for the most promising area in which to conduct the search. How does the terrain affect the probability of a safe landing?

#### PERFORMANCE OBJECTIVES

1. Contrast landform features and rock types of the Blue Ridge with other regions of the state.
2. Illustrate Blue Ridge Region landscape features by using graphs to make topographic profiles and map information to calculate slopes.
3. Analyze and retell legends and ballads taken from Native American and early pioneer folklore.
4. Correlate mountain topography with historical land use.
5. Recognize the importance of mountain coves as a unique habitat for rare plant species.
6. Describe processes used for generating electricity in mountainous regions and explain why Blue Ridge topography is favorable for these processes.
7. Evaluate multiple uses of the Blue Ridge landscape and make recommendations for a balance of tourism, recreation, logging, commercial exploitation, and preservation of wilderness areas.
8. Compare mountain landscape features on infrared aerial lithographs with symbols and patterns on topographic maps.
9. Differentiate among types of vegetative cover on land and degree of sediment load of bodies of water on infrared lithographs.

10. Calculate areas of geometric regions on maps and lithographs using scale conversion factors.

## BACKGROUND INFORMATION

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### Description of Landforms, Drainage Patterns, and Geological Processes

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#### Characteristic Landforms of the Blue Ridge

The **Blue Ridge** Mountain Region is located in the northwestern corner of South Carolina and covers approximately two percent of the area of the state. South Carolina State Hwy. 11, also known as the Cherokee Foothills Scenic Highway, serves as a fairly accurate and easily recognizable eastern boundary for this region, which occupies the northern portions of Oconee, Pickens, and Greenville counties but also extends north and west well beyond the borders of the state. This region is the only truly mountainous region in South Carolina. Although other regions are hilly in places, none show the drastic elevation changes and high **relief** (difference in elevation between high hills and adjacent low valleys) that characterize the Blue Ridge. Several mountain peaks rise to more than 3,000 feet above sea level, and many mountains have very steep slopes and high cliffs. Local topographic relief can range from a few hundred feet to more than a thousand feet from valley floor to ridge crest. The best scenic lookouts are often located at the tops of cliffs because most other areas, including the mountain tops, are covered with trees and other vegetation.

Mountain streams or creeks are usually small and rocky with clear, cold water and many rapids and waterfalls. They generally flow in narrow valleys which have developed a **rectangular drainage pattern** due to the underlying geologic structure. Occasionally these streams will disappear below piles of rock debris fallen from the adjacent mountainside, and reappear as springs at the downslope side. Landslides and other mass movement of rock and soil are common occurrences in the mountains. The amount of water flowing in these creeks varies greatly, depending on the amount of precipitation which has fallen recently in the local area. Occasionally small **floodplain** areas, called hollows or coves, occur along flatter sections of streams. Such areas contain rich bottomland soil for farming and provide a unique **habitat** for wildlife. No natural lakes occur in this region although beavers occasionally dam up small streams to form ponds and engineers have constructed several **reservoirs** in the area.

#### Geographic Features of Special Interest

The highest point in South Carolina, Sassafras Mountain, lies along the North Carolina - South Carolina state boundary line in Pickens County, and is 3,554 feet above sea level. A paved road leads to the top. Caesar's Head Mountain can also be reached by road. Several other high mountains, such as Table Rock Mountain, Pinnacle Mountain, and Whetstone Mountain, are accessible by hiking trail. Stumphouse Tunnel, a partially completed Civil War era railroad tunnel, is accessible from Hwy. 28 north of Walhalla. Several state and county parks in the area offer hiking, swimming, fishing, boating, and scenic views.

Whitewater rafting is a popular activity along the Chattooga River, and many spectacular waterfalls in the area attract both hikers and photographers. The most famous waterfalls in the Blue Ridge are Raven Cliff Falls, near Caesar's Head; Isaqueena Falls, near Stumphouse Tunnel; and Whitewater Falls, north of Lake Jocassee. Upper Whitewater Falls is located just over the state line in North Carolina, but the Lower Falls are in South Carolina. Collectively, Whitewater Falls is the second highest waterfall in the eastern United States. The 7,500 acre Lake Jocassee and the Bad Creek Reservoir are artificial lakes built by Duke Power Company for hydroelectric power generation. Table Rock Reservoir and Poinsett Reservoir were built primarily as water supplies for the nearby city of Greenville. A few of the most popular trout rivers are the Chattooga, the Whitewater, the Eastatoe, and the Saluda. Lake Jocassee likewise is home to a large native trout population, and is also a popular water recreational area for fishing, boating, swimming, and scuba diving.

### **Blue Ridge Rock Types**

Blue Ridge rocks are composed of various types of **igneous** and **metamorphic** rock, especially granite-gneiss and amphibolite, which is a very dark banded gneiss with high concentrations of the mineral amphibole. Many of the mountains of the Blue Ridge Region started out deep underground as large **igneous intrusions** of granite called **batholiths**. During several episodes of **tectonic** activity, due to continental collisions, these batholiths were uplifted and metamorphosed. During this **metamorphism**, minerals were totally recrystallized by high temperatures and pressures to create a texture very different from that found in the original rock.

As erosion removed the overlying rock and soil, the granite-gneiss rose closer to the surface and began to expand and crack because of the lower confining pressures near the surface of the earth. Eventually, the resistant granite-gneiss rose so high that all surrounding rock was eroded away and the mountains as we know them today took form. Because of the cracking and expansion, sections of the rock often slide off the steep slope to crash to the ground at the base of the exposed cliffs. It is this frequent sliding of rock, along with the dense crystalline nature of the rock, which prevents trees and other vegetation from populating the exposed rock slopes of Table Rock Mountain as well as several other similar mountains in the Blue Ridge and upper **Piedmont** regions.

### **Blue Ridge -- Piedmont Boundary**

The boundary between the Piedmont and Blue Ridge **landform** regions is marked by a sharp **escarpment** characterized by sudden changes in elevation and slope. The higher elevation Blue Ridge shows considerable relief, as indicated by huge cliffs, large waterfalls, and deeply eroded valleys. The contrast with the relatively flat Piedmont has long baffled geologists because the rock types of the two regions are fairly similar. Some have tried to relate this difference to a major vertical **fault**, but no direct evidence of uplift has ever been found. Another theory proposes that more than 70 million years ago the Atlantic Ocean extended westward to this area, causing extensive shoreline erosion, which affected the Piedmont but not the Blue Ridge. Again, no direct evidence of such an event has ever been found.

A final attempt to explain the sharp transition in landscape features utilizes the difference in stream power between streams flowing to the north from the Blue Ridge and streams flowing to the south. Streams flowing northward from the Eastern Continental Divide have a much lower gradient (slope) and therefore erode the landscape much more slowly. The lower gradient is a result of the fact that these northward flowing rivers have to travel over 1,500 miles to reach sea level in the Gulf of Mexico. The southward flowing streams, by contrast, only have to travel about 300 miles to the Atlantic Ocean and therefore drop in elevation more rapidly producing higher gradients and higher energies which erode the landscape more quickly. Such stream behavior could allow the Blue Ridge escarpment to be maintained through time even while the location of the divide itself migrated slowly northwestward.

### **Fracturing, Folding, and Uplift of the Blue Ridge**

In addition to being altered by metamorphism, the rock in the Blue Ridge Region has been severely fractured and folded by tectonic activity. The fractures in particular create zones of weakness and provide preferred pathways for stream erosion and chemical **weathering**. Sudden bends in the generally rectangular drainage pattern, as seen on maps and photographs, mark the intersections of such fracture lines. The cliffs of Table Rock itself are roughly parallel to existing fracture lines. **Folds** in the rock are not noticeable on maps or aerial photographs, but are easily seen while walking along the many trails within the park.

In general, the higher elevated section of Table Rock Mountain is mostly granite-gneiss and is very resistant to erosion. The lower elevations are generally underlain by the less resistant amphibolite. The relative positioning of these two main rock types, resistant and non-resistant, determines the occurrence of waterfalls, rapids, and water slides within the area. Vegetation grows more readily on the easily decomposed amphibolite areas.

**Native American Folklore**

The Cherokee Nation developed many legends and stories to explain how the world came to be the way it is and how each animal and plant had its own special place in the natural order of things. Legends were usually told or sung by the elders of the community to the children to help teach the history and values of their people. Before written language became widespread, such oral storytelling was the only way to pass along the beliefs and traditions of the community to future generations. The "Legend of Little Deer" is one example of a legend designed to teach young hunters to respect the land and its animal inhabitants and to hunt only when necessary.

**Legend of Little Deer**

Adapted from Richard Mancini, Indians of the Southeast

Long ago the Cherokee people lived peacefully with all the animals. They hunted only when they needed food or skins for clothing. Later, the hunters learned to make bows and arrows, and hunting was much easier. They hunted all the time, even when they did not need food or clothes. The deer held a council to find a way to make the people stop killing so many of their family. Little Deer was the leader. He spoke wisely and told the other deer that the people must hunt only to live and not kill for sport. They must respect the deer and hunt only when they are in need. Little Deer told the Cherokee people that they must prepare themselves for the hunt. They must ask permission before killing one of the deer family. After they kill a deer, they must respect its spirit and ask to be pardoned--if they do not, then they will be crippled. To this very day when a Cherokee hunter kills a deer, he must go to the deer and ask for pardon. If he does not, then Little Deer returns to punish him. For this reason, the Cherokee respect and thank the deer and all other animals they hunt.

**Traditional Scottish Ballads of the Blue Ridge**

The Blue Ridge Mountain region contains a large number of people who are of Scotch-Irish descent. The Scots and the Irish both have long histories of strong oral tradition shown in their collection of narrative songs and ballads. Any event of general interest such as a joke, a love affair, or a murder, might find its way into a ballad. The form of such ballads is usually

expressed in strongly rhymed, four-syllable measures of verse, not prose. Many of these old ballads were brought to America from Europe by early settlers. In most cases, the old dialects and wordings were kept, even though the people spoke modern English in their day-to-day lives. The sharing of such narrative songs was a way to remember and maintain the old culture in a new land with new ways.

**Bonny Barbara Allan**

--Anonymous--

It was in and about the Martinmas time, When the green  
leaves were afalling,  
That Sir John Graeme, in the West Country, Fell in love with  
Barbara Allan.

He sent his men down through the town, To the place where  
she was dwelling;

``O haste and come to my master dear, Gin ye be Barbara  
Allan.''

O hooly, hooly rose she up, To the place where he was lying,  
And when she drew the curtain by: ``Young man, I think  
you're dying.''

``O it's I'm sick, and very, very sick, And 'tis a' for  
Barbara Allan.''

``O the better for me ye's never be, Tho your heart's blood  
were aspilling.''

``O dinna ye mind, young man,''' said she, ``When ye was in  
the tavern adrinking,  
That ye made the health gae round and round, And slighted  
Barbara Allan?''

He turned his face unto the wall, And death was with him  
dealing:

``Adieu, adieu, my dear friends all, And be kind to Barbara  
Allan.''

And slowly, slowly raise she up, And slowly, slowly left  
him,

And sighing said she could not stay, Since death of life had  
reft him.

She had not gane a mile but twa, When she heard the dead-  
bell ringing,

And every jow that dead-bell geid, It cried, " Woe to  
Barbara Allan!''

``O mother, mother, make my bed! O make it saft and narrow!  
Since my love died for me today, I'll die for him  
tomorrow.''

**Ellicott's Rock**

Within Sumter National Forest, along the banks of the  
Chattooga River, is a special marker known as Ellicott's Rock.

The marker identifies the spot where three states, South Carolina, North Carolina, and Georgia, meet. Chiseled on the rock is a three line notation. The inscription reads "Lat 35°/ AD 1813/ NC & SC." The marker was named for Andrew Ellicott who was a geographer and astronomer originally commissioned by the state of Georgia to determine its boundary with North Carolina. In his journal, Ellicott noted that he stayed at the house of Captain John Lynch, who resided in what today is Oconee County. According to Robert Mills in his Statistics this was the same Lynch who, as a patriot leader during the Revolutionary War, had a reputation for dealing harshly with **Tories** and was responsible for the origination of the phrase "Lynch law."

What many people do not realize is that there is a second, not so famous, Ellicott's Rock located on the North Carolina - South Carolina boundary line near Sassafras Mountain in Pickens County. The surveyor established these two rock markers as the endpoints of a straight line which today forms the northern boundary of both Oconee and Pickens counties in South Carolina. Most straight line boundaries of other states or counties have been determined by surveyors in much the same way.

## **Mountains as Recreational Areas**

The Blue Ridge Region has developed into a picturesque tourist attraction primarily because of the dramatic slopes and high relief of the area. This effect is mostly due to the different resistance of the major rock layers and the widespread erosion of powerful streams, especially during storm events. These elevation differences are sufficient to produce spectacular scenery and also create unique microclimates and microenvironments found nowhere else in South Carolina. Not far from Table Rock State Park are attractions such as Whitewater Falls, whitewater rafting expeditions on the Chattooga River, the Walhalla Fish Hatchery, Caesar's Head Mountain, and several Heritage Preserves such as the Ashmore Tract and Watson Bog.

Although a small area, the Blue Ridge Region, as a result of its inspiring scenery, natural resources, largely undeveloped land, and relatively mild summer climate, attracts great numbers of tourists, both from other parts of the state and from elsewhere in the nation. The high, rocky, forested mountains and ridges give a character to the area unlike any found elsewhere in the state, and numerous hiking trails allow visitors to experience this area in a thorough and personal way. For those with time and stamina enough for the trip, a hike along the Foothills Trail, which extends approximately 90 miles from Caesars Head State Park in Greenville County to Oconee State Park in Oconee County (passing through much of the Blue Ridge Region in South Carolina) is a wonderful way to appreciate the character of this area.

Shorter hikes on this trail or walks on any of the numerous other trails in this region, such as the Bartram Trail (named after the 18th Century explorer-botanist William Bartram, who traveled throughout the Southeast) also allow glimpses of this beautiful, rugged terrain. For those who desire a view to reward their efforts, a day hike up Pinnacle or Table Rock Mountain in Table Rock State Park will provide opportunities to gaze at a distant horizon. From these vantage points, the Piedmont can be seen spreading out below like a green blanket, clearly showing the mostly level surface.

## **Tourist Attractions**

The Blue Ridge Region has developed into a picturesque tourist attraction. In addition to hiking, opportunities for recreation abound in the Blue Ridge, an area rich with possibilities. Mountain bikers and horseback riders wend their way through the forested mountains. Motorists find varied and rewarding drives on the numerous and well-maintained roads of the region, with each new season changing the drives--winter views, spring flowers, summer greenery, and fall colors, perhaps the most powerful

attraction. Those drivers who seek challenge and adventure trek through public lands on numerous four-wheel drive roads designated for this purpose. The exposed rock faces provide adventurers with locations for hang-gliding and rock climbing. Numerous waterfalls attract viewers and photographers to their rocky cascades. Trout in the streams and cold mountain reservoirs bring anglers to the region. Trophy bucks hide from agile hunters. Mountain crafts and collectibles await buyers in many roadside shops. Homestyle meals are served in friendly restaurants tucked into the hills. Festivals such as Walhalla's Oktoberfest and Westminster's Apple Festival celebrate the history and commerce of their communities.

The list of attractions continues. Numerous summer camps introduce young people to the joys of the area, and the many communities of vacation homes testify that these joys are not forgotten as people grow older. State parks and private campgrounds provide visitors with quiet and scenic places to spend a night or more. The peaceful environment and slower pace of the region have attracted people for generations, as the names Travelers Rest and Mountain Rest, two towns in the region, show. Legend has it that Travelers Rest got its name because it was a convenient and pleasant stopping-off point for those traveling north from Greenville into the mountains. Farther to the west, in the lower part of Table Rock cove, was the junction point of the State Road, which ran from Charleston into North Carolina, and the Keowee Trail (or Cherokee Path) to Virginia. This junction point, called Pumpkintown because of the large and plentiful pumpkins that the early settlers grew, was popular because even in the days of the colonists the Table Rock area was a recreational haven. In 1840, Table Rock Hotel was built. It was a two-story building constructed from lumber sawed on a Pumpkintown farm. On a flat area between Table Rock and Stool Mountain a saddle rack was built to serve the travelers who came by horse. Table Rock as a resort site experienced periods of plenty followed by years of lean. During the 1930's, under Franklin D. Roosevelt's administration, the area surrounding Table Rock was purchased by the state of South Carolina for a park. The Civilian Conservation Corps (CCC), organized as part of President Roosevelt's New Deal, provided work for young men during the depression. The CCC workers landscaped the area and built a fresh water lake on the grounds.

### **Climate Influences Land Use**

The Blue Ridge Region has a humid temperate climate with a 200 day growing season. The region receives some of the highest rainfall amounts in the state with average annual precipitation ranging from 60 to 76 inches. In great part, this high precipitation rate is due to elevation, because as moist air masses from the ocean pass northward over the mountains, the air rises and cools, moisture condenses, and clouds form producing rain or occasionally a winter snow. The higher elevations also feature cooler summer temperatures and lower humidities which make the area attractive to vacationers. It is not unusual for summertime mountain top temperatures to be at least ten degrees cooler than adjacent lower elevation Piedmont temperatures.

### **Trout Streams**

Trout can be found in streams throughout the Blue Ridge Region, from clear, steep mountain creeks to large, slow-moving streams in the valley bottoms. Local anglers, and many who are not local, are drawn here over and over again to walk the banks or wade these waters in hopes of catching some of these reclusive and delicious fish. Sometimes an angler may spend the entire day alone or with only a friend or two, endlessly casting small, beautiful, hand-tied flies into the shady nooks and rocky pools of a seldom-visited stream. Sometimes a path is beaten all along the water's edge, and people are lined up almost as thick as shoppers waiting to check out at the grocery store. But in either case, and in all of the cases in between, anglers enjoy that surprising combination--like sweet and sour--of relaxation and excitement that comes with fishing. And the trout keep bringing the anglers back.

There are three kinds of trout which inhabit the waters of the Blue Ridge: the Brook trout, the Rainbow, and the Brown. Of these three, only the Brook trout, or Brookie, is a native species. Before the sport anglers of today, before European settlers, before Native Americans, long before anglers of any sort--other than bear, osprey, and the like--Brookies made the Blue Ridge their home. Technically, Brookies are not a trout at all, but are a type of char, an arctic fish. Although the glaciers of the last Ice Age stopped well north of South Carolina, the climate was cooler then; it is surmised that Brookies moved south in the ocean and up the rivers of this state. When the Ice Age ended and the climate warmed, the Brookies retreated to the cool, shaded mountain headwaters of these river systems, a move to

be duplicated in the Nineteenth Century by wealthy South Carolinians who also hoped to leave the summer heat behind as they climbed the escarpment into the Blue Ridge Mountains.

However, by the 20th century increasing numbers of anglers were chasing decreasing numbers of trout. Brookies, also called speckled trout, were disappearing from many streams. Once plentiful enough to be a dependable trail food for early travelers and briefly a staple of settlers and the occupants of upstate forts, the Brookie declined throughout the 19th century because of over-fishing and habitat degradation. Land cleared for agriculture and in timbering operations eroded, sending heavy loads of silt into streams. Also, once the shade-providing trees along the banks were cut, water temperatures in many streams rose too high for Brookies. To fill the vacancy, trout more tolerant of the changed conditions were introduced.

### **Fish Hatcheries and Stream Stocking**

There are numerous tales of zealous anglers (and thoughtful businessmen) bringing trout from elsewhere to stock the depleted streams of the Blue Ridge Region. One recounts that members of the Nicholson family, who ran a lodge on the Whitewater River, went into Tennessee to bring fertilized trout eggs back from the Erwin fish hatchery near Johnson City. These Rainbow trout, raised in rearing ponds constructed on small tributaries of the Whitewater River, were released for the eager anglers. Other accounts are harder to believe, such as the tale of a plane loaded with Brown trout destined to be stocked elsewhere which is supposed to have crashed into the Chattooga River, introducing in unplanned and dramatic fashion a new species.

Stocking continues today, with a government fish hatchery on the Chattooga, although some disparage the practice, calling it "Put and Take Fishing," since many of the newly stocked fish are caught almost immediately by anglers alerted to the stocking. But a balance has been reached among the trout. Brown and Rainbow may co-exist, but Browns, which can tolerate warmer and less clear water, generally live lower in the stream system. While Rainbows and Brookies both need clear, cool water, Rainbows are the more aggressive species and usually out-compete the native Brook trout. Therefore, Brookies only do well when separated from Rainbows, often upstream from a fall which the stocked Rainbows cannot pass. However, all three species are susceptible to fishing pressure and continued development that alters their streams. Care must be taken to ensure a happy ending to the story of trout in the Blue Ridge.

## Soils and Farming

Soils in the Blue Ridge Region vary from thin to moderately thick. The thinnest soils often occur on steep sideslopes and exposed ridgetops along which rock outcroppings and **regolith** (loose rock fragments) are also common. Thicker soils occur on more level areas such as lower elevation hilltops and valley bottoms. Mountain soils are primarily composed of an altered rock material called **saprolite**, which has weathered in place for long periods of time. The characteristics of the soil are determined almost exclusively by the characteristics of the minerals present in the original rock. Surface soils are clayey to **loamy** in nature and may be especially well drained on slopes.

In a few cases, such as along river bottoms, transported soils can form from the sediment brought in by rivers, called **alluvium**, or from material falling from the adjacent slopes, called **colluvium**. The agricultural use of mountain soils is generally limited by the steepness of the slope. Suitability for row crops is classified as poor to fair. Only about 13,900 acres, 2.8 percent of the region, is categorized as potential prime farmland. Close to 90 percent of the land is forested. Farming areas that do occur are generally limited, occurring mainly in bottomlands and adjacent slopes associated with the narrow valleys, in mountain coves, or along flat ridgetops. The comparatively small family farms produce mainly corn, hay, and truck crops.

## Unique Habitats and Changes Through Time

Blue Ridge Mountain forests are predominately hardwood, consisting mainly of oaks and hickories. They are surprisingly similar to more northern forests found in New England. Some species, such as hemlock, white pine, beech and sweet birch, became established here during the Ice Ages when the region experienced much colder temperatures. There are also some locations in the region which contain a mix of hardwoods and pines, as well as some isolated stands of shortleaf and Virginia pine. Shrubs, such as the flame azalea, wild azalea, mountain laurel and rhododendron, constitute the typical understory - the last two particularly near streams. Other trees like alder, tulip poplar, cottonwood, and sycamore are also commonly found near streams throughout the region.

The Blue Ridge's diverse forest types and **topography** support one of the state's richest and most abundant assortment of plant and animal communities, including some rare old-growth hemlock-hardwood forests. Within the Blue Ridge Region are located many small but important pockets of land with various unique environmental characteristics. Examples are the Coon Branch Natural Area along the Whitewater River, Eastatoe Gap along the

Eastatoe River, and the Ashmore and Wildcat tracts within the Mountain Bridge Wilderness area. These locations harbor many species of rare and unusual plants and likewise provide specialized habitat for animals. Mountain coves which face south are often protected from storms and enjoy a much milder and more humid climate than the surrounding regions. Bogs and water slides also create unique habitat conditions where rare plants flourish. An example of such a plant is the insect-eating mountain sweet pitcher plant, which is found only in the Carolina mountains. These special areas are fragile and can be destroyed easily by development activities.

The South Carolina Heritage Trust, with the assistance of the South Carolina Nature Conservancy, has purchased several of these sites to protect and preserve them for years to come. For example, 40,000 acres of mountain wilderness habitat is now protected as part of the Mountain Bridge Wilderness, an undertaking started in the 1970's by public and private interests with the vision of preserving a significant portion of the magnificent Blue Ridge escarpment. This wilderness area includes sheer rock faces, mountain coves, whitewater rivers and streams, old growth hardwood forests, waterfalls, and steep gorges. Each of these significant landscapes supports a diversity of plants and animals, including mammals, birds, reptiles, amphibians, insects, and aquatic life. Also, this region supports the largest black bear population within the state.

### **Constructing Reservoirs**

Small, man-made lakes, called reservoirs, have been constructed for many centuries as storage areas of water for irrigation or drinking. Since the early 1900's, even larger reservoirs have been constructed to help produce electric power. Lake Jocassee and Lake Keowee are two examples of this latter type of reservoir. Duke Power Company constructed these lakes to generate hydroelectric power and to be used for cooling when nuclear energy is generated.

When considering the construction of a reservoir, much planning is required. A topographic map is needed to determine what land will be underwater and what areas will become waterfront real estate. Reservoir constructors like Duke Power Company must buy all the land that will be flooded. Waste storage facilities must be cleaned out or sealed to prevent leakage, cemeteries must be removed, and trees and other tall objects must be removed so that they do not become future underwater obstacles. Large reservoirs provide many positive benefits for the surrounding communities. In addition to creating electrical power, the lakes provide water management capability and flood control. Boating,

swimming, camping, and fishing are all recreation benefits that everyone has an opportunity to enjoy.

### **Hydroelectric Power Plants**

The development of hydroelectric power plants was achieved by constructing large dams on major free-flowing rivers which experienced a rapid drop in elevation as they flowed through the local region. Such dams were designed to maximize water storage capabilities and change in elevation, above and below the dam, based on the natural topography of the area. The energy in the falling water provides the power to generate electricity.

Another way to use water to generate electricity during times of great demand is through **pumped-storage** facilities. There are two such facilities in this area, one located between the Bad Creek Reservoir and Lake Jocassee and another between Lake Jocassee and Lake Keowee. These pumped-storage facilities pump water uphill when energy costs are low, or during off-peak hours. At the upper reservoir of Bad Creek, this pumping raises water level as much as 160 feet. When electrical power is in higher demand, the water is released through an 850 foot vertical underground tunnel and four turbines to the lower reservoir of Jocassee. This can create about 1,000 megawatts of power per hour which can supply 700,000 average households with all the electricity they need.

### **Multiple Use of the Blue Ridge Landscape: Concepts and Conflicts**

Much of the Blue Ridge Region remains relatively untouched by modern civilization. Until recently, only Cherokee villages and log cabins of early settlers were found in this region. The greatest threats to this region today are over-development and over-commercialization. For example, power projects have drastically changed the landscape by forming lakes from dammed rivers and streams. These newly formed lakes continue to attract recreational developments and retirement communities that steadily encroach upon wilderness areas, while pumping millions of dollars into the local economy. Although logging has been commercially important to the economy of upper South Carolina for some time, most of the area is still heavily forested. Tourism proponents and logging interests occasionally clash over issues such as clearcutting and the need for extensive systems of logging roads. The values which have made the tourist industry so successful are themselves endangered by that success and will continue to be affected by the activities of people.

The environmental implications of building reservoirs must also be considered before more are planned and constructed.

Serious loss of habitat for many native species, like the Oconee Bell wildflower and the Clemson Salamander, could result. Both species are dependent on shaded areas near streams but are still successful in areas surrounding the lakes. Some argue that new aquatic habitats will be created as lakes and **wetland** areas are formed. A change in the thermal layering of established reservoirs by nuclear stations is a concern, as well as fish kills from reversing turbine direction in pumped-storage facilities. Increased development and expanding human populations surrounding a reservoir may also create the potential for significant pollution increases which could have damaging effects on the aquatic environment.

Currently, several federally maintained campgrounds are located in the Sumter National Forest in Oconee County. This is also the home of the Chattooga River, a National Wild and Scenic River and one of the foremost whitewater rivers in the nation. In addition to the tens of thousands of canoers and kayakers who challenge themselves with the rapids of the Chattooga each year, and who enjoy the remote river gorge, approximately 40,000 people a year descend the river with commercial outfitters. These commercial rafters are treated to an experience of rugged beauty which, according to the supporters of the activity, heightens their appreciation for natural places in general and for the Blue Ridge Region in particular. Opponents of large-scale rafting maintain that 40,000 people a year is too many for the Chattooga. They claim that such visitation degrades the resource which attracted the people in the first place, a condition which, if true, is detrimental both environmentally to the river ecosystem and economically to the Blue Ridge Region, which benefits from tourism dollars.

This worry--that our use of attractive resources may degrade them to the point that they are no longer attractive--is a concern throughout the Blue Ridge Region. How many hikers can a trail carry without being damaged? How many anglers before a stream is fished out? How many vacation homes can be built before vistas are degraded and traffic increased? And how can the quality of life and the traditions of the local population be safeguarded as tourism continues to grow? Sound management plans must be developed for the Blue Ridge Region. In addition to protecting the natural resources of the area, it is necessary to balance the wants and needs of many users. A single region, even one as rich and diverse as the Blue Ridge, cannot be all things to all people.

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**Summary**

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West of the industrial corridor of I-85, which is located in the upper Piedmont of South Carolina, rises the Blue Ridge Region. South Carolina State Hwy. 11, also known as the Cherokee Foothills Scenic Highway, serves as a fairly accurate and easily recognizable eastern boundary for this region, which extends north and west well beyond the borders of South Carolina. The Blue Ridge Region in South Carolina is composed of parts of three upstate counties: Greenville, Pickens, and Oconee. Whereas elevations in the lower parts of these counties range from 500 to 700 feet, in the Blue Ridge Region one is generally above 1500 feet, and often higher. The highest point in South Carolina is Sassafras Mountain, located in Pickens County, with an elevation of 3,554 feet.

This high, rugged corner of South Carolina has long been a land apart. The Cherokee Nation held this region until the 1800's, well after the Revolutionary War. Their lifestyle of small farms, hunting and fishing, and the trade with the people of the lower state was largely continued by the predominately Scotch-Irish settlers who came into the Blue Ridge Region after the Cherokees were gone. Indeed, this lifestyle is echoed even today by the current residents of this part of the state, although the ease of modern transportation and the job opportunities in the Upper Piedmont have turned many of the residents of the Blue Ridge into commuting workers.

Although many residents of the Blue Ridge Region leave that area daily to work in the Piedmont, many residents of the Piedmont (and beyond) visit the Blue Ridge for scenery and recreation. Tourism is an important industry, but so are timber and power production. To balance uses, which possibly have adverse effects on each other, is a difficult task, but it is the task before us.

## PLACES TO VISIT 📞

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Table Rock State Park. Highway 11, Pickens, SC. For information call 864-878-9813 or 864-878-6641.

Walhalla National Fish Hatchery. Highway 28, north of Walhalla. For information call 864-638-2866.

The South Carolina Botanical Garden. Perimeter Rd. Clemson, South Carolina. For information call 864-656-3404.

Caesar's Head State Park. Highway 28, south of Highlands, NC. For information call 864-836-6115 or 864-836-7438.

Ellicott Rock Wilderness/Burrels Ford. SC 28 to SC 107 to Forest Service Road 708 W. For information call 864-638-9568.

Tugaloo Education Center. 351 Teec Drive in Westminster, SC. For information call 864-647-4930.

Wildwater Ltd. Off Hwy. 76 on Academy Road. For information call 864-647-9587.

Chatooga Adventures Unlimited. 14546B Long Creek Hwy., Mount Rest, SC. For information call 864-647-0365.

Chatooga Whitewater Shop. 14239 Long Creek Hwy., Long Creek, SC. For information call 864-647-9083.

Jones Gap State Park. 25 miles northwest of Greenville off US 276 and 11 miles northwest of Marietta, at 303 Jones Gap Road, Marietta, SC. For information call 864-836-3647.

Oconee Station/Oconee State Park. Walhalla, SC. For information call 864-638-2792/5353.

Duke Power World of Energy. Northeast of Seneca, SC. For information call 864-882-5620.

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## STUDY AREA 2: BLUE RIDGE OVERVIEW

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### Activity 2-1: Overview

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**Material:**

6	STATE BASE MAP #1, SHADED RELIEF	1 : 500,000
6	STATE BASE MAP #2, WITH HIGHWAYS	1 : 500,000
6	TABLE ROCK LITHOGRAPH	1 : 18,000
6	TABLE ROCK TOPOGRAPHIC MAP	1 : 24,000
6	Wipe-off Pens	

**PERFORMANCE TASKS**

(Icon Key) Overview = ➔; Science = ⚙; Math = 📐; History = 📖;  
Language Arts = ✍

**1. Compare Blue Ridge terrain with rest of state. ➔**

Use the STATE BASE MAP #1, SHADED RELIEF, to identify the Blue Ridge Landform Region. Mark the Blue Ridge-Piedmont boundary line with a wipe-off pen. Contrast the mountainous terrain with the flatter landforms in the rest of the state. Which rivers are formed in the Blue Ridge Region of South Carolina? Identify the major lakes and dams in this region. Locate the approximate position of Table Rock State Park and Sassafras Mountain.

**2. Locate state boundaries and Ellicott's Rock. ➔**

How are the state boundaries between South Carolina and North Carolina identified on the STATE BASE MAP #2, WITH HIGHWAYS? Between South Carolina and Georgia? Locate the 35° North latitude line and the point where Georgia, South Carolina and North Carolina meet. This is the location of the famous Ellicott's Rock. Is the latitude of that point exactly 35°? What is the longitude value for Ellicott's Rock? What is the name of the river that marks the boundary between South Carolina and Georgia in this area? Now find the location of the other Ellicott's Rock, near Sassafras Mountain at the eastern end of the straight state boundary with North Carolina. Name the county in which each Ellicott's Rock is located. Describe the terrain of the area. Why is a straight line boundary suitable for this region?

**3. Create ballad commemorating Ellicott's Rock. ✍**

Use the story of Ellicott's Rock as the basis for creating a ballad commemorating Ellicott's adventures. Try putting your verses to a familiar tune, and then sing or recite your ballad to the rest of the class.

**4. Re-write " Bonny Barbara Allan" into standard English. ✍**

Read through the ballad "Bonny Barbara Allan" on page 2-6 and select your two favorite stanzas. Re-write these into standard English, as it is taught in your school, and practice telling them aloud to your classmates. How does the use of antiquated words or a dialect affect how others understand your story? Find at least two examples of words or phrases in the ballad, which would lead you to think of Scotland instead of the Blue Ridge Region of South Carolina. Explain your choice. Are those words nouns, verbs, adjectives, or adverbs?

5. **Relate story of modern deer hunt to Native American legend.**



The story "Legend of Little Deer" on page 2-5 was told by the elders of the community to the young before they went on their first hunt. Think of other examples of legends (stories) used to teach people different lessons. What are they? Write a story that a modern deer hunter might tell, or give your own hunting experience story. Use the TABLE ROCK TOPOGRAPHIC MAP to determine where you would hunt for deer. Explain your choice of location.

6. **Make up Native American legend based on real place names.**



Pretend you are living in the Blue Ridge Mountains in the year 1700. Make up a legend or story using real Native American place names from the STATE BASE MAP #1, SHADED RELIEF, which are based on local landforms. Assume that any Native American sounding names found on the map were actually in use at the time (although this may not be true in all cases). Use newspaper articles or library references if needed to get more names. Once your story is complete, form a circle and share your legends much the way the Native Americans would have done.

7. **Explain the cultural isolation of the Blue Ridge.**



Why has there always been such a strong, isolated single culture in the Blue Ridge Region? Why have people of other cultures not mixed or blended in easily? Refer to the terrain of the area as shown on the TABLE ROCK LITHOGRAPH to explain your answer.

**ENRICHMENT**

1. **Plan a publicity campaign to preserve mountain coves.**



Plan a multi-media publicity campaign to alert other students to the unique mountain cove environments and the Heritage Trust areas. Outline all the reasons for preserving and protecting these unique areas.

2. **Research mammal habitat in mountainous areas.**



White-tailed deer, black bears, silver and red foxes, and gray squirrels are some of the inhabitants of South Carolina's mountain forests. Select one of these mammals to research. Find out about the animals' habitat, food, range, natural enemies, and reproduction characteristics. What is needed for each of these animals to survive in the face of continuing development?

3. **Compare Native American and modern hunting practices.**



Chapter 2 of Forrest Carter's The Education of Little Tree (University of New Mexico Press, 1986) is titled "The Way."

This chapter deals with the same lesson some Native Americans have taught their young--never kill more than you truly need. What restrictions do we have today for hunters? How has environmental awareness affected the way we protect our world and its creatures? Plan an activity you and your classmates can do which will teach others to respect life. Make up your own legend that could be used in teaching this lesson to others. Tell it as though it is from long, long ago.

# Greenville News

July 29, 1991

## Teen Found at Table Rock; Family Relieved

by Jason Folkmanis

The mood shifted quickly at Table Rock State Park's Cabin 11. What had earlier been a scene of desperation had become a joyful gathering, as the family and friends of Bradley Wayne Nivens celebrated the news that the 14-year-old Mauldin youth was alive and in good condition.

"My arms are going to go around him, and I'm going to say 'I love you'," said his mother Clydie Nivens when asked what she would do when she first saw her son. "I'm not mad at him. I just

thank God he's been found."

"I just want to hug him and tell him I love him," echoed Nivens' brother Billy who was with the boy before he set off up the mountain. "It's something I usually don't do with my brother but it's something I really want to do right now. No matter how much he stinks I'm going to hug him."

Nivens' family said they believed the fact that the teenager is a good athlete played a crucial role in his ability to survive. "He's in good physical condition" says Clydie Nivens. "He's a get-up-and-goer."

Though most of Nivens' family and friends believed he was all right they also admitted to having some doubts. "I wanted to feel confident," said Wanda Donley, Nivens' sister, "but I was real bad worried."

Candace Donley, a niece of Bradley Nivens, expressed relief that he had been found but also suggested that some discipline for the wayward youth might be in order. "The first thing that went through my mind," she said when she heard the news, "is that we ought to whip his butt."

### RATIONALE

The Table Rock Mountain region is an excellent example of Blue Ridge topography, land use, and wildlife habitat. At 3,124 feet above sea level, the mountain itself is one of the highest in South Carolina. Its sheer cliffs and bare rock exposures create spectacular scenic views characteristic of this mountainous region. Waterfalls abound on steep mountain slopes, and numerous hiking trails lead not only to the summit of Table Rock Mountain, but also to a variety of unique habitats and forest ecosystems at lower elevations. Table Rock Mountain is the major attraction in Table Rock State Park, one of South Carolina's oldest and best known parks, which has recently become a major tourist attraction for the whole southeastern region of the United States. The park area also reveals a diverse human history, both Native American and colonial, as well as a rich heritage of folk tales and traditions. The recent influx of tourists has replaced logging as the major economic resource and created a demand for even more development, which has in turn created much controversy over how

best to manage the land for so many different and sometimes contradictory purposes.

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## Brief Site Description

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### Introduction

The towering mass of rock known as Table Rock Mountain sits high above the surrounding valleys and is almost completely surrounded by exposed white cliffs. These cliffs represent surfaces of hard, resistant granite-gneiss which have been gradually uplifted over long spans of geologic time while weaker rock has been removed and carried away by stream erosion. Because of its location at the eastern edge of the Blue Ridge landform region, Table Rock Mountain is easily visible for miles around in the neighboring Piedmont and has become well known as a famous South Carolina landmark. Table Rock State Park is one of South Carolina's busiest parks and is a favorite tourist destination because of its spectacular scenery and easy accessibility. How was Table Rock named? Many legends have been told about this unique geological feature. Reece, in his history of Pumpkintown, relates one such tale.

#### Table Rock Legend Traditional

*In the days of extreme witchcraft, the witches had planned a convention and needed a place to meet. They chose the flat top of our mountain. The morning session had ended and it was time for lunch, but they had no table on which to spread their lunch. They bewitched the wind and commanded it to blow the rock clean. The wind blew--and it blew and blew until there was nothing left on the rock. So, they spread their lunch on it. But, there were no chairs and they knew their mighty Wizard, The Old Man of the Mountain, must be provided a place to sit. So the witches made ready the little hill into a stool for their ruler. He sat on this stool and ate from the table of rock. So, this welded the name Table Rock to the mountain and The Stool to the nearby hill, and the wind is still keeping the rock clean.*

#### Table Rock State Park Constructed by CCC

In 1935, the area surrounding Table Rock (3,083 acres in total) was purchased by the state of South Carolina for a state park. Many of the early state parks were actually constructed by the Civilian Conservation Corps (CCC), organized by President Franklin D. Roosevelt's administration to address the problem of

the nation's vast number unemployed young men between the ages of eighteen and twenty-five. Table Rock State Park was constructed by workers housed in CCC Camps SP-5 and SP-6. Utilizing natural materials and manual labor, CCC workers built Table Rock Lodge from hand-worked stone and hand-hewn chestnut logs. The spillway at the park's man-made 36-acre reservoir, called Pinnacle Lake, was constructed of slabs of granite laid in a stairstep pattern to imitate a mountain waterfall. The CCC also transplanted azaleas and mountain laurel and used them in landscaping the park.

By the time that the CCC was abolished by Congress in 1942, various CCC groups in South Carolina had constructed thousands of soil control dams, built 97 fire towers, planted 57 million trees to help turn the tide against deforestation, built and stocked two fish hatcheries, and constructed 18 state parks. Today the citizens of the state continue to enjoy and to benefit from this CCC legacy.

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**Activity 2A-1: Mountain Landforms**

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**Material:**

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	TABLE ROCK TOPOGRAPHIC MAP	1 : 24,000
6	TABLE ROCK LITHOGRAPH	1 : 18,000
1	State Map of Major Drainage Basins	Figure 1-2
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 Table Rock Study Site on the STATE BASE MAP #2, WITH HIGHWAYS, on the LAND USE/LAND COVER MAP, on the GEOLOGIC AND MINERAL RESOURCE MAP, and on the GENERAL SOIL MAP 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? Refer to Figure 1-2, "State Map of Major Drainage Basins."

**2. Locate features and place names. ⚙**

Locate the following well-known landscape features on the TABLE ROCK TOPOGRAPHIC MAP: Table Rock Mt., Stool Mt., Caesar's Head Mt., Pinnacle Lake, Saluda River, Table Rock Reservoir, Raven Cliff Falls, Pumpkintown, and Oolenoy River. How many of these features can you find on the TABLE ROCK LITHOGRAPH? Explain how you were able to locate each feature. Using the topographic map, determine the elevation of the highest and lowest points shown on the map. Indicate their approximate latitude and longitude values. Use the scale bar on the map to determine how far Pumpkintown is from Table Rock.

**3. Locate edge of Blue Ridge Region. ⚙**

On the TABLE ROCK TOPOGRAPHIC MAP, both the Blue Ridge and Piedmont can be identified. Refer to the TABLE ROCK LITHOGRAPH for help in determining landform differences. Locate the approximate boundary between the two regions by looking

carefully at contour lines. At what elevation does this transition occur?

**4. Compare stream course and cliff trends. ⚙**

Use a wipe-off pen to trace all stream courses north and west of Table Rock Mountain on the TABLE ROCK TOPOGRAPHIC MAP. Examine your tracing and describe the pattern of drainage in this area. What might cause such a pattern? Examine the cliff exposures on Table Rock and nearby mountains. Using a different color pen, trace along the cliff lines. How does the cliff pattern compare with the stream pattern? Would you have expected this result? Why? Examine the streams on the topographic map, relative to contour line patterns. Use contour line data to identify two areas where a waterfall is likely to be found. Why did you choose these areas? How can you tell which way the stream is flowing?

**5. Examine vegetation and lake patterns. ⚙**

Using the TABLE ROCK LITHOGRAPH, examine the vegetation patterns and different intensities of red on the infrared aerial photograph. What factor is most responsible for the differing colors along streams versus mountain tops? Recall that the infrared photograph was taken during the month of April. How would the vegetation pattern appear different in July? In December? Several lakes are visible on the lithograph. Notice that most of the lakes in the upper half of the lithograph are a slightly different color than the lakes in the lower half. What do you think causes this color difference? Why is there such a clear separation on the photo of the two groups of lakes? How is this difference related to the division between the Blue Ridge and Piedmont regions?

**6. Write legend about mountain names. ⚙**

Use the TABLE ROCK TOPOGRAPHIC MAP. Locate mountains other than Table Rock whose names refer to natural landform features. Select one of these mountains and write a legend about how it got its name. What is the scientific hypothesis which explains how that mountain came to be? How does your legend compare with the geological explanation?

**7. Locate south facing cove. ⚙**

Compare the TABLE ROCK LITHOGRAPH with the TABLE ROCK TOPOGRAPHIC MAP to locate a south-facing cove or hollow in the mountains. Why are such areas wetter, warmer, and more protected than surrounding areas?

**8. Compare drainage basins on opposite sides of reservoir. ⚙**

Examine Table Rock Reservoir on the TABLE ROCK TOPOGRAPHIC MAP. Count the number of stream tributaries entering the reservoir from the north. Count the number entering the reservoir from

the south (ignore the Saluda River drainage which enters from the west). Use a wipe off pen to outline each of the stream drainage systems to the north and to the south of the reservoir. Which drainage basins cover more area, those to the north or those to the south? Use the transparent grid overlay to estimate the area of each basin. Use contour line information from the map to help explain any difference in your answers.

**9. Locate drainage divide between North and South Carolina. ✪**

On the TABLE ROCK TOPOGRAPHIC MAP, locate the North Carolina-South Carolina boundary line. Trace the North Carolina rivers using a wipe-off pen. In which direction do the North Carolina rivers flow? Trace the South Carolina rivers with a wipe-off pen. In which direction do the South Carolina rivers flow? Use a broad-tip wipe-off pen to draw the actual drainage divide. Why is a drainage divide the sensible place to locate a state boundary line? Can you locate the North Carolina-South Carolina state line on the TABLE ROCK LITHOGRAPH? If so, how? If not, why not?

**10. Calculate slope of Table Rock Mountain. ✪📏**

Compare the different topography on the north and south sides of Table Rock Mountain. Use contour line information to find the elevation of each point. Use the scale bar on the map to determine your distance. Is your estimate of the slope an accurate representation of this topography? Use the following formula.

$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{\text{difference in elevation between two points}}{\text{distance between two points}}$$

Note that the slope is the same whether you go from the Lake to Table Rock or from Table Rock to the Lake. Algebra students should note that the slope may be viewed as positive or negative, depending on the frame of reference.

**Group I North Slope**

Estimate the average slope of the ground from the top of Table Rock Mountain to the western shore of Table Rock Reservoir. Use the TABLE ROCK TOPOGRAPHIC MAP and the formula for slope.

**Group II South Slope**

Estimate the average slope of the ground from the top of Table Rock Mt. to the shore of Pinnacle Lake. Use the TABLE ROCK TOPOGRAPHIC MAP and the formula for slope.

**11. Construct mathematical models of Table Rock slopes. 📏**

Using the slopes determined in Performance Task #10, build a model of the triangle formed (rise vs. run) using rulers,

toothpicks, straws, or Cuisenaire rods. Compare the two models and observe the mathematical relationships. Mathematically, what is the difference in the two slopes? How does your model compare with the actual ground slopes as indicated on the TABLE ROCK TOPOGRAPHIC MAP?

## 12. Construct topographic profiles. ⚙️ 🖨️

### Group I North Profile

Make a profile of the scenic view of Table Rock Skyline by looking northward along South Carolina State Hwy. 11. Locate the peak of Pinnacle Mountain on the TABLE ROCK TOPOGRAPHIC MAP. Draw a straight line starting at the peak of Pinnacle Mountain along the western edge of Table Rock Mountain. End at Table Rock Reservoir just to the right of the final letter "r" in the word "Reservoir." Determine the vertical axis scale by finding the difference between the highest and lowest elevations (the rise) along the drawn line. Mark intervals of 10 or 50 feet (based on your rise) on the graph paper. This is your vertical axis. Be sure your axis is at least one inch from the left edge of your graph paper.

Fold the graph paper to form the horizontal axis. Place the horizontal axis along your line so that the origin is at Pinnacle Mountain. Starting at the origin, imagine you are walking a path along the line you have drawn. Each time you come to an index contour line, stop and plot the elevation corresponding to that point. Continue to walk, stopping and plotting each contour line until you reach the reservoir. Connect the points you have plotted. Label Pinnacle Mountain, Table Rock, and Table Rock Reservoir. This graph is your profile of Table Rock area. Driving northeast along South Carolina State Hwy. 11, the Cherokee Foothills Scenic Highway, and looking northwest, you would see this skyline. Describe the scenery you would see driving along State Hwy. 11. How would the shape of the profiles you drew change if you made the horizontal and vertical scales equal?

### Group II South Profile

Make a profile of the skyline of the view seen by looking southward driving along South Carolina State Hwy. 11. On the TABLE ROCK TOPOGRAPHIC MAP, draw a line starting at the letter "y" of the word "Oolenoy River" in the lower left hand corner of the map. End at the symbol labeled "New Town School" located in the lower middle part of the map. Determine the vertical axis scale by finding the difference between the highest and lowest elevations (the rise) along the drawn line. Mark intervals of 10 or 50 feet (based on your rise) on the graph paper. This is your vertical axis. Be sure your axis is at least one inch from the left edge of your graph paper.

Fold the graph paper to form the horizontal axis. Place the horizontal axis along your line so that the origin is at Oolenoy River. Starting at the origin, imagine you are walking a path along the line you have drawn. Each time you come to a contour line, stop and plot the elevation corresponding to that point. Continue to walk until you get to the New Town School, stopping and plotting each contour line until you reach the peak. Connect the points you have plotted and label Oolenoy River, Carrick Creek, and New Town School. Driving northeast along South Carolina State Hwy. 11, the Cherokee Foothills Scenic Highway, and looking southward, this is the skyline you would see. Describe the scenery you would see driving along State Hwy. 11. How would the shape of the profiles you drew change if you made the horizontal and vertical scales equal?

**13. Estimate maximum number of witches Table Rock could hold. 🗺️**

Read the story "Legend of Table Rock." Assume that each witch needed 256 sq. ft. to spread her picnic on the top of the mountain. Estimate the number of witches who would be able to gather there at one time. Use the TABLE ROCK LITHOGRAPH and the transparent grid overlay to estimate the size of the flat top of Table Rock Mountain. Refer to the scale bar on the lithograph to make your conversion. Based on your understanding of the story, is your assumption of 256 square feet per witch a reasonable one? Explain why or why not.

**14. Plan a hiking trip to top of mountain. ⚙️🗺️👉**

You and three friends want to take a hike up Pinnacle Mt. First, locate Pinnacle Mt. on the TABLE ROCK TOPOGRAPHIC MAP. With a wipe-off pen, trace the trail with a dashed line from the parking lot at Pinnacle Lake to the top of Pinnacle Mt. Compare the topographic map with the TABLE ROCK LITHOGRAPH. With the transparent grid overlay placed on the map, determine the coordinates of this mountain using the parking lot as your origin. Calculate the distance from the parking lot to this mountain. Write a complete agenda for your hiking trip. Plan to leave your car in the parking lot at Pinnacle Lake. If you hike at a rate of two miles per hour and start at Pinnacle Lake, how long will it take you to climb the mountain and return to your car? What provisions will you need? What gear will you need? Where will you stop to rest? Where along the trail will you expect to get some good scenic views? Refer to the lithograph to confirm your results. How can you use the lithograph to locate scenic overlooks? Write a letter to your three friends inviting them to join your group and telling them what each one needs to bring.

**ENRICHMENT**

1. **Research state symbols.** →⊗

Plan an imaginary hike on one of the Table Rock trails. Research and identify the state bird, flower, tree, stone, fish, animal, wild game bird, fruit, shell, gemstone, reptile, and insect. Which of these state symbols could you probably see on your hike? In other words, does Table Rock State Park have the proper environment or habitat for any of the state adopted specimens?

2. **Calculate height of Table Rock using shadow.** 📐

Using the TABLE ROCK LITHOGRAPH, calculate the total relief of Table Rock Mountain by measuring the length of the shadow cast by the mountain. Be sure to use the scale bar on the lithograph to determine the actual length of the shadow. The sun is approximately 5 degrees north of the celestial equator in April when this infrared aerial photograph was taken, and Table Rock Mountain lies at approximately 35 degrees north latitude. This means that the sun would appear to be 60 degrees above the horizon at midday. Elementary trigonometry gives the following relationship:

$$\text{Local Relief} = \text{Tangent } 60^\circ \times \text{Length of shadow (in feet)}$$
$$60^\circ = 1.76$$

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**Activity 2A-2: Land Use and Development**

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**Material:**

6	STATE BASE MAP #2, WITH HIGHWAYS	1 : 500,000
6	LAND USE/LAND COVER MAP	1 : 500,000
6	TABLE ROCK LITHOGRAPH	1 : 18,000
6	TABLE ROCK TOPOGRAPHIC MAP	1 : 24,000
6	Transparent Grid Overlay	
6	Wipe-off Pens	

**PERFORMANCE TASKS**

(Icon Key) Overview = ➔; Science = ⚙; Math = 📐; History = 📖;  
Language Arts = ✍

**1. Analyze the newspaper article. ✍**

Read the newspaper article on page 2A-1 "Teen Found at Table Rock, Family Relieved." Explain how the story relates to the Blue Ridge Landform Region. Identify a possible location on the TABLE ROCK TOPOGRAPHIC MAP (refer to the TABLE ROCK LITHOGRAPH if needed) where 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.

**2. Correlate land use to topography. ⚙**

Look carefully at the TABLE ROCK LITHOGRAPH. Identify farm fields, small towns or communities, logging roads, and developed and undeveloped land. What type of landform, slope, and topography is associated with each of these types of land use? See how well you can identify the same features on the TABLE ROCK TOPOGRAPHIC MAP. Look at the pattern of agricultural fields in the lower half of the infrared lithograph. Why are these fields located where they are? Refer to the LAND USE/LAND COVER MAP. How many of the Table Rock land use categories can be recognized on the state map?

**3. Analyze land use changes through time. ⚙**

On the TABLE ROCK TOPOGRAPHIC MAP, notice the features shown in purple. These represent new developments or other changes which have occurred since 1946 when the land was surveyed for the original map. Identify major new features not on the original map. What section of the map area has experienced the most change? Why do you think these changes have occurred? How will these changes affect the environment and the scenic features of the Table Rock area? How many of these changes can you recognize on the TABLE ROCK 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.

**4. Select best route for trail. ⚙**

Mountainous areas always pose transportation problems. Early Native American trail blazers looked for passes through the mountains which provided the lowest possible slope. Modern highways generally follow original Native American trails. Keeping in mind the landforms of this region, plot the best trail route on the TABLE ROCK TOPOGRAPHIC MAP from Table Rock Reservoir to the East Fork Road in North Carolina near the upper left hand corner of the topographic map. Identify natural features that are obstacles along your trail route and explain how you overcame them. Is your route a straight line? Why or why not? Compare your route with routes of others in your class. Which route is best? Why? Use the map scale to calculate the trail length. How long is the distance "as the crow flies." Would you rather climb a short steep trail than a long trail with a gradual slope? Explain.

**5. Explain location of Greenville's water supply. ⚙**

Locate Table Rock Reservoir and the city of Greenville on the STATE BASE MAP #2, WITH HIGHWAYS. With a wipe-off pen, trace the path of the Saluda River from the Table Rock Reservoir to the Anderson County line. How close does the Saluda come to the city of Greenville? The city of Greenville uses this reservoir on the Saluda River for its drinking water supply. Why do you suppose the city founders of Greenville built a dam on the Saluda River over 25 miles away from the city, when they could have built a reservoir on the Saluda River just a few miles west of the Greenville City limits?

**6. Write story about Pumpkintown history. 📖✎**

Pumpkintown developed at a junction point of two well-traveled roads, one for travelers going east-west and one for others going north-south. Locate Pumpkintown on the STATE BASE MAP #2, WITH HIGHWAYS. What do you think was the destination of the travelers on these well traveled roads in the past? Is Pumpkintown located on a main highway now? How do you think Pumpkintown got its name? Write a short story about the adventures of a traveler in 1800 who passed through Pumpkintown on his way to Charleston. Include at least three references to pumpkins in your story and write a surprise ending!

**7. Create a Venn diagram contrasting mountain land use. ⚙**

Create a Venn diagram to compare and contrast the uses of the Table Rock area of today versus the way it was used in the time of the Cherokees. Focus on both land and water resources. Refer to the TABLE ROCK LITHOGRAPH and the Background Information on pages 1-12 and 2-12 for ideas.

**8. Identify ways people have altered natural landscape. 📖⚙**

Using the TABLE ROCK TOPOGRAPHIC MAP and the Background Information on page 2A-2, identify features which were constructed or altered by the Civilian Conservation Corps (CCC). How did they utilize the natural landscape and natural resources of the area? List pro's and con's to help you consider the long term effect of these changes to this natural area.

9. **Calculate average field size.** 🗺️⚙️

Use the TABLE ROCK LITHOGRAPH to locate farm fields along the Oolenoy River. (If necessary, refer to the TABLE ROCK TOPOGRAPHIC MAP to locate the Oolenoy River.) How can you recognize an agricultural field on the photo? On the map? Select at least 10 sample rectangular (or approximately rectangular) fields on the lithograph along the Oolenoy River and calculate their area in acres. South Carolina fields are usually measured in acres. Use two different mathematical procedures to do your calculations. Use your sample data to calculate the average (mean) field area and the median and range of these values. Compare data from Group I and Group II. Would you expect both groups to get exactly the same answers? Explain any discrepancies.

**Group I Calculation**

Use the scale bar to determine length and width of the rectangular fields in feet. Use the formula below to determine the area (square feet) of each field.

$$\text{area} = \text{length} \times \text{width}$$

Now convert the area (square feet) to acres by multiplying by the conversion factor 1 acre = 43,560 ft<sup>2</sup>.

**Group II Estimation**

Use the transparent grid overlay to count the approximate number of squares which cover each rectangular field. Use the scale bar to determine the approximate area of a grid square in square feet. Next multiply the number of squares (including fractional squares) by the approximate area of a single square to determine the total area of each field in square feet. Then multiply the area in square feet by the conversion factor 1 acre = 43,560 ft<sup>2</sup> to get the area expressed in units of acres.

10. **Compare shapes and patterns of road intersections.** 🗺️

In order to improve visibility, road intersections are usually designed to be as close as possible to a 90 degree angle. Measure either the acute or obtuse angle of 10 road intersections on the TABLE ROCK TOPOGRAPHIC MAP and record your results in the table below. Explain any significant variances you find. On the map, mark the intersections with a wipe-off pen and assign a number to each one. Note the location of contour lines near the intersections. Enter your data on the table below. Locate these same intersections on the TABLE ROCK LITHOGRAPH.

SHAPES AND PATTERNS OF ROAD INTERSECTIONS					
# OF INTERSECTION	#DEGREES MAP	ACUTE OBTUSE	# DEGREES PHOTO	ACUTE OBTUSE	REASON FOR NON-90 ANGLE


**ENRICHMENT**

**1. Interview a Realtor. →⚙**

Talk with a local Realtor about where and why new developments are planned in the Table Rock region. Compare the rate of subdivision growth in the Table Rock area to growth rates in your own county.

**2. Interview a forester. →⚙**

Talk with a timber company representative. Find out what trees are being harvested in the Table Rock region and why. List the pros and cons of different timber management practices. Also find out about the South Carolina "Best Management Practices" booklet published by the South Carolina Forestry Commission.

**3. Interview a former CCC member. →⚙**

Interview a former participant of the Civilian Conservation Corps (CCC). How old would such a person have to be now to have participated in the original government program? Plan for your interview by making a list of questions concerning daily life and living conditions on the camp sites and types of projects supported by the CCC. Write up the interview and submit the article to your school newspaper. Research the state park closest to your school. How was it developed? Was it developed by the CCC? What are the special recreational features for which this park is noted?







# The News

Dec. 17, 1989

## Trout Stream affected by Bad Creek Development

<p>by Ron Barnett</p> <p>While Duke Power Co. officials say protecting the environment has been a major concern in development of the Bad Creek pumped-storage hydrostation since its beginning, they also say they were aware that the project could seriously damage--at least temporarily--one of the state's few pristine trout streams.</p> <p>But their expectations that the stream would recover from the excess load of silt and sand that has washed into it appear to be holding true.</p> <p>When construction on the project began in 1984, Bad</p>	<p>Creek and West Bad Creek had to be diverted into nearby Howard Creek to avoid water filling in behind the dams. Though the muddy water was first channeled through settling pools, the silt and sand pumped into Howard Creek was still overbearing.</p> <p>Environmentalist Dennis Chastain says that Howard Creek is looking better now than when he saw it four years ago, but he isn't convinced that the creek will return to its natural state any time soon.</p> <p>According to Randy Geddings, district fisheries biologist for the South Carolina Wildlife and</p>	<p>Marine Resources Department, sediments washing in from the diverted streams killed the aquatic insects that trout depend upon for food and smothered the gravel trout use as spawning grounds.</p> <p>Duke Plans to flush the creek with clear water in 1992 or '93 if the sediments haven't sufficiently washed away by then. The state will re-stock the stream, if necessary, in 1993 or '94.</p> <p>David Meecham, Duke's environmental coordinator for the Bad Creek project, said that in recent weeks a few brown trout have begun to migrate back into the stream.</p>
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### RATIONALE

The Lake Jocassee Region Study Area is a prime wilderness location characterized by rugged mountain topography, scenic waterfalls, pristine trout streams, and unique habitats, which are home to more than fifty rare plant and animal species. Because of the undeveloped nature of this region, both the federal and state government, along with private groups such as the Nature Conservancy, have established a series of parks, preserves, and wild-and-scenic river corridors to help preserve this wilderness area for the study and enjoyment of future generations. Lake Jocassee is one part of a series of dams and reservoirs constructed, operated, and maintained by Duke Power Company, to provide electricity for the citizens residing in upstate South Carolina. The rugged topography is ideal for power generation by standard hydroelectric plants as well as pumped storage technology. Lake Keowee also provides cooling water for the Oconee Nuclear Station. The environmental demands created by power generation often conflict with goals of wilderness preservation. Duke Power Company, through their land management subsidiary, Crescent Resources, Inc., has established a winning partnership with state

resource agencies and private organizations to provide the power needs of upstate South Carolina with minimal disruption to the environmental resources.

## Brief Site Description

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### Introduction

The Lake Jocassee area is a complex mixture of unspoiled wilderness, carefully managed wildlife habitat, and a series of dams, reservoirs, and utility corridors used in generating electrical power for a large portion of upstate South Carolina. Until the mid 1800's, this area was populated mostly by Native Americans of the Cherokee Nation. For years prior to that time, the only European Americans to visit the area were either soldiers or traders. Today, tourists constitute the major population group, drawn not only by the many scenic waterfalls, whitewater streams, and hiking trails in the area, but also by the two major visitor centers run by the Duke Power Company whose exhibits highlight both the scenic wonders of the area and the many varieties of energy production used in South Carolina. The World of Energy, located at the Oconee Nuclear Station, has many hands-on exhibits that show how natural resources such as falling water, coal, and uranium are used to make electricity. The Bad Creek Visitors Center offers seasonal tours of the pumped storage facility, including the underground powerhouse. Several parks with picnic, camping, and boat launch areas are operated by county, state, and private agencies. The renowned Foothills Trail runs through a large portion of the Lake Jocassee Region with several footbridges over spectacular gorges north of Lake Jocassee.

### The Legend of Issaqueena

#### Traditional

At the time when the British had forts in the upstate and the Cherokees still held the westernmost part of South Carolina there lived near the Chattooga River a beautiful Native American Princess named Issaqueena. She was dark, modest, and lovely, and she had caught the eye of a handsome, young British soldier who occasionally had business with the locals. She returned his admiration, and soon they shared a deeply felt but secret love.

Relationships were strained between the British and the Cherokees, and Princess Issaqueena doubted whether her father, the chief, would ever give consent for her to wed the soldier. One night Issaqueena heard with horror that the Cherokees planned to hold a raid against her soldier's fort at dawn. What must she do? If she warns the soldiers

she has betrayed her father and her people. If she does not warn them then her own true love will soon lie dead. Taking no more time to think, she flees her village, running off into the darkness to her soldier's fort. Running in the nighttime, she counts off her progress, naming every creek she crosses: Six Mile Creek, Twelve Mile Creek, Eighteen Mile Creek, Three and Twenty Creek, and finally Six and Twenty.

At last she reached the fort and warned the soldiers. They were ready in the morning; when the Cherokees arrived the fort was closed and guarded. Under clouds of anger and betrayal, the natives returned to their own village. At the village, Issaqueena's father, noting that she had been gone the night before, asked her flatly if she had warned the soldiers in the fort.

Standing there before her chief and father, with tattered dress and battered feet from all her nighttime running, Issaqueena would not shame him by lying to him. "Yes, father," she said, "for love I warned the soldiers."

"Then you must flee," her father said. "Flee now! Our warriors will be after you. Be gone, my daughter. Now! Be swift!"

Off Issaqueena ran toward the fort, but soon she knew the fleet-footed warriors would overtake her, weary from her grief and night of running. At the top of a waterfall near Stumphouse Mountain, at the very edge, Princess Issaqueena paused and looked out a moment eastward on the Piedmont down below and thought about her soldier there. She heard the native warriors close behind her, and then she flung herself out to fall among the silver water to the rocks below.

The creeks are still called by the names she gave them, and the waterfall near Stumphouse Mountain still is known as Issaqueena Falls.

Some people say that Princess Issaqueena grabbed a muscadine vine as she fell and swung herself back into a cave behind the falls. They say she waited there until the warriors gave up their fruitless search for her body on the rocks below. She then climbed out into the evening air and made her way quietly to her soldier's fort where she and the young soldier married, and they lived happily ever after.

Part of the popularity of the Lake Jocassee area is the diversity of plant and animal species, which can be found there. The Duke Power Company has worked with various environmental agencies to ensure that the maximum amount of habitat is preserved during both the construction and operational phases of their many power projects. An example is the construction of an artificial cliff along the side of a mountain that was mined for rock for the Jocassee Hydroelectric Dam. Once the rock was

removed, the remaining steep drop-off provided a perfect habitat for peregrine falcons. Other habitats are uniquely suited to a variety of plant species, some of them on the endangered list. The folklore of many of these plants, particularly wildflowers, is fascinating. Ralph Waldo Emerson once defined a weed as "a plant whose virtue has not yet been discovered." Many of the plants found around Lake Jocassee did have presumed virtues, at least by those who originally named them. In such cases, plant names followed what is known as the "Doctrine of Signatures," a theory proposed by a Swiss physician in 1657 that some plants have parts (called signatures) that resemble parts of the human body. The so-called signature of the plant enabled doctors to recognize which portions of the plant were useful for medicines and food. For example, the leaf of *Hepatica* looks very much like the human liver and was therefore thought to be a cure for liver ailments. A book entitled "Wild Flower Folklore" reveals how observers can obtain information on the plant to discover its physical characteristics, the reason for its name, the medicinal values, its value as a food source, the superstitions and lore associated with the plant, and the language of the plant. A sample analysis is given for the common dandelion.

## Wildflower Folklore (abridged)

by Laura C. Martin

COMMON NAME: **dandelion**

FAMILY: Compositae (Daisy)

Genus: *Taraxacum*

Species: *officinale*

DESCRIPTION: A bright yellow head of flowers sits atop a hollow stem, which arises from a rosette of basal leaves. The blossoms are about one to two inches across, and the stems grow from two to eighteen inches tall. The leaves are dark green and, in most cases, deeply toothed.

HABITAT: The dandelion is very common in yards and waste places all over North America.

BLOOMS: February through June

Almost everyone is familiar with the dandelion. Its common name is French, meaning "the tooth of the lion," because of the toothed margins of the leaves. The generic name, from Arabic and Persian, means bitter herb. The species name means that it was sold in the marketplace. Due to its widespread growth, the yellow-flowered dandelion is sometimes called "tramp with the golden head."

An important folk medicine, dandelion, rich in vitamins A and C, is used as a general antidote and also for specific ailments. An old mountain superstition says that if you drink a cup of dandelion tea every morning and evening you will never have rheumatism. A Dutch legend says that if you eat dandelion salad on Monday and Thursday you will always stay healthy. An herbal remedy written in 1821 says that the root of the dandelion is good for impetigo, the itch, and several other ailments including "induration of the liver."

A native of Europe, the plant is often cultivated for food. The leaves are gathered in early spring when they are sweetest and boiled and eaten like spinach or eaten raw in salad.

The dandelion is abundant for several reasons. Its bitter summer leaves are not grazed, and the root is buried deeply, resisting burrowing animals and fire. The silken parachutes are actually seeds, easily dispersed by wind.

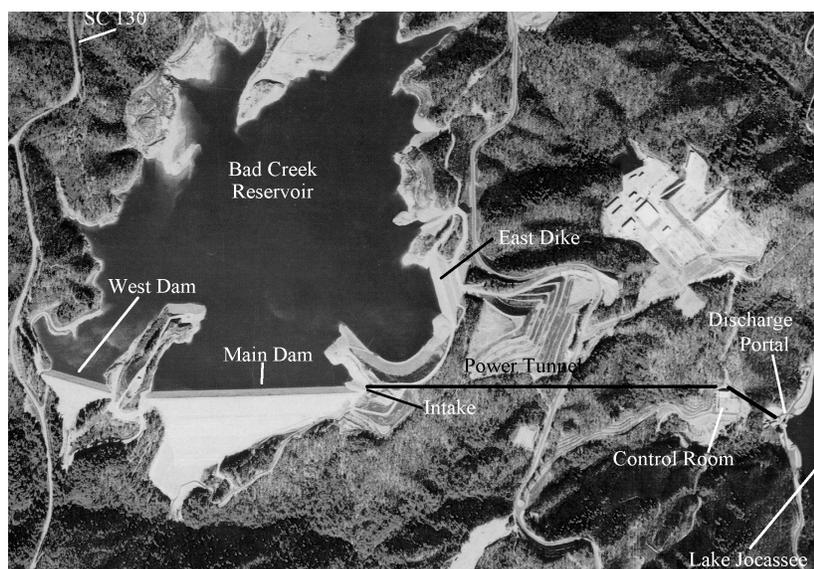
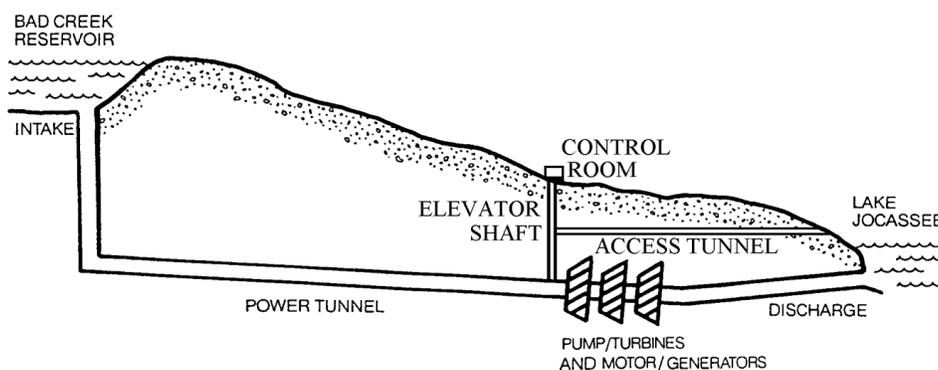
Because the blowballs, or parachutes, are irresistible to children all over the world, there are several

superstitions about them. Children commonly believe if they can blow off all the seeds in one breath, a wish will come true. Another superstition says the number of seeds left tells what time it is. Yet another says the number of seeds left on a blowball after a child's good hard puff tells how many children that child will have. Some say if you whisper words of love to your favorite person and blow the seeds gently towards him, the seeds will carry your words to your beloved.

## The Bad Creek Pumped Storage Project

The Bad Creek project was started in 1981 but did not begin generating electricity until 1991. Although some environmental concerns were raised during construction, particularly regarding possible sediment pollution of trout streams, attempts were made to minimize damage and to restore full habitat quality to the affected areas. To construct the reservoir, engineers had to dam up two small streams (Bad Creek and West Bad Creek) with two separate dams and a dike. The main dam, made of earth and covered with rock, stands 360 feet high and measures a half-mile across. At full pond, the reservoir covers 313 acres, is 310 feet deep, and has a maximum drawdown capability of 160 feet, which can be achieved in 27 hours. Bad Creek's water flows into Lake Jocassee through 30 foot diameter pipes in an underground tunnel. The water turns turbines located in a powerhouse 540 feet underground in solid rock, then exits through an underwater portal on the Whitewater River arm of Lake Jocassee. When the reservoir is to be refilled, the turbine generators act as electric motors to pump the water back uphill until the next time it is needed. Lake Jocassee itself is also used for pumped storage with Lake Keowee serving as the lower reservoir.

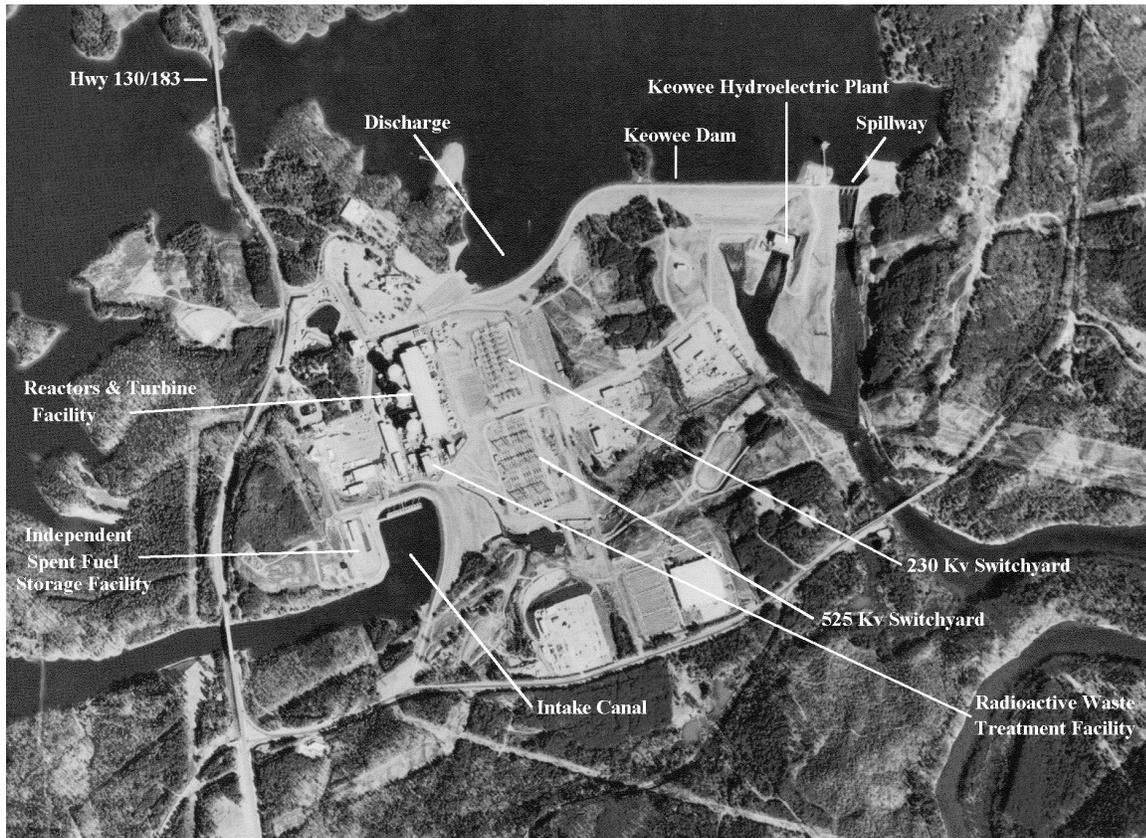
**Figure 2B-1: Bad Creek Pumped Storage Project: Diagram and Map View**



## The Oconee Nuclear Station

The establishment of a nuclear power plant in northwestern South Carolina was a massive undertaking, which required years of planning. The arrival of the first nuclear reactor vessel at the Oconee site marked the end of one of modern history's most complicated hauling jobs. The 325 ton container completed its long journey in February 1970, nearly two months after leaving the Babcock & Wilcox Plant at Mt. Vernon, Indiana, where it was constructed. Enroute to its final resting base, this huge mass traveled by barge and special rail car, and on the world's largest truck. It traveled the Ohio and Mississippi Rivers, the Gulf of Mexico, the Florida Barge Canal, the Intracoastal Waterway, the Savannah River, and 145 miles of road and rail bed. The total distance covered was almost 2,000 miles. The power plant began generating electricity in 1973. Its three units are capable of producing up to 2.6 million kilowatts of electricity. By 1991, the Oconee Unit became the first nuclear power plant in the United States to produce 100 million megawatts of electricity.

**Figure 2B-2: Oconee Nuclear and Keowee Hydroelectric Stations**





Lake Keowee was constructed in the late 1960's primarily to provide cooling water for the Oconee Nuclear Station. A nuclear power plant generates electricity by using nuclear fuel (usually uranium) to produce heat (from nuclear fission) that changes water into steam and turns turbines mechanically. Water from Lake Keowee never comes in direct contact with radioactive material, but rather supplies a secondary flow path, which circulates around the primary system to cool the steam back into water for re-heating. This water also removes heat from the reactor itself to prevent the unit from overheating. Colder water is brought in to the reactor building from the bottom of Lake Keowee. After absorbing heat from the three reactors at the Oconee Nuclear Station, the water is warmer and therefore less dense. It is therefore released at surface levels of the lake, which are usually warmer than bottom waters, to minimize any temperature differences in the lake water and any subsequent threat to aquatic organisms in the lake.

### **Transmission of Power**

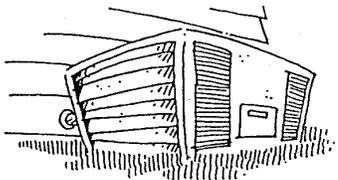
Producing electricity is only part of the job faced by utility companies. To be useful, power must be transferred to where people live and work. Almost all electricity travels at velocities close to the speed of light over high voltage (44,000 - 525,000 volts) transmission lines that connect the power plants to regional substations. Transformers at these substations reduce the voltage level to amounts that are safe to transmit along highway power lines (4,160 - 24,940 volts). Still another set of transformers must be used before the voltage level is safe for use in homes or businesses (120 - 240 volts). The major advantage of using higher voltages is that electricity can be transferred greater distances with less loss of power. The disadvantage is that high voltage lines must be placed high off the ground and away from trees and buildings. This requires the complete clearing of a corridor of land before a power line can be constructed across the area.

Whenever a new power line is needed, planning engineers look for the best corridor site to achieve reliable electrical service to an area at reasonable cost while addressing local environmental and aesthetic concerns. Siting and construction are particularly difficult in wilderness areas or other places with limited access for heavy machinery and other equipment. Usually planners will route power lines along highways or railroads to reduce environmental impact. Sometimes the power company will purchase the land, but in most cases it is more effective to simply purchase a "right-of-way" that allows the company to run its power lines across other people's property. Normally neutral paint colors (grays and greens) are used on the

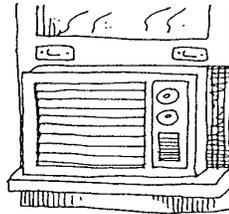
metal towers, which helps them blend with the natural landscape. Planting trees adjacent to the cleared corridor helps to control erosion and also helps to hide the lines.

**Figure 2B-3: Operating Costs of Various Appliances**

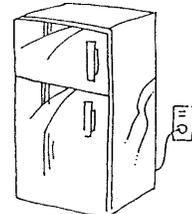
Appliance: Heat Pump  
 Wattage: 5,000 watts  
 Hours of Operation: 12  
 Kilowatt-hours consumed: 60  
 Operating cost (kWh  $\times$  7.5¢) = 450¢



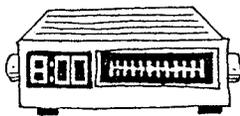
Appliance: Room Air Conditioner  
 Wattage: 900 watts  
 Hours of Operation: 12  
 Kilowatt-hours consumed: 10.8  
 Operating cost (kWh  $\times$  7.5¢) = 81¢



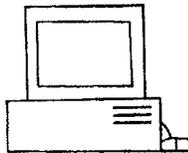
Appliance: Refrigerator/freezer  
 Wattage: 920 watts  
 Hours of Operation: 12  
 Kilowatt-hours consumed: 11.04  
 Operating cost (kWh  $\times$  7.5¢) = 82.8¢



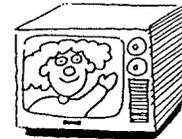
Appliance: Radio  
 Wattage: 50 watts  
 Hours of Operation: 4  
 Kilowatt-hours consumed: 0.15  
 Operating cost (kWh  $\times$  7.5¢) = 1.1¢



Appliance: Computer  
 Wattage: 150 watts  
 Hours of Operation: 6  
 Kilowatt-hours consumed: 0.9  
 Operating cost (kWh  $\times$  7.5¢) = 6.75¢



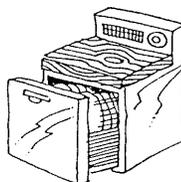
Appliance: Color Television  
 Wattage: 145 watts  
 Hours of Operation: 6  
 Kilowatt-hours consumed: 0.87  
 Operating cost (kWh  $\times$  7.5¢) = 6.5¢



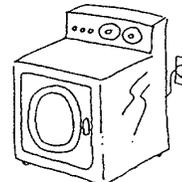
Appliance: Hair Dryer  
 Wattage: 1,000 watts  
 Hours of Operation: 0.5  
 Kilowatt-hours consumed: 0.5  
 Operating cost (kWh  $\times$  7.5¢) = 3.75¢



Appliance: Electric Dishwasher  
 Wattage: 1,200 watts  
 Hours of Operation: 0.5  
 Kilowatt-hours consumed: 0.6  
 Operating cost (kWh  $\times$  7.5¢) = 4.5¢



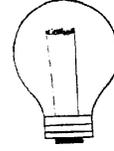
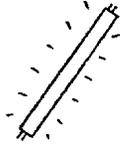
Appliance: Clothes Dryer  
 Wattage: 5,600 watts  
 Hours of Operation: 1  
 Kilowatt-hours consumed: 5.6  
 Operating cost (kWh  $\times$  7.5¢) = 42¢



Appliance: Vacuum Cleaner  
 Wattage: 650 watts  
 Hours of Operation: 1  
 Kilowatt-hours consumed: 0.65  
 Operating cost (kWh  $\times$  7.5¢) = 4.9¢

Appliance: Lights (Fluorescent)  
 Wattage: 34 watts per bulb  
 Hours of Operation: 12  
 Kilowatt-hours consumed: 41  
 Operating cost (kWh  $\times$  7.5¢) = 3.1¢

Appliance: Light (incandescent)  
 Wattage: 100 watts per bulb  
 Hours of Operation: 12  
 Kilowatt-hours consumed: 1.2  
 Operating cost (kWh  $\times$  7.5¢) = 9.0¢



## Grandma Gets Electricity

by Jody Tinsley

I asked my grandmother if she remembers when her family first got electricity, and she said, "Yes. We got it after we moved into town." Moving into town was a big event in my grandmother's life, and she often dates things that happened when she was young as either before or after this move. Before it, she and her parents and many siblings lived in the country to the west of Pickens and farmed, plus whatever other work they could come by. She was about 10 or 12 when she moved into town, and she can still remember what she was doing when she found out that they were moving.

The day they moved she was washing clothes for a neighbor lady; one of her brothers walked over and told her, "Hurry up, Essie. We're moving to the mill!" She finished the washing, and the neighbor paid her with a small paper sack of peanuts. By the time she got home her family was nearly packed.

"Moving to the mill" was a good way to put it, because the mill village or mill hill was like a small town of its own. You lived in mill houses, paying rent to the mill, and bought your groceries and clothes at the mill store. Some mills even paid you in their own money, good only at their own stores. You bought coal for heating and wood for cooking and oil for lamps from the mill. You could keep chickens and a small garden at your house, but you couldn't keep pigs since the houses were too close together for that. The mill had a nearby pasture where everyone who wanted to could keep a cow. And of course you worked at the mill.

Soon the mill began providing one more thing: electricity. The mill houses were wired with one power cord hanging from the ceiling of one room. A bare light bulb hung in a socket at the end of the wire. And that was all: one wire, one bulb, and electric power for two hours each week on Wednesday afternoon when the mill closed down and didn't need the power.

My grandmother says they used to sit around and talk about what electricity might be good for. They guessed some people at the time might have had electric irons, but they didn't have one. My grandmother's family still used flatirons heated on the woodstove. She says she can't remember when they started getting electricity all of the time, but she does remember the first appliance they got when they had full-time electricity: a small refrigerator. She says it changed their life; milk would keep, meat could be bought ahead of time, and they could have cold water to drink--things only possible before when they could buy a

piece of ice for their ice box. "We didn't dream of air conditioning," she said, "or even of a window fan. But we didn't need them. After we got that refrigerator we could have cold water any time we wanted!"

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**Activity 2B-1: Watershed Management and the Environment**

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**Material:**

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	LAKE JOCASSEE REGION LITHOGRAPH	1 : 28,000
6	LAKE JOCASSEE REGION TOPOGRAPHIC MAP	1 : 32,000
1	State Map of Major Drainage Basins	Figure 1-2
6	Transparent Grid Overlay	
6	Wipe-off Pens	

**PERFORMANCE TASKS**

(Icon Key) Overview = ➔; Science = ⚙; Math = 📊; History = 📖;  
Language Arts = ✍

**1. Locate the study site. ➔ ⚙**

Locate the Lake Jocassee Region Study Site on the STATE BASE MAP #2, WITH HIGHWAYS, on the LAND USE/LAND COVER MAP, on the GEOLOGIC AND MINERAL RESOURCE MAP and on the GENERAL SOIL MAP 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? Refer to Figure 1-2, "State Map of Major Drainage Basins."

**2. Locate features and place names. ➔**

Locate the following landscape features on the LAKE JOCASSEE REGION TOPOGRAPHIC MAP and use the map information to answer the questions.

- Lake Jocassee (large light purple area on right side of map). Outline the shoreline of this lake with a blue wipe-off pen. Why does this lake have such an irregular shoreline shape? Explain your answer.
- Lake Keowee (smaller light purple area in lower right corner of map). Outline the shoreline with a green wipe-off pen. How is the shape of Lake Keowee similar to Lake Jocassee? How is the shape different? Explain your answer.
- Lake Jocassee Dam (where Lake Jocassee flows out into Lake Keowee). Outline the location of the dam with a red wipe-off pen. Why do you think the dam was built at this particular location?

- Bad Creek Reservoir (smaller light purple area in center of map, to left of Lake Jocassee). Outline the shoreline with a black wipe-off pen. The dam that holds back Bad Creek Reservoir is not shown on this map. Mark the location where you think the dam should be, and explain why you think it was placed there.
- Four main rivers that flow into Lake Jocassee. Trace these river courses with a wipe-off pen. Whitewater River (also mark the location of the Lower Falls and Upper Falls); Thompson River; Horsepasture River (also mark the location of Windy Falls and Rainbow Falls); Toxaway River (also mark the location of Toxaway Falls). Why do you think there are so many large waterfalls on these rivers? Why do you think the Federal Government has established a "wild and scenic river" designation for the Horsepasture River?
- State Highway 11 (a new highway shown in light purple running SW - NE along the bottom portion of the map). Why do you think this highway was needed? What benefits did the new highway bring to this region? South Carolina has officially designated this highway as the "Cherokee Foothills Scenic Highway." Explain the reasons behind this designation.
- Walhalla Fish Hatchery (far left center of map along the east Fork of the Chattooga River). Along which river is this facility located? Why do you think it is located there?

How many of these features can you find on the LAKE JOCASSEE REGION LITHOGRAPH? Explain how you were able to locate each feature. Using the topographic map, determine the elevation of the highest and lowest points shown on the map. Can you locate these points on the lithograph? If so, how did you locate them? Use the scale bar on the map to determine how far Jocassee Dam is from Lower Whitewater Falls (straight line distance - as the crow flies). How far is this distance by road (non-straight line distance - as the car drives)?

### 3. Analyze the newspaper article. ✎

Read the newspaper article on page 2B-1, "Trout Stream affected by Bad Creek Development." Explain how the story relates to the Blue Ridge Landform Region. Identify a possible location on the LAKE JOCASSEE REGION TOPOGRAPHIC MAP (refer to the LAKE JOCASSEE REGION LITHOGRAPH if needed) where 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 point.

### 4. Correlate land use to topography. ⚙

Look carefully at the LAKE JOCASSEE REGION LITHOGRAPH. Identify farm fields, small towns or communities, logging roads, and developed and undeveloped land. What type of landform, slope, and topography is associated with each of these types of land use? See how well you can identify the same features on the LAKE JOCASSEE REGION TOPOGRAPHIC MAP. Look at the pattern of agricultural fields in the lower half of the infrared lithograph. Why are these fields located where they are? Refer to the LAND USE/LAND COVER MAP. How many of the Lake Jocassee land use categories can be recognized on the state map? Identify sources of non-point source pollution associated with each land use.

**5. Analyze land use changes through time. ⚙**

On the LAKE JOCASSEE REGION TOPOGRAPHIC MAP, notice the features shown in purple. These represent new developments or other changes that have occurred since 1946 when the land was surveyed for the original map. Identify major new features not on the original map. What section of the map area has experienced the most change? Why do you think these changes have occurred? How will these changes affect the environment and the scenic features of the Lake Jocassee area? How many of these changes can you recognize on the LAKE JOCASSEE REGION LITHOGRAPH? In what year was the aerial photograph taken? Circle and explain any additional changes that occurred between the time the map was revised and the time the photograph was taken.

**6. Analyze vegetation using the 'Doctrine of Signatures.' ✎ ⚙**

Pick any plant likely to be found in the Lake Jocassee region and construct a "Doctrine of Signatures" similar to what was done in the "Wildflower Folklore" example on page 2B-4. Include your own original stories about the plant. Identify a location on either the LAKE JOCASSEE REGION TOPOGRAPHIC MAP or the LAKE JOCASSEE REGION LITHOGRAPH at which you would expect to find this particular plant. Explain why this plant is found in this particular environment.

**7. Write short story about travel down stream. ✎**

Write an adventure story starring Rudy the Raindrop, who fell out of the sky on a dreary summer afternoon and landed in Sapphire Lake (near the top border of the LAKE JOCASSEE REGION TOPOGRAPHIC MAP). Tell the story of Rudy's travels as he winds his way down the Horsepasture River to Lake Jocassee. Describe the creatures he meets along the way as well as the changing habitat along the river. Use lots of adjectives to make his story exciting to read.

**8. Locate forest land. → ⚙**

Note the abundance of green color on the LAKE JOCASSEE REGION TOPOGRAPHIC MAP. What does this green color represent on most topographic maps? What color represents forests on the LAKE JOCASSEE REGION LITHOGRAPH? Why are these colors different? Compare the colors of lakes and streams on the topographic map and lithograph. How are they similar? How are they different? Why is purple used in place of blue for certain bodies of water? Identify forest clear-cut areas on the lithograph. Can you identify these areas on the topographic map? Explain your answer. Is clear-cutting usually done alongside large bodies of water? Why or why not? Discuss within your group the pros and cons of clear-cutting as a timber management practice.

9. **Determine the dimensions of a lake.** 🗺️

Determine a simple way to measure the length in miles of the shoreline of Lake Jocassee. Try out your method and record your answer. Use the Transparent Grid Overlay to estimate the area of Lake Jocassee in square miles. Calculate the ratio of this area to your measured perimeter of Lake Jocassee. In the same way, determine values for the area and perimeter of Bad Creek Reservoir and calculate the ratio of area to perimeter. Which ratio is larger? Use your analysis of the topographic map and lithograph to create a hypothesis as to why the ratios would be different. What percentage of the map area is occupied by Bad Creek Reservoir? What percentage is occupied by Lake Jocassee? Does the size difference between these lakes affect the value of your calculated ratio?

10. **Sketch a topographic profile along the state boundary line.**



Draw a topographic profile, on a separate piece of graph paper, along the state boundary line between the Thompson River and the Horsepasture River. Plot distance from the Thompson River along the X-axis of your graph and plot elevation (contour data) along the Y-axis of the graph. Before you label your Y-axis, identify the highest and lowest elevations along the profile line and use a contour interval of 200 feet to set up your graph. Use only the marked index contour lines to record elevation data points, then connect the points to construct your sketch. Analyze your sketch and discuss why this part of South Carolina's boundary was originally surveyed as a straight line. Would this boundary line be a good place along which to construct a hiking trail? Explain your answer.

11. **Analyze geographic distribution of trout streams.** ⚙️

Biologists have determined that most streams in the Lake Jocassee Region will contain trout if the elevation of the stream is over 1,000 feet. Trace with a wipe-off pen the

paths of all streams on the LAKE JOCASSEE TOPOGRAPHIC MAP that meet this criterion (elevation higher than 1,000 feet). These higher streams are usually colder water streams and therefore make the best trout streams. Based on information from the topographic map and lithograph, what factors other than temperature do you think might create problems for trout in this area?

**12. Compare vegetation and bear habitat on north vs. south facing slopes.** ☼ 📷

Locate several areas on the LAKE JOCASSEE REGION LITHOGRAPH that would qualify as south-facing mountain coves. Compare the vegetation coverage in these coves to that on more exposed open areas on steeper south-facing slopes. What characteristics of infrared aerial photographs enable you to identify such areas? Also, compare this coverage with vegetation patterns on north-facing slopes. List observable differences. Why do blackberries usually grow better on south-facing slopes? These slopes are prime black bear habitat. Wildlife experts estimate that over 200 bears live in the mountains of upstate South Carolina and that their population density here approaches one black bear for every square mile of wilderness habitat. Draw a square, with an area of one square mile, anywhere on the lithograph such that at least half of the square is within the boundaries of Sumter National Forest (refer to topographic map for exact location). Examine the lithograph and identify at least five danger zones within that square where humans and bears are most likely to come in close contact. Predict how long a black bear would stay in this spot. Explain your prediction.

**13. Compare modern and pioneer life.** 📷 ✍

Locate, on the LAKE JOCASSEE REGION TOPOGRAPHIC MAP, where Laurel Fork Creek flows into the northeast side of Lake Jocassee not far below the North Carolina state boundary line. In the early years of the 20th century, before Lake Jocassee was ever constructed, a small community with several houses, and even a school, existed in the broad, flat valley of Laurel Fork Creek. Mark on the map the exact location at which you suspect the community might have been located. The lives of students attending that community school were very different from what most students' experience in modern times. The community no longer exists today. Discuss with your classmates where all the people might have gone and why the community ceased to exist. Imagine you have found the diary of one of these students in the Laurel Fork Community who left the area when he or she was 14 years old. Write what you think might have been included as daily journal entries for the week just before leaving home.

14. **Locate areas of active sedimentation.** ⚙

What coloration on the LAKE JOCASSEE REGION LITHOGRAPH indicates sediment-filled water? What characteristics of infrared aerial photography make this determination possible? Locate areas of active sedimentation in Bad Creek Reservoir, Lake Jocassee, and Lake Keowee. In each case, speculate about the cause of the sedimentation. Is land use a factor? Explain your answer. Refer to the LAKE JOCASSEE REGION TOPOGRAPHIC MAP for additional data.

15. **Analyze stream drainage patterns.** ⚙ 🗺

Trace the original stream drainage pattern (ignoring all modern lakes and reservoirs) for the entire Keowee River Drainage System (includes the Keowee, Whitewater, Thompson, Toxaway, and Horsepasture Rivers) on the LAKE JOCASSEE TOPOGRAPHIC MAP. Take special notice of the numerous right angle bends in each of the stream channels. Divide into groups to analyze each of these river patterns individually. Each group should construct a special kind of graph, called a "rose diagram," for their assigned river by dividing a piece of graph paper into equal quarters and labeling the vertical and horizontal axes with compass directions (North, East, South, and West). Be sure the North Axis points toward the top of the page.

- |   |   |
|---|---|
| <b>Group 1</b> Keowee River<br>(Transylvania Co.) | <b>Group 4</b> Horsepasture River                 |
| <b>Group 2</b> Whitewater River<br>North Carolina | <b>Group 5</b> Toxaway River in<br>North Carolina |
| <b>Group 3</b> Thompson River<br>South Carolina   | <b>Group 6</b> Toxaway River in<br>South Carolina |

Re-trace your assigned river, with a different color wipe-off pen, so that the river channel shows up as a series of straight-line segments and angular bends. This new tracing will not exactly match the actual path of the river channel, but it should be a close approximation. Do not try to trace every little bend of your river, but try for a total of between ten and twenty line segments that mark a mostly linear portion of the river channel. Measure, with a ruler and protractor, the length of each line segment and its compass orientation (degrees away from north). Transfer that information to your rose diagram by drawing each segment in its proper length and angular orientation. Be sure that the midpoint of every line segment falls exactly on the origin point of your graph (where the vertical and horizontal axes intersect).

What conclusions about stream patterns in the Lake Jocassee Region can you derive from your rose diagram? Compare your graph to those of other groups. How are they similar? How

are they different? Can you identify an underlying geologic cause for these results? How would this relate to the geologic history of the Blue Ridge Landform Region?

**16. Prepare a land use management plan. → 📖**

Mark off a square one mile by one mile anywhere on the LAKE JOCASSEE REGION LITHOGRAPH. Exchange your map with another group. Analyze your designated area and prepare a complete 'land use management plan' that will address environmental impacts, economic benefits, and social factors. You may refer to the LAKE JOCASSEE REGION TOPOGRAPHIC MAP for additional information. Prepare a short presentation to give to the class. The class will act out the role of a county government planning commission that will have to decide whether or not to approve each group's plan. Groups not receiving approval must modify their plan or prepare additional documentation for a second hearing.

**17. Write a short story about how natural features were named. ✍️**

Examine the LAKE JOCASSEE REGION TOPOGRAPHIC MAP looking for unusual names for rivers, mountains, lakes and other natural features. List ten place names that your group agrees are unusual. Write down some brief explanations for why these names might have been given. From your list, select the most unusual name and write a short story about how that feature got its name. Share your stories with the rest of the class. Point out your location on the topographic map. Use the Legend of Issaqueena as an example. In your story, refer to other place names on the map so that other readers can follow the action.

**ENRICHMENT**

**1. Research land use restrictions. → 📖**

Examine various state and local programs designed to protect scenic mountain areas. Are land use and building restrictions needed in your local community (such as zoning and building codes)?

**2. Relate life history of trout to sedimentation problems in streams. ⚙️**

Research the life history of the rainbow trout or brown trout and explain how excessive sedimentation in streams affects these fish.

**3. Research folklore associated with common plants. ✍️ ⚙️**

Obtain a copy of *Wildflower Folklore* or a similar book and research the folklore associated with the following plants common in the Lake Jocassee region.

Butterfly-weed	Mayapple	Rattlesnake
Plantain		
Foam Flower	Mullein	Solomon's Seal
Jack-in-the-Pulpit	Oconee Bells (Shortia)	Trillium
Jewelweed	Pokeweed	Watercress
Joe-Pye Weed	Queen Anne's Lace	Yarrow

4. **Research potential for gold mining in Lake Jocassee Region.**



Research the potential for gold mining on the Chauga River and nearby areas in Oconee County. An application to prospect for gold in this area was turned down by government authorities in 1997. Examine newspaper articles from local newspapers as well as the article in *South Carolina Wildlife* magazine (September-October 1996 issue) to discover why the application was rejected.

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**Activity 2B-2: Power Production and Engineering**

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**Material:**

6	STATE BASE MAP #2, WITH HIGHWAYS	1 : 500,000
6	LAKE JOCASSEE REGION LITHOGRAPH	1 : 28,000
6	LAKE JOCASSEE REGION TOPOGRAPHIC MAP	1 : 32,000
6	JOCASSEE HYDRO STATION LITHOGRAPH	1 : 17,220
6	BAD CREEK HYDRO STATION LITHOGRAPH	1 : 20,400
6	OCONEE AND KEOWEE STATIONS LITHOGRAPH	1 : 19,560
6	Transparent Grid Overlay	
6	Wipe-off Pens	

**PERFORMANCE TASKS**

**(Icon Key)** Overview = ➔; Science = ⚙; Math = 📐; History = 📖;  
Language Arts = ✍

- 1. Identify possible second pumped storage facility site.** ➔ ⚙  
Assume Duke Power Company wants to build a second pumped storage power facility in the Lake Jocassee Region. Select a site that you think will provide the greatest opportunity for electrical output with the least amount of environmental impact. What information will you need to make these decisions? You must locate the site on the LAKE JOCASSEE REGION TOPOGRAPHIC MAP, identify the best spot for a dam, mark off the area to be covered by the reservoir, locate your generators, run power transmission lines, roads, etc. Make separate lists of engineering and environmental obstacles you may encounter. Explain which items on each list are most significant and propose a method for overcoming both types of problems. Compare your site selection with that of other groups. Are there similarities in the areas you selected? What are the differences?
- 2. Trace path taken by the nuclear reactor vessel in route to Lake Keowee.** ➔ 📖  
The nuclear reactor vessel for the Oconee Nuclear Station traveled all the way from Indiana to Lake Keowee on a variety of different transport vehicles. Refer to the paragraph entitled "The Oconee Nuclear Station" on page 2B-6. Trace, on the STATE BASE MAP #2, WITH HIGHWAYS, the South Carolina portion of the route (from Savannah, GA, to Lake Keowee). What obstacles did each form of transportation have to overcome to move such a large and heavy object? How long do you think each portion of the journey took? Explain your answer.
- 3. Calculate the volume of water in a reservoir.** 📐  
Calculate the volume of water in the Bad Creek Reservoir by approximating a geometric shape for the surface area and hypothesizing an average depth or determining a maximum depth.

Three possible options are to assume a triangular solid, a hemisphere, and a cylinder.

Volume of triangular solid =  $1/2 bh l$  (area of triangle times depth)

Volume of hemisphere =  $2/3 \pi r^3$  Volume of cylinder =  $\pi r^2 h$   
Calculate the amount of power produced by that water based on the potential energy. Determine the elevation change as the water falls from the Bad Creek Reservoir surface to Lake Jocassee surface.

Potential Energy =  $mgh$  (mass X gravity X height)

4. **Locate a fire tower/wildlife observation center in wilderness.** ⚙

As a forest ranger for Sumter National Forest, you must locate and build a mountain cabin to service a combination fire tower / wildlife observation center in a wilderness area. You must locate the center at least two miles from the nearest paved road; and you must be on high ground to get a good view from the fire tower. You must also be sure your location is in South Carolina. What other factors do you have to consider when selecting your site? Present your plans as a group to the rest of the class. Evaluate other groups' sites.

5. **Evaluate power generation options for wilderness cabin.** 🖨  
⚙

Having located your cabin (from task #4), you will have to provide power of some kind to run your computer, short-wave radio, and other necessary household appliances. Refer to Figure 2B-3 "Operating Costs of Various Appliances" to determine your total power requirements. List all of the electrical appliances you will need along with their power requirements. Consider all of the different ways you can produce electrical energy to run these appliances. Do a cost-benefit analysis for each method and decide what method of power generation you will use. Note the environmental impact of each method you consider. Compare results among groups.

6. **Plan new housing subdivision on lake.** ➔

Plan the best location for a new housing subdivision on Lake Keowee by gathering data from the LAKE JOCASSEE REGION TOPOGRAPHIC MAP and the LAKE JOCASSEE REGION LITHOGRAPH. Use the Transparent Grid Overlay or a series of other transparent sheets as a template to record information. Use three different colors of wipe-off pens to shade in the following areas:

- Red = all areas one mile or less away from a paved road
- Green = all areas one mile or less away from Lake Keowee
- Blue = all areas one mile or less away from a power line corridor

Look over all areas that meet all of the criteria and select the best location for the subdivision. Why are these three criteria important for selecting sites for new subdivisions?

7. **Evaluate stream profile for hydroelectric potential.** ⚙

Using the LAKE JOCASSEE REGION TOPOGRAPHIC MAP as a guide, draw a stream profile graph along the line of the Thompson River from its confluence with Reed Branch (north of Long Spur Ridge and Misery Mountain) to its entry into Lake Jocassee. Treat the stream channel as a straight line (even though it's not) and transfer stream distance measurements to the

horizontal axis of your graph. Use only the marked index contour lines to transfer elevation data to the vertical axis of your graph. Before you set up your vertical scale, determine the beginning and ending elevation values for your stream profile. When your elevation points have been transferred, connect the points with a smooth line and describe the resulting profile. Explain why such a profile is appropriate for producing hydroelectric power, and is especially favorable for pumped storage projects. What other topographic factors are important for locating hydroelectric power projects?

8. **Speculate about future uses of facilities used for energy production.** ☼ →

In the future, nuclear fusion, solar, or some other abundant energy source might eventually replace the need for both nuclear fission power plants and pumped storage facilities. If the Bad Creek facility were no longer needed to produce energy, what would you do with the site? Refer to the LAKE JOCASSEE REGION TOPOGRAPHIC MAP and the LAKE JOCASSEE REGION LITHOGRAPH to justify and explain your plan. What would you do with the Oconee Nuclear Station power plant? Refer to the OCONEE AND KEOWEE STATIONS LITHOGRAPH inset to justify and explain your plan.

9. **Identify areas threatened by point source and non-point source pollution.** ☼

Refer to the LAKE JOCASSEE REGION TOPOGRAPHIC MAP, the BAD CREEK HYDRO STATION LITHOGRAPH inset, and Figure 2B-1 "Bad Creek Pumped Storage Project.". Trace on the lithograph the path of underground pipes and water flow, the reservoir, the building complex, and the outflow into Howard Creek. Also, for Howard Creek, identify areas of sediment influx and trace the stream channel downstream. For the spoils area, hypothesize as to why it was located so close to the reservoir, why it was terraced, and why the material was not simply used up in making the dam. Locate possible sources of both point source and non-point source pollution associated with the Bad Creek Project and suggest ways that Duke Power Company might have used to minimize environmental impact.

10. **Locate power line corridors.** →

Locate, on the LAKE JOCASSEE REGION LITHOGRAPH and the LAKE JOCASSEE REGION TOPOGRAPHIC MAP, several sets of power lines that come together at the Lake Jocassee Dam. Also locate these power lines on the JOCASSEE HYDRO STATION LITHOGRAPH inset. Which lines are shown on the lithograph, but not on the topographic map? Why is this so? Use a wipe-off pen to draw the missing power lines onto the topographic map. Are any power lines shown on the topographic map, but not on the lithograph? Can you determine which direction the electricity is flowing in a power line from map or lithograph information? Explain your answer.

11. **Determine whether power lines are visible from center of lake.** ☼ ☼

Power companies usually try to place their power lines so they are not easily seen. Determine whether the power lines to the east and to the west of Lake Jocassee (as seen on the LAKE JOCASSEE REGION LITHOGRAPH) are visible from a boat located in the exact center of the lake. The easiest way to determine this is to draw a topographic profile, using information on

the LAKE JOCASSEE REGION TOPOGRAPHIC MAP, from the center of the lake to the location of the power line in question and see if the power line lies in a direct line of sight. The center of the lake can be assumed to be the location where the Whitewater and Toxaway Rivers used to join together (before Lake Jocassee was constructed) to form the Keowee River. Group A should draw a topographic profile from the western power line to the center of the lake, while group B should draw a topographic profile from the eastern power line to the center of the lake. How easy is it to hide power lines from view?

12. **Compare ease of identification of features on map and photo.**



Use the JOCASSEE HYDRO STATION LITHOGRAPH inset to identify the dam, substation, parking lot, roads, power lines, and the peregrine falcon cliff (shaded shoreline area at very top center of inset image). Locate these same features on the LAKE JOCASSEE REGION TOPOGRAPHIC MAP. Which features are easier to identify on the map? Which features are easier to identify on an aerial image? How high is the peregrine falcon cliff? How deep is the lake at the base of this cliff? What is unusual about the way this cliff is illustrated on the topographic map?

13. **Analyze vegetation types by examining infrared color signatures.** ☛

Use the OCONEE AND KEOWEE STATIONS LITHOGRAPH inset and Figure 2B-2 "Oconee Nuclear and Keowee Hydroelectric Stations" to identify the cold-water intake area, warm-water release area, dam, hydroelectric plant, nuclear plant, waste storage facility, visitor center, parking lots, roads, and power line corridors. Analyze the different types of vegetation shown on this image by examining the infrared color signatures. Speculate as to what kind of ground cover is present on the dam, surrounding the nuclear plant buildings, along highways, along lakefront property, and in power line corridors. What advantages would each vegetation type have in each of these locations?

14. **Calculate change in lake levels when pumped storage water is released.** 🖨️

Use the BAD CREEK HYDRO STATION LITHOGRAPH inset and the Transparent Grid Overlay to calculate the surface area of Bad Creek Reservoir. The volume of many lakes can be approximated by multiplying the area times two-thirds of the maximum depth (or take volume value from task #3). Next use the LAKE JOCASSEE REGION LITHOGRAPH and the Transparent Grid Overlay to calculate the volume of Lake Jocassee the same way. Using these data, determine a method to predict the total rise in elevation of Lake Jocassee when Bad Creek Reservoir is drained to generate electricity. You may assume (for simplicity) that the entire reservoir drains, although this does not actually happen. Determine the percentage increase in volume of Lake Jocassee and use this information to determine the new elevation of the water surface.

15. **Explain why contour lines do not line up with lake shoreline.**



Examine closely the shoreline of Lake Jocassee as shown on the LAKE JOCASSEE REGION TOPOGRAPHIC MAP. Notice how the shoreline seems to cross contour lines in several places. Is

such a situation physically possible? Explain your answer. Explain how such a situation could happen during the process of printing a topographic map.

## **ENRICHMENT**

**1. Determine how much power people generate in one day. 📖 ⚙️**

Use a variety of references to determine how much horsepower the average person can generate in one day. How many light bulbs would this much power be able to light? How many hair dryers? Can you invent a way that human power could be harnessed to operate light bulbs and hair dryers? Share your results with the class. If any of the ideas seem practical, make it a class project to produce a working model of the invention.

**2. Research advantages and disadvantages of coal-fired energy facilities. ⚙️**

Research the requirements and environmental impact of coal-fired energy facilities. Would it be feasible to substitute coal-power for the Oconee Nuclear Power Station? Would it be feasible to substitute coal-power for a pumped-storage hydroelectric facility? What would be the long-term effects of such substitutions?

**3. Research the Duke Power Management Plan for the Bad Creek Project. ⚙️ 📖**

Obtain a copy of the Duke Power Management Plan for the Bad Creek area. Identify all of the partners who worked with the power company to plan and implement the pumped storage project. What did each group hope to accomplish by being a part of the partnership? Did they achieve their goal?

**4. Research public opinion of nuclear power plants through time. 📖**

Research various historical media to locate articles, documentaries, etc. that reflect changing public opinion toward the nuclear power industry at various points in recent history. For example, compare the treatment of nuclear power by postwar cartoonists and columnists in the 1940's to public reaction to the more recent Three Mile Island and Chernobyl nuclear plant accidents.