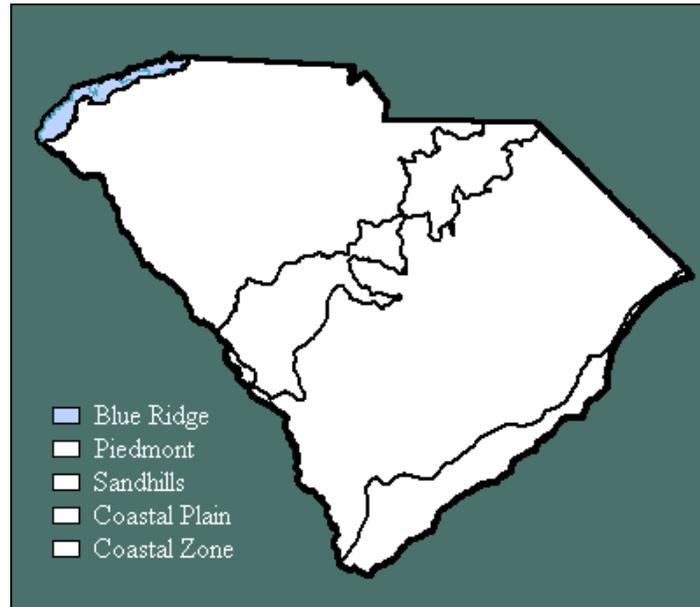


# Blue Ridge Ecoregion Terrestrial Habitats

## Description and Location

South Carolina's mountains are part of a multi-state region within the Southern Appalachians known as the Southern Blue Ridge Escarpment. The escarpment forms an abrupt transition between higher mountains in adjoining states and the piedmont. High-gradient streams fed by high annual rainfalls carve the mountain landscape (Griffith et al. 2002). A portion of the region's northern boundary in South Carolina is formed by the Eastern Continental Divide, which provides resource managers with the rare opportunity of working with ecological and jurisdictional boundaries.



The present-day landscape is the remnant of an ancient mountain chain, thought to be the result of three separate episodes of mountain building (King 1959). The underlying rocks are gneisses and schists that have weathered to relatively acidic soils. Soils consist of clay loams and sandy loams that are generally thin, with well-developed organic horizons on undisturbed sites (Myers et al. 1986). In some areas, weathering of rocks with high iron and magnesium content have produced more alkaline soils that support a flora distinct from that of habitats with more acidic soils.

Although the Blue Ridge in South Carolina constitutes a small portion of the state's land area (328,500 acres or 1.69 percent of the total area), it supports the most extensive upland hardwood forest complex in the state. The region is rich in floral diversity best expressed in the mixed mesophytic forest vegetation community (Braun 1950), and described as moist broadleaved forests that can harbor over 30 different tree species and many more types of fungi and ferns. Other biological resources unique to the region include a viable black bear (*Ursus americanus*) population extending across the North Carolina, Georgia and South Carolina state lines, sustained nesting of peregrine falcons (*Falco peregrinus*) following reintroduction in the 1980's and self-sustaining populations of native brook trout (*Salvelinus fontinalis*).

## Habitats and Priority Species

Overstory, understory, shrub and herbaceous plant communities of the Blue Ridge are generally related to topography, elevation, slope, and soil type of a site (Abella 2002). A few specialized habitats, such as bogs or rock faces, are present due to unique geological formations. Habitat types in the region generally blend from one to the next, rarely with abrupt transition. Because of this integration of communities, very few animal species are strictly associated with any single habitat type.

Habitat definitions primarily follow the Landscape Ecological Classification of Abella (2002), which is based on a multivariate analysis of geomorphology and vegetation on late successional sites (more than 70 years since timber harvest) in the Jocassee Gorges. To give a broader picture of habitat types across the region, the work of Patterson (1994) for the Ellicott's Rock in the extreme Northwestern corner of the region is incorporated, as are a number of classifications based on vegetation composition and structure, notably Nelson (1986). Variation of habitat characteristics within the region has not been systematically quantified, although white pine-dominated types are more prevalent in the western portion of the region. Some qualitative differences in vegetation composition between the Ellicott Rock and Jocassee Gorges areas have also been observed (Camp 2004).

### *Appalachian Oak & Oak-Pine Forest*

#### **General Description and Location**

Oak and oak-pine forests compose the predominant vegetation type throughout the Blue Ridge Ecoregion. Vegetation composition and structure is highly variable, depending primarily on exposure and position on slope and, secondarily, on soil moisture. Ridgetops and exposed upper slopes support an open canopy forest of oak species such as scarlet, black and chestnut oak and/or mixed pines and oaks. The understory is open, and groundcover is sparse; blueberry is a characteristic groundcover. Upper portions of hill slopes and exposed nose slopes typically support a canopy dominated by chestnut oak, with numerous hardwood co-dominants, and a shrub layer dominated on some sites by dense stands of mountain laurel. More mesic lower slopes, particularly north-facing slopes at intermediate and low elevations and sites along small streams and ravines, support diverse hardwood species, typically including white oak, tulip poplar, Fraser magnolia, and red maple. Diverse shrub and herbaceous species are also present, along with widely spaced clumps of mountain laurel. Early successional sites dominated by grasses, shrubs, and seedlings or saplings of numerous tree species are included in the definition of this habitat type.

#### **Associated Species**

Highest Priority: Loggerhead Shrike, Field Sparrow, Northern Bobwhite, Wood Thrush, Eastern Wood Peewee, Kentucky Warbler, Worm-eating Warbler, Prairie Warbler, Coal Skink, Green Salamander.

High Priority: Eastern small-footed Bat, Pine Snake, Timber Rattlesnake, Wood Frog, Meadow Vole, Appalachian Cottontail, Rafinesque's big-eared Bat, Hairy-tailed Mole, Red-backed Vole

Moderate Priority: Scarlet Tanager, Louisiana Waterthrush, Chestnut-sided Warbler, Black-throated Blue Warbler, Slender Glass Lizard, Eastern Woodrat, Spotted Skunk, Pygmy Shrew, Woodland Jumping Mouse.

### *Low Elevation Basic Mesic Forest*

#### **General Description and Location**

Low elevation mesic forest occupies relatively sheltered, well-drained sites on concave landforms and lower slopes. It is a rare type within the ecoregion, occurring only on sites

exhibiting unusually deep soils. It corresponds to the mixed mesophytic forest of Braun (1950), which is recognized for its rich floristic composition. Tulip poplar typically dominates the overstory, and Carolina silverbell is a characteristic in the mid-story or understory. The shrub layer is typically sparse or absent. Herb species richness and cover are highest in this type and characteristic ground flora species include bloodroot, foamflower, silverbell, partridge berry, cane and ginseng. Mixed mesophytic forests are recognized generally as habitats within the Southern Appalachians that support high densities and/or provide optimal habitat for many species of breeding birds and as have high salamander species diversity (Hunter et al. 1999).

### **Associated Species**

Highest Priority: Wood Thrush, Green Salamander

High Priority: Acadian Flycatcher, Coal Skink, Seepage Salamander, Shovel-nosed Salamander, Wood Frog, Eastern small-footed Bat, Hairy-tailed Mole, Red-backed Vole, Masked Shrew

Moderate Priority: Scarlet Tanager, Jordan's Salamander, Eastern Woodrat, Spotted Skunk, Rafinesque's big-eared Bat, Pygmy Shrew, Woodland Jumping Mouse

### *Low Elevation Acidic Mesic Forest*

#### **General Description and Location**

Low elevation acidic mesic forest occurs on well-drained, relatively sheltered sites in stream bottoms, along ravines of small streams or on hill slopes. The type is more prevalent on north facing slopes or lower positions on other slopes. Eastern hemlock is the characteristic tree, occurring either as the dominant overstory or understory tree; rhododendron dominates the shrub layer, occurring in thickets or solitary clumps. Tulip poplar, white pine, hickories, sweet birch, beech and basswood are common associates. White pine becomes much more dominant along with hemlock in the Ellicott Rock /Chattooga River basin in the western portion of the Blue Ridge. The type provides key habitat for wildlife species associated with riparian habitats.

### **Associated Species**

Highest Priority: Swainson's Warbler, Coal Skink, Appalachian Cottontail

High Priority: Acadian Flycatcher, Seepage Salamander, Wood Frog

Moderate Priority: Ruffed Grouse, Red-breasted Nuthatch, Golden-crowned Kinglet, Red Crossbill, Spotted skunk, Eastern small-footed Bat, Eastern Woodrat, Rafinesque's big-eared Bat, Hairy-tailed Mole, Red-backed Vole, Pygmy Shrew, Woodland Jumping Mouse

### *High-elevation Forest*

#### **General Description and Location**

In South Carolina, this type is limited to the highest peaks. Occurring at scattered sites at over 900 meters elevation, South Carolina represents the southern limit of this habitat (Braun 1950). Several canopy trees, other plant species and a few priority wildlife species, are also at their southern range limits. Canopies consist of red maple, chestnut oak, northern red oak, black oak hickory and yellow poplar. Herbaceous species diversity is high, but less than that occurring in mesic hardwood/bloodroot or cove forests. High-elevation forest is distinguished from other

forests by the lack of calciphilic species and the dominance of red maple and chestnut oak. On steep to very steep upper to middle slopes with northerly aspects, vegetation is dominated by northern red oak with or without lesser amounts of chestnut oak and red maple. Rosebay rhododendron or great laurel (*Rhododendron maximum*) forms a dense continuous subcanopy and on more exposed sites, piedmont or small-leaf rhododendron (*Rhododendron minus*) becomes more dominant.

### **Associated Species**

Highest Priority: Field Sparrow, Northern Bobwhite, Wood Thrush, Eastern Wood-pewee, Prairie Warbler, Coal Skink  
High Priority: Black-throated Blue Warbler, Timber Rattlesnake, Wood Frog, Appalachian Cottontail, Hairy-tailed Mole, Red-backed Vole, Masked Shrew  
Moderate Priority: Scarlet Tanager, Chestnut-sided Warbler, Ruffed Grouse; Dark-eyed Junco, Common Raven, Red-breasted Nuthatch, Golden-crowned Kinglet, Red Crossbill, Eastern small-footed Bat, Rafinesque's big-eared Bat, Eastern Woodrat, Spotted Skunk, Pygmy Shrew

### *Riverbanks, Streambanks, and Alder Zones*

#### **General Description and Location**

This habitat types forms the riparian vegetation zone on streams and rivers, typically along wadeable or navigable streams that are wide enough to prevent canopy closure, at scattered locations with a suitable substrate of seasonally flooded rocky or alluvial soils. It exhibits variation in size and persistence. At the base of the escarpment, this habitat also occupies broad floodplains, where it grades into the floodplain forest types of the upper piedmont (Barry 1980). Alder (*Alnus* spp.) is a characteristic species that occurs in relative abundance along with mixed canopy species. Common shrubs are yellow root (*Xanthorhiza simplicissima*), Virginia willow (*Itea virginica*), azalea (*Rhododendron* spp.) and occasionally black willow (*Salix nigra*) and sweet pepperbush (*Clethra alnifolia*).

### **Associated Species**

Highest Priority: Rusty Blackbird  
High Priority: Acadian Flycatcher, Hellbender, Mink, Eastern small-footed Bat, Star-nosed Mole, Red-backed Vole

### *Moist or Wet Types Due to Unique Landform*

#### **General Description and Location**

Highly variable landforms within the Southern Blue Ridge Ecoregion include numerous wet places that increase local and regional habitat diversity. Open seeps of variable size occur on granitic cliffs and domes. Spray cliffs occur in spray and splash zones at the edges and bases of waterfalls. Upland bogs form in poorly drained wet seepage areas at heads of small streams, which are nearly always saturated. Upland bogs are characterized by Sphagnum (*Sphagnum* spp.) and many bog species such as orchids and sedges. Vegetation in upland bogs is apparently fire-controlled. Without burning, succession leads to a wetland community dominated by woody vegetation.

### **Associated Species**

Highest Priority: Bog Turtle, Coal Skink, Shovel-nosed Salamander, Green Salamander  
High Priority: Seepage Salamander, Wood Frog, Meadow Vole, Appalachian Cottontail,  
Star-nosed Mole, Red-backed Vole  
Moderate Priority: Woodland Jumping Mouse

### *Vertical or Horizontal Rock Outcrop*

### **General Description and Location**

Rock outcrops of widely varying sizes and slopes occur throughout the region. Slopes range from nearly horizontal to nearly vertical. The more extensive and exposed outcrops have their own characteristic vegetation and habitat features. Vegetation ranges from none, (bare rock) to a mosaic of herbaceous plant, shrub and tree-dominated communities. Successional trees, such as eastern red cedar (*Juniperus virginiana*) and Virginia pine (*Pinus virginiana*) are common on these sites. Crevices and ledges can only provide habitats for larger plants once sufficient soil has built up. Vegetation communities are relatively unstable. A cliff or dome may also have a significant area of wet seepage zones.

### **Associated Species**

High Priority: Peregrine Falcon, Pine Snake, Timber Rattlesnake  
Moderate Priority: Appalachian Cottontail, Eastern small-footed Bat, Rafinesque's big-eared Bat, Dark-eyed Junco, Common Raven

### **General Condition of Habitats**

At higher elevations, the current landscape consists of large tracts of unbroken forest. Overall condition is best described as trending toward mid-successional, relatively lacking in both the early successional stages resulting from disturbances and the late-successional or “old growth” stages characterized by canopy openings and other complexity-providing structures.

Eighteenth century European settlers cleared flatter sites at all elevations for agricultural settlements and utilized wood from surrounding forests for a variety of purposes (SCDNR, 1998). Beginning in the late nineteenth and early twentieth centuries, industrial development in the upper piedmont led to a period of extensive timber extraction. Early logging operations focused on removing oaks and yellow poplar from cove and mid-slope forests for construction timbers (SCDNR 1998; Abella 2002). Later logging operations utilized a network of temporary roads that penetrated the entire region. Therefore, between the early intensive logging at lower elevations and more recent logging roads accessing higher elevation sites, almost all sites in the region have been subjected to timber extraction in some form.

Beginning in the mid-twentieth century, a round of land consolidations began, which shifted ownership toward public and quasi-public purposes. In 1963, the Jocassee Gorges property was purchased by the Duke Power Company for hydropower development, a transfer that set the stage for the property's ultimate acquisition by the SCDNR in 1998. Other significant transfers in modern times include Sumter National Forest in Pickens and Oconee Counties; Poinsett and

Table Rock Reservoirs in Greenville County; Table Rock, Jones Gap and Caesars Head State Parks; and several acquisitions by the SCDNR. Comparison of public versus private ownership in the Blue Ridge is illustrated in the adjacent map. The following table also provides a summary of the land holdings in the Blue Ridge.



Major Public Land and Protected Private Holdings in conservation status in the Blue Ridge Ecoregion (hectares)	
City of Greenville, S.C.	7,614
South Carolina Department of Natural Resources	16,075
South Carolina Department of Parks, Recreation & Tourism	5,867
The Nature Conservancy	12,690
United States Forest Service	31,032
<b>Grand Total</b>	<b>73,278</b>
<b>Proportion of region in conservation status</b>	<b>53%</b>

Forest condition and age on public lands varies with ownership. Although the Sumter National Forest is managed under a multiple-use approach, recent legal challenges have significantly curtailed forestry operations. Current composition on Sumter National Forest is primarily a mixture of mid-successional pine-hardwood stands and managed pine-dominated stands of various ages. The SCDNR-owned Jocassee Gorges tract was heavily logged before acquisition by the SCDNR and US Forest Service, while the Greenville Watershed and State Park lands have a long history of passive management.

Fire management practices also vary across the region, ranging from regular use of prescribed fire on the Sumter National Forest to total fire exclusion on Greenville Watershed and State Park lands. Current burning practices are contradictory to historic descriptions of widespread wildfires that created relatively open stands with sparse woody understory vegetation (Brose et al. 2001).

Habitats at lower elevations in the Blue Ridge are ecologically similar to those of the adjoining Piedmont Ecoregion. Settlement and land use patterns at these elevations are also similar to those of the piedmont; most land is in private ownership and, as such, land uses have become highly fragmented with agriculture, managed woodlands and residential uses separating tracts of natural forests. Further, many historic farming communities are undergoing rapid development as land values are increase rapidly. Amenities such as Highway 11, a scenic highway running along the base of the escarpment, SC PRT properties and Lakes Keowee and Jocassee contribute to the Blue Ridge region's popularity for recreation and development.

## Region-wide Challenges

Most forests in the region are in mid-successional stages; therefore the forest structure is not optimal for many priority bird species (Hunter et al. 1999) and possibly species in other taxa. As forests mature, an optimal age structure is expected to develop; however, management practices that favor a faster transition or provide some of the characteristics of mature forest would benefit many priority species.

Fire exclusion that has been the practice since the early 1900's may be leading to landscape-level changes in forest. These changes include the gradual replacement of oak species by less fire-tolerant species in the overstory and increased dominance of ericaceous plants in the shrub cover (Abella 2002). At the same time, several studies indicate that early successional habitat may be lacking, which provides obligate or optimal habitat for some priority species (Abella 2002; Camp 2004).

At lower elevations and at scattered locations at higher elevations, the region is experiencing a boom in development. This activity is spurred in part by the attraction of nearby mountain scenery, which is enhanced by the large public land base protecting the views. If present trends continue, the predominant mix of agricultural lands and woodland existing at lower elevations will continue to be supplanted by residential and recreational developments. As a consequence of this region-wide shift in land use, the suitability of private land for priority species will change. As the mountains become accessible to more people, recreation pressure is increasing, a trend that can be expected to continue. Finally, increasing human populations can be expected to lead to increasing numbers of human-wildlife conflicts.

The hemlock woolly adelgid threatens to eliminate eastern hemlock from the region's forest over time. Originally confined to the New England states (McClure 1987), this exotic insect pest first appeared in the Southern Appalachians in approximately 2002. Other potentially destructive insects, parasites and diseases that have been reported from other locations near the Blue Ridge include gypsy moth, dogwood anthracnose disease and sudden oak death.

Based on data and analyses of air quality sources within the Southern Appalachian region, concentrations of potentially damaging air pollutants are relatively low along the Blue Ridge, and susceptibility of streams and vegetation to impacts from atmospheric pollution in this region is also relatively low (SAMAB 1996). However, impacts have been reported from other portions of the Southern Appalachians, so this situation should continue to be monitored.

Major recreation resources such as the Foothills Trail and popular state parks such as Table Rock, Mountain Bridge and Jones Gap, as well as the recent Jocassee Gorges acquisitions have stimulated demand for recreational access to public lands within the Blue Ridge Escarpment. Although accounts of visitation trends are currently anecdotal, visitation and demand for services is increasing dramatically. The second regional trail to traverse the escarpment, the Palmetto Trail, is also nearing completion and is expected to draw additional interest and traffic to the region. Managing agencies face competing demands for access by users whose interests are not always compatible. Impacts of recreation uses on the resource base vary by intensity and type, posing challenges to meeting resource-based management objectives.