# AN INVENTORY OF THE SIGNIFICANT NATURAL AREAS OF CALDWELL COUNTY, NORTH CAROLINA

James E. Padgett
Inventory Biologist

North Carolina Natural Heritage Program
Office of Natural Resource Planning and Conservation
Department of Environment and Natural Resources
Raleigh, N.C.

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## ABSTRACT

This inventory of the significant natural areas, ecological communities, and rare plant and animal species of Caldwell County was funded by the North Carolina Natural Heritage Trust Fund. Of the 100 counties in the state, Caldwell County ranks in the top half in terms of total numbers of rare species and community types within North Carolina. This report provides background information on the county as a whole and descriptions of 33 Significant Natural Heritage Areas (SNHAs), including two aquatic habitats and one large landscape-scale macrosite. The descriptions of SNHAs include information on their significance (National, State, Regional, and County), viability, natural community types, rare species, management needs, and protection status. This report is designed in part to provide guidance for land use decisions by private landowners, conservation and land management agencies, and county government. The North Carolina Natural Heritage Program (NCNHP) supervised the field work conducted during the 2006-2007 growing seasons.

Most of the survey work was conducted in three very different localized regions of the county. The first region is the Blue Ridge Escarpment, covering the northwestern third of the county. It contains some of the best examples of rare natural communities and rare species in the county, with a Nationally Significant cluster of rare species and natural community examples located at Grandfather Mountain, the highest point in the Blue Ridge Mountains. The second region covers the northeastern third of the county. This area is known as the Brushy Mountains, and is called in this inventory the Foothills region. Much of this region has yet to be explored due to a lack of permission to conduct any extensive survey work there, but portions of this region that have been explored have yielded some significant finds, and hint at the potential diversity and unique natural communities that might occur there. The third region is the Piedmont, covering the remaining southern portion of the county. This region has had heavy human impacts since the late 18$^{th}$ century, resulting from numerous agricultural, residential, and timber-based enterprises. These enterprises have decreased the overall biodiversity of this region, but small pockets of biodiversity still do exist, mostly in the form of rare plant sites.

**ACKNOWLEDGMENTS**

During the course of this inventory, many agencies, organizations, and individuals contributed to the planning, progress, and completion of the work. I am very appreciative of the assistance and support provided by all the staff of the Foothills Conservancy of North Carolina, especially Andrew Kota, with whom I spent many hours in the field in Caldwell County. The U.S. Forest Service (USFS) have allowed me unfettered access to many different parts of the Pisgah National Forest. Within the USFS a special thanks goes to the staff at the Grandfather Ranger District, especially to biologist Dave Danley and Gary Kauffman for their assistance and expertise. The North Carolina Chapter of The Nature Conservancy also contributed greatly to this report by allowing access to their easements located at Grandfather Mountain and Wilson Creek. At Grandfather Mountain, the staff were a great asset. They allowed me to enjoy and explore the mountain in detail. Within the Caldwell County government, I'd like to thank the County Planner, Eric Woolridge and the Caldwell County Tax Office who provided county GIS data and ownership updates. I am also grateful to various herbaria that allowed to study and deposit plant specimens, as well as provide species distribution information. The herbaria that contributed to this inventory are the Gardner-Webb University Herbarium, the Appalachian State University Herbarium (ASU), and the University of North Carolina at Chapel Hill Herbarium (UNC-CH). A special thanks go to Dr. Zack Murrell and Derick Poindexter of ASU for working with me in the Wilson Creek Gorge area of Caldwell County.

I am also very appreciative and grateful to all of the landowners of Caldwell County who permitted me access to their private lands for this inventory. This work would not be possible without the private landowners who recognized the importance of identifying the significant natural areas within the county. I would like to express my thanks to the North Carolina Natural Heritage Trust Fund for funding this inventory. I would like to thank all my colleagues at the North Carolina Natural Heritage Program for providing valuable information and critical insight to this project. In particular, Harry LeGrand and Kristen Sinclair of for editing and reviewing this document. Kristen Sinclair also assisted with the preparation of several figures in the report and contacted landowners and obtained inventory permission. I would also like to thank Angie Rodgers for work and assistance with the Aquatic Habitat updates and site descriptions.

The cover photograph is of an Allegheny onion (*Allium allegheniense*) found growing on the cliffs at Blowing Rock Cliffs. The photo was taken by the author.

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# INTRODUCTION

## OBJECTIVES

The objective of this inventory was to identify and describe the Significant Natural Heritage Areas (SNHAs) of Caldwell County. Significant areas contain good to excellent examples of natural communities, and rare plant and animal populations. Natural areas are reservoirs for biodiversity and contain habitats that are crucial to the long-term survival of species present within them. Natural areas are critical to the overall ecological, scientific, aesthetic, environmental health, recreational, and educational benefits that they provide for the human community. For example, natural areas can play a significant role in groundwater recharge and pollution control. Recent increases in land development throughout the state, including Caldwell County, threatens, and in many cases, reduces or eliminates natural areas and repositories of natural diversity. In order to maintain high quality habitats and guide development toward less sensitive areas, it is crucial to identify high quality areas and protect them, with the willing cooperation of the landowners and surrounding communities.

## METHODS

The methods used for this inventory are those established by the North Carolina Natural Heritage Program (NCNHP), within the Office of Natural Resource Planning and Conservation of the North Carolina Department of the Environment and Natural Resources (NC DENR). The NCNHP maintains the state's primary database of geographic information for rare species (both plant and animal), as well as for exemplary natural community types and Significant Natural Heritage Areas.

Field surveys for Caldwell County fell within three major regions: the Blue Ridge (Blue Ridge Escarpment and Grandfather Mountain), the Foothills (The Brushy Mountains and Yadkin River Valley), and the Inner Piedmont, with emphasis placed on surveying both public and privately-owned lands. Due to the large percentage of public land within Caldwell County (roughly 35-40%), mostly within the Pisgah National Forest, a considerable amount of fieldwork was spent surveying public lands. Private landowners gave verbal or written consent for their properties to be included in the inventory. Searches for rare plant species, and natural community types were conducted during field surveys in 2006 and 2007. Specific surveys for rare animals were not a major component of this inventory, however, information from previous animal surveys and chance discoveries are included.

For a number of reasons, this inventory is not a complete record of all natural areas in Caldwell County. Although thousands of acres were identified, surveyed, and found to be significant, they only represent a fraction of the total land area within the county. Some potential areas were not surveyed due to lack of landowner permission or a lack of time. Smaller, more fragmented tracts in less pristine condition were given lower priority. It is almost certain that additional natural areas

would be found if currently inaccessible areas become available for biological surveys.

This inventory drew upon data maintained by the NCNHP from previous inventory work, including rare species records and previous reports on natural areas. In addition to this, topographic maps, geologic maps, and aerial photographs were used to help target potential areas of interest. For sites that merited recognition as SNHAs, natural communities and rare species are described using standard report formats developed by the NCNHP. Updated SNHA boundaries and rare species occurrences are maintained at the NCNHP headquarters in Raleigh, in a Geographic Information System (GIS) database. The information is available from NCNHP, the Center for Geographic Information and Analysis (CGIA) in Raleigh, and the western regional office of CGIA in Asheville.

SNHAs are ranked as National, State, Regional, or County Significant based on criteria used by the NCNHP. The criteria used for site significance are:

**National Significance:** These sites are considered to contain examples of natural communities, rare plant or animal populations, or other significant ecological features that are among the highest quality occurrences of their type in the nation. Comparable (or more significant) sites may occur elsewhere in the nation.

**State Significance**: These sites are considered to contain examples of natural communities, rare plant or animal populations, or other significant ecological features that are among the highest quality occurrences in North Carolina after any Nationally Significant examples. There may be comparable (or more significant) sites elsewhere in the nation or the state.

**Regional Significance**: These sites contain communities or species that are represented elsewhere in the state by better quality examples, but which are among the highest quality or best examples in their geographic region of the state. The geographic region within which they are considered is based on location and geologic and/or geomorphic similarity and is defined by NCNHP.

**County Significance**: These sites are considered to contain significant biological resources at the county level, but which do not rank at the regional (or higher) level. These may include sites with a good examples of fairly common community types that are better represented elsewhere, but are important at a local scale.

# DESCRIPTION OF THE STUDY AREA

## GENERAL OVERVIEW

Caldwell County is located in the west-central portion of the North Carolina Inner Piedmont, at the interface of the Piedmont and the Blue Ridge physiographic provinces. Watauga County borders it to the north; to the east it shares a border with Alexander, Catawba, and Wilkes Counties; to the west and south it shares borders with Avery County and Burke County. Caldwell County has an area of 474 square miles (361,791 acres). Of that, approximately 271,343 acres lie within the western Piedmont while the remaining 90,448 acres fall into the Blue Ridge Escarpment or the Brushy Mountains region. The population was 77,415 in 2002, and was estimated at 79,122 in 2005 (U.S. Census Bureau).

Figure 1 shows the municipalities and major roads of the county. The county seat and the largest municipality is the town of Lenoir, with a population of 16,793. Most of the county's municipalities are found along US 321 (Alternative, Business, and Bypass routes). Along this stretch of roadways includes the incorporated towns of Blowing Rock, Granite Falls, Hudson, and Sawmills. Other smaller municipalities scattered throughout the county along secondary roads include Cajah's Mountain, Cedar Rock, Collettsville, Gamewell, and North Lakes. Even more numerous smaller communities exist throughout the county.

## CLIMATE

Caldwell County's climate varies greatly from northwest to southeast. This is mainly due to the effects of the high elevation region around Grandfather Mountain. The temperature at Grandfather Mountain averages roughly 20 degrees cooler than the Piedmont region around Lenoir. Another significant climate feature associated with Grandfather Mountain is the extremely high surface winds that occur there. The highest wind speed recorded to date is 200 mph on January 2006, breaking the previous record of 195.5 mph in 1997 (the wind gauge at Grandfather Mountain only records up to 200 mph). In comparison, the highest surface wind speed ever recorded in the world from a weather station is 231 mph at Mount Washington, New Hampshire in 1934.

Caldwell County has four distinct seasons in these two fairly distinct regions (high and low elevation) of the county. The average winter daytime temperature is 51 degrees Fahrenheit in Lenoir and 35.8 degrees Fahrenheit at Grandfather Mountain, while the average daytime summer temperature reaches 88 degrees Fahrenheit in Lenoir and 69.5 degrees Fahrenheit at Grandfather Mountain. The average annual rainfall is 48.9 inches in Lenoir and 62.4 inches at Grandfather Mountain, with annual snowfall averaging 6.4 inches at Lenoir and 54.2 inches at Grandfather Mountain.

## TOPOGRAPHY AND PHYSIOGRAPHY

Physiographic provinces are expanses of land with similar geomorphic and geological features. Caldwell County lies in two physiographic provinces: The Blue Ridge Province and the Piedmont Province. In order to facilitate the process of ranking Significant Natural Heritage Areas, the NCNHP has divided the physiographic provinces into small regional units known as NCNHP Aquatic and Terrestrial Regions (Figure 2). These regions are also used here to discuss physiography and topography. The Northern Mountain Terrestrial Region is part of the larger Blue Ridge physiographic province. The Middle Foothills are part of the larger Piedmont physiographic province.

The northwestern third of Caldwell County is in the Northern Mountain Terrestrial Region. This region is characterized by a rugged topography of high peaks, ridges, coves, and small valleys extending west from the slopes of the Blue Ridge Escarpment to the state line with Tennessee. The highest peak is Calloway Peak at Grandfather Mountain at 5,964 ft. It lies in the northwestern most portion of the county, and is also the highest peak in the Blue Ridge Mountains (Mount Mitchell, the highest peak in the eastern U.S., is located in the Black Mountains).

The southeastern two-thirds of Caldwell County fall within the Middle Foothills Terrestrial Region. This area consists of rolling hills and small mountainous areas (Brushy Mountains) with steep slopes and narrow ridges ranging from1,200 ft to 2,600 ft. In the southernmost part of this region, elevations range down to 900 ft.

Caldwell County contains parts of two river basins: the Catawba River Basin and the Yadkin River Basin. The major rivers in Caldwell County are the Johns River and the Yadkin River. The Johns River-Catawba River system drains about 70% of the county. The headwaters of the Johns River start at the top of the Blue Ridge Escarpment near Blowing Rock. Its tributaries include Mulberry Creek, Wilson Creek, and Lower Creek. Numerous smaller tributaries such as Lower Creek drain southward into the Catawba River and eventually flow into Lake Rhodhiss, one of six large reservoirs located on the Catawba River as it flows through North Carolina. The Yadkin River Basin drains the remaining 30% of the county. The Yadkin River headwaters are located near Blowing Rock and the river flows southward towards the community of Patterson, turning northeast to flow into Wilkes County. Major tributaries of the Yadkin River include Buffalo Creek, Kings Creek, and Little Kings Creek.

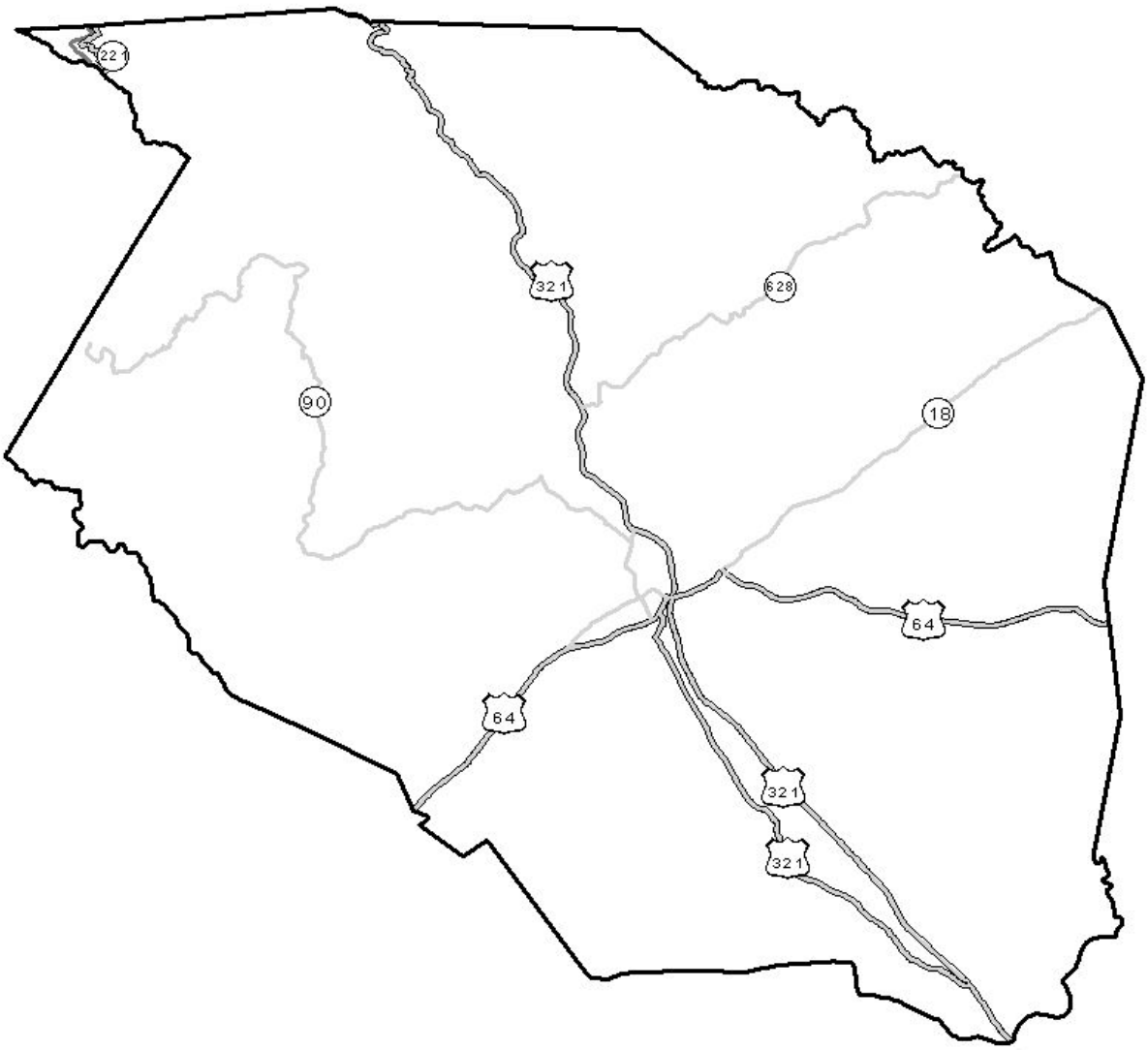


Figure 1. Municipalities and Major Roads of Caldwell County, North Carolina.

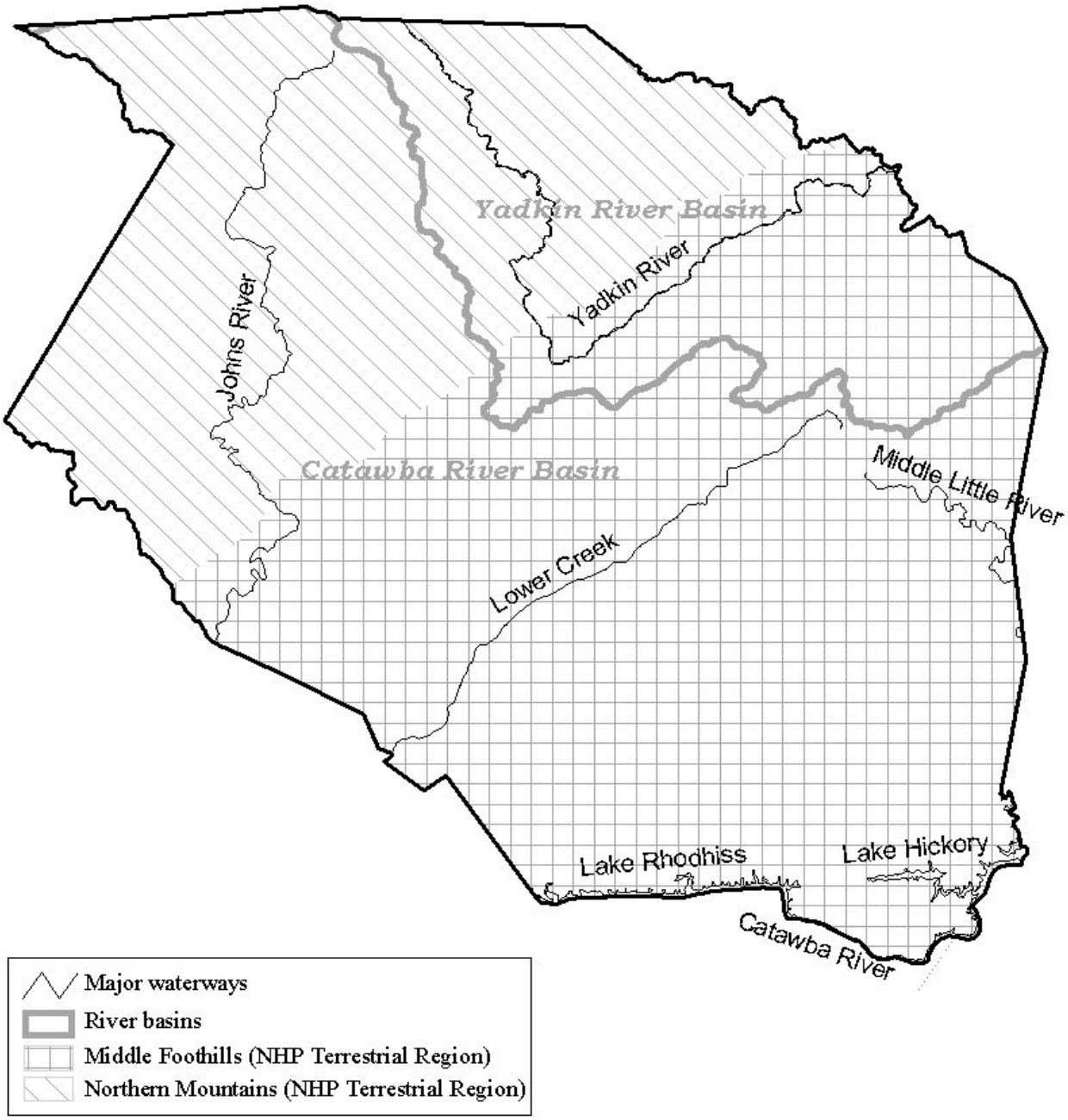


Figure 2. NCNHP Terrestrial Regions, River Basins, and Waterways of Caldwell County, North Carolina.

## GEOLOGY AND SOILS

### Geology

Like many regions in the Southern Appalachians, the geology of Caldwell County is the result of the accumulation of many different geologic processes over time. These processes include uplift of the mountains caused by continental collision, sedimentation, igneous and sedimentary rock formation (including metamorphosis of these rock types due to extreme heat and pressure), and intrusion of molten materials. Over time, weathering and erosion of these rock formations have resulted in a unique profile of geologic formations of various ages and composition. The erosion of softer materials has left behind more erosion-resistant rock types that comprise the high peaks found in the northwestern portion of the county near Grandfather Mountain. Soils originating from the erosion of rock, especially rocks with basic pH levels, often contribute to nutrient rich soils (high in magnesium, iron, and calcium). These soils are often present in areas of high biological diversity. Soils that form from acidic pH rock types generally have overall lower biological diversity. Figure 3 shows the major rock types found in Caldwell County (North Carolina Geologic Survey, 1985). The southeastern half of the county is underlain mostly with metamorphic rock consisting of biotite, gneiss, and schist, migmatitic granitic gneiss, biotite gneiss, schist, and mica schist (these generally erode into acidic soils). These rock types are associated with the Inner Piedmont Region of the Piedmont physiographic province and include the Brushy Mountain range.

Between the Inner Piedmont and Blue Ridge Belts lies the Brevard Fault Zone. The fault zone runs southwest to northeast through Caldwell County and lies along the Johns River. Several smaller fault lines also run southwest to northeast through the county north of the Brevard Fault Line. Some of these faults cross through Wilson Creek Gorge, the Johns River, and Mulberry Creek, and across a high ridge of mountains north of the main Brevard Fault Zone and the Yadkin River near the base of the Blue Ridge Escarpment.

In the northwestern half of the county, the geology is of the Blue Ridge Belt, and changes dramatically as the elevation rises. This part of the county is underlain with intrusive, metamorphic, and sedimentary rock types with many unconformities present including some with mafic qualities. Prominent rock formations found in the county associated with this Belt include the Alligator Formation, the Blowing Rock Formation, and the Grandfather Mountain Window Formation. Rock types found in lesser amounts in this region include garnet-mica schist, granitic gneiss, metamorphic granite, and biotite granitic gneiss. Minor amounts of meta-ultramafic rock are also present. Mafic rock types generally weather into nutrient-rich, high pH basic soils that are habitat for numerous rare plant species and unusual natural community types.

For additional information and discussion regarding the geology the region, refer to Justus (1971) and Boyer (1978).

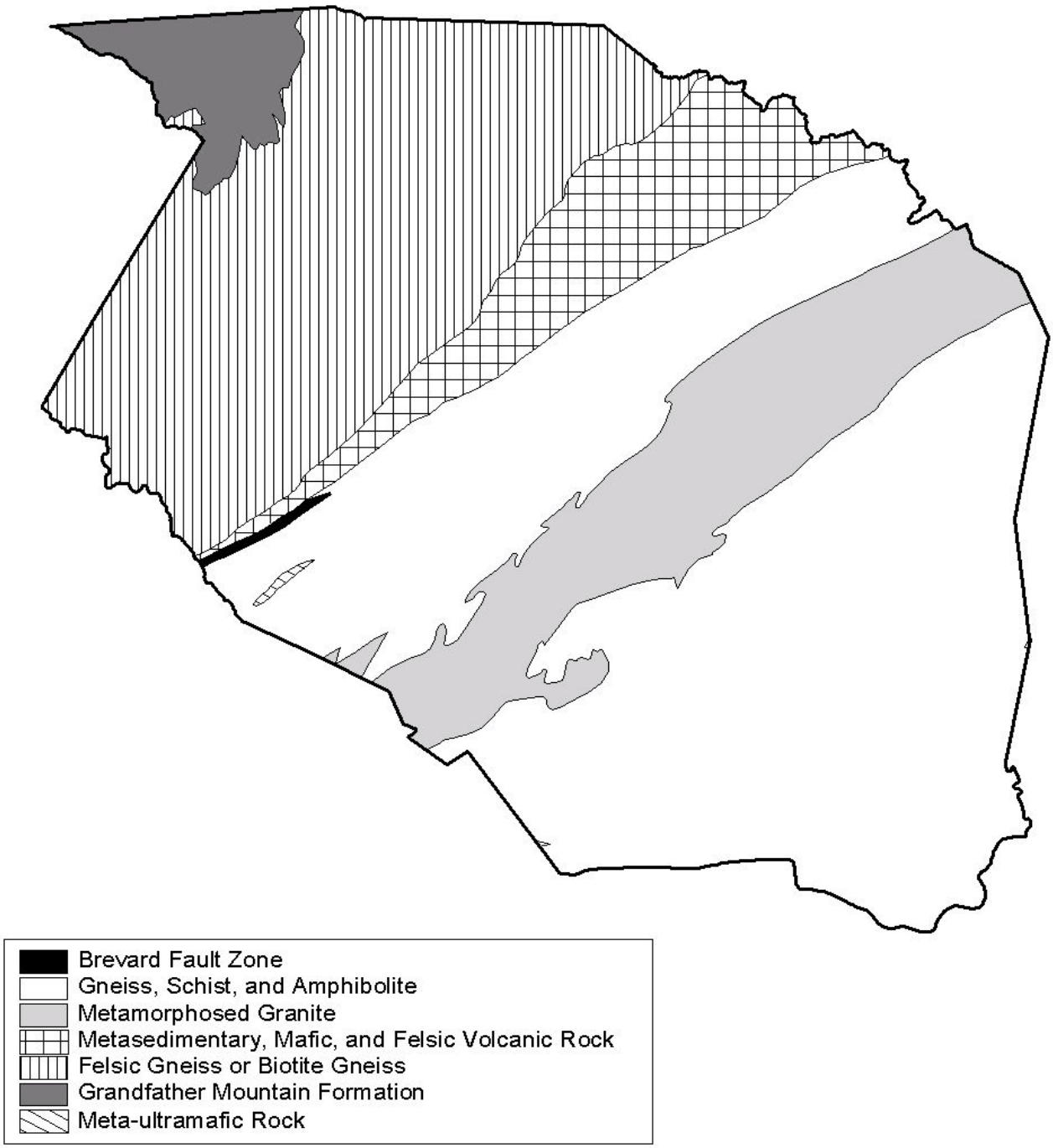


Figure 3. Geologic Map of Caldwell County, North Carolina.

## Soils

There are three major taxonomic soil groups containing most of the soil types within Caldwell County. They are the Kanhapludult, Drystrudept, and Hapludult taxonomic soil classes. The majority of soils in Caldwell County fall into the Kanhapludult taxonomic class (39.9% ), which consists of fine thermic soils. They are well-drained soils occurring across a broad range of landform including interfluves, hillsides, ridges, upper slopes, and mountain summits. These soils form from various parent material such as granite, gneiss, and schist. The most common of these in Caldwell County are Cecil, Davidson, Haynesville, and Pacolet series.

The second large group of soils falls into the Drystrudept taxonomic soil class (31%). Of that 4.2% are Fluvaquentic Drystrudept. These soils are well-drained and are often found on mountain slopes and ridges. They generally form from weathering of parent igneous and metamorphic rock. The most common of these in Caldwell County are Ashe, Chestnut, Chewacla, and Wehadkee series.

The third large group of soils falls into the Hapludult taxonomic soil class (25.1%), which is fine-loamy soils. These soils are well-drained and often found in stable, older landscapes, slopes, and ridges. They are formed from creep deposits over residuum weathered from igneous and metamorphic rock. They are often leeched of minerals and nutrients required for plant growth, and are often quite acidic. The most common of these present in the county are Dogue, Evard, Hibriten, Masada, Rion, Saluda, Slate, and Tate series.

For additional information and discussion regarding soils in Caldwell County soils, please refer to the Natural Resources Conservation Service, U.S. Department of Agriculture web soil survey web page located online at: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx.

## LAND USE

Caldwell County consists of both private and public lands that form a mosaic of timberlands, farms, numerous towns, and residential communities. The majority of the public land is located within the Pisgah National Forest (comprising roughly 30% of the county) and managed by the U.S. Forest Service. Located in the northeastern part of the county is the Buffalo Cove Game Lands managed by the North Carolina Wildlife Resources Commission (roughly 5-7% of the county). Also, a small portion of the Blue Ridge Parkway crossing the northwestern portion of Caldwell County is managed by the National Park Service (Figure 4). Although many areas remain forested (often 2$^{nd}$ and 3$^{rd}$ generation forest), logging activities are common in many parts of the county, including publicly-owned lands to a lesser degree. Agricultural activities have declined in last few decades throughout the county with much of the former agricultural lands being converted to residential developments, especially in areas located along the US 321 corridor between Hickory and Lenoir.

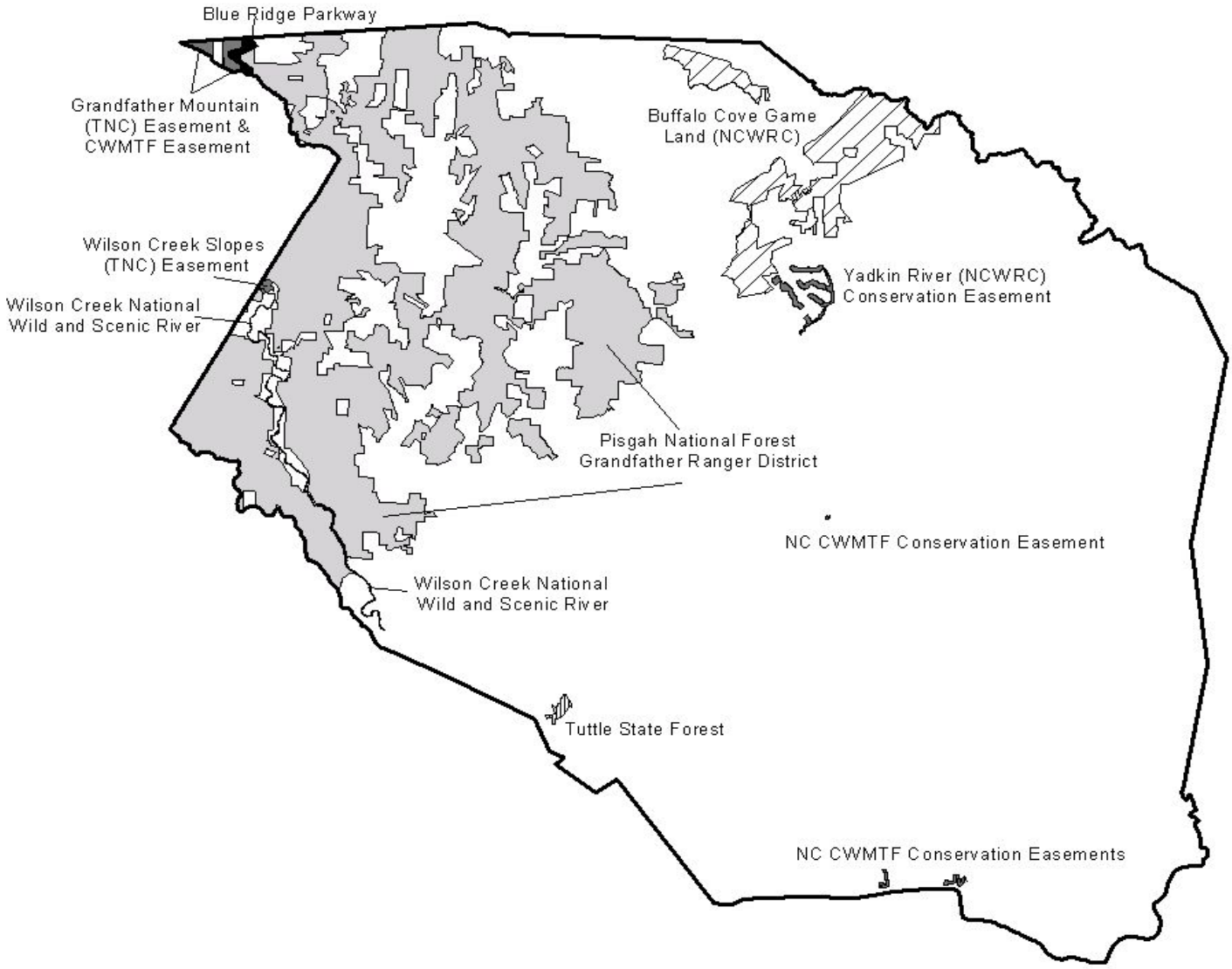


Figure 4. Public and Private Conservation Lands of Caldwell County, North Carolina.

## SUMMARY OF RESULTS

### NATURAL AREAS

This inventory identifies 32 Significant Natural Heritage Areas and one landscape-scale macrosite in Caldwell County. These sites are listed in Table 1, and their distribution throughout the county is mapped in Figure 5 with corresponding numbers.

Of the 32 sites identified in Caldwell County, Grandfather Mountain, Peaked Top Rare Plant Site, and Wilson Creek Aquatic Habitat are considered Nationally Significant, meaning they are among the some of the best examples of their kind in the nation. Nine sites were identified as State Significant, making them among the best in the examples in the state. Of the remaining sites, thirteen were identified as Regionally Significant and seven as County Significant.

The Significant Natural Heritage Areas have been organized by their geographic and ecological features into three broad groups. The first group is the Blue Ridge Escarpment, which encompasses the natural areas in the northwestern portion of Caldwell County. Sites in the region include well-known areas such as Grandfather Mountain, Blowing Rock Cliffs, and Wilson Creek Gorge. This region includes both high and low elevation natural communities and numerous rare species.

The second group is the Brushy Mountains/Upper Yadkin Valley. It encompasses areas in the northeastern portion of Caldwell County. Sites here include Buffalo Creek Gorge, Buffalo Cove Forests, Patterson Bog, and Hibriten Mountain. Small pockets of mafic rock allow for some occurrences of rare plant, and animals.

The third group is the Inner Piedmont. It includes a large portion of the county subject to historic and current human disturbances such as agriculture, timbering, and residential development. Within this region are small pockets of biological and ecological significance such as the Little Gunpowder Creek Rare Plant Site, the Rock Creek Rare Plant Site, and Peaked Top Rare Plant Site.

Most of the significance of the sites in the latter two regions comes from the presence of rare heartleaf species (*Hexastylis contracta* and *H. naniflora*).

Within the Blue Ridge Escarpment section are two Aquatic Habitats: Wilson Creek Aquatic Habitat, and the Johns River/Mulberry Creek Aquatic Habitat. The Wilson Creek Aquatic Habitat is Nationally Significant due to its outstanding water quality, which supports a high diversity of rare animal species. The Johns River/Mulberry Creek Aquatic Habitat is State Significant due to its water quality and high biodiversity.

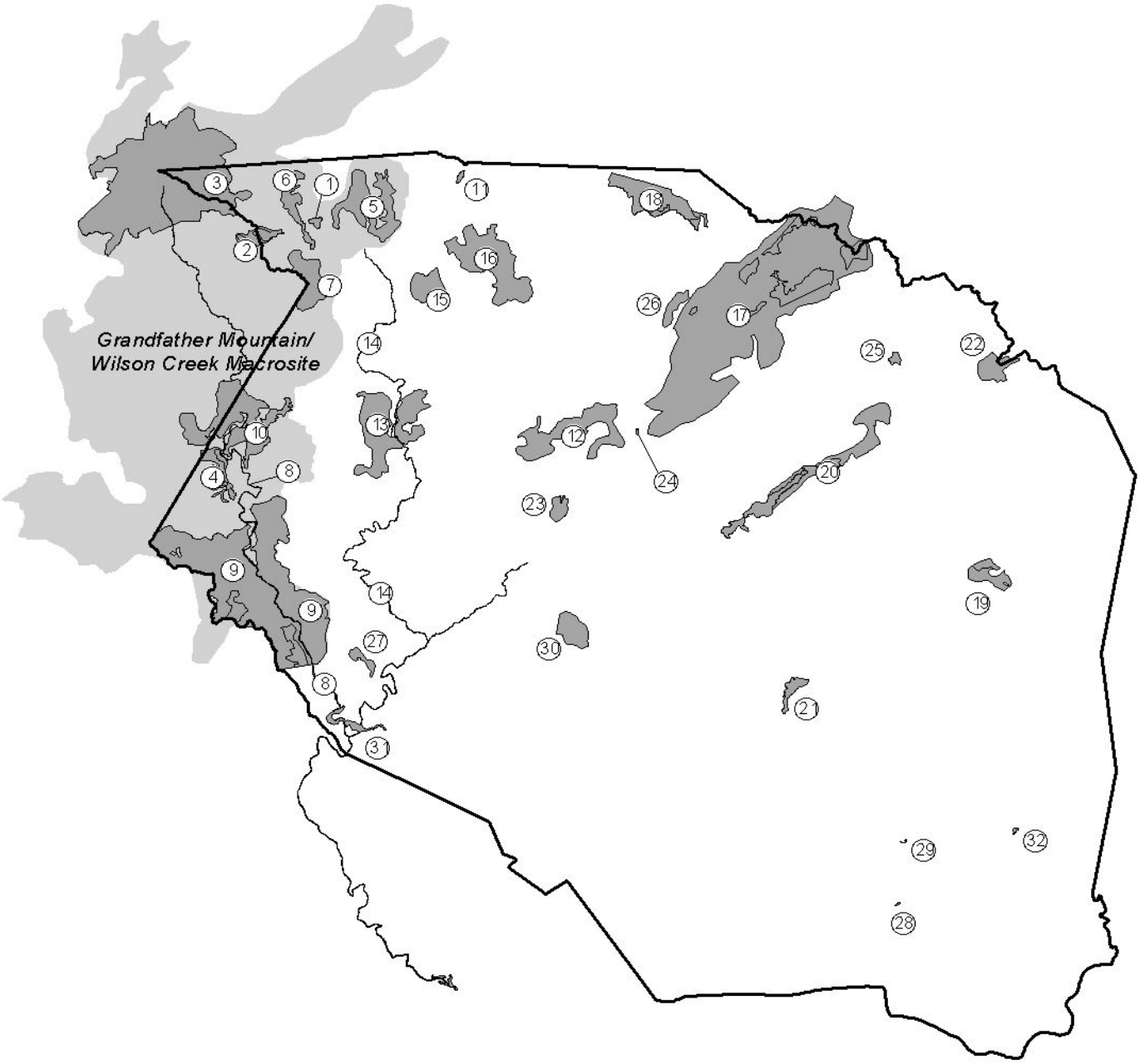


Figure 5. Significant Natural Heritage Areas of Caldwell County, North Carolina.

**Table 1. Significant Natural Heritage Areas of Caldwell County, North Carolina.**

Rank Codes: A = National Significance, B = State Significance
C = Regional Significance, D = County Significance

| | SITES | RANK |
|---|---|---|
| BLUE RIDGE ESCARPMENT SITES | | |
| | Grandfather Mountain/Wilson Creek Macrosite | A |
| 1 | Backbone Ridge | C |
| 2 | Gragg Forests | D |
| 3 | Grandfather Mountain | A |
| 4 | Harpers Creek/Yellow Buck Mountain | D |
| 5 | Pack Hill/Thunderhole Creek | C |
| 6 | Racket Creek Slopes | B |
| 7 | Walker Hollow Ridge | C |
| 8 | Wilson Creek Aquatic Habitat | A |
| 9 | Wilson Creek Gorge | B |
| 10 | Wilson Creek Slopes/Lost Cove Creek/Thorps Creek | C |
| 11 | Blowing Rock Cliffs | B |
| 12 | Boone Fork/Johnnys Knob | B |
| 13 | Globe Mountain/Tate Mountain | B |
| 14 | Johns River/Mulberry Creek Aquatic Habitat | B |
| 15 | Mills Knob | C |
| 16 | Rocky Knob | B |
| BRUSHY MOUNTAINS/UPPER YADKIN VALLEY SITES | | |
| 17 | Buffalo Cove Forests | D |
| 18 | Buffalo Creek Gorge | C |
| 19 | Ginger Cascades | D |
| 20 | Green Mountain/Zacks Fork | C |
| 21 | Hibriten Mountain | C |
| 22 | Jerry Mountain | D |
| 23 | Mulberry Creek Rare Plant Site | B |
| 24 | Patterson Bog | C |
| 25 | Round Top Mountain | C |
| 26 | Upper Yadkin/Stone Mountain Outcrops | C |
| INNER PIEDMONT SITES | | |
| 27 | Guys Creek Rare Plant Site | B |
| 28 | Little Gunpowder Creek Rare Plant Site 1 | C |
| 29 | Little Gunpowder Creek Rare Plant Site 2 | D |
| 30 | Peaked Top Rare Plant Site | A |
| 31 | Playmore Beach Rare Plant Site | D |
| 32 | Rock Creek Rare Plant Site | C |

## NATURAL COMMUNITY OVERVIEW

Caldwell County contains a great diversity of natural communities, with 22 different types recognized during this inventory. Natural communities are distinct biological entities, which possess varying degrees of biological diversity. These ecological units are important because they are examples of unique species compositions and often contain rare species. Natural communities are characterized by vegetation composition, physiognomy, assemblages of animals or other organisms, topography, substrate, hydrology, soil characteristics, or other abiotic factors. The Natural Heritage Program is interested in protection of the highest quality examples of the many different natural communities found throughout the state. Natural communities exist across the state in various forms, including forests, rock outcrops, woodlands, scrublands, or a number of various wetland habitats ranging from tidal wetlands to mountain bogs. Although Significant Natural Heritage Areas are often recognized for the presence of rare species, most of sites contain one to several good quality examples of natural communities. The presence of rare species in a natural community type adds to but alone does not determine the final significance placed on a particular site. Natural community types described in this report correspond to those described in the *Classification of the Natural Communities of North Carolina; Third Approximation* (Schafale and Weakley, 1990).

Natural communities often occur as mosaics within sites. In order to protect and conserve the different types of natural communities, it is necessary to define their boundaries, classify, and describe them as best as possible. Table 2 summarizes the natural communities recognized from Caldwell County. The ranks given indicate their current global and state status based on rarity. Explanations of these ranks are given at the end of the table. NCNHP assigns the current state ranks for these natural community types based on information of community rarity across their range, both globally and within the state. In addition, NatureServe works with partners across the country and around the world to establish guidelines and rankings for natural communities at the global level.

Of the known natural communities, some are uncommon or even quite rare. Some of the uncommon types occur on rock outcroppings such as Low Elevation Granitic Domes, Low Elevation Rocky Summits, and High Elevation Rocky Summits. These occur in the mountainous regions of the county along the Blue Ridge Escarpment at Grandfather Mountain, Wilson Creek Gorge, Blowing Rock Cliffs, and Rocky Knob. In the low mountain areas of the upper Yadkin River Valley and the Foothills (Brushy Mountains), rock outcroppings can be found at Stone Mountain, Cedar Knob, and Hibriten Mountain. Another rock outcrop type found in Caldwell County is Montane Acidic Cliff. Some of the better examples of this community type in the county are located at Wilson Creek Gorge, Harpers Creek/Yellow Buck Mountain, Wilson Creek Slopes/Lost Cove Creek/Thorps Creek, Grandfather Mountain, and Walker Hollow Ridge. The Carolina Hemlock Bluff, a rare and threatened natural community type, is found in the county at Blowing Rock Cliffs, Rocky Knob, and Grandfather Mountain. Numerous small patches can be found scattered on rocky summits and ridgelines throughout the mountainous region of the county.

Certain wetlands, especially bogs, are uncommon and sometimes rare natural communities in North Carolina. In the Southern Appalachians small bogs exist as remnants of a once larger network of

upland mountain wetlands that have severely declined since European settlement began back in the 18th century. In Caldwell County, the best example of a remnant Southern Appalachian Bog is the Patterson Bog. Even it has been recently impacted by road expansion. Other wetlands more common than bogs are seeps that are found in many mountain coves. They generally originate from a hillside and eventually form small tributaries that flow to larger streams.

**Table 2. Natural community types identified from Caldwell County, North Carolina.**

| | RANK | |
|---|---|---|
| | STATE | GLOBAL |
| High Elevation Communities | | |
| Fraser Fir Forest | S1 | G1 |
| Red Spruce--Fraser Fir Forest | S2 | G2 |
| Heath Bald | S3 | G4 |
| High Elevation Red Oak Forest | S5 | G5 |
| Northern Hardwood Forest (Typic subtype) | S4T4 | G5T5 |
| | | |
| Low Elevation Mesic Forests | | |
| Rich Cove Forest | S4 | G4 |
| Acidic Cove Forest | S5 | G5 |
| Mesic Mixed Hardwood Forest (Piedmont Subtype) | S4 | G5T5 |
| | | |
| Low Elevation Dry and Dry-Mesic Forests and Woodlands | | |
| Carolina Hemlock Bluff | S2 | G2G3 |
| Pine--Oak/Heath | S4 | G5 |
| Chestnut Oak Forest | S5 | G5 |
| Montane Oak--Hickory Forest | S5 | G5 |
| Dry-Mesic Oak--Hickory Forest | S5 | G5 |
| | | |
| Rock Outcrop Communities | | |
| High Elevation Rocky Summit | S2 | G2 |
| Low Elevation Rocky Summit | S2 | G2 |
| Low Elevation Granitic Dome | S1 | G2 |
| Montane Acidic Cliff | S3 | G4 |
| | | |
| River Floodplains | | |
| Montane Alluvial Forest | S1 | G2? |
| Rocky Bar and Shore | S5 | G5 |
| | | |
| Nonalluvial Wetlands | | |
| Southern Appalachian Bog (Northern subtype) | S1S2 | G1G2T1T |
| Spray Cliff | S2 | G3 |
| Low Elevation Seep | S3 | G4? |

## EXPLANATION OF RANK CODES FOR NATURAL COMMUNITIES

STATE RANK

S1 = Critically imperiled in North Carolina because of extreme rarity or because of some factor making it especially vulnerable to degradation or destruction in the state.

S2 = Imperiled in North Carolina because of rarity or because of some factor making it very vulnerable to degradation or destruction in the state.

S3 = Rare or uncommon in North Carolina.

S4 = Apparently secure in the state, with many occurrences.

S5 = Demonstrably secure in the state.

S_? = Rank uncertain.

GLOBAL RANK

G1 = Critically imperiled globally because of extreme rarity or because of some factor making it especially vulnerable to degradation or destruction.

G2 = Imperiled globally because of rarity or because of some factor making it vulnerable to degradation or destruction.

G3 = Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range or because of other factors making it vulnerable to degradation or destruction.

G4 = Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery.

G5 = Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.

G_? = Rank uncertain.

T_ = The rank of a subtype. As an example, G5T1 would apply to a subtype of a community with an overall rank of G5, but the subtype warranting a rank of T1.

An S or G rank involving two numbers indicates uncertainty of rank. For example, a G1G2 rank indicates that the species appears to warrant either a G1 or a G2 ranking, but that existing data do not allow that determination to be made.

Status and rank codes were derived from the database of the North Carolina Natural Heritage Program (2008).

## NATURAL COMMUNITY DESCRIPTIONS

High Elevation Communities

**Fraser Fir Forest** is a very rare natural community type and occurs only at the highest elevations. In Caldwell County it is restricted to Grandfather Mountain. Undisturbed examples are dominated by a dense canopy of Fraser fir (*Abies fraseri*), with smaller numbers of red spruce (*Picea rubens*), yellow birch (*Betula alleghaniensis*), mountain-ash (*Sorbus americana*), and other high-elevation trees. In good examples, the understory and herb layers are sparse and limited to species of very high elevations. Most examples have been degraded by canopy death due to the non-native pest balsam woolly adelgid, and have numerous canopy openings where understory species such as young Fraser fir, and thickets of blackberry (*Rubus* sp.) grow. Herbs and mosses are typically a dense collection of high-elevation species.

**Red Spruce --Fraser Fir Forest** is a rare natural community type that occurs at very high elevations on slopes and crests, typically above Northern Hardwood Forest communities. In Caldwell County this community is restricted to Grandfather Mountain. It differs from Fraser Fir Forest by having a canopy dominated by red spruce (*Picea rubens*) and sometimes Fraser fir (*Abies fraseri*), with occasional northern hardwood trees. Understories are usually sparse, but may be moderately dense, with shrubs such as Blue Ridge blueberry (*V. altomontanum*), mountain cranberry (*V. erythrocarpum*), witch-hobble (*Viburnum lantanoides*), and mountain elderberry (*Sambucus pubens*). Herbs and mosses are typically a dense collection of high-elevation species.

**Heath Bald** is relatively uncommon in the Southern Appalachians and occurs on thin, somewhat acidic soils, at exposed, high elevation sites such as peaks, steep slopes, and sharp ridges. In Caldwell County they are found at Grandfather Mountain around the summit area of Calloway Peak. They are generally quite dry due to rapid soil drainage and exposure to sun and wind, and the dominant plant species are shrubs such as mountain laurel (*Kalmia latifolia*), great laurel (*Rhododendron maximum*), and Catawba rhododendron (*R. catawbiense*). The rare Heller's blazing-star (*Liatris helleri*) may occur where patches of bare rock limit growth of woody plants.

**High Elevation Red Oak Forest** occurs on dry to moist slopes and ridgetops at middle to high elevations (typically over 3,500 feet). In Caldwell County this community occurs at Grandfather Mountain. These forests are common throughout the Blue Ridge at higher elevations and are 'orchard like' with a full herb layer and more open canopy. The canopy is dominated by northern red oak (*Quercus rubra*), with most other canopy species lacking except for occasional hickories (*Carya* spp.) and other oak species (*Quercus* spp.). Sites occurring over amphibolite often have sugar maple (*Acer saccharum*), white ash (*Fraxinus americana*), and shagbark hickory (*C. ovata*). Common understory species include downy serviceberry (*Amelanchier arborea*), mountain holly (*Ilex montana*), striped maple (*Acer pensylvanicum*), alternate-leaf dogwood (*Cornus alternifolia*), and American chestnut (*Castanea dentata*) sprouts. Shrubs are often moderately dense and frequently include mountain elderberry (*Sambucus pubens*), and blueberries (*Vaccinium* spp.). Herbs are dense, but generally lack the diversity found in coves. Often present are wild sarsparilla

(*Aralia nudicaulis*), asters, false Solomon's-seal (*Maianthemum racemosum*), Canada mayflower (*M. canadense)*, sedges (*Carex* spp.), goldenrod (*Solidago* sp.), speckled wood lily (*Clintonia umbellulata*), New York fern (*Thelypteris noveboracensis*), and others.

**Northern Hardwood Forest (Typic Subtype)** is widespread at high elevations, usually on open slopes and crests at elevations over 3,800 feet. Yellow birch (*Betula alleghaniensis*) is often dominant, although sugar maple (*Acer saccharum*) may be dominant in areas on mafic rock types. Several other hardwood species such as yellow buckeye (*Aesculus flava*), beech (*Fagus grandifolia*), and white ash (*Fraxinus americana*) are often co-dominant in the canopy. This natural community type generally has a moderately dense understory with canopy species as well as striped maple (*Acer pensylvanicum*) and cucumber tree (*Magnolia acuminata*). The shrub layer is often sparse with witch-hobble (*Viburnum lantanoides*), smooth hydrangea (*Hydrangea arborescens*), and gooseberry (*Ribes* sp.) present. The herb layer is well-developed with many species of primarily from a more northern distribution. Some common herb species include bee-balm (*Monarda didyma*), fernleaf phacelia (*Phacelia bipinnatifida*), marginal wood-fern (*Dryopteris marginalis*), and doll's-eyes (*Actaea pachypoda*).

Low Elevation Mesic Forests

**Rich Cove Forest** is widespread and common in the Southern Appalachian mountains. In Caldwell County, this community type is found along the Blue Ridge Escarpment and a few localities in the Brushy Mountains. Rich Cove Forest is one of the most species-diverse community types in eastern North America, especially for the number of tree and herb species that can occur in them. These forests typically have a closed canopy dominated by a diverse mixture of species including sweet birch (*Betula lenta*), yellow buckeye (*Aesculus flava*), basswood (*Tilia americana* var. *heterophylla*), tulip poplar (*Liriodendron tulipifera*), cucumber tree (*Magnolia acuminata*), and black cherry (*Prunus serotina*) among others. In the best examples, the understory is not dense and supports witch-hazel (*Hamamelis virginiana*), flowering dogwood (*Cornus florida*), and occasionally sourwood (*Oxydendrum arboreum*). The shrub layer is generally sparse, with smooth hydrangea (*Hydrangea arborescens*) and strawberry-bush (*Euonymus americanus*) being numerous. The herb layer is typically diverse and lush. Characteristic species include black cohosh (*Actaea racemosa*), blue cohosh (*Caulophyllum thalictroides*), Canada horsebalm (*Collinsonia canadensis*), wild geranium (*Geranium maculatum*), wild ginger (*Asarum canadense*), foamflower (*Tiarella cordifolia* var. *cordifolia*), bloodroot (*Sanguinaria canadensis*), ginseng (*Panax quinquefolius*), sweet Cicely (*Osmorhiza claytonii*), violets (*Viola* spp.), goat's-beard (*Aruncus dioicus*), marginal wood-fern (*Dryopteris marginalis*), southern lady fern (*Athyrium asplenioides*), and frequently many others.

**Acidic Cove Forest** is common in the mountainous regions of North Carolina and in sheltered sites at low to moderate elevations outside of the mountains. In Caldwell County it often occurs in narrow rocky gorges, steep ravines, and sheltered valleys and slopes where it is generally moist and humid. These communities occur over more nutrient-poor or acidic soils than Rich Cove Forests. This natural community often transitions into Rich Cove Forest or Canada Hemlock Forest

downslope, and various oak-hickory forest types upslope. The forest canopy is closed and generally dense with dominant species typically being red maple (*Acer rubrum*), tulip poplar (*Liriodendron tulipifera*), Canada hemlock (*Tsuga canadensis*), and northern red oak (*Quercus rubra*). The understory is fairly open and generally dominated by saplings of canopy species with occasional flowering dogwood (*Cornus florida*), and sourwood (*Oxydendrum arboreum*). The shrub layer is often very dense with great laurel (*Rhododendron maximum*), gorge rhododendron (*R. minus*), and mountain laurel (*Kalmia latifolia*). The herb layer is typically sparse with dense beds of herbs occurring in canopy light gaps or along open stream channels. Characteristic herbs include galax (*Galax urceolata*), Christmas fern (*Polystichum acrostichoides*), Canada violet (*Viola canadensis*), bellworts (*Uvularia* spp.), Indian cucumber-root (*Medeola virginiana*), Jack-in-the-pulpit (*Arisaema triphyllum*), false Solomon's-seal (*Maianthemum racemosum*), trilliums (*Trillium* spp.), and sedges (*Carex* spp.).

**Mesic Mixed Hardwood Forest (Piedmont Subtype)** is common throughout the Piedmont. In Caldwell County, it occurs along small stream drainages and along the lower and middle slopes of sheltered coves and valleys, notably along the river valleys. This community has a higher percentage of mesic canopy species such as beech (*Fagus grandifolia*), tulip poplar (*Liriodendron tulipifera*), and white oak (*Quercus alba*). Understory species include flowering dogwood (*Cornus florida*), red maple (*Acer rubrum*), and American holly (*Ilex opaca*). The shrub layer includes blueberries (*Vaccinium* spp.), strawberry-bush (*Euonymus americanus*), and occasionally mountain laurel (*Kalmia latifolia*). Herbs are moderately dense and include Christmas fern (*Polystichum acrostichoides*), little brown jugs (*Hexastylis arifolia* var. *arifolia*), foamflower (*Tiarella cordifolia* var. *cordifolia*), alumroot (*Heuchera americana*), mayapple (*Podophyllum peltatum*), grape fern (*Botrychium* spp.), pipsissewa (*Chimaphila maculata*), and Devil's-bit (*Chamaelirium luteum*).

Low Elevation Dry and Dry-Mesic Forests and Woodlands

**Carolina Hemlock Bluff** is considered rare because its dominant species, Carolina hemlock (*Tsuga caroliniana*), is restricted to southern Virginia, western North Carolina, eastern Tennessee, northwestern South Carolina, and northern Georgia. Sites where it is capable of becoming dominant are uncommon. Carolina Hemlock Bluffs usually occur on rocky acidic soils on steep slopes, bluffs, or gorge walls. This natural community may be fire dependent. Several examples of this community type occur in Caldwell County. Good examples can be found at Grandfather Mountain, Blowing Rock Cliffs, and Rocky Knob. Other canopy species occurring with the Carolina hemlock include tulip poplar (*Liriodendron tulipifera*), northern red oak (*Quercus rubra*), chestnut oak (*Q. montana*), and various hickories (*Carya* spp.). The understory is generally sparse with occasional canopy species or sourwood (*Oxydendrum arboreum*) present. Shrubs typically include mountain laurel (*Kalmia latifolia*), wild azalea (*Rhododendron periclymenoides*), and occasionally sparkleberry (*Vaccinium arboreum*) and lowbush blueberry (*V. pallidum*). Herbs are sparse under the hemlocks, with a few occurring along the margins such as partridgeberry (*Mitchella repens*), pipsissewa (*Chimaphila maculata*), Virginia snakeroot (*Aristolochia serpentaria*), and downy rattlesnake-plantain (*Goodyera pubescens*). Like the Canada hemlock, the Carolina hemlock is under attack by the invasive hemlock woolly adelgid (*Adelges tsugae*), a small insect that feeds on the new

growth

of the trees by sucking sap from the base of the needles. This exotic pest threatens the long term existence of this community type.

**Pine--Oak/Heath** occurs on very dry, acidic soils of exposed ridgetops and crests at low to middle elevations. Good examples of this community type occur along predominantly south-facing dry and rocky soils in Wilson Creek Gorge and along steep and rocky south-facing ridgelines of the Blue Ridge Escarpment. The canopy is fairly open and dominated by pitch pine (*Pinus rigida*) and Table Mountain pine (*P. pungens*), as well as other pine and hardwood species of dry sites such as oaks (*Quercus* spp.), black gum (*Nyssa sylvatica*), persimmon (*Diospyros virginiana*), and sourwood (*Oxydendrum arboreum*). The understory is sparse, but the shrub layer is generally well developed and dominated by mountain laurel (*Kalmia latifolia*), fetterbush (*Leucothoe recurva*), lowbush blueberry (*Vaccinium pallidum*), sparkleberry *(V. arboreum*), and black huckleberry (*Gaylussacia baccata*). Herbs are sparse, but include galax (*Galax urceolata*), rosinweed (*Silphium reniforme*), eastern bracken fern (*Pteridium aquilinum*), Biltmore carrion-flower (*Smilax biltmoreana*), and greenbrier (*S. glauca*).

**Chestnut Oak Forest** is probably the most common mountain forest community at low to middle elevations, and is found throughout Caldwell County. The canopy is generally closed, with canopy gaps occurring around rock outcrops. The dominant canopy species are chestnut oak (*Quercus montana*) and scarlet oak (*Q. coccinea*). Other species such as white oak (*Q. alba*), black oak (*Q. velutina*), southern red oak (*Q. falcata*), northern red oak (*Q. rubra*), mockernut hickory (*Carya alba*), and pignut hickory (*C. glabra*) are often present in the canopy as well. In areas of higher moisture and humidity, red maple (*Acer rubrum*) and tulip poplar (*Liriodendron tulipifera*) are common. American chestnut (*Castanea dentata*) was once an important tree in this forest community, but it now only occurs as an understory sprout. Other understory species include sourwood (*Oxydendrum arboreum*), red maple, flowering dogwood (*Cornus florida*), and downy serviceberry (*Amelanchier arborea*). The shrub layer may vary from sparse and open to very dense, with thickets of mountain laurel (*Kalmia latifolia*) and great laurel (*Rhododendron maximum*) present. Fetterbush (*Leucothoe recurva*), New Jersey tea (*Ceanothus americanus*), lowbush blueberry (*Vaccinium pallidum*), and black huckleberry (*Gaylussacia baccata*) are often present. The herb layer is generally sparse and of low diversity. Characteristic herbs include trailing arbutus (*Epigaea repens*), galax (*Galax urceolata*), goldenrods (*Solidago* spp.), tickseed (*Coreopsis* spp.), eastern bracken fern (*Pteridium aquilinum*), and downy rattlesnake-plantain (*Goodyera pubescens*).

**Montane Oak--Hickory Forest** is widespread in the mountains of North Carolina. It occurs along upper slopes and ridgelines in many of the mountainous areas of Caldwell County, occurring on dry to moist slopes and ridgetops that are somewhat exposed at low to high elevations. The soils can range from acidic to basic, and composition may vary widely. The canopy is generally closed and dominated by a mixture of northern red oak (*Quercus rubra*), white oak (*Q. alba*), chestnut oak (*Q. montana*), scarlet oak (*Q. coccinea*), black oak (*Q. velutina*), mockernut hickory (*Carya alba*), and

pignut hickory (*C. glabra*). The understory is moderately dense with saplings of canopy species, American chestnut (*Castanea dentata*) sprouts, flowering dogwood (*Cornus florida*), red maple (*Acer rubrum*), witch-hazel (*Hamamelis virginiana*), and black gum (*Nyssa sylvatica*). The shrub layer varies in density from sparse to occasional with patches of mountain laurel (*Kalmia latifolia*) and great laurel (*Rhododendron maximum*) present. Flame azalea (*Rhododendron calendulaceum*), lowbush blueberry (*Vaccinium pallidum*), and maple-leaf viburnum (*Viburnum acerifolium*) may also be present. The herb layer is moderately sparse and often contains false Solomon's-seal (*Maianthemum racemosum*), Solomon's-seal (*Polygonatum biflorum*), Indian cucumber-root (*Medeola virginiana*), hay-scented fern (*Dennstaedtia punctilobula*), New York fern (*Thelypteris noveboracensis*), and bellworts (*Uvularia* spp.).

**Dry-Mesic Oak--Hickory Forest** is a common forest community in the Piedmont and in Caldwell County. This natural community occurs on lower slopes and ridges, and in Caldwell County it generally transitions upslope into Chestnut Oak Forest and downslope into Mesic Mixed Hardwood Forest. The canopy is typically closed and dominated by white oak (*Quercus alba*), post oak (*Q. stellata*), southern red oak (*Q. falcata*), mockernut hickory (*Carya alba*), pignut hickory (*C. glabra*), and occasionally bitternut hickory (*C. cordiformis*). The understory is sparse, with flowering dogwood (*Cornus florida)* and sourwood (*Oxydendrum arboreum*) common. Shrub species present include strawberry-bush (*Euonymus americanus*), spicebush (*Lindera benzoin*), and occasionally small patches of mountain laurel (*Kalmia latifolia*) on sheltered slopes. Herbs are generally sparse to moderately dense with dwarf-flowered heartleaf (*Hexastylis naniflora*), pipsissewa (*Chimaphila maculata*), Virginia snakeroot (*Aristolochia serpentaria*), liverleaf (*Hepatica americana*), Christmas fern (*Polystichum acrostichoides*), and bloodroot (*Sanguinaria canadensis*) common.

Rock Outcrop Communities

**High Elevation Rocky Summit** occurs on rugged, horizontal and vertical outcrops on exposed ridges, peaks, and upper slopes at elevations usually above 4,600 feet. Bare rock is abundant, with cracks, ledges, and other irregularities in which small quantities of soil accumulate. Plant growth and natural succession in this natural community type are limited by a cold harsh climate and high winds. Rare themselves, High Elevation Rocky Summits support rare endemic plant species including spreading avens (*Geum radiatum*), Roan Mountain bluet (*Houstonia montana*), and Heller's blazing-star (*Liatris helleri*), as well as many other rare endemic and disjunct species.

**Low Elevation Rocky Summit** occurs on exposed summits at middle and low elevations in the mountains and Piedmont. This natural community is found scattered in the mountains of Caldwell County at Wilson Creek Gorge (Adams Mountain), Hibriten Mountain, and several peaks in Buffalo Creek Forests (including Spring and Stone Mountains). This uncommon natural community is similar in structure to the High Elevation Rocky Summit, but differs in flora assemblages, and generally occurs below 3,500 ft. elevation. They can be characterized by the presence of rugged uneven vertical and horizontal rock faces with little or no canopy trees present. Small islands of accumulated organic soils (soil mats) occur on a few horizontal surfaces, on cliff bases, and in crevices. They are typically open, but occasionally support a few stunted canopy trees along the

margins in deeper soils. Vegetation is typically a zoned collection of herbs that may include live-forever (*Hylotelephium telephioides*), fameflower (*Talinum teretifolium*), rock spikemoss (*Selaginella rupestris*), Appalachian bellflower (*Campanula divaricata*), blue curls (*Trichostema dichotomum*), flowering spurge (*Euphorbia corollata*), tickseed (*Coreopsis* sp.), goldenrods (*Solidago* spp.), broomsedge (*Andropogon virginicus*), ebony spleenwort (*Asplenium platyneuron*), panic grass (*Dichanthelium* sp.), and sedges (*Carex* spp.).

**Low Elevation Granitic Dome** is distinguished from other natural community types of rock outcrops by the absence of crevices and deep soil pockets. The rock surfaces are steep to gently sloping exposures of smooth, exfoliating granite or similar massive igneous or metamorphic rock, such as granitic gneiss. Shallow soil mats determine the vegetation composition. This community type is found in several different locations in Caldwell County. Good examples can be found at Wilson Creek Gorge, Hibriten Mountain, and Stone Mountain. The canopy is generally absent, tree species being primarily chestnut oak (*Quercus montana*), northern red oak (*Q. rubra*), and Carolina hemlock (*Tsuga caroliniana*) when present. With no understory, the shrub layer can grow dense in the soil mats, with Georgia hackberry (*Celtis tenuifolia*), great laurel (*Rhodendron maximum*), and mountain laurel (*Kalmia latifolia*) common. The herb layer is sparse and limited to areas marginal to the rock outcrops or along soil mats. Common herb species include fall ladies-tresses (*Spiranthes cernua*), granite goldenrod (*Solidago simulans*), mountain Cynthia (*Krigia montana*), big bluestem (*Andropogon gerardii*), woolly lip-fern (*Cheilanthes tomentosa*), galax (*Galax urceolata*), and mountain spleenwort (*Asplenium montanum*).

**Montane Acidic Cliff** occurs on rocky slopes that are steep enough to prevent the formation of a closed canopy and which are near exposed ridgetops and peaks. There are numerous examples of this community type scattered across the northern one-half of Caldwell County. These cliffs typically have an open light gap with vertical to nearly vertical cliff faces, fissures, and small ledges present that are often bare except for, lichen, and moss cover. The herbaceous layer is often sparse, located on small soil accumulations on ledges of the sloping rock faces. Herbs present may include alumroot (*Heuchera villosa*), maidenhair spleenwort (*Asplenium trichomanes*), saxifrage (*Saxifraga* sp.), and rockcap fern (*Polypodium* sp.). Also present are species from surrounding communities that often take advantage of the cliffs due to available habitat and light gaps. Such species include marginal wood fern (*Dryopteris marginalis*), bladder fern (*Cystopteris protrusa*), walking fern (*Asplenium rhizophyllum*), and stonecrop (*Sedum* sp.).

<u>River Floodplains</u>

**Montane Alluvial Forest** occurs along river and stream floodplains at moderate elevations on alluvial soils. In Caldwell County, examples of this community can be found along Wilson Creek, Harpers Creek, and Phillips Branch. This rare natural community type was once common, but the flat, nutrient-rich areas on which it occurs were cleared long ago for timber, settlement, and agriculture. The well-developed canopy has a mixture of bottomland and mesophytic tree species, including sweet birch (*Betula lenta*), tulip poplar (*Liriodendron tulipifera*), white pine (*Pinus strobus*), and Canada hemlock (*Tsuga canadensis*). The shrub layer is limited in diversity but can

be quite dense in areas. Common shrubs may include great laurel (*Rhododendron maximum*), spicebush (*Lindera benzoin*), and blueberries (*Vaccinium* spp.). The herb layer is generally sparse.

**Rocky Bar and Shore** in Caldwell County is restricted to rock outcrops and gravel bars along rivers and streams that are too rocky, too wet, or too severely flooded to support trees. Examples in Caldwell County include Buffalo Cove Creek, Harpers Creek, Phillips Branch, and Wilson Creek. Vegetation in this community type is often variable, ranging from dense to sparse shrubs or herbs, but seldom with bottomland or mesophytic trees. Shrubs typical for this community type are tag alder (*Alnus serrulata*), button-bush (*Cephalanthus occidentalis*), yellowroot (*Xanthorhiza simplicissima*), willow (*Salix* sp.), and silky dogwood (*Cornus amomum*). Characteristic herbs include jewelweed (*Impatiens* sp.), sedges (*Carex* spp.), rushes (*Juncus* spp.), knot-weed (*Polygonum* spp.), and bluets (*Houstonia* spp.).

Nonalluvial Wetlands

**Southern Appalachian Bog (Northern Subtype)** is restricted to the mountains of North Carolina, Tennessee, and Virginia. It is among the rarest and most imperiled natural community types in western North Carolina. In Caldwell County, examples can be found along US 321 near Patterson and Ginger Cascades. Southern Appalachian Bogs are naturally open and contain a mixture of vegetation. Herbs, shrubs, and open canopy trees often fall into distinct zones. Sphagnum mosses are characteristic of this community type. Distinctive herb zones commonly include cinnamon fern (*Osmunda cinnamomea*), spotted jewelweed (*Impatiens capensis*), sedges (*Carex* spp.), and bulrushes (*Juncus* spp.). Rare and uncommon herbs that occur are often northern disjuncts. These may include American willow-herb (*Epilobium ciliatum*). Shrub zones often include tag alder (*Alnus serrulata*), hardhack (*Spiraea* sp.), and spicebush (*Lindera benzoin*).

**Spray Cliff** is uncommon in Caldwell County, with only small examples known from a few locations. These occur at waterfalls at Globe Mountain/Tate Mountain and Walker Hollow Ridge on steeply sloping to vertical rock faces that remain wet from the spray of waterfalls. They support a collection of nonvascular species (mosses and liverworts), as well as herbs scattered in small soil pockets. These highly specialized habitats can contain rare vascular plants such as Carolina saxifrage (*Saxifraga caroliniana*) and Carey's saxifrage (*S. careyana*). Other species that may be present include maidenhair fern (*Adiantum pedatum*), galax (*Galax urceolata*), meadow-rue (*Thalictrum* sp.), Jack-in-the-pulpit (*Arisaema triphyllum*), sedges (*Carex* spp.), and species from surrounding forests.

**Low Elevation Seep** occurs along low lying areas near small streams, with seepage generally flowing towards a larger stream in a bottomland or floodplain. In Caldwell County examples of Low Elevation Seeps are common in the mountainous regions. They contrast with the adjacent floodplain or upland communities in vegetation and soils. These communities are usually saturated, mucky, and occur in small localized areas. The canopy is usually closed, with the wettest portions remaining open. Typical canopy species include tulip poplar (*Liriodendron tulipifera*), red maple

(*Acer rubrum*), sycamore (*Platanus occidentalis*), and river birch (*Betula nigra*). The understory includes sourwood (*Oxydendrum arboreum*) and silky dogwood (*Cornus amomum*). Common shrubs within the seep include maleberry (*Lyonia ligustrina*), sparkleberry (*Vaccinium arboreum*), and various viburnum species (*Viburnum dentatum*, *V. prunifolium*, and *V. nudum*). Woody vines often include catbrier (*Smilax rotundifolia* and *S. glauca*), Virginia creeper (*Parthenocissus quinquefolia*), and Carolina milkvine (*Matelea carolinensis*). Herbaceous species are uncommon in the seep, with cane (*Arundinaria gigantea*), beard-tongue (*Penstemon canescens*), cinnamon fern (*Osmunda cinnamomea*), pipsissewa (*Chimaphila maculata*), partridgeberry (*Mitchella repens*), rushes (*Juncus* spp.), and sedges (*Carex* spp.) most commonly found.

## FLORA AND FAUNA

Caldwell County contains native plant and animal species from two different physiographic regions: the southern Blue Ridge Mountains, which extend from Virginia to northern Alabama, and the Piedmont, which lies east of the Blue Ridge Mountains and extends from southern New York to Alabama. With a substantial gradient in elevation, a varied topography, and the wide range of geology, Caldwell County supports a diverse set of natural communities as well as a high diversity of plants and animals.

Caldwell County ranks in the upper 50% of North Carolina's 100 counties both in the number of rare plant species and rare animal species present. There are currently 42 special status plant species and 19 special status animal species (as defined by NatureServe, USFWS, and tracked by NCNHP) recorded from Caldwell County (Tables 3 and 4). Of the 61 species tracked from Caldwell County, 20 are Federally-listed as Endangered, Threatened, or Species of Concern. Explanations of the ranks and statuses of rare plants and rare animals appear after each table.

Caldwell County contains significant populations of the State Endangered and Federal Species of Concern mountain heartleaf (*Hexastylis contracta*). It occurs in the northwestern portion of the county primarily within the Pisgah National Forest. Populations occurring in North Carolina (Henderson, Buncombe, and Caldwell Counties) are disjunct from the main range, which is located along the Tennessee-Kentucky state line on the Cumberland Plateau.

Another rare species of heartleaf found in Caldwell County is dwarf-flowered heartleaf (*Hexastylis naniflora*). This species' global range is 11 counties in North Carolina and 3 counties in South Carolina. It is Federally-listed as Threatened, with three known populations and two additional small occurrences found in Caldwell County. The best examples occur at Peaked Top Rare Plant Site, located west of the town of Lenoir and along Little Gunpowder Creek just off US 321, near the community of Sawmills.

Heller's blazing-star (*Liatris helleri*) is known from 21 populations worldwide (totaling approximately 3,000 known individuals). It occurs on high elevation rock outcrops in Caldwell County at Blowing Rock Cliffs and just over the county line at Grandfather Mountain. Heller's blazing-star is Federally and State-listed as Threatened.

Bent avens (*Geum geniculatum*) is known worldwide from only 15 populations, one in eastern Tennessee, and the rest in western North Carolina. It grows at high elevations, in forests and on streambanks and seepage slopes. It is found in Caldwell County at Grandfather Mountain. Bent avens is currently listed as a Federal Species of Concern and is State Threatened.

Several rare plant species that were documented historically from Caldwell County were either rediscovered or new populations were located during the inventory. The dwarf chinquapin oak (*Quercus prinoides*) was reported in the 1950's from credible sources. It was relocated along Rock

Creek in eastern Caldwell County. Sweet pinesap (*Monotropsis odorata*) was found in Wilson Creek Gorge and at Rocky Knob.

Rare nonvascular plants in Caldwell County are known from Blowing Rock Cliffs and Grandfather Mountain. Golden tundra-moss (*Rhytidium rugosum*) was observed at Blowing Rock Cliffs in the 1990s. Most of the nonvascular plant occurrences from Grandfather Mountain are historical (twenty or more years since last observed), and have not been relocated in decades. These include Feather moss (*Brachythecium populeum* and *B. rotaeanum*), rockshag lichen (*Ephebe americana*), and northern peatmoss (*Sphagnum capillifolium*).

The spruce-fir moss spider (*Microhexura montivaga*) is known historically from four mountain peaks in western North Carolina and one in eastern Tennessee. Currently, four populations are known, of which only two are reproducing, including Grandfather Mountain. This spider lives on moss mats in high elevation spruce-fir forests, which are imminently threatened by the decline of Fraser firs. The species is also highly vulnerable to human disturbance of the moss mats. The spruce-fir moss spider is Federally-listed as Endangered.

Edmund's snaketail (*Ophiogomphus edmundo*) is a dragonfly known from only four rivers and streams in North Carolina, eastern Tennessee, and northwest Georgia. It occurs along cold rocky mountain streams**.** In Caldwell County its only known occurrence is along Wilson Creek. Attempts were made during this inventory to further document this species in Wilson Creek but were unsuccessful. It is considered to be Significantly Rare in the state and listed as a Federal Species of Concern.

The Carolina northern flying squirrel (*Glaucomys sabrinus coloratus*) is known only from the southern Appalachian mountains of Tennessee, Virginia, and North Carolina, where it lives in high elevation forests, primarily spruce-fir forests. It occurs on Grandfather Mountain in Caldwell County. This subspecies is Federally and State-listed as Endangered.

The bog turtle (*Glyptemys muhlenbergii*) ranges from New York to northern Georgia. Occurring in bogs, wet pastures, and wet thickets, the species is uncommon and vulnerable to habitat disturbance and destruction, as well as to collecting. Because the animal is hard to find, its actual numbers range-wide are not known, but its populations tend to be small. The bog turtle population in the southern Appalachians is State and Federally Threatened due to Similarity of Appearance. Within Caldwell County one record exists from an incidental report of a turtle found in an open field.

The Appalachian woodrat (*Neotoma magister*) is known to occur from New York to Alabama. This species is a State Federal Species of Concern. These animals live under rock grottos and ledges at several localities in Caldwell County including Backbone Ridge, Walker Hollow Ridge, Wilson Creek Gorge, Blowing Rock Cliffs, and Rocky Knob.

**Table 3. Special status plant species documented from Caldwell County, North Carolina.**

| SCIENTIFIC NAME<br>COMMON NAME | STATUS<br>NC | <br>US | RANK<br>NC | <br>GLOBAL |
|---|---|---|---|---|
| VASCULAR PLANTS | | | | |
| *Aconitum reclinatum* *<br>Trailing Wolfsbane | SR-T | - | S3 | G3 |
| *Allium allegheniense*<br>Allegheny Onion | SR-T | - | S2 | G3? |
| *Asplenium pinnatifidum* *<br>Lobed Spleenwort | SR-P | - | S1 | G4 |
| *Brachyelytrum septentrionale* *<br>Northern Shorthusk | SR-P | - | S3 | G4G5 |
| *Calystegia catesbeiana* ssp. *sericata*<br>Appalachian Bindweed | SR-T | - | S3 | G3T2T3Q |
| *Cardamine clematitis*<br>Mountain Bittercress | SR-T | FSC | S2 | G2G3 |
| *Carex misera*<br>Wretched Sedge | SR-L | - | S3 | G3 |
| *Chamerion platyphyllum*<br>Fireweed | SR-P | - | S1 | G5T5 |
| *Coreopsis latifolia*<br>Broadleaf Tickseed | SR-T | - | S3 | G3 |
| *Delphinium exaltatum* *<br>Tall Larkspur | E-SC | FSC | S2 | G3 |
| *Epilobium ciliatum*<br>American willow-herb | SR-P | - | S2 | G5 |
| *Eupatorium godfreyanum*<br>Godfrey's Thoroughwort | SR-P | - | S2 | G4 |
| *Geum geniculatum*<br>Bent Avens | T | FSC | S2 | G2 |
| *Hackelia virginiana*<br>Virginia Stickseed | SR-P | - | S1S2 | G5 |
| *Hexastylis contracta*<br>Mountain Heartleaf | E | E | S1 | G3 |
| *Hexastylis naniflora*<br>Dwarf-flowered Heartleaf | T | T | S2 | G2 |
| *Liatris helleri*<br>Heller's Blazing-star | T-SC | T | S2 | G2 |

| SCIENTIFIC NAME<br>COMMON NAME | STATUS<br>NC | <br>US | RANK<br>NC | <br>GLOBAL |
|---|---|---|---|---|
| *Lilium grayi*<br>Gray's Lily | T-SC | FSC | S3 | G3 |
| *Malaxis bayardii* *<br>Appalachian Adder's-mouth | SR-T | - | S1 | G1G2 |
| *Minuartia groenlandica*<br>Greenland Sandwort | SR-D | - | S2 | G5 |
| *Monotropsis odorata*<br>Sweet Pinesap | SR-T | FSC | S3 | G3 |
| *Packera paupercula* *<br>Balsam Ragwort | SR-P | - | S1? | G5 |
| *Platanthera peramoena* *<br>Purple Fringeless Orchid | SR-P | - | S2 | G5 |
| *Quercus prinoides*<br>Dwarf Chinquapin Oak | SR-P | - | S1 | G5 |
| *Rhododendron vaseyi*<br>Pink-shell Azalea | SR-L | - | S3 | G3 |
| *Thermopsis mollis*<br>Appalachian Golden-banner | SR-P | - | S2 | G3G4 |
| *Tofieldia glutinosa* *<br>Sticky Bog Asphodel | SR-P | - | S2 | G5 |
| *Trichophorum cespitosum*<br>Deerhair Bulrush | SR-D | - | S2S3 | G5 |
| *Verbena riparia* *<br>Riverbank Vervain | SR-T | FSC | SH | GUGHQ |
| NONVASCULAR PLANTS | | | | |
| *Bazzania nudicaulis*<br>A Liverwort | SR-T | - | S2 | G2G3 |
| *Brachythecium populeum* *<br>Matted Feather Moss | SR-P | - | SH | G5 |
| *Brachythecium rotaeanum* *<br>Rota's Feather Moss | SR-D | - | S1 | G3G4 |
| *Entodon sullivantii* *<br>Sullivant's Entodon | SR-O | - | S2 | G3G4 |
| *Ephebe americana* *<br>A Rockshag Lichen | SR-T | - | S1 | G2G3 |
| *Leptodontium excelsum*<br>Grandfather Mountain Leptodontium | SR-L | - | S1 | G2 |
| *Leptodontium flexifolium*<br>Pale-margined Leptodontium | SR-D | - | S1 | G5 |

| SCIENTIFIC NAME<br>COMMON NAME | STATUS<br>NC | <br>US | RANK<br>NC | <br>GLOBAL |
|---|---|---|---|---|
| *Metzgeria temperata*<br>A Liverwort | SR-D | - | S1S2 | G4 |
| *Mylia taylorii*<br>A Liverwort | SR-D | - | S1 | G5 |
| *Plagiochila sullivantii var. sullivantii* * <br>A Liverwort | SR-T | FSC | S2 | G2T2 |
| *Rhytidium rugosum*<br>Golden Tundra-moss | SR-P | - | S2 | G5 |
| *Sphagnum capillifolium* *<br>Northen Peatmoss | SR-P | - | S1 | G5 |
| *Sphenolobopsis pearsonii*<br>A Liverwort | E | FSC | S2 | G2? |

* = Historical records of species not observed within at least 20 years.

EXPLANATION OF STATUS AND RANK CODES FOR RARE PLANTS

N.C. Status:
E = Endangered
T = Threatened
SC = Special Concern
SR-L = Significantly Rare, limited. The range of the species is limited to North Carolina and adjacent states (endemic or near endemic).
SR-T = Significantly Rare, throughout. The species is rare throughout its range.
SR-D = Significantly Rare, disjunct. The species is disjunct in North Carolina from a main range in a different part of the country or world.
SR-P = Significantly Rare, peripheral. The species is at the periphery of its range in North Carolina. Such species are generally more common somewhere else in their ranges, occurring in North Carolina peripherally to their main ranges, primarily in habitats that are unusual in North Carolina.
SR-O = Significantly Rare, obscure. The range of the species is sporadic or cannot be described by the other Significantly Rare categories.

Plant statuses are determined by the Plant Conservation Program of the N.C. Department of Agriculture and Consumer Services and the North Carolina Natural Heritage Program (NCNHP). Collection from the wild of Endangered, Threatened, and Special Concern species is regulated by state law. The Significantly Rare status is an NCNHP designation indicating the need for population monitoring and possible conservation action for species not currently listed as Endangered, Threatened, or Special Concern

U.S. Status:
E = Endangered. A plant that is in danger of extinction throughout all or a significant portion of its range.
T = Threatened. A plant that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
FSC = Federal Species of Concern. This status replaces the former "Category 2" Candidate status used by the U.S. Fish and Wildlife Service. Category 2 plants were those for which there was some evidence of vulnerability, but for which there were not enough data to support listing as Endangered or Threatened. The FSC code has no official status.

N.C. Rank:
S1 = Critically imperiled in North Carolina because of extreme rarity or because of some factor making it especially vulnerable to extirpation from the state. Typically 1-5 populations.
S2 = Imperiled in North Carolina because of rarity or because of some factor making it very vulnerable to extirpation from the state. Typically 6-20 populations.
S3 = Rare or uncommon in North Carolina. Typically 21-100 populations.
SH = Of historical occurrence in North Carolina, not having been verified in more than 20 years, and suspected to be still extant.
SX= Believed to be extirpated in North Carolina.
S_? = Rank uncertain.

Global Rank:
G1 = Critically imperiled globally because of extreme rarity or because of some factor making it especially vulnerable to extinction throughout its range. Typically 5 or fewer occurrences globally.
G2 = Imperiled globally because of rarity or because of some factor making it very vulnerable to extinction throughout its range. Typically 6-20 occurrences globally.
G3 = Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range or because of other factors making it vulnerable to extinction throughout its range. Typically 21-100 occurrences globally.
G4 = Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery.
G5 = Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.
GX= Believed to be extinct throughout its range (e.g., passenger pigeon) with virtually no likelihood that it will be rediscovered.
Q = Questionable taxonomic assignment.
T = The rank of a subspecies or variety. For example, G4T1 would apply to a subspecies or variety of a species with an overall rank of G4, but with the subspecies or variety warranting a rank of G1.
G_? = Rank uncertain.

Status and rank codes for plants are derived from the Natural Heritage Program list of the rare plant species of North Carolina (Franklin, M.A. and J.T. Finnegan. 2006).

**Table 4. Rare animal species documented from Caldwell County, North Carolina.**

| SCIENTIFIC NAME<br>COMMON NAME | STATUS<br>NC | <br>US | RANK<br>NC | <br>GLOBAL |
|---|---|---|---|---|
| MAMMALS | | | | |
| *Neotoma magister*<br>Appalachian Woodrat | SC | FSC | S2 | G3G4 |
| *Sorex dispar*<br>Long-tailed Shrew | SC | - | S2 | G4 |
| *Glaucomys sabrinus coloratus*<br>Carolina Northern Flying Squirrel | E | E | S2 | G5T1 |
| BIRDS | | | | |
| *Coccyzus erythropthalmus*<br>Black-billed Cuckoo | SR | - | S2B | G5 |
| *Dendroica cerulea*<br>Cerulean Warbler | SR | FSC | S2B | G4 |
| *Vireo gilvus*<br>Warbling Vireo | SR | - | S2B | G5 |
| REPTILES | | | | |
| *Glyptemys muhlenbergii*<br>Bog Turtle | T | T (S/A) | S2 | G3 |
| AMPHIBIANS | | | | |
| *Desmoganthus wrighti*<br>Pigmy salamander | SR | FSC | S3 | G3G4 |
| *Eumeces anthracinus*<br>Coal Skink | SR | - | S2S3 | G5 |
| FISHES | | | | |
| *Cyprinella zanema*<br>Santee Chub | SR | - | S3 | G4 |

| SCIENTIFIC NAME<br>COMMON NAME | STATUS<br>NC | <br>US | RANK<br>NC | <br>GLOBAL |
|---|---|---|---|---|
| MOLLUSKS - FRESHWATER BIVALVES | | | | |
| *Alasmidonta varicosa*<br>Brook Floater | E | FSC | S1 | G3 |
| *Villosa delumbis*<br>Eastern Creekshell | SC | - | S3 | G4 |
| ARACHNIDS | | | | |
| *Microhexura montivaga*<br>Spruce-fir Moss Spider | SR | E | S1 | G1 |
| CADDISFLIES AND STONEFLIES | | | | |
| *Bolotoperla rossi*<br>Smoky Willowfly | SR | - | S3 | G4 |
| *Micrasema burksi*<br>A Caddisfly | SR | - | S3 | G4G5 |
| BUTTERFLIES | | | | |
| *Papilio cresphontes*<br>Giant Swallowtail | SR | - | S2 | G5 |
| DRAGONFLIES | | | | |
| *Macromia margarita*<br>Mountain River Cruiser | SR | FSC | S2S3 | G3 |
| *Ophiogomphus edmundo*<br>Edmund's Snaketail | SR | FSC | S1? | G1G2 |
| *Ophiogomphus mainensis*<br>Maine Snaketail | SR | - | S2S3 | G4 |

## EXPLANATION OF STATUS AND RANK CODES FOR RARE ANIMALS

N.C. Status:
E = Endangered, T = Threatened, SC = Special Concern, SR = Significantly Rare

Animal statuses are determined by the N.C. Wildlife Resources Commission and the NCNHP. Endangered, Threatened, and Special Concern species are afforded some protection by state law (the Endangered and Threatened Wildlife and Wildlife Species of Special Concern act, 1987). The Significantly Rare status is a NCNHP designation indicating rarity and the need for Population monitoring and possible conservation action for species not currently listed as Endangered, Threatened, or Special Concern.

U.S. Status:
E = Endangered. An animal that is in danger of extinction throughout all or a significant portion of its range.
T = Threatened. An animal that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
FSC = Federal Species of Concern. This status replaces the former "Category 2" Candidate status used by the U.S. Fish and Wildlife Service. Category 2 animals were those for which there was some evidence of vulnerability, but for which there were not enough data to support listing as Endangered or Threatened. The FSC code has no official status.
T(S/A) = Threatened due to similarity of appearance. The southern population of the bog turtle is so listed due to similarity of appearance with the northern population of the bog turtle (which is Federally-listed as Threatened and which does not occur in North Carolina).

N.C. Rank:
S1 = Critically imperiled in North Carolina because of extreme rarity or because of some factor making it especially vulnerable to extirpation from the state. Typically 1-5 populations.
S2 = Imperiled in North Carolina because of rarity or because of some factor making it very vulnerable to extirpation from the state. Typically 6-20 populations.
S3 = Rare or uncommon in North Carolina. Typically 21-100 populations.
SH = Of historical occurrence in North Carolina, not having been verified in more than 20 years, and suspected to be still extant.
S_B (e.g., S2B) = Rank of the breeding population in the state (for migratory species only). In the example provided, "S2B", the breeding population has a state rank of S2, regardless of the rank of the non-breeding population.
S_N = Rank of the non-breeding population in the state (for migratory species only).
_Z_ (e.g., SZN) = Population is not of significant conservation concern. For example, SZN would indicate a non-breeding population of a species that is not of significant conservation concern in the state.
S_? = Rank uncertain.

Global Rank:
G1 = Critically imperiled globally because of extreme rarity or because of some factor making it especially vulnerable to extinction throughout its range. Typically 5 or fewer occurrences globally.
G2 = Imperiled globally because of rarity or because of some factor making it very vulnerable to extinction throughout its range. Typically 6-20 occurrences globally.
G3 = Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range or because of other factors making it vulnerable to extinction throughout its range. Typically 21-100 occurrences globally.
G4 = Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery.
G5 = Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.
T = The rank of a subspecies or variety. For example, G4T1 would apply to a subspecies or variety of a species with an overall rank of G4, but with the subspecies or variety warranting a rank of G1.
U = Possibly in peril range-wide, but status uncertain; more information is needed.
G_? = Rank uncertain.

_NR = Not ranked. A global rank has not yet been assigned.

An S or G rank involving two numbers indicates uncertainty of rank. For instance, a G2G3 rank indicates that the species appears to warrant either a G2 or a G3 ranking, but that existing data do not allow that determination to be made.

Status and rank codes were derived from the database of the North Carolina Natural Heritage Program (2008).

## PROTECTION PRIORITIES

Although site significance rankings indicate the biological significance of a given site, they do not consider the site's protection needs. As previously described, site significance results from an objective evaluation of biological data with no regard to the potential threats for a given site or the ownership, as these two variables often change over the course of time. Ideally, conservation efforts should concentrate on the most significant sites in the county, which have good integrity and are ecologically viable. Viability of any given site can be influenced by numerous external pressures that can eventually lead to habitat fragmentation or destruction. In the past, pressures were primarily a result of logging/forestry activities and agricultural practices. With increased population growth and tourism in the county, external pressures now also include new development for industry and homes.

It is important that conservation planners and agencies consider the long-term viability of a given site and the factors that influence it. Well-planned conservation efforts that take into account the objectives and abilities of all partners involved often results in a more efficient use of conservation resources and provides a better overall conservation plan for a site.

Well-coordinated conservation plans, integrating local, private, and public resources that consider the overall context of the site, are the best way the ensure natural areas conservation in Caldwell County. Such coordinated plans can also result in more efficient use of conservation dollars by achieving multiple goals. These include protecting water quality, wildlife habitat, and providing recreation opportunities. Fortuitous opportunities for conservation should not be overlooked, and the high quality of certain natural areas under threat may warrant protection even if they are not part of any coordinated plan.

In Caldwell County, many of the highest quality natural areas are already afforded some legal protection as federal public lands, state public lands, and private nature preserves. These sites include Grandfather Mountain, Boone Fork/Johnnys Knob, Buffalo Cove Forests, Buffalo Creek Gorge, Johns River/Mulberry Creek Aquatic Habitat, Mills Knob, Mulberry Creek Rare Plant Site, Pack Hill/Thunderhole Creek, Rocky Knob, Walker Hollow Ridge, Wilson Creek Aquatic Habitat, Wilson Creek Gorge, and a section of Wilson Creek Slopes/Lost Cove Creek/Thorps Creek. Even with legal protection that limits development on public lands, habitat destruction is a real threat especially from timber sales within the national forest. The Pisgah National Forest approved a timber sale in 2008 in Pack Hill/Thunderhole Creek on sections that were described as old growth forest (Messick 2000). At Boone Fork/Johnnys Knob, timber sales are ongoing but were scaled back in 2007 due to the presence of mountain heartleaf (*Hexastylis contracta*) at the site.

Recently a landowner of significant acreage along Wilson Creek considered selling for development, but later withdrew that option. Concerned citizens of the county organized and established a committee to work with the landowners, federal (USFS) and state agencies (WRC) to find a solution that might put this area into some sort of public ownership and remove the threat of development along this Nationally Significant Aquatic Habitat with high quality waters.

Much of the Green Mountain/Zacks Fork site in the Yadkin River Valley is vulnerable to development. The county government and local land trust are working with local landowners to ensure that the view shed remains intact, by developing a plan to limit ridgeline development and to try to obtain conservation easements along the ridgeline.

One of the most vulnerable areas in Caldwell County is the western end of the Brushy Mountains between NC 18 and NC 90. This mountainous region has not been well explored for natural diversity and has been used for timber for many years. Some large tracts have been sold and developed, with more tracts scheduled for development. Opportunistic chances to inventory and perhaps acquire large tracts in this region especially by agencies such as the Wildlife Resources Commission should be considered, as this area will likely become more fragmented over time.

With the southern portion of Caldwell County already heavily impacted by agricultural, timber, and residential usage, protection efforts are already more limited. Chance opportunities for protection of small pockets of intact natural communities that have rare animals and plants such as bog asphodel (*Tofieldia glutinosa*), dwarf-flowered heartleaf (*Hexastylis naniflora*), mountain heartleaf (*Hexastylis contracta*), or chinquapin oak (*Quercus prinoides*) should be consider as opportunities arise.

Finally, ecological processes will continue to impact the condition of natural areas. Canada hemlock (*Tsuga canadensis*) and Carolina hemlock (*T. caroliniana*) populations are under attack from the hemlock woolly adelgid (*Adelges tsugae*). This non-native pest threatens the survival of both hemlock species throughout their range. Another ecological process to consider is global warming. As temperatures rise, the composition and survival of certain animal and plant species will be directly and indirectly affected. Many disjunct species from the Canadian region located on some of our highest mountain peaks will be likely be threatened with expiration from the state, as higher temperatures will lead to warming of their very limited and often fragile habitats.

## LANDOWNER PROTECTION INITIATIVES

Protection of significant sites in private ownership will depend largely on an active partnership and the participation of Federal and State agencies, local land trusts, landowners, and interested citizens. Numerous options are available to the landowners who promote conservation and protection on their properties. These options can provide financial incentives as well as assistance in conservation planning and land management. In some cases, such options could mean the difference between divesting land for development or retaining it as a natural area.

One of the most useful options for a landowner is a conservation easement. The conservation easement is a flexible option to permanently conserve land for scenic, natural, or cultural values. Conservation easements can be sold or donated, they confer state and federal tax benefits to the owner, and they are affixed to the property deed “in perpetuity”. Conservation easements are agreements entered into with a recognized conservation organization or government. They allow

the owner to retain the title/deed to their land and to maintain a negotiated property right. Certain rights, such as development rights, are deeded over to the conservation entity. One example of conservation organizations that work with landowners to set up conservation easements are local land trust. The Foothills Conservancy of North Carolina is the land trust qualified to hold conservation easements in Caldwell County. The Foothills Conservancy of North Carolina can be reached by mail at: P.O. Box 3023, Morganton, N.C. 28680, by telephone at: (828) 437-9930, or on the internet at http://www.foothillsconservancy.org.

The Conservation Trust for North Carolina (CTNC) located in Raleigh, can help design conservation easements as well as refer interested individuals to a qualified local land trust. Their website is http://www.ctnc.org/. The North Carolina chapter of The Nature Conservancy (TNC) is based in Durham, with offices located in western North Carolina in Asheville. TNC is a good option for lands high in biological diversity and significance. TNC can be contacted by mail at: 4705 University Drive, Suite 290 Durham, N.C. 27707, by phone at: (919) 403-8558, or on the internet at: http://www.nature.org/wherewework/northamerica/states/northcarolina/. Assistance in identifying conservation organizations in North Carolina can also be obtained by contacting the N.C. Natural Heritage Program of the Office of Natural Resources Planning and Conservation by telephone at: (919) 715-7808, by mail at: NCNHP, 1601 MSC, Raleigh, N.C. 27699-1601, or on the internet at: http://www.ncnhp.org/.

Owners who are interested in improving the habitat value of their land can explore various cost-share programs that are available through the Natural Resources Conservation Services of the United States Department of Agriculture and the Caldwell County Soil and Water Conservation District. Various programs are available for soil and water protection, reforestation, erosion control, wildlife enhancement, and riparian-stream area restoration. For more information contact them at: 120 Hospital Ave. NE, Suite 2, Lenoir, N.C. 28645, telephone: (828) 758-1111.

Landowners that would like assistance in achieving forest management goals can look into cost-sharing through the North Carolina Forest Stewardship Program, which is sponsored by several state and federal agencies. Management plans could include controlled burning, reforestation with natural vegetation, maintenance of buffer strips along watercourses, and wildlife enhancement. For more information, contact the local representative of one of the following partner agencies: Natural Resources Conservation Services of the United States Department of Agriculture at 120 Hospital Ave. NE, Suite 2, Lenoir, N.C. 28645, telephone: (828) 758-1111; North Carolina Division of Forestry Resources, County Rangers Office, 1543 Wilkesboro Blvd. NE, Lenoir, N.C. 28645, telephone (828)757-5612, or the North Carolina Wildlife Resources Commission, Wildlife Management Division, telephone: (919) 707-0050.

One final option for landowners who wish to preserve high quality land in a natural state is through the North Carolina Registry of Natural Areas, administered by the North Carolina Natural Heritage Program. The program relies on voluntary agreements with landowners and can provide management prescriptions, some degree of statutory protection from pipelines and transmission lines, and public recognition (if desired). For more information, contact the N. C. Natural Heritage

Program of the Office of Natural Resources Planning and Conservation by telephone at: (919) 715-7808, or by mail at: NCNHP, Attn: Protection Specialist, 1601 MSC, Raleigh, N.C. 27699-1601.

## AREAS FOR FURTHER STUDY

Although this inventory examined numerous areas across the county, a need still exists for subsequent survey. This includes areas where permission to survey was not granted, and areas not targeted by this inventory. A list of taxa and areas suggested for future survey work follows.

### Animal Surveys

Generally, this inventory focused heavily on identifying natural communities and plants, with less attention given to animals. Although a number of rare animal records exist for Caldwell County, the majority are on public and protected lands where they are often visited. However, many rare animal locations have not been visited in over 20 years. Future animal surveys should focus on relocation of existing records as well as identification of habitats critical for uncommon and rare animals. This will allow for site designs that could incorporate their needs. There are also potential associations of rare insects with mountain bogs which should be addressed. In recent years, the need for survey of common wide-ranging species has become more apparent, especially in light of increased habitat fragmentation due to human impacts on the landscape. Information about species such as black bear (*Ursus americanus*), bobcat (*Lynx rufus*), and eastern coyote (*Canis latrans*) could be informative in regard to landscape function and conservation planning and design.

### Nonvascular Plant Surveys

Additional surveys for uncommon and rare nonvascular plant species are needed. The majority of Caldwell County records from Grandfather Mountain and Blowing Rock Cliffs are historical records (have not been seen in at least 20 years with many not observed in decades). The majority of the Blue Ridge Escarpment has not been surveyed for non-vascular plants. This region includes favorable habitats such as moist stream corridors and gorges, which often yield a high diversity of bryophytes.

### Brushy Mountain Region

On the Boomer, Grandin, and Kings Creek quadrangles, the Brushy Mountains extend into Caldwell County. Little or no exploration of the Brushy Mountains in the county has been conducted due to the vast portion with no access roads and the lack of landowner permission to conduct a survey. In recent years, the land use has shifted from a timber land use to one of high-end residential development. Areas that warrant survey work include the mountain range extending from Cedar Rock to Cox Knob. There is a conservation easement within the Brushy Mountains held by the North American Land Trust (NALT).

### Collettsville Quadrangle

Additional survey work along wooded steams could yield additional occurrences of mountain heartleaf (*Hexastylis contracta*).

**Globe Quadrangle**

Areas southeast of Blowing Rock Cliffs along the headwaters of the Johns River westward to Big Ridge need additional survey work, especially along the aquatic habitats such as Thunderhole Creek, New Years Creek, and China Creek. Also, aquatic survey work is needed along the upper portion of Phillips Creek between Big Ridge and Pack Hill Ridge.

**Grandfather Mountain Quadrangle**

Grandfather Mountain is one of the most well-surveyed areas in the state, but it has many records that are now considered historical (20 years or more since last observation) and are in need of updating. In Caldwell County these include a number of the non-vascular mosses and liverworts. Additionally, areas across of the mountain south of US 221 within the Pisgah National Forest, as well as private lands, may yield more rare species. Additional pockets of undocumented old growth forest may also exist along the upper reaches of Ballew and Dixon Creek.

**Inner Piedmont**

Development along the US 321 corridor extends out several miles from Lenoir southward to Hickory. Additional survey work along Little Gunpowder Creek, as well as other small creeks in that area, may yield additional occurrences of dwarf-flowered heartleaf (*Hexastylis naniflora*). Additionally, there exists habitat for dwarf chinquapin oak (*Quercus prinoides*) along small coves and stream corridors near the Caldwell-Alexander County line.

Additional survey work along Lower Creek could help relocate historical occurrences of sticky bog asphodel (*Tofieldia glutinosa*), last observed in the 1930s in two locations along Lower Creek south of Lenoir. As development increases along the creek, the likelihood that these occurrences will be relocated decreases dramatically.

**Lenoir Quadrangle**

Additional survey work along wooded streams could yield additional occurrences of mountain heartleaf (*Hexastylis contracta*), especially along Spencer Branch, Mitchell Branch, Loving Branch, and Stapps Branch.

## BIOLOGICAL SURVEY AND ENDANGERED SPECIES LAWS

Obtaining landowner permission to survey is an integral part of biological inventory. Occasionally, however, permission to survey on private lands is not granted due to a belief that if a rare species is discovered, restrictions and land-use limitations will be imposed. Clearly, when this occurs the search for scientific information is hindered. A secondary effect of not granting permission to survey is that owners of biologically significant lands do not learn about the conservation options and tax incentives that are available to them. Those who grant permission and are found to own significant lands are given results from the biological survey and, if they wish, are put in contact with an appropriate conservation organization, or are made aware of other management or protection options.

In reality, there is very little reason for landowners to have concerns about the presence of rare species on their land. A summary of federal and state endangered species laws relevant to private landowners was recently prepared by Mark A. Cantrell of the U.S. Fish & Wildlife Service and Kenneth A. Bridle of the Piedmont Land Conservancy in Greensboro, N.C. Some of that information is presented below to help dispel concerns that landowners may have about rare species and to provide clarification on potential land-use restrictions.

## FEDERAL LAW

1. The Endangered Species Act (ESA) protects only plants and animals that are Federally-listed as Endangered or Threatened. Since Federally-listed species are by definition very rare, the likelihood of any occurring on a given tract of private land is very small.

2. The ESA protects Federally-listed animal species from the potentially harmful actions of private landowners. Because this may lead to restrictions on their use of lands, Congress, the U.S. Fish & Wildlife Service (USFWS), and other partners have worked to develop flexible tools for resolving conflicts. These tools include Section 10 permits, such as habitat conservation plans, safe harbor agreements, and candidate conservation agreements. Federal funds are also available to assist landowners with management and conservation of listed and candidate species (rare federally but not officially listed) on their land. Plants on private land are not subject to provisions of the ESA, unless federal funding or permitting is involved.

3. Engaging in interstate or foreign trade of a Federally-listed species without a permit is illegal for plants and animals. “Taking” (i.e., harassing, harming, pursuing, hunting, killing, trapping) or possessing illegally taken animals is a violation of the ESA. Removing, digging up, cutting, damaging, or destroying a Federally-listed plant is illegal on federal lands.

4. Through the habitat conservation planning process, the USFWS may issue a permit so that private landowners may lawfully “take” a Federally-listed animal species if it is “incidental to and not the purpose of carrying out otherwise lawful activities.” These permits are available as long as the landowner implements an approved habitat conservation plan, and the “taking” does not jeopardize

the continued existence of the species. A private landowner is not required to prepare a conservation plan for the "taking" of listed plant species as long as the activity does not involve federal funding or permitting, or is not in violation of other laws.

5. Under the ESA, private developers can obtain permits to legally harm or even kill Federally-listed species on their property provided that they show that attempts were made to minimize impacts on the species in other ways.

6. The existence of a Federally-listed plant species on private property has no legal effect on the landowner unless a project requires a federal permit or uses federal funds and will clearly result in adverse impacts to the listed plant. Landowners, individuals, and agencies are prohibited from taking listed animals without authorization, whether the action is private or federally funded.

7. When critical habitat is designated for Federally-listed species, it applies only to federal actions, not to state or local projects, and not to the actions of private landowners unless there is federal funding or permitting involved.

**STATE LAW**

1. North Carolina endangered species laws apply to species listed by the state as Endangered, Threatened, or Special Concern.

2. The state plant and animal endangered species laws are modeled after the ESA, in that they prohibit illegal trafficking or poaching of listed species.

3. The state endangered animal species law states that "no rule may be adopted that restricts use or development of private property."

4. The state endangered plant species law states that "the incidental disturbance of protected plants during agricultural, forestry, or development operations is not illegal so long as the plants are not collected for sale or commercial use." Collection of federal or State-listed plants from public or private land can only be done with the landowner's written permission and a permit from the N.C. Department of Agriculture's Plant Conservation Program.

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# SITE DESCRIPTIONS

GRANDFATHER MOUNTAIN/WILSON CREEK MACROSITE

## Caldwell County Natural Area Inventory

## GRANDFATHER MOUNTAIN/WILSON CREEK MACROSITE
## Significant Natural Heritage Area

**Site Significance:** National
**Counties:** Avery, Burke, Caldwell, and Watauga
**Size:** 67,938 acres
**Ownership:** U.S. Forest Service and Private

The Grandfather Mountain/Wilson Creek Macrosite contains numerous special status rare animals, plants, and natural community types. This Macrosite lies along a section of the Blue Ridge Mountains and Escarpment along the Wilson Creek corridor. The Caldwell County portion of this Macrosite includes a small portion of Grandfather Mountain, as well as all or parts of Backbone Ridge, Gragg Forests, Harpers Creek/Yellow Buck Mountain, Walker Hollow Ridge, Wilson Creek Aquatic Habitat, Wilson Creek Gorge, and Wilson CreekSlopes/Lost Cove Creek/Thorps Creek.

This Macrosite contains diverse assemblages of natural communities, spread over a large area ranging from north of Grandfather Mountain and extending down the escarpment along the Wilson Creek corridor. Within the Macrosite are nearly 100 documented occurrences of special status animals, plants, and natural communities, making this locality one of the most diverse regions in the state.

Within the Macrosite, several of the Standard Sites have some formal protection. One example is Grandfather Mountain, protected by a conservation easement and is a Registered Heritage Area (RHA). Grandfather Mountain contains some of the rarest plants and animals in the state, many of them ice age relicts restricted to the harsh, high elevation conditions found only on the tops of a few mountains throughout the southeastern United States. Examples of these rare species include bent avens (*Geum geniculatum*), spreading avens (*G. radiatum*), Roan Mountain bluets (*Houstonia montana*), Carolina northern flying squirrel (*Glaucomys sabrinus coloratus*), and spruce-fir moss spider (*Microhexura montivaga*) The sites that fall within the Pisgah National Forest have some formal protection, though they are subject to timber sales.

Fragmentation of the landscape is more prevalent in the north around Grandfather Mountain where several small towns and communities exist. Scattered residential development on the privately-owned lands is also common in the northern portions of the Macrosite. Despite the residential encroachment to the north, this Macrosite has excellent ecological viability as a contiguous forested region. This allows for migration of far-ranging mammals such as black bear (*Ursus americanus*), bobcat (*Felis rufus*), and white-tailed deer (*Odocoileus virginianus*). Also, large unfragmented areas provide benefits for species that are disturbance sensitive and need large blocks of unfragmented habitat to reproduce.

BACKBONE RIDGE

**Caldwell County Natural Area Inventory**

**BACKBONE RIDGE**
**Significant Natural Heritage Area**

**Site Significance:** Regional
**Quadrangle:** Globe
**Size:** 42 acres
**Ownership:** U.S. Forest Service and Private

**SIGNIFICANT FEATURES:** This site includes one of the better examples of both Low Elevation Rocky Summit and Pine-Oak/Heath communities located along the Blue Ridge Escarpment within Caldwell County, with mature canopy trees and undisturbed rock outcroppings. A good example of Chestnut Oak Forest is also found in the site. The Federal and State Species of Concern Appalachian woodrat (*Neotoma magister*) is present, as are several uncommon North Carolina Watch List species that include the lesser rattlesnake plantain (*Goodyera repens*), turkey-beard (*Xerophyllum asphodeloides*), and Carolina hemlock (*Tsuga caroliniana*).

**LANDSCAPE RELATIONSHIPS:** This site is located near the top of the Blue Ridge Escarpment, 3.8 miles southwest of the town of Blowing Rock. It is located in the northern portion of the county in a large area of the Pisgah National Forest, with private lands clustered primarily along stream corridors. Notable Significant Natural Heritage Areas nearby include Pack Hill which lies 0.3 miles to the east; Racket Creek Slopes and Gragg Forests, 0.1 and 0.8 miles to the west respectively; and Walker Hollow Ridge, 0.8 miles to the south. Johns River/ Mulberry Creek Aquatic Habitat is located 1.3 miles to the southeast, Grandfather Mountain is located 2.0 miles to the west, and Blowing Rock Cliffs is located 3.9 miles to the east.

**SITE DESCRIPTION:** This site consists of a prominent ridge that runs north to south off the Blue Ridge Escarpment. Nearly central to the site is a Low Elevation Rocky Summit of about 1-2 acres. This community is located along the steep spine of a northwest-facing ridge. A large area of rock extends outward in layers that protrude upward nearly 20-25 yards. Below some large vertical upthrust rocks in talus at the base is an area that supports a small population of Appalachian woodrat (*Neotoma magister*). Other small rocky outcroppings are scattered along the nearby ridgeline and may possess additional Appalachian woodrat habitat. Surrounding forest canopy species extend out onto some of the rocky areas. They include Carolina hemlock (*Tsuga caroliniana*), Table Mountain pine (*Pinus pungens*), and black gum (*Nyssa sylvatica*). In the understory, red maple (*Acer rubrum*), downy serviceberry (*Amelanchier arborea*), and sourwood (*Oxydendrum arboreum*) are abundant. Shrubs are abundant and dense, with great laurel (*Rhododendron maximum*), mountain laurel (*Kalmia latifolia*), and red chokeberry (*Aronia arbutifolia*) dominant. Herbs in the rocky areas are sparse due to the thick shrub layer. In small open areas, herbs such as spotted wintergreen (*Chimaphila maculata*), galax (*Galax urceolata*), and alumroot (*Heuchera villosa*) are present. Small patches of the uncommon turkey-beard

(*Xerophyllum asphodeloides*) occur in small open areas among the shrubs that surround the larger rock outcroppings, while a few clumps of lesser rattlesnake plantain (*Goodyera repens*) can be seen under the mountain laurel.

To the south and east of the Low Elevation Rocky Summit is a very good example of a Pine--Oak/Heath community. It has a somewhat open canopy dominated by Table Mountain pine, shortleaf pine (*Pinus echinata*), and scattered chestnut oak (*Quercus montana*). Some of the canopy pine trees are 16-19" diameter at breast height (dbh) and show little or no presence of southern pine bark beetle. The understory is nearly absent, with black gum, red maple, and sourwood present, but sparse. The shrub layer is thick, suggesting a long history of fire suppression, and consists mainly of great laurel and mountain laurel. The herb layer is sparse overall, with herbs occurring in small open areas where the shrub layer is either thin or absent. Common herbs include galax, spotted wintergreen, and tickseed (*Coreopsis major*).

Forests to the south and east of the Pine--Oak/Heath and the Rocky Summit are primarily Chestnut Oak Forest. This is a younger forest with a closed canopy that runs along the ridgeline and down the adjacent slopes. The average canopy tree size ranges from 11-15" diameter at breast height. Dominant canopy species include chestnut oak, scarlet oak (*Quercus coccinea*), northern red oak (*Q. rubra*), mockernut hickory (*Carya alba*), and tulip poplar (*Liriodendron tulipifera*). The understory is well-defined and contains sourwood, flowering dogwood (*Cornus florida*), black gum, and Fraser's magnolia (*Magnolia fraseri*). The shrub layer is less dense than the surrounding natural communities, with patches of mountain laurel and great laurel scattered throughout. Other shrubs include highbush blueberry (*Vaccinium corymbosum*), deerberry (*V. stamineum*), lowbush blueberry (*V. pallidaum*), strawberry-bush (*Euonymus americanus*), and horse-sugar (*Symplocos tinctoria*). Woody vines are more common than in the surrounding areas and include grapes (*Vitis* spp.), greenbrier (*Smilax rotundifolia* and *S. glauca*), Virginia creeper (*Parthenocissus quinquefolia*), and poison ivy (*Toxicodendron radicans*). The herb layer is more diverse and abundant than in the surrounding communities. Common herbs include spotted wintergreen, galax, partridgeberry (*Mitchella repens*), bottlebrush grass (*Hystrix patula*), Christmas fern (*Polystichum acrostichoides*), ebony spleenwort (*Asplenium platyneuron*), tickseed, sunflowers (*Helianthus* spp.), and downy rattlesnake plantain (*Goodyera pubescens*).

**MANAGEMENT AND PROTECTION:** The biggest management need at this site currently would be a controlled burn, especially in the Pine--Oak/Heath where the shrub layer is dense and suppresses the herb layer. One old logging road runs along the east and south portions of the site. A large portion of this site is afforded some protection by the U.S. Forest Service. The remainder of the site is privately-owned and unprotected. This site would make a good conservation project for a local land trust to pursue.

**NATURAL COMMUNITIES:** Pine--Oak/Heath, Low Elevation Rocky Summit, and Chestnut Oak Forest.

**RARE PLANTS:** Watch List – Lesser rattlesnake plantain (*Goodyera repens*) and turkey-beard (*Xerophyllum asphodeloides*).

**RARE ANIMALS:** Appalachian woodrat (*Neotoma magister*).

**REFERENCES:**

Padgett, J. E. 2007. Site Survey Report: Backbone Ridge. Natural Heritage Program, Office of Natural Resource Planning and Conservation, DENR, Raleigh, N.C.

GRAGG FORESTS

**Caldwell County Natural Areas Inventory**

## GRAGG FORESTS
## Significant Natural Heritage Area

**Site Significance:** County

**Size:** 277 acres (130 primary and 147 secondary)

**Quadrangle:** Grandfather Mountain and Globe

**Ownership:** Private

**SIGNIFICANT FEATURES:** The site contains a small but mature Chestnut Oak Forest and a fair quality Rich Cove Forest.

**LANDSCAPE RELATIONS:** Gragg Forests is bounded by roads on all sides; most are small, unused private roads. The old Globe Road bisects the site. The northeastern boundary of the site is adjacent to part of the Pisgah National Forest. Pisgah National Forest holdings surround the area. The site lies two miles from Grandfather Mountain and the Wilson Creek drainage.

**SITE DESCRIPTION:** Located on moderate to steep slopes descending to Anthony Creek, Gragg Forests consists of Rich Cove Forest and a small but mature Chestnut Oak Forest. The majority of the site has been logged within the last 50 years. Some of the area has been logged much more recently (15 to 20 years); these areas are included in the secondary area. Old dirt logging roads cross much of the site. The west end is bordered by Anthony Creek, and a tributary to Anthony Creek borders the east end. The Rich Cove Forests are dominated by tulip poplar (*Liriodendron tulipifera*), basswood (*Tilia americana* var. *heterophylla*), black locust (*Robinia pseudoacacia*), yellow buckeye (*Aesculus flava*), northern red oak (*Quercus rubra*), chestnut oak (*Q. montana*), red maple (*Acer rubrum*), and American beech (*Fagus grandifolia*). Shagbark hickory (*Carya ovata*), black cherry (*Prunus serotina*), and white oak (*Q. alba*) are occasional in the canopy. The subcanopy is characterized by Canada hemlock (*Tsuga canadensis*), sweet birch (*Betula lenta*), witch-hazel (*Hamamelis virginiana*), flowering dogwood (*Cornus florida*), Fraser's magnolia (*Magnolia fraseri*), and other typical subcanopy species associated with this forest type. The northwestern corner of the site features a small stand of red spruce (*Picea rubens*). The sparse shrub layer contains occasional patches of great laurel (*Rhododendron maximum*) and mountain laurel (*Kalmia latifolia*). Witch-hobble (*Viburnum lantanoides*) and smooth hydrangea (*Hydrangea arborescens*) are common along Anthony Creek and its tributaries. The herb layer, while diverse, is largely dominated by poison ivy (*Toxicodendron radicans*). Where there are breaks in the poison ivy, the herb layer contains greenbrier (*Smilax glauca*), wood nettle (*Laportea canadensis*), jewelweed (*Impatiens* sp.), Jack-in-the-pulpit (*Arisaema triphyllum*), false Solomon's-seal (*Maianthemum racemosum*), sweet Cicely (*Osmorhiza claytonii*), Christmas fern (*Polystichum acrostichoides*), black cohosh (*Actaea racemosa*), large-flowered bellwort (*Uvularia grandiflora*), and other typical herbaceous species. Along Anthony Creek and its tributaries, speckled wood lily (*Clintonia umbellulata*),

alumroot (*Heuchera villosa*), wild stonecrop (*Sedum ternatum*), and pink turtlehead (*Chelone lyonii*) are common.

The many old logging roads have created openings in the forest, in which grow a diverse mix of herbaceous species, including invasive species. Multiflora rose (*Rosa multiflora*) and microstegium (*Microstegium vimineum*) are quite abundant along and within these old roads. Other herbaceous species found in these disturbed areas include smaller Enchanter's nightshade (*Circaea alpina*), bedstraw (*Galium latifolium*), rattlesnake fern (*Botrychium virginianum*), hay-scented fern (*Dennstaedtia punctilobula*), and Virginia creeper (*Parthenocissus quinquefolia*). This area has been extensively logged in the past, as evidenced by the numerous small diameter trees and the old logging roads. Anthony Creek and its tributaries contain a high degree of fine sediment, likely resulting from development higher in the watershed and runoff at points where the dirt logging roads cross the streams.

The northeastern corner of the site features a small but mature Chestnut Oak Forest, which is dominated by chestnut oak, red oak, and occasionally red maple. The shrub layer is sparse, consisting almost exclusively of mountain laurel. The herb layer is equally sparse, with the occasional patch of galax (*Galax urceolata*). A small stand (approximately 50 trees) of red spruce grows within this forest.

**MANAGEMENT AND PROTECTION:** Allowing the forests to continue to mature will increase their biological significance, as well as help protect Anthony Creek from sedimentation. This site is privately-owned and has no formal protection.

**NATURAL COMMUNITIES:** Rich Cove Forest and Chestnut Oak Forest.

**RARE PLANTS:** None observed.

**RARE ANIMALS:** None observed.

**REFERENCES:**

Smith, P. 2004. Site Survey Report: Anthony Creek Forests (= Gragg Forests). N.C. Natural Heritage Program, OCCA, DENR, Raleigh, N.C.

GRANDFATHER MOUNTAIN

**Caldwell County Natural Areas Inventory**

# GRANDFATHER MOUNTAIN
## Significant Natural Heritage Area

**Site Significance:** National
**Quadrangles:** Grandfather Mountain and Valle Crucis

**Size:** 6,250 acres
**Ownership:** Grandfather Mountain Inc., National Park Service, U.S. Forest Service, and The Nature Conservancy

**SIGNIFICANT FEATURES:** Grandfather Mountain is the highest point in the Blue Ridge Mountains, with excellent occurrences of several rare high elevation natural community types and numerous rare plant and animal species. It is one of the most significant sites in the southern Appalachian Mountains, comparable in terms of biodiversity with Great Smoky Mountains National Park and Roan Mountain. It is an important site for rare Southern Appalachian endemic species and also for rare northern disjunct species.

**LANDSCAPE RELATIONSHIPS:** Grandfather Mountain is directly connected to extensive, unfragmented areas in the Pisgah National Forest along much of its southern boundary. There is a 0.5 mile-wide connection to Pisgah National Forest at Pilot Knob on the southeast flank of Grandfather Mountain. On the northeast, the site is directly connected to the western end of Julian Price Memorial Park on the Blue Ridge Parkway. Dun Vegan Mountain lies within one mile to the north and Hanging Rock Mountain lies about two miles to the north. Linville Gap Bog (Avery County) lies at the foot of Grandfather Mountain just across NC 105.

**SITE DESCRIPTION:** Grandfather Mountain is one of the most steep, rugged mountains in the Southern Appalachians and is the highest point in the Blue Ridge Mountains. Elevations range from about 3,800 feet to 5,964 feet. Its principal summit ridge is oriented southwest to northeast, producing great variation in microclimate due to the resulting north-facing and south-facing slopes. The primary peaks of its summit -- Linville Peak, MacRae Peak, Attic Window Peak, and Calloway Peak – are all in excess of 5,200 feet in elevation. Known as the rockiest mountain in North Carolina, its upper half is characterized by crags, cliffs, and boulderfields.

Grandfather Mountain is one of the most biologically significant sites in the Southern Appalachians, and the single most important site for several rare species. A total of 41 rare plant species and 19 rare animal species are known from the site, though only some occur in the Caldwell County portion. The combination of complex geology and high altitude explains much of the mountain's biodiversity. Numerous species from northern North America were displaced southward during the last glacial age, but some populations were unable to migrate northward during subsequent warm climatic periods. These relict populations found refuge in the high elevation habitats of the mountain. The mountain is now a stronghold for numerous Southern

Appalachian endemic species, as well as for these northern disjunct species. Some of the endemic plant species for which it is a stronghold include bent avens (*Geum geniculatum*), Blue Ridge goldenrod (*Solidago spithamaea*), Roan Mountain bluet (*Houstonia montana*), and Heller's blazing-star (*Liatris helleri*). Among the more notable rare animal species are the Carolina northern flying squirrel (*Glaucomys sabrinus coloratus*), Weller's salamander (*Plethodon welleri*), known elsewhere in North Carolina from only several locations; the Virginia big-eared bat (*Corynorhinus townsendii virginianus*), and the spruce-fir moss spider *(Microhexura montivaga*), with one of the world's only viable populations. The mountain supports good examples of at least 11 natural community types. Of these, the High Elevation Rocky Summit, Fraser Fir Forest, Red Spruce--Fraser Fir Forest, Boulderfield Forest, and Montane Calcareous Cliff communities are the most rare. The High Elevation Rocky Summit communities along the summit ridge are among the best examples known. The Fraser Fir Forests of the mountain are among the best remaining examples, though somewhat smaller in extent than those in the Black Mountains, Great Smoky Mountains, or Great Balsam Mountains. The Red Spruce--Fraser Fir Forests are notable in terms of their quality. Extensive examples of high quality Boulderfield Forest occur on the northwest flank of the mountain. A large part of the mountain supports exemplary Northern Hardwood Forest. High Elevation Red Oak Forests are common on the middle to lower slopes of the south flank of the mountain. Rich Cove Forests with high plant diversity are distributed in protected areas all around the mountain. Excellent forested High Elevation Seep communities occur along most major drainages and support several rare plant species. Montane Acidic Cliff and Montane Calcareous Cliff communities occur at scattered locations. Detailed descriptions of the flora, fauna, and natural community types of the mountain are contained in Oakley (1991 and 1995).

**MANAGEMENT AND PROTECTION:** The site is a well-known, well-managed tourist attraction. A large part of the site is formally protected by a conservation easement with the North Carolina Chapter of The Nature Conservancy. Lands in the Blue Ridge Parkway corridor are Registered Natural Heritage Areas. The Nature Conservancy owns several large tracts on the north slope of the mountain. Certain parts of the mountain northeast of Calloway Peak are without protection. Developed areas on the southwest flank, including Linville Bluffs and Linville Peak, are without formal protection but are monitored by Grandfather Mountain, Inc. Backcountry staff manage trails and campsites to prevent excessive impacts to vegetation and to detect poachers. Dieback of Fraser Fir Forest and Red Spruce--Fraser Fir Forest from the balsam wooly adelgid (*Adelges picea*) and stresses from air pollution are a major and (presently) unmitigatable stress to several of the rare species. See Oakley for detailed information on stresses and management strategies. The potential for additional rare species is high. To date, few surveys for nonvascular plants and no systematic surveys of invertebrate animals have been conducted on the mountain.

**NATURAL COMMUNITIES:** Fraser Fir Forest, Red Spruce--Fraser Fir Forest, High Elevation Rocky Summit, Heath Bald, Montane Calcareous Cliff*, High Elevation Seep*, High Elevation Red Oak Forest, Northern Hardwood Forest, Boulderfield Forest*, Rich Cove Forest*, Acidic Cove Forest.

**RARE PLANTS:** [Vascular Plants]: hemlock-parsley (*Conioselinum chinense*)*, Heller's blazing-star (*Liatris helleri*)*, Roan rattlesnakeroot (*Prenanthes roanensis*)*, balsam ragwort (*Packera paupercula*), Blue Ridge goldenrod (*Solidago spithamaea*)*, mountain bittercress (*Cardamine clematitis*), roseroot (*Rhodiola rosea*)*, pink-shell azalea (*Rhododendron vaseyi*)*, fruitful locust (*Robinia hispida var. fertilis*)*, fireweed (*Chamerion angustifolium*), trailing wolfsbane (*Aconitum reclinatum*), tall larkspur (*Delphinium exaltatum*)*, bent avens (*Geum geniculatum*), spreading avens (*Geum radiatum*)*, Roan Mountain bluet (*Houstonia montana*), Carolina saxifrage (*Saxifraga caroliniana*)*, wretched sedge (*Carex misera*), Wood's sedge (*Carex woodii*)*, deerhair bulrush (*Trichophorum cespitosum*)*, Gray's lily (*Lilium grayi*), pinebarren death-camas (*Zigadenus leimanthoides*)*, northern shorthusk (*Brachyeletrum septentrionale*)*, Canada reedgrass (*Calamagrostis canadensis*)*, fragile fern (*Cystopteris fragilis*)*, Appalachian fir-clubmoss (*Huperzia appalachiana*)*. [Nonvascular Plants]: A liverwort *(Barbilophozia hatcheri*)*, a liverwort (*Bazzania nudicaulis*), a liverwort (*Metzgeria termperata*), a liverwort (*Mylia taylori*)*, a liverwort (*Plagiochila austinii*)*, a liverwort (*Plagiochila corniculata*)*, a liverwort (*Plagiochila sullivantii var. sullivantii*)*, a liverwort (*Plagiochila virginica var. virginica*)*, a liverwort (*Sphenolobopsis pearsonii*), matted feather moss (*Brachythecium populeum*), Rota's feather moss (*Brachythecium rotaeanum*), lime homalia (*Homalia trichomanoides*)*, Grandfather Mountain leptodontium (*Leptodontium excelsum*), pale-margined leptodontium (*Leptodontium flexifolium*)*, rock gnome lichen (*Gymnoderma lineare*)*, an aquatic lichen (*Hydrothyria venosa*)*, a foliose lichen (*Melanelia stygia*)*, a foliose lichen (*Cetraria arenaria*), northern peatmoss (*Sphagnum capillifolium*).

**RARE ANIMALS:** Virginia big-eared bat (*Corynorhinus townsendii virginianus*)*, eastern small-footed myotis (*Myotis leibii*), northern myotis (*Myotis septentrionalis*)*, Appalachian cottontail (*Sylvilagus obscurus*)*, Carolina northern flying squirrel (*Glaucomys sabrinus coloratus*), Appalachian woodrat (*Neotoma magister*), long-tailed shrew (*Sorex dispar*), southern water shrew (*Sorex palustris punctulatus*)*, northern saw-whet owl (*Aegolius acadicus*)*, sharp-shinned hawk (*Accipiter striatus*)*, black-billed cuckoo (*Coccyzus erythropthalmus*)*, black-capped chickadee (*Poecile atricapillus*)*, hermit thrush (*Catharus guttatus*)*, magnolia warbler (*Dendroica magnolia*)*, Weller's salamander *(Plethodon welleri*)*, green comma (*Polygonia faunus*), high mountain supercoil *(Paravitrea andrewsae*)*, velvet covert (*Mesodon subpalliatus*)*, and spruce-fir moss spider (*Microhexura montivaga).*

* = species not known from Caldwell County

**REFERENCES:**

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HARPER CREEK/YELLOW BUCK MOUNTAIN

**Caldwell County Natural Area Inventory**

**HARPERS CREEK/YELLOW BUCK MOUNTAIN**
**Significant Natural Heritage Area**

**Site Significance:** County

**Size:** 428 acres (316 primary and 112 secondary)

**Quadrangle:** Chestnut Mountain

**Ownership:** U.S. Forest Service and Private

**SIGNIFICANT FEATURES:** This site has extensive good quality examples of common natural community types that are among some of the best in Caldwell County. Chestnut Oak Forest, Montane Oak--Hickory Forest, Pine--Oak/Heath, and Acidic Cove Forest occur in a large, designated roadless area.

**LANDSCAPE RELATIONSHIPS:** This site lies in western Caldwell County adjacent to a portion of the Wilson Creek Aquatic Habitat, south of Wilson Creek Slopes/Lost Cove Creek/Thorps Creek. Upper Falls Creek is 3.9 miles to the west and Wilson Creek Gorge begins one mile to the south.

**SITE DESCRIPTION:** This site is a mosaic of several different natural community types ranging from mesic to dry. By far the most extensive natural community type within the site is Chestnut Oak Forest. It transitions into Acidic Cove Forest along streams and lower sheltered slopes, with patches of smaller embedded forest community types such as Pine--Oak/Heath and Low Elevation Rocky Summit along dry ridgelines. The canopy is dominated by chestnut oak (*Quercus montana*) and scarlet oak (*Q. coccinea*) that typically comprise over 50 percent of the canopy in most instances. The remaining canopy is a mosaic of northern red oak (*Q. rubra*), southern red oak (*Q. falcata*), tulip poplar (*Liriodendron tulipifera*), a few basswood (*Tilia americana* var. *heterophylla*), and cucumber tree (*Magnolia acuminata*). The understory consists of red maple (*Acer rubrum*), sourwood (*Oxydendrum arboreum*), flowering dogwood (*Cornus florida*), serviceberry (*Amelanchier arborea*), and black gum (*Nyssa sylvatica*). The understory is generally sparse to dense, uneven aged, and varies with slope and aspect. The shrub layer also varies according to moisture, soils, and aspect. The more common shrubs are great laurel (*Rhododendron maximum*), mountain laurel (*Kalmia latifolia*), sparkleberry (*Vaccinium arboreum*), lowbush blueberry (*V. pallidum*), maple-leaf viburnum (*Viburnum acerifolium*), and sassafras (*Sassafras albidum*). Others shrubs present are horse-sugar (*Symplocos tinctoria*) and hackberry (*Celtis* sp.). The herb layer contains partridgeberry (*Mitchella repens*), snakeroot (*Sanicula canadensis*), galax (*Galax urceolata*), and spotted wintergreen (*Chimaphila maculata*).

Found along stream corridors and occasionally along sheltered lower slopes, Acidic Cove Forest is relatively abundant. It transitions into Chestnut Oak Forest on higher slopes, and occasionally

into small areas of well-developed Piedmont-Montane Alluvial Forest. The canopy is a combination of acid-tolerant mesophytic trees such as tulip poplar, cucumber tree, Canada hemlock (*Tsuga canadensis*), Fraser's magnolia (*Magnolia fraseri*), sweet birch (*Betula lenta*), a few northern red oak, and chestnut oak. The understory contains red maple, flowering dogwood, Carolina silverbell (*Halesia tetraptera*), witch-hazel (*Hamamelis virginiana*), and black gum. The shrub layer is well developed with areas of thick heaths along moist north-facing slopes. Common shrubs are sweet-shrub (*Calycanthus floridus*), strawberry-bush (*Euonymus americanus*), and spicebush (*Lindera benzoin*) in open areas. In the thick heath dominated areas, mountain laurel, great laurel, smooth hydrangea (*Hydrangea arborescens*), sparkleberry, and lowbush blueberry are common. The herb layer is generally abundant and diverse, or sparse to absent. Some of the more common herbs are black cohosh (*Actaea racemosa*), Christmas fern (*Polystichum acrostichoides*), New York fern (*Thelypteris noveboracensis*), broad beech fern (*Phegopteris hexagonoptera*), spiderwort (*Tradescantia subaspera*) Solomon's-seal (*Polygonatum biflorum*), mayapple (*Podophyllum peltatum*), heartleaf (*Hexastylis* sp.), and downy rattlesnake plantain (*Goodyera pubescens*).

Located along the prominent south-facing dry ridgelines are several fair to good examples of Pine--Oak/Heath. This community was probably more abundant in the past. Several factors seem to have played a role in reducing it, including the advent of fire suppression and the southern pine bark beetle (*Dendroctonus frontalis*). The canopy is dominated by a mixture of pines (*Pinus pungens*, *P. echinata*, and *P. virginiana*) as well as chestnut oak and scarlet oak. The understory is sparse and includes red maple, sourwood, and scattered American holly (*Ilex opaca*). The shrub layer is generally well defined and often very thick. Dominant shrubs include great laurel, gorge rhododendron (*Rhododendron minus*), mountain laurel, sparkleberry, deerberry (*V. stamineum*), lowbush blueberry, horse-sugar, and sweet pepperbush (*Clethra acuminata*). Woody vines include poison ivy (*Toxicodendron radicans*), greenbrier (*Smilax glauca* and *S. rotundifolia*), cross-vine (*Bignonia capreolata*), and Virginia creeper (*Parthenocissus quinquefolia*). The herb layer is sparse, with galax, spotted wintergreen, yellow star-grass (*Hypoxis hirsuta*), tickseed (*Coreopsis major*), goldenrods (*Solidago* spp.), and sunflower (*Helianthus* sp.) common. Turkey-beard (*Xerophyllum asphodeloides*), an uncommon grass-like herb, often occurs in fairly large patches along dry ridgelines and slopes.

Along the northern edge of the site along an unnamed small stream is a well-developed example of a Montane Acidic Cliff. This north-facing cliff extends for 200+ yards along the slope, reaching heights of 20 yards. Along it occurs a canopy break with moderate sunlight filtering in. The dominant canopy species are a mixture of Acidic Cove Forest and Chestnut Oak Forest species including tulip poplar, red maple, sweet birch, northern red oak, chestnut oak, mockernut hickory, and shortleaf pine. The understory is mainly composed of canopy species seedlings, with scattered occurrences of black gum, sourwood, and flowering dogwood. Shrubs are fairly thick, with large amounts of great laurel. Other shrubs present include mountain laurel, strawberry-bush, and blueberries. Woody vines present are Virginia creeper, grapes, and poison ivy. Herbs are diverse along the base of the cliff, where the canopy break occurs, with walking fern (*Asplenium rhizophyllum*), downy rattlesnake plantain, galax, spotted wintergreen,

partridgeberry, Canada snakeroot, hairy alumroot (*Heuchera villosa*), and foam-flower (*Tiarella cordifolia*) present.

Small embedded areas of Low Elevation Rocky Summit are found near the summit of Yellow Buck Mountain. Small areas of Montane Alluvial Forest are located in wider areas of floodplain along Harper Creek above and below a waterfall.

**MANAGEMENT AND PROTECTION:** This site is afforded some legal protection as part of the Pisgah National Forest. Increasing public trail usage within this site is the biggest management concern. The majority of the trail system within the site consists of old logging and access roads which become eroded on steep slopes. Installment of switchbacks and water bars would alleviate much of this problem.

**NATURAL COMMUNITIES:** Chestnut Oak Forest, Montane Oak---Hickory Forest, Pine--Oak/Heath, and Acidic Cove Forest.

**RARE PLANTS:** Watch List – turkey-beard (*Xerophyllum asphodeloides*) and Fraser's sedge (*Cymophyllus fraserianus*).

**REFERENCES:**

Padgett, J. E. 2007. Site Survey Report: Harpers Creek/Backbone Ridge. Natural Heritage Program, Office of Natural Resource Planning and Conservation, DENR, Raleigh, N.C.

PACK HILL/THUNDERHOLE CREEK

**Caldwell County Natural Area Inventory**

**PACK HILL/THUNDERHOLE CREEK**
**Significant Natural Heritage Area**

**Site Significance:** Regional
**Quadrangle:** Globe
**Size:** 1,095 acres
**Ownership:** U.S. Forest Service and Private

**SIGNIFICANT FEATURES:** This natural area has some of the best examples in the region of common natural communities described and documented as old growth forest (Messick 2000). Occurrences of the Significantly Rare broadleaf tickseed (*Coreopsis latifolia*) and the Watch List Diana fritillary (*Speyeria diana*) are also present.

**LANDSCAPE RELATIONSHIPS:** This site has a good connection to the rest of Pisgah National Forest, which mostly surrounds it. This site is located along the Blue Ridge Escarpment east of Grandfather Mountain. It spans nearly the entire length of the escarpment from top to bottom (about two miles), and contains narrow ridgelines and steep coves running north to south. Blowing Rock Cliffs is located 1.6 miles to the east; Gragg Forests and Grandfather Mountain lie 1.7 and 2.7 miles to the west respectively. The Johns River/Mulberry Creek Aquatic Habitat is located 0.6 miles to the south, and the Blue Ridge Parkway is located 2.2 miles to the north.

**SITE DESCRIPTION:** The dominant natural community within this site is Chestnut Oak Forest. It is found on most of the middle and upper slopes throughout the site. It is also found, but not as frequently, near the upper limits of Acidic Cove Forest and along the ridgelines where Pine--Oak/Heath is common. The Chestnut Oak Forest consists of a closed canopy that covers the ridgeline and the upper and middle slopes. Dominant canopy species include chestnut oak (*Quercus montana*), scarlet oak (*Q. coccinea*), northern red oak (*Q. rubra*), mockernut hickory (*Carya alba*), tulip poplar (*Liriodendron tulipifera*), and pines (*Pinus* spp.). The understory contains red maple (*Acer rubrum*), sourwood (*Oxydendrum arboreum*), flowering dogwood (*Cornus florida*), and black gum (*Nyssa sylvatica*). Shrubs are abundant and include patches of mountain laurel (*Kalmia latifolia*) and great laurel (*Rhododendron maximum*). Other common shrubs include sparkleberry (*Vaccinium arboreum*), deerberry (*V. stamineum*), lowbush blueberry (*V. pallidum*), strawberry-bush (*Euonymus americanus*), and horse-sugar (*Symplocos tinctoria*). Common woody vines include grapes (*Vitis* spp.), greenbrier (*Smilax rotundifolia*), Virginia creeper (*Parthenocissus quinquefolia*), and poison ivy (*Toxicodendron radicans*). Dominant herbs include spotted wintergreen (*Chimaphila maculata*), galax (*Galax urceolata*), partridgeberry (*Mitchella repens*), bottlebrush grass (*Hystrix patula*), Christmas fern (*Polystichum acrostichoides*), ebony spleenwort (*Asplenium platyneuron*), sunflower (*Helianthus* sp.), and downy rattlesnake plantain (*Goodyera pubescens*).

Along the lower slopes and in the sheltered coves, Acidic Cove Forest is abundant. Within this community the uncommon butterfly, Diana fritillary (*Speyeria diana*), might be seen along lighted areas near the margins of old access roads, streams, and woods. The dominant canopy tree species include tulip poplar, sweet birch (*Betula lenta*), Canada hemlock (*Tsuga canadensis*), northern red oak, white oak (*Quercus alba*), scarlet oak, mockernut hickory, and red maple. The understory is comprised of canopy seedlings, black gum, Fraser's magnolia (*Magnolia fraseri*), black walnut (*Juglans nigra*), Carolina silverbell (*Halesia tetraptera*), flowering dogwood (*Cornus florida*), and sourwood. Shrub density varies, with the dominant shrubs being great laurel, pinxter-flower (*Rhododendron periclymenoides*), mountain laurel, strawberry-bush, maple-leaf viburnum (*Viburnum acerifolium*), and sassafras (*Sassafras albidum*). Common woody vines include grapes, Virginia creeper, and Dutchman's-pipe (*Aristolochia macrophylla*). Herbs are common and include spotted wintergreen, partridgeberry, Canada snakeroot (*Sanicula canadensis*), woodland agrimony (*Agrimonia rostellata*), ground pine (*Huperzia lucidulum*), Christmas fern (*Polystichum acrostichoides*), New York fern (*Thelypteris noveboracensis*), fern-leaf phacelia (*Phacelia bipinnatifida*), wild ginger (*Asarum canadense*), tickseed (*Coreopsis major*), turtlehead (*Chelone lyonii*), and sunflower (*Helianthus* sp.). A small occurrence of the rare broadleaf tickseed (*Coreopsis latifolia*) is found in an area where Rich Cove Forest plant species are growing together near the stream. Habitat for this species is very limited throughout this region.

Along the prominent south-running dry and often rocky ridgelines, patches of Pine--Oak/Heath are common. The canopy is closed to sparsely open and dominated by a mixture of pines (*Pinus pungens*, *P. echinata*, and *P. virginiana*) as well as chestnut oak and scarlet oak. The understory is sparse and includes red maple, sourwood (*Oxydendrum arboreum*), and scattered American holly (*Ilex opaca*). The shrub layer is generally well defined and often very thick. Dominant shrubs include great laurel, gorge rhododendron, mountain laurel, sparkleberry, deerberry, and lowbush blueberry, horse-sugar, and sweet pepperbush (*Clethra acuminata*). Woody vines include poison ivy, greenbrier (*Smilax glauca* and *S. rotundifolia*), cross-vine (*Bignonia capreolata*), and Virginia creeper. The herb layer is sparse, with galax (*Galax urceolata*), spotted wintergreen, yellow star-grass (*Hypoxis hirsuta*), tickseed, goldenrods (*Solidago* spp.), and sunflowers (*Helianthus* spp.) common. The uncommon turkey-beard (*Xerophyllum asphodeloides*) occurs here in small patches of more open, dry rocky forest. Habitat for turkey-beard is confined to open, marginal areas, due mainly to a lack of fire or other natural disturbances that once kept these Pine--Oak/Heath communities open.

Embedded areas of Montane Acidic Cliff can be found on many of the spur ridges. Some are extensive but shaded by the surrounding forests. Often thick patches of shrubs such as rhododendrons and mountain laurel surround them, so the plant diversity is overall lower than surrounding forests. Also, embedded areas of Montane Oak--Hickory Forest occur along northern portions of the site on middle and upper slopes, but are too patchy and often too small to tease out of the surrounding Chestnut Oak Forest.

**MANAGEMENT AND PROTECTION:** A large portion of this site is afforded some protection and is managed by the U.S. Forest Service. The remainder of the site is privately-owned and would make a good project for local land trust to pursue for permanent protection.

**NATURAL COMMUNITIES:** Acidic Cove Forest, Chestnut Oak Forest, Montane Acidic Cliff, Montane Oak--Hickory Forest, and Pine--Oak/Heath.

**RARE PLANTS:** broadleaf tickseed (*Coreopsis latifolia*). Watch List – turkey-beard (*Xerophyllum asphodeloides*).

**RARE ANIMALS:** Watch List – Diana fritillary (*Speyeria diana*).

**REFERENCES:**

Messick, R. 2000. Summary Report: Old Growth Forest Communities in the Nantahala-Pisgah National Forest. A report for the Western North Carolina Alliance, Asheville, N.C.

Padgett, J. E. 2007. Site Survey Report: Pack Hill/Thunderhole Creek. Natural Heritage Program, Office of Natural Resource Planning and Conservation, DENR, Raleigh, N.C.

RACKET CREEK SLOPES

**Caldwell County Natural Area Inventory**

**RACKET CREEK SLOPES**
**Significant Natural Heritage Area**

**Site Significance:** State
**Quadrangle:** Globe
**Size:** 398 acres
**Ownership:** U.S. Forest Service and Private

**SIGNIFICANT FEATURES:** This site contains one of the best examples of Acidic Cove Forest in the state, and best Montane-Oak Hickory and Chestnut Oak Forest in the region, due primarily to the remnant 'old growth' patches present. U. S. Forest Service timber base records indicate that most of the forest within this natural area has not been timbered or selectively harvested since the early 1800s.

**LANDSCAPE RELATIONSHIPS:** This site is part of a contiguous forested area located within the Pisgah National Forest. Large areas of national forest surround the site with some private lands located to the east. The site is 1.3 miles east-southeast of Grandfather Mountain, 0.9 miles south of Julian Price Park, 0.6 miles east of Gragg Forests, and 1.5 miles northwest of the Johns River/Mulberry Creek Aquatic Habitat.

**SITE DESCRIPTION:** Racket Creek Slopes is located on a steep ridgeline leading off the Blue Ridge Escarpment down into the Johns River drainage to the south.The site consists of a stream valley with moderately steep to very steep slopes. Rock outcrops and cliffs are common along the stream, with a number of small waterfalls present as well. Except for access roads coming in from the east and a section of the Old Johns River Road, the site is virtually undisturbed. Some of the canopy tree species are in excess of three feet diameter at breast height, with many canopy trees over two feet diameter at breast height.

The dominant natural community, found along the streams, sheltered coves, and lower slopes, is Acidic Cove Forest. The quality of this natural community makes it rank among the best of this type in the state. The slopes along the creek and tributaries are often rocky, with scattered canopy trees that have large patches of dense herbaceous plants beneath them. The uncommon blackstem spleenwort (*Asplenium resiliens*) occurs here sporadically in rock crevices of large embedded rock outcropping along the slopes. Potential habitat for blackstem spleenwort exists throughout the site where large rock outcropping occur. The canopy includes tulip poplar, sweet birch (*Betula lenta*), Canada hemlock (*Tsuga canadensis*), northern red oak, white oak, scarlet oak, mockernut hickory, and red maple. The understory includes black gum, Fraser's magnolia, basswood (*Tilia americana* var. *heterophylla*), Carolina silverbell (*Halesia tetraptera*), flowering dogwood, and sourwood. Shrub density varies with aspect, with common shrubs being great laurel, pinxter-flower (*Rhododendron periclymenoides*), mountain laurel, strawberry-bush, horse-sugar, blueberries, viburnum (*Viburnum* sp.), and sassafras (*Sassafras albidum*). Woody vines include grapes,

Virginia creeper, Dutchman's-pipe (*Aristolochia macrophylla*), and cross-vine (*Bignonia capreolata*). Herbs are common and include spotted wintergreen, partridgeberry, downy rattlesnake plantain, rattlesnake root (*Sanicula* sp.), buttercup (*Ranunculus* sp.), woodland agrimony (*Agrimonia rostellata*), shining clubmoss (*Huperzia lucidulum*), Christmas fern (*Polystichum acrostichoides*), New York fern (*Thelypteris noveboracensis*), broad beech fern (*Phegopteris hexagonoptera*), fern-leaf phacelia (*Phacelia bipinnatifida*), wild ginger (*Asarum canadense*), tickseed, red turtlehead (*Chelone lyonii*), and sunflower (*Helianthus* sp.).

On less sheltered middle and upper slopes, Chestnut Oak Forest is common throughout the site. Dominant canopy species include chestnut oak (*Quercus montana*), scarlet oak, northern red oak, mockernut hickory, tulip poplar, and red maple. The understory contains sourwood, flowering dogwood (*Cornus florida*), black gum, and Fraser's magnolia (*Magnolia fraseri*). Shrubs are somewhat sparse throughout, with some locally dense patches scattered about. Common shrubs are mountain laurel, great laurel, highbush blueberry (*Vaccinium corymbosum*), deerberry (*V. stamineum*), lowbush blueberry (*V. pallidum*), strawberry-bush, and horse-sugar (*Symplocos tinctoria*). Common woody vines include grapes (*Vitis* spp.), greenbrier (*Smilax rotundifolia* and *S. glauca*), Virginia creeper (*Parthenocissus quinquefolia*), and poison ivy (*Toxicodendron radicans*). Herbs vary in respect to abundance and diversity. Spotted wintergreen, galax, partridgeberry (*Mitchella repens*), bottlebrush grass (*Hystrix patula*), Christmas fern, ebony spleenwort (*Asplenium platyneuron*), tickseed, and violets (*Viola* spp.) are common.

A closed canopy of Montane Oak--Hickory Forest is found along some of the more sheltered upper slopes and ridgelines. The canopy is markedly different from surrounding Chestnut Oak Forests by the increased dominance of white oak (*Quercus alba*) and northern red oak (*Q. rubra*). Other canopy dominants include scarlet oak (*Q. coccinea*), mockernut hickory (*Carya alba*), pignut hickory (*C. glabra*), tulip poplar (*Liriodendron tulipifera*), and pines (*Pinus* spp.). The understory generally consists of canopy species seedlings, red maple (*Acer rubrum*), black gum (*Nyssa sylvatica*), and a few scattered sourwood (*Oxydendrum arboreum*). Shrubs are generally sparse, but do occur in dense patches in some areas. Common shrubs include patches of great laurel (*Rhododendron maximum*), mountain laurel (*Kalmia latifolia*), strawberry-bush (*Euonymus americanus*), blueberries (*Vaccinium* spp.), and maple-leaf viburnum (*Viburnum acerifolium*). Herbs are fairly diverse, often patchy, and sparse. Common herbs include galax (*Galax urceolata*), spotted wintergreen (*Chimaphila maculata*), poverty oat grass (*Danthonia* sp.), Christmas fern (*Polystichum acrostichoides*), tickseed (*Coreopsis major*), small-head sunflower (*Helianthus microcephalus*), flowering spurge (*Euphorbia corollata*), and iris (*Iris* sp.).

Other examples of embedded natural community types include rock outcrops primarily along the streams as well as small patches of Montane Acidic Cliff. Also present are small patches of Pine--Oak/Heath along prominent dry south-facing ridges. Areas of Rich Cove Forest and Montane Alluvial Forest are present in small patches along Racket Creek and in some of the sheltered coves.

**MANAGEMENT AND PROTECTION:** This site is afforded some protection as part of the Pisgah National Forest. With little old growth forest remaining in North Carolina, this site should be managed as such and preserved in its current state.

**NATURAL COMMUNITIES:** Acidic Cove Forest, Chestnut Oak Forest, Montane Oak--Hickory Forest, Pine--Oak/Heath, Montane Alluvial Forest, and Rich Cove Forest.

**RARE PLANTS:** Watch List: Blackstem spleenwort (*Asplenium resiliens*).

**RARE ANIMALS:** None observed.

**REFERENCES:**

Messick, R. 2000. Summary Report: Old Growth Forest Communities in the Nantahala-Pisgah National Forest. A report for the Western North Carolina Alliance, Asheville, N.C.

Padgett, J. E. 2007. Site Survey Report: Racket Creek Slopes, Natural Heritage Program, Office of Natural Resource Planning and Conservation, DENR, Raleigh, N.C.

WALKER HOLLOW RIDGE

**Caldwell County Natural Area Inventory**

**WALKER HOLLOW RIDGE**
**Significant Natural Heritage Area**

**Site Significance:** Regional
**Quadrangle:** Globe
**Size:** 617 acres
**Ownership:** U.S. Forest Service and Private

**SIGNIFICANT FEATURES:** This natural area has good examples of common and uncommon natural communities, with parts of the forests described as old growth. This site has an occurrence of the State and Federal Species of Concern Appalachian woodrat (*Neotoma magister*) as well as a suite of Watch List plant species including the uncommon Fraser's sedge (*Cymophyllus fraserianus*), heath woodrush (*Luzula multiflora*), and roundleaf ragwort (*Packera obovata*).

**LANDSCAPE RELATIONSHIPS:** This site is embedded in the Pisgah National Forest, which occupies a large undeveloped contiguous region in northern Caldwell County. Gragg Forests and Grandfather Mountain lie to the northwest 0.7 and 2.0 miles, respectively. The site lies between the Wilson Creek Aquatic Habitat and Johns River/Mulberry Creek Aquatic Habitat, located to the west and east of the site, respectively.

**SITE DESCRIPTION:** This site contains a mosaic of several different community types with smaller community types often embedded within the large ones. Most coves and slopes in this region were either small farms and homesteads in the past or were extensively logged.

The dominant natural community within the site is Chestnut Oak Forest. It is found along middle and upper slopes as well as many ridgelines throughout the site. It is generally a forest with a closed canopy of chestnut oak (*Quercus montana*), scarlet oak (*Q. coccinea*), northern red oak (*Q. rubra*), mockernut hickory (*Carya alba*), tulip poplar (*Liriodendron tulipifera*), pines (*Pinus* spp.) and red maple (*Acer rubrum*). The understory contains sourwood (*Oxydendrum arboreum*), alternate-leaf dogwood (*Cornus alternifolia*), flowering dogwood (*Cornus florida*), black gum (*Nyssa sylvatica*), and Fraser's magnolia (*Magnolia fraseri*). Although the shrubs are overall less dense than in the surrounding community types, thick patches of mountain laurel (*Kalmia latifolia*), and great laurel (*Rhododendron maximum*) often occur. Other common shrubs include sparkleberry (*Vaccinium arboreum*), deerberry (*V. stamineum*), lowbush blueberry (*V. pallidum*), strawberry-bush (*Euonymus americanus*), and horse-sugar (*Symplocos tinctoria*). Common woody vines include grape (*Vitis* sp.), greenbrier (*Smilax rotundifolia*), Virginia creeper (*Parthenocissus quinquefolia*), and poison ivy (*Toxicodendron radicans*). Common herbs include spotted wintergreen (*Chimaphila maculata*), galax (*Galax urceolata*), partridgeberry (*Mitchella repens*), bottlebrush grass (*Hystrix patula*), Christmas fern (*Polystichum acrostichoides*), ebony spleenwort (*Asplenium platyneuron*), tickseed (*Coreopsis major*), sunflower (*Helianthus* sp.), and downy rattlesnake plantain (*Goodyera pubescens*). Embedded within this natural community is a rocky

steep slope with grottos that harbor a small population of Appalachian woodrat (*Neotoma magister*). The area occurs off to the north of Big Branch. Additionally, the grottos provide habitat for a lampshade spider (*Hypochilus pococki*).

Along the stream corridors and in sheltered coves through most of the site are several examples of fair to good quality Acidic Cove Forest. The canopy is a closed canopy with dominant species including tulip poplar, sweet birch (*Betula lenta*), red maple, northern red oak, white pine (*Pinus strobus*), and Canada hemlock (*Tsuga canadensis*). Small definable patches of Rich Cove Forest are embedded along short sections of the stream corridor. These patches are distinguished by the presence of several Rich Cove species, such as basswood (*Tilia americana* var. *heterophylla*), Carolina silverbell (*Halesia tetraptera*), and Fraser's sedge (*Cymophyllus fraserianus*), which is located along the stream and adjacent slopes along a hiking trail leading up to Woodruff Ridge. Occurring near the Fraser's sedge is a small occurrence of the uncommon heath woodrush (*Luzula multiflora*). The understory consists of canopy species, alternate-leaf dogwood (*Cornus alternifolia*), mountain holly (*Ilex montana*), witch-hazel (*Hamamelis virginiana*), sourwood (*Oxydendrum arboreum*), and black gum (*Nyssa sylvatica*). Shrubs vary in abundance and are often locally abundant along north-facing slopes where they occur in thick patches. The dominant shrubs include great laurel, Catawba rhododendron (*R. catawbiense*), mountain laurel, sweet pepperbush (*Clethra acuminata*), blueberries (*Vaccinium* spp.), pinxter-flower (*R. periclymenoides*), flame azalea (*R. calendulaceum*), and horse-sugar (*Symplocos tinctoria*). Common woody vines include Virginia creeper, greenbrier, poison ivy, grape, cross-vine (*Bignonia capreolata*), and hog peanut (*Amphicarpaea bracteata*). The herbaceous layer is fairly diverse. Dominant herbs include marginal wood-fern (*Dryopteris marginalis*), Canada horsebalm (*Collinsonia canadensis)*, hay-scented fern (*Dennstaedtia punctilobula*), dwarf crested iris (*Iris cristata*), American water horehound (*Lycopus americanus*), Indian cucumber (*Medeola virginiana*), and white snakeroot (*Ageratina altissima*). Downy rattlesnake plantain (*Goodyera pubescens*) and the uncommon roundleaf ragwort (*Packera obovata*) are less abundant. They occur along the lower slopes where the community transitions to Acidic Cove Forest above the shrub-line of great laurel and mountain laurel found along the stream. Potential habitat for roundleaf ragwort exists along the slopes throughout the site and the region.

Along a few prominent south-facing slopes and ridgelines on dry and rocky soils are fair to very good examples of Pine--Oak/Heath. Several of these examples are considered to be 'old growth' forest remnants (Messick 2000). This community has either an open or closed canopy, with the dominant canopy species of Table Mountain pine (*Pinus pungens*), shortleaf pine (*P. echinata*), scrub pine *(P. virginiana*), chestnut oak, scarlet oak, hickories, black gum, and red maple. The southern pine bark beetle has killed some of the canopy pines. This is especially noticeable along Walker Hollow Ridge. The understory is comprised of black gum, red maple, and sourwood. Shrubs are thick and contains blueberries, maple-leaf viburnum (*Viburnum acerifolium*), horse-sugar, strawberry-bush, great laurel, and mountain laurel. Common woody vines include muscadine grape (*Vitis rotundifolia*), poison ivy, and Virginia creeper. The herb layer is sparse overall, with herbs occurring in open areas where the shrub layer is either thinned or absent. Common herbs include spotted wintergreen, galax, ragwort (*Packera* sp.), tickseed, and sunflower.

The uncommon turkey-beard (*Xerophyllum asphodeloides*) occurs in large patches along the south-facing slopes and ridgeline of Walker Hollow Ridge. It occurs frequently in areas of canopy tree die-off due to southern pine beetle damage.

Areas of Rich Cove Forest, Montane Oak--Hickory Forest, Montane Acidic Cliff, and Spray Cliff are present within the site, but are patchy and so hard to tease out from the dominant natural communities that they are not described here.

**MANAGEMENT AND PROTECTION:** A large portion of this site is afforded some protection and is managed by the U. S. Forest Service. The remainder of the site is privately-owned and would be a good conservation project for a local land trust.

**NATURAL COMMUNITIES:** Acidic Cove Forest, Chestnut Oak Forest, and Pine--Oak/Heath.

**RARE ANIMALS:** Appalachian woodrat (*Neotoma magister*).

**RARE PLANTS:** Watch List – Fraser's sedge (*Cymophyllus fraserianus*), turkey-beard (*Xerophyllum asphodeloides*), heath woodrush (*Luzula multiflora*), roundleaf ragwort (*Packera obovata*).

**REFERENCES**:

Messick, R. 2000. Summary Report: Old Growth Forest Communities in the Nantahala-Pisgah National Forest. A report for the Western North Carolina Alliance, Asheville, N.C.

Padgett, J. E. 2007. Site Survey Report: Walker Hollow Ridge. Natural Heritage Program, Office of Natural Resource Planning and Conservation, DENR, Raleigh, N.C.

WILSON CREEK AQUATIC HABITAT

**Caldwell County Natural Area Inventory**

## WILSON CREEK AQUATIC HABITAT

**Site Significance**: National
**Quadrangles:** Grandfather Mountain, Chestnut Mountain, Collettsville

**Length**: 23 river miles (approximately 15 river miles in Caldwell County and eight in Avery County)
**Ownership**: North Carolina Public Waters

**SIGNIFICANT FEATURES:** Wilson Creek Aquatic Habitat contains a diversity of rare aquatic species, including the Federal Species of Concern and State Endangered brook floater (*Alasmidonta varicosa)*; the Federal Species of Concern and State Significantly Rare Edmund's snaketail (*Ophiogomphus edmundo)*; and the State Significantly Rare Santee chub (*Cyprinella zanema)*, eastern creekshell (*Villosa delumbis)*, a stonefly (*Bolotoperla rossi)*, a caddisfly (*Ceraclea slossonae)*, a mayfly (*Ephemerella berneri)*, a caddisfly (*Micrasema burksi*), and a caddisfly (*Palaeagapetus celsus*). Wilson Creek is designated Outstanding Resource Waters (ORW) by the North Carolina Division of Water Quality due to an excellent water quality rating, and in 2000 the entire waterway was designated a National Wild and Scenic River.

**LANDSCAPE RELATIONSHIPS:** All of Wilson Creek is included within this site, which extends from the headwaters in Avery County to the confluence with the Johns River in Caldwell County. The entire watershed is embedded within Pisgah National Forest, with Grandfather Mountain surrounding the headwater reaches. Wilson Creek runs through a relatively narrow and steep gorge in the Southern Blue Ridge, with many associated waterfalls and plunge pools, before becoming less steep as it enters the Piedmont approximately 3.4 river miles from its confluence with the Johns River. Wilson Creek Slopes are adjacent to the aquatic habitat at the Avery/Caldwell line. Gragg Forests and Lost Cove Creek Forests are located within 1.5 miles of Wilson Creek.

Wilson Creek is part of the Catawba River basin, which joins with the Broad River basin to form the Santee-Cooper River system in South Carolina before flowing into the Atlantic Ocean.

**SITE DESCRIPTION:** Wilson Creek Aquatic Habitat comprises the entire reach of Wilson Creek from its headwaters to its confluence with Johns River. Wilson Creek contains a variety of aquatic habitats that support a large diversity of organisms. In addition to the species noted above, Wilson Creek supports the following animals, collected during recent monitoring efforts by N. C. Division of Water Quality and N. C. Wildlife Resources Commission:

Fishes: Fantail darter (*Etheostoma flabellare*), seagreen darter (*E. thalassinum*), redbreast sunfish (*Lepomis auritus*), warpaint shiner (*Luxilus coccogenis*), smallmouth bass (*Micropterus dolomieu*), bluehead chub (*Nocomis leptocephalus*), margined madtom (*Noturus insignis*), rainbow trout (*Oncorhynchus mykiss*), brown trout (*Salmo trutta*), brook trout (*Salvelinus fontinalis)*; Mussels:

*Elliptio* sp. cf. *angustata*, *Elliptio* sp. cf. *producta*, eastern elliptio (*Elliptio complanata*); Crayfishes: *Cambarus* (*Puncticambarus*) sp. C, *Cambarus* (*Cambarus*) cf. *C.* sp. A, *Cambarus* (*Cambarus*) cf. *C. bartonii*; Snails: crested mudalia (*Leptoxis carinata*).

The diversity of aquatic habitats in Wilson Creek contributes to the presence of these species. Habitat diversity is based on the geology of the area, with upper reaches in the Blue Ridge physiographic province, characterized as high gradient, cold and clear water, substrates consisting largely of bedrock, boulder, and cobble; and lower reaches in the Piedmont, with less gradient, slightly warmer waters to support freshwater mussels, and substrates including smaller particle sizes. Additionally, the creek is relatively silt-free which is often a limiting factor on many aquatic species. The presence of surrounding National Forest land contributes to the overall high quality of this system.

**MANAGEMENT AND PROTECTION:** The uppermost reach of Wilson Creek (approximately 0.25 river miles) is within the Grandfather Mountain Preserve, owned by The Nature Conservancy. The next 0.4 river miles is within the Blue Ridge Parkway management area of the National Park Service. The remainder of the watershed is within the Pisgah National Forest Grandfather Ranger District, managed by the U.S. Forest Service, with the exception of a few areas along the main stem of Wilson Creek in private ownership. The entire waterway is designated a National Wild and Scenic River.

Flooding in September 2004, associated with the remnants of Hurricanes Ivan, Frances, and Jeanne, was particularly severe in the French Broad and the Catawba River Basins. N.C. Wildlife Resources Commission biologists conducted mussel surveys in these basins before and after the 2004 floods to characterize the effects on mussel populations. Stream habitat heterogeneity, presence of flow refuges, and natural channel design with a functioning floodplain all appear to contribute to habitat preservation and therefore mussel survival during severe flooding. The change in mussel catch per unit effort pre and post flooding was negligible for Wilson Creek, and although the exact reasons for this relatively unchanged mussel population are unknown, the presence of a natural channel nestled within National Forest land may contribute to its habitat stability. The most significant problem with mussel populations in the upper Catawba River system is the relatively small population size and reproductive isolation of species present in the Johns River, Warrior Fork, and Linville River systems due to habitat fragmentation. Management actions based on mussel population size and genetic diversity within these upper Catawba systems may be pursued to ensure long-term survival of these vulnerable populations.

**RARE ANIMALS:** Santee chub (*Cyprinella zanema*), brook floater (*Alasmidonta varicosa*), eastern creekshell (*Villosa delumbis*), Edmund's snaketail (*Ophiogomphus edmundo*), a stonefly (*Bolotoperla rossi*), a mayfly (*Ephemerella berneri*), a caddisfly (*Ceraclea slossonae*), a caddisfly (*Micrasema burksi*), a caddisfly (*Palaeagapetus celsus*).

**REFERENCES:**

Fraley, S.J. and J.W. Simmons. 2006. An assessment of selected rare mussel populations in western North Carolina following extraordinary floods of September 2004. Completion report submitted to N.C. Department of Environment and Natural Resources, Division of Water Quality, Raleigh, N.C.

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WILSON CREEK GORGE

**Caldwell County Natural Area Inventory**

## WILSON CREEK GORGE
## Significant Natural Heritage Area

**Site Significance:** State
**Quadrangles:** Chestnut Mountain and Collettsville
**Size:** 6,296 acres (5,904 primary and 392 secondary)
**Ownership:** U.S. Forest Service and Private

**SIGNIFICANT FEATURES:** This site contains significant old growth Chestnut Oak Forest and Montane Oak--Hickory Forest within the gorge. These communities are located along the upper slopes and ridgelines of Adams Mountain, Brown Mountain, Wilson Ridge, Pine Ridge, and Horsepen Creek. Within the gorge are very good to excellent examples of several other natural community types that include Acidic Cove Forest, Low Elevation Granitic Dome, Low Elevation Rocky Summit, and Pine--Oak/Heath. Wilson Creek Gorge is also home to 11 known special status animal and plant species, and enhances Wilson Creek's designation as a National Wild and Scenic River.

**LANDSCAPE RELATIONSHIPS:** Wilson Creek Gorge is located within a large area of the Pisgah National Forest. It lies in the southern portion of the Grandfather Mountain/Wilson Creek Gorge Macrosite. The Wilson Creek Aquatic Habitat runs north to south through the site. Linville Gorge lies 5.1 miles to the west. Wilson Creek Slopes/Lost Cove Creek/Thorps Creek, Gragg Forests, and Grandfather Mountain lie 2.0, 7.0, and 8.0 miles to the north, respectively. The Johns River/Mulberry Creek Aquatic Habitat lies 1.5 miles to the east.

**SITE DESCRIPTION:** Wilson Creek Gorge is a rugged forested area located in northwestern Caldwell County along 5.25 miles of lower Wilson Creek. The gorge extends from Wilson Ridge and Woodcock Knob south to Adams Mountain and Brown Mountain, terminating just before the creek's confluence with the Johns River. Most of the site is within the Pisgah National Forest, with private ownership making up less than 600 acres (adjacent to Wilson Creek). Several large pockets of old-growth forest occur within Wilson Creek Gorge, comprising approximately one-third of the overall site. The natural communities consist of a mosaic of forest types ranging from sheltered moist north-facing to dry south-facing communities.

Moving up the slope away from the moist sheltered coves, drier natural community types are common along both sides of the gorge. The most abundant natural community in the gorge is Chestnut Oak Forest, with some extensive areas that were described as old growth forest (Messick 2000). This natural community comprises a large percentage of the middle and upper slopes throughout the site with chestnut oak (*Quercus montana*) being the dominant canopy species. The remaining canopy is a mosaic of oaks (*Q. alba, Q. rubra, Q. coccinea.* and *Q. falcata*), hickories (*Carya alba* and *C. glabra*), tulip poplar (*Liriodendron tulipifera*) and Fraser's magnolia

(*Magnolia fraseri*). The understory is well-defined and consists of red maple (*Acer rubrum*), sourwood (*Oxydendrum arboreum*), and black gum (*Nyssa sylvatica*). Shrubs in this community vary in abundance, often occurring as thick patches or scattered in the understory. Common shrubs are great laurel (*Rhododendron maximum*), gorge rhododendron (*R. minus*), mountain laurel (*Kalmia latifolia*), and various blueberry species (*Vaccinium* spp.). The herb layer is often sparse and contains partridgeberry (*Mitchella repens*), Canada snakeroot (*Sanicula canadensis*), galax (*Galax urceolata*), and spotted wintergreen (*Chimaphila maculata*).

Within this natural community, sweet pinesap (*Monotropsis odorata*) and Appalachian golden-banner (*Thermopsis mollis*) both occur. These rare species can often be found in patches of disturbance and openness in association with pines. This might suggest the need of fire to maintain these occurrences. Even though only one occurrence of sweet pinesap was located, there is an enormous area of potential habitat for it to occur within Wilson Creek Gorge. Neither sweet pinesap nor Appalachian golden-banner are confined to only Chestnut Oak Forest. They can also occur in Acidic Cove Forest and Pine--Oak/Heath.

In sheltered middle and upper slopes and coves throughout the site are some very good examples of Montane Oak--Hickory Forest. This natural community contains some of the largest canopy trees in the gorge, with some reaching 3-4 feet in diameter at breast height. A substantial portion of this natural community is described as old growth forest. Examples of this community are found along both sides of the gorge as well as along some small tributaries off Wilson Creek. The canopy is dominated by oaks, hickories, and other hardwood species. Some pines occur in the natural setting. The more common canopy species are white oak, northern red oak, chestnut oak, mockernut hickory, and pignut hickory. The understory is generally open with sourwood, red maple, and downy serviceberry (*Amelanchier arborea*). The shrub layer varies, with mountain laurel often abundant on acidic soils and absent on the more circumneutral soils. Other shrubs include gorge rhododendron, pinxter-flower (*Rhododendron periclymenoides*), and strawberry-bush (*Euonymus americanus*). The herb layer is generally sparse, with false Solomon's-seal (*Maianthemum racemosum*), New York fern (*Thelypteris noveboracensis*), poverty oat grass (*Danthonia* sp.), and sedges present.

Along Wilson Creek are good examples of Rocky Bar and Shore. These are generally found in the sweeping bends of the creek and consist of large deposits of rock covered over with sand and some organic material that has washed down the creek and have been deposited. Canopy tree species are generally absent, with a few small tress found on older rocky bars. Generally they are river birch (*Betula nigra*) or red maple. Shrubs are often present, with tag alder (*Alnus serrulata*), swamp azalea (*Rhododendron viscosum*) and spicebush (*Lindera benzoin*) common. Herbs comprise most of the vegetation, with twisted sedge (*Carex torta*), thymeleaf bluet (*Houstonia serpyllifolia*), the invasive Japanese knotweed (*Polygonum cuspidatum*), and panic grass (*Dichanthelium* sp.) common. The uncommon terrestrial water-starwort (*Callitriche terrestris*) is found along the margins of several large rocky areas of the creek, growing in the collected muck and sand. It often occurs with water-starwort (*Callitriche heterophylla)* that resides in small, still pools. Habitat for terrestrial water-starwort potentially exists along all of Wilson Creek.

Acidic Cove Forest is common in nearly all of the coves throughout Wilson Creek Gorge and is generally less mature than other natural communities due to it being accessible to logging in the past. The uncommon butterfly Diana fritillary (*Speyeria diana*) can be seen occasionally along the roads, near the creek and other streams, and in nearby wooded areas. The canopy is dominated by mesophytic trees such as tulip poplar, cucumber tree (*Magnolia acuminata*), and Canada hemlock (*Tsuga canadensis*). Fraser's magnolia and sweet birch (*Betula lenta*) are also common. The understory is well-developed, with red maple, Carolina silverbell (*Halesia tetraptera*), and black gum present. Shrubs are often locally abundant, especially along moist, north-facing slopes. Great laurel and mountain laurel often occur in large dense patches that may extend along long stretches of slope. In the more open understory, sweet-shrub (*Calycanthus floridus*), spicebush (*Lindera benzoin*), sparkleberry (*Vaccinium arboreum*), and lowbush blueberry (*Vaccinium pallidum*) are common. Herbs vary from sparse to abundant with the presence or absence of the thick shrub layer. Common herbs present are black cohosh (*Actaea racemosa*), Christmas fern (*Polystichum acrostichoides*), Solomon's-seal (*Polygonatum biflorum*), and downy rattlesnake plantain (*Goodyera pubescens*). Occasionally herbs that are generally found in rich coves occur in small numbers in acidic coves. Examples of these are blue cohosh (*Caulophyllum thalictroides*), maidenhair fern (*Adiantum pedatum*), and ginseng (*Panax quinquefolius*).

In a few small coves, especially in the northern portions of the gorge, are some small but very good examples of Rich Cove Forest. These areas have a dense forest canopy with a diverse mixture of mesophytic trees including tulip poplar, yellow buckeye (*Aesculus flava*), and cucumber tree. The understory contains alternate-leaf dogwood (*Cornus alternifolia*), downy serviceberry, and witch-hazel (*Hamamelis virginicus*). The shrub layer, unlike those found in Acidic Coves, is open and often sparse. Smooth hydrangea (*Hydrangea arborescens*), spicebush, and horse-sugar (*Symplocos tinctoria*) are common. Woody vines include Dutchman's-pipe (*Aristolochia macrophylla*), Virginia creeper (*Parthenocissus quinquefolia*), and greenbrier (*Smilax* spp.). The herb layer is abundant and lush. A few of the many herbs present include black cohosh, trilliums (*Trillium cuneatum* and *T. erectum*), blue cohosh, sweet Cicely (*Osmorhiza claytonii*), liverleaf (*Hepatica acutiloba*), and ginseng (*Panax quinquefolius*). Two Watch List species that occur within this community type along roads and the adjacent rich slopes are Fraser's sedge (*Cymophyllus fraserianus*) and Tennessee starwort (*Stellaria corei*). Both are locally abundant in this area.

Along steep rocky predominantly south-facing dry slopes are many examples of Pine--Oak/Heath. They are dominated by Table Mountain pine (*Pinus pungens*), shortleaf pine (*P. echinata*), and occasionally scrub pine (*P. virginiana*). Chestnut oak and scarlet oak are often present and co-dominate in some areas. The understory consists primarily of canopy species, black gum, and sourwood. The shrub layer is generally patchy and includes thickets of mountain laurel and gorge rhododendron, suggesting a long history of fire suppression. Woody vines include Virginia creeper and poison ivy (*Toxicodendron radicans*). Herbs tend to be dominated by ericaceous species such as trailing arbutus (*Epigaea repens*), winterberry (*Gaultheria procumbens*), and spotted wintergreen. Other common herbs are broomsedge (*Andropogon virginicus*), galax, and ebony spleenwort (*Asplenium platyneuron*). Appalachian golden-banner occurs here, as well as in the

Chestnut Oak Forest. It generally occurs in small open areas created by disturbance. It may also be a fire dependent species.

Along the upper slopes and peaks throughout the site are some excellent examples of Low Elevation Rocky Summit. This dry, terrestrial natural community contain rocks intermittently with widely scattered canopy species, which include Table Mountain pine, shortleaf pine, and chestnut oak. Understory species are widely scattered red maple, black gum, and chinquapin (*Castanea pumila*). The shrub layer extends onto the rock surface with St. John's-wort (*Hypericum* sp.), mountain laurel, and horse-sugar locally abundant. Common herbs include woolly lipfern (*Cheilanthes tomentosa*), sedum (*Hylotelephium telephioides*), sweet pea (*Clitoria mariana*), dayflower (*Commelina erecta*), and galax. The common raven (*Corvus corax*), turkey vulture (*Cathartes aura*), and black vulture (*Coragyps atratus*) are often seen flying overhead and may utilize this community for nesting.

Another rock outcrop community in Wilson Creek Gorge is Low Elevation Granitic Dome. Some of the best examples are concentrated on Adams Mountain and Brown Mountain. They consists of semi-exfoliating rock, with canopy tree species restricted to areas of soil pockets and along margins. Dominant canopy trees include pines, oaks, and hickories. Understory species extend from the edge of the rock and included serviceberry, witch-hazel, sourwood, and black gum. Shrubs are locally abundant along the margins of the rock, and on small ledges where enough soil is present to support them. The shrub layer is dominated by gorge rhododendron, mountain laurel, and blueberries. Woody vines thrive on the open rock surfaces in some locations, with Virginia creeper and greenbrier being most common. Herbs occur along the margin, in rock crevices, and on soil mats. Common herbs include winterberry, flowering spurge (*Euphorbia corollata*), broomsedge, woolly lipfern, rabbit tobacco (*Gnaphalium obtusifolium*), and sunflower (*Helianthus* sp.). Nonvascular plants include a number of mosses, lichens, and liverworts. A small population of Appalachian woodrat (*Neotoma magister*) is found under small grottos and large rocks within this community type. Given the extent of the rock outcrop communities within Wilson Creek Gorge, additional occurrences of Appalachian woodrat are likely to exist.

Additionally, small examples of Montane Alluvial Forest occur along Wilson Creek in several locations where the floodplain is wide enough to support it. In the Montane Alluvial Forest, the dominating canopy species are sycamore (*Platanus occidentalis*), river birch, white pine (*Pinus strobus*), tulip poplar, and Canada hemlock.

**MANAGEMENT AND PROTECTION:** Much of this site is afforded some long-term protection as part of the Pisgah National Forest. While most of the site is designated as roadless and 'wild and scenic', some areas are still being timbered. This is a highly popular area for recreational purposes. Recreational activities include kayaking, swimming, hiking, fishing, hunting, and off-road biking/four-wheeling (at Brown Mountain). With increased use of this natural area, attention should be paid to trail management, and high use areas should be monitored for impacts. Also, along Wilson Creek, there much litter visible from parking areas and right along the creek. This is something that warrants additional attention from the U.S. Forest Service.

**NATURAL COMMUNITIES:** Acidic Cove Forest, Rich Cove Forest, Chestnut Oak Forest, Low Elevation Granitic Dome, Low Elevation Rocky Summit, Montane Oak--Hickory Forest, Montane Alluvial Forest, Pine--Oak/Heath, and Rocky Bar and Shore.

**RARE PLANTS:** Appalachian golden-banner (*Thermopsis mollis*) and sweet pinesap (*Monotropsis odorata*). Watch list – blackstem spleenwort (*Asplenium resiliens*), turkey-beard (*Xerophyllum asphodeloides*), Fraser's sedge (*Cymophyllus fraserianus*), Tennessee starwort (*Stellaria corei*), and terrestrial starwort (*Callitriche terrestris*).

**RARE ANIMALS**: Appalachian woodrat (*Neotoma magister*); Watch List – Diana fritillary (*Speyeria diana*) and common raven (*Corvus corax*).

**REFERENCES:**

Messick, R. 2000. Summary Report: Old Growth Forest Communities in the Nantahala-Pisgah National Forest. A report for the Western North Carolina Alliance, Asheville, N.C.

Padgett, J. E. 2007. Site Survey Report: Wilson Creek Gorge. Natural Heritage Program, Office of Natural Resource Planning and Conservation, DENR, Raleigh, N.C.

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WILSON CREEK SLOPES/LOST COVE CREEK/THORPS CREEK

**Caldwell County Natural Area Inventory**

## WILSON CREEK SLOPES/LOST COVE CREEK/THORPS CREEK
## Significant Natural Heritage Area

**Site Significance:** Regional
**Quadrangles:** Chestnut Mountain, Grandfather Mountain, and Globe
**Size:** 1,738 acres
**Ownership:** U.S. Forest Service and Private

**SIGNIFICANT FEATURES:** The high quality, high integrity Wilson Creek and Lost Cove Creek flowing through the site and the good quality, uncommon Montane Alluvial Forest bordering the creeks give this site its significance. Additionally, good quality examples of common and uncommon natural community types occur with several Watch List plants that include Fraser's sedge (*Cymophyllus fraserianus*) and turkey-beard (*Xerophyllum asphodeloides*). Brook saxifrage (*Boykinia aconitifolia*) grows on boulders in Lost Cove Creek, and this is the only known location in the immediate area that supports this species.

**LANDSCAPE RELATIONSHIPS:** This site combines and expands two former sites based on additional inventory work that was performed in the vicinity. Areas along Thorps Creek were also added into the site once inventory work had been conducted there. This site is situated in northwestern Caldwell County and eastern Avery County, north of Wilson Creek Gorge, and South of Grandfather Mountain. It is located north of the community of Mortimer and east of the community of Edgemont, north of NC 90. This site is surrounded by the Pisgah National Forest and it is bisected by the Wilson Creek Aquatic Habitat. Lost Cove Cliffs lies 3.0 miles to the west, Grandfather Mountain is located 4.7 miles to the north, and the Johns River/Mulberry Creek Aquatic Habitat lies 2.8 miles to the east.

**SITE DESCRIPTION:** Along Lost Cove and Wilson Creeks are fair to good examples of the uncommon Montane Alluvial Forest natural community. The canopy is dominated by a mix of tree species, including tulip poplar (*Liriodendron tulipifera*), sycamore (*Platanus occidentalis*), white pine (*Pinus strobus*), Canada hemlock (*Tsuga canadensis*), and sweet birch (*Betula lenta*). American holly (*Ilex opaca*), sourwood (*Oxydendrum arboreum*), umbrella magnolia (*Magnolia tripetala*), and occasionally silverbell (*Halesia tetraptera*) dominate the fairly sparse understory. A sporadic shrub layer is primarily of great laurel (*Rhododendron maximum*), mountain laurel (*Kalmia latifolia*), spicebush (*Lindera benzoin*), dog-hobble (*Leucothoe fontanesiana*) and, closer to the creek, smooth alder (*Alnus serrulata*). Along the length of Lost Cove Creek, there are many examples of the Rocky Bar and Shore natural community. In general, these low cobble and gravel bars are completely dominated by twisted sedge (*Carex torta*). Many of the larger boulders within the stream corridor support the uncommon Watch List brook saxifrage (*Boykinia aconitifolia*). The north-central portion of the site has a small (0.5 acre) but well-developed boggy area. This depression is formed by two small springs flowing south into Lost Cove Creek across a flat broad

bench of bottomland forest. This area has an open canopy and supports peat mosses (*Sphagnum* spp.), cinnamon fern (*Osmunda cinnamomea*), numerous sedges (*Carex atlantica, C. gynandra, C. intumescens, C. scoparia, C. stipata*), stiff cowbane (*Oxypolis rigidior*), and other typical herbs.

Upslope from the creeks out of the floodplain, the alluvial areas transition to a Montane Oak--Hickory Forest. The closed canopy is dominated by red oak (*Quercus rubra*), white oak (*Q. alba*), white pine, and various hickory (*Carya* spp.) species. The understory includes sourwood, witch-hazel (*Hamamelis virginiana*), Canada hemlock, and red maple (*Acer rubrum*). A dense shrub layer is dominated by mountain laurel and lesser amounts of great laurel. Flame azalea (*Rhododendron calendulaceum*) and deerberry (*Vaccinium stamineum*) are common in the shrub layer. Galax (*Galax urceolata*), Devil's-bit (*Chamaelirium luteum*), heartleaf (*Hexastylis shuttleworthii*), yellow-eyed grass *(Hypoxis hirsuta*), and ebony spleenwort (*Asplenium platyneuron*) grow in the sparse herb layer. Slopes to the south and west of Lost Cove Creek have largely regenerating forest consisting of a mix of oaks, hickories, American beech (*Fagus grandifolia*), and numerous stump sprouts of American chestnut (*Castanea dentata*). A very dense shrub layer is dominated by great laurel.

Acidic Cove Forest is found along many of the streams and sheltered slopes, transitioning to Chestnut Oak Forest upslope. The dominant canopy species often include tulip poplar, red maple, northern red oak, and some sweet bitch. The understory consists of primarily canopy species, sourwood, flowering dogwood (*Cornus florida*), and scattered black gum. Shrubs often occur in dense patches, with great laurel and mountain laurel occurring most frequently. Other shrubs present include sweet pepperbush (*Clethra acuminata*), blueberries, and horse-sugar. Woody vines present include Virginia creeper (*Parthenocissus quinquefolius*), greenbrier (*Smilax* sp.), and crossvine *(Bignonia capreolata*). Herbs most often occur along the streams where the shrubs are often not present and the sunlight filters through. The uncommon Fraser's sedge (*Cymophyllus fraserianus*) is found in a couple of locations, often with other more Rich Cove Forest associated species such as blue cohosh (*Caulophyllum thalictroides*) and ginseng (*Panax quinquefolius*).

Along drier upper slopes and ridgelines are good examples of Chestnut Oak Forest. The canopy is dominated by chestnut oak (*Quercus montana*) and scarlet oak (*Q. coccinea*) that typically comprise up to fifty percent of the canopy. The remaining canopy is a mosaic of northern red oak, southern red oak (*Quercus falcata*), tulip poplar, scattered basswood (*Tilia americana* var. *heterophylla*), and cucumber tree (*Magnolia acuminata*). The understory contains red maple (*Acer rubrum*), sourwood, flowering dogwood, serviceberry (*Amelanchier arborea*), and black gum (*Nyssa sylvatica*). The understory is generally sparse to dense, uneven aged and varying with slope and aspect. The shrub layer varies according to moisture, soils, and aspect. The more common shrubs are great laurel, mountain laurel, sparkleberry (*Vaccinium arboreum*), lowbush blueberry (*V. pallidum*), maple-leaved viburnum (*Viburnum acerifolium*), and sassafras (*Sassafras albidum*). Others shrubs which might be present are horse-sugar (*Symplocos tinctoria*) and hackberry (*Celtis* spp.). The herb layer contains partridgeberry (*Mitchella repens*), snakeroot (*Sanicula canadensis*), galax (*Galax urceolata*), and spotted wintergreen (*Chimaphila maculata*).

Along prominent south-facing dry rocky ridgelines are good examples of Pine--Oak/Heath. Pines (*Pinus pungens, P. echinata*, and *P. virginiana*), chestnut oak, and scarlet oak dominate the canopy. The understory is sparse with red maple, sourwood, and scattered American holly (*Ilex opaca*) common. The shrub layer is generally well defined and often very thick. Dominant shrubs include great laurel, gorge rhododendron (*R. minus*), mountain laurel, sparkleberry, horse-sugar, and sweet pepperbush. Woody vines are fairly common with poison ivy (*Toxicodendron radicans*), greenbrier (*Smilax glauca* and *S. rotundifolia*), and Virginia creeper present. The herb layer tends to be overall sparse, with galax (*Galax urceolata*), and yellow star-grass (*Hypoxis hirsuta*) the more abundant herbs. The uncommon turkey-beard (*Xerophyllum asphodeloides*) is often found in small to moderate-sized patches in open, somewhat disturbed areas. Fires would potentially increase this species' occurrence in the area as additional suitable habitat becomes available.

Along Thorps Creek is a good example of Montane Acidic Cliff consisting of a well-developed north-facing rock outcrop extending for 100-150 meters along an unnamed stream that reaches heights of 65 ft. or more. Along the cliff a natural canopy break occurs with moderate sunlight filtering down. The canopy has a mixture of Acidic Cove Forest and Chestnut Oak Forest tree species with tulip poplar, northern red oak, and sweet birch common. The understory consist of canopy species, sourwood, and scattered flowering dogwood. The shrub layer is well-developed along the margins with great laurel and mountain laurel abundant. Along the lower portions of the cliff, blueberries (*Vaccinium* spp.) are common. Woody vines consist of Virginia creeper, grapes, and poison ivy. Herbs are more abundant at the base of the cliff, with walking fern (*Asplenium rhizophyllum*) and downy rattlesnake plantain (*Goodyera pubescens*) common. Galax, hairy alumroot (*Heuchera villosa*), and foam-flower (*Tiarella cordifolia*) are found among the rock outcrops and the upper portions of the cliff.

**MANAGEMENT AND PROTECTION:** Allowing the forests to continue to mature will increase their biological significance. Further inventory of the boggy area for rare species is recommended. Protection of the privately-owned portions of the site through a local land trust is recommended. A large portion of this site is afforded some protection by the U.S. Forest Service.

**NATURAL COMMUNITIES:** Acidic Cove Forest, Chestnut Oak Forest, Montane Acidic Cliff, Montane Alluvial Forest, Montane Oak--Hickory Forest, Pine--Oak/Heath, and Rocky Bar and Shore.

**RARE PLANTS:** Watch List – brook saxifrage (*Boykinia aconitifolia*), Fraser's sedge (*Cymophyllus fraserianus*), and turkey-beard (*Xerophyllum asphodeloides*).

**RARE ANIMALS:** Watch List – Common raven (*Corvus corax*).

**REFERENCES:**

Goode, A. and S. Oakley. 1991. Report on the ecological features of the Edgemont Ltd. Property, Avery and Caldwell Counties. North Carolina Chapter of The Nature Conservancy, Durham, N.C.

Padgett, J. E. 2007. Addendum to Wilson Creek Slopes Site Survey Report (see Thorps Creek Site Survey Report). Natural Heritage Program, Office of Natural Resource Planning and Conservation, DENR, Raleigh, N.C.

Smith, P. 2005. Site Survey Report: Lost Cove Creek Forests. NC Natural Heritage Program, OCCA, DENR, Raleigh, N.C.

BLOWING ROCK CLIFFS

**Caldwell County Natural Area Inventory**

**BLOWING ROCK CLIFFS**
**Significant Natural Heritage Area**

**Site Significance:** State
**Quadrangle:** Globe
**Size:** 24 acres
**Ownership:** Private

**SIGNIFICANT FEATURES:** Blowing Rock Cliffs contains a very good example of a High Elevation Rocky Summit at the headwaters of the Johns River. The site is also home to several Federal and State-listed rare plant and animal species including Heller's blazing-star (*Liatris helleri*), Allegheny onion (*Allium allegheniense*), golden tundra-moss (*Rhytidium rugosum*), rockshag lichen (*Ephebe americana*), and Appalachian woodrat (*Neotoma magister*). Also present is a small suite of Watch List species that includes lyre-leaved rockcress (*Arabidopsis lyrata*), mountain-cinquefoil (*Sibbaldiopsis tridentata*), and Carolina hemlock (*Tsuga caroliniana*).

**LANDSCAPE RELATIONSHIPS:** This site is located at the top of the Blue Ridge Escarpment. The Johns River/Mulberry Creek Aquatic Habitat lies 3.0 miles to the southwest, and Julian Price Park is 3.75 miles to the northwest.

**SITE DESCRIPTION:** The Blowing Rock Cliffs is a gorge-like area of high elevation rock cliffs and forested slopes. The upper portion of the site consists of a High Elevation Rocky Summit. It has exposed rock with varying degrees of vegetated areas on rock with deeper soil pockets. Canopy species present include northern red oak (*Quercus rubra*), chestnut oak (*Q. montana*), and sweet birch (*Betula lenta*). Some Table Mountain pine (*Pinus pungens*) is present in the canopy. The understory and shrub layer are dominated by striped maple (*Acer pensylvanica*), black gum (*Nyssa sylvatica*), smooth hydrangea (*Hydrangea arborescens*), mountain ash (*Sorbus americana*), mountain laurel (*Kalmia latifolia*), great laurel (*Rhododendron maximum*), and gorge rhododendron (*R. minus*). Woody vines present are greenbrier (*Smilax rotundifolia*) and Virginia creeper (*Parthenocissus quinquefolia*). Herbs occur on soil mats and accumulated soil on rock ledges. Locally abundant herbs include Heller's blazing-star, mountain cinquefoil, hairy alumroot (*Heuchera villosa*), and marginal wood-fern (*Dryopteris marginalis*). Less common plants, such as Allegheny onion (*Allium allegheniense*) occur near the observation deck along the cliff margin. Some rare nonvascular species known from Blowing Rock Cliffs include golden tundra moss, and rockshag lichen, none of which have not been observed in recent years. Suitable habitat for them exists all along the cliff. The nearest known occurrence of these species is at Grandfather Mountain.

To the south, below the rocky summit and cliffs, is an area of Montane Oak–Hickory Forest. The canopy is dominated by northern red oak, white oak (*Quercus alba*), and red maple (*Acer rubrum*). The understory consists of canopy species, black gum, sourwood (*Oxydendrum arboreum*), and

alternate-leaf dogwood (*Cornus alternifolia*). The shrub layer has patches of mountain laurel, great laurel, and gorge rhododendron. Woody vines are not common, but include greenbrier (*Smilax* sp.), Virgin's-bower (*Clematis virginiana*), and grape (*Vitis* sp.). Herbs include spiderwort (*Tradescantia subaspera*), Turk's-cap lily (*Lilium superbum*), snakeroot (*Sanicula* sp.), downy rattlesnake plantain (*Goodyera pubescens*), and Canada horsebalm (*Collinsonia canadensis*). An occurrence of the uncommon lyre-leaved rockcress (*Arabidopsis lyrata*) is known from the rocky moist areas embedded on the slopes, and a population of Appalachian woodrat (*Neotoma magister*) is known from the rocky areas below the cliffs. Potential habitat for both the lyre-leaf rockcress and the Appalachian woodrat exist in the immediate area, and additional habitat for them may exist along the headwaters of the John's River, below the cliffs.

North of High Elevation Rocky Summit is a small, but good example of a Carolina Hemlock Bluff. The dominant canopy species is Carolina hemlock (*Tsuga caroliniana*), with interspersed Canada hemlock (*T. canadensis*), and northern red oak. The understory and shrub layer contains red maple, alternate-leaf dogwood, mountain laurel, and gorge rhododendron. Woody vines present include greenbrier and Virginia creeper. Herbs are found mainly along the edges and on small soil mats in this community type and include wild sarsaparilla (*Aralia nudicaulis*), marginal wood-fern, hairy alumroot, violets (*Viola* spp.), and galax (*Galax urceolata*).

**MANAGEMENT AND PROTECTION:** A portion of this site is managed as a tourist attraction, but has no formal protection. Visitors are managed by use of walls and other barriers to deter individuals away from sensitive areas and cliffs. A registry agreement with the Natural Heritage Program would be desirable for the cliffs. The valley below has no formal protection and should be of interest to conservation agencies as it forms the headwaters of the Johns River.

**NATURAL COMMUNITIES:** High Elevation Rocky Summit, Carolina Hemlock Bluff, Montane Oak–Hickory Forest.

**RARE PLANTS:** Heller's blazing-star (*Liatris helleri*), Allegheny onion (*Allium allegheniense*), golden tundra moss (*Rhytidium rugosum*), and rockshag lichen (*Ephebe americana*). Watch List – mountain-cinquefoil (*Sibbaldiopsis tridentata*) and lyre-leaved rockcress (*Arabidopsis lyrata*).

**RARE ANIMALS:** Appalachian woodrat (*Neotoma magister*).

**REFERENCES:**

Padgett, J. E. 2007. Site Survey Report: Blowing Rock Cliffs. Natural Heritage Program, Office of Natural Resource Planning and Conservation, DENR, Raleigh, N.C.

BOONE FORK/JOHNNYS KNOB

**Caldwell County Natural Area Inventory**

**BOONE FORK/JOHNNYS KNOB**
**Significant Natural Heritage Area**

**Site Significance:** State
**Quadrangles:** Buffalo Cove, Collettsville, Lenoir, and Globe
**Size:** 1,320 acres
**Ownership:** U.S. Forest Service and Private

**SIGNIFICANT FEATURES:** This site contains the largest known population in the state of the State-listed mountain heartleaf (*Hexastylis contracta*). It occurs in a large mosaic of common forest types within the Pisgah National Forest and private lands. This site also contains occurrences of the rare Blue Ridge bindweed (*Calystegia catesbeiana* ssp. *sericata*).

**LANDSCAPE RELATIONSHIPS:** This site is located along the Blue Ridge Escarpment approximately 7.3 miles northwest of the town of Lenoir. The Johns River/Mulberry Creek Aquatic Habitat lies 3.0 miles to the east, Buffalo Cove Forests is located 1.0 mile to the east, and Blowing Rock Cliffs is 7.3 miles to the north.

**SITE DESCRIPTION:** This natural area contains a matrix of several common natural communities types in various states of maturity due to prior timbering activities. This site has several stream drainages that form the headwaters of Boone Fork Creek, including low-lying floodplains and moderately steep slopes and ridges. Numerous logging roads, a campground, and a man-made pond exist within the site.

Along sections of Boone Creek, past logging is evident with uneven-aged patches of forest noticeable. Exemplary patches of Acidic Cove Forest can be found embedded within the immature patches. The canopy consists of a mix of mesophytic trees that include tulip poplar (*Liriodendron tulipifera*), sweet birch (*Betula lenta*), and Canada hemlock (*Tsuga canadensis*). The understory is well-defined and includes canopy species, sourwood (*Oxydendrum arboreum*), and American holly (*Ilex opaca*). The shrub layer is generally dense along the stream corridors, especially along moist north-facing slopes. Dominant shrubs are great laurel (*Rhododendron maximum*), mountain laurel (*Kalmia latifolia*), and blueberries (*Vaccinium* spp). Woody vines are common near the streams, with grapes (*Vitis* spp.) and poison ivy (*Toxicodendron radicans*) common and locally abundant. Herbs include galax (*Galax urceolata*), bloodroot (*Sanguinaria canadensis*), Catesby's trillium (*Trillium catesbaei*), Solomon's-seal (*Polygonatum biflorum*), false Solomon's-seal (*Maianthemum racemosum*), and ragwort (*Packera aurea*). Mountain heartleaf (*Hexastylis contracta*) is often found along the adjacent slopes in moderate to open understory. It also grows in very shady conditions, where it rarely flowers, but persists vegetatively.

Upslope from the Acidic Cove Forests are fair to good examples of Chestnut Oak Forest. The canopy is closed, with chestnut oak (*Quercus montana*) the dominant canopy tree species. Other canopy species include white oak (*Q. alba*) and mockernut hickory (*Carya alba*). The understory includes red maple (*Acer rubrum*), American holly, mountain holly (*Ilex montana*), and serviceberry (*Amelanchier arborea*). The shrub layer is patchy, but still contains mountain laurel along predominantly north-facing slopes. Other common shrubs include deerberry (*Vaccinium stamineum*), horse-sugar (*Symplocos tinctoria*), and strawberry-bush (*Euonymus americanus*). Vines include Virginia creeper (*Parthenocissus quinquefolia*), Blue Ridge bindweed (*Calystegia catesbeiana* ssp. *sericata*), and hog peanut (*Amphicarpaea bracteata*). The herbaceous layer is sparse overall, with pockets of diverse vegetation occurring locally. The more common herbs include mountain heartleaf, spotted wintergreen (*Chimaphila maculata*), Christmas fern (*Polystichum acrostichoides*), rattlesnake-weed (*Hieracium venosum*), Virginia snakeroot (*Aristolochia serpentaria*), ragwort (*Packera* spp.), and anise-scented goldenrod (*Solidago odora*). Mountain heartleaf is found along low-lying ridges and north-facing slopes where it can be quite abundant. It is also found growing abundantly along old logging-access roads. A large area of potential habitat for mountain heartleaf exists in the region. Future survey work in the region should focus on this species.

Along the drier rocky ridges, mainly south-facing, are pockets of good quality Pine--Oak/Heath. Canopy species include shortleaf pine (*Pinus echinata*), Table Mountain pine (*P. pungens*), chestnut oak, and red maple. The understory contains downy serviceberry, and sourwood. Patches of mountain laurel, blueberries, and horse-sugar make up the majority of the shrubs present. Woody vines are primarily greenbrier, cross-vine (*Bignonia capreolata*), and poison ivy. Herbs are sparse and include yellow star-grass (*Hypoxis hirsuta*), poverty oat grass (*Danthonia* sp.), tickseed (*Coreopsis major*), and spotted wintergreen.

**MANAGEMENT AND PROTECTION:** Management should include prescribed burns in the dry forest communities to remove thick shrub layers and fuel loads resulting from a long history of fire suppression. Little is known about the management needs of mountain heartleaf, so any monitoring project would greatly enhance the current knowledge of this plant species. A large portion of this site is afforded some protection by the U.S. Forest Service, but much of this site is in the timber base and undergoes rotational logging. The remainder of the site is privately-owned and would make a great conservation project for a local land trust.

**NATURAL COMMUNITIES:** Acidic Cove Forest, Chestnut Oak Forest, and Pine--Oak/Heath.

**RARE PLANTS:** Mountain heartleaf (*Hexastylis contracta*), Blue Ridge bindweed (*Calystegia catesbeiana* ssp. *sericata*).

**RARE ANIMALS:** None observed.

**REFERENCES:**

Padgett, J. E. 2007. Site Survey Report: Boone Fork/Johnnys Knob. Natural Heritage Program, Office of Natural Resource Planning and Conservation, DENR, Raleigh, N.C.

GLOBE MOUNTAIN/TATE MOUNTAIN

**Caldwell County Natural Area Inventory**

**GLOBE MOUNTAIN/TATE MOUNTAIN**
**Significant Natural Heritage Area**

**Site Significance:** State
**Quadrangles:** Collettsville and Globe
**Size:** 1,591 acres
**Ownership:** U.S. Forest Service and Private

**SIGNIFICANT FEATURES:** This site is part of the large contiguous forests along the Blue Ridge Escarpment. Within the site are several areas of remnant old growth forest, with one of the best examples of Chestnut Oak Forest in the state. Also present within the site are occurrences of several special status plant species including Blue Ridge bindweed (*Calystegia catesbeiana* ssp. *sericata*), broadleaf tickseed (*Coreopsis latifolia*), and the uncommon Fraser's sedge (*Cymophyllus fraserianus*).

**LANDSCAPE RELATIONSHIPS:** This natural area is located in north central Caldwell County in a large area of Pisgah National Forest. The Johns River bisects the site, and the town of Lenoir is located 9.4 miles to the southeast. Gragg Forests and Grandfather Mountain are located 5.0 and 6.5 miles to the northwest respectively. Buffalo Cove Forests lies 5.0 miles east, and Wilson Creek Slopes/Lost Cove Creek/Thorps Creek lies 3.2 miles west.

**SITE DESCRIPTION:** This site is located in a forested region of moderately steep slopes and mountain peaks along the Blue Ridge Escarpment. The Johns River creates a riverine valley leading down from the summits of Globe and Tate Mountains. The forests vary from moist to dry cove forest along the river up to the lower slopes with dry woodlands upslope and along the ridges, and patches of mature old growth forest in scattered localities.

Abundant examples of Acidic Cove Forest with mixed mesophytic canopy species are found throughout the natural area in low sheltered coves. The forest has a closed canopy except along the larger streams where light gaps are present. Dominant canopy tree species include tulip poplar (*Liriodendron tulipifera*), red maple (*Acer rubrum*), and sweet birch (*Betula lenta*). The understory is well-defined, with ironwood (*Carpinus caroliniana*), American holly (*Ilex opaca*), sourwood (*Oxydendrum arboreum*), and black gum (*Nyssa sylvatica*). Shrubs vary from sparse to very dense, with dominant shrubs being great laurel (*Rhododendron maximum*), gorge rhododendron (*Rhododendron minus*), pinxter-flower (*Rhododendron periclymenoides*), and mountain laurel (*Kalmia latifolia*) in the dense areas. More open understory species include blueberries (*Vaccinium* spp.) and horse-sugar (*Symplocos tinctoria*). Woody vines are locally abundant, with poison ivy (*Toxicodendron radicans*) and cross-vine (*Bignonia capreolata*) common. The herbaceous layer is abundant and diverse. Common herbs include turtlehead (*Chelone* sp.), spotted St. John's-wort (*Hypericum punctatum*), rattlesnake-weed (*Hieracium*

*venosum*), Fraser's sedge (*Cymophyllus fraserianus*), foamflower (*Tiarella cordifolia*), ebony spleenwort (*Asplenium platyneuron*), and Christmas fern (*Polystichum acrostichoides*).

Located along two small streams are small examples of a Rich Cove Forest. They are marginally distinguishable from the Acidic Cove Forest by a lack of dense shrubs and different herbs. This natural community contains a canopy of mixed species including basswood (*Tilia americana* var. *heterophylla*), tulip poplar, sweet birch, black walnut (*Juglans nigra*), and northern red oak (*Quercus rubra*). The understory contains mountain holly (*Ilex montana*) and alternate-leaf dogwood (*Cornus alternifolia*). Shrubs are sparse and include sweet-shrub (*Calycanthus floridus*) and spicebush (*Lindera benzoin*). Woody vines include honeysuckle (*Lonicera* sp.) and hog peanut (*Amphicarpaea bracteata*). Herbs are diverse and include foamflower, Fraser's sedge, turtlehead, Christmas fern, stonecrop (*Sedum ternatum*), golden ragwort (*Packera aurea*), and Trillium (*Trillium* sp.). Small patches of the uncommon broadleaf tickseed occur along small streams that are tributaries to the John's River.

The majority of the site consists of Chestnut Oak Forest. This community is located on the upper slopes and ridgelines throughout the site. A large portion of this community consists of old growth trees, with many trees over 2.5 ft diameter at breast height. The canopy is dominated by chestnut oak (*Quercus montana*), scarlet oak (*Q. coccinea*), shortleaf pine (*Pinus echinata*), mockernut hickory (*Carya alba*), and black gum. The understory is sparse, with red maple, sourwood, and downy serviceberry (*Amelanchier arborea*) present. Shrubs are sparse, often patchy with mountain laurel found on north-facing slopes and along dry ridgelines. Other shrubs include lowbush blueberry (*Vaccinium pallidum*), horse-sugar, and sassafras (*Sassafras albidum*). Woody vines include grapes (*Vitis* spp.), Virginia creeper, greenbrier (*Smilax glauca* and *S. rotundifolia*), and poison ivy. Common herbs include downy rattlesnake plantain (*Goodyera pubescens*), partridgeberry (*Mitchella repens*), spotted wintergreen (*Chimaphila maculata*), turkey-beard (*Xerophyllum asphodeloides*), and ebony spleenwort (*Asplenium platyneuron*). An occurrence of the uncommon Blue Ridge bindweed (*Calystegia catesbeiana* ssp. *sericata*) occurs on Tate Mountain along a dry ridgeline in an open area maintained by human disturbance (small ATV trail). Potential habitat for this species is scattered throughout the site, along old logging-access roads, and in open somewhat rocky naturally-disturbed areas. Animals such as whitetail deer *(Odocoileus virginianus*), black bear (*Ursus americana*), black-and-white warbler (*Mniotilta varia*), and lampshade spider (*Hypochilus pococki*) are present.

Areas of Montane Acidic Cliff are embedded within other forest communities throughout the site. Common canopy tree species are chestnut oak, scarlet oak, white oak, and tulip poplar. The understory includes black gum, American holly, and sourwood. Shrubs present include fringe tree (*Chionanthus virginicus*), mountain laurel, and great laurel. Woody vines are usually found growing on the exposed rock and margins. They include greenbrier, cross-vine, grapes, Virginia creeper, and poison ivy. Herbs grow on soil mats of accumulated soil on small ledges, out on the exposed rock, and along the margins of the rock. Herbs consist of foamflower, beardtongue (*Penstemon canescens*), spiderwort (*Tradescantia subaspera*), pale corydalis (*Corydalis sempervirens*), Christmas fern, spotted wintergreen, and downy rattlesnake plantain. Much of the

exposed rock is suitable habitat for timber rattlesnake (*Crotalus horridus*) and Appalachian woodrat (*Neotoma magister*), but none were observed during this inventory.

Along the dry ridgelines are many small to moderate sized examples of Pine--Oak/Heath. They range from open to closed canopy with Table Mountain pine (*Pinus pungens*), shortleaf pine, scrub pine (*Pinus virginiana*), oaks, and hickories. The understory is dominated by canopy species, sourwood, red maple, and black gum. Shrubs are generally sparse, but do include patches of mountain laurel and blueberries. Small patches of the uncommon sweet-fern (*Comptonia peregrina*) are present along a few dry pine-oak dominated ridgelines on Globe Mountain. Patches of common bristly locust (*Robinia hispida*) are also found in the same general areas. Woody vines include grapes, greenbrier, and poison ivy. Common herbs include anise-scented goldenrod (*Solidago odora*), tickseed (*Coreopsis major*), yellow star-grass (*Hypoxis hirsuta*), turkey-beard, spotted wintergreen, teaberry (*Gaultheria procumbens*), St. John's-wort (*Hypericum stragulum*), yarrow (*Achillea millefolium*), and honesty-weed (*Baptisia tinctoria*).

**MANAGEMENT AND PROTECTION:** Most of this natural area needs no active management. Along the river, management for invasive species is needed. A large portion of this site is afforded some long-term protection as part of the Pisgah National Forest. Along the Johns River are some areas of privately-owned land that have no formal protection. These areas would make excellent conservation projects for a local land trust to pursue.

**NATURAL COMMUNITIES:** Acidic Cove Forest, Chestnut Oak Forest, Montane Acidic Cliff, Pine--Oak/Heath, and Rich Cove Forest.

**RARE PLANTS:** Blue Ridge bindweed (*Calystegia catesbeiana* ssp. *sericata*), broadleaf tickseed (*Coreopsis latifolia*). Watch List – Fraser's sedge (*Cymophyllus fraserianus*), turkey-beard (*Xerophyllum asphodeloides*).

**RARE ANIMALS:** None observed.

**REFERENCES:**

Messick, R. 2000. Summary Report: Old Growth Forest Communities in the Nantahala-Pisgah National Forest. A report for the Western North Carolina Alliance, Asheville, N.C.

Padgett, J. E. 2007. Site Survey Report: Globe Mountain/Tate Mountain. Natural Heritage Program, Office of Natural Resource Planning and Conservation, DENR, Raleigh, N.C.

JOHNS RIVER/MULBERRY CREEK AQUATIC HABITAT

## Caldwell County Natural Area Inventory

## JOHNS RIVER/MULBERRY CREEK AQUATIC HABITAT

**Site Significance**: State
**Quadrangles**: Globe, Collettsville, and Morganton North

**Length**: 41 river miles (approximately four river miles of Mulberry Creek and 24 river miles of Johns River in Caldwell County, plus 13 river miles of Johns River in Burke County)
**Ownership:** North Carolina Public Waters

**SIGNIFICANT FEATURES:** Johns River/Mulberry Creek Aquatic Habitat contains a diversity of rare aquatic species, including the Federal Species of Concern and State Endangered brook floater (*Alasmidonta varicosa)*; the State Special Concern notched rainbow (*Villosa constricta)*; and the State Significantly Rare Santee chub (*Cyprinella zanema)*, eastern creekshell (*Villosa delumbis)*, a stonefly (*Bolotoperla rossi)*, a caddisfly (*Ceraclea slossonae)*, and a mayfly (*Ephemerella berneri)*. The Johns River from the confluence with Wilson Creek in Caldwell County down to the confluence with the Catawba River at Lake Rhodhiss in Burke County is designated High Quality Waters by the NC Division of Water Quality.

**LANDSCAPE RELATIONSHIPS:** All of the Johns River is included within this site except for the uppermost four river miles. The headwaters begin in northwestern Caldwell County and the river flows south/southwest through Caldwell County and into Burke County where it flows southeast to its confluence with the Catawba River at Lake Rhodhiss. The headwaters of Mulberry Creek begin just east of the Johns River headwaters, Mulberry Creek flows south, then southwest before its confluence with the Johns River. The upper portion of the Johns River watershed is located within the Southern Blue Ridge Ecoregion. The Mulberry Creek watershed, approximately three miles of the Johns River before its confluence with Mulberry Creek, and the remaining portion of the Johns River watershed are all contained within the Piedmont Ecoregion. Portions of the Johns River and Mulberry Creek watersheds in Caldwell County are surrounded by Pisgah National Forest Grandfather Ranger District; however there are many private landholdings along both the Johns River and Mulberry Creek. The Johns River in Burke County is surrounded solely by private landholdings. This subbasin, which also contains Upper Creek, Wilson Creek, and tributaries to Lake Rhodhiss, consists of forest/wetland (85%), agriculture (11%), urban (3%), and surface water (1%). The Johns River watershed has widespread agricultural uses, but is also severely threatened by residential development. Much of the land within the Johns River watershed is forested, with a considerable amount of it within the Pisgah National Forest. Land use on private in holdings along the river are generally residential dwellings, small pastures or farms, or large horticultural operations (the latter is found more often along the river where large floodplains are common).

The following Significant Natural Heritage Areas are in the Johns River and Mulberry Creek watersheds: Blowing Rock Cliffs, Backbone Ridge, Boone Fork/Johnnys Knob, Globe Mountain/Tate Mountain, Guys Creek Rare Plant Site, Mills Knob, Mulberry Rare Plant Site, Pack

Hill/Thunderhole Creek, and Racket Creek Slopes.

The Johns River and Mulberry Creek are part of the Catawba River basin, which joins with the Broad River basin to form the Santee-Cooper River system in South Carolina before flowing into the Atlantic Ocean.

**SITE DESCRIPTION:** Johns River/Mulberry Creek Aquatic Habitat comprises the majority of the Johns River and Mulberry Creek as they flow through Caldwell County and into the Catawba River at Lake Rhodhiss in Burke County. Wilson Creek is a major tributary to the Johns River and the confluence is just upstream of the Johns River entrance into Burke County. The Johns River and Mulberry Creek contain a variety of aquatic habitats that support a large diversity of organisms. In addition to the species noted above, the Johns River and Mulberry Creek support the following animals, collected during recent monitoring efforts by NC Division of Water Quality and NC Wildlife Resources Commission:

Fishes: Rock bass (*Ambloplites rupestris*), snail bullhead (*Ameiurus brunneus*), white catfish (*Ameiurus catus*), brown bullhead (*Ameiurus nebulosus*), flat bullhead (*Ameiurus platycephalus*), central stoneroller (*Campostoma anomalum*), white sucker (*Catostomus commersonii*), greenfin shiner (*Cyprinella chloristia*), thicklip shiner (*C. labrosa*), whitefin shiner (*Cyprinella nivea*), fieryblack shiner (*C. pyrrhomelas*), common carp (*Cyprinus carpio*), gizzard shad (*Dorosoma cepedianum*), fantail darter (*Etheostoma flabellare*), tessellated darter (*E. olmstedi*), seagreen darter (*E. thalassinum*), eastern silvery minnow (*Hybognathus regius*), channel catfish (*Ictalurus punctatus*), redbreast sunfish (*Lepomis auritus*), green sunfish (*L. cyanellus*), pumpkinseed (*L. gibbosus*), warmouth (*L. gulosus*), bluegill (*L. macrochirus*), warpaint shiner (*Luxilus coccogenis*), smallmouth bass (*Micropterus dolomieu*), largemouth bass (*M. salmoides*), white perch (*Morone americana*), notchlip redhorse (*Moxostoma collapsum*), v-lip redhorse (*M. pappillosum*), striped jumprock (*M. rupiscartes*), brassy jumprock (*Moxostoma sp. nov.*), bluehead chub (*Nocomis leptocephalus*), spottail shiner (*Notropis hudsonius*), sandbar shiner (*N. scepticus*), margined madtom (*Noturus insignis*), yellow perch (*Perca flavescens*), Piedmont darter (*Percina crassa*), black crappie (*Pomoxis nigromaculatus*); Mussels: Carolina lance *(Elliptio angustata)*, eastern elliptio (*Elliptio complanata*), variable spike (*Elliptio icterina*), Atlantic spike (*Elliptio producta*); Crayfish: Appalachian brook crayfish (*Cambarus bartonii*), *Cambarus sp.* A, *Cambarus acuminatus*, *Cambarus sp.* C; Snails: sprite elimia (*Elimia proxima*), crested mudalia (*Leptoxis carinata*).

The diversity of aquatic habitats in the Johns River and Mulberry Creek contribute to the presence of these species. Habitat diversity is based on the geology of the area, with the upper half of the Johns River in the Blue Ridge physiographic province, characterized as high gradient, cold and clear water; substrates consisting largely of bedrock, boulder, and cobble; and Mulberry Creek and the lower half of the Johns River in the Piedmont, with less gradient, slightly warmer waters to support freshwater mussels, and smaller substrates such as gravel and sand.

**MANAGEMENT AND PROTECTION:** A large portion of the Johns River watershed in Caldwell County is within Pisgah National Forest (Grandfather Ranger District). However, the majority of the lands owned by the U.S. Forest Service are upland areas; most of the land directly adjacent to the river is within private ownership. These lands have become increasingly popular for residential development. In early 2007, 2,800 acres at the confluence of the Johns and Catawba Rivers in Burke County were added to the N.C. Wildlife Resources Commission's Game Lands program. The protected area includes 17 miles along both sides of the Johns River and Lower Creek below NC 18 in Burke County.

A large portion of the Mulberry Creek upstream of the aquatic habitat is designated High Quality Waters. Additionally, the Johns River from the confluence with Wilson Creek down to the confluence with the Catawba River at Lake Rhodhiss is designated High Quality Waters. High Quality Waters, a supplemental classification given by N. C. Division of Water Quality, is based on excellent biological and/or chemical/physical monitoring.

The Catawba River Basin is heavily impacted by impoundments, resulting in habitat fragmentation and negative impacts due to cold water releases from dams. The Johns River watershed lies between Lake James and Lake Rhodhiss. Sensitive species remain in this watershed, although should these species become extirpated, it will be virtually impossible for natural recolonization due to the numerous impoundments.

Flooding in September 2004, associated with the remnants of Hurricanes Ivan, Frances, and Jeanne, was particularly severe in the French Broad and the Catawba River Basins. N.C. Wildlife Resources Commission biologists conducted mussel surveys in these basins before and after the 2004 floods to characterize the effects on mussel populations. Stream habitat heterogeneity, presence of flow refuges, and natural channel design with a functioning floodplain all appear to contribute to habitat preservation and therefore mussel survival during severe flooding. There were two sites on the Johns River in Caldwell County that were surveyed in September 2003 and again in September 2005. The upper site showed a positive change in the mussel catch per unit effort, although brook floater (*Alasmidonta varicosa*) was not detected in 2005. This was previously known as its uppermost extent within the Johns River and the lack of records from 2005 does not necessarily mean the species is eliminated from this stretch of river, but possibly that it was not detected during the 2005 survey. The lower site showed a negative change in mussel catch per unit effort. The Johns River, Warrior Fork System, and Linville River support the most diverse mussel fauna remaining within the upper Catawba River Basin. The most significant problem with mussel populations in the upper Catawba Basin rivers is the relatively small population size and reproductive isolation of species present in the Johns River, Warrior Fork, and Linville River systems due to habitat fragmentation. Management actions based on mussel population size and genetic diversity within these upper Catawba systems may be pursued to ensure long-term survival of these vulnerable populations.

**RARE ANIMALS:** Santee chub (*Cyprinella zanema*), brook floater (*Alasmidonta varicosa*), notched rainbow (*Villosa constricta*), eastern creekshell (*V. delumbis*), a stonefly (*Bolotoperla rossi*), a mayfly (*Ephemerella berneri*), a caddisfly (*Ceraclea slossonae*).

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MILLS KNOB

**Caldwell County Natural Area Inventory**

**MILLS KNOB**
**Significant Natural Heritage Area**

**Site Significance:** Regional
**Quadrangle:** Globe
**Size:** 401 acres
**Ownership:** U.S. Forest Service and Private

**SIGNIFICANT FEATURES:** This site has one of the best examples of Chestnut Oak Forest in the region with about half of the site described as old growth forest. It also has some good examples of Acidic Cove Forests and Pine--Oak/Heath.

**LANDSCAPE RELATIONSHIPS:** Mills Knob is located along the Blue Ridge Escarpment on a prominent ridgeline that run generally north to south off the Escarpment. It is an area of undeveloped mature forest within the larger landscape of the Pisgah National Forest. The Johns River/Mulberry Creek Aquatic Habitat lies 0.5 miles to the west. Blowing Rock Cliffs is located 2.5 miles to the north.

**SITE DESCRIPTION:** This site includes several old growth forest patches and maturing forests. The site contains Mills Knob, a prominent peak in the long-running Globe Mountain complex that extends off the Blue Ridge Escarpment into the Johns River Valley. The site consists of forested, moderately steep slopes and deep coves.

The dominant natural community within this natural area is Chestnut Oak Forest. It is located along middle and upper slopes throughout the site with a closed canopy. A large section of this community was previously mapped and described as old growth forest (Messick 2000). Dominant canopy tree species are chestnut oak (*Quercus montana*), scarlet oak (*Q. coccinea*), mockernut hickory (*Carya alba*), and shortleaf pine (*Pinus echinata*). The understory is open, with sourwood (*Oxydendrum arboreum*), black gum (*Nyssa sylvatica*), and flowering dogwood (*Cornus florida*) common. Shrubs are abundant, with dense patches of mountain laurel (*Kalmia latifolia*) on north-facing steep slopes. Other common shrubs present are great laurel (*Rhododendron maximum*), deerberry (*Vaccinium stamineum*), and horse-sugar (*Symplocos tinctoria*). Woody vines occur infrequently, with poison ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quinquefolia*), and cross-vine (*Bignonia capreolata*) most common. Herbs are sparse, with galax (*Galax urceolata*), trailing arbutus (*Epigaea repens*), spotted wintergreen (*Chimaphila maculata)*, poverty oat grass (*Danthonia* spp.), Indian tobacco (*Lobelia inflata*), and sunflower (*Helianthus* sp.) dominating this layer.

In sheltered coves and lower slopes Acidic Cove Forest is abundant. Dominant canopy tree species are tulip poplar (*Liriodendron tulipifera*), sweet birch (*Betula lenta*), white oak (*Quercus alba*), and black gum. The understory contains Fraser's magnolia (*Magnolia fraseri*), sourwood, and red maple (*Acer rubrum*). Shrubs include great laurel, maple-leaf viburnum (*Viburnum*

*acerifolium*), highbush blueberry (*Vaccinium corymbosum*), and lowbush blueberry (*V. pallidum*). Dominant woody vines include greenbrier (*Smilax* sp.) and poison ivy. Some of the more abundant herbs are downy rattlesnake plantain (*Goodyera pubescens*), Canada snakeroot (*Sanicula canadensis*), black cohosh (*Actaea racemosa*), and Christmas fern (*Polystichum acrostichoides*).

Along south-facing steep and often rocky ridgelines, Pine--Oak/Heath is present in small patches. Common canopy tree species include pines (*Pinus* spp.), chestnut oak, and scarlet oak. Sourwood, black gum, and red maple are abundant in the understory. Shrubs are patchy and dense, with mountain laurel and fetterbush (*Leucothoe recurva*) common. Greenbrier and poison ivy are frequently present. The dominant herbs are generally ericaceous, with galax, trailing arbutus, spotted wintergreen (*Chimaphila maculata*) common. The uncommon Watch List turkey-beard (*Xerophyllum asphodeloides*) occurs in small patches along the ridgeline in several small open areas and along a section of what appears to have been an old logging road that is now used as an ATV trail. Other herbs present are yellow star-grass (*Hypoxis hirsuta*), wood aster (*Eurybia divaricata*), and anise-scented goldenrod (*Solidago odora*).

**MANAGEMENT AND PROTECTION:** This site needs little management except for controlling and managing exotic invasive species. A large portion of this site is afforded some long-term protection as part of the Pisgah National Forest. The remainder of the site is privately-owned and would be a suitable conservation project for a local land trust.

**NATURAL COMMUNITIES:** Acidic Cove Forest, Chestnut Oak Forest, and Pine--Oak/Heath.

**RARE PLANTS:** Watch List – turkey-beard (*Xerophyllum asphodeloides*).

**RARE ANIMALS:** None observed.

**REFERENCES:**

Messick, R. 2000. Summary Report: Old Growth Forest Communities in the Nantahala-Pisgah National Forest. A report for the Western North Carolina Alliance, Asheville, N.C.

Padgett, J. E. 2007. Site Survey Report: Mills Knob. Natural Heritage Program, Office of Natural Resource Planning and Conservation, DENR, Raleigh, N.C.

ROCKY KNOB

**Caldwell County Natural Area Inventory**

# ROCKY KNOB
## Significant Natural Heritage Area

**Site Significance:** State
**Quadrangle:** Globe
**Size:** 1,545 acres
**Ownership:** U.S. Forest Service and Private

**SIGNIFICANT FEATURES:** This site supports one of the best Chestnut Oak Forests in the state, including areas described as old growth forest. The site also contains occurrences of cerulean warbler (*Dendroica cerulea*) and sweet pinesap (*Monotropsis odorata*). Also present are Blue Ridge bindweed (*Calystegia catesbeiana* ssp. *sericata*), Appalachian woodrat (*Neotoma magister*), and Swainson's warbler (*Limnothlypis swainsonii*).

**LANDSCAPE RELATIONSHIPS:** This natural area is located along the easternmost boundary of the Pisgah National Forest in Caldwell County. It is a series of south-running ridges that extend for several miles off the Blue Ridge Escarpment near Blowing Rock south to Mulberry Creek. Blowing Rock Cliffs is located 1.3 miles to the north, Buffalo Cove Forests is 3.6 miles to the east, and the Johns River/Mulberry Creek Aquatic Habitat is located 2.0 miles to the west.

**SITE DESCRIPTION:** This natural areas is situated in north-central Caldwell County. The topography of the site is a rugged area of low mountains, steep slopes and prominent south-running narrow ridges along the escarpment. Many of the longer ridges extend for over a mile. Between the ridges are moderately deep coves with steep slopes. The different aspects and elevations within the site allow for a variety of natural community types to exist within the site.

Along the lower slopes and in the sheltered deep coves, Acidic Cove Forest is abundant. It has a closed canopy with regeneration occurring in light gaps resulting from tree fall. The dominant canopy species are tulip poplar (*Liriodendron tulipifera*), sweet birch (*Betula lenta*), and northern red oak (*Quercus rubra*). The understory is well-defined, with Fraser's magnolia (*Magnolia fraseri*) and flowering dogwood (*Cornus florida)* common. Red maple (*Acer rubrum*) and various pines (*Pinus* spp.) are common on drier lower slopes. Along north-facing slopes and stream corridors, shrubs are often quite thick with great laurel (*Rhododendron maximum*) and mountain laurel (*Kalmia latifolia*). In more open areas, strawberry-bush (*Euonymus americanus*) and blueberries (*Vaccinium* spp.) are often present. Common woody vines such as Virginia creeper (*Parthenocissus quinquefolia*) and poison ivy (*Toxicodendron radicans*) are present along open stream corridors and lower slopes. The herbaceous layer includes a variety of different herbs such as downy rattlesnake plantain (*Goodyera pubescens*), partridgeberry (*Mitchella repens*), Canada snakeroot (*Sanicula canadensis*), false Solomon's-seal (*Maianthemum racemosum*), Christmas fern (*Polystichum acrostichoides*), and New York fern (*Thelypteris noveboracensis*).

Upslope of the Acidic Cove Forest, the forest often transitions quickly into Chestnut Oak Forest. It is the dominant forest community within the site and the region. The canopy is generally closed. Several large portions of this natural community have been described as old growth forest (Messick 2000). Dominant canopy tree species are chestnut oak (*Quercus montana*), scarlet oak (*Q. coccinea*), and mockernut hickory (*Carya alba*). The understory is fairly open with sourwood (*Oxydendrum arboreum*), black gum (*Nyssa sylvatica*), and downy serviceberry (*Amelanchier arborea*) present. Shrubs consist of patchy areas of great laurel and mountain laurel. Other common shrubs in more open areas include deerberry (*Vaccinium stamineum*) and horse-sugar (*Symplocos tinctoria*). Woody vines occur infrequently; poison ivy and greenbrier (*Smilax* spp.) are present. A small area of Blue Ridge bindweed (*Calystegia catesbeiana* ssp. *sericata*) occurs in an open rocky area near the access road about midslope of Rocky Knob. The area is somewhat disturbed. Just above the access road and adjacent slopes up to a low ridgeline where an older logging road is located, there is additional potential habitat for the Blue Ridge bindweed. Herbs are sparsely scattered throughout with galax (*Galax urceolata*), trailing arbutus (*Epigaea repens*), spotted wintergreen (*Chimaphila maculata*), poverty oat grass (*Danthonia spicata* and *D. compressa*), Indian tobacco (*Lobelia inflata*), and St. Andrew's cross (*Hypericum hypericoides*) common. Cerulean warbler (*Dendroica cerulea*) and Swainson's warbler (*Limnothlypis swainsonii*) are present in the older, mature sections of forest. Potential habitat for these uncommon bird species consist of a fairly large area of mature forest that is located along ridges, slopes, and coves of Rocky Knob.

Along many south-facing ridges and spur ridges are examples of Pine--Oak/Heath. This natural community generally has a closed canopy with open patches occurring at small rock outcroppings, or where a loss of canopy trees due to southern bark beetle (*Dendroctonus frontalis*). Dominant canopy tree species include shortleaf pine (*Pinus echinata*), chestnut oak, scarlet oak, and pignut hickory (*Carya glabra*). The understory contains sourwood, red maple, and American holly (*Ilex opaca*). Shrubs are patchy and often dense with mountain laurel being the dominant shrub. Other common shrubs include fetter bush (*Leucothoe recurva*), deerberry (*Vaccinium stamineum*), and horse-sugar. Woody vines include greenbrier and poison ivy. The dominant herbs are mainly ericaceous, with galax, trailing arbutus (*Epigaea repens*), and spotted wintergreen common. A small patch of sweet pinesap (*Monotropsis odorata*) occurs along the ridgeline under pines near a trail. Other areas along the ridgeline and slopes also contain potentially suitable habitat for sweet pinesap. Other non-ericaceous herbs include yellow star-grass (*Hypoxis hirsuta*), poverty oat grass (*Danthonia spicata*), tickseed (*Coreopsis major*), and sunflowers (*Helianthus* spp.).

Along the prominent ridgelines and upper portion of the peak at Rocky Knob, Low Elevation Rocky Summit is common. Canopy trees, when present, are similar in composition to Chestnut Oak Forest with chestnut oak, scarlet oak, and shortleaf pine common. The understory contains scattered sourwood, downy serviceberry, and witch-hazel (*Hamamelis virginiana*). Shrubs are generally abundant along the rock-forest margin, with gorge rhododendron (*Rhododendron minus*), mountain laurel, and blueberries present. Common woody vines are roundleaf greenbrier (*Smilax rotundifolia*) and poison ivy. Herbs are sparse on the exposed rocks, but more abundant along the rock-forest margin. Common herbs are pale corydalis (*Corydalis sempervirens*), spotted

wintergreen, violets (*Viola* spp.), Canada snakeroot (*Sanicula canadensis*), and mountain spleenwort (*Asplenium montanum*). A large concentration of Appalachian woodrats (*Neotoma magister*) reside under rock grottos, boulders, and the bases of small cliffs throughout the site. Given the already observed nesting locations, this population is potentially one of the largest in the region. There is also an extensive area of suitable habitat at Rocky Knob that may contain many more occurrences of Appalachian woodrat.

In many of the same areas where there is the Low Elevation Rocky Summit, there are also examples of Low Elevation Granitic Dome. These are open patches of exfoliated rock with small thin soil mats. Canopy species occur along the margins and on larger, more well-developed soil mats. Dominant canopy species include chestnut oak, red maple, and Table Mountain pine (*Pinus pungens*). On more exposed rock, Canada and Carolina hemlock (*Tsuga canadensis* and *T. caroliniana*) are common. Understory and shrub species include sourwood, witch-hazel, black gum (*Nyssa sylvatica*), and mountain laurel. Woody vines are not common but some poison ivy, Virginia creeper (*Parthenocissus quinquefolia*), and greenbrier are present. The herbaceous layer is sparse overall with herbs restricted to soil mats. Spotted wintergreen, galax, Michaux's saxifrage (*Saxifraga michauxii*), pale corydalis, ebony spleenwort, Canada cinquefoil (*Potentilla canadensis*), and poverty oat grass are some of the common herbs present.

Along a prominent, bluff-like area in the northwest corner of the site is a good example of the uncommon Carolina Hemlock Bluff natural community. The canopy is dominated by Carolina hemlock. Other canopy species include chestnut oak and Canada hemlock. Sourwood and black gum dominate the understory. Shrubs are dense near the bluff, with great laurel, gorge rhododendron, and mountain laurel present. Woody vines are sparse, with greenbrier and poison ivy present. The herb layer is sparse under the hemlocks and shrubs, with galax, trailing arbutus, and downy rattlesnake plantain the most common.

**MANAGEMENT AND PROTECTION:** A large portion of this site is afforded some protection as part of the Pisgah National Forest. The remainder of the site is privately-owned and would make a great conservation project for a local land trust.

**NATURAL COMMUNITIES:** Acidic Cove Forest, Carolina Hemlock Bluff, Chestnut Oak Forest, Low Elevation Granitic Dome, Low Elevation Rocky Summit, and Pine-Oak/Heath.

**RARE PLANTS:** Blue Ridge bindweed (*Calystegia catesbeiana* ssp. *sericata*) and sweet pinesap (*Monotropsis odorata*).

**RARE ANIMALS:** Appalachian woodrat (*Neotoma magister*) and cerulean warbler (*Dendroica cerulea*). Watch List - Swainson's warbler (*Limnothlypis swainsonii*).

**REFERENCES:**

Messick, R. 2000. Summary Report: Old Growth Forest Communities in the Nantahala-Pisgah National Forest. A report for the Western North Carolina Alliance, Asheville, N.C.

Padgett, J. E. 2007. Site Survey Report: Rocky Knob. Natural Heritage Program, Office of natural Resource Planning and Conservation, DENR, Raleigh, N.C.

BUFFALO COVE FORESTS

**Caldwell County Natural Area Inventory**

## BUFFALO COVE FORESTS
## Significant Natural Heritage Area

**Site Significance:** County

**Size:** 10,254 acres (1,056 primary and 9,198 secondary)

**Quadrangles:** Buffalo Cove and Grandin

**Ownership:** N.C. Wildlife Resources Commission and Private

**SIGNIFICANT FEATURES:** The site is part of a large, predominantly forested area on the rugged lands of the Blue Ridge Escarpment, just northwest of the narrow Yadkin River Valley and the Brushy Mountains. This site contains occurrences of coal skink (*Eumeces anthracinus*) and timber rattlesnake (*Crotalus horridus*). This site is also significant as wildlife habitat, especially for large mammals that need large expanses of contiguous land to maintain viable populations.

**LANDSCAPE RELATIONSHIPS:** This site is located along the lower portions of the Blue Ridge Escarpment. Buffalo Creek Gorge is located 1.3 miles northwest. Other nearby sites include South Fork Laurel Creek/Dugger Mountain 5.0 miles north, the Johns River/Mulberry Creek Aquatic Habitat is 6.7 miles to the west, and Blowing Rock Cliffs 6.8 miles north-northwest.

**SITE DESCRIPTION:** This site consists of a large expanse of rugged land at the southeastern edge of the Blue Ridge escarpment. Narrow to broad high ridges and knobs surround steep ravines and valleys. Small areas of gently sloping land are present in the vicinity of Laytown Creek.

Chestnut Oak Forest of varying maturity occupies the majority of the site, on ridges and upper to middle slopes. A varying mixture of chestnut oak (*Quercus montana*) and scarlet oak (*Q. coccinea*) dominates the canopy. White oak (*Q. alba*) is generally present in small amounts, as are red maple (*Acer rubrum*), black oak (*Q. velutina*), and black gum (*Nyssa sylvatica*). Pitch pine (*Pinus rigida*) and Table Mountain pine (*P. pungens*) are present in small groves, and white pine (*P. strobus*) is scattered as canopy individuals. The understory is dominated by sourwood (*Oxydendrum arboreum*), and includes canopy oak species, white pines, red maple, black gum, and occasionally Canada hemlock (*Tsuga canadensis*). The shrub layer is dense, with large patches dominated by mountain laurel (*Kalmia latifolia*), huckleberry (*Gaylussacia baccata*), and lowbush blueberry (*Vaccinium pallidum*). Other common shrubs include sassafras (*Sassafras albidum*), American chestnut (*Castanea dentata*) sprouts, and deerberry (*V. stamineum*). The herb layer is usually sparse, expect for large beds of galax (*Galax urceolata*) and smaller patches of trailing arbutus (*Epigaea repens*).

Montane Oak–Hickory Forest occurs in several sizeable patches on ridgetops and upper slopes. The canopy is a varying mix of white oak with scarlet oak, chestnut oak, northern red oak (*Q. rubra*), and hickories (*Carya* spp). The understory includes red maple and Fraser's magnolia (*Magnolia fraseri*), along with canopy species. The shrub layer is patchy, with mountain laurel and great laurel (*Rhododendron maximum*) dominating some areas, and other areas largely free of shrubs. Herbs are generally sparse. This community varies in maturity, similar to the Chestnut Oak Forest. The coal skink (*Eumeces anthracinus*) was observed in 2005 along a road bank through this dry natural community.

Acidic Cove Forest is abundant in most of the coves and lower slopes. The canopy is a mixture of tulip poplar (*Liriodendron tulipifera*), red maple, white pine, and sweet birch (*Betula lenta*), with moderate numbers of oaks and occasional Canada hemlock (*Tsuga canadensis*). Table Mountain pine and scrub pine (*P. virginiana*) are present locally. The understory consists of these same species plus sourwood, and occasional flowering dogwood (*Cornus florida*). The shrub layer ranges from sparse to dense. Great laurel is the typical dominant species, but mountain laurel and dog-hobble (*Leucothoe fontanesiana*) can be abundant. The herb layer ranges from dense to nearly absent. New York fern (*Thelypteris noveboracensi*s) is dominant, with Christmas fern (*Polystichum acrostichoides*), southern lady fern (*Athyrium asplenioides*), and galax abundant. Occasionally, cinnamon fern (*Osmunda cinnamomea*) is present.

A large number of muddy Low Elevation Seeps are present in different areas. In general, they occur on the edges of cove bottoms, separated from the main creeks, and are surrounded by Acidic Cove Forest. The substrate is soft muck bounded by a distinct head where the spring emerges, and generally they contain a small outflow stream. Most are no more than 30 feet across. The canopy is the same as in the adjacent Acidic Cove Forest. A dense shrub layer is sometimes present, which may include possumhaw (*Viburnum nudum*) and tag alder (*Alnus serrulata*), as well as the more widespread great laurel. Where shrubs are not dense, a dense herb layer is usually present, generally dominated by sedges (*Carex* spp.), cinnamon fern, New York fern, and smooth ragwort (*Packera glabella*). Royal fern (*Osmunda regalis*) and seep rush (*Juncus gymnocarpus*) may be present in small numbers. Moss covers much of the ground, but Sphagnum is largely or completely absent.

One area of Rich Cove Forest is present, though it can only be marginally distinguished from he adjacent Acidic Cove Forest. The canopy is dominated by tulip poplar, with some white ash (*Fraxinus americana*), bitternut hickory (*Carya cordiformis*), and various oaks. The understory consists of canopy species plus flowering dogwood. The shrub layer is sparse, but some spicebush (*Lindera benzoin*) is present. The herb layer is moderately dense. New York fern is the most abundant herb, but black cohosh (*Actaea racemosa*) and witch grass (*Dichanthelium boscii*) are also abundant. A few bloodroot (*Sanguinaria canadensis*) and hog peanut (*Amphicarpaea bracteata*) are present.

A small Low Elevation Rocky Summit is present in one area, but is too small and poorly developed to be notable. Michaux's saxifrage (*Saxifraga michauxii*) and St. John's-wort

(*Hypericum* sp.) are the only species present here that are not shared with the surrounding forest. It is possible that larger, more well-developed Rocky Summit communities exist on the steep west-facing bluffs north of Cottrell Knob.

**MANAGEMENT AND PROTECTION:** This site is protected as part of the Buffalo Cove Game Land. The N. C. Wildlife Resources Commission manages this property for wildlife values. A portion of the game land has been proposed as a Dedicated State Nature Preserve.

**NATURAL COMMUNITIES:** Chestnut Oak Forest, Montane Oak–Hickory Forest, Acidic Cove Forest, Low Elevation Seep, Rich Cove Forest, Low Elevation Rocky Summit.

**RARE PLANTS:** None observed.

**RARE ANIMALS:** Coal skink (*Eumeces anthracinus*) and timber rattlesnake (*Crotalus horridus*).

**REFERENCES:**

LeGrand, H. E. 2004. Site Survey Report. Mingo Tract. Natural Heritage Program. OCCA, DENR. Raleigh, N.C.

Oakley, S. 1999. Site Survey Report. Patterson School Game Land. Natural Heritage Program, OCCA, DENR. Raleigh, N.C.

Schafale, M.. 2007. Site Survey Report: Buffalo Cove Forests. Natural Heritage Program, Office of Natural Resource Planning and Conservation, DENR, Raleigh, N.C.

BUFFALO CREEK GORGE

**Caldwell County Natural Area Inventory**

**BUFFALO CREEK GORGE**
**Significant Natural Heritage Area**

**Site Significance:** Regional
**Quadrangle:** Buffalo Cove
**Size:** 969 acres (849 primary and 120 secondary)
**Ownership:** N.C. Wildlife Resources Commission

**SIGNIFICANT FEATURES:** Buffalo Creek Gorge contains very good examples of several common and uncommon natural community types, as well as a large suite of North Carolina Watch List plant species.

**LANDSCAPE RELATIONSHIPS:** This site lies along the Blue Ridge Escarpment in the northern portion of the county. Buffalo Cove Forests, also managed by the N. C. Wildlife Resources Commission, lies 1.4 miles to the southeast. South Fork Laurel Creek/Dugger Mountain lies 3.0 miles north, Blowing Rock Cliffs is located 4.2 miles west, and Johns River/Mulberry Creek Aquatic Habitat is 7.2 miles to the southwest.

**SITE DESCRIPTION:** Buffalo Creek Gorge is a rugged, mountain gorge located along Buffalo Creek. Chestnut Oak Forest is the most abundant natural community in the site, occupying most of the middle to upper slopes. The canopy in both is dominated by chestnut oak (*Quercus montana*), with scarlet oak (*Q. coccinea*) co-dominant in places. White pine (*Pinus strobus*), Table Mountain pine (*P. pungens*), shortleaf pine (*P. echinata*), pitch pine (*P. rigida*), and black gum (*Nyssa sylvatica*) are present in the canopy. The understory is dominated by sourwood (*Oxydendrum arboreum*) and red maple (*Acer rubrum*), with Fraser's magnolia (*Magnolia fraseri*) locally abundant . Both Canada hemlock (*Tsuga canadensis*) and Carolina hemlock (*T. caroliniana*) occur locally. The shrub layer varies from sparse to dense. Mountain laurel (*Kalmia latifolia*) is dominant over the largest area, but great laurel (*Rhododendron maximum*) is remarkably common even in fairly dry portions. Where these species are scarce, lowbush blueberry (*Vaccinium pallidum*), deerberry (*V. stamineum*), horse-sugar (*Symplocos tinctoria*), American chestnut (*Castanea dentata*) sprouts, Allegheny chinquapin (*Castanea pumila*), and even Catawba rhododendron (*Rhododendron catawbiense*) or sand myrtle (*Leiophyllum buxifolia*) may be common. The herb layer is generally sparse. The most characteristic species are extremely acid-tolerant such as spotted wintergreen (*Chimaphila maculata*), trailing arbutus (*Epigaea repens*), and winterberry (*Gaultheria procumbens*).

Acidic Cove Forest is abundant in the site, occupying most of the sheltered and lower slopes and the bottom of the gorge. The canopy is a varying mix of tulip poplar (*Liriodendron tulipifera*), sweet birch (*Betula lenta*), Canada hemlock, red maple, beech (*Fagus grandifolia*), and northern red oak (*Q. rubra*). Chestnut oak, white oak (*Q. alba*), scarlet oak, white pine, and an occasional basswood (*Tilia americana* var. *heterophylla*) are present in areas. The understory consists largely

of Canada hemlock or red maple, and also includes American holly (*Ilex opaca*) and Fraser's magnolia. The shrub layer is generally dense, dominated by great laurel, and in some places by dog-hobble (*Leucothoe fontanesiana*). Some areas have a more open shrub layer, or virtually none. Herbs are generally sparse. Parts of this forest type are comparable in maturity to the Chestnut Oak Forest, but some are younger in age, though relatively mature.

Patches of Rich Cove Forest occur in several areas within the site, mostly along the main creeks. Tulip poplar is the most abundant species. Other canopy species include cucumber magnolia (*Magnolia acuminata*), Canada hemlock, basswood, white ash (*Fraxinius americana*), pignut hickory (*Carya glabra*), and beech. The understory consists primarily of ironwood (*Carpinus caroliniana*) and canopy species. The shrub layer is generally sparse, with spicebush (*Lindera benzoin*) the most characteristic species. The herb layer is moderate in density and fairly diverse, with black cohosh (*Actaea racemosa*), wild licorice (*Galium latifolium*), Canada horsebalm (*Collinsonia canadensis*), Christmas fern (*Polystichum acrostichoide*s), maidenhair fern (*Adiantum pedatum*), beak grass (*Brachyeletrum erectum*), broad beech fern (*Phegopteris hexagonoptera*), acute-lobe liverleaf (*Hepatica acutiloba*), speckled wood-lily (*Clintonia umbellula*), and hog peanut (*Amphicarpaea bracteata*) common. Also present within this community are are several small areas that contain the uncommon Fraser's sedge (*Cymophyllus fraserianus*) and lesser rattlesnake plantain (*Goodyera repens*). They both occur along the steep slopes along small tributaries near Buffalo Creek. Some of the Rich Cove Forest patches examined were mature, but not as old as the best portions of the other forest communities.

Pine–Oak/Heath occurs in a few places of limited extent on sharp high ridges and the upper edges of cliffs. The canopy is a mix of pines including shortleaf pine, pitch pine, and Table Mountain pine, along with some scarlet oak. The understory is not well-developed, but some sourwood is present. Canopy trees average 10-12" diameter at breast height, with some reaching 14". The shrub layer is moderate in density. Mountain laurel dominates, but huckleberry (*Gaylussacia baccata*), sweet pepperbush (*Clethra acuminata*), Allegheny chinquapin, sassafras (*Sassafras albidum*), and sand myrtle are present. Herbs are scarce. Turkey-beard (*Xerophyllum asphodeloides*) is common, and there is some broom sedge (*Schizachyrium scoparium*) and bracken fern (*Pteridium aquilinum*) present.

Montane Acidic Cliffs occur in scattered places throughout the site, on middle to lower slopes of the gorge walls. The well-developed cliffs are 20 to 50 feet tall, with sections that are nearly vertical or have overhanging bare rock, and ledges that support larger plants. These plants include hairy alumroot (*Heuchera villosa*), marginal wood-fern (*Dryopteris marginalis*), brittle fern (*Cystopteris protrusa*), Carey's saxifrage (*Saxifraga careyana*), mountain spleenwort (*Asplenium montanum*), and numerous bryophytes and lichens. Deeper soil patches support great laurel, mountain laurel, Dutchman's-pipe (*Aristolochia macrophylla*), and a variety of herbs from the surrounding forests. All the cliffs appear to be in excellent condition, with no sign of disturbance. Several well-developed cliffs were seen.

One area, best described as a Low Elevation Acidic Glade (Montane Acidic Cliff), is an area of more extensive sloping bedrock outcrop. It has more extensive soil and fits the structure of a glade. Patchy, open tree cover is present, primarily Table Mountain pine and wild cherry (*Prunus serotina*). Patches of lowbush blueberry and winged sumac (*Rhus copallina*) are present. There is extensive cover of broom sedge on shallow soil. Other herbs include tickseed (*Coreopsis major*), grass-leaved golden-aster (*Pityopsis graminifolia*), southern harebell (*Campanula divaricata*), and lespedeza (*Lespedeza* sp.).

Along sections of Buffalo Creek and adjoining tributaries are some examples of Rocky Bar and Shore. Two areas with well-developed, small expanses of this community type were observed. Most parts are rocky bars with some areas of scoured bedrock. The vegetation has a typical patchy open stratum of shrubs and young trees, including yellow-root (*Xanthorhiza simplicissima*), tag alder (*Alnus serrulata)*, dog-hobble, mountain laurel, and Canada hemlock. Herbs are sparse and patchy. Species present include Appalachian bluet (*Houstonia serpyllifolia*), branch lettuce (*Saxifraga micranthidifolia*), golden ragwort (*Packera aurea*), bluegrass (*Poa* sp.), knotweed (*Persicaria* sp.), southern lady fern (*Athyrium asplenioides*), wood aster (*Eurybia divaricata*), goldenrod (*Solidago* sp.), tassel-rue (*Trautvetteria caroliniensis*), and mountain meadowrue (*Thalictrum clavatum*). All of the area seen appeared to be unaltered and in excellent condition.

**MANAGEMENT AND PROTECTION:** This site is afforded protection as part of the Buffalo Cove Game Land. The N. C. Wildlife Resources Commission manages this site for wildlife values.

**NATURAL COMMUNITIES:** Chestnut Oak Forest, Pine--Oak/Heath, Rich Cove Forest, Montane Acidic Cliff, Low Elevation Acidic Glade, and Rocky Bar and Shore.

**RARE PLANTS:** Watch List - Fraser's sedge (*Cymophyllus fraserianus*), lesser rattlesnake plantain (*Goodyera repens*), ginseng (*Panax quinquefolius*), Carey's saxifrage (*Saxifraga careyana*), turkey-beard (*Xerophyllum asphodeloides*), and roundleaf ragwort (*Packera obovata*).

**RARE ANIMALS:** None observed.

**REFERENCES:**

Schafale, M. 2007. Site Survey Report: Buffalo Creek Gorge. Natural Heritage Program, Office of Natural Resource Planning and Conservation, DENR, Raleigh, N.C.

GINGER CASCADES

**Caldwell County Natural Area Inventory**

**GINGER CASCADES**
**Significant Natural Heritage Area**

**Site Significance:** County
**Quadrangle:** Kings Creek
**Size:** 339 acres (255 primary and 84 secondary)
**Ownership:** Girl Scouts of America

**SIGNIFICANT FEATURES:** This site contains one of the better examples of the uncommon Southern Appalachian Bog natural community in the county, with good examples of Acidic Cove Forest and Chestnut Oak Forest. There is also an occurrence of broadleaf tickseed (*Coreopsis latifolia*).

**LANDSCAPE RELATIONSHIPS:** This site is located in eastern Caldwell County in the Brushy Mountains. Buffalo Cove Forests lies 8.0 miles to the northwest and Rock Creek Rare Plant Site lies 7.5 miles to the south.

**SITE DESCRIPTION:** The natural area contains small examples of the uncommon Southern Appalachian Bog natural community along a tributary of Ginger Creek, as well as moderately steep slopes with narrow ridgelines.

Along a tributary of Ginger Creek are small pool-like depression areas that approximate the description for a Southern Appalachian Bog. The canopy is mostly closed, with some light gaps over the boggy areas and along the creek and road. Dominant canopy species are sweet birch (*Betula lenta*), cucumber magnolia (*Magnolia acuminata*), yellow buckeye (*Aesculus flava*), and green ash (*Fraxinus pensylvanica*). The understory contains witch-hazel (*Hamamelis virginiana*), persimmon (*Diospyros virginiana*), and American holly (*Ilex opaca*). Locally abundant shrubs include spicebush (*Lindera benzoin*), smooth hydrangea (*Hydrangea arborescens*), and sweet pepperbush (*Clethra acuminata*). Woody vines are common, with Virginia creeper (*Parthenocissus quinquefolia*), trumpet vine (*Campsis radicans*), and coral honeysuckle (*Lonicera sempervirens*) present. Common herbs like bulrush (*Juncus effusus* and *J. tenuis*), woodland bulrush (*Scirpus expansus*), deer tongue grass (*Panicum clandestinum*), sedges (*Carex lurida, C. rosa, C. atlantica,* and *C. intumescens*), and spotted jewelweed (*Impatiens capensis*) occur throughout the wet areas. New York fern (*Thelypteris noveboracensis*), halberd-leaf violet (*Viola hastata*), giant chickweed (*Stellaria pubera*), and false Solomon's-seal (*Maianthemum racemosum*) are found on higher ground around the seeps and boggy areas.

Along the streams, and in the majority of the coves in the site, are good examples of Acidic Cove Forest. It has a closed canopy dominated by Canada hemlock (*Tsuga canadensis*), tulip poplar (*Liriodendron tulipifera*), northern red oak (*Quercus rubra*), and Fraser's magnolia (*Magnolia fraseri*). The understory has black gum (*Nyssa sylvatica*), flowering dogwood (*Cornus florida*),

downy serviceberry (*Amelanchier arborea*), and sourwood (*Oxydendrum arboreum*). Shrubs vary from place to place within the site. Dense patches of great laurel (*Rhododendron maximum*), gorge rhododendron (*Rhododendron minus*), and mountain laurel (*Kalmia latifolia*) are often present along streams and north-facing slopes. In more dry open areas, strawberry-bush (*Euonymus americanus*), sweet-shrub (*Calycanthus floridus*), blueberry (*Vaccinium* spp.), and maple-leaf viburnum (*Viburnum acerifolium*) are common. Woody vines are frequent and include grape (*Vitis* sp.), Virginia creeper, and cross-vine (*Bignonia capreolata*). The herb layer includes Michaux's saxifrage (*Saxifraga michauxii*), Canada horsebalm (*Collinsonia canadensis*), foamflower (*Tiarella cordifolia*), downy rattlesnake plantain (*Goodyera pubescens*), little brown jugs (*Hexastylis arifolia*), galax (*Galax urceolata*), Indian cucumber-root (*Medeola virginiana*), and showy orchid (*Galearis spectabilis*). A small area containing the uncommon broadleaf tickseed (*Coreopsis latifolia*) occurs along Ginger Creek in an area of fairly rich, herbaceous plant growth. The occurrence is downslope from an old logging road, towards the creek near an area used for water activities by the Girl Scout camp.

Along the middle and upper slopes and across the ridgelines are fair to good examples of Chestnut Oak Forest. The dominant canopy species are chestnut oak (*Quercus montana*), scarlet oak (*Quercus coccinea*), white oak (*Quercus alba*), pignut hickory (*Carya glabra*), and shortleaf pine (*Pinus echinata*). The understory consists of red maple (Ac*er rubrum),* black gum, and sourwood. Shrubs include locally abundant patches of mountain laurel, maple-leaf viburnum, black haw (*Viburnum prunifolium*), and blueberries (*Vaccinium* spp.). Woody vines include muscadine grape (*Vitis rotundifolia*), poison ivy (*Toxicodendron radicans*), and Japanese honeysuckle (*Lonicera japonica*). Herbs are sparse overall. Herbs present are spotted wintergreen (*Chimaphila maculata*), poverty oat grass (*Danthonia spicata*), Christmas fern (*Polystichum acrostichoides*), and hawkweed (*Hieracium venosum*).

**MANAGEMENT AND PROTECTION:** This site is operated as a Girl Scout Camp, and run by the Catawba Council of Girl Scouts of America. It has no natural areas management plan and lacks any formal protection. A management plan should be written and implemented to insure the long-term integrity of the natural communities. The boggy areas may need a separate site-specific management plan.

**NATURAL COMMUNITIES:** Southern Appalachian Bog, Acidic Cove Forest, and Chestnut Oak Forest.

**RARE PLANTS:** Broadleaf tickseed (*Coreopsis latifolia*).

**RARE ANIMALS:** None observed.

**REFERENCES:**

Padgett, J. E. 2007. Site Survey Report: Ginger Cascades. Natural Heritage Program, Office of Natural Resource Planning and Conservation, DENR, Raleigh, N.C.

GREEN MOUNTAIN/ZACKS FORK

**Caldwell County Natural Area Inventory**

**GREEN MOUNTAIN/ZACKS FORK**
**Significant Natural Heritage Area**

**Site Significance:** Regional

**Size:** 1,357 acres (1,023 primary and 334 secondary)

**Quadrangles:** Grandin, Kings Creek, and Lenoir

**Ownership:** Private

**SIGNIFICANT FEATURES:** This natural area has good examples of both common and uncommon natural communities. Also present is a small suite of Significantly Rare and Watch List plant species including ginseng (*Panax quinquefolius*), broadleaf tickseed (*Coreopsis latifolia*), whiteleaf sunflower (*Helianthus glaucophyllus*), roundleaf ragwort (*Packera obovata*), and turkey-beard (*Xerophyllum asphodeloides*).

**LANDSCAPE RELATIONSHIPS:** This site is located on a long southwest-northeast oriented ridge situated between the Brushy Mountains and the Blue Ridge Escarpment. It is located 3.3 miles northeast of the town of Lenoir and 5.4 miles north of Hibriten Mountain. Buffalo Cove Forests are located approximately 3.0 miles north. The Mulberry Creek portion of the Johns River/Mulberry Creek Aquatic Habitat lies 5.6 miles to the west.

**SITE DESCRIPTION:** This natural area is located along five miles of undeveloped ridgeline between the Yadkin River and Zacks Fork Creek. A mosaic of natural communities are located throughout the site. Soils are mainly acidic, but some small areas of circumnetural soils are present and provide for a more rich and unique flora than found in the majority of the region.

Chestnut Oak Forest is the most abundant natural community within this natural area. It is located along the upper slopes and the ridgeline. Dominant canopy species are chestnut oak (*Quercus montana*), northern red oak (*Q. rubra*), scarlet oak (*Q. coccinea*), and pignut hickory (*Carya glabra*). To a lesser degree, the canopy contains mockernut hickory (*C. alba*), tulip poplar (*Liriodendron tulipifera*), and white pine (*Pinus strobus*). The understory is sparse, with sourwood (*Oxydendrum arboreum*), and red maple (*Acer rubrum*) common. American holly (*Ilex opaca*) and mountain holly (*I. montana*) are scattered in the understory. Shrub are sparse, with patches of mountain laurel (*Kalmia latifolia*) common. North-facing slopes are dense, with large patches of great laurel (*Rhododendron maximum*), gorge rhododendron (*R. minus*), and lowbush blueberry (*V. pallidum*). Woody vines are common and include cross-vine (*Bignonia capreolata*), poison ivy (*Toxicodendron radicans*), scattered patches of greenbrier (*Smilax* sp.), and sensitive brier (*Mimosa microphylla*). The herb layer is sparse overall, with some areas of abundant coverage. Common herbs include Christmas fern (*Polystichum acrostichoides*), spotted wintergreen (*Chimaphila maculata*), partridgeberry (*Mitchella repens*), Joe-pye-weed (*Eupatorium*

sp.), wood- aster (*Eurybia divaricata*), common dittany (*Cunila origanoides*), panic grass (*Dichanthelium* sp.), trailing arbutus (*Epigaea repens*), galax (*Galax urceolata*), and whiteleaf sunflower (*Helianthus glaucophyllus*).

Acidic Cove Forest is abundant in sheltered coves and low lying slopes throughout the site. The canopy contains a combination of acid-tolerant mesophytic trees such as tulip poplar, cucumber tree (*Magnolia acuminata*), and Fraser's magnolia (*Magnolia fraseri*). In the understory, red maple, Carolina silverbell (*Halesia tetraptera*), and black gum (*Nyssa sylvatica*) are common. The shrub layer is well-developed, with thick patches mountain laurel and rhododendron along moist north-facing slopes and stream corridors. Sweet-shrub (*Calycanthus floridus*), strawberry-bush (*Euonymus americanus*), and spicebush (*Lindera benzoin*) occur in more open understory. Herbs vary in abundance due to the presence or absence of a thick heath layer, but are still quite diverse. A few of the common herbs present include black cohosh (*Actaea racemosa*), Christmas fern (*Polystichum acrostichoides*). New York fern (*Thelypteris noveboracensis*), Solomon's-seal (*Polygonatum biflorum*), and downy rattlesnake plantain (*Goodyera pubescens*).

A large example of Montane Acidic Cliff occurs along the very steep north-facing slope of Green Mountain. The rock outcrops either lack a canopy or are shaded partly by the surrounding canopy. Canopy species present include chestnut oak, northern red oak, red maple, and pines. The Understory contains flowering dogwood (*Cornus florida*), sourwood, and black gum. Shrubs include areas of mountain laurel and great laurel. Near the base of the largest rock outcrop is an area dominated by redbud (*Cercis canadensis*). Woody vines present include poison ivy and Virginia creeper. The herb layer is sparse on the rock surfaces, occurring in soil mats of accumulated soil along ledges. Goldenrods (*Solidago* spp.), spotted wintergreen, Solomon's-seal, ginseng (*Panax quinquefolius*), green violet (*Hybanthus concolor*), blue cohosh (*Caulophyllum thalictroides*), violets (*Viola* spp.), and Maidenhair fern (*Adiantum pedatum*) are locally abundant.

Small areas of Pine--Oak/Heath are found along prominent, south-facing ridges and upper slopes, on dry and often rocky soils. This community type is often embedded within Chestnut Oak Forest. The closed to semi-open canopy is dominated by pines (*Pinus pungens*, *P. echinata*, and *P. virginica*), chestnut oak and scarlet oak. The understory is sparse, with red maple, sourwood, and scattered American holly present. The shrub layer is well-defined and often very thick. great laurel, mountain laurel, and deer berry make up the majority of the shrubs. Woody vines such as poison ivy, greenbrier, and cross-vine (*Bignonia capreolata*) are common. The herb layer is sparse and contains galax, yellow star-grass (*Hypoxis hirsuta*), turkey-beard (*Xerophyllum asphodeloides*), and sunflowers (*Helianthus* spp.).

An example of Rich Cove Forest is located along the base of Green Mountain The canopy is closed, with light gaps near the rock outcrop. Dominant canopy species include tulip poplar, basswood (*Tilia americana* var. *heterophylla*), ash (*Fraxinus* sp.), and white oak (*Quercus alba*). The understory includes redbud and downy serviceberry. Along the margins sourwood can be found in the understory. Common shrubs include spicebush, sweet-shrub, and strawberry-bush. The dominant vine species is poison ivy. Herbs are diverse and lush, with mountain meadowrue

(*Thalictrum clavatum*), ginseng, sweet Cicely (*Osmorhiza claytonia*), roundleaf violet (*Viola rotundifolia*), Christmas fern, and maidenhair fern present.

**MANAGEMENT AND PROTECTION:** Little or no management is needed for this natural area, other than allowing the forest to mature and controlling some invasive exotic species. There is formal protection through the Conservation Trust for North Carolina on the south-facing slopes west of White Mountain to Moses Knob. However, the majority of the site has no formal protection. This site would make an excellent conservation project for the local land trust, given the extensive ridgeline and potential viewshed protection.

**NATURAL COMMUNITIES:** Acidic Cove Forest, Chestnut Oak Forest, Montane Acidic Cliff, Pine--Oak/Heath, Rich Cove Forest, Low Elevation Rocky Summit, and small embedded pockets of Montane Oak--Hickory Forest.

**RARE PLANTS:** Watch List – whiteleaf sunflower (*Helianthus glaucophyllus*), ginseng (*Panax quinquefolius*), wild licorice (*Galium lanceolatum*), broadleaf tickseed (*Coreopsis latifolia*), turkey-beard (*Xerophyllum asphodeloides*), and roundleaf ragwort (*Packera obovata*).

**RARE ANIMALS:** None observed.

**REFERENCES:**

Padgett, J. E. 2007. Site Survey Report: Green Mountain/Zacks Fork. Natural Heritage Program, Office of Natural Resource Planning and Conservation, DENR, Raleigh, N.C.

HIBRITEN MOUNTAIN

**Caldwell County Natural Area Inventory**

**HIBRITEN MOUNTAIN**
**Significant Natural Heritage Area**

**Site Significance:** Regional
**Quadrangle:** Kings Creek
**Size:** 157 acres
**Ownership:** Private

**SIGNIFICANT FEATURES:** Hibriten Mountain contains good examples of several natural communities near the summit of the mountain. These include Low Elevation Granitic Dome, Low Elevation Rocky Summit, and Chestnut Oak Forest. The site also contains Regionally Significant populations of Greenland sandwort (*Minuartia groenlandica*) and giant swallowtail (*Papilio cresphontes*), one of only three known occurrences in the mountains of North Carolina.

**LANDSCAPE RELATIONSHIPS:** This site is located in central Caldwell County near the town of Lenoir. This site lies in the southwestern portion of the Brushy Mountains. Green Mountain/Zacks Fork lies 4.5 miles to the north and Ginger Cascades is located 5.3 miles to the northeast.

**SITE DESCRIPTION:** This natural area consists of a prominent mountain peak forested nearly to the summit, with large, exposed rock outcrops occurring along the north and west sides on the steep upper slopes and summit. Patches of rocky, forested areas form a matrix with the exposed rock. An access road follows the ridgeline at the summit, where communication towers are present.

At the summit, and extending down the upper slopes, is a good example of Low Elevation Granitic Dome. It consists of exposed patches of exfoliated and semi-exfoliated rock primarily along the north-facing upper slopes, with various sized soil mats scattered throughout. The soil mats vary with mosses, grasses, and herbs to moderate-sized trees present. Common canopy species on the soil mats and along the margins of the outcrop include chestnut oak (*Quercus montana*), shortleaf pine (*Pinus echinata*), and red maple (*Acer rubrum*). Understory species include downy serviceberry (*Amelanchier arborea*), black gum (*Nyssa sylvatica*), and sourwood (*Oxydendrum arboreum*). Shrubs are common on the medium and large soil mats, with fringe tree (*Chionanthus virginiana*), wafer-ash (*Ptelea trifoliata*), and mountain laurel (*Kalmia latifolia*) abundant. Dominant herbs such as Virginia saxifrage (*Saxifraga virginiana*), live forever (*Hylotelephium telephioides*), broom sedge (*Andropogon virginicus*), tickseed (*Coreopsis major*), and sunflower (*Helianthus* sp.) can be found on soil mats and along the margin of the outcrop area. The rare Greenland sandwort (*Minuartia groenlandica*) is also found growing on the small soil mats along the middle and upper portions of the exposed rock. Habitat for this plant species in North Carolina is restricted to a few rock outcrops within the mountains. In addition to the Greenland sandwort, the giant swallowtail (*Papilio cresphontes*) occurs on Hibriten Mountain. There are only a handful

of known occurrences of giant swallowtail in the mountains; the majority of populations occur along the coast. Habitat for this species seems to be linked to its host plant, the wafer-ash, which is fairly restricted to rock outcrops on high pH soils.

Also present, but covering a smaller overall area, is an example of Low Elevation Rocky Summit located on the uppermost slopes and summit of the mountain. It contains both exposed and shaded rock outcroppings often embedded in wooded patches. Wooded areas are dominated by chestnut oak, scarlet oak (*Quercus coccinea*), mockernut hickory (*Carya alba*), and red cedar (*Juniperus virginiana*). The understory and shrub layer have sourwood (*Oxydendrum arboreum*), ninebark (*Physocarpus opulifolius*), and flowering dogwood (*Cornus florida*). Woody vines are infrequent with poison ivy (*Toxicodendron radicans*), greenbrier (*Smilax glauca*), and leather-flower (*Clematis virona*) common. The herbaceous layer contains many of the same herb species found on the Low Elevation Granitic Dome. Marginal wood-fern (*Dryopteris marginalis*), yellow star-grass (*Hypoxis hirsuta*), beardtongue (*Penstemon canescens*), and ebony spleenwort (*Asplenium platyneuron*) are also common.

Below the rock outcrop communities along the middle slopes are areas of Chestnut Oak Forest. The canopy is dominated by chestnut oak, white oak (*Quercus alba*), and pignut hickory. Other canopy tree species include tulip poplar (*Liriodendron tulipifera*) and shortleaf pine. The understory is somewhat sparse, with scattered sourwood and flowering dogwood. Shrubs are common and include deerberry (*Vaccinium stamineum*), lowbush blueberry (*V. pallidum*), and maple-leaf viburnum (*Viburnum acerifolium*). Woody vines present are almost entirely poison ivy, Virginia creeper, and grape (*Vitis* sp.). The herb layer is sparse, with variable-leaf heartleaf (*Hexastylis heterophylla*), trailing arbutus (*Epigaea repens*), Christmas fern (*Polystichum acrostichoides*), and galax (*Galax urceolata*) common.

Small patches of natural communities too small to map also occur within this natural area. They include small examples of Pine--Oak/Heath and Montane Oak--Hickory Forest embedded within the Chestnut Oak Forest or located along the margins of the rock outcrops.

**MANAGEMENT AND PROTECTION:** Management for this site might include limiting new tower construction along the summit, control of invasive species, and reducing trampling on the rock outcrops. A majority of the trampling most likely comes from hang gliding that takes place off the north-northwest side of the mountain. This site has no formal protection and would be an excellent project for a conservation group to protect with an easement or registry agreement..

**NATURAL COMMUNITIES:** Low Elevation Granitic Dome, Low Elevation Rocky Summit, and Chestnut Oak Forest.

**RARE PLANTS:** Greenland sandwort (*Minuartia groenlandica*); Watch List – wafer-ash (*Ptelea trifoliata*).

**RARE ANIMALS:** Giant swallowtail (*Papilio cresphontes*).

**REFERENCES:**

Padgett, J. E. 2007. Site Survey Report: Hibriten Mountain. Natural Heritage Program, Office of Natural Resource Planning and Conservation, DENR, Raleigh, N.C.

JERRY MOUNTAIN

**Caldwell County Natural Area Inventory**

# JERRY MOUNTAIN
## Significant Natural Heritage Area

**Site Significance:** County
**Quadrangle:** Grandin
**Size:** 343 acres
**Ownership:** Private

**SIGNIFICANT FEATURES:** This natural areas has some of the best examples of common natural communities in the county such as Chestnut Oak Forest, Dry-Mesic Oak--Hickory Forest, and Mesic Mixed Hardwood Forest.

**LANDSCAPE RELATIONSHIPS:** This site is not located near other Significant Natural Heritage Areas. It is located approximately 5 miles northeast of the Buffalo Cove Game Land, and approximately 4 miles southeast of the Blue Ridge Escarpment and 4 miles northwest of the Brushy Mountains.

**SITE DESCRIPTION:** This natural area consists of an intermediate foothill region located between the Blue Ridge Escarpment and the southwestern extent of the Brushy Mountains, consisting of a series of low ridges, moderate slopes, and small coves. Jerry Mountain, one of the higher points in the immediate landscape, lies on the southern boundary of the site, at 2,150 feet in elevation. Examples of Mesic Mixed Hardwood Forest, Dry-Mesic Oak--Hickory Forest, and Chestnut Oak Forest, with patches of mature woods embedded within younger forests, is present in various stages of maturity. Across these three common community types, the predominant tree species are chestnut oak (*Quercus montana*), red maple (*Acer rubrum*), yellow poplar (*Liriodendron tulipifera*), and white pine (*Pinus strobus*). Other notable tree species include sourwood (*Oxydendrum arboreum*), black gum (*Nyssa sylvatica*), and southern red oak (*Q. falcata*).

Dry-Mesic Oak--Hickory Forest, dominated by a variety of upland oaks, is found along lower to upper slopes and ridgelines. Some successional forests exist close to the main road where timber was harvested more recently. Some exemplary Chestnut Oak Forests, dominated by chestnut oak, occur on exposed knobs, ridges, and drier upper slopes. Some small but good examples are present, with some patches of younger forests. Also present are a few small examples of Mesic Mixed Hardwood Forest, dominated by American beech (*Fagus grandifolia*), Canada hemlock (*Tsuga canadensis*), northern red oak (*Q. rubra*), and other moist-site species.

The general pattern of forest quality is a mosaic, with some mature forests embedded within younger, lower quality forests along the primary road through the site. Exemplary Chestnut Oak Forest and Dry-Mesic Oak--Hickory Forests are found on the spur ridge and slopes that extend northwest from the summit of Jerry Mountain. Natural area boundaries have been drawn to

include the more mature forests and to exclude areas in successional condition.

**MANAGEMENT AND PROTECTION:** Management to encourage older growth would help provide habitat necessary for forest interior species. Old, badly-eroded forest roads should be improved to reduce sediment runoff into Kings Creek and the nearby Yadkin River. Also, management and control of invasive species is desirable. This site has no formal protection and would probably be best suited for use as a game land. It contains openings and forests in various stages of maturity which are desirable for game species management.

**NATURAL COMMUNITIES:** Chestnut Oak Forest, Dry-Mesic Oak--Hickory Forest, and Mesic Mixed Hardwood Forest.

**RARE PLANTS:** None observed.

**RARE ANIMALS:** None observed.

**REFERENCES:**

Oakley, S. 2000. Site Survey Report: Jerry Mountain. OCCA, DENR. Raleigh, N.C.

MULBERRY CREEK RARE PLANT SITE

**Caldwell County Natural Area Inventory**

**MULBERRY CREEK RARE PLANT SITE**
**Significant Natural Heritage Area**

**Site Significance:** State
**Quadrangle:** Lenoir
**Size:** 167 acres
**Ownership:** U.S. Forest Service and Private

**SIGNIFICANT FEATURES:** This site contains one of the best populations of the State Endangered and Federal Species of Concern mountain heartleaf (*Hexastylis contracta*) in North Carolina.

**LANDSCAPE RELATIONSHIPS:** This site is located in northern Caldwell County along the eastern part of the Pisgah National Forest. Buffalo Cove Forests lies 2.8 miles to the northeast and the Johns River/Mulberry Creek Aquatic Habitat lies 1.4 miles to the southwest (Mulberry Creek) and 3.8 miles to the west (Johns River).

**SITE DESCRIPTION:** This site is located along the edge of the Blue Ridge Escarpment. The topography consists of low mountains with long narrow ridgelines generally running southward off the escarpment to the western Piedmont.

On lower slopes and in sheltered coves, Acidic Cove Forest is found. It contains a fairly large population of mountain heartleaf in middle-aged to mature forest. This type of habitat is rather extensive in the region, so it may be locally abundant and occur in other yet unknown locations. The canopy consists of mixed mesophytic tree species that include tulip poplar (*Liriodendron tulipifera*), Carolina silverbell (*Halesia tetraptera*), sweet birch (*Betula lenta*), and an occasional basswood (*Tilia americana* var. *heterophylla*). The understory is fairly well-defined with ironwood (*Carpinus caroliniana*), sourwood (*Oxydendron arboreum*), and black gum (*Nyssa sylvatica*) common. Shrubs are often very dense along the streams, with patches of mountain laurel (*Kalmia latifolia*) upslope in slightly drier habitat. Great laurel (*Rhododendron maximum*), flame azalea *(R. calendulaceum*), and blueberries (*Vaccinium* spp.) are common. Virginia creeper (*Parthenocissus quinquefolia*), poison ivy (*Toxicodendron radicans*), and cross-vine (*Bignonia capreolata*) comprise the majority of woody vines. The herbaceous layer is fairly diverse and lush, with downy rattlesnake plantain (*Goodyera pubescens*), turtlehead (*Chelone* sp.), Robin's-plantain (*Erigeron pulchellus*), foamflower (*Tiarella cordifolia*), and Christmas fern (*Polystichum acrostichoides*) present.

Dominating the majority of the site, Chestnut Oak Forest occurs along drier middle and upper slopes and ridgelines. It has a closed canopy with chestnut oak (*Quercus montana*), scarlet oak (*Q. coccinea*), shortleaf pine (*Pinus echinata*), and mockernut hickory (*Carya alba*). The understory is sparse, with red maple (*Acer rubrum*), sourwood (*Oxydendrum arboreum*), and mountain holly (*Ilex montana*). Mountain laurel occurs in patches in the shrub layer along with highbush

blueberry (*Vaccinium corymbosum*), horse-sugar (*Symplocos tinctoria*), and strawberry-bush (*Euonymus americanus*). Woody vines such as Virginia creeper and greenbrier (*Smilax rotundifolia*) are locally abundant. Common herbs include tickseed (*Coreopsis major*), rattlesnake weed (*Hieracium venosum*), spotted wintergreen (*Chimaphila maculata*), Christmas fern (*Polystichum acrostichoides*), and goldenrods (*Solidago* spp.). Diana fritillary (*Speyeria diana*) can be seen feeding and flying along the access road and nearby wooded areas.

**MANAGEMENT AND PROTECTION:** Little or no active management is needed for this site. There are some exotic invasive plant species along the access road that should be controlled. A large portion of this site is afforded some protection as part of the Pisgah National Forest. With the remainder of the site being privately-owned, local conservation groups might pursue conservation or registry agreements to protect the site.

**NATURAL COMMUNITIES:** Acidic Cove Forest and Chestnut Oak Forest.

**RARE PLANTS:** Mountain heartleaf (*Hexastylis contracta*).

**RARE ANIMALS:** Watch List – Diana fritillary (*Speyeria diana*).

**REFERENCES**:

Padgett, J. E. 2007. Site Survey Report: Mulberry Creek Rare Plant Site. Natural Heritage Program, Office of Natural Resource Planning and Conservation, DENR, Raleigh, N.C.

PATTERSON BOG

**Caldwell County Natural Area Inventory**

**PATTERSON BOG**
**Significant Natural Heritage Area**

**Site Significance:** Regional
**Quadrangle:** Buffalo Cove
**Size:** 7 acres
**Ownership:** Private

**SIGNIFICANT FEATURES:** This site contains one of the best Southern Appalachian Bogs and seeps in the region. It is located along the base of the Blue Ridge Escarpment. It also contains an occurrence of the Significantly Rare American willow-herb (*Epilobium ciliatum*).

**LANDSCAPE RELATIONSHIPS:** This site is isolated from any similar bogs. The western portion of Buffalo Cove Forests lies approximately 0.3 miles to the east, and the Johns River/Mulberry Creek Aquatic Habitat lies to the southwest and west, 4.8 miles away.

**SITE DESCRIPTION:** This site consists of flat terrain and shallow depressions that are spring and stream-fed. This natural area has no canopy or understory, but a few tree species are present along the stream channel and in scattered raised areas. The canopy and understory trees present include sweet birch (*Betula lenta*), red maple (*Acer rubrum*), black willow (*Salix nigra*), sycamore (*Platanus occidentalis*), and tulip poplar (*Liriodendron tulipifer*a). Shrubs are confined to the drier raised flat portions of the site. Dominant shrubs are tag alder (*Alnus serrulata*), sweet-shrub (*Lindera benzoin*), and rose (*Rosa* sp.). Vines are common in portions of the site, with groundnut (*Apios americana*), climbing fern (*Lygodium palmatum*), Japanese honeysuckle (*Lonicera japonica*), Virgin's-bower (*Clematis virginiana*), greenbriers (*Smilax* spp.), and muscadine grape (*Vitis rotundifolia*) present. Herbs vary according to moisture and light. Under the tag alder thicket, herbs are sparse. The open wet portions have large areas of sedges (*C. atlantica*, *C. rosea*, *Carex* sp.), and bulrushes (*Juncus effusus*, *Juncus* sp., *Scirpus expansus*). Other herbs include cattail (*Typha latifolia*), bur-reed (*Sparganium americanum*), rose-pink (*Sabatia angularis*), clearweed (*Pilea pumila*), golden ragwort (*Packera aurea*), spotted jewelweed (*Impatiens capensis*), poverty oat grass (*Danthonia* sp.), goldenrods (*Solidago* spp.), and asters. A small occurrence of American willow-herb (*Epilobium ciliatum*) occurs in the bog in association with sedges, bur-reed, and climbing fern.

**MANAGEMENT AND PROTECTION:** This site needs little active management other than control of invasive exotic species. This site currently has no formal protection and would make an excellent mitigation project for agencies such as the N. C. Department of Transportation. This site would also be an excellent conservation opportunity for a local land trust.

**NATURAL COMMUNITIES:** Southern Appalachians Bog (Northern Subtype).

**RARE PLANTS:** American willow-herb (*Epilobium ciliatum*).

**RARA ANIMALS:** None observed.

**REFERENCES:**

Padgett, J. E. 2007. Site Survey Report: Patterson Bog. Natural Heritage Program, Office of Natural Resource Planning and Conservation, DENR, Raleigh, N.C.

ROUND TOP MOUNTAIN

**Caldwell County Natural Area Inventory**

# ROUND TOP MOUNTAIN
## Significant Natural Heritage Area

**Site Significance:** Regional
**Quadrangle:** Grandin
**Size:** 49 acres
**Ownership:** Private

**SIGNIFICANT FEATURES:** Round Top Mountain is a mountain summit with a small, but good quality Chestnut Oak Forest. This site also has the only known occurrence of the Significantly Rare Virginia stickseed (*Hackelia virginiana*) in Caldwell County, and one of only a few known extant populations in North Carolina.

**LANDSCAPE RELATIONSHIPS:** This site is located in northeast Caldwell County, 2.5 miles southeast of Buffalo Cove Forests. Green Mountain/Zacks Fork is located 1.1 miles to the southwest, and Jerry Mountain lies 2.1 miles to the east.

**SITE DESCRIPTION:** The site consists of a remnant Chestnut Oak Forest located on the upper slopes and summit of Round Top Mountain. Within this community is a very small occurrence of Virginia stickseed (*Hackelia virginiana*) situated along the uppermost east-running ridgeline. The forest has a closed canopy of uneven aged trees, with a moderately open understory. The canopy is dominated by chestnut oak (*Quercus montana*), white oak (*Q. alba*), northern red oak (*Q. rubra*), tulip poplar (*Liriodendron tulipifera*), mockernut hickory (*Carya alba*), and pignut hickory (*C. glabra*). Some older trees have den cavities for such animals as raccoon (*Procyon lotor*), eastern chipmunk (*Tamias tamias*), and gray squirrel (*Sciurus carolinensis*). Along the south-facing side of the summit is white pine (*Pinus strobus*) and shortleaf pine (*P. echinata*). The understory consists of red maple (*Acer rubrum*), flowering dogwood (*Cornus florida*), black gum (*Nyssa sylvatica*), sourwood (*Oxydendrum arboreum*), and black cherry (*Prunus serotina*). The shrub layer is sparse with mountain laurel (*Kalmia latifolia*), lowbush blueberry (*Vaccinium pallidum*), horse-sugar (*Symplocos tinctoria*), and sweet-shrub (*Calycanthus floridus*) present. Woody vines include greenbrier (*Smilax glauca* and *S. rotundifolia*), cross-vine (*Bignonia capreolata*), muscadine (*Vitis rotundifolia*), and poison ivy (*Toxicodendron radicans*). Common herbs present are bedstraw (*Galium* sp.), Pennsylvania sedge (*Carex pensylvanica*), poverty oat grass (*Danthonia spicata*), false Solomon's-seal (*Maianthemum racemosum*), spotted wintergreen (*Chimaphila maculata*), partridgeberry (*Mitchella repens*), galax (*Galax urceolata*), downy rattlesnake plantain (*Goodyera pubescens*), and ebony spleenwort (*Asplenium platyneuron*).

**MANAGEMENT AND PROTECTION:** This site has no protection, but would be well-suited for a conservation agreement or nature preserve. The remnant Chestnut Oak Forest and the surrounding forest of younger age should be allowed to mature, and then managed for old-growth conditions. The removal of invasive plant species, such as tree-of-Heaven (*Ailanthus altissima*) and Nepalese browntop (*Microstegium vimineum*), is desirable.

**NATURAL COMMUNITIES:** Chestnut Oak Forest.

**RARE PLANTS:** Virginia stickseed (*Hackelia virginiana*).

**RARE ANIMALS:** None observed.

**REFERENCES:**

Padgett, J.E. 2007. Site Survey Report: Round Top Mountain. Natural Heritage Program, Office of Natural Resource Planning and Conservation, DENR, Raleigh, N.C.

UPPER YADKIN/STONE MOUNTAIN OUTCROPS

**Caldwell County Natural Area Inventory**

**UPPER YADKIN /STONE MOUNTAIN OUTCROPS**
**Significant Natural Heritage Area**

**Site Significance:** Regional
**Quadrangle:** Buffalo Cove
**Size:** 183 acres
**Ownership:** Private

**SIGNIFICANT FEATURES:** This site contains an example of a Low Elevation Granitic Dome and an occurrence of the Significantly Rare Greenland sandwort (*Minuartia groenlandica*).

**LANDSCAPE RELATIONSHIPS:** This site is adjacent to the Buffalo Cove Forests to the east, 6.7 miles southeast of Blowing Rock Cliffs, and 6.1 miles south of South Fork Laurel Creek/Dugger Mountain.

**SITE DESCRIPTION:** An example of Low Elevation Granitic Dome with surrounding forests is central to this site. Large areas of exposed rock contain vegetated soils mats. On several of the soil mats located mainly along the upper portions of the exposed rock are patches of the uncommon Greenland sandwort (*Minuartia groenlandica*). It is often situated on flat, exposed rock in patches with moss mats, that have accumulated thin soils and collect water seeping from the vegetation-rock zone above. Canopy species consist of northern red oak (*Quercus rubra*), chestnut oak (*Q. montana*), scarlet oak (*Q. coccinea*), pignut hickory (*Carya glabra*), white oak (*Q. alba*), and white pine (*Pinus strobus*). Growing on the exposed rock in deep soil pockets and in fissures are canopy species that include red maple (*Acer rubrum*), Table Mountain pine (*P. pungens*), shortleaf pine (*P. echinata*), and scrub pine (*P. virginiana*). Understory species such as black gum (*Nyssa sylvatica*), flowering dogwood (*Cornus florida*), and sourwood (*Oxydendrum arboreum*) are present. The shrub layer is thick along the margin of the rock outcrops and the deeper soil mats out on the rock. Dominant shrubs include mountain laurel (*Kalmia latifolia*), great laurel (*Rhododendron maximum*), gorge rhododendron (*R. minus*), flame azalea (*R. calendulaceum*), lowbush blueberry (*Vaccinium pallidum*), deerberry (*V. stamineum*), and horse-sugar (*Symplocos tinctoria*). Woody vines are patchy and common. Greenbrier (*Smilax rotundifolia* and *S. glauca*), Virgin's-bower (*Clematis virginiana*), Virginia creeper (*Parthenocissus quinquefolia*), and poison ivy (*Toxicodendron radicans*) are frequent in the forested areas as well as out on the exposed rock surfaces. Herbs are sparse and vary in abundance on the soil mats of the exposed rock. Herbs are a bit more frequent along the rock outcrop margins and in the forested areas where soils are deeper and moisture is more abundant. Some of the more common herbs present are spotted wintergreen (*Chimaphila maculata*), poverty oat grass (*Danthonia sp*.), bluets (*Houstonia purpurea)*, whorled loosestrife (*Lysimachia quadrifolia*), ragwort (*Packera aurea* and *P. anonyma*), galax (*Galax urceolata*), and tickseed (*Coreopsis major*).

**MANAGEMENT AND PROTECTION:** This site has no protection and would make an excellent conservation project for a local land trust. The N. C. Wildlife Resources Commission may want to consider incorporating it into their adjacent Buffalo Cove Game Land.

**NATURAL COMMUNITIES:** Low Elevation Granitic Dome.

**RARE PLANTS:** Greenland sandwort (*Minuartia groenlandica*).

**RARE ANIMALS:** None observed.

**REFERENCES:**

Padgett, J.E. 2007. Site Survey Report: Upper Yadkin/Stone Mountain Outcrops. Natural Heritage Program, Office of Natural Resource Planning and Conservation, DENR, Raleigh, N.C.

GUYS CREEK RARE PLANT SITE

**Caldwell County Natural Area Inventory**

**GUYS CREEK RARE PLANT SITE**
**Significant Natural Heritage Area**

**Site Significance:** State
**Quadrangle:** Collettsville
**Size:** 119 acres
**Ownership:** U.S. Forest Service and Private

**SIGNIFICANT FEATURES:** This site contains one of the best populations of mountain heartleaf (*Hexastylis contracta*) in the state.

**LANDSCAPE RELATIONSHIPS:** This site is located in an ecotone along the base of the Blue Ridge Escarpment and the western portion of the Piedmont. Wilson Creek Gorge is located 0.6 miles to the west-northwest. The site is situated between the Johns River/Mulberry Creek Aquatic Habitat and Wilson Creek Aquatic Habitat.

**SITE DESCRIPTION:** This site is located along Guys Creek, covering the adjacent slopes and coves. Natural communities present are Acidic Cove Forest and Chestnut Oak Forest of varying degrees of maturity. The Significantly Rare mountain heartleaf (*Hexastylis contracta*) is common to locally abundant along the creek and adjacent slopes in an Acidic Cove Forest. It also appears to thrive in an area of recently timbered forest.

The dominant natural community type within the site is Chestnut Oak Forest. It consists of a mixed canopy with chestnut oak (*Quercus montana*) being the dominant canopy tree species. Other common canopy species include tulip poplar (*Liriodendron tulipifera*), scarlet oak (*Q. coccinea*), and shortleaf pine (*Pinus echinata*). The understory is sparse and includes red maple (*Acer rubrum*), sourwood (*Oxydendrum arboreum*), and downy serviceberry (*Amelanchier arborea*). Shrubs are sparse, with patches of mountain laurel (*Kalmia latifolia*) locally abundant. Other shrubs include sparkleberry (*Vaccinium arboreum*), horse-sugar (*Symplocos tinctoria*), and sassafras (*Sassafras albidum*). Woody vines are common, with Virginia creeper (*Parthenocissus quinquefolia*), greenbrier (*Smilax glauca*), and poison ivy (*Toxicodendron radicans*) present. Trumpet vine (*Campsis radicans)* is common in disturbed areas and along the creek. Herbs are abundant along the road, creek, and the open forest. Common herbs are tickseed (*Coreopsis major*), downy rattlesnake plantain (*Goodyera pubescens*), partridgeberry (*Mitchella repens*), spotted wintergreen (*Chimaphila maculata*), ebony spleenwort (*Asplenium platyneuron*), and goldenrods (*Solidago* spp.).

Along Guys Creek, in small sheltered coves and lower slopes, is Acidic Cove Forest. The canopy is a mixed mesophytic canopy containing tulip poplar, Carolina silverbell (*Halesia tetraptera*), sweet birch (*Betula lenta*), and red maple. A few scattered basswood(*Tilia americana* var. *heterophylla*) are found along Guys Creek in the canopy. The understory is well-defined, with ironwood (*Carpinus caroliniana*), sourwood (*Oxydendrum arboreum*), and black gum (*Nyssa*

*sylvatica*) abundant. Dominant shrubs include great laurel (*Rhododendron maximum*), pinxter-flower (*R. periclymenoides*), and flame azalea (*R. calendulaceum*). Common vines such as poison ivy, milkweed vine (*Matelea* sp.), and greenbrier occur frequently along the creek and areas of open understory. The herb layer is diverse, with downy rattlesnake plantain, turtlehead (*Chelone* sp.), rattlesnake-weed (*Hieracium venosum*), fleabane (*Erigeron pulchellus*), mountain heartleaf, foamflower (*Tiarella cordifolia*), and Christmas fern (*Polystichum acrostichoides*) common.

**MANAGEMENT AND PROTECTION:** Management of the site for invasive exotic species is needed. A no-herbicide zone should be posted by the N. C. Department of Transportation along the road where mountain heartleaf occurs. A portion of this site is protected as part of the Pisgah National Forest. The remainder of the site is privately-owned and would make a good conservation project for a local land trust.

**NATURAL COMMUNITIES:** Chestnut Oak Forest and Acidic Cove Forest.

**RARE PLANTS:** Mountain heartleaf (*Hexastylis contracta*).

**RARE ANIMALS:** None observed.

**REFERENCES:**

Padgett, J.E. 2007. Site Survey Report: Guys Creek Rare Plant Site. Natural Heritage Program, Office of Natural Resource Planning and Conservation, DENR, Raleigh, N.C.

LITTLE GUNPOWDER CREEK RARE PLANT SITE 1

**Caldwell County Natural Area Inventory**

## LITTLE GUNPOWDER CREEK RARE PLANT SITE 1
## Significant Natural Heritage Area

**Site Significance:** Regional
**Quadrangle:** Granite Falls

**Size:** 3.6 acres
**Ownership:** N. C. Department of Transportation

**SIGNIFICANT FEATURES:** This site contains a Regionally Significant population of the Federal and State Threatened dwarf-flowered heartleaf (*Hexastylis naniflora*).

**LANDSCAPE RELATIONSHIPS:** This site is located in the south-central portion of Caldwell County near the town of Granite Falls. It is situated between a major highway (US 321) and Lower Cedar Valley Road in a fast-developing portion of the county.

**SITE DESCRIPTION:** A moderately-sized population of dwarf-flowered heartleaf (*Hexastylis naniflora*) occurs within low-quality Dry-Mesic Oak--Hickory Forest along Little Gunpowder Creek and the adjacent north-facing slopes up from the creek. It is abundant throughout the site along the gentle north-facing slope that leads down to Little Gunpowder Creek. A small unnamed tributary running into the creek from the south has little of no dwarf-flowered heartleaf. In 2000, the naturally-occurring population of dwarf-flowered heartleaf was augmented with an additional 175 plants relocated by the N. C. Department of Transportation. The relocated plants came from an adjacent bridge replacement project.

The Dry-Mesic Oak--Hickory Forest where dwarf-flowered heartleaf occurs contains a mosaic of canopy trees species that are uneven-aged. Canopy species present include a mixture of white oak (*Quercus alba*), northern red oak (*Q. rubra*), southern red oak (*Q. falcata*), scarlet oak (*Q. coccinea*), mockernut hickory (*Carya alba*), and tulip poplar (*Liriodendron tulipifera*). A few scattered large white pines (*Pinus strobus*) are present in the canopy as well. The understory has an abundance of sourwood (*Oxydendrum arboreum*) and American holly (*Ilex opaca*). The shrub layer contains patches of mountain laurel (*Kalmia latifolia*), strawberry-bush (*Euonymus americanus*), and blueberries (*Vaccinium* spp.). Woody vines are common, with greenbrier (*Smilax glauca* and *S. rotundifolia*), Virginia creeper (*Parthenocissus quinquefolia*), cross-vine (*Bignonia capreolata*), poison ivy (*Toxicodendron radicans*), and muscadine (*Vitis rotundifolia*) present. Common herbs include bloodroot (*Sanguinaria canadensis*), Christmas fern (*Polystichum acrostichoides*), downy rattlesnake plantain (*Goodyera pubescens*), southern lady fern (*Athyrium asplenioides*), grape fern (*Botrychium sp*.), galax (*Galax urceolata*), partridgeberry (Mitchella repens), common dittany (*Cunila origanoides*), spotted wintergreen (*Chimaphila maculata*), sedges (*Carex* spp.), panic grass (*Panicum* sp.), and ebony spleenwort (*Asplenium platyneuron*).

**MANAGEMENT AND PROTECTION:** This site was protected by the N. C. Department of Transportation as a mitigation site for impacts caused by a recent bridge replacement at the site. The forest should be allowed to mature naturally, and invasive species should be controlled near the highway.

**RARE PLANTS:** Dwarf-flowered heartleaf (*Hexastylis naniflora*).

**RARE ANIMALS:** None observed.

**REFERENCES:**

Padgett, J.E. 2007. Site Survey Report: Little Gunpowder Creek Rare Plant Site 1. Natural Heritage Program, Office of Natural Resource Planning and Conservation, DENR, Raleigh, N.C.

LITTLE GUNPOWDER CREEK RARE PLANT SITE 2

**Caldwell County Natural Area Inventory**

## LITTLE GUNPOWDER CREEK RARE PLANT SITE 2
**Significant Natural Heritage Area**

**Site Significance:** County
**Quadrangle:** Granite Falls
**Size:** 3.6 acres
**Ownership:** Private

**SIGNIFICANT FEATURES:** This site contains a small population of the Federal and State Threatened dwarf-flowered heartleaf (*Hexastylis naniflora*).

**LANDSCAPE RELATIONSHIPS:** This site is located in the south-central portion of Caldwell County approximately 3 miles northeast of the town of Granite Falls and 1.9 miles east of US 321. It lies 1.7 miles north of Little Gunpowder Creek Rare Plant Site 1.

**SITE DESCRIPTION:** A small population of dwarf-flowered heartleaf (*Hexastylis naniflora*) is located within a small remnant alluvial forest. The heartleaf is scattered along a small tributary to Little Gunpowder Creek and on a steep, north-facing slope of the creek. The remnant forest canopy is dominated by river birch (*Betula nigra*), tulip poplar (*Liriodendron tulipifera*), red maple (*Acer rubrum*), northern red oak (*Quercus rubra*), and white oak (*Q. alba*). Away from the immediate floodplain, black cherry (*Prunus serotina*), pignut hickory (*Carya glabra*), shortleaf pine (*Pinus echinata*) and scrub pine (*P. virginiana*) are present in the canopy. The understory is relatively sparse, consisting of canopy species, flowering dogwood (*Cornus florida*), ironwood (*Carpinus caroliniana*), black gum (*Nyssa sylvatica*), and sourwood (*Oxydendrum arboreum*). Common shrubs include mountain laurel (*Kalmia latifolia*), dog-hobble (*Leucothoe fontanesiana*), sassafras (*Sassafras albidum*), blueberry (*Vaccinium* sp.), and sweet-shrub (*Calycanthus floridus*). Greenbrier (*Smilax glauca* and *S. rotundifolia*), poison ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quinquefolia*), muscadine (*Vitis rotundifolia*), and trumpet vine (*Campsis radicans*) are common woody vines. The more common herb species are dwarf-flowered heartleaf (*Hexastylis naniflora*), spotted wintergreen (*Chimaphila maculata*), cranefly orchid (*Tipularia discolor*), partridgeberry (*Mitchella repens*), foamflower (*Tiarella cordifolia*), sedge (*Carex* sp.), panic grass (*Panicum clandestinum*), Christmas fern (*Polystichum acrostichoid*es), and ebony spleenwort (*Asplenium platyneuron*).

**MANAGEMENT AND PROTECTION:** This site contains a bridge currently scheduled for replacement by the N. C. Department of Transportation. Management scenarios for this species include taking no action (with mitigation occurring at another location containing dwarf-flowered heartleaf), relocation of impacted plants, or formal protection of the remaining plants that are not impacted by construction.

**RARE PLANTS:** Dwarf-flowered heartleaf (*Hexastylis naniflora*).

**RARE ANIMALS:** None observed.

**REFERENCES:**

Padgett, J.E. 2007. Site Survey Report: Little Gunpowder Creek Rare Plant Site 2. Natural Heritage Program, Office of Natural Resource Planning and Conservation, DENR, Raleigh, N.C.

PEAKED TOP RARE PLANT SITE

**Caldwell County Natural Area Inventory**

**PEAKED TOP RARE PLANT SITE**
**Significant Natural Heritage Area**

**Site Significance:** National
**Quadrangle:** Lenoir
**Size:** 397 acres
**Ownership:** Caldwell County

**SIGNIFICANT FEATURES:** This site contains the largest known population of dwarf-flowered heartleaf (*Hexastylis naniflora*).

**LANDSCAPE RELATIONSHIPS:** This site is located in central Caldwell County 3.5 miles west of the town of Lenoir in the uppermost part of the Piedmont at the base of the Blue Ridge Escarpment. NC 90 lies to the north and NC 18 lies to the south.

**SITE DESCRIPTION:** This site contains an estimated 30,000 plants of dwarf-flowered heartleaf (*Hexastylis naniflora*) in both Acidic Cove Forest and Dry-Mesic Oak Hickory Forest. Even though the forest communities are of low quality, they contain the largest known occurrence of dwarf-flowered heartleaf in the world.

The upper slopes consist of maturing Dry-Mesic Oak--Hickory Forest with small patches of Chestnut Oak Forest along the ridgelines. The area contains a mosaic of mixed hardwoods and pines. The majority of the dwarf-flowered heartleaf present within the site is located here in small coves and along stream drainages, mainly along north-facing slopes. The canopy is closed, with dominant species of tulip poplar (*Liriodendron tulipifera*) and red maple (*Acer rubrum*). Other common canopy trees are white oak (*Quercus alba*), northern red oak (*Q. rubra*), chestnut oak (*Q. montana*), southern red oak (*Q falcata*), mockernut hickory (*Carya alba*), pignut hickory (*C. glabra*), white pine (*Pinus strobus*), and scrub pine (*P. virginiana*). The understory consists of canopy species as well as sourwood (*Oxydendrum arboreum*), flowering dogwood (*Cornus florida*), alternate-leaf dogwood (*C. alternifolia*), American holly (*Ilex opaca*), and black gum (*Nyssa sylvatica*). Shrubs vary in abundance with aspect and moisture. The more north-facing slopes contain abundant amounts of great laurel (*Rhododendron maximum*), gorge rhododendron (*R. minus*), and mountain laurel (*Kalmia latifolia*). Along drier slopes, the shrubs tend to be less abundant and consist of maple-leaf viburnum (*Viburnum acerifolium*), low bush blueberry (*Vaccinium pallidum*), and strawberry-bush (*Euonymus americanus*). Invasive species such as Chinese privet (*Ligustrum sinense*) and multiflora rose (*Rosa multiflora*) are present. The herb layer is diverse. Woody vines are common, with hog peanut (*Amphicarpaea bracteata*), grapes (*Vitis* spp.), greenbrier (*Smilax glauca*), wild yam (*Dioscorea villosa*), Virginia creeper (*Parthenocissus quinquefolia*), and poison ivy (*Toxicodendron radicans*) present throughout. The more common herbs include downy rattlesnake plantain (*Goodyera pubescens*), spotted Joe-pye-weed (*Eupatorium purpureum*), tickseed (*Coreopsis major*), goldenrods (*Solidago* spp.), spotted wintergreen (*Chimaphila maculata*), partridgeberry (*Mitchella repens*), showy orchid (*Galearis*

*spectabilis*), Christmas fern (*Polystichum acrostichoides*), maidenhair fern (*Adiantum peltatum*), violets (*Viola* spp.), and galax (*Galax urceolata*).

In sheltered coves and along small streams, Acidic Cove Forest is abundant. This community has a closed canopy, with some light gaps occurring right along the streams. The canopy is dominated by tulip poplar, red maple, and river birch (*Betula nigra*). Moving away from the streams, basswood (*Tilia americana* var. *heterophylla*), Fraser's magnolia (*Magnolia fraseri*), sycamore (*Platanus occidentalis*), and Canada hemlock (*Tsuga canadensis*) are common. The understory contains canopy species, sourwood (*Oxydendrum arboreum*), witch-hazel (*Hamamelis virginiana*), and black gum (*Nyssa sylvatica*). Shrubs are dense along the north-facing slopes with great laurel, gorge rhododendron, pinxter-flower (*Rhododendron periclymenoides*), and mountain laurel. Shrubs in more open forest include strawberry-bush (*Euonymus americanus*), dog-hobble (*Leucothoe fontanesiana*), spicebush (*Lindera benzoin*), and sweet-shrub (*Calycanthus floridus*). Vines present include hog peanut (*Amphicarpaea bracteata*), Virginia creeper, and poison ivy. Dominant herbs are Catesby's trillium (*Trillium catesbaei*), cardinal flower (*Lobelia cardinalis*), monkey flower (*Mimulus ringens*), sedges (*Carex* spp.), hay-scented fern (*Dennstaedtia punctilobula*), Christmas fern, wood aster (*Eurybia divaricata*), roundleaf violet (*Viola rotundifolia*), brittle fern (*Cystopteris protrusa*),and Devil's-bit (*Chamaelirium luteum*). Small areas of dwarf-flowered heartleaf are also present here, but this species is mainly confined to the upper portions of this community type on north-facing slopes.

**MANAGEMENT AND PROTECTION:** This site needs little or no active management other than allowing the forest to reach maturity and managing for invasive species. This site is on property operated as a county landfill, so land-use issues may arise in the future. A portion of this site is afforded some long-term protection as a conservation easement held by Foothills Conservancy of North Carolina, which contains the bulk of the dwarf-flowered heartleaf located within the site.

**NATURAL COMMUNITIES:** Acidic Cove Forest and Dry-Mesic Oak--Hickory Forest.

**RARE PLANTS:** Dwarf-flowered heartleaf (*Hexastylis naniflora*).

**RARE ANIMALS:** None observed.

**REFERENCES:**

Padgett, J.E. 2007. Site Survey Report: Peaked Top Rare Plant Site. Natural Heritage Program, Office of Natural Resource Planning and Conservation, DENR, Raleigh, N.C.

PLAYMORE BEACH RARE PLANT SITE

**Caldwell County Natural Area Inventory**

**PLAYMORE BEACH RARE PLANT SITE**
**Significant Natural Heritage Area**

**Site Significance:** County
**Quadrangle:** Collettsville

**Size:** 148 acres
**Ownership:** N. C. Department of Transportation and Private

**SIGNIFICANT FEATURES:** This site contains one of only a handful of extant mountain heartleaf (*Hexastylis contracta*) populations in the state.

**LANDSCAPE RELATIONSHIPS:** This natural area is located in western Caldwell County, south of the Pisgah National Forest along a section of Playmore Beach Road. Wilson Creek Aquatic Habitat and Johns River/Mulberry Creek Aquatic Habitat flow through the site. Guys Creek Rare Plant Site lies 1.3 miles north and Wilson Creek Gorge is 1.4 miles northwest.

**SITE DESCRIPTION:** This site falls within the western Piedmont section of the county, along the Johns River south of Brown Mountain Beach Rd. The site contains small sections of bottomland floodplain and small coves along tributaries of the Johns River. The forests vary in quality and maturity, with the majority being young, maturing woods that have been disturbed both by agricultural and timber practices.

Fair-quality Acidic Cove Forest are present along adjacent slopes of the Johns River and Wilson Creek. The canopy is closed and dominated by tulip poplar (*Liriodendron tulipifera*), river birch (*Betula nigra*), white pine (*Pinus strobus*), and northern red oak (*Quercus rubra*). The understory includes ironwood (*Carpinus caroliniana*), red maple (*Acer rubrum*), and American holly (*Ilex opaca*). Areas of disturbance, especially along the road and streams, often have significant numbers of sweetgum (*Liquidambar styraciflua*) in the understory. Common shrubs include mountain laurel (*Kalmia latifolia*) and blueberries (*Vaccinium* spp.). Woody vines are quite common along the river, with poison ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quinquefolia*), cross-vine (*Bignonia capreolata*), and invasive Japanese honeysuckle (*Lonicera japonica*) abundant. Herbs are patchy, but abundant. Common herbs are tickseed (*Coreopsis major*), galax (*Galax urceolata*), wing-stem (*Verbesina occidentalis*), downy rattlesnake plantain (*Goodyera pubescens*), and spotted jewelweed (*Impatiens capensis*).

Along the drier middle and upper slopes of the site are fair examples of a Dry-Mesic Oak--Hickory Forest with pockets of Chestnut Oak Forest embedded along the more prominent spur ridges. Common canopy tree species are chestnut oak (*Q. montana*), white oak (*Q. alba*), scarlet oak (*Q. coccinea*), southern red oak (*Q. falcata*), mockernut hickory (*C. alba*), and scrub pine (*P. virginiana*). The understory contains red maple, black gum (*Nyssa sylvatica*), and downy serviceberry (*Amelanchier arborea*). Shrubs are often present as patches of mountain laurel, maple-leaf viburnum (*Viburnum acerifolium*), and sassafras (*Sassafras albidum*). Woody vines

include poison ivy and greenbrier (*Smilax* sp.). Dominant herbs include Canada horseweed (*Conyza canadensis*), pilewort (*Erechtites hederacea*), sunflower (*Helianthus* sp.), goldenrods (*Solidago* spp.), Christmas fern (*Polystichum acrostichoides*), and ebony spleenwort (*Asplenium platyneuron*). The uncommon mountain heartleaf (*Hexastylis contracta*) is found along several north-facing slopes, low ridgelines, and portions of the Acidic Cove Forest. It also persists at several locations right along the road banks of Playmore Beach Road.

**MANAGEMENT AND PROTECTION:** This site has no formal protection. A no-herbicide zone should be enacted by the N. C. Department of Transportation along the road where mountain heartleaf occurs. This site is a potential mitigation site for N.C. Department of Transportation, or could be a good restoration project for a local land trust.

**NATURAL COMMUNITIES:** Acidic Cove Forest and Dry-Mesic Oak--Hickory Forest.

**RARE PLANTS:** Mountain heartleaf (*Hexastylis contracta*).

**RARE ANIMALS:** None observed.

**REFERENCES:**

Padgett, J.E. 2007. Site Survey Report: Playmore Beach Rare Plant Site. Natural Heritage Program, Office of Natural Resource Planning and Conservation, DENR, Raleigh, N.C.

ROCK CREEK RARE PLANT SITE

**Caldwell County Natural Area Inventory**

**ROCK CREEK RARE PLANT SITE**
**Significant Natural Heritage Area**

**Site Significance:** Regional
**Quadrangle:** Granite Falls
**Size:** 9 acres
**Ownership:** Private

**SIGNIFICANT FEATURES:** With most of the state's occurrences of dwarf chinquapin oak (*Quercus prinoides*) known historically, this site contains one of the few current occurrences in the region.

**LANDSCAPE RELATIONSHIPS:** This site lies in southeastern Caldwell County, just north of Rock Creek. Little Gunpowder Creek Rare Plant Sites 1 and 2 are located 2.9 and 3.7 miles to the west and southwest, respectively.

**SITE DESCRIPTION:** This site consists a successional forest that contains a few specimens of the Significantly Rare dwarf chinquapin oak (*Quercus prinoides*). The forest has a closed canopy dominated by white oak (*Quercus alba*), chestnut oak (*Q. montana*), northern red oak (*Q, rubra*), scarlet oak (*Q. coccinea*), and southern red oak (*Q. falcata*). Other canopy species present are mockernut hickory (*Carya alba*), tulip poplar (*Liriodendron tulipifera*), red maple (*Acer rubrum*), and white pine (*Pinus strobus*). The understory includes sourwood (*Oxydendrum arboreum*), flowering dogwood (*Cornus florida*), downy serviceberry (*Amelanchier arborea*), and American holly (*Ilex opaca*). The shrub layer is sparse, with mountain laurel (*Kalmia latifolia*), lowbush blueberry (*Vaccinium pallidum*), and huckleberry (*Gaylussacia baccata*) present. Invasive species such as multiflora rose (*Rosa multiflora*) and Chinese privet (*Ligustrum sinense*) are also present in the shrub layer. Woody vines occur frequently and include greenbrier (*Smilax rotundifolia* and *S. glauca*), Virginia creeper (*Parthenocissus quinquefolia*), and Japanese honeysuckle (*Lonicera japonica*). Herbs are sparse, with spotted wintergreen (*Chimaphila maculata*), Virginia snakeroot (*Aristolochia serpentaria*), Joe-pye weeds (*Eupatorium* spp.), goldenrods (*Solidago* spp.), Canada snakeroot (*Sanicula canadensis*), ragwort (*Packera aurea*), Christmas fern (*Polystichum acrostichoides*), and ebony spleenwort (*Asplenium platyneuron*) common.

**MANAGEMENT AND PROTECTION:** This site has no protection, and a large portion of the site was logged as recently as 10-15 years ago. This would be a potential candidate site for a conservation easement held by a local land trust.

**RARE PLANTS:** Dwarf chinquapin oak (*Quercus prinoides*).

**RARE ANIMALS:** None observed.

**REFERENCES:**

Padgett, J.E. 2007. Site Survey Report: Rock Creek Rare Plant Site. Natural Heritage Program, Office of Natural Resource Planning and Conservation, DENR, Raleigh, N.C.