

**INVENTORY OF THE NATURAL AREAS
OF THE PACOLET AREA**

(Polk County, North Carolina and upper Greenville and
Spartanburg Counties, South Carolina)

by

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Douglas A. Rayner
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PREFACE

The Pacolet Area Conservancy in 1990, as a newly-organized local, land trust, consulted with the State of North Carolina's Natural Heritage Program for advice in the best way to determine its objectives for a land protection program in the Pacolet Area of Polk County, North Carolina and the upper portions of Greenville and Spartanburg counties, South Carolina. In response to the recommendations to undertake a thorough inventory of special natural areas and other significant environmental resources of the region, the Pacolet Area Conservancy provided substantial funding to undertake a natural areas inventory. The project was administered for the N.C. Natural Heritage Program through a contract between the Pacolet Area Conservancy and the Conservation Trust for North Carolina, with supplemental matching grant funding from the N.C. Recreation and Natural Heritage Trust Fund. (At the start of the project, the Conservation Trust was known as the N.C. Natural Heritage Foundation.)

The Conservation Trust contracted with Dr. Douglas A. Rayner, a professor of biology at Wofford College in Spartanburg and respected and experienced research botanist and ecologist, who for more than a decade had served as the State of South Carolina's natural heritage inventory program coordinator for the S.C. Heritage Trust Program.

The Conservation Trust for North Carolina is a private, nonprofit corporation which provides support to local communities and land conservation organizations for the protection of natural areas throughout the state. In particular, the Conservation supports and fosters the efforts of local and regional land trusts, like the Pacolet Area Conservancy. The Conservation Trust collaborated with the State of North Carolina's Natural Heritage Program, whose standard specifications and formats for natural areas and rare species surveys were followed in this study.

The purpose of this inventory was to assist the Pacolet Area Conservancy, N.C. Natural Heritage Program, and other local government agencies in identifying and protecting important natural areas and ecological resources in the region.

We are most appreciative for the fine quality work and dedication of Dr. Douglas Rayner in his research and inventory. N.C. Natural Heritage Program biologists, Alan Weakley and Michael Schafale, provided advice and guidance throughout the study.

We are grateful for the financial assistance, understanding and commitment of the Pacolet Area Conservancy, who made this project possible and will take the lead role

in efforts to protect the many exceptional natural areas identified by the inventory. We also thank the N.C. Natural Heritage Program for its support and supplemental funding, from the N.C. Recreation and Natural Heritage Trust Fund.

Charles E. Roe, Executive Director

Conservation Trust for North Carolina

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INTRODUCTION

The Pacolet Area includes all of Polk County, North Carolina and parts of upper Greenville and Spartanburg counties in South Carolina north of S.C. highway 11. This area is basically the same as the area described by Peattie (1929) as the "Tryon Region." The western portion is part of the Blue Ridge Physiographic Province and the eastern portion is part of the Piedmont (foothills) Physiographic Province. The high, rolling hills of the Piedmont are much dissected with small streams, and because of its generally red soils, the area is commonly referred to as the "red clay hills" (Peattie 1928). The Blue Ridge portion includes the steep escarpment that separates this region from the Piedmont and is commonly referred to as the "mountains." The major industry in the Pacolet Area is farming. Largely because of the beautiful natural setting and the mild summer temperatures, the Pacolet Area has long been a favorite area for "second homes" and one of the most popular areas for retirees in the Carolinas.

The natural diversity of the Pacolet Area is rapidly being lost as development accelerates. What was once a haven for summer homes for people seeking to escape the heat of oppressive low country summers has now become recognized as an ideal place to live year-round. Accessible mountain areas were the first to feel these development pressures, but it now seems that all but the most inaccessible areas of the mountains are threatened by development, as witnessed by the recent accelerated development of the Glassy Mountain area in Greenville County, S.C. and White Oak Mountain, Miller Mountain and several other mountains in Polk County. The farmable sections of the Piedmont have long been in agriculture, and there is now a significant increase in residential development here as well. In part as a response to this rapid alteration of the natural landscape, the Pacolet Area Conservancy was organized in 1988. This local land conservation organization, along with the Conservation Trust for North Carolina, provided the funding for this inventory. This inventory describes the location and significance of the most important natural areas for protection. Also included for each site and for the Pacolet Area as a whole are descriptions of the natural communities, rare plants, rare animals and other significant features.

This inventory is intended as a tool to assist county and town planning agencies and state and local conservation organizations in protecting the natural diversity of the Pacolet Area. It is hoped that appropriate protection can be provided for many of the sites that are presently unprotected. Protection options include acquisition and formal or informal conservation/management agreements. At a minimum, this document provides planning agencies and land developers with information that otherwise was unavailable, and should prevent inadvertent loss of significant natural resources. Hopefully, future development can be steered away from many of these areas, even if they are not given official protection.

As with any inventory of this type, this is not a complete inventory of the Pacolet Area. Constraints of time and money precluded a more comprehensive survey. Although most of the best natural areas in the Pacolet Area probably are included, some areas of equal or even greater significance almost certainly have been left out inadvertently. The fact that a spectacular cliff or a rich wildflower bluff are not included does not mean that they are not significant. It probably means that the area was not known to the author. Many spectacular wildflower slopes above the North Pacolet River west of Tryon , for example, have not been included. This whole area, both north and south slopes, is one of the richest wildflower areas in the Carolinas. This inventory should be considered a baseline to be added to as additional information becomes available.

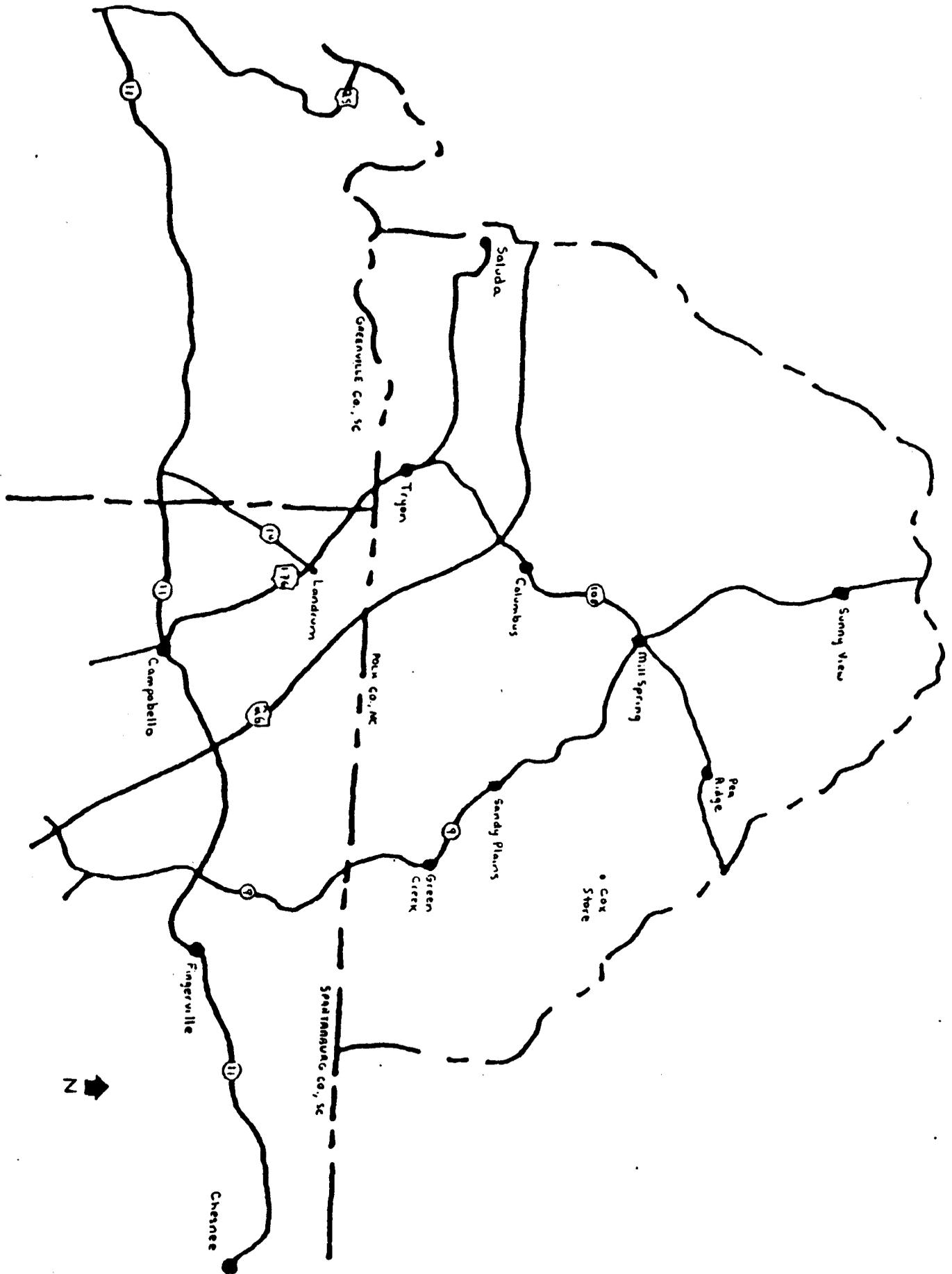


Figure 1. Major towns and roads in the Pacolet Area

PACOLET AREA --- GENERAL FEATURES

SURVEY AREA

The Pacolet Area includes all of Polk County in southwestern North Carolina and parts of Greenville and Spartanburg counties in northwestern South Carolina. As agreed to by the Pacolet Area Conservancy, the South Carolina portion of the survey area had S.C. Highway 11 as the southern boundary and southward extensions of the east and west boundaries of Polk County as the east and west boundaries in general. This area corresponds reasonably well with the "Tryon Region" of Peattie as described in his numerous studies (Peattie 1928-1931). The Pacolet Area lies partly in the Piedmont Physiographic Province and partly in the Blue Ridge Physiographic Province. The Pacolet Area contains about 354 square miles, including 239 in Polk County, about 50 in Greenville County, and about 65 in Spartanburg County. Polk County alone is one of the smallest counties in North Carolina and the combined area of the three portions of the Pacolet Area still would represent one of the smaller counties in The Carolinas.

According to the U. S. Census, in 1990 Polk County had a population of 14,416. The largest town, Tryon, had a population of 1680, and Columbus, the county seat, had a population of 812. No towns or cities are in the Greenville County, S.C. portion of the Pacolet Area. The largest towns in the Spartanburg County, S.C. portion of the Pacolet Area in 1990 were Landrum (population 2347) and Campobello (population 482) (S.C. State Data Center 1993).

TOPOGRAPHY AND PHYSIOGRAPHY

The eastern portion of the Pacolet Area lies in the Piedmont Physiographic Province as defined by Merschatt and Wiener (1975), Ranson and Garihan (1990), and Keenan (1993) but not as defined by Fenneman (1938). According to the less technical definition of the former three authors, the Piedmont occurs in the eastern and central parts of the Pacolet Area, generally at elevations below 1200 feet and the Blue Ridge occupies the western portion at elevations above 1200 feet. The term Piedmont literally means 'foot of the mountain' and the term foothills is often used as a non-technical synonym. The Piedmont generally is a broad region of rolling hills that extends from the unconsolidated sediments of the Coastal Plain to the east to the steep scarp or escarpment that forms the boundary with the Blue Ridge to the west. Since the Pacolet Area includes both Piedmont and Blue Ridge Provinces, the Piedmont here literally is at the 'foot of the mountains.' The 'rolling' hills of the Piedmont are dissected by numerous small streams generally with narrow floodplains and generally are much more subdued in topography than those of the adjacent Blue Ridge. Very steep slopes do often occur along major streams, particularly on north-facing slopes, but such areas are poorly represented in the Pacolet Area. The Piedmont also is characterized by the occasional presence of monadnocks, isolated

hills of resistant rock that rise abruptly above the adjacent plain. Several monadnocks are present in the Pacolet Area. The elevation of the Piedmont here averages about 1000 feet, and the lowest elevation is about 720 feet in the extreme southeastern portion of the Pacolet Area. Topographic relief averages about 150 feet (Conley and Drummond 1975). There is little level land in the Piedmont here, and what level land exists has generally been severely disturbed by past agrarian practices. There are no natural lakes and only a few swamps or bogs, all of which are very small. There are several large artificial lakes and many artificial ponds.

The Blue Ridge Province lies in the western portion of the Pacolet Area and consists of "a chain of mountains rising as the front wall of the Appalachians" (Peattie 1928-1931). The Blue Ridge Front or Escarpment is a narrow belt where the mountains meet the foothills, and it is an area of especially abrupt and steep relief. Here the mountains rise rapidly over 2000 vertical feet from the Piedmont at 1000-1200 feet elevation to peaks and ridges at elevations above 3000 feet. In North Carolina on the other side of this escarpment, the "plains" are 2000 to 2200 feet and the topographic relief is about 1000 vertical feet, about 1000 feet less than in the escarpment portion of the Pacolet Area (Ranson and Garihan 1993). The highest peak is Tryon Mountain at 3235 feet elevation, and there are 7-8 peaks above 3000 feet. The elevation of the Blue Ridge portion of the Pacolet Area in general is about 1500-2500 feet. Accessible scenic vistas are few but spectacular.

The Pacolet Area is drained primarily by the Green River, the North Pacolet River, the South Pacolet River, and their numerous tributary creeks and streams. Drainage of these systems generally is from northwest to southeast. The South Saluda River drains a significant portion of the Pacolet Area in Greenville County, and this system runs generally northeast to southwest.

The Soil Survey of Polk County, N.C. (Keenan et al. 1993) divides Polk County into the following landscape types and provides an estimate of the percentage of the total landscape occupied by each: Piedmont uplands, 61 percent; mountain uplands, 26 percent; mountain coves and footslopes, 3 percent; and flood plains and stream terraces, 6 percent.

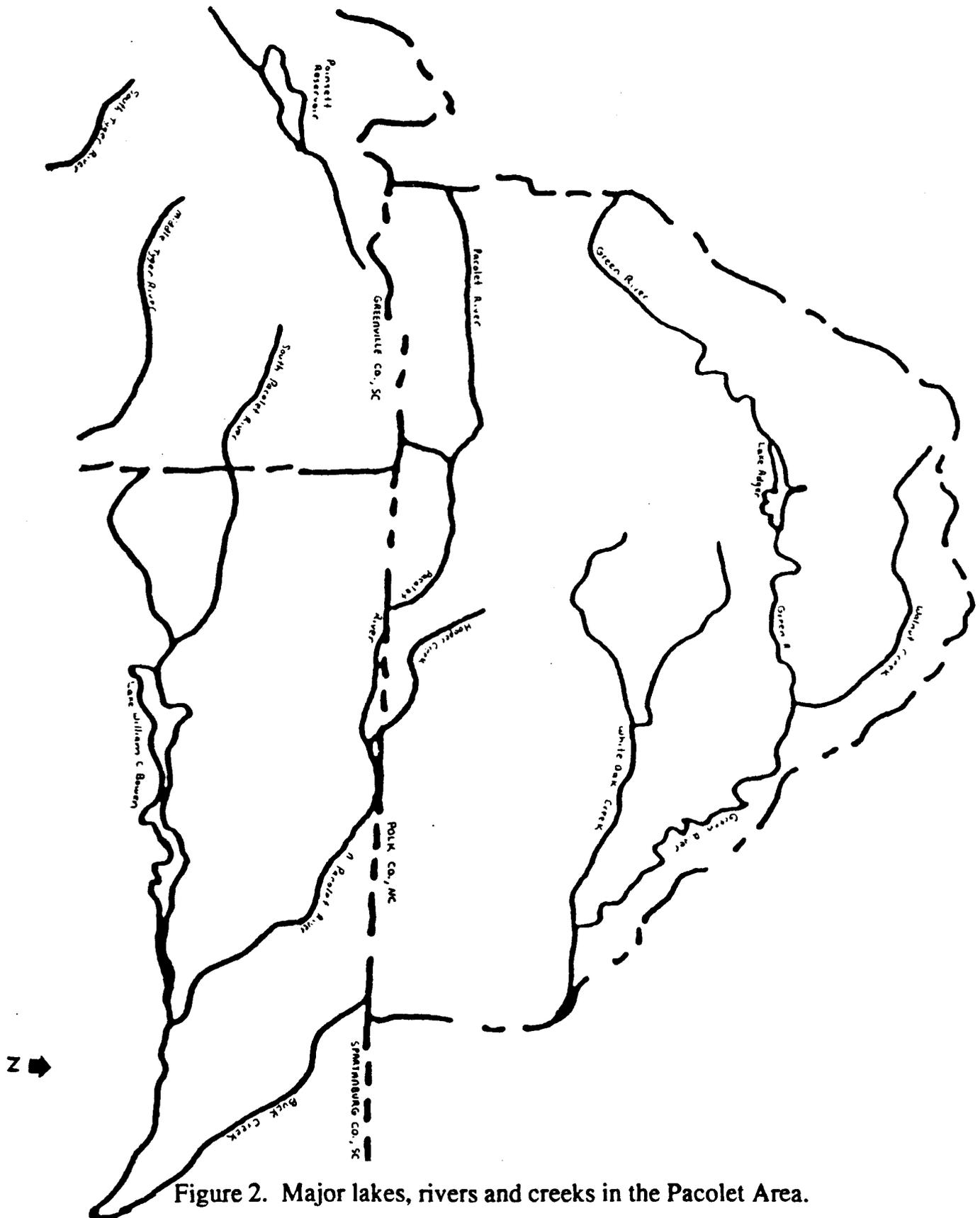


Figure 2. Major lakes, rivers and creeks in the Pacolet Area.

LEGEND for Figure 3. Major rock types in the Pacolet Area.

POLK COUNTY

- OCgm = migmatitic granitic gneiss**
- CZbg = biotite gneiss and shist**
- CZms = mica shist**
- CZgms = garnet - mica shist**
- CZtp = porphyroblastic gneiss**
- CZpg = inequigranular biotite gneiss**

GREENVILLE AND SPARTANBURG COUNTIES

- MpCs = biotite shist**
- DpCM = biotite gneiss and migmatite**
- DpCh = hornblende gneiss**
- MOiq = quartzite**
- Otm = toluca quartz monzonite**
- DOgg = biotite granitic gneiss**
- Qal = alluvium**

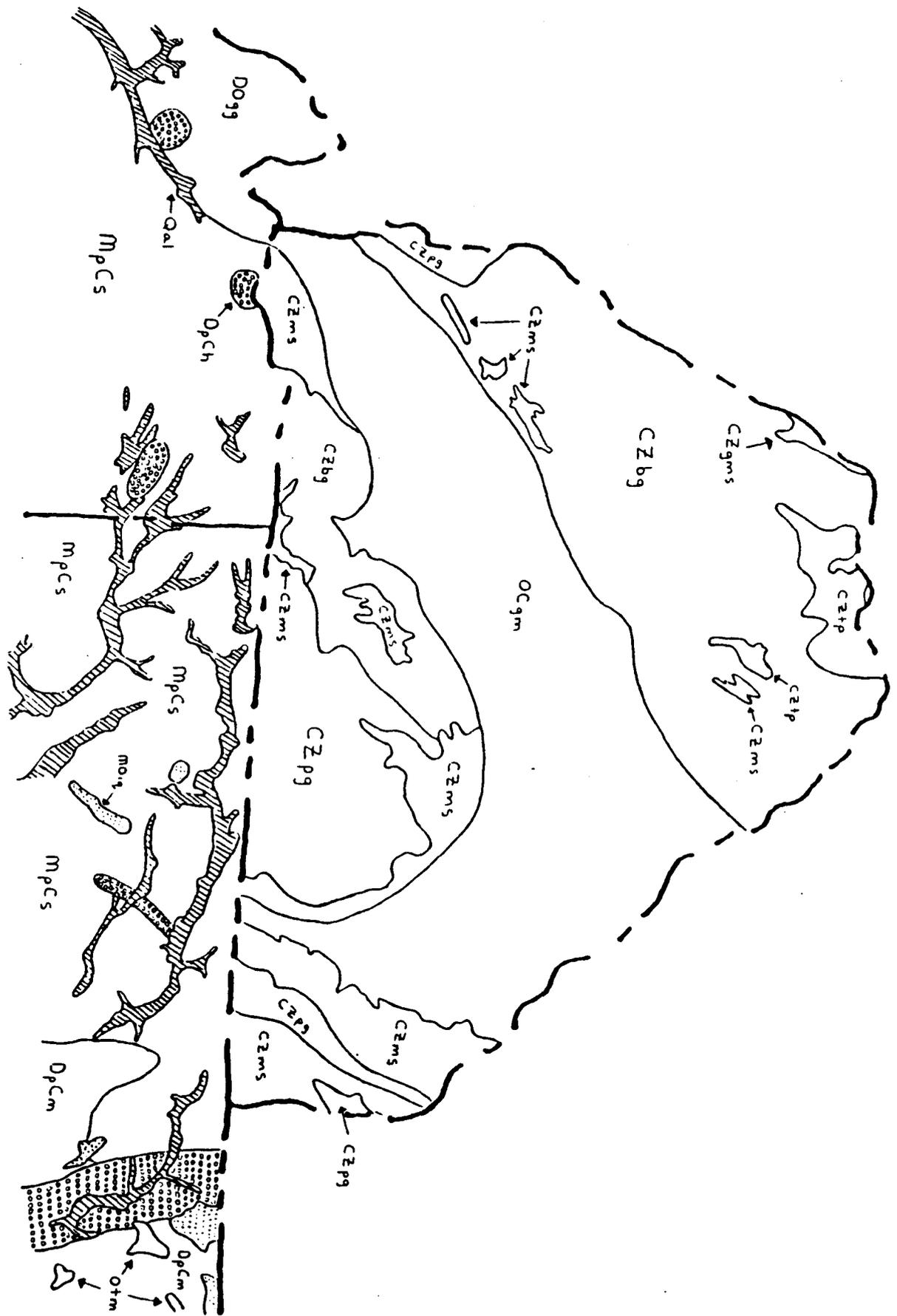


Figure 3. Major rock types in the Pacolet Area.

GEOLOGY

If the boundary between the Piedmont and the Blue Ridge is accepted by definition as the base of the mountains (Merschhat and Wiener 1975), then the Pacolet Area lies in the Blue Ridge to the west at elevations above about 1200 feet and in the Piedmont to the east at elevations below 1200 feet (Merschhat and Wiener 1975, Conley and Drummond 1975, Ranson and Garihan 1992). This is the definition that is accepted by most botanists and is the definition accepted here. Researchers who accept this definition apparently also believe that the origin of the "mountain wall," the Blue Ridge Escarpment or Blue Ridge Front, the physiographic feature that separates the Piedmont from the Blue Ridge, is probably due at least in part to faulting and that it probably occurs for different reasons along its 700 km length from Georgia to Virginia (Ranson and Garihan 1992).

Other researchers, including the authors of the "official" geologic maps of North Carolina (North Carolina Geologic Survey 1985 and 1988) and South Carolina (Overstreet and Bell 1965), include the entire Pacolet Area in the Inner Piedmont Belt of the Piedmont Province. These authors define "belts," including the Blue Ridge Escarpment, based on litho-tectonics, "characteristic rocks and structural features reflected in the landform" (N.C. Geologic Survey 1988). These authors define the Blue Ridge Escarpment as an "erosional escarpment."

Figure 3. is a map of the major rock types in the Pacolet Area as redrawn from N.C. Geologic Survey (1988), Overstreet and Bell (1965), and Conley and Drummond (1975). The value in having a detailed geology of an area is the aid it provides in selecting areas for preliminary botanical survey. Unusual rocks often harbor unusual species directly, or weather to soils that harbor distinctive communities and species. The general geology of the Pacolet Area proved of little value in this regard.

Conley and Drummond (1975) provide detailed information for Polk County on past geologic investigations, a detailed geologic map, detailed (and very technical) information on the stratigraphy and structure of the geology, and a summary of economic geology. Although none of this proved directly useful (i.e. there was not a direct correlation between mapping of unusual rocks and the occurrence of unusual communities or species), general locations of outcroppings of ultramafic rocks did suggest that unusual communities could or should occur nearby, and indeed they did. For example, sheltered areas in the Piedmont, eg. north-facing slopes, often had unusual soils and unusual plant communities.

The Geologic Map and Mineral Resources Summary of the Bat Cave Quadrangle, North Carolina (Lemmon and Dunn 1973 and Lemmon 1973) includes the location for an outcropping of marble. This area could prove to be quite interesting. I attempted to locate the outcrop one day when I was nearby and had only a few hours

available; I went down the adjacent valley by mistake and didn't have enough time to correct my mistake.

Sources of additional information on the geology of the Pacolet Area are included in the REFERENCES section of this paper.

LAND USE AND THREATS TO PRESENT DAY VEGETATION

According to estimates for Polk County in 1992 included in the "Soil Survey of Polk County, North Carolina" (Keenan et al. 1993), 15,500 acres (10.1 %) were in pasture and hayland, 1700 acres (1.1 %) were used as cropland, 1300 acres (0.9 %) were in peach or apple orchards, and most of the remainder were in woodlands. No reliable, present-day estimates are available for the South Carolina portion of the Pacolet Area, but a rough estimate is possible from visual examination of recent topographic maps and older soil maps. The vast majority of the Greenville County portion of the Area is in woodland, at least 95 percent. Development in the Spartanburg County portion is more variable with some topographic maps showing as little as ten percent developed land and others showing as much as forty percent or more.

Determination in detail of past land use history would be a major effort well beyond the scope of this report. Some individuals who are intimately familiar with Polk County suggest that few uplands or bottomlands that were even marginally suitable for subsistence agriculture or pasturage were not so used at some time in the past 150-200 years (T. G. McHugh pers. comm. 1993). On the other hand, Donald Culross Peattie, a noted botanist who did a fairly comprehensive survey of the flora of the "Tryon Region," wrote in 1928, "It is not a populous county, nor highly developed agriculturally. Its forests are not of sufficient importance to have been lumbered, and hence they are actually in better condition than the forests of many other parts of the state originally more famous for their trees. By escaping fame and development this little county has preserved its wildness and beauty..." Based on my incomplete survey efforts, I would suggest that most of those forests have since been lumbered, except in small pockets in the most inaccessible areas. Even the very steep slopes of White Oak , Tryon, Clifffield, Hogback and Melrose mountains have been heavily logged, and many of the highest peaks show evidence of once having been in pasture or some form of agriculture. A few old growth forest stands still exist, even a few in the Piedmont, but such stands are small and rare. Bottomlands in undisturbed condition may be the rarest element in the landscape here, and I made no systematic effort to locate remaining examples. In spite of an apparently heavy past disturbance history, most of the second growth forests here are similar in structure and composition to undisturbed examples in other counties, and with few exceptions, rare associated plants have not suffered significantly.

There is probably little doubt that more of the Pacolet Area is presently in woodland than at any time in the past 150-200 years. Threats to these recovering forests are now three-fold, 1) conversion into monoculture pine stands, 2) residential development, and 3) invasion by weedy alien species (biological pollution in the jargon of ecologists). The climax (self-replicating) vegetation of the Piedmont uplands is oak-hickory. Pine species are successional and typically have died out before the climax is reached. While much of the Piedmont is still in woodland, more and more of these woodlands are being converted to pine plantations. Pine plantations, unlike naturally regenerated stands, do not allow for maintenance of plant diversity. Rare plant species typically are lost following conversion of an upland forest to a pine plantation. While this threat is mostly restricted to the Piedmont, some mountain stands are being converted to plantations of white pine.

Mountain scenery, mild climate and easy access to major highways are some of the reasons that the Pacolet Area, and Polk County in particular, is such a popular area for retirement living. While this is a boon to the local economy, it is a serious threat to the natural and scenic beauty of the Pacolet Area, particularly to the mountains. While the steep to very steep slopes in much of the mountains would seem to be an impediment to extensive residential development, it apparently is not. Major developments are in progress or planned for White Oak Mountain, Miller (Indian) Mountain, Tryon Peak, Glassy Mountain, Melrose Mountain, Little Warrior Mountain, Piney Mountain (not its real name), and several others. It can only be hoped that some of the spectacular scenery that has attracted such a boom can be maintained in the scramble for mountain breezes and a house with a mountain view.

Biological pollution is the fancy name for the aggressive weedy species that threaten the integrity of natural lands throughout the east. Some of the species that are causing problems today in the Pacolet Area and that will become increasing threats in the future include kudzu (*Pueraria lobata*), Japanese honeysuckle (*Lonicera japonica*), tree-of-heaven (*Ailanthus altissima*), princess tree (*Paulownia tomentosa*), common privet (*Ligustrum sinense*), and the grass *Microstegium vimineum*. As the landscape of the Pacolet Area is fragmented more and more by continued development, these species will exert a greater and greater negative influence on native habitats by outcompeting and crowding out native species. Bottomlands in particular are threatened because they provide favored habitat for all of the above species except Princess tree. Control of any of these will be very difficult, but the difficulty will only increase with time.

NATURAL COMMUNITIES

A brief summary of the natural communities in the Pacolet Area is presented in Table 1. Deciding which described natural community best fits a particular assemblage of plants in a particular area is not always easy, partly because

communities grade into other communities, sometimes imperceptibly and sometimes abruptly, depending on slope, aspect, soil texture, soil pH, and other factors; partly because there are many community types in N.C. and S.C.; and partly because some plant assemblages don't easily fit described community types. Considerable effort was made to fit observed plant assemblages surveyed in the Pacolet Area into existing communities as described for N.C. by Schafale and Weakley (1990) and for S.C. by Nelson (1986). While recognizing the undesirable consequences of too narrowly defining natural communities, two communities are described here that are new to both N.C. and S.C. (Piedmont / Low Mountain Non-alluvial Forest and Piedmont Acidic Cove). Also, a community adequately described for S.C. (Piedmont Seepage Forest) is first described here for a site in N.C., and a community adequately described for N.C. (Basic Oak-Hickory Forest) is first described here for a site in S.C. The descriptions of the communities below follow the order of description in Schafale and Weakley's "Classification of the Natural Communities of North Carolina," i.e., TERRESTRIAL SYSTEM, high mountain communities, low elevation mesic forests, low elevation dry and dry-mesic forests and woodlands, and rock outcrop communities; PALUSTRINE SYSTEM (wetlands), river floodplains and non-alluvial wetlands of the mountains and Piedmont. No systematic and comprehensive effort was made to locate and survey river floodplain communities; the description of these communities that follows is therefore based more on descriptions in Schafale and Weakley (1990) than on personal observations. When there is a difference between the N.C. name for a community (Schafale and Weakley 1990) and the S.C. name for a community (Nelson 1986), the S.C. name is given in brackets.

Terrestrial System - High Mountain Communities

Montane White Oak Forests once occurred on the tops and upper slopes of most of the highest peaks in Polk County. Many of the level ridge tops in the northeastern mountains of the county have been cleared and planted in apple orchard, a testament to the relatively deep, rich soil here. This community is characterized by the overwhelming dominance of white oak (*Quercus alba*) on exposed high elevation sites; elevations here are somewhat less (ca. 3000 feet) than suggested in the community description (3500-5000 ft.), and herb cover is often rich and diverse. Only one example of High Elevation Red Oak Forest was found in Polk County. Red oak (*Quercus rubra*), tulip poplar (*Liriodendron tulipifera*) and a variety of species associated with mesic sites dominate the closed canopy. This community has the same general physiognomy as Rich Cove Forests and many of the same species. Yellow buckeye (*Aesculus octandra*) is absent from the canopy, and the herb layer is dense but not nearly as rich as in rich cove forests.

Terrestrial System - Low Elevation Mesic Forests

Rich Cove Forest [Cove Forest] is relatively common in the mountains of Polk County and quite rare in the mountains of South Carolina. Sheltered lower slopes and

coves are typical sites, but mid-slope locations are possible where the soil is particularly rich. Most occurrences here have a relatively young canopy as a result of past logging, but there are a few small old-growth examples. Rich Cove Forests are characterized by a dense canopy composed of a large number of mesophytic species; characteristic species include yellow buckeye and basswood (*Tilia heterophylla*). The understory, shrub and herb layers also are diverse; diagnostic species in the dense herb layer in the Pacolet Area include green violet (*Hybanthus concolor*), ginseng (*Panax quinquefolius*), and sweet white trillium (*Trillium simile*). A great variety of rare plant species may be present.

Steep, narrow gorges in the mountains and upper Piedmont are typical sites for Acidic Cove Forest communities. Separation of Acidic Cove Forest from Canada Hemlock Forest is based on the degree of dominance of Canada hemlock; the latter community has more than two-thirds of the canopy dominated by Canada hemlock (*Tsuga canadensis*). In general no effort was made to distinguish between these communities.

Canada Hemlock Forest [Hemlock Forest and Rhododendron Forest] is one of the most abundant mesic communities in the mountains but is much rarer in the Piedmont. It occupies a variety of sites but is best developed in open valley flats and in narrow acidic ravines; it often is found on slopes above Rich Cove Forest. The dense canopy dominated by Canada hemlock (*Tsuga canadensis*) often has white pine (*Pinus strobus*) as an associate. Undergrowth generally is a dense thicket of rosebay (*Rhododendron maximum*), alone or with mountain laurel (*Kalmia latifolia*), doghobble (*Leucothoe axillaris*) often is abundant, and herb cover and diversity is usually low.

One old-growth example of Mesic Mixed Hardwood Forest, Piedmont Subtype, is found in a characteristic site, a steep, lower, north-facing slope. Small pockets of this community are infrequent in the Piedmont here. American beech (*Fagus grandifolia*) often is the canopy dominant along with red oak (*Q. rubra*) and tulip poplar. Herb cover varies from sparse to moderately dense and rare species are not common.

Circumneutral to basic soils are infrequent in the Piedmont of the Pacolet Area, but are much more common here than in most Piedmont counties. Sites are typically small and lenses of amphibolite are the usual source of the higher than usual concentration of calcium. Sheltered north slopes and ravines produce the Piedmont's richest community, the Basic Mesic Forest [Basic Forest]. The dense canopy is dominated by a variety of mesophytic species, and the herb layer generally is both dense and diverse. Species in Piedmont sites that are usual indicators of this community type include green violet (*Hybanthus concolor*), lowland brittle fern (*Cystopteris protrusa*), and wahoo (*Euonymus atropurpureus*).

Terrestrial System - Low Elevation Dry, Dry/Mesic Forests

A few small pockets of Carolina Hemlock Forest occur here, but none was impressive enough to warrant inclusion in a protection project. Carolina hemlock (*Tsuga caroliniana*) dominates the canopy in the exposed, rocky sites where this community occurs, and a dense understory of evergreen heaths generally is present.

Pine-Oak Heath communities are not nearly as common in the mountains and upper Piedmont of the Pacolet Area as in most mountain counties. Many of the exposed ridges, steep south slopes, and low elevation peaks in the Pacolet Area are not occupied by this community as one would expect, because of the presence of high-calcium soils. A variety of pines and dry-site oaks dominate the often stunted canopy. The dense shrub layer is dominated by ericaceous species, evergreen, deciduous, or both. Characteristic herbs include galax (*Galax aphylla*) and trailing arbutus (*Epigaea repens*).

Chestnut Oak Forests are relatively common in the Piedmont and mountains of the Pacolet Area. Chestnut oak (*Q. prinus*) and scarlet oak (*Q. coccinea*) now dominate the somewhat open to dense canopy, but American chestnut (*Castanea dentata*) was a major component prior to its devastation by the chestnut blight. Sourwood (*Oxydendrum arboreum*) is a typical component of the understory. Shrub cover varies from dense to sparse, and herb cover mirrors shrub density in reverse; the more shrubs, the fewer herbs are present.

Piedmont Monadnock Forest in good condition is rare here. S.C. considers monadnocks to be a geomorphic feature and then describes the plant communities that are found there. The only example of this type recommended for protection here is in the Piedmont of S.C. Chestnut Oak Forest dominates the upper slopes on E, W, and S aspects, and Oak-Hickory Forest occupies the upper N-facing slopes.

Dry Oak-Hickory Forests [Oak-Hickory Forest] once was one of the most common communities in the Piedmont. Good undisturbed examples are uncommon and old-growth examples are very rare. This community extends into the low mountains of the Pacolet Area. The generally closed canopy is dominated by a variety of dry site oak species including southern red oak (*Q. falcata*), blackjack oak (*Q. marilandica*), scarlet oak, and white oak; hickories also are well represented, including mockernut (*Carya tomentosa*) and pignut (*C. glabra*). Pines are typical components in successional stands. Sparse to dense shrub cover is dominated by ericads, especially species of blueberry (*Vaccinium* spp.). Muscadine (*Vitis rotundifolia*) and spotted wintergreen (*Chimaphila maculata*) are inevitably present.

Dry-Mesic Oak-Hickory Forest [Oak-Hickory Forest] is probably the most abundant community in the Pacolet Area. It occupies a variety of dry/mesic upland sites on acidic soils, typically mid-slopes on a variety of aspects. Canopy cover is dense and dominated by white oak and a number of other oaks and hickories. Flowering dogwood (*Cornus florida*) and sourwood always dominate the well

developed sub-canopy. Shrubs are moderate to sparse, and herbs generally are sparse. Typical herbs include rattlesnake plantain (*Goodyera pubescens*) and hairy hawkweed (*Hieracium venosum*).

Basic Oak-Hickory Forest is most easily distinguished from Dry-Mesic Oak-Hickory Forest by the absence of acid-loving species such as *Vaccinium* and sourwood, the greater diversity of herb species, and the greater abundance of hickories. Good examples occur both in the mountains of Polk County and the Piedmont of Greenville County (S.C.). The presence of the rare white irisette (*Sisyrinchium dichotomum*) in a dry-mesic site is often a good indicator of this community type.

Piedmont Acidic Cove is the proposed name for a new Piedmont community type that is typical of small ravines and north-slopes on acidic soils, especially Pacolet sandy loam. Soils of this type have a clay hardpan along which water from upslope flows, producing mesic, acidic conditions on the lower slopes, and numerous small see pages at the slope base. The closed canopy is dominated by white oak, tulip poplar and American beech. The well developed subcanopy is dominated by sourwood and dogwood, and the sparse to moderate shrub layer inevitably includes mountain laurel. The herb layer is sparse to moderate, and Christmas fern (*Polystichum acrostichoides*) and New York fern (*Thelypteris novaboracensis*) are always present. The rare dwarf-flowered heartleaf (*Hexastylis naniflora*) is often found here, but it is not restricted to this community type.

Terrestrial System - Rock Outcrop Communities

Low Elevation Rocky Summit [Acidic Cliff] includes level to vertical outcrops of fractured rock on low elevation peaks, ridges, and upper slopes in the mountains (and Piedmont). Vegetation is very heterogeneous and restricted to pockets of soil. Dry-site pines and oaks are present in the open canopy. Pockets of mountain laurel and deciduous blueberries (especially *Vaccinium vacillans*) usually are present. Rock spikemoss (*Selaginella rupestris*) and a stonecrop (*Sedum telephioides*) always seem to be present in the Pacolet Area. Most of the outcrops on or near summits in the Pacolet Area appear to have some species that suggest at least pockets of circumneutral soils are present. This probably is the rarer outcrop type in this area.

The only Low Elevation Granitic Domes [Granitic Dome] in the Pacolet Area are in Greenville County. The best of them have been disturbed recently by residential development. This community occurs here on steep exposures on smooth, exfoliating granite or granite-gneiss on exposed upper slopes and ridge tops. Except for outcrop margins, most of the soils here are in thin mats over smooth rock. This community shares some species with most of the rock outcrop communities delineated by Schafale and Weakley (1990), and it is the expanses of smooth, exfoliating (peeling like an

onion) rock that most distinguishes this community.

Piedmont/Coastal Plain Heath Bluff is typically found on steep, north-facing bluffs on acid soils, often overlooking small-to-large streams. The canopy is open, with such species as chestnut oak, sourwood, and various pines usually predominating. The shrub layer is dense and mountain laurel is the typical dominant. Herb cover and diversity is sparse, with galax, spotted wintergreen and various species of heartleaf as typical associates. Schafale and Weakley (1990) note that the federally-threatened dwarf-flowered heartleaf (*Hexastylis naniflora*) is a possible associate here, but this species, although locally abundant in the Pacolet Area, is unknown from this community as described. My original designation of the habitat for many of the occurrences of this rarity were in this community, because nothing else seemed to fit. I have proposed a new community, Piedmont Acidic Cove, to better describe the typical habitat of this rarity.

The mountains of Polk County, with their jumble of acidic and basic rocks, include several good sites harboring one of the rarest communities in N.C., Montane Mafic Cliff. Sites are on very steep, rocky or cliff-like, upper slopes, presumably over mafic or basic rocks. In the Pacolet Area the best sites are bounded upslope by mesic communities on deep rich soils. This is a very variable community best defined by the presence of numerous rare calcium-loving species, including Biltmore sedge (*Carex biltmoreana*), Small's beardtongue (*Penstemon smallii*), and Allegheny cliff fern (*Woodsia scopulina*).

Palustrine System - River Floodplains

'Rocky Bar And Shore communities are common in the mountains and much less common in the Piedmont of the Pacolet Area. Sites for this community are in and adjacent to streams and rivers, and consist of rock exposures and gravel bars which don't support trees. Vegetation is extremely variable from site to site, and consists of sparse to dense growths of shrubs and/or herbs. Characteristic shrubs include tag alder (*Alnus serrulata*), yellowroot (*Xanthorhiza simplicissima*) and several species of willow (*Salix* spp.). Herb cover is often dominated by grasses, sedges and rushes, with broad-leaved herbs such as brook-saxifrage (*Boykinia aconitifolia*) and Carolina tassel-rue (*Trautvetteria carolinensis*) usually present.

Piedmont/Mountain Levee Forests [Bottomland Hardwoods] occur on natural levees (embankments) on large floodplains. Most of the floodplains in the Pacolet Area have been severely disturbed, and it would be worthwhile to locate and protect undisturbed examples. Typical species in the closed canopy include sycamore (*Platanus occidentalis*), river birch (*Betula nigra*), box elder (*Acer negundo*), and sweetgum (*Liquidambar styraciflua*). Ironwood (*Carpinus caroliniana*) is the predominant understory species, and shrubs include switch cane (*Arundinaria gigantea*), pawpaw (*Asimina triloba*), and spicebush (*Lindera benzoin*). Vines often

are abundant, particularly crossvine (*Anistostichus capreolata*), greenbriar (*Smilax* spp.), and poison ivy (*Rhus radicans*). Herb cover usually is dense and diverse. Exotic weedy species [Japanese honeysuckle (*Lonicera japonica*), *Microstegium vimineum* (a ubiquitous grass), and common privet (*Ligustrum sinense*)] often are abundant, even on sites that have been disturbed very little.

Piedmont/Mountain Bottomland Forest [Bottomland Hardwoods] often grades into Levee Forest downslope and a variety of upland forests upslope. Tulip poplar, American elm (*Ulmus americana*), and sweetgum dominate the closed canopy, along with some wet-site oaks. Ironwood, flowering dogwood and American holly (*Ilex opaca*) usually are present in the understory, and vines typical of Levee Forests often are abundant. Herb cover is usually quite dense and diverse and often includes species that are also typical of the adjacent lower slopes, such as Jack-in-the-pulpit (*Arisaema triphyllum*) and Christmas fern. Characteristic herbs include squawweed (*Senecio aureus*) and jumpseed (*Tovara virginiana*).

Old, man-made impoundments and beaver ponds are included in the Piedmont/Mountain Semipermanent Impoundment designation of Schafale and Weakley (1990). These communities are very variable in the structure and composition of the vegetation, depending on age since disturbance, water depth, and duration of standing water. Woody species typically present include tag alder, buttonbush (*Cephalanthus occidentalis*), red maple (*Acer rubrum*), sweetgum, persimmon (*Diospyros virginiana*), and willow. Herbs inevitably present include wool-grass (*Scirpus cyperinus*), several species of rush (*Juncus* spp.), and several species of seedbox (*Ludwigia* spp.).

Narrow stream floodplains in the Piedmont and lower mountains that are too small to separate into any of the main floodplain forests delineated above are included in the category Piedmont/Low Mountain Alluvial Forest. The canopy is closed and dominated by a mix of Levee, Bottomland and mesophytic trees, as are the subcanopy, shrub and herb layers.

Palustrine System - Nonalluvial Wetlands of the Mountains and Piedmont

Spray Cliff natural communities occur on cliffs, ledges and gently-sloping rock faces that are nearly constantly wetted by the spray from adjacent waterfalls. Because of the high humidity and moisture, mosses and liverworts are often very abundant. Vascular plants occur in pockets of soil interspersed with bare rock. Structure and composition of the vegetation is very variable, depending on the aspect, elevation, rock type, degree of shading and extent of spray. Distinctive bryophyte assemblages with many endemic or tropical disjuncts are supposed to characterize the best of these communities. Only relatively poor examples have been found in the Pacolet Area.

Hillside Seepage Bog [Piedmont Seepage Forest] natural communities typically

occur in small areas at or near the base of slopes and are continually fed by seepage. As described by Schafale and Weakley, these rare communities typically have an open central area and forested margins. This is generally not true of examples of this type in the Pacolet Area. Occurrences here typically have a closed canopy and little zonation. Important trees include red maple, tulip poplar, and swamp tupelo (*Nyssa biflora*). Important shrubs include alder, wild raisin (*Viburnum nudum*), and chokeberry (*Aronia arbutifolia*). The herb layer is dense to sparse and dominated by a variety of grasses, sedges, forbs and, as described by Schafale and Weakley (1990), Sphagnum moss (*Sphagnum* spp.). Important forbs include cinnamon fern (*Osmunda cinnamomea*), netted chain-fern (*Woodwardia areolata*), and partridge berry (*Mitchella repens*) in the drier parts and a variety of sedges and forbs [especially hedge hyssop (*Gratiola virginiana*) in the boggy areas. Many small examples of this community are present in the Pacolet Area, typically associated with Pacolet sandy loam soils. The best examples occupy several to more than 50 acres and have a closed canopy essentially throughout. The S.C. designation of Piedmont Seepage Forest seems to better describe this community type; the name used by Oliver Freeman on his herbarium labels on plants from these sites also is very descriptive, i.e. springhead forest. Piedmont Seepage Forest usually does not have Sphagnum moss as an important component, but does contain many of the same sedges as Hillside Seepage Bog. Little wood orchid (*Habenaria clavellata*) is always present in the herb layer, and poison sumac (*Rhus vernix*) is usually present in the shrub layer. Climbing hydrangea (*Decumaria barbara*) and wild bamboo vine (*Smilax laurifolia*) are abundant vines. The canopy is almost always dominated by red maple and swamp black gum. The occurrences of this community type here may be best treated as variants of the Hillside Seepage Bog or as a new type for North Carolina.

One forest assemblage in the Piedmont of Polk County is so different in community composition and it occurs on such a distinctive topography that it seems worthy of being described as a new and distinctive community type, a community designated here as Piedmont Nonalluvial Flat. This community occupies a broad streamside flat near the headwaters of a seepage stream on Pacolet sandy loam soils. The streamside flat is dissected by seepage channels and natural erosion into a patchwork of ridges, sloughs, and small circular depressions. The topography is very reminiscent of karst topography in the coastal plain. A mix of dry/mesic upland species and bottomland species dominate the canopy, subcanopy, shrub and herb layers. Particularly distinctive is the high dominance of American holly in the subcanopy and the abundance of the rare dwarf-flowered heartleaf in the herb layer. Red maple and white oak dominate the closed canopy, and mountain laurel and rabbit eye blueberry (*Vaccinium tenellum*) dominate the shrub layer. This rare mix of species is likely due to the unusual mix of geomorphic features.

METHODS

DATA SOURCES

The planning for and conducting of this natural areas inventory followed general procedures established by the North Carolina Natural Heritage Program (NHP) for projects of this type. The first task was to obtain all available information that might be of assistance in selecting potential sites for inventory work, including published and unpublished reports and maps and locating and interviewing knowledgeable individuals. Initial consultation with the Pacolet Area Conservancy and the NHP occurred in early June, 1990. At that time the general project concept and methodology were discussed and the boundaries of the project area were agreed upon. A few days later the PAC arranged a meeting with knowledgeable local residents and later in the month an article was published in the local newspaper which described the project and solicited input from individuals not contacted previously; a PAC brochure was included as a supplement. Visits were made to the offices of the NHP and the South Carolina Heritage Trust Program (SCHTP), at which time: known locations of rare plants, animals and communities were obtained, and exact locations added to topographic maps to be used in the inventory; publications on survey methodology, rare plants, rare animals, and technical survey forms were obtained; and discussions were held with botanists and zoologists knowledgeable about the Pacolet Area. Published and unpublished information on the flora, soils, hydrology and geology were obtained from the Lanier Library in Polk County, from other libraries via interlibrary loan, or from personal copies of colleagues.

Topographic maps, soil maps, geologic maps and aerial photos were carefully examined for insight into likely locations for inventory work. Soil maps proved especially helpful in locating potential habitats of springhead bogs, habitat for several rare plant species, and nonalluvial wetlands. Geologic maps were helpful in providing general locations of outcrops of unusual rock types (i.e. lenses of amphibolite, outcrops of marble, and outcrops of ultramafic rocks), as well as outcrops of boulders and cliffs of more typical rocks. Topographic maps were helpful in locating sheltered north slopes and other unusual topographies. Aerial maps were especially helpful in detailing the locations of roads not indicated on topographic maps, recently cutover woodlands, and woodlands planted in pine.

Information in the files of the NHP and the SCHTP and knowledgeable individuals, such as Ivan Kuster and Scott Keenan, provided numerous leads on potential survey locations. But, the single greatest source of survey leads were the herbarium specimens of Dr. Oliver Freeman housed in the herbarium at U.N.C. Asheville. Freeman scoured most of the Pacolet Area (and a little in Henderson County) in the 1950's looking for and collecting unusual or unreported plants. He published summaries of his findings in a series of articles between 1953 and 1958. The NHP

and the SCHTP had included his many published locations of rare plants in their inventory files, but many of his collections were not reported, and no one had previously examined his specimens in detail.

Since my interest and training are in endangered and threatened plant species, the primary focus of this inventory was on habitats of significantly rare species, especially species federally listed as endangered or threatened, federal candidate species, and species reported from the Pacolet Area but not seen in at least 30 years. Voucher specimens were made for all significantly rare plants discovered in the course of this survey.

The field survey efforts for this project were concentrated in the summers (late May-late August) of 1990 and 1991. A few weeks were spent on surveys in the spring of these same years, and only a few days were spent on fall surveys in these same years. About four weeks were spent on field surveys in the late spring and summer of 1992, and only a few days were spent in the field in 1993. Many hundreds of hours were spent in the field as part of this survey effort.

SITE SELECTION AND RANKING OF SIGNIFICANCE

Each of the natural areas recommended for protection here have been ranked in terms of ecological significance in one of four categories: in descending order of importance they are National (AA), State (A), Regional (B), or County (C). These designations of significance follow in large part the designations of the NHP and the SCHTP, and input of these programs regarding the suitability of these designations for each described area has been considered prior to the publication of this report. Ecological significance in general includes such characteristics as: the quality, integrity, and size of the natural communities; the rarity (state and global rank), quality, and condition of plants and animals; and the uniqueness or importance of geomorphic features. The following detailed descriptions of each significance category closely follow the descriptions provided in Carter and LeGrand (1989).

AA - National Significance. The natural area is considered of nationwide importance due to the presence of very rare and very high quality natural communities or geomorphic features that are in exemplary condition, or due to the presence of large, high quality populations of rare plants or animals that are globally endangered or threatened (G1 or G2, usually with fewer than 20 populations worldwide). There are few natural areas with similar ecological features elsewhere in N.C. or S.C. or in neighboring states. Areas of National Significance are given high priority for protection, and state and national conservation organizations will assist with providing protection for such sites.

A - State Significance. The natural area is considered to be of statewide

importance. The site contains either very rare natural communities or geomorphic features, or high-quality populations of endangered plants or animals that have a global rank of G3, or contains one of the best examples of a natural community or geomorphic feature in N.C. or S.C. There are other natural areas in the Carolinas or in neighboring states that are more significant. Usually the natural communities are in good condition. Natural areas harboring small populations of globally-rare species (G1 or G2), are also included here. These areas have a very high priority for protection and in some cases state and national conservation organizations may be interested in assisting with the protection of these areas.

B - Regional Significance. The natural area is considered to be one of the most significant sites in the regions that are included in the Pacolet Area, ie. lower Blue Ridge, Blue Ridge escarpment, or upper Piedmont. There are natural areas with similar ecological features that are more significant in the region. Generally these sites harbor at least some rare plants or animals. This designation also includes areas of exceptional scenic or aesthetic appeal. These areas may have a high priority for protection by county or regional land trusts.

C - County Significance. These sites are considered one of the more significant sites in the Pacolet Area. Natural areas with similar ecological characteristics that are more significant are present in adjacent counties. These sites may not contain high-quality natural communities or rare plants or animals. A typical site to include here would be the best example of a common community type, a site in relatively undisturbed condition, or a site with general aesthetic appeal. These areas have moderate priority for protection by local land trusts.

The above significance designations do not include factors such as viability or defensibility, and other characters that relate to the degree of threat rather than ecological significance. Given two sites of equal significance, the site that is more directly threatened should receive the first consideration for protection.

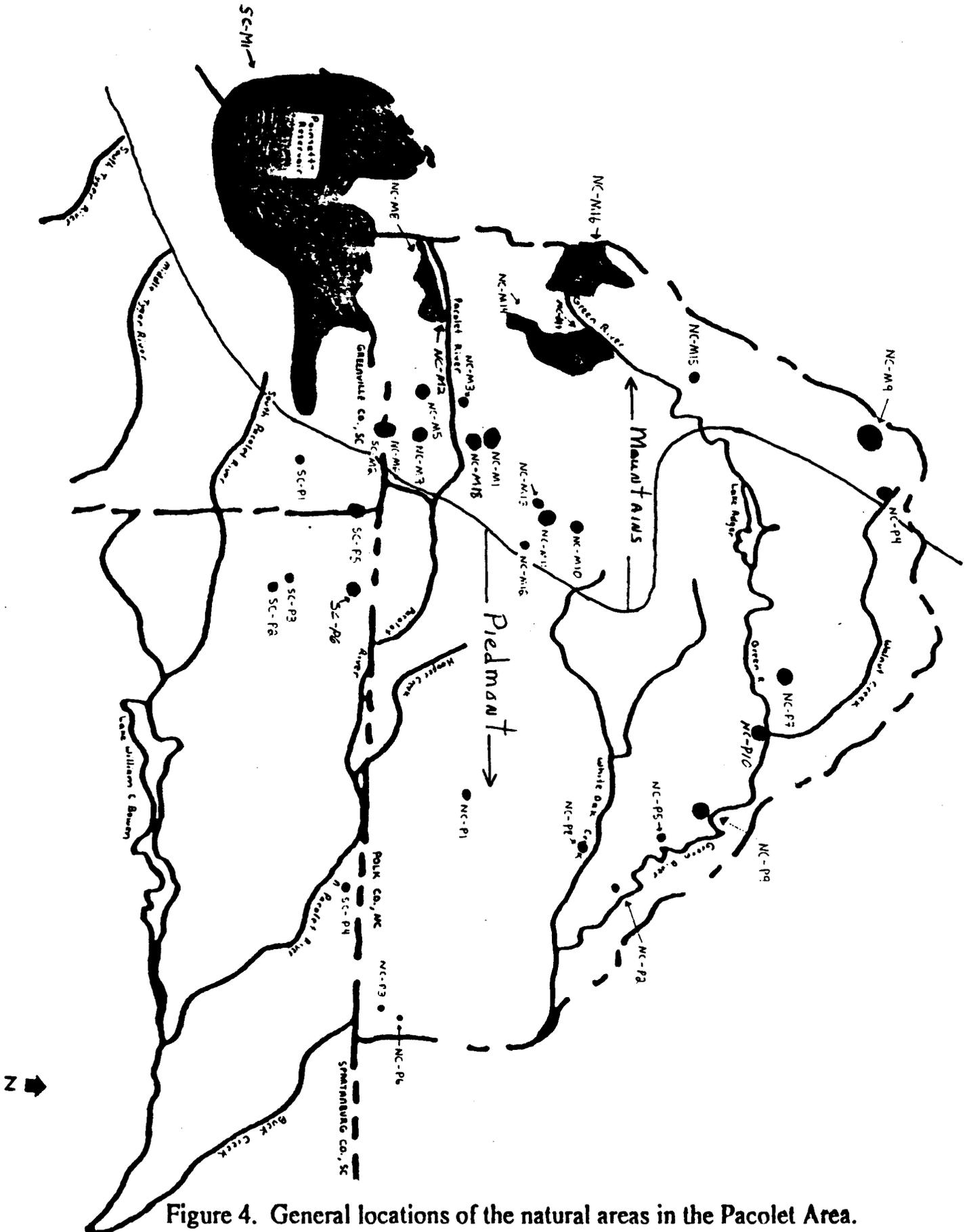


Figure 4. General locations of the natural areas in the Pacolet Area.

Figure 5. Explanation of Rare Plant and Animal Status Designations

1. Weakley, A.S. 1993. Natural Heritage Program List of the Rare Plant Species of North Carolina. NHP. N.C. Dept. of Env., Health and Natural Resources, Raleigh, N.C.

- E = Endangered
- T = Threatened
- SC = Special Concern
- PP = Primary Proposed
- SR = Significantly Rare

E, T and SC species are protected by state law (the Plant Protection and Conservation Act, 1979); the other two categories indicate rarity and the need for population monitoring, as determined by the Plant Conservation and Natural Heritage programs.

2. From Rayner, D.A., C. Aulbach-Smith, W.T. Batson, C. Leland Rogers Committee. 1984. Native Vascular Plants: Rare, Threatened or Endangered in South Carolina, unpublished list, S.C. Heritage Trust Program, S.C. Wildlife and Marine Resources Department.

- N = National Concern; endangered or threatened throughout the U.S.
- R = Regional Concern; endangered or threatened throughout a significant portion of its range in the U.S.
- S = Statewide Concern; endangered or threatened in S.C.
- U = Status Unresolved; apparently rare, but insufficient information to determine status
- E = Endangered
- T = Threatened

3. From Federal Register, February 21, 1990, Review of Plant Taxa for listing as Endangered or Threatened Species; Notice of Review 55:6184-6229. Also, from Federal Register, September 26, 1991, Determination of Endangered Status for the Plant *Sisyrinchium dichotomum* (white Irisette) 56:48752-48755.

- FE = Taxa currently listed as Endangered
- FT = Taxa currently listed as Threatened
- RE = Taxa currently proposed for listing as Endangered
- PT = Taxa currently proposed for listing as Threatened Taxa under review for possible listing ("candidate species"):
- C1 = Taxa with sufficient information to support listing
- C2 = Taxa without sufficient information to support listing
- C3 = Taxa more abundant than previously believed; no longer candidates for federal listing

4. From the Nature Conservancy, 1985. Global element rank: worldwide status. Unpublished listing.

- G1 = Critically imperiled globally because of extreme rarity or otherwise very vulnerable to extinction throughout its range
- G2 = Imperiled globally because of rarity or otherwise vulnerable to extinction throughout its range
- G3 = Either very rare and local throughout its range, or found locally in a restricted area
- 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)
- GU = Possibly in peril, but status uncertain; need more information
- GX = Believed to be extinct throughout range
- Q = A suffix attached to the Global Rank indicting questionable taxonomic status
- T = An additional status for the subspecies or variety; the G rank then refers only to the species as a whole

Table 1. Endangered, Threatened, and Rare Plant Species in the Pacolet Area

A. Seen since 1970 and still believed to occur in the area

Scientific and Common Names	Status				Habitat	Selected Locations
	1 NC	2 SC	3 US	4 Global		
<i>Anemone berlandieri</i> southern thimbleweed	C	U		G3G4	thin, rocky woods	SC-P1, NC-M3
<i>Asplenium pinnatifidum</i> lobed spleenwort	SR	ST		G4	rock outcrops	SC-P1, SC-M1
<i>Calystegia sericata</i> Blue Ridge Bindweed	C			G3T2T3	open, sunny sites	NC-M4, M10, M-14
<i>Campanula americana</i> tall bellflower		ST		G5	rich woods usu. calcareous	SC-M1
<i>Cardamine flagellifera</i> a bittercress		U		G3	streambanks and seeps	NC-M2, M14, NC- M16, M17
<i>Carex biltmoreana</i> Biltmore sedge	SR	NT	C3	G3	granitic domes and outcrops	NC-M11, NC-M12
<i>Carex bromoides</i> brome sedge	W7			G5T3	bogs and seepages	NC-M16
<i>Carex cherokeensis</i> Cherokee sedge	SR			G4G5	floodplains	NC-M16
<i>Carex pedunculata</i> longstalk sedge	C			G5	rich cove forests	NC-M16
<i>Caulophyllum thalictroides</i> blue cohosh		ST		G4G5	rich cove forests	SC-P1, SC-M1
<i>Chelone lyonii</i> moist cliffs		U		G5	rich coves and moist cliffs	SC-M1
<i>Collinsonia verticillata</i> whorled horsebalm	C			G2G3	calcareous woodlands	NC-P2,4,9,10 NC-M1,12, SC-P2
<i>Convallaria montana</i> wild lily-of-the-valley		ST		G5	wooded slopes and coves	SC-M1
<i>Coreopsis latifolia</i> broadleaf coreopsis	C	NE	3C	G3	cove forests and rich woods	MC-M1,2,4,6,10,14 SC-P1,M1
<i>Fothergilla major</i> large fothergilla	C	RT	PC2	G3	dry ridgetops	NC-M6

<i>Helianthus glaucophyllus</i> whiteleaf sunflower	W1	NT	3C	G3	cove forests and other forests	NC-P10,M1,2,4 NC-M10, SC-P1, M1
<i>Hexalectris spicata</i> crested coralroot	SR			G3G4	dry/mesic woods on basic soils	
<i>Heuchera parviflora</i> littleleaf alumroot	W1	U		G4T4	under overhanging cliffs and rock outcrops	SC-M1, many NC sites
<i>Hexastylis naniflora</i> dwarf-flowered heartleaf	E	NE	T	G2G3	sandy hummocks near seeps and bogs	NC-P1,P3,P6 SC-P2,P3,P4
<i>Hexastylis rhombiformis</i> French Broad heartleaf	C		C2	G1	acidic forests	NC-M3,M4,M8 NC-M16
<i>Hydrastis canadensis</i> golden seal	E-SC		3C	G4	rich, deciduous woods; cove forest	NC-P5
<i>Hydrophyllum canadense</i> waterleaf			ST	G5	rich woods and cove forests	SC-M1
<i>Juglans cinerea</i> white walnut	W5	U	C2	G3	rich woods and cove forests	NC-P2, NC-M4 SC-M1
<i>Lonicera flava</i> Yellow honeysuckle	SR	ST		G5?	near rock outcrops, usually mafic	NC-M3, M9 SC-M1
<i>Lygodium palmatum</i> climbing fern		ST		G5?	bogs and moist thickets	one unlisted SC site
<i>Nestronia umbellula</i> nestronia	SR		C2 P3C	G3G4	upland forests, usu. on Pacolet soils	NC-P1, P7 SC-P2, P3
<i>Osmorhiza claytonii</i> sweet cicely		U		G5	mixed deciduous woods	SC-M1, many NC sites
<i>Pachysandra procumbens</i> Allegheny spurge	C	RE		G4G5	basic forests	NC-P2, P9, P10
<i>Panax quinquefolius</i> ginseng	W5	RT		G4	cove forests and other rich forests	NC-2,5,8,9 M7,12, M2,3,4 SC-P1,M1
<i>Platanthera peramoena</i> Purple fringeless orchid	C	RE	3C	G5	bogs and forests	one unlisted site
<i>Pycnanthemum montanum</i> mountain horse-mint		RT		G5?	rich woods	SC-M1,M2
<i>Senecio millefolium</i> divided-leaf ragwort	T	RT	C2	G2?	granitic domes and rock outcrops	NC-M3,9,11 SC-M1

<i>Sisyrinchium dichotomum</i> white iredette	E	E	G1	thin woods over amphibolite	NC-P4,M1,5,6,7 M9, 10,11,13 SC-P1, M1
<i>Smilax biltmoreana</i> Biltmore carrion-flower	C		G2G3	dry/mesic forests over mafic rocks	NC-M2,3,6,7,9 NC- M13,15 SC-M1, SC- P1
<i>Smilax lasioneura</i> a carrion-flower	C		G5	oak/hickory forests over mafic rocks	NC-M9, M13
<i>Stachys latidens</i> broad-toothed hedge-nettle		ST	G5	rocky slopes and rich bottomlands	SC-M1, many NC sties
<i>Stellaria alsine</i> longstalk starwort	SR		G5	seeps	NC-M14
<i>Trautvetteria carolinensis</i> Carolina tassel-rue		U	G5	rocky seepages and bogs	SC-P1, SC-M1 many NC sites
<i>Thermopsis fraxinifolia</i> ash-leaved golden-banner	C		G3?	dry ridges	NC-M6?, 10
<i>Trillium simile</i> sweet white trillium	SR		G3	rich coves	NC-M2, M4, M15 NC-M16, M17
<i>Verbesina walteri</i> Walter's crownbeard	C		G3G4	rich woods and cove forests	NC-M1, M11?
<i>Woodsia scopulina</i> Allegheny cliff fern	SR		G5	rock outcrops and cliffs	NC-M9, 10, 11

B. Seen prior to 1970, but not since; of uncertain presence in the county.

Scientific and Common Names	Status				Habitat	Selected Locations
	1 NC	2 SC	3 US	4 Global		
<i>Cardamine rotundifolia</i> mountain watercress	C			G4	seeps and banks of brooks	NC-M17
<i>Dryopteris intermedia</i> fancy fern		U		G5	rich woods and shaded rocky slopes	SC-M1
<i>Dodecatheon meadia</i> shooting star	SR			G5T5	rich, rocky wood over mafic rocks	White Oak Mountain
<i>Echinacea purpurea</i> purple coneflower	SR			G4G5	open woods and clearings	unknown
<i>Eupatorium incarnatum</i> pink thoroughwort	SR			G5	rich woods and calcareous woods	NC-M13

Hackelia virginiana Virginia stickseed		U		G5	woodlands and thickets	SC-M1
Helianthus Laevigatus smooth sunflower	SR			G3G4	shaly open woods and roadsides	one unlisted site
Huperzia porophila rock clubmoss	C	ST		G4	spray zone of waterfalls	one unlisted site
Hypericum buckleyi Blue Ridge St. John's-wort	W7	U		G3?	high elevation domes and granitic summits	unknown
Liatris turgida shale-barren blazing star	SR			G3	dry rocky woods	
Lilium philadelphicum wood lily	C			G5	grassy balds and glades	unknown
Marshallia grandiflora large flowered Barbara's buttons	C		C2	G2	bogs (and drier sites?)	unknown
Melanthium woodii Ozark bunchflower	C		3C	G5	rocky woods	unknown
Monotropis odorata sweet pinesap	C	RT	PC2	G3	dry forests and pine bluffs	one unlisted site 3 vague locations
Orbexilum macrophyllum bigleaf scurfpea	E		C1	GH	unknown	Tryon or White Oak Mountains
Polygala paucifolia fringed milkwort		ST		G5	deciduous woods above 2000' elevation	SC-M1
Robinia kelseyi Kelsey's locust	C			G5TUQ	high elevation red oak forests, rocky	unknown
Thermopsis mollis Appalachian golden-banner	SR			G3G4	dry ridges	unknown
Trichomanes boschianum Appalachian filmy-fern	T	RT		G4	spray zones and seeps over rocks	unknown
Trillium flexipes bent white trillium	C			G5	rich cove forests basic mesic forests?	NC-P5?

C. Species on the North Carolina Plant "Watch List." Scientific names preceded by an asterisk (*) have not been seen since before 1970.

Asplenium pinnatifidum lobed spleenwort SR G4
Celastrus scandens American bittersweet W7 S2? G5
Diplazium (Athyrium) pycnocarpon glade fern W1 S2 G5
Helianthus glaucophyllus whiteleaf sunflower W1 3C S3 G3
Heuchera parviflora littleleaf alumroot W1 S2S3 G4T4
Houstonia longifolia longleaf bluet SR S3 G5T3
**Hydrangea cinerea* ashy hydrangea W7 S1S2 G4
Juglans cinerea butternut W5 C2 S2S3? G3
**Krigia montana* montain cynthia W1 S3 G3
**Liatris scariosa* New England blazing-star W7 S2 G5
Lysimachia tonsa southern loosestrife W1 S2? G3?
**Muhlenbergia sobolifera* a muhly grass C G5
Penstemon smallii Small's beardstongue W7 S3 G3G4
Philadelphus hirsutus streambank mock orange W7 S2 G5
Philadelphus inodorus scentless mock orange W1 S3 G4G5
**Polygala senega* Senecs snakeroot W7 S2S3 G4G5
**Prunus allegheniensis* Allegheny sloe W7 SH G3
**Prunus nigra* (*Prunus americana* var. *lanata*) Canada plum W7 S1 G4G5
Ptelea trifoliata wafer-ash W7 S2 G5
Quercus muhlenbergii chinquepin oak W1 S2 G5
Rhamnus caroliniana Carolina buckthorn W7 S2? G5

**Rhynchospora harveyi* Harvey's beakrush W7 S2S3 G4
**Robinia viscosa* clammy locust W7 S3? G3T3
Scutellaria ovata a heartleaf skullcap W7 S1 G5T?
Senecio obovatus roundleaf ragwort W7 S2 G5
Trillium rugelii (T. cernuum) southern nodding trillium W1 S2? G4
Triphora trianthophora three birds orchid W7 S2? G4
**Viola conspersa* American dog violet W7 S2? G5
**Viola walteri* prostrate blue violet W7 S1S2 G4G5

Table 2. Rare Animal Species Reported from the Pacolet Area. Status categories are the same as for rare plants.

Mammals

Neotoma floridana eastern wood rat SC C2 S2 G5

Birds

Coragyps atratus black vulture SC S3 G5

Amphibians

Aneides aeneus green salamander E C2 S1 G3G4

Hemidactylium scutatum four-toed salamander SC S3 G5

Arachnids

Vaejovis carolinianus Carolina scorpion SC S2? G?

Insects

Agarodes tetron a caddis fly only known from a few collections in S.C. and Tenn.

Euphydryas phaeton baltimore SR S2?

Amblyscirtes hegon pepper and salt skipper unknown S2? G5

Amblyscirtes vialis roadside skipper unknown S3? G5

Atrytonopsis hianna dusted skipper unknown S3? G4

Autochton cellus gold-banded skipper SR S2? G4

Erynnis martialis mottled dusky wing SR S3? G4

Hesperia metea cobweb skipper SR S2 G4G5

Incisalia augustus brown elfin SR S3 G5

Pieris virginiensis West Virginia white W3 S3S4 G4
Satyrium edwardsii Edward's hairstreak SR S2? G4

Table 3. Natural Communities and Natural Area Locations

SOUTH CAROLINA

Community Name (Natural Area Location)

Acidic Cliff (M1)
Basic Oak-Hickory Forest, Calcareous Substrate Variant (P1, M1)
Bottomland Hardwoods (P6)
Chestnut Oak Forest (P5, M1, M2)
Cove Forest (M1)
Dry-Mesic Oak-Hickory Forest (P3?)
Dry Oak-Hickory Forest (P2, P3)
Granitic Dome (M1)
Hemlock Forest (M1)
Mesic Mixed Hardwood Forest (P6)
Oak-Hickory Forest (P5, P6, M1, M2)
Piedmont Acidic Cove Forest (P2,P4)
Piedmont/Coastal Plain Heath Bluff (P2, P3, P4)
Piedmont Monanock Forest (P5)
Pine-Oak Heath (M1)
Rhododendron Forest (M1)
Small Stream Forest (M1)
Swamp Forest Bog Complex (P2)
Talus Slope (M1)

NORTH CAROLINA

Community Name (Natural Area Location)

Acidic Cove Forest (M4)
Basic Mesic Forest, Piedmont Subtype (P2, P5, P8,P9,P10)
Basic Oak-Hickory Forest (M6)
Canada Hemlock Forest (M4, M8, M12, M14, M15, M16)
Carolina Hemlock Forest (Present, but no examples described.)
Chestnut Oak Forest (M3, M6, M10, M13, M14, M15)
Dry-Mesic Oak-Hickory Forest (P1, P4, P6, M1, M3, M4, M5, M6, M7, M14,
M15,
M18)
Dry Oak-Hickory Forest (P1, P7, M8, M14, M18)
High Elevation Red Oak Forest (M11?)
Hillside Seepage Bog (P3, P6, P8)
Low Elevation Rocky Summit (M3)

Mixed Mesic Hardwood Forest, Piedmont Subtype (P5)
Montane Acidic Cliff (M4, M10, M12, M14)
Montane Alluvial Forest (M16)
Montane Mafic Cliff (M9?, M11)
Montane Oak-Hickory Forest (M8?, M9, M10, M11, M13, M18?)
Montane White Oak Forest (M9?, M10?, M11?)
Piedmont Acidic Cove Forest (P6, P7)
Piedmont/Coastal Plain Heath Bluff (P6)
Piedmont/Low Mountain Alluvial Forest (P10)
Piedmont Mafic Outcrop (M3?)
Piedmont Monadnock Forest (Present, but no examples were described.)
Piedmont/Mountain Bottomland Forest (Present, but no examples were described.)
Piedmont/Mountain Levee Forest (Present, but no examples were described.)
Piedmont/Mountain Semipermanent Impoundment (P8)
Piedmont Nonalluvial Flat (P1)
Piedmont Seepage Forest (P3, P6)
Pine-Oak Heath (M4)
Rich Cove Forest (M1, M2, M4, M6, M7, M14, M15, M16, M17, M18)
Rocky Bar and Shore (M16)
Spray Cliff (M4, M12, M14)
Swamp Forest-Bog Complex (P8)

DISCUSSION

Significance of Rare Plants and Animals

The lists of rare and endangered plants for North Carolina (Weakley 1993) and South Carolina (Rayner et al. 1984) include 89 species that have been documented as occurring in the Pacolet Area (see Table 1., parts A, B, and C). One additional species has been reported from the area based on distribution data in Radford et al. (1964), but documentation for this record has not been located. Of the 89 species documented for the area, 64 are included on N.C. and/or S.C. lists as official special status species, and 26 are on the North Carolina Plant "Watch List." Of the 64 special status species, two are Federally-listed as endangered (*Sisyrinchium dichotomum*, white irisette) or threatened (*Hexastylis naniflora*, dwarf-flowered heartleaf). Seven additional species are candidates for Federal listing (C1 or C2 status), including five species still known to occur in the area [Biltmore sedge (*Carex biltmoreana*), French Broad heartleaf (*Hexastylis rhombiformis*), butternut (*Juglans cinerea*), nestronia (*Nestronia umbellula*) and divided-leaf ragwort (*Senecio millefolium*)]; two additional Federal candidate species haven't been seen in the Area in many years and probably no longer occur here [large-flowered barbaras's buttons (*Maeshallia grandiflora*) and bigleaf scurfpea (*Orbexilum macrophyllum*)]. Three more species are former Federal candidates that have been removed from consideration (3C status) because they are more abundant and less threatened than formerly believed, i.e. broadleaf coreopsis (*Coreopsis latifolia*), whiteleaf sunflower (*Helianthus glaucophyllus*), and ginseng (*Panax quinquefolius*).

As most botanists would expect, most of the rare plants in the Pacolet Area are found only in the Blue Ridge portion of the Area (55 species), but an additional 16 species are found here in both the Blue Ridge and Piedmont. The most significant species in the Blue Ridge is white irisette, which is Federally-listed as endangered. Prior to this study, this rare relative of the common blue-eyed grass was known from fewer than five populations world-wide and was restricted in distribution to Polk and Henderson counties. Numerous additional populations have been found in the Pacolet Area, including two in Greenville County, S.C. and one additional population in Henderson County. Although it might be described as locally abundant in the Pacolet Area, populations are always very small, the total number of plants here is probably less than 2000 individuals. Weakley (1990) describes the habitat of this species as "thin woods over amphibolite," a description that sounds nebulous but is actually quite accurate. Such woods are inevitably dominated by white oak (*Quercus alba*) and almost always are on south-facing slopes at elevations above 1500 feet. The divide between the heads of two small streams is usually a good place to look. The relative abundance of the species here, of course, is due to the numerous (though unpredictable) outcroppings of rocks high in amphibole, a mineral rich in calcium.

The recently-described French Broad heartleaf is restricted in distribution to Polk County and a few adjacent counties. Its typical habitat, acidic forests, certainly is abundant, so it is difficult to explain the rarity of this heartleaf. It should be noted that many species of heartleaf are very restricted in distribution; the fact that they all are ant dispersed probably is of some significance. A few new populations were discovered in the course of this study.

Montane Mafic Cliff is probably the most significant natural community in the Pacolet Area, and it certainly harbors the greatest assemblage of rare plants. Species found here, though not necessarily all on any one site, include two federal candidates (Biltmore sedge and divided-leaf ragwort), four special status plants [southern thimbleweed (*Anemone berlandieri*), shooting star (*Dodecatheon meadia*), yellow honeysuckle (*Lonicera flava*), and Allegheny cliff fern (*Woodsia scopulina*)], and eight plants on the N.C. "Watch List" [lobed spleenwort (*Asplenium pinnatifidum*), littleleaf alumroot (*Heuchera parviflora*), mountain cynthia (*Krigia montana*), southern loosestrife (*Lysimachia tonsa*), Small's beardtongue (*Penstemon smallii*), streambank mock orange (*Philadelphus hirsutus*), scentless mock orange (*P. inodorus*), and wafer-ash (*Ptelea trifoliata*)]. Allegheny cliff fern deserves special note here because of its unusual distribution. It is known in North Carolina from Polk County and a few other scattered locations along the Blue Ridge Escarpment; the few scattered populations in the eastern U.S. are far disjunct from the main population center in the western U.S.

Butternut, a close relative of the common black walnut, was actually once relatively common in rich woods and cove forests in the Piedmont and Blue Ridge of the Pacolet Area, as well as in the remainder of its wide range in the eastern U.S. It now is a candidate for Federal listing primarily due to drastic decline as a result of infestation with a blight. Several small populations were found in the course of this study.

Although the general impression of most professional botanists seems to be that the Piedmont is depauperate in rare species when compared to the Coastal Plain or the Blue Ridge, the Piedmont of the Pacolet Area is actually quite rich. Seventeen rare plants have been documented only from the Piedmont here, as well as 16 species found in both the Piedmont and Blue Ridge. Of these 33 species, one is Federally-listed as threatened (dwarf-flowered heartleaf), one is a federal candidate for listing (*nestronia*), two are former candidates for listing (ginseng and whiteleaf sunflower), 15 are special status species, and 13 are on the N.C. "Watch List." Special efforts were made to locate populations of dwarf-flowered heartleaf in the Pacolet Area. These efforts were highly successful, primarily because the species is found with reasonable consistency on moderate-to-steep, north-trending slopes on Pacolet sandy loam soils. Numerous populations were found in the South Carolina portion of the study area, as well as the first reports of this species from Polk County. The Polk County populations were all associated with seepage flats on

Dogue-Roanoke soils.

Dwarf-flowered heartleaf is one of several Piedmont species that were originally thought to be very rare in the Pacolet Area and are now known to be locally abundant, including *Collinsonia verticillata* (Whorled horsebalm), *Pachysandra procumbens* (Allegheny spurge), and to a somewhat lesser degree, *nestronia*. Nearly twenty populations of whorled horsebalm were found in the Pacolet Area, mostly in Polk County. Polk County apparently is now the heart of the range of this southeastern endemic. The abundance of this species here is a tribute to the widespread occurrence of soils derived from mafic rocks. This species is only known in N.C. from Polk County, and it is unlikely that this species will be found in similar abundance in adjacent counties in North Carolina. It is also quite common in parts of Oconee County, S.C. where amphibolite is abundant, and it is rare in the Pacolet Area of Greenville County. The facts surrounding Allegheny spurge in the Pacolet Area are similar to those for whorled horsebalm. Seven (eight?) populations are now known from Polk County; it occurs on soils weathered from amphibolite; and in N.C. it is only found in Polk County. This species does have a wider range than whorled horsebalm, and it apparently is abundant in parts of its range. *Nestronia*, like dwarf-flowered heartleaf, is typically associated with uplands on Pacolet sandy loam soils. It is now known from five populations in the Pacolet Area and about 50 populations worldwide. It is quite seriously threatened, however, by natural weakness associated with its population biology (i.e. most populations consist of either all male or all female plants) and by a fungus that causes stem die-back. It may have contracted this fungus from sweet shrub (*Calycanthus floridus*), which also commonly is infected, but with much less serious effects.

Twenty special status plants documented from the Pacolet Area in the past 100 years were not relocated during this study. No specific effort was made to relocate some of the more common of these species. I estimate that six of these species probably still occur here, but that still leaves 14 species, or nearly 22 percent of the documented special status plants, that have been lost from the area. Two of these "lost" species are candidates for Federal listing, large-flowered barbara's buttons and bigleaf scurfpea. Bigleaf scurfpea is known globally only from a few collections by Edward Townsend and Willard Rowlee in 1897 from "White Oaks, Mt. Tryon, near Columbus, North Carolina" and White Oaks, near Columbus, North Carolina". No habitat information was included with these collections; this and the inclusion of both White Oaks (White Oak Mountain) and Mt. Tryon (Tryon Peak) as possible localities makes the task of relocating the species even more difficult. A number of well-known botanists have unsuccessfully searched for this species, especially Steven Leonard, who has looked long, hard and systematically. This species probably no longer occurs here and is thus probably extinct, a conclusion that was reached earlier by Massey and Whitson (1980). The occurrence of large-flowered barbara's buttons here is based on a 1898 collection by Beadle & Boynton in the Biltmore Herbarium. The specimen is marked "Type Sheet," indicating that this was the collection on

which the original scientific description was based. The plant was collected from "dry soil near Saluda, Polk County, North Carolina. This species occurs in a variety of dry-to-wet habitats, and the poor locality data and lack of high habitat specificity makes relocation of this rarity very difficult. The other North Carolina records from Granville and Henderson counties are from "bogs," according to Radford et al. (1964). Another "lost" plant of some interest and significance is Ozark bunchflower (*Melanthium woodii*). This Polk County record is based on several collections in the early 1950's by Oliver Freeman from "rocky hillside near the North Pacolet River" and "three and one half miles southeast of Columbus, Polk County." In a June 1991 correspondence with me, Dr. James H. Zimmerman, who monographed the genus *Veratrum* (*Melanthium*) for his Ph.D. dissertation, suggested that this disjunct population probably was introduced. I nonetheless carefully searched all potential habitat within a mile and one-half radius of the Freeman report. I found a rocky hillside near the North Pacolet River with calciphilic species, as suggested by Zimmerman to be appropriate, but I found no Ozark bunchflower. This species probably no longer exists in Polk County or North Carolina.

Table 2. (p. 33) lists the rare animal species documented from the Pacolet Area. Two animals here are candidates for federal listing as endangered or threatened, eastern woodrat (*Neotoma floridana*) and green salamander (*Aneides aeneus*). The woodrat report is based on my sighting of nesting material in an old wooden shed adjacent to the old agricultural fields at the mouth of Cove Creek, at the Green River. I made no notes on how active the woodrat nest was; the report needs to be verified by a competent mammalogist. The green salamander report is from the files of the S.C. Heritage Trust Program, and was from a rock outcropping in the North Greenville Watershed (Poinsett Reservoir). Attempts to locate additional populations in 1992 by Sorrow et al. (1992) as part of a broad-based study to document the significance of the Greenville and North Greenville Watersheds were unsuccessful.

Few detailed studies have been conducted on specific groups of animals in the Pacolet Area. The few studies that have been done in the past were either not especially detailed or thorough, or didn't cover much of the Pacolet Area. Hardin and Shaw (1975) report results of brief studies done in 1974 on the mammals, birds, and herptiles of the Pulliam River Watershed and the Green River Cove in Polk County. Greenville Watersheds Study Committee (1992) report the results of brief surveys done in the Table Rock and Poinsett reservoirs in Greenville County for black bear, bats, herptiles, green salamander, birds, and aquatic insects. Both of these broad-based animal surveys were done to document the significance of the areas in question. The aquatic insects survey documented, in the Pacolet Area section of the study area, several caddis fly species as new S.C. distribution records and one rare caddis fly species that is known only from a few specimens in S.C. and Tennessee. Simon Thompson, a naturalist with FENCE, recently has documented nesting by Cerulean warblers at several sites in the Pacolet Area and vicinity.

I made no special efforts as part of this project to document the presence of rare animals in the Pacolet Area. I did note the woodrat nest as mentioned previously and I located a nest of a black vulture near the top of Little White Oak Mountain. Based on personal experience in the mountains (and upper Piedmont) of S.C. and the personal observations of some knowledgeable Polk County residents, I suggest that the Carolina scorpion is common to abundant here in appropriate habitats.

SIGNIFICANCE OF THE NATURAL AREAS

Of the 35 natural areas described in this inventory, two are considered to be of National significance, 20 of Statewide significance, nine of regional significance, and four are considered of County (local) significance. White Oak Mountain (Dodge), NC-M10, is considered of National significance in part because it harbors the Pacolet Area's (and the world's?) largest population of white irisette, a species federally listed as endangered, and in part because of the occurrence of numerous, additional rare species and numerous geomorphic features typical of the unusual White Oak Mountain/Tryon Peak area in general. Kross Keys Natural Area (NC-P1) may be the Pacolet Area's most unusual and most significant natural area. It harbors the Area's largest populations of the Federally-threatened dwarf-flowered heartleaf and the federal candidate for listing, *nestronia*, as well as a community that occupies a karst-like streamside flat and that appears to be unique in the Carolinas. The North Carolina Natural Heritage Program (NHP) may determine that this community is just a very unusual variant of a more common community, but this is the only natural community I have seen in the Carolinas with this combination of floristics and geomorphology.

Of the 21 natural areas considered here to be of Statewide significance, only one is so ranked almost solely because of the presence of a large population of a high-ranked plant species, i.e., Harris Dwarf Heartleaf (SC-P4). The only sites of Statewide concern without one or more high-ranked plant species are the two sites that are so ranked because they are significant geomorphic features, i.e., Bird Mountain (SC-P5, monadnock) and Little Warrior Mtn. Cave Natural Area (NC-M18 natural fissure cave). Most sites of Statewide significance harbor many rare plants, including at least one high-ranked species, including seven sites harboring white irisette (NC-P4, SC-P1, NC-M1, NC-M5, NC-M6, NC-M9, NC-M11, and SC-M1), five sites harboring dwarf-flowered heartleaf (NP3, NC-P^, SC-P2, SC-P3 SC-P4), two sites harboring the federal candidate *nestronia* (SC-P2 and SC-P3), two sites harboring the federal candidate Broad River heartleaf (NC-M3 and NC-M4), four sites harboring the federal candidate divided-leaf ragwort (NC-M3, NC-M8, NC-M9, and NC-M11), and one site harboring the federal candidate Biltmore sedge (NC-M11). Basic Mesic Forest is rare in general in the Piedmont of the Carolinas, but is relatively common in the Pacolet Area. In the North Carolina Piedmont of the Pacolet Area, four sites harboring this rare forest type are recommended for

protection, including two of Statewide significance, Green River Plantation (NC-P2) and Green River Rich Slopes (NC-P9). These sites are two of the eight sites in Polk County for Allegheny spurge and two of nearly twenty sites in the Pacolet Area for whorled horsebalm. Polk County is the only N.C. county that harbors these species. The Montane Mafic Cliff natural community is specifically described from only one site, Tryon Peak (NC-M11), but species composition suggests that mafic outcrops occur in several other sites, including NC-M3, NC-M9, and SC-M1. Pearson's Falls Glen, NC-M17, is of Statewide significance because it represents an extensive, old-growth example of Rich Cove Forest. Only three sites recommended for protection here comprise more than 1000 acres, i.e. North Greenville Watershed (SC-M1, 19,000+ acres), Green River Gorge (NC-M16, 1150+ acres), and Holbart's Cove: Cove Creek / Bradley Falls (NC-M14, 1000+ acres). Each of these areas are very scenic and harbor numerous rare plants, pockets of old-growth vegetation, and in some cases rare animals (especially SC-M1).

Nine of the sites are considered of Regional significance. Most of these sites harbor high-ranked species and could rank higher but don't, either because the site is somewhat disturbed (NC-P10, NC-M7, and NC-M13) or because the population(s) of high-ranked species is (are) small (NC-M5 and NC-M8), or a combination of the two (NC-P5). Pacolet Mixed Mesophytic Hardwoods (SC-P6) and Pearson's Falls Glen; Addition (NC-M2) are excellent examples of their respective natural community types, but are too small to be ranked higher. Shukanwahken Falls and Ravine (NC-M12) does harbor one high-ranked species, the federal listing candidate, Biltmore sedge, and good quality examples of several community types, but much better examples are known elsewhere in the mountains of N.C.

Only three of the natural areas included here are considered to be of County (local) significance. White Oak Creek Non-alluvial Wetlands (NC-P8), is the largest non-alluvial wetland in the Pacolet Area. It's significance would have been higher had the site not been somewhat disturbed by lumbering in the past 10-15 years. Big Level Natural Area (NC-P7) is significant solely because of the presence of a large population of nestronia; it may be appropriately considered an area of Regional significance. Laurel Branch Rich Woods (NC-M15) is a good, but small, example of a common natural community, Rich Cove Forest, and no high-ranked plant or animal species are present. It is a very scenic area and is well worthy of protection. Other areas not included in this report could be considered of county or local significance.

SELECTION OF NATURAL AREAS FOR THE INVENTORY

Included in this inventory are those sites that the author considers to be the most biologically and geomorphologically significant in the Pacolet Area. They include sites that should be protected because of the presence of rare plant or animal species, unusual geomorphic features, and high-quality natural communities. As is obvious

from a reading of the previous section, this inventory features locations of rare, threatened, or endangered species. Especially well represented here are locations of Federally-listed plants, plants presently under consideration for listing, and plants for whom the Pacolet Area is the heart of the species range in the Carolinas. Eleven different locations of the Federally-endangered white irisette are included in protection projects, as well as six locations for the Federally-threatened dwarf heartleaf. Federal candidate species and the number of locations recommended here for protection include nestronia (four locations), French Broad heartleaf (four locations), divided-leaf ragwort (four locations), and Biltmore sedge (two locations). Allegheny spurge and whorled horsebalm are known in North Carolina only from Polk County. Three of the eight Allegheny spurge populations in Polk County and eight of the whorled horsebalm populations in the Pacolet Area are recommended for protection. Only four sites recommended for protection harbor only a single high-ranked plant species; most sites harbor numerous elements of concern.

No effort was made to include representative examples of all known natural communities in the Pacolet Area. However, because one very large area in South Carolina (19,000+ acres) and two areas in excess of 1000 acres in North Carolina are included as in this inventory, examples of nearly all known natural communities in the Pacolet Area are included in areas recommended for protection. The only probable exceptions are natural communities on river flood plains in the Piedmont, and my sources in the Pacolet Area were doubtful as to whether any undisturbed flood plains of any size were present in the Pacolet Area. If any intact examples are found, they should be considered significant. Special effort was made to locate non-alluvial wetlands, and several are recommended for protection.

AREAS FOR FURTHER SURVEY WORK AND ADDITIONAL AREAS WORTHY OF PROTECTION

Selection of sites was based on a nationwide scale of rarity. Only two sites are considered to be of National significance; the vast majority of the sites, 21, are considered of Statewide significance; nine sites are considered of Regional significance; and only three sites are considered to be significant only at the County (local) level. Many additional sites, mostly those considered to be significant at the Regional or County level, were not included here because of time constraints. A few areas that probably should be considered to be significant at the Statewide level were not included, and additional surveys might even turn up another site of National significance. Most of the locations for dwarf heartleaf were not written-up, as well as several additional populations of white irisette, one additional site for nestronia, one additional location for divided-leaf ragwort and five additional locations for Allegheny spurge. Additional areas worthy of protection include Little White Oak Mountain, Big Warrior Mountain, the south slopes of White Oak Mountain below the very top and also along Skyuka Road above and below Camp Skyuka, undisturbed portions of FENCE, Deep Gap, Twin Bridges, Pacolet Falls (This area is in Henderson County.),

an additional Piedmont non-alluvial wetland, the CBC sanctuary, and numerous properties for which the landowners have expressed interest in protection through conservation easement, including properties of N. Wilder, B. Farwell, B. Frost, T. Moore, D. Wells, E. Ogden, E. Walcott and A. Slater.

Although the Pacolet Area is relatively small in total acreage, and although this survey adds significantly to our knowledge of the area, it is inevitably incomplete. Fruitful areas for additional survey include: 1. the lower south slopes in much of the North Pacolet River valley west of Tryon; 2. the lower slopes, both north-and south-trending, of Tryon Peak and White Oak Mountain; 3. the south slopes of Wildcat Ridge and World's Edge; and 4. undisturbed floodplains along major rivers. River flood plains probably are the greatest survey need, and considering the abundance of amphibolite lenses in the Piedmont of Polk County, such a survey could turn up some highly significant areas.

PRIORITIES FOR PROTECTION

This document provides a description of the natural features of the Pacolet Area and their significance. This information should be used by county planning agencies and conservation agencies for the protection of natural areas and biological diversity in the Area. The Pacolet Area is fortunate to have two local land trust that will take a leadership role in providing appropriate levels of protection for each natural area. These organizations are the Pacolet Area Conservancy, which obviously covers the entire Pacolet Area, and SPACE, which works in the Spartanburg County area.

One South Carolina site (SC-M1) and two North Carolina sites (NC-M4 and NC-M14) are in public ownership, and an additional site is in partial public ownership (NC-M5). None of these areas is managed as a natural area, per se, although SC-M1 is already protected by a conservation easement that precludes lumbering or any other land disturbance unless it is directly associated with facilities needed to provide for public water supply. Sites NC-M4 and NC-M14 are owned by the N.C. Wildlife Resources Commission, but there is some concern that some of the minimal management to promote wildlife could adversely affect the natural qualities of these properties. Site NC-M5 is partly owned by the city of Tryon as part of their public water supply. Activities detrimental to the natural integrity of the area need to be officially precluded.

Priorities for protection should begin with the most highly-ranked sites that are unprotected and continue with the sites of lesser significance, i.e. sites of National significance should be worked on first, next sites of Statewide significance, next sites of Regional significance, and lastly sites of County significance. Although it is a sore temptation to work on the easily protected sites first, inevitable limitations of time and money necessitate working on the most significant sites first.

As stated so well in Carter and LeGrand (1989), "Protection of natural areas not only involves the "active" protection of sites by acquisition, registry, or easement, but it also involves "passive" protection. Sites can be "protected" by making sure that proposed highways, sewerlines, transmission lines, and other such structures are routed around identified natural areas and potentially significant areas, such as extensive tracts of forest or wetlands. Thus this inventory should be used by county and local governments to help with zoning regulations and with assessments so that development can be directed away from crucial natural areas."

The area encompassed by the Pacolet Area is, acre for acre, one of the richest natural regions in the Carolinas, and therefore in the entire southeastern United States. It is sincerely hoped that this document will help the Pacolet Area maintain the scenic and natural qualities for which it is so justly famous.

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SITE DESCRIPTIONS

The primary contents of this report are non-technical descriptions of the most significant natural areas in the Pacolet Area. These site descriptions are organized according to physiographic province (Piedmont or Mountains [Blue Ridge]) and by state (N.C. or S.C.). and are presented in the following order; Piedmont, North Carolina; Piedmont, South Carolina; Mountain, North Carolina; and Mountain, South Carolina. Included in each site description are the following information categories; SITE NAME, SITE NUMBER, Size, LOCATION, QUAD MAP(S), SIGNIFICANCE, GENERAL DESCRIPTION, OWNERSHIP, COMMENTS, and REFERENCES. SITE NAMES are those already in use by the North Carolina Natural Heritage Program (NHP) or the South Carolina Heritage Trust Program (SCHTP), or they are names that the author made up. SITE NUMBERS are a combination of letters that indicate the state and physiographic province of occurrence and a number that indicates the order in which sites in that state and province were prepared. For example, NC-P2 is the Site Number for the "Green River Plantation", which was the second site description prepared for sites in the Piedmont of North Carolina. Order of preparation does not reflect degree of significance. Identifying sites by such abbreviations facilitates the inclusion of sites in summary tables and maps, such as Figure 4. General Locations of the Natural Areas in the Pacolet Area. "Size" is an approximation of the size of the site in acres, generally excluding buffer zone. LOCATION describes the general location of each area, usually in terms of distance from the nearest town or city in the state where the site occurs. SITE SIGNIFICANCE is a simple significance designation and is given as a single descriptive term (e.g. State) and a letter code (AA, A, B, or C), as described under Methods. The QUAD MAP(S) category is self explanatory. The SIGNIFICANCE heading includes a brief summary of the ecological characteristics that give the site significance. Under the heading of GENERAL DESCRIPTION each site is described in terms of topography, physiography, natural communities and their dominant floristic components, and noteworthy plants and animals. OWNERSHIP is given as either private or public, and the names of public owners are given, but not of private owners. COMMENTS includes information on land use history, threats, management considerations, and sometimes additional information about the designation of site significance.

A portion of the county map showing the general location of each site is provided in Appendix A. Exact property boundaries are not drawn. The ownership of some sites is unknown. Providing exact property boundaries might encourage unauthorized site visitation of privately owned sites, a practice that should not be encouraged. Detailed maps and other technical information on each site have been provided to the Pacolet Area Conservancy, the NHP, and the SCHTP.

SITE NUMBER: Kross Keys Natural Area

SITE NUMBER: NC-P1 **Size:** ca. 115 acres

SITE SIGNIFICANCE: A (STATE) or AA (NATIONAL)

LOCATION: Southeastern Polk County; ca. 1.5 miles southeast of Sandy Plains; the site is bounded to the north by SR-1551 (which is just S. of SR 1521), and to the south by SR-1536.

QUAD MAPS(S): Fingerville West

SIGNIFICANCE:

1. This site contains Polk County's largest population of nestronia (*Nestronia umbellula*), a state threatened plant species and Federal candidate (C₂) for listing as an endangered or threatened species.

2. This site contains Polk County's largest population of dwarf-flowered heartleaf (*Hexastylis naniflora*), a state endangered plant species that is Federally-listed as a threatened species.

3. This site contains an excellent, undisturbed example of a forest community that is rare and distinctive and may warrant a separate plant community classification (white oak/red maple/American holly/partridge berry). I've tentatively designated this community as a Piedmont Nonalluvial Flat.

4. Several additional noteworthy plant species occur here, including leatherwood (*Dirca palustris*), longleaf bluet (*Houstonia longifolia*) and poison sumac (*Rhus vernix*).

GENERAL DESCRIPTION:

This site comprises essentially the wet to mesic lowlands and adjacent dry uplands along the headwaters of a small stream whose source is seepage through the adjacent Pacolet sandy loam soil. Seepage and erosion are typical of sites associated with Pacolet sandy loam soil, and this site exhibits both to the extreme. The head of the main streams here are deeply eroded, with the stream bottom as much as 20 feet below the top of the stream banks. The relatively broad streamside flats toward the south end of the site are dissected by natural erosion into a patchwork of ridges, seepage sloughs and pothole-like, wet-to-dry depressions that are very reminiscent of karst (limestone-related) topography in parts of the coastal plain. The plant community here is a mix of sub-hydric to sub-xeric species and doesn't fit any described community type very well; the soil here (Dogue-Roanoke) also is a mix of

hydric (Roanoke) and non-hydric (Dogue) soils. The canopy is dominated by white oak (*Quercus alba*) and red maple (*Acer rubrum*) and is quite mature; American holly (*Ilex opaca*) dominates the subcanopy and partridge berry (*Mitchella repens*) and dwarf-flowered heartleaf dominate the herb cover; the shrub layer is a mix of dry-mexic species, including Mountain laurel and paw paw.

Seepage streams and wet depressions are found throughout the streamside flats and harbor poorly developed Hillside Seepage Bog communities.

The adjacent uplands aren't nearly as mature as the lowlands and contain Dry Oak-Hickory Forest, with an abundance of the rare shrub, *Nestronia*.

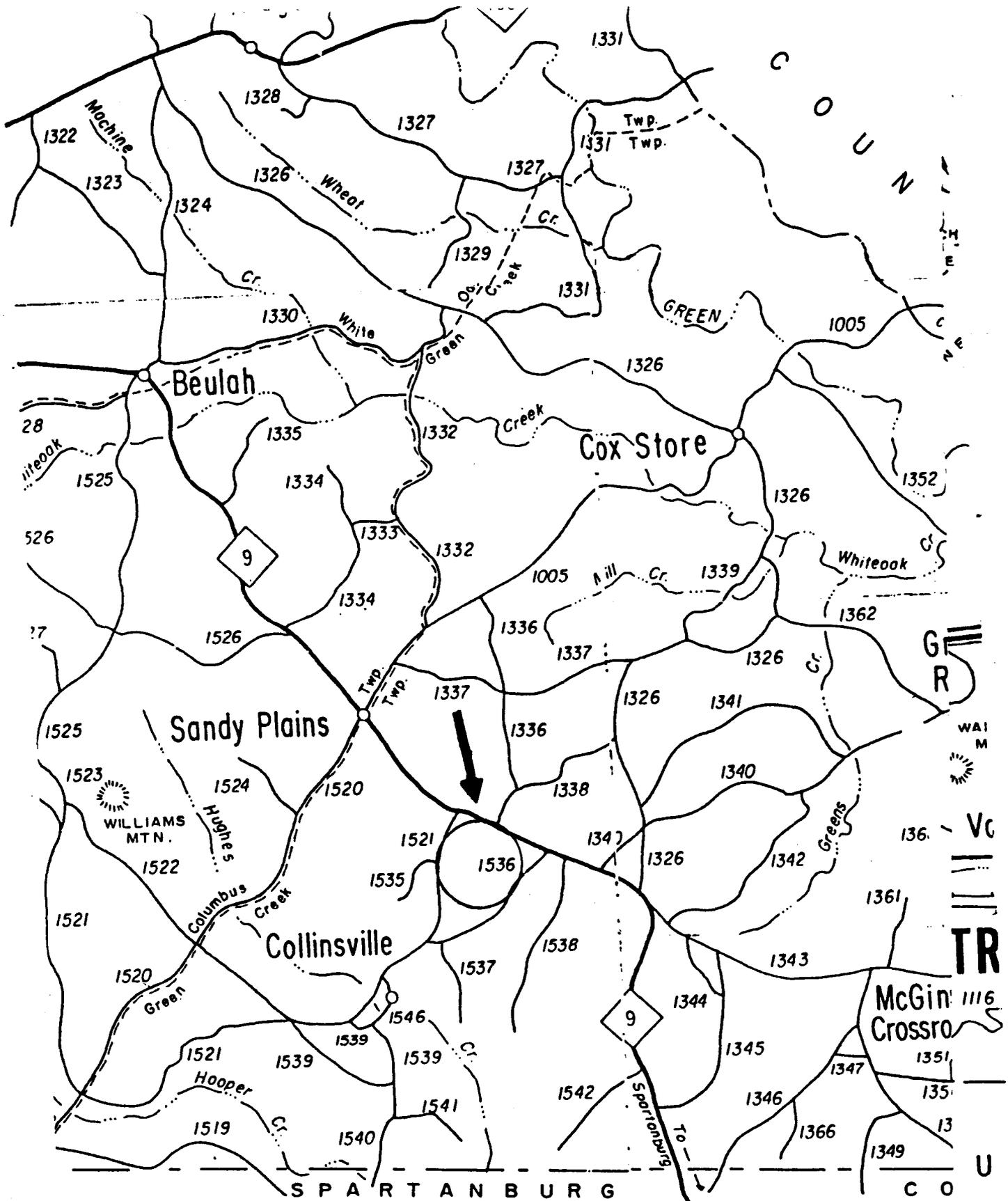
OWNERSHIP: Private

COMMENTS:

The ridge/slough/depression topography of the streamside flats here provide a striking visual effect. At first glance one assumes that this unusual topography has been created artificially, possibly by sand-robbing. That it is in fact a naturally created topography due to the high erodibility of the soils is confirmed by the occurrence of similar, though less extreme, examples at other nearby sites in Polk County and the high erodibility of Pacolet soils in general.

This site has been assigned a significance of A (State), but it may prove to be of national significance if the topography and geomorphology are as rare and unusual as they seem to be.

REFERENCES: Rayner (1992a)



Kross Keys Natural Area
(NC-P1)

SITE NAME: Green River Plantation

SITE NUMBER: NC-P2

Size: ca. 75 acres

SITE SIGNIFICANCE: A (STATE)

LOCATION: Eastern Polk County, near the Rutherford County line; the site is about one-third mile northeast from Cox Store (junction of SR-1352 and SR-1005).

QUAD MAP(S): Pea Ridge

SIGNIFICANCE:

1. Excellent populations of two plant species whose range in North Carolina is nearly confined to Polk County, whorled horsebalm (*Collinsonia verticillata*) and Allegheny spurge (*Pachysandra procumbens*).

2. A small, but high-quality example of a Basic-Mesic Forest - Piedmont Subtype. The forest within the primary ecological site boundary is basically old growth.

3. Other noteworthy species here include ginseng (*Panax quinquefolius*), wahoo (*Euonymus atropurpureus*), scentless mock orange (*Philadelphus inodorus*), and green violet (*Hybanthus concolor*).

GENERAL DESCRIPTION:

This site is comprised of the north-trending slopes associated with a rolling hill overlooking the Green River. The entire hill (maximum elevation, 930 feet; minimum, 760 feet) presently is undisturbed and undeveloped, but only the north-trending slopes are mature and harbor elements of concern. The Basic-Mesic Forest here is located on relatively steep (lower and mid) slopes, with an aspect of nearly due north. Canopy trees generally are quite large, and uneven-aged, and small canopy gaps of younger trees are present. As is typical of Basic-Mesic Forest, there is a well-developed canopy and subcanopy, a diverse shrub layer, and a dense and diverse herb stratum. The canopy is dominated by American beech (*Fagus grandifolia*), white oak (*Quercus alba*) and yellow poplar (*Liriodendron tulipifera*). Herbs and shrubs here that are indicative of Basic-Mesic Forest include green violet (*Hybanthus concolor*), baneberry (*Actaea pachypoda*), wild ginger (*Asarum canadense*), spreading bladder fern (*Cystopteris protrusa*), wahoo (*Euonymus atropurpureus*), and spice bush (*Lindera benzoin*). With over 700 plants counted, this is the largest population of Allegheny spurge (*Pachysandra procumbens*) in Polk County (and N.C.?). The 133 stems of whorled horsebalm, (*Collinsonia verticillata*)

counted here also make this the largest population of this rare herb in Polk County (and N.C. & S.C.?)

OWNERSHIP: Private

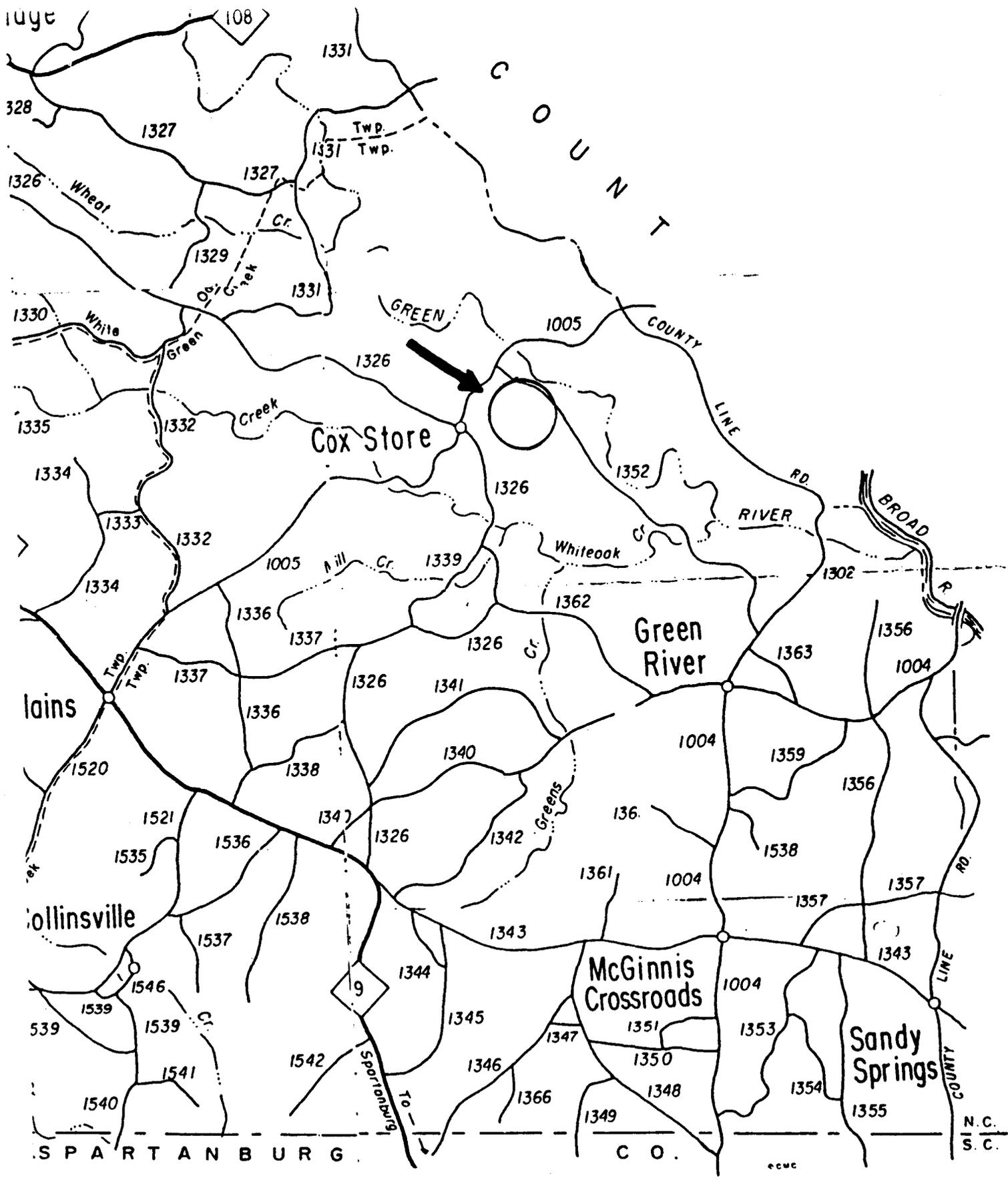
COMMENTS:

This site was formerly part of the Green River Plantation; it is now subdivided into 5 parcels (10 for the hill as a whole). An old jeep trail runs through the eastern portion of the site, and slopes are somewhat eroded in places. The former floodplain of the Green River north of the site is now in agricultural fields. Some weedy species are present along the site's border with SR-1352, but invasion of weedy species into the site does not appear to be a serious threat. Residential development probably is a serious threat.

This site is listed here as of statewide significance. The site's main significance is derived from the presence of whorled horsebalm (*Collinsonia verticillata*) and Allegheny spurge (*Pachysandra procumbens*). Both species are essentially confined in N.C. to Polk County. Whorled horsebalm could be described as locally abundant in Polk County since nearly 20 new populations were found in the course of this study. However, populations tend to be very small and the total number of populations globally still probably is less than 50. If the status of whorled horsebalm is downgraded, this site may drop to regional or county-wide significance.

This is the likely site of O.M. Freeman's Collection #5660 of Allegheny spurge, "One mile E. of Cox Store at the Green River, on the property of the Green River Plantation."

REFERENCES: Rayner (1992 b)



Green River Plantation
(NC-P2)

SITE NAME: Sandy Springs Church Springhead Swamp

SITE NUMBER: NC-P3

Size: ca. 16 acres

SITE SIGNIFICANCE: A (STATE)

LOCATION: Southeastern Polk County; ca one mile W 10 N from Sandy Springs (at the jct. of SR-1343 and SR-1101).

QUAD MAP(S): Fingerville East

SIGNIFICANCE:

1. This is the largest springhead swamp of its type in Polk County. Although the integrity of this natural community has been compromised somewhat, this is nonetheless the largest and best example of this rare Piedmont community type in Polk County. The North Carolina natural community that it fits best is Hillside Seepage Bog. Piedmont Seepage Forest, a natural community found in S.C., but that has not previously been described for N.C., is what this community would be called if it were in South Carolina.

2. This site harbors a good population of dwarf heartleaf (*Hexastylis naniflora*), a species that is federally-listed as threatened; green-fringed orchid (*Habenaria lacera*) was reported from the site in the 1950's.

GENERAL DESCRIPTION:

This site consists of a bowl-like streamhead flat nearly surrounded by gently-sloping uplands. Seepage exits the sandy uplands at the edges of the flat, creating a rather extensive seepage or springhead swamp and several seepage channels. Ridge and slough microtopography characterize the area as a whole, particularly where seepage is abundant. Large portions of the site, however, are raised 2-10 inches above the water table and thus are without standing water except following the heaviest of thunderstorms. As is often typical of areas on Pacolet and Cecil soils, seepage and stream flow are much more substantial than usually would be predicted based on the size of the watershed or drainage basin.

The canopy here is closed and is dominated by red maple (*Acer rubrum*), swamp tupelo (*Nyssa biflora*), yellow poplar (*Liriodendron tulipifera*), and ash (*Fraxinus* sp.) The subcanopy is poorly developed, but the shrub and vine layers are well-developed and diverse. Typical shrubs include alder (*Alnus serrulata*), Virginia willow (*Itea virginica*), elderberry (*Sambucus candensis*), wild raisin (*Viburnum nudum*), and red chokeberry (*Sorbus arbutifolia*). Bamboo briar (*Smilax laurifolia*) is the common vine, forming impenetrable thickets in places. Ferns are the dominant

herb cover, with netted chain-fern (*Woodwardia areolata*) and cinnamon fern (*Osmunda cinnamomea*) predominating. Dwarf-flowered heartleaf (*Hexastylis naniflora*) also is abundant on upland ecotones and hummocks or flats between seepage channels.

A number of weedy herbs (and shrubs) are invading from disturbed upland margins.

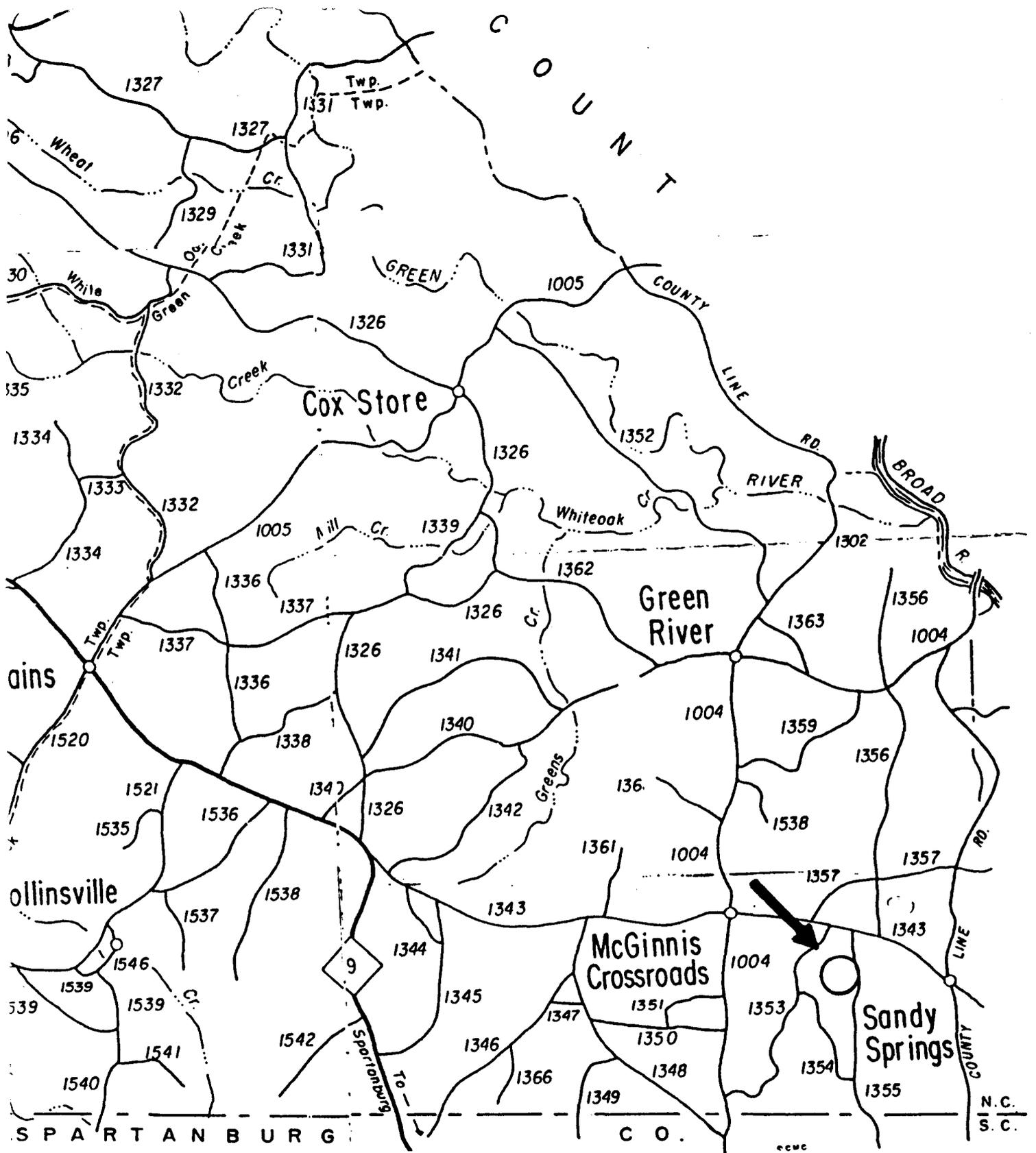
OWNERSHIP: Private

COMMENTS:

The natural community in the lowlands here really doesn't fit any of the communities described in Schafale and Weakley's "Classification of Natural Communities of North Carolina." It is described by Rayner (1992 d) as a Swamp Forest - Bog Complex, but could as easily be described as Hillside Seepage Bog. The term "springhead swamp" seems to describe it most accurately. It best fits the community described in S.C. (Nelson 1986) as Piedmont Seepage Forest.

The springhead swamp here is in good condition and quality except for the invasion of weedy herbs and shrubs from parts of the upland and a long narrow cattle pond that has been dug out of the west margin. Control of weedy species, such as Virginia creeper (*Parthenocissus quinquefolia*), Japanese honeysuckle (*Lonicera japonica*), blackberry (*Rubus* sp.), muscadine (*Vitis rotundifolia*), periwinkle (*Vinca minor*), English ivy (*Hedera helix*), and common privet (*Ligustrum vulgare*), will be a major management objective. The potential negative effect of cattle grazing the adjacent uplands needs to be assessed; nutrient input may be a problem, now or in the future. A forested, weed-free uplands buffer zone is needed around the entire wetlands system.

REFERENCES: Rayner (1992 d).



Sandy Springs Church
 Springhead Swamp
 (NC-P3)

SITE NAME: Rotten Creek Headwater Slopes

SITE NUMBER: NC-P4

Size: ca. 150 acres

SITE SIGNIFICANCE: B (REGIONAL)

LOCATION: Northwestern Polk County; ca 2.5 miles west of Sunny View (on N.C.9).

QUAD MAP(S): Mill Spring

SIGNIFICANCE:

1. A medium-sized population, consisting of eight scattered colonies, of white irisette (*Sisyrinchium dichotomum*) occurs here. White irisette is Federally-listed as an endangered species, and the heart of this species' range is Polk County.

2. A good-sized population of whorled horsebalm (*Collinsonia verticillata*) occurs here. This species' range in N.C. is all but limited to Polk County. Although many populations of this species have been documented by this author recently in Polk County, the populations are always very small. The heart of this species range also appears to be Polk County.

GENERAL DESCRIPTION:

This site consists of the lower, south-trending slopes of a NE-SW-trending ridge on Pacolet sandy loam or Pacolet sandy clay loam soils. The sand in these soils makes them somewhat droughty, producing in places the "thin woods" that often are characteristic habitat for white irisette (*Sisyrinchium dichotomum*). The thin woods here consist of a closed canopy (but with considerable amounts of filtered light) and poorly developed subcanopy, shrub and herb layers. Canopy dominants include white oak (*Quercus alba*), yellow poplar (*Liriodendron tulipifera*), and red maple (*Acer rubrum*). Sourwood (*Oxydendrum arboreum*) and flowering dogwood (*Cornus florida*) dominate the subcanopy, sweet shrub (*Calycanthus floridus*) is the most important shrub species, and a variety of dry-mesic herbs are present, especially a bluet (*Houstonia purpurea*) and a flea-bane (*Erigeron pulchellus*). Several observations suggest that the soil in the small pockets with significantly-rare species is richer than expected, including the dominance of the canopy by white oak (*Quercus alba*) rather than chestnut oak (*Quercus prinus*) and the occurrence of whorled horsebalm (*Collinsonia verticillata*). Significantly-rare plants here typically occur on due south slopes on the ridge between the forks of small streams; such areas typically have an abundance of exposed soil patches.

Pacolet soils, usually (as here) are the source of seepage streams whose water

flow typically is much greater than expected for the size of the area drained. Seepage bogs here are quite disturbed. These bogs may be worth restoring to undisturbed condition.

OWNERSHIP: Private

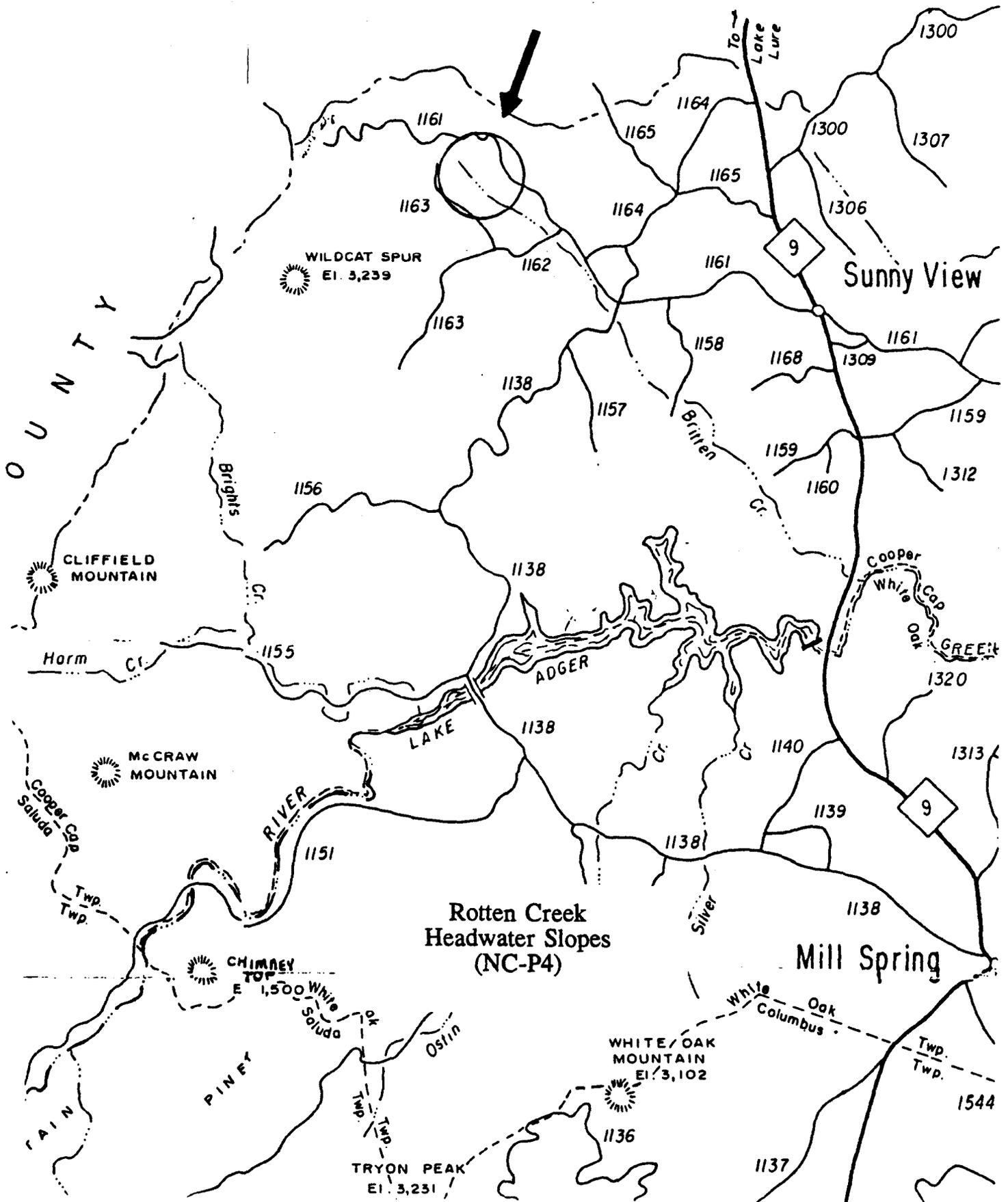
COMMENTS:

The natural community here doesn't seem to fit any described category particularly well. It is described by Rayner (1992 e) as a Dry-Mesic Oak-Hickory forest. White irisette typically occurs in the Basic Oak-Hickory Forest community type, but the presence of the acid-loving sourwood (*Oxydendrum arboreum*) is good evidence that this is not a Basic Oak-Hickory Forest community.

Lands to the east are in pasture and cows have ready access to the lower slopes. Slopes with significantly-rare species are steep enough to preclude access by cows. Active management is not needed for the significantly rare species or the natural community found here.

The presence of a high quality population of a Federally-listed species (white irisette) with fewer than 5 known populations globally (G_1), suggests a significance at the state and possibly the national level.

REFERENCES: Rayner (1992 e)



SITE NAME: Camp Bethlehem Rich Woods

SITE NUMBER: NC-P5

Size: ca. 22 acres

SITE SIGNIFICANCE: A (STATE)

QUAD MAP(S): Pea Ridge

LOCATION: East-central Polk County, ca. 3 miles ESE from Pea Ridge.

SIGNIFICANCE:

1. The significance of this site derives mainly from the presence of rare plant species. This is the only known occurrence of golden-seal (*Hydrastis canadensis*) in Polk County, and is one of fewer than 20 statewide. This species is listed as endangered/special concern in North Carolina. Bent white trillium (*Trillium flexipes*) is known only from historic records in North Carolina. This site is probably the site of the historic report by O. M. Freeman (Collection number 5819: three miles southeast of Pea Ridge on a cool valley slope; Polk County). This is the same locality that Freeman gave for his collection of *Hydrastis canadensis*. I was unable to verify the presence of this trillium. Several small colonies of ginseng (*Panax quinquefolius*) also are present .

GENERAL DESCRIPTION:

This site consists of part of an east-facing bluff above Wheat Creek and part of a north-facing bluff on a tributary of Wheat Creek. The base of the E-facing bluff is short but quite steep, and it is here and on the adjacent upland flat that a rich Basic-Mesic Forest occurs, along with most of the significantly-rare plant species. The closed, uneven-aged canopy is dominated by yellow poplar (*Liriodendron tulipifera*), red oak (*Quercus rubra*) and yellow buckeye (*Aesculus octandra*). The subcanopy is dominated by flowering dogwood (*Cornus florida*) and bladdernut (*Staphylea trifolia*). The well-developed and diverse shrub layer is dominated by pawpaw (*Asimina triloba*) and spicebush (*Lindera benzoin*). The herb layer is dense and diverse, and in addition to the significantly-rare species mentioned above, it harbors such species as nodding trillium (*Trillium rugelii*, a "Watch List" species), false Solomon's seal (*Smilacina racemosa*) and black cohosh (*Cimicifuga racemosa*). The quality and condition of this community is good, but the canopy is quite young and the slopes are somewhat eroded.

A good quality Mesic Mixed Hardwood Forest community occurs on the N-facing bluffs at the site. This forest is somewhat more mature than the Basic-Mesic Forest, and beech (*Fagus grandifolia*) is the dominant canopy species. The shrub and herb layers here are dense and diverse, but do not include species characteristic of

Basic-Mesic Forests, such as golden-seal (*Hydrastis canadensis*) and green violet (*Hybanthus concolor*).

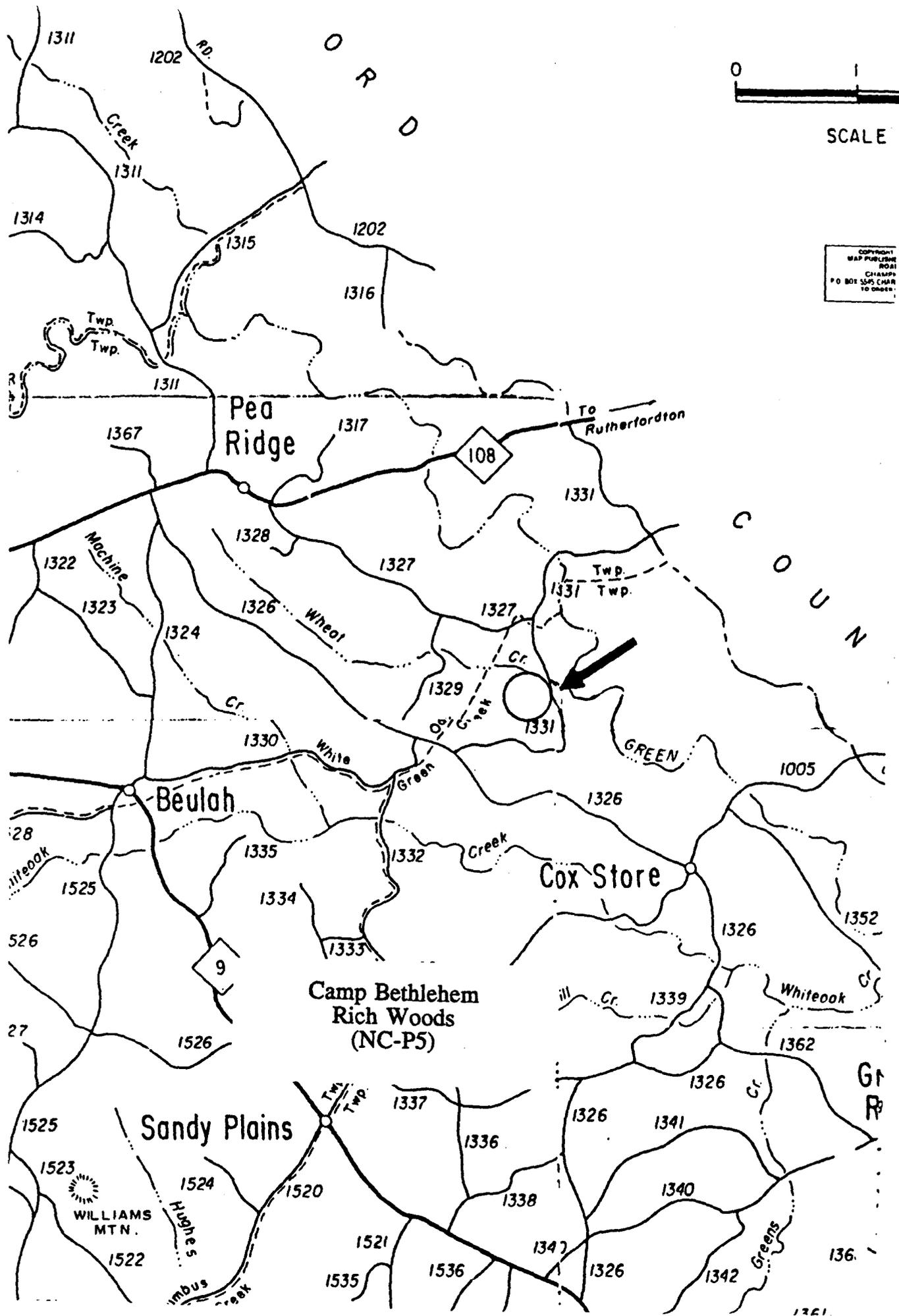
Although Basic-Mesic Forest is not rare in North Carolina, this is one of the few examples in Polk County and is the only one with golden-seal.

OWNERSHIP: Private

COMMENTS:

The woodlands north and east of this site were clear-cut less than 8-10 years ago. These woods are now a jungle of vegetation. The flat at the base of the E-bluff has been negatively impacted by the invasion of weedy species from the adjacent clear-cut. Management of weedy species may be the only real management concern at this site. Weedy species also are very abundant above the crossing of the unnamed tributary of Wheat Creek and SR-1331.

REFERENCES: Rayner (1992h)



SITE NAME: New Hope Springhead Swamp

SITE NUMBER: NC-P6 **Size:** ca. 85 acres

SITE SIGNIFICANCE: A (STATE)

LOCATION: Southeastern Polk County, near the Rutherford County line; ca. 3/4
mile NNW from Sandy Springs.

QUAD MAP: Fingerville East

SIGNIFICANCE:

1. This is a very good, large example of a somewhat unusual Piedmont natural community. The North Carolina natural community that it fits best is Hillside Seepage Bog. Piedmont Seepage Forest, a natural community found in S.C., but that has not previously been described for N.C., is what this community would be called if it were in South Carolina. The forest community here is undisturbed and quite mature.

2. Dwarf-flowered heartleaf (*Hexastylis naniflora*), a plant species that is Federally-listed as threatened, occurs here in abundance.

GENERAL DESCRIPTION:

This site consists of a springhead swamp (Piedmont Seepage Forest) at (near) the head of an unnamed branch of McKinney Creek. The main stream channel is naturally and deeply eroded and fingers of seepage drain small upland valleys. Swamp forest-bog habitat varies from a narrow fringe along the main stream channel to more than 200 feet in width; it is broadest where fingers of seepage join the main seepage stream. The springhead swamp here is nearly level and is quite hummocky where seepage is plentiful. Soils here are a mixture of hydric (Roanoke) and non-hydric (Dogue) soils. The plant species here are mostly those indicative of hydric, or at least periodically wet, conditions. Pockets of constantly-wet seepages are intermixed with areas that have waterlogged soils only following heavy rains. The wettest portions of the swamp are dominated by red maple (*Acer rubrum*) and swamp tupelo (*Nyssa biflora*). Sweetgum (*Liquidambar styraciflua*) and yellow poplar (*Liriodendron tulipifera*) are also present in the drier swamp flats, where swamp tupelo is absent. Poison sumac (*Rhus vernix*) and bamboo briar (*Smilax laurifolia*) are distinctive species in the wet swamp, and Virginia willow (*Itea virginica*), climbing hydrangea (*Decumaria barbara*), partridge berry (*Mitchella repens*), and netted chain-fern (*Woodwardia areolata*) are distinctive and important components of the drier swamp flats.

The swamp is bounded by relatively gently-sloping uplands on Pacolet sandy clay loam soil. Pacolet soils typically are associated with seepage at slope bases and with acid-loving communities. Only a narrow strip of undisturbed uplands bounds the swamp here; Dry-Mesic Oak-Hickory Forest community is present in general, and Piedmont/Coastal Plain Heath Bluff (Piedmont Acidic Cove Forest) is present in places.

OWNERSHIP: Private

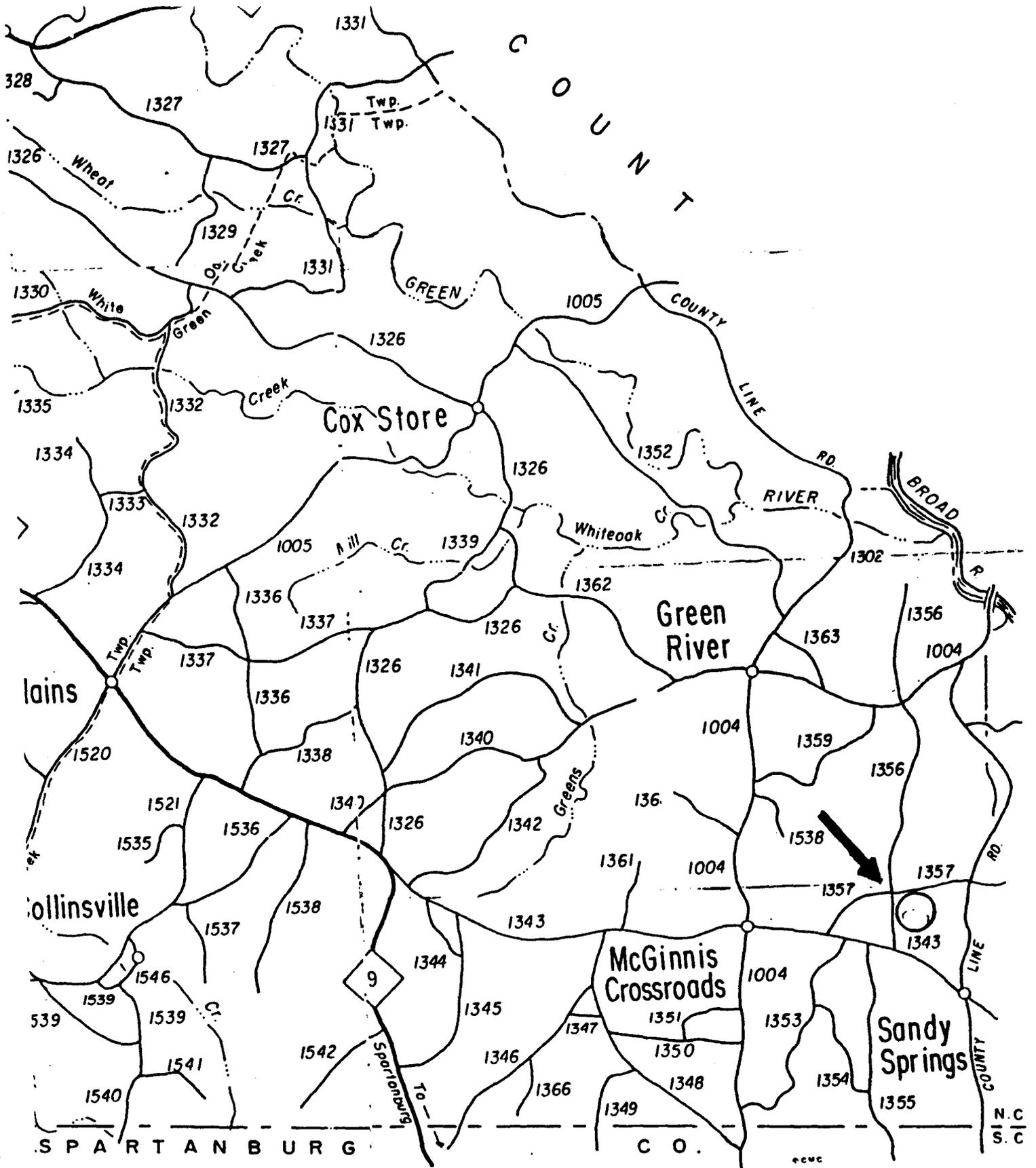
COMMENTS:

This site is nearly completely surrounded by fields and rural residential development. Only a narrow border of undisturbed uplands bounds the swamp forest-bog; this is bordered by a somewhat wider zone of young pine-hardwoods that are very weedy, and this zone is bounded by cleared fields.

The northeastern site boundary has been invaded by a variety of weedy herbs and shrubs, including Japanese honeysuckle (*Lonicera japonica*), English ivy (*Hedera helix*), periwinkle (*Vinca minor*), poison ivy (*Rhus radicans*), and common privet (*Ligustrum sinense*). Common privet also is scattered throughout the swamp, but is generally not abundant. Management of weedy species may be the major management concern at the site. An adequate upland buffer will be needed to keep weedy species out of the ecologically significant swamp habitat.

Rayner (1992i) describes the swamp-bog here as a Hillside Seepage Bog, as per the "Classification of the Natural Communities of North Carolina" by Schafale and Weakley (1990). The natural community here really doesn't fit well any of the natural communities described by Schafale and Weakley, and is best described as Piedmont Seepage Forest as per Nelson (1986) for S.C.

REFERENCES: Rayner (1992i)



New Hope
Spring Head Swamp
(NC-P6)

SITE NAME: Big Level Natural Area

SITE NUMBER: NC-P7

Size: ca. 40 acres

SITE SIGNIFICANCE: B (REGIONAL)

QUAD MAP(S): Mill Spring

LOCATION: Northwestern Polk County; ca. 2.25 miles WSW from Sunny View; just north of the junction of SR1161 and SR1313.

SIGNIFICANCE:

1. This site harbors an excellent population of the rare shrub *Nestronia umbellula*. It is the second largest population in the Pacolet Area. One of the few Piedmont populations of *Magnolia virginiana* (sweet bay) also occurs here.

2. The two main plant communities here, Dry Oak-Hickory Forest and Piedmont Acidic Cove Forest, are rather young, but they are good in quality and condition.

GENERAL DESCRIPTION:

This site consists of the gently-sloping, north-trending ridges and moderately-sloping side slopes along an intermittent stream. Surface soil layers are quite sandy and acidic. Because the site is on Pacolet soils (Pacolet sandy loam), the stream here has much higher water flow than would be expected from the size of the area drained. The stream here is basically fed by seepage through the sandy upland soils and along a relatively impervious clay layer. *Nestronia* is found in the Dry Oak-Hickory Forest that occupies the upslope areas, especially a N/S-trending and gently-sloping ridge top. Dry oaks (scarlet, white, chestnut and southern red), mockernut hickory (*Carya tomentosa*), and some pines [Virginia pine (*Pinus virginiana*) and shortleaf pine (*Pinus echinata*)] dominate the closed canopy. Flowering dogwood, sourwood, black gum and persimmon dominate the subcanopy, and the relatively dense low shrub layer is codominated by blueberry (*Vaccinium pallidum*) and, in places, *Nestronia*. The herb layer is sparse. Species composition in this community is typical, except for the presence and abundance of *Nestronia*. The Piedmont Acidic Cove (my designation) here occupies a narrow zone along the intermittent stream and is unusual in that part of it occurs on a seepage slope. This community is quite scenic and aesthetically pleasing. Red maple and white oak dominate the canopy and a relatively dense shrub layer of mountain laurel is present. Several typical Coastal Plain seepage slope species, including sweet bay (*Magnolia virginiana*) and red chokeberry (*Sorbus arbutifolia*), are found here; this is unusual for the Piedmont.

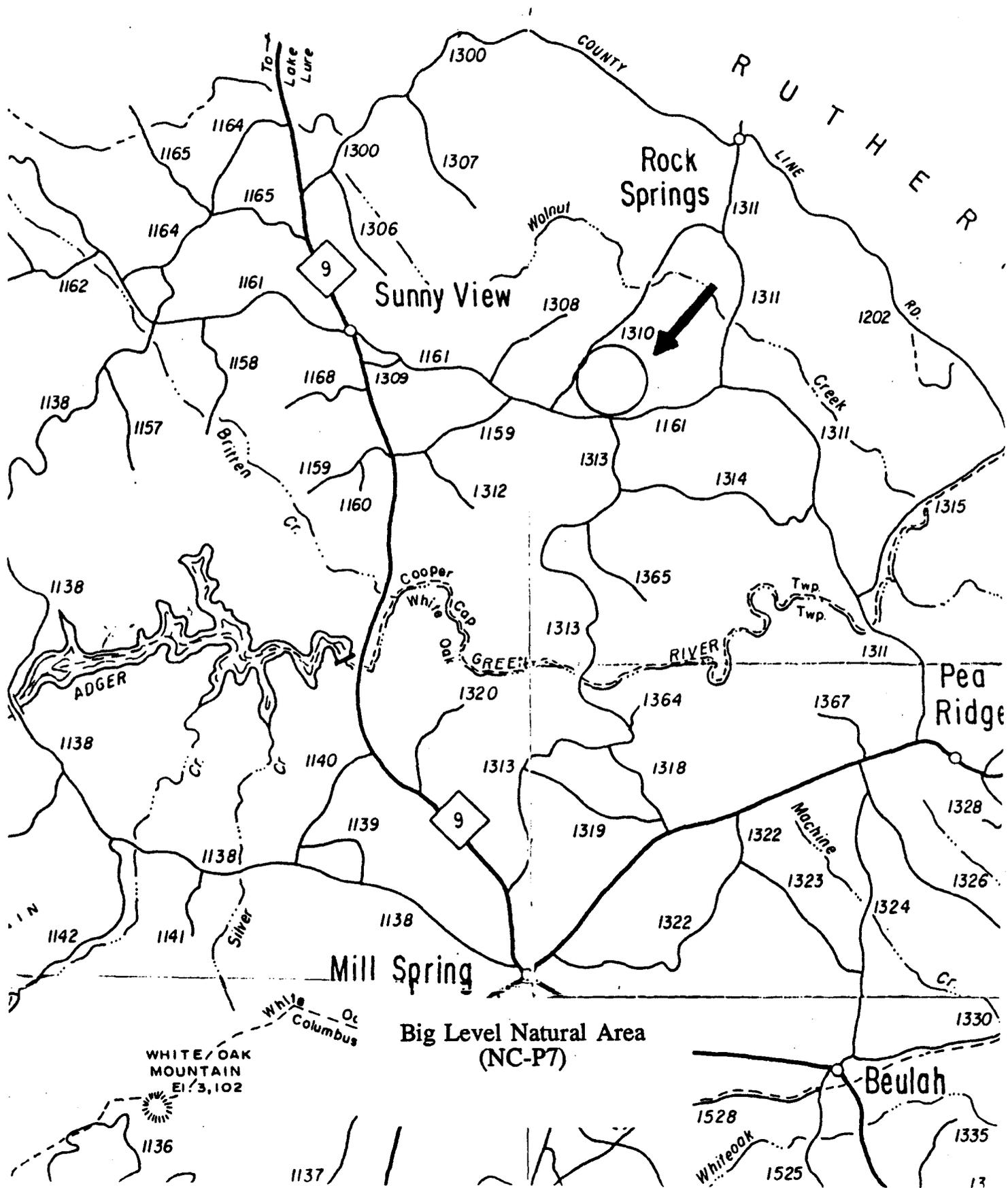
OWNERSHIP: Private

COMMENTS:

This natural area is surrounded on three sides by residential development, including a new home 100 yards south of the largest nestronia colony. Additional development could destroy this project. Even if this threat is prevented, the close proximity of homes will likely create unauthorized use that may be difficult to control. Conservation easement are the logical means for protecting this area.

Most nestronia plants here are infected with a fungus that causes stem die-back and ultimately death. In the smaller of the two nestronia colonies here I counted 78 living plants and 40 dead plants. Every population of nestronia that I have seen in the Carolinas in recent years has had at least some infestation with this fungus. This problem will require monitoring and possibly some active management.

REFERENCES: Rayner 1993h



Big Level Natural Area
(NC-PT)

WHITE OAK
MOUNTAIN
Elev. 3,102

Beulah

Rock Springs

Sunny View

Mill Spring

Pea Ridge

COUNTY RUTHER

LINE

Rd.

Creek

RIVER

Twp.
Twp.

Machine

Whiteoak

To
Lake
Lure

Walnut

Blitten
Cr.

Cooper
White Oak
GREEN

ADGER

Silver

White
Columbus

Cr.

13

SITE NAME: White Oak Creek Non-alluvial Wetlands

SITE NUMBER: NC-P8

Size: ca. 80 acres

SITE SIGNIFICANCE: C (COUNTY)

LOCATION: Eastern Polk County; ca. 3/4 mile southwest of Cox Store (Junction of SR 1005 and SR 1326).

QUAD MAP(S): Pea Ridge

SIGNIFICANCE:

1. This appears to be a unique juxtaposition of three natural community types, Basic Mesic Forest, Hillside Seepage Bog, and Swamp Forest-Bog Complex. The site has been given the lowest significance for which it qualifies. If the composition of the non-alluvial wetland here turns out to reflect the high base content of the surrounding uplands, then the significance of the site could be raised considerably. The site also will increase in significance with time, as the evidence of past logging disturbance becomes less apparent.

2. This is the largest and least disturbed non-alluvial wetland in Polk County.

GENERAL DESCRIPTION:

This site consists of a 10-15 acre, semi-permanently flooded, non-alluvial wetland and the associated N-trending slopes along White Oak Creek. This wetland appears to be a natural one created by blockage of the drainage of the area into White Oak Creek. The wetland is fed by several small seepage streams, each of which has a small pocket of Hillside Seepage Bog somewhere along it, at the seephead, or at the terminus of the seepage where it enters the primary wetland. The uplands comprise a U-shaped arrangement which surrounds the non-alluvial swamp on three sides, and it is likely that this arrangement of uplands facilitated the paludification that produced this wetland. The seepage stream that feeds the western portion of the wetland occurs on shallow soil over rock and is very gently sloping. A Hillside Seepage Bog about 200 feet long and 20-30 feet wide is found along this stream. The non-alluvial wetland here does not seem to fit any of the natural community descriptions for either N.C. (Schafale and Weakley 1990) or S.C. (Nelson 1986). It is described here as a Swamp Forest-Bog Complex, but this community is not supposed to include boggy openings greater than one acre in extent. This entire wetland is boggy (with semi-permanent water) and is about 10-15 acres in extent. The canopy here is quite open and low and is dominated by red maple (*Acer rubrum*), black willow (*Salix nigra*), and tag alder (*Alnus serrulata*). Ground cover is interspersed with smaller pockets of (shallow ?) open water. A wide variety of grasses, sedges and

broad-leaved herbs appears to be present, but a detailed survey was not conducted. This wetland may be a natural variant of the Piedmont/Mountain Semi-permanent Impoundment. The adjacent uplands are mostly occupied by a Basic Mesic Forest community dominated by a young canopy of white oak (*Quercus alba*), tulip poplar (*Liriodendron tulipifera*), American beech (*Fagus grandifolia*), and basswood (*Tilia* sp.). Flowering dogwood (*Cornus florida*), ironwood (*Carpinus caroliniana*), and slippery elm (*Ulmus rubra*) are important understory species, and spicebush (*Lindera benzoin*), pawpaw (*Asimina triloba*), and possum haw (*Viburnum* spp.) are dominant shrub species. Wahoo (*Euonymus atropurpureus*) is a somewhat unusual shrub found here. The herb layer is rich and diverse and includes such characteristic species as wild ginger (*Asarum canadense*), Jack-in-the-pulpit (*Arisaema triphyllum*), southern nodding trillium (*Trillium virgellii*), and Canada stoneroot (*Collinsonia canadensis*). Rare species found here include ginseng and green violet (*Hybanthus concolor*). The latter two species are on the N.C. plant "Watch List." The Hillside Seepage Bog communities here are small and not well developed, but they do harbor many characteristic species, including tag alder, Virginia willow (*Itea virginica*), wild raisin (*Viburnum nudum*), royal fern (*Osmunda regalis*), and New York fern (*Thelypteris novaboracensis*). The slaty-bottomed seepage stream (Low Elevation Seep?) is dominated by branch lettuce (*Saxifraga micranthidifolia*). No unusual species were found in this community.

OWNERSHIP: Private

COMMENTS:

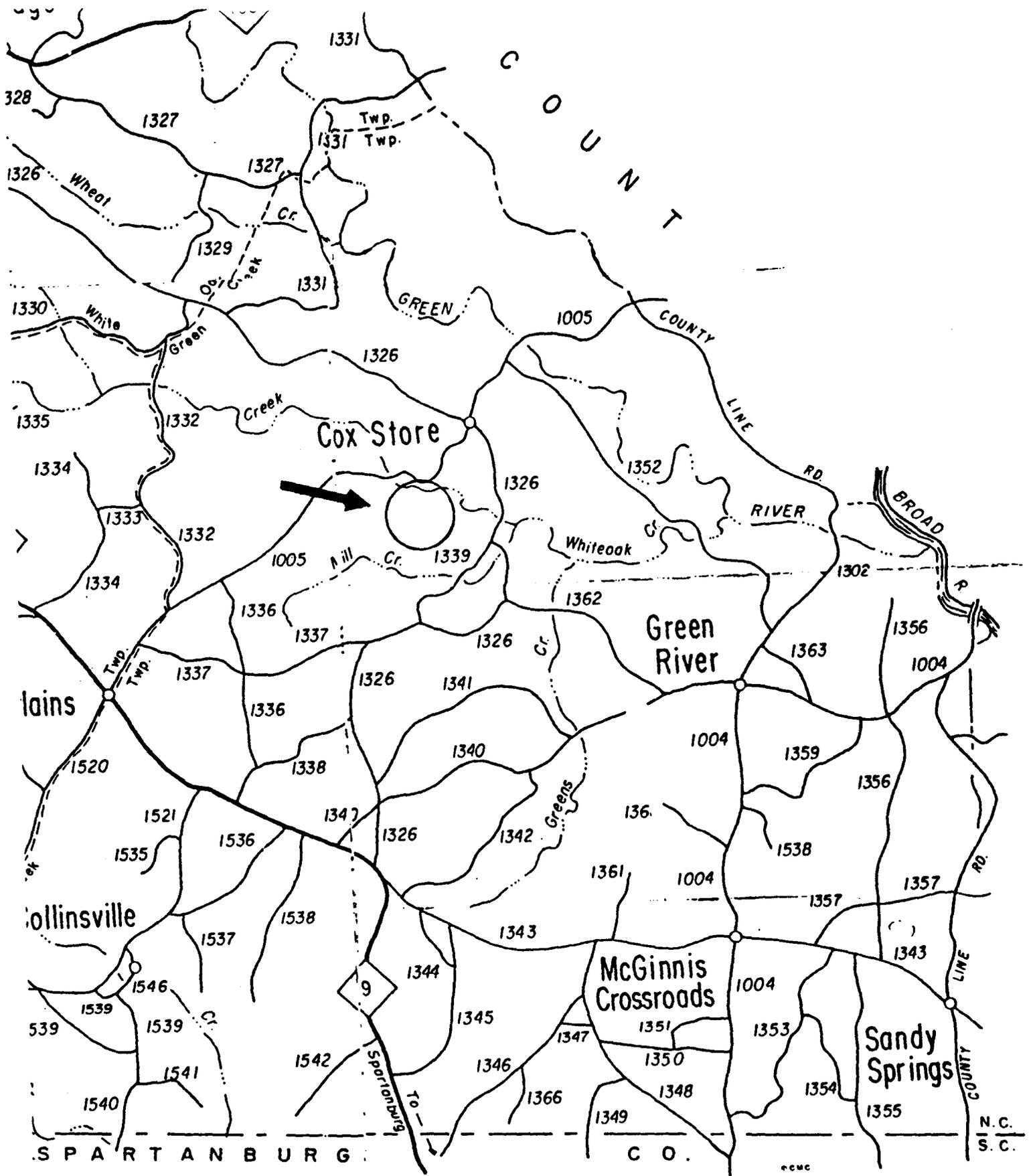
The significance of this site is somewhat difficult to access. First, this is likely the largest undisturbed non-alluvial wetland in Polk County and the Pacolet Area. As such it is worthy of protection. Second, this area appears to include a very unusual juxtaposition of community types. The significance of that juxtaposition is not completely known because no detailed survey of the wetlands has been completed. It does seem clear that the wetlands here do not seem to fit any of the natural community descriptions for N.C. or S.C. This in itself, however, does not give this area a high significance or a high priority for protection. It may be that this is just an unrecognized, but not uncommon or unique, community type. I have seen a few similar community types in the Piedmont of South Carolina in association with Piedmont Seepage Forest, habitats that harbor the federally-endangered bunched arrowhead (*Sagittaria fasciculata*). These communities too were the apparent result of natural blockage of drainage in nearly-level areas downslope from areas of nearly-permanent seepage. They too had a somewhat disturbed appearance resulting from the conversion of a former forest into a bog or bog/forest. They didn't harbor unusual species as did the adjacent uplands, but they were a natural community decidedly different in composition from the adjacent seepage forest or from man-made impoundments. Such is likely the case here. In S.C., however, the uplands were very acidic. In this case the uplands are basic or circumneutral in pH, and the

possibility exists that unusual species will be found here. If so, the significance of the site could be raised to State or possibly even National status, depending on the status of the associated species. At any rate, I know of only two such juxtapositions of communities in Polk County, and none in the remainder of the Pacolet Area. Third, assessment of significance is difficult because the forests here are quite young and show the obvious effects of past disturbance, especially logging. Evidence of past disturbance will fade with the passage of time and natural significance will increase.

Common privet (*Ligustrum sinense*) is very abundant in places at the wetland/upland ecotone. It needs to be controlled before it takes over the area. Poison ivy (*Rhus radicans*) is very abundant in places. It may prove difficult to control. Other than control of weedy species, no active management should be required here.

This site is mostly in a single ownership, so it may be possible to provide protection to the site, in spite of the fact that it is in an area that is undergoing some residential development.

REFERENCES: Rayner 1993i



White Oak Creek
 Non-alluvial wetlands
 (NC-P8)

SITE NAME: Green River Rich Slopes

SITE NUMBER: NC-P9

Size: ca. 30 acres

SITE SIGNIFICANCE: A (STATE)

LOCATION: Eastern (central) Polk County; ca. 1 1/3 mile east of Pea Ridge on N.C. highway 108.

QUAD MAP(S): Pea Ridge

SIGNIFICANCE:

1. This site harbors a good quality example of a rare natural community type, i.e. Basic Mesic Forest. A diverse and unusual assemblage of tree, shrub and herb species are present, as is typical for this community type. The site is undisturbed, at least where significantly-rare plants are located.

2. Numerous significantly-rare plants are present, including Allegheny spurge (*Pachysandra procumbens*), whorled horsebalm (*Collinsonia verticillata*), ginseng (*Panax quinquefolius*), mock orange (*Philadelphus* sp.), butternut (*Juglans cinerea*), wafer ash (*Ptelea trifoliata*), buck thorn (*Rhamnus caroliniana*) and chinquapin oak (*Quercus muehlenbergii*). Allegheny spurge ranges from Kentucky to Florida and Louisiana and is rare in much of its range. In N.C. and the Pacolet Area it is known only from Polk County; this is one of the best of the 7-8 Polk County populations. Whorled horsebalm is known from only four southeastern states, and it too is known in N.C. only from Polk County; it has been found to be locally abundant in Polk County, and a small population occurs here. Ginseng is known from over 100 populations in N.C. and more than 15 populations in Polk County. It is of concern because of its drastic decline in abundance due to commercial exploitation; it can be collected and sold under special regulations. The additional species mentioned above are all on the NHP's "Watch List."

GENERAL DESCRIPTION:

This site is in the rolling Piedmont Province and consists of a moderately-sloping bluff and associated slopes above the west bank of the Green River. A very narrow (or nonexistent) floodplain bounds the E-facing slope, and small unnamed tributaries bound the site to the north and south. Mid- and lower slopes are generally undisturbed. Some exposed rocks and boulder outcrops are present. The only forest community of interest here is a small but good quality example of a Basic Mesic Forest. All strata of this community reflect the fact that the soil is circumneutral. The canopy is composed of a wide diversity of species, including basswood (*Tilia* sp.), beech (*Fagus grandifolia*), white oak (*Quercus alba*), butternut, and slippery elm

(*Ulmus rubra*). The subcanopy is well-developed, and species that suggest high calcium soils include redbud (*Cercis canadensis*) and cucumber magnolia (*Magnolia acuminata*). The shrub layer also is well-developed, and calciphiles include spicebush (*Lindera benzoin*), buckthorn (*Rhamnus caroliniana*), wafer ash (*Ptelea trifoliata*), and mock orange (*Philadelphus* sp.). The herb layer is the most interesting aspect of the site, and it is very diverse (but not always dense). Species indicative of high-calcium soils include the rarities Allegheny spurge, ginseng, and whorled horsebalm, as well as lowland brittle fern (*Cystopteris protrusa*), false goatsbeard (*Astilbe biternata*), and silvery spleenwort (*Athyrium thelypteroides*). Calciphiles in the adjacent floodplain include enchanter's nightshade (*Circaea lutetiana* ssp. *canadensis*), and moonseed (*Menispermum canadense*). The upper east-facing slopes harbor most of the interesting species. The east aspect and the fact that the bluff is adjacent to a moderately-sized river give the site relatively high exposure. For those reasons the site is not quite as mesic as it might be if it were more sheltered. The herb layer generally is not dense, so the richness of the site is not immediately obvious, and it doesn't become obvious until one starts enumerating all the different species that make up the site.

OWNERSHIP: Private

COMMENTS:

Legrand (1989) reports chinquapin oak (*Quercus muehlenbergii*) as present here. I did not see any individuals of this species during my site visit.

This site does not appear to be immediately threatened, but it is threatened long-term both by residential development and logging activities. Access to the site presently is not easy, but that could be easily remedied with a bulldozer. The northern boundary is adjacent to cleared field, and the other boundaries are bounded by woodlands that have been cutover. Woodlands not far to the west, and under the same ownership as much of this site, are in pines. Protection efforts should begin immediately before uninformed, and possibly conservation-minded, landowners inadvertently destroy or seriously disturb the site. Active management of this site probably will be restricted to control of weedy species that inevitably will become more abundant as the adjacent lands are developed.

REFERENCES: Gaddy 1986, Legrand 1989, and Rayner 1993p.

SITE NAME: Mills Bridge Natural Area

SITE NUMBER: NC-P10

Size: ca. 75 acres

SITE SIGNIFICANCE: B (REGIONAL)

LOCATION: Northcentral Polk County; ca. 1.2 miles NNW of Pea Ridge.

QUAD MAP(S): Pea Ridge

SIGNIFICANCE:

1. Excellent populations of two special status species occur here, Allegheny spurge (*Pachysandra procumbens*) and whorled horsebalm (*Collinsonia verticillata*). Both of these species are confined to Polk County in N.C. This is one of the largest of the 7-8 populations of Allegheny spurge in Polk County (three colonies comprising an estimated 550 plants). Whorled horsebalm was found in nearly 20 locations in the course of this study. Although locally abundant in Polk County, it is known from only four southeastern states and is known globally from fewer than 50 populations.

2. Other noteworthy species here include butternut (*Juglans cinerea*), leatherwood (*Dirca palustris*), and doll's eye (*Actaea pachypoda*). The former two species are on the NHP's "Watch List," and doll's eye is rare in the Piedmont; all of these species are indicators of soils with higher-than- usual levels of calcium.

3. Basic Mesic Forest is a rare natural community in the Piedmont of both N.C. and S.C. This community is relatively common in Polk County. This occurrence is not a high quality example, either in terms of integrity or diversity of species. But, it still is worthy of protection, and the integrity of the site will improve with time.

GENERAL DESCRIPTION:

This site consists of the moderate to gently sloping north-trending slopes of a rolling Piedmont hill overlooking the Green River . Slopes directly overlook the Green River for a small distance and most of the slopes overlook a broad disturbed floodplain of the Green River. Several small streams, mostly intermittent, dissect the slopes. Soils in places are deep and rich and probably are nearly neutral in pH, based on species composition. Lenses of amphibolite are outcropped in many places in this vicinity in Polk County (Conley and Drummond 1975), but presence here is unverified. Trees here are very young; the area probably was logged 10-15 years ago and probably was once in pasture. An abundance of weedy species are present in places, but species composition in general in the Basic Mesic Forest is typical of similar, less-disturbed sites. This suggests that this area should recover from past disturbance. Tulip poplar (*Liriodendron tulipifera*), white oak (*Quercus alba*), red oak

(*Q. rubra*), and basswood (*Tilia* sp.) dominate the closed canopy. Subcanopy trees include sourwood (*Oxydendrum arboreum*), ironwood (*Carpinus caroliniana*), and cucumber tree (*Magnolia acuminata*). Shrubs are quite abundant and include buckeye (*Aesculus sylvatica*), spicebush (*Lindera benzoin*), mapleleaf viburnum (*Viburnum acerifolium*), and hazelnut (*Corylus americana*). Herb cover is moderately dense and quite diverse, including several species that are indicators of high-calcium soils. The base of the north-trending slopes are the richest areas, and it is here that most of the rare plants are found, including Allegheny spurge, whorled horsebalm, doll's eye, and butternut. A narrow band of heath bluff directly overlooks the Green River for a short distance, and more Basic Mesic Forest occurs above the heath bluff. In the northeastern portion of the site a narrow band of Piedmont/Low Mountain Alluvial Forest bounds the uplands near the mouth of a small stream. Here a small population of leatherwood occurs.

OWNERSHIP: Private

COMMENTS:

The young canopy and other evidence of recent disturbance detract from the natural significance of the area, as well as lessening the site's aesthetic appeal. Improvement in both regards should only be a matter of time.

Much of the northern project boundary is adjacent to agricultural fields on a former floodplain of the Green River, woodlands east of the project are in young planted pine, and a powerline R-O-W cuts through the eastern portion of the site. These disturbed areas provide ample sources of weedy species that might invade the site. Some areas are having problems with cow-itch (*Campsis radicans*) and/or Japanese honeysuckle (*Lonicera japonica*). Control of weedy species may be a management concern.

REFERENCES: Rayner 1993t

SITE NAME: Chestnut Ridge

SITE NUMBER: SC-P1

Size: 325 acres

SITE SIGNIFICANCE: A (STATE)

LOCATION: Northeastern Greenville County; about 22 miles NE of Greenville; the central portion of the ridge, and the area of greatest interest, is ca. 6625 ft. W 70 N from Blue Ridge Church.

QUAD MAP(S): Saluda

SIGNIFICANCE:

1. The primary significance of this site derives from the presence of several significantly rare plant species. This site harbors one of only three known populations in S.C. of the federally endangered white irisette (*Sisyrinchium dichotomum*). This also is one of only a few S.C. localities for southern thimbleweed. (*Anemone berlandieri*) and is the only recently verified population. Other plant species of note here include broadleaf coreopsis (*Coreopsis latifolia*), ginseng (*Panax quinquefolius*), butternut (*Juglans cinerea*) southern nodding trillium (*Trillium rugelii*) and lobed spleenwort (*Asplenium pinnatifidum*).

2. This rich, diverse forest community on S-facing slopes is a very unusual community for South Carolina. It probably best fits the Basic Oak-Hickory Forest (Calcareous Substrate Variant) type as described for North Carolina (Schafale and Weakley 1990). This is a forest type that at present is undescribed for S.C., i.e. it is not included in Nelson (1986), "The Natural Communities of South Carolina."

GENERAL DESCRIPTION:

Chestnut Ridge is an east-west trending ridge adjacent to the South Pacolet River. Slopes of greatest interest are south-facing, and only the south-trending slopes are included in the recommended project boundary. The ridge is dissected by a series of small streams. A few small granitic outcrops are scattered on the slopes, and water-slides occur on two of the larger streams. Soils apparently are near neutral in pH, at least in places, as suggested by the species composition, dense herb cover and one pH reading of 8.0 (Bert Pittman, S.C. Heritage Program, personal communication). Only the small cove near the center of the site (Community 1) has been examined and described in detail. This area probably is best described as a Basic Oak-Hickory Forest. It contains an unusual mix of base-loving species, as well as mesic and submesic species. The canopy is well developed, though not particularly mature, and is dominated by yellow poplar (*Liriodendron tulipifera*), bitternut hickory (*Carya cordiformis*), beech (*Fagus*

grandifolia) and white oak (*Quercus alba*). The subcanopy is poorly developed and is noteworthy for its absence of sourwood (*Oxydendrum arboreum*). The absence of sourwood in the subcanopy and blueberry (*Vaccinium* spp.) species in the shrub layer is one of the characteristics that defines the Basic Oak-Hickory Forest community type. The shrub cover is well developed and diverse, with species such as pawpaw (*Asimina triloba*) and spice bush (*Lindera benzoin*) predominating. Herb cover generally is dense and thick, with notable species such as white irisette, southern thimbleweed, ginseng and nodding trillium (*Trillium rugelii*).

Cursory field surveys of other parts of the site resulted in the discovery of additional species of concern and additional pockets of rich woods on S-facing slopes. Lobed spleenwort (*Asplenium pinnatifidum*) was reported by a reliable source (Ivan Kuster, Tryon, NC), but no voucher specimens are available, and the author has not seen the species here. Additional surveys are needed to further verify the significance of proposed project lands outside the boundary of the Basic Oak-Hickory Forest.

OWNERSHIP: Private

COMMENTS:

The quality and integrity of the site is good but not excellent. Evidence of past disturbance include old logging roads and at least one old homesite. Parts of the site at or near the crest of the ridge have been subjected to ground fire, probably from past lightning strikes.

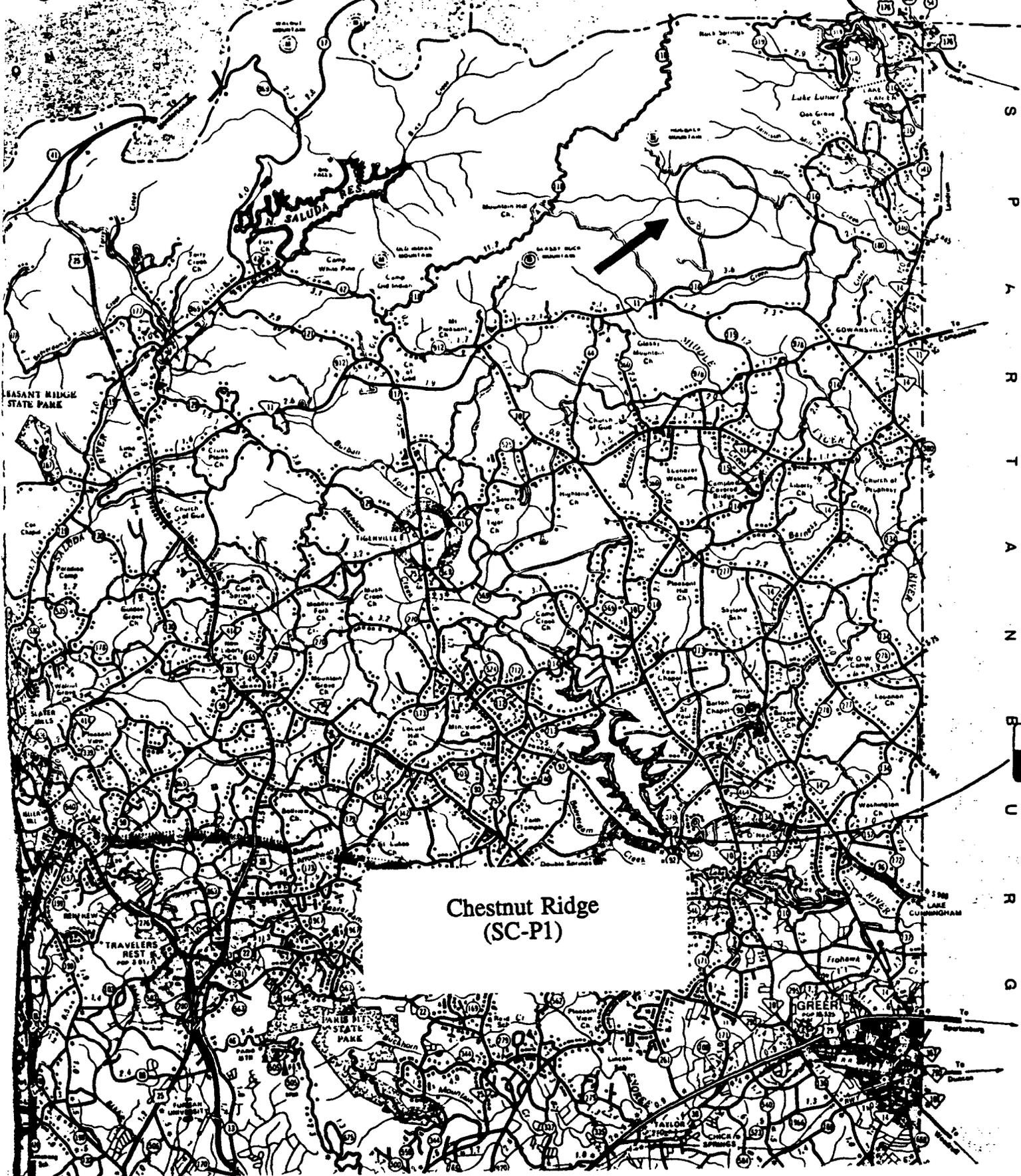
The headwaters of the South Pacolet River on Greenville Water System lands has been described as a significant part of the North Saluda Watershed site. Although not impressive in terms of forest maturity, the entire South Pacolet River watershed, from below Chestnut Ridge to highway SR-16 (SR-118 on old maps), may be worthy of protection. Parts of this watershed have been clear-cut recently, and clear-cutting is a potential threat to Chestnut Ridge and the remainder of the watershed.

Some aggressive, weedy species are present, such as *Microstegium vimineum*, princess tree (*Paulownia tomentosa*), and tree of heaven (*Ailanthus altissima*). Control of this "biological pollution" may be an important part of future management efforts.

Although this site has been given a significance designation of state or statewide, the presence of a federally endangered species, white irisette, with fewer than twenty populations known globally, suggests that this site could be considered to be of national significance.

REFERENCES: Rayner (1992 c)

C A C O U N T Y L I N A
P O L K C O U N T Y



Chestnut Ridge
(SC-P1)

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SITE NAME: Branch Creek Natural Area

SITE NUMBER: SC-P2

Size: 43 Acres

SITE SIGNIFICANCE: A (STATE)

LOCATION: Northwestern Spartanburg County, about 2 miles due south of the center of Landrum.

QUAD MAP(S): Landrum

SIGNIFICANCE:

1. The significance of this site derives mostly from the presence of significantly rare plant species. Dwarf-flowered heartleaf (*Hexastylis naniflora*), a federally threatened species, is present in a very good to excellent population. *Nestronia* (*Nestronia umbellula*) is a candidate (C₂) for federal listing as an endangered or threatened species. This is one of only two sites in S.C. with both dwarf-flowered heartleaf and *nestronia*. A small population of whorled horsebalm (*Collinsonia verticillata*) is located here. This species is endemic to the southeastern U.S. and is known from fewer than 10 sites in S.C. and perhaps 30 sites in N.C.

2. This is a good example of a Piedmont/Coastal Plain Heath Bluff community, a community probably better described as a Piedmont Acidic Cove Forest.

GENERAL DESCRIPTION:

This site consists of the moderately-sloping, northward-facing slopes and ridge top of a rolling Piedmont hill. Seepage is present in places at the base of the slopes and a swamp-bog complex is present at the junction of Branch Creek and an unnamed stream at the base of the slopes here. Dwarf-flowered heartleaf (*Hexastylis naniflora*) is found toward the base of the slopes, especially on hummocks adjacent to small seepage bogs. Acid soils and seepage are typically associated with Pacolet sandy loam soils on N-trending slopes. The Piedmont Heath Bluff community here has a closed canopy of white oak (*Quercus alba*), beech (*Fagus grandifolia*) and tulip popular (*Liriodendron tulipifera*). Flowering dogwood (*Cornus florida*), sourwood (*Oxydendrum arboreum*) and American holly (*Ilex opaca*), dominate the well-developed subcanopy, and mountain laurel (*Kalmia latifolia*) and dog-hobble (*Leucothoe axillaris*) dominate the often thick shrub zone. Herbs are sparse to moderate, with partridge berry (*Mitchella repens*), Christmas fern (*Polystichum acrostichoides*) and dwarf-flowered heartleaf predominating. The quality and condition of this community is quite good.

Nestronia occurs in a Dry Oak-Hickory Forest that has a young canopy and is

somewhat disturbed. Blueberries (*Vaccinium stamineum* and *V. pallidum*) dominate the well developed shrub layer, and muscadine (*Vitis rotundifolia*) is the predominant ground cover species. The canopy, of course, is dominated by oaks and hickories typical of dry woodlands.

Whorled horsebalm occurs in a small evergreen-free zone toward the base of a N-slope at the junction of the unnamed stream with Branch Creek; soil is probably not nearly as acidic here as in other parts of the site.

OWNERSHIP: Private

COMMENTS:

The Swamp Forest-Bog Complex was not surveyed in much detail and so is not included in its entirety in the proposed project area.

The two *nestronia* colonies here are quite near (200-300 ft.) a clearing associated with a rural residence. As with most *nestronia* populations, no fruits were seen here, and the plants were suffering from a fungus that causes stem die-back. Intervention may be needed to control this disease.

Since this site is in a rural residential area, problems may arise from unauthorized use of the area, e.g. campfires, off-road vehicles etc.

REFERENCES: Rayner (1992 f)

SITE NAME: Ingleside Seeps and Bluffs

SITE NUMBER: SC-P3 **SIZE:** ca. 50 acres

SITE SIGNIFICANCE: A (State)

LOCATION: Northwestern Spartanburg County; ca. 1.4 miles SSE from the center of Landrum; 3800 ft. NW from the junction of SR-209 and US 176 in Ingleside.

SIGNIFICANCE:

1. The significance of this site derives primarily from the presence of two significantly rare plant species. Dwarf-flowered heartleaf (*Hexastylis naniflora*), a plant species federally listed as threatened, is present in abundance. *Nestronia* (*Nestronia umbellula*), a candidate for federal listing as an endangered or threatened species, also is present in a small-to-medium sized population. This is one of only two sites in S.C. with both dwarf heartleaf and *nestronia*.

GENERAL DESCRIPTION:

This site consists of the moderately-sloping, northward-facing bluffs of a rolling Piedmont hill overlooking Spivey Creek. Small seepage bogs are present at the base of the slopes, especially along the unnamed branch of Spivey Creek in the eastern portion of the site. The slopes there are on Pacolet sandy loam soil, which typically is quite acid in pH and tends to produce greater than normal seepage at the base of bluffs. The western portion of the site is on Cecil sandy loam soil. The natural community here is described by Rayner (1992 g) as Dry-Mesic Oak-Hickory Forest, although parts of the site might be more appropriately called a Piedmont/Coastal Plain Heath Bluff. Mountain laurel (*Kalmia latifolia*) is present throughout the site, but not in sufficient abundance for the site to qualify as a Heath Bluff. Slopes are not steep enough or rocky enough to provide for an abundance of mountain laurel. Dwarf-flowered heartleaf is most abundant at the base of the slopes and adjacent to small hillside seepage bogs, areas where mountain laurel also is abundant. *Nestronia* is restricted to a small area on the upper slopes in the western portion of the site, where southern red oak (*Quercus falcata*) is codominant with white oak (*Quercus alba*) in the canopy and beaked hazelnut (*Corylus cornuta*) and low blueberry (*Vaccinium pallidum*) are the predominant shrubs, along with *nestronia*. White oak, yellow poplar (*Liriodendron tulipifera*), and beech (*Fagus grandifolia*) dominate the closed canopy throughout the site, as do sourwood (*Oxydendrum arboreum*) and flowering dogwood (*Cornus florida*) in the well developed subcanopy. Partridge berry (*Mitchella repens*) and New York fern (*Thelypteris novaboracensis*) are important species in areas with dwarf-flowered heartleaf, and muscadine (*Vitis rotundifolia*) is important ground cover species where *nestronia* is found.

OWNERSHIP: Private

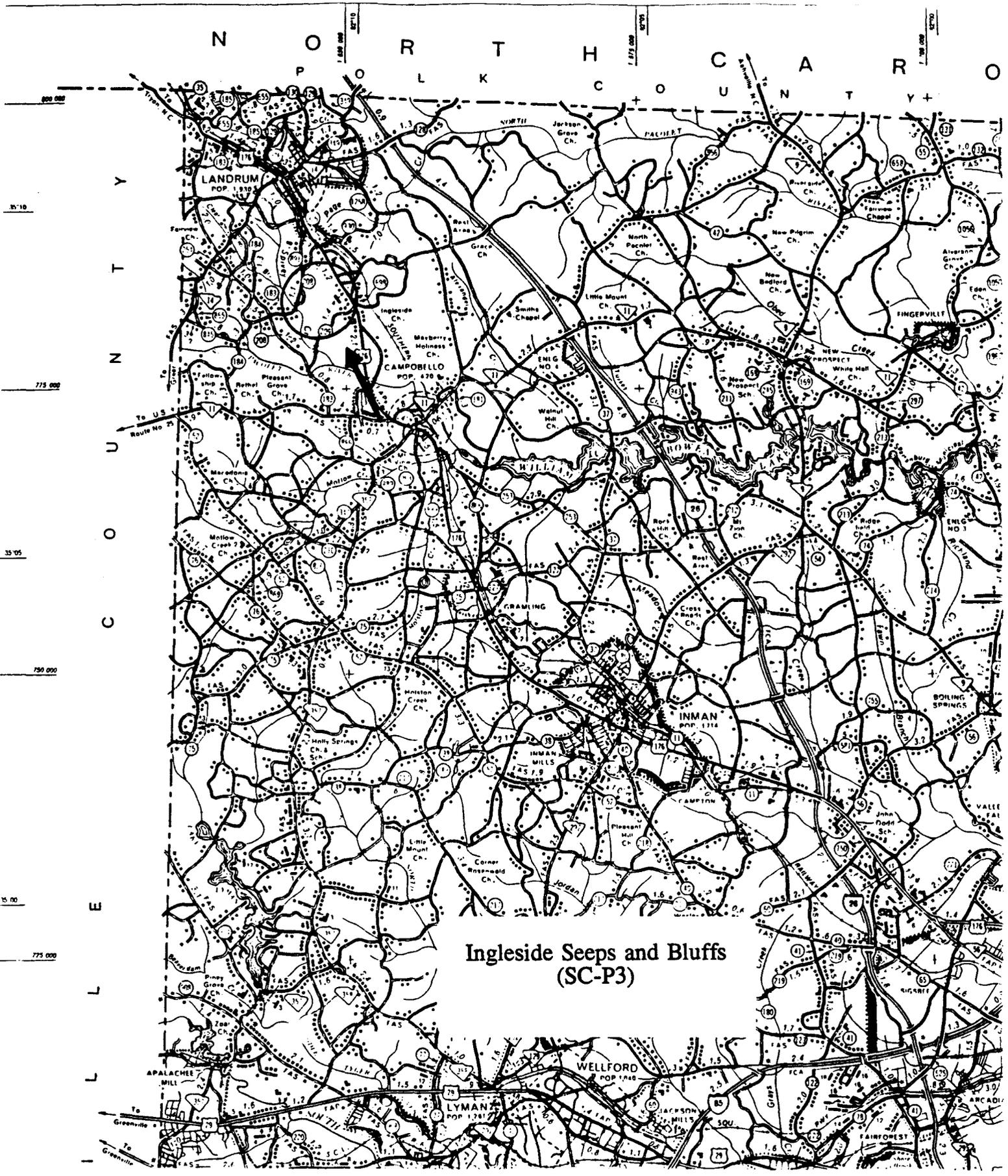
COMMENTS:

The area just SE of the southeastern portion of the site is highly disturbed and is dominated by Virginia pine (*Pinus virginiana*) and English ivy (*Hedera helix*). English ivy needs to be kept from invading ecologically significant parts of the site.

The slopes here are somewhat eroded and the quality and condition of some of the upper slopes is only fair.

The site is bisected by a new road to a house on the top of the hill.

REFERENCE: (Rayner 1992 g)



Ingleside Seeps and Bluffs
(SC-P3)

SITE NAME: Harris Dwarf Heartleaf

SITE NUMBER: SC-P4

SIZE: ca. 27 acres

SITE SIGNIFICANCE: B (REGIONAL)

LOCATION: Northern Spartanburg County; just south of the Polk County line, and northeast of the junction of Old Mill Rd. (SR-3047) and S.C. 9.

QUAD MAP: Fingerville West

SIGNIFICANCE:

1. This site harbors a small population of the rare plant, dwarf-flowered heartleaf (*Hexastylis naniflora*). Dwarf-flowered heartleaf is endemic to S.C. and N.C. and is federally listed as a threatened species.

2. A good example of a rather common natural community type is represented here, white oak/yellow poplar/mountain laurel/partridge berry. The natural community best fits the present community described as Piedmont/Coastal Plain Heath Bluff. I believe it may represent a new community type, a community I've tentatively called Piedmont Acidic Forest.

GENERAL DESCRIPTION:

This site consists of the northward-facing bluffs along a small segment of Bear Creek. Slopes are on Pacolet sandy loam soil, a soil type that typically harbors acid loving plant species and produces abundant seepage at the base of slopes. Seepage is not significant at this site, but slopes are dominated by acid loving species. The slopes here are quite steep and rocky in places. White oak (*Quercus alba*) and yellow poplar (*Liriodendron tulipifera*) dominate the somewhat open canopy; sourwood (*Oxydendrum arboreum*), cucumber-tree (*Magnolia acuminata*), and ironwood (*Carpinus caroliniana*) are important subcanopy trees. Mountain laurel (*Kalmia latifolia*) generally forms dense colonies on the slopes and dog-hobble (*Leucothoe axillaris*) often forms dense stands along the stream. Herb cover is sparse, with partridge berry (*Mitchella repens*) and Christmas fern (*Polystichum acrostichoides*) the most important species. Dwarf-flowered heartleaf (*Hexastylis naniflora*) is present in several small colonies on the NE-facing bluffs; no dwarf-flowered heartleaf was seen on the NW-facing bluffs.

OWNERSHIP: Private

COMMENTS:

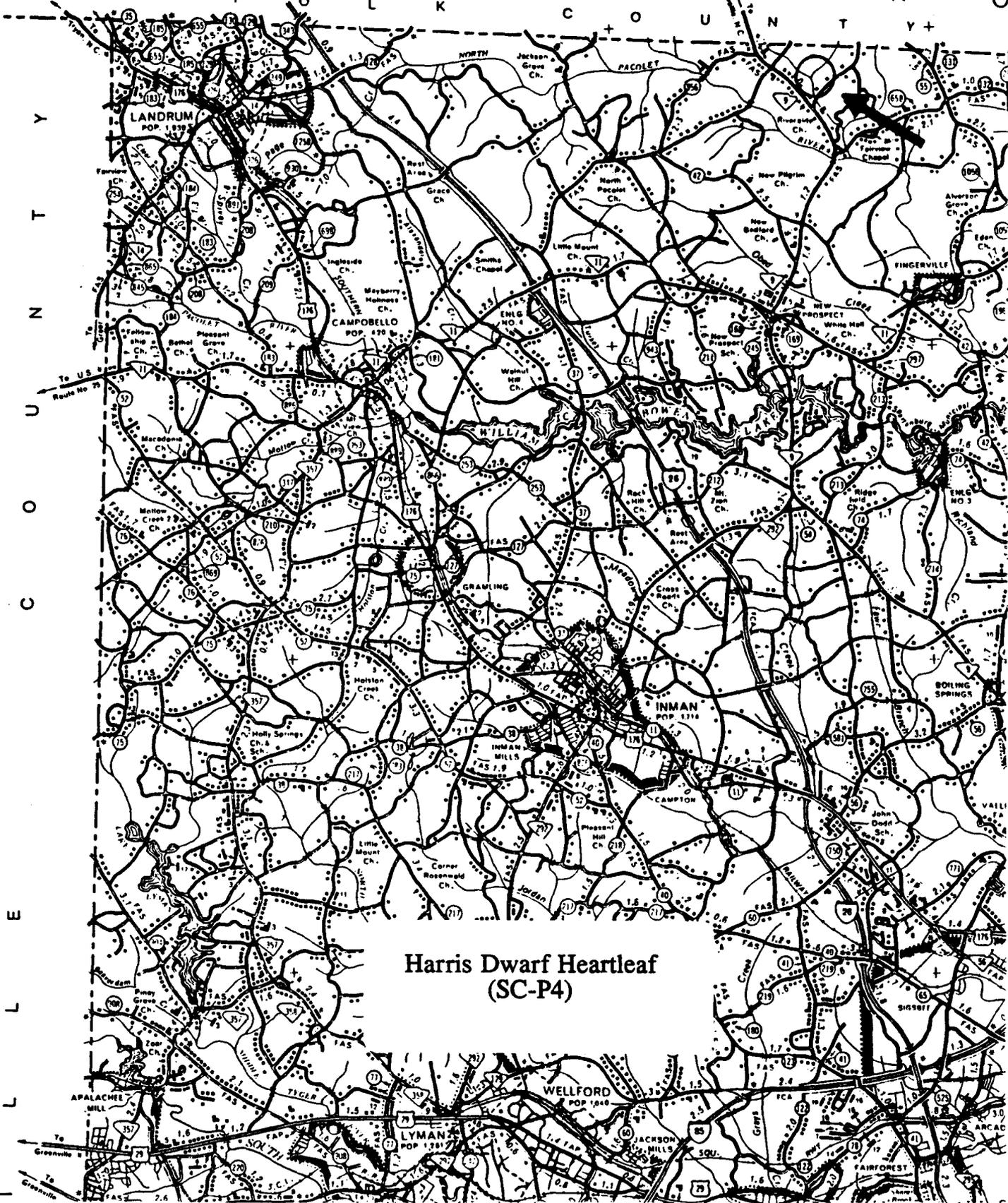
The clean gravelly or rocky-bottomed stream and the undisturbed bluffs with dense stands of mountain laurel make this a very aesthetically pleasing site. Little active management should be needed, except perhaps to check the growth and/or expansion of Japanese honeysuckle, which is abundant in a few places.

REFERENCES: Rayner (1992)

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Harris Dwarf Heartleaf
(SC-P4)

SITE NAME: Bird Mountain*

SITE NUMBER: SC-P5

Size: ca. 60-80 acres

SITE SIGNIFICANCE: A (STATE)

LOCATION: Northwestern Spartanburg and northeastern Greenville counties, S.C.; ca. 1.6 miles NW of Landrum.

QUAD MAP(S): Landrum

SIGNIFICANCE:

This site is a good example of an inner Piedmont monadnock, a hill or mountain of resistant rock in a relatively level plain. Relatively undisturbed examples of this geomorphic feature in good quality and condition are rare in South Carolina. An intact forest approaching old growth condition is present on three sides of the summit, including good examples of Oak-Hickory Forest and Chestnut Oak Forest natural communities. The South Carolina Heritage Trust Program in 1988 ranked this site as Priority 2 (Statewide Concern) and Level 1 (No Protected Examples).

GENERAL DESCRIPTION:

This site is comprised of most of a geomorphic feature known as an inner Piedmont monadnock. Monadnocks in general are prominent hills or mountains in areas of generally poorly developed relief, i.e. hills or mountains at least partially surrounded by gently rolling or level plains. As is typical of inner Piedmont monadnocks, this one occurs with several others and is literally part of the foothills (ped = foot; mont = mountain) adjacent to the mountains. Elevation here varies from 1135 to 1496 feet, with the 360+ change in elevation taking place over a relatively short distance. Slopes are moderately steep. This site is very prominent locally, particularly as viewed from the east or south.

Natural communities here include representatives of Oak-Hickory Forest and Chestnut Oak Forest. The former community is present on all aspects, from the base of the mountain to near the top. The more sheltered slopes, northward-facing and lower in elevation, are mesic and are dominated in the canopy by white oak (*Quercus alba*), tulip poplar (*Liriodendron tulipifera*), and red maple (*Acer rubrum*). Herbs here include bloodroot (*Sanguinaria canadensis*), crested iris (*Iris cristata*), and wind-flower (*Thalictrum thalictroides*). Less sheltered locations, e.g. east and south aspects, have more hickory (*Carya tomentosa*) and black gum (*Nyssa sylvatica*) in the canopy and sparkleberry (*Vaccinium arboreum*) is more abundant in the shrub layer. Some American chestnut (*Castanea dentata*) stump sprouts are present here, as well as

some pines, including Table Mountain pine (*Pinus pungens*). Occurrence of this pine at such a low elevation is unusual. The summit and uppermost slopes are dominated by Chestnut Oak Forest. Chestnut oak (*Quercus prinus*) dominates the canopy, with lesser amounts of white oak (*Quercus alba*). Mountain laurel (*Kalmia latifolia*) is a very abundant shrub in places, as are galax (*Galax aphylla*), wild oregano (*Cunila origanoides*), and trailing arbutus (*Epigaea repens*), in the generally sparse herb layer.

OWNERSHIP: Private

COMMENTS:

Much of the western slope of Bird Mountain in Greenville County has already been developed as a residential area. Some of the landowners with undeveloped lands abutting the undeveloped Spartanburg lands may be interested in providing a conservation easement on parts of their property. North of a small, east-flowing creek on the north side of the mountain, considerable development has also occurred. A junkyard and water filtration plant are located here.

A winding gravel road leads to the summit of the mountain from S.C. highway 183. The top has been partially cleared for the development of a home and an astronomical observatory. The current landowner lives in the residence here.

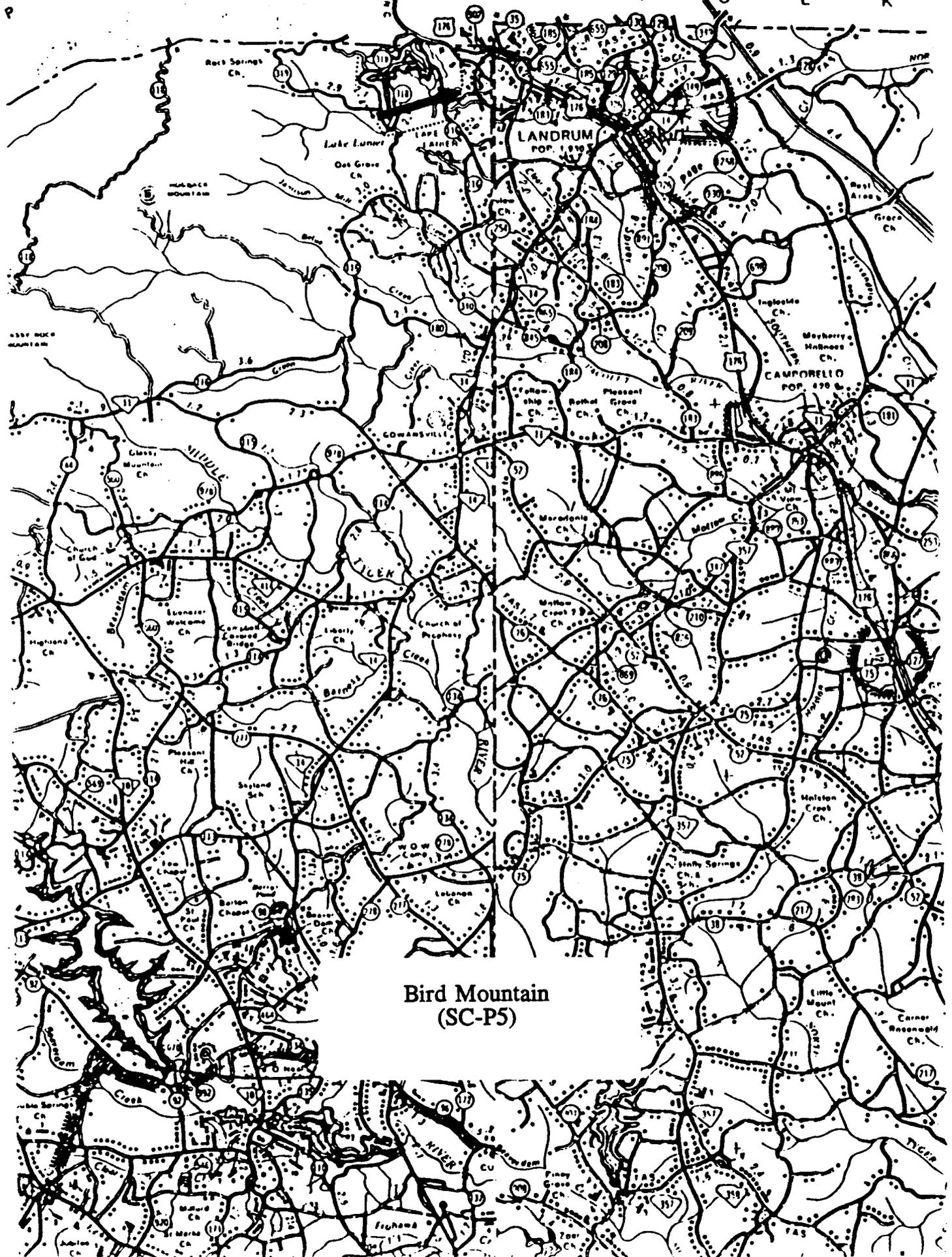
This site will not need much active management. The primary landowners take good care of the property and look forward to the long-term maintenance of the area as a natural area. The gravel entrance road will need to be maintained to prevent erosion and wash-outs. Some unauthorized timber cutting has occurred in the past, but close watch by the landowners minimizes this as a threat.

The primary landowners have registered this site with the S.C. Heritage Trust Program as a "Heritage Site." They also have expressed interest in granting a conservation easement on the property.

REFERENCES: Nelson 1988

*Note: This report is based largely on Nelson's "Bird Mountain", documentation of the significance of Bird Mountain prepared for the registration of the area as a S.C. Heritage Site.

P O L K C O U N T Y N O R T H P O L K



Bird Mountain
(SC-P5)

SITE NAME: Pacolet Mixed Mesophytic Hardwoods

SITE NUMBER: SC-P6

Size: ca. 80 acres

SITE SIGNIFICANCE: B (REGIONAL)

LOCATION: Northwestern Spartanburg County; ca. 3 miles east of Landrum.

QUAD MAP(S): Landrum

SIGNIFICANCE:

1. The primary significance of this site is the presence of an excellent old-growth Mixed Mesophytic Hardwood Forest natural community. Unpublished studies by my ecology classes at Wofford College indicate that this community is in a self-replicating or climax stage of succession. This is the best community of this type in the Pacolet Area and is one of the few old-growth communities in the Pacolet Area.

GENERAL DESCRIPTION:

This site consists of the northward-facing bluffs and ravines associated with a rolling Piedmont hill above, and near the mouth of, Page Creek at the North Pacolet River. Slopes are gentle to very steep and elevation ranges from 853 to 985 feet. The major element of interest here is a old growth Mixed Mesophytic Hardwood Forest. Trees of American beech (*Fagus grandifolia*) up to 3.5 feet in diameter dominate the closed canopy. Other important canopy trees include several species of hickory (*Carya* spp.), white oak (*Quercus alba*), and tulip poplar (*Liriodendron tulipifera*). These tree species are not as mature here as beech, but they generally are old growth trees. Potential replacement trees for the existing canopy are present in proportions similar to the existing canopy, suggesting that the forest here is in or near a climax stage of succession. The subcanopy is quite well developed and is dominated by sourwood (*Oxydendrum arboreum*) and cucumber tree (*Magnolia acuminata*). Shrub cover is moderate to sparse and includes such mesic forest indicators as spicebush (*Lindera benzoin*) and buckeye (*Aesculus sylvatica*). Herb cover generally is sparse but is moderately dense in some places. Characteristic species include Catesby's trillium (*Trillium catesbaei*), beech drops (*Epifagus virginiana*), and wind-flower (*Thalictrum thalictroides*). The Mixed Mesophytic Hardwood Forest merges upslope into an Oak-Hickory Forest that is not particularly mature and that occurs on slopes that are somewhat eroded. An unnamed secondary road is present at the base of the north-facing slopes. Downslope and to the west is a narrow band of Bottomland Hardwood Forest on the narrow levee above Page Creek. Most of this narrow levee is north of the unnamed secondary road. Some of these north slopes were significantly disturbed by the construction of the road, i.e. the surface soils were

removed to make way for the road, leaving a steep slope with exposed soils that are still not completely revegetated. Downslope and to the east is a broader former floodplain of Page Creek that presently is in cultivation.

OWNERSHIP: Private

COMMENTS:

In a study of the use of transition matrices in the study of forest succession, several ecology classes at Wofford College in recent years have studied the present canopy composition in the Mixed Mesophytic Hardwood Forest here. By noting at numerous sample points the nearest canopy tree and the tallest likely replacement for each sample tree, present composition can be determined and future composition can be predicted. Analysis of the transition matrix that was developed from data obtained in 1992 suggests that the future canopy composition is very similar to present composition, indicating that this community is in the climax or self-replacement stage of succession.

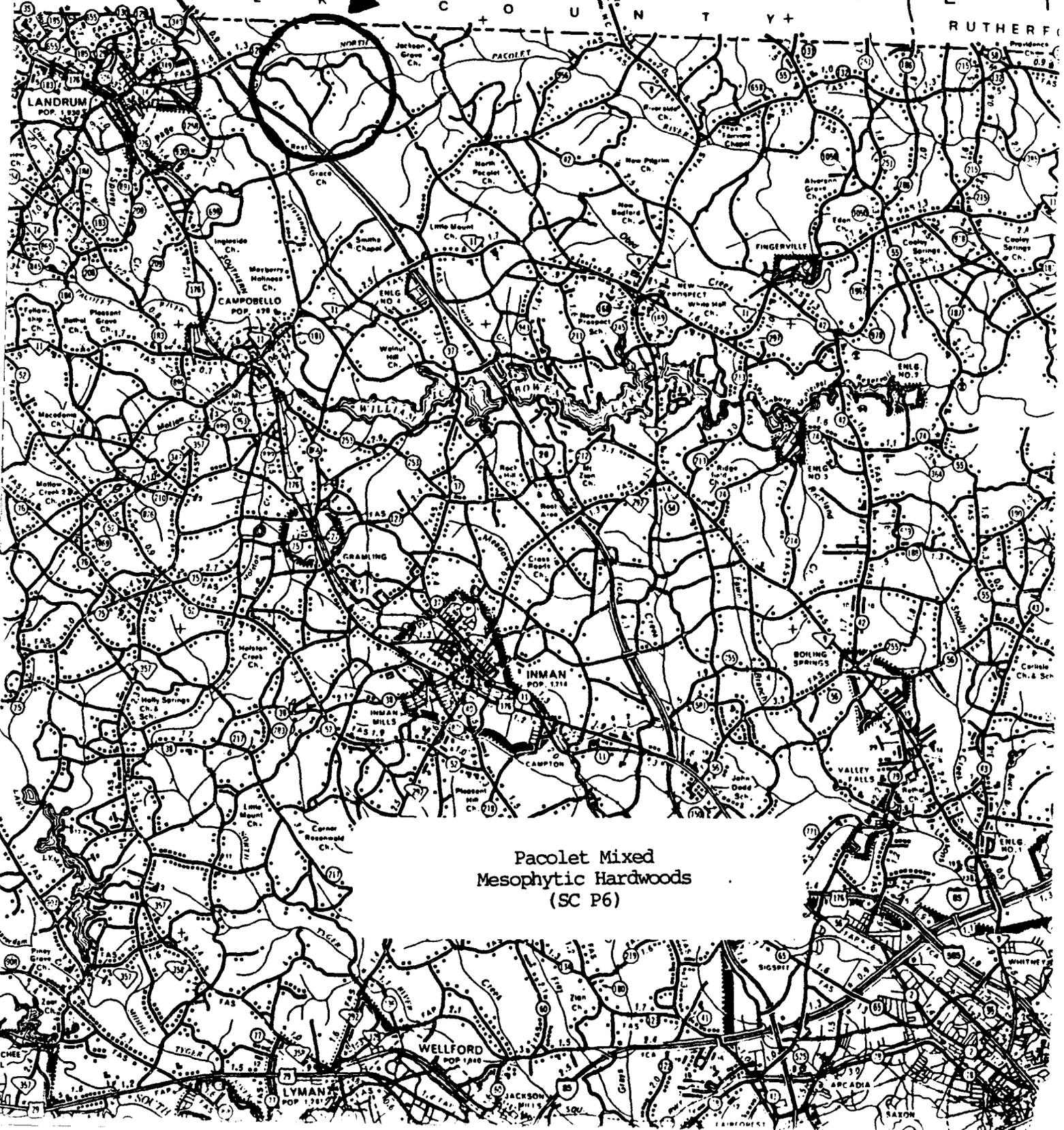
One small canopy gap has been invaded and taken over by a heavy growth of tree-of-heaven (*Ailanthus altissima*). This species needs to be actively controlled, possibly by hand injection with herbicide. In the absence of control this species will become more and more abundant and may significantly change community composition over time. Other aggressive weedy species such as Japanese honeysuckle (*Lonicera japonica*) and common privet (*Ligustrum sinense*) are present and will need to be monitored to make sure they do not become so abundant that they begin displacing native vegetation.

The old logging road that bisects the property is now used occasionally as a horse trail. There is some erosion along the road (trail), and this may need to be controlled in the future. No other active management of this area should be needed to maintain the quality and integrity of the site.

Although the unnumbered highway at the base of the north-facing bluffs is the logical northern project boundary, the bottomlands just below the highway and adjacent to Page Creek in places have a rich and interesting herb cover. It may be appropriate to include these rich bottomlands in the project area.

REFERENCES: Rayner 1993r

N O R T H C O U N T Y + R U T H E R F O R D C O U N T Y



Pacolet Mixed
Mesophytic Hardwoods
(SC P6)

SITE NAME: Round Mountain (eastern slopes)

SITE NUMBER: NC-M1 **Size:** ca. 140 acres

SITE SIGNIFICANCE: B (REGIONAL)

LOCATION: Southeastern Polk County; ca. three miles NNW of Tryon;
2000 feet NE of Warrior Mtn. Church on SR-1122.

QUAD MAP: Saluda

SIGNIFICANCE:

1. The significance of this site derives mostly from the presence of rare plant species. This site harbors six significantly-rare plant species and three noteworthy plant species, as well as one significantly-rare animal species. White irisette (*Sisyrinchium dichotomum*), a plant federally-listed as endangered, is present here in five small colonies. Additional significantly-rare plants include broadleaf coreopsis (*Coreopsis latifolia*), whorled horsebalm (*Collinsonia verticillata*), Walter's crownbeard (*Verbesina walteri*), and Piedmont horsebalm (*Collinsonia tuberosa*). Noteworthy plants here include a heartleaf skullcap (*Scutellaria ovata*), ginseng (*Panax quinquefolius*), and scentless mock orange (*Philadelphus inodorus*); these species are all on the N.C. plant "Watch List." Cerulean warblers (*Dendroica cerulea*), a Candidate for Federal listing, also are reported to breed here.

2. Good examples of Rich Cove Forest and Dry-Mesic Oak-Hickory Forest communities also occur here.

GENERAL DESCRIPTION:

This site consists of the gently-sloping lower slopes and steep-to- very-steep upper, east/west-trending slopes associated with Round Mountain. Round Mountain is part of the pronounced escarpment that forms the boundary between the Piedmont and Blue Ridge Physiographic Provinces in Polk County. One main (unnamed) stream traverses the area, and several smaller streams divide the site into a series of small ridges and valleys. Slopes are quite rocky in places, especially near streams. The woods here generally are quite undisturbed, except for bands adjacent to I-26 and SR-1122, the western portion of the site above SR-1122, and the top of Round Mtn. Plant species composition suggests that this entire area, at least in places, is under the influence of higher-than-normal pH. This is certainly true of the Rich Cove Forest communities here and seems to be true of the Dry-Mesic Oak-Hickory Forest communities here as well. The abundance of yellow poplar (*Liriodendron tulipifera*) and black locust (*Robinia pseudo-acacia*) in the canopy of the Rich Cove Forest communities here are indicative of heavy past logging activity. A small pocket of

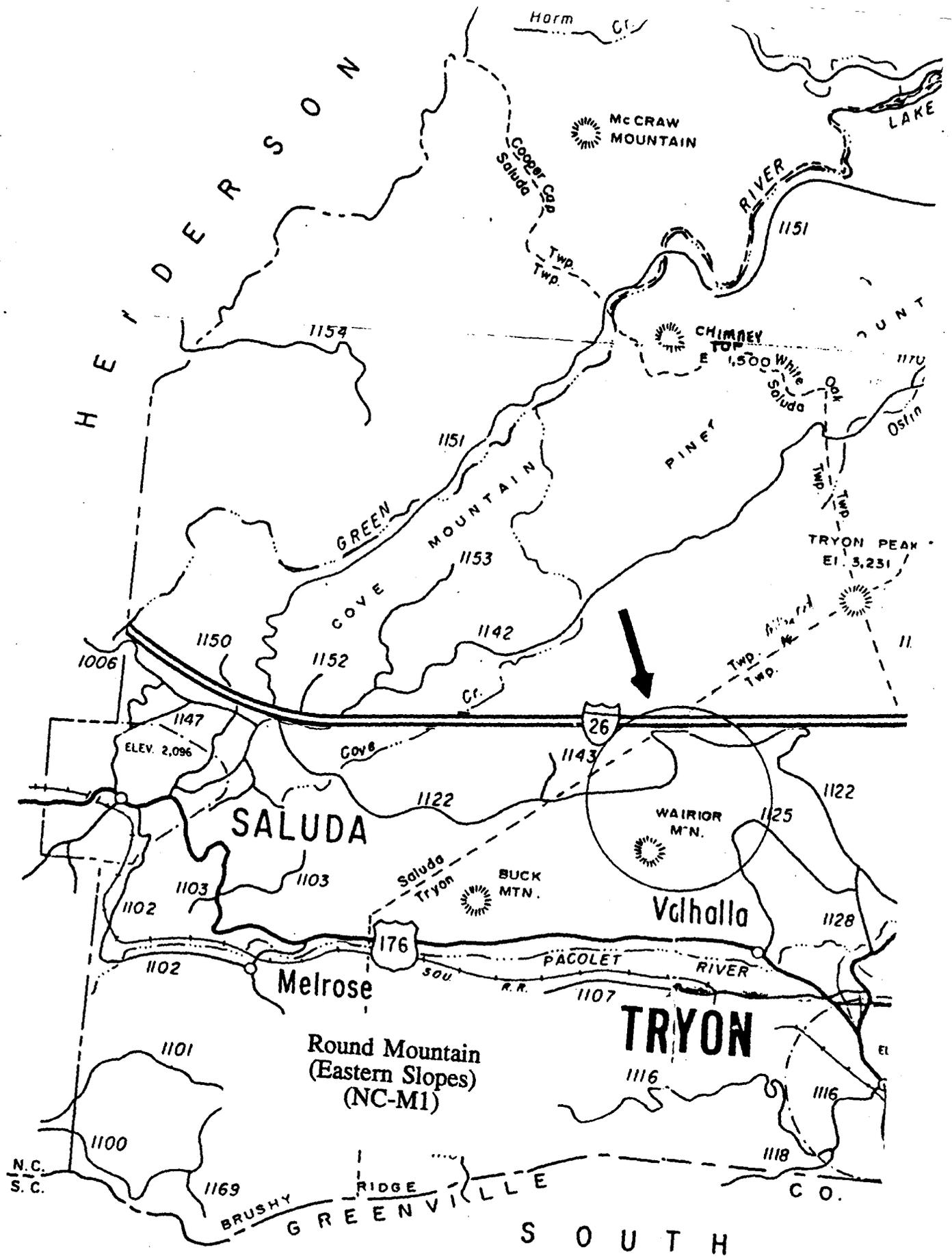
Rich Cove Forest north of SR-1122 harbors Polk County's only known population of Piedmont horsebalm (*Collinsonia tuberosa*). It also harbors one of the few North Carolina populations of Walter's crownbeard. More typical rarities of this rich woods community here include broadleaf coreopsis (*Coreopsis latifolia*), ginseng (*Panax quinquefolius*), a heartleaf skullcap (*Scutellaria ovata*), green violet (*Hybanthus concolor*), and scentless mock orange (*Philadelphus inodorus*).

The Dry-Mesic Oak-Hickory Forest community here might be best described as a Basic Oak-Hickory Forest based on the presence of such rarities as white irisette (*Sisyrinchium dichotomum*), whorled horsebalm, and broadleaf coreopsis. However, the absence of a distinctly oak-hickory dominated canopy, the abundance of sourwood (*Oxydendrum arboreum*) and the absence of a rich and diverse herb layer suggests that this is not a typical Basic Oak-Hickory Forest community. The elevation here probably is too low for this to be a Montane Oak-Hickory Forest. Once again, heavy past logging activity may explain why this community is not easily defined. This community has a well-developed canopy of white oak (*Quercus alba*) yellow poplar, and red maple (*Acer rubrum*). The subcanopy is dominated by flowering dogwood (*Cornus florida*) and sourwood. Mapleleaf viburnum (*Viburnum acerifolium*) and sweet shrub (*Calycanthus floridus*) typically dominate the diverse shrub layer, although spicebush (*Lindera benzoin*) is very abundant in places. The herb layer is not diverse or dense in general, but there are pockets of dense herbs. It may be that calcium-rich soils only occur in small pockets and that the woodlands in general are somewhat acidic.

OWNERSHIP: private

COMMENTS:

For purposes of land protection, and depending on land ownership, this site may be best considered as two separate sites, lands above SR-1122 and lands below SR-1122. The significant lands above SR-1122 occur in the eastern half. The western half, as well as the north slopes of Round Mountain, are highly disturbed and weedy or they are recovering from recent clear-cutting.



SITE NAME: PEARSON'S FALLS GLEN: ADDITION

SITE NUMBER: NC-M2

Size: ca. 30 acres

SITE SIGNIFICANCE: A (STATE)

LOCATION: Southwestern tip of Polk County; ca. 5 miles W from the center of Tryon; bounded to the north by SR-1102, to the east by SR-1100, and to the west and south by Pearson's Falls Glen.

QUAD MAP: Saluda

SIGNIFICANCE:

1. This proposed addition to Pearson's Falls Glen harbors many of the same significantly-rare and noteworthy plant species as does the Glen, including broadleaf coreopsis (*Coreopsis latifolia*), ginseng (*Panax quinquefolius*), green violet (*Hybanthus concolor*), and sweet white trillium (*Trillium simile*). This coreopsis is a candidate for threatened or endangered status in N.C.; it formerly was a candidate for Federal status as a threatened species). Ginseng is a species of "special concern" because of widespread commercial collection; it is known from well over 100 populations in N.C. Sweet white trillium only recently was recognized as being in N.C.; it is officially designated a "Significantly-Rare" species in N.C., and the heart of its range in N.C. is Polk County and Pearson's Falls Glen. Green violet until recently was on the N.C. "Watch List;" it is a good indicator of high-calcium soils usually associated with Rich Cove Forest communities. This site also harbors mountain bittercress (*Cardamine clematidis*) and Biltmore carrion-flower (*Smilax biltmoreana*); both of these species are candidates for listing as threatened or endangered species in North Carolina.

2. The high diversity and density of plant species, especially herbaceous species, for which the Glen is famous, is also characteristic of this proposed addition.

3. The high quality and maturity of the second growth forest here also is similar to that of the Glen. This addition adds to the acreage of what was described by Julie Moore (Moore 1987) as " a high quality example of the cove forest natural community as defined by Schafale and Weakley (1985)". An updated version of Schafale and Weakley was published in 1990.

GENERAL DESCRIPTION:

This site consists of the steep, mostly north-facing slopes above (south of) North Pacolet River and SR-1102, between Fork Creek and Colt Creek, and below (north of) lands already part of Pearson's Falls Glen. As is typical of Rich

Cove Forest natural communities the canopy is dense and comprised of a wide variety of mesophytic trees, including yellow poplar (*Liriodendron tulipifera*), red oak (*Quercus rubra*), sweet birch (*Betula lenta*), sugar maple (*Acer saccharum*) and basswood (*Tilia americana*). The open understory includes such species as ironwood (*Carpinus caroliniana*), cucumber-tree (*Magnolia acuminata*) and slippery elm (*Ulmus fulva*). The moderate-to-sparse shrub layer includes spicebush (*Lindera benzoin*), sweet shrub (*Calycanthus floridus*), mapleleaf viburnum (*Viburnum acerifolium*), and witch hazel (*Hamamelis virginiana*), among others. The diverse and dense herbaceous flora is the most striking characteristic of this area, as it is for the Glen as a whole. Some of the herbaceous species characteristic of calcium-rich cove forests include, wild ginger (*Asarum canadense* var. *acuminata*), Canada moonseed (*Menispermum canadense*), green violet (*Hybanthus concolor*), blue cohosh (*Caulophyllum thalictroides*), great Indian-plantain (*Cacalia muhlenbergii*), and sweet white trillium (*Trillium simile*). The large white-flowered trillium that was known as wake robin (*Trillium erectum* var. *erectum*), and that for years has excited visitors, has recently been identified by trillium expert Dr. Tom Patrick as sweet white trillium (*Trillium simile*). Ginseng (*Panax quinquefolius*) is found among the most dense herb cover, and Biltmore carrion-flower (*Smilax biltmoreana*) and broadleaf coreopsis (*Coreopsis latifolia*) are found in areas of less dense herb and canopy cover. Mountain bittercress (*Cardamine clematidis*) is found in springy ground on the banks of Fork Creek, probably in acidic soil.

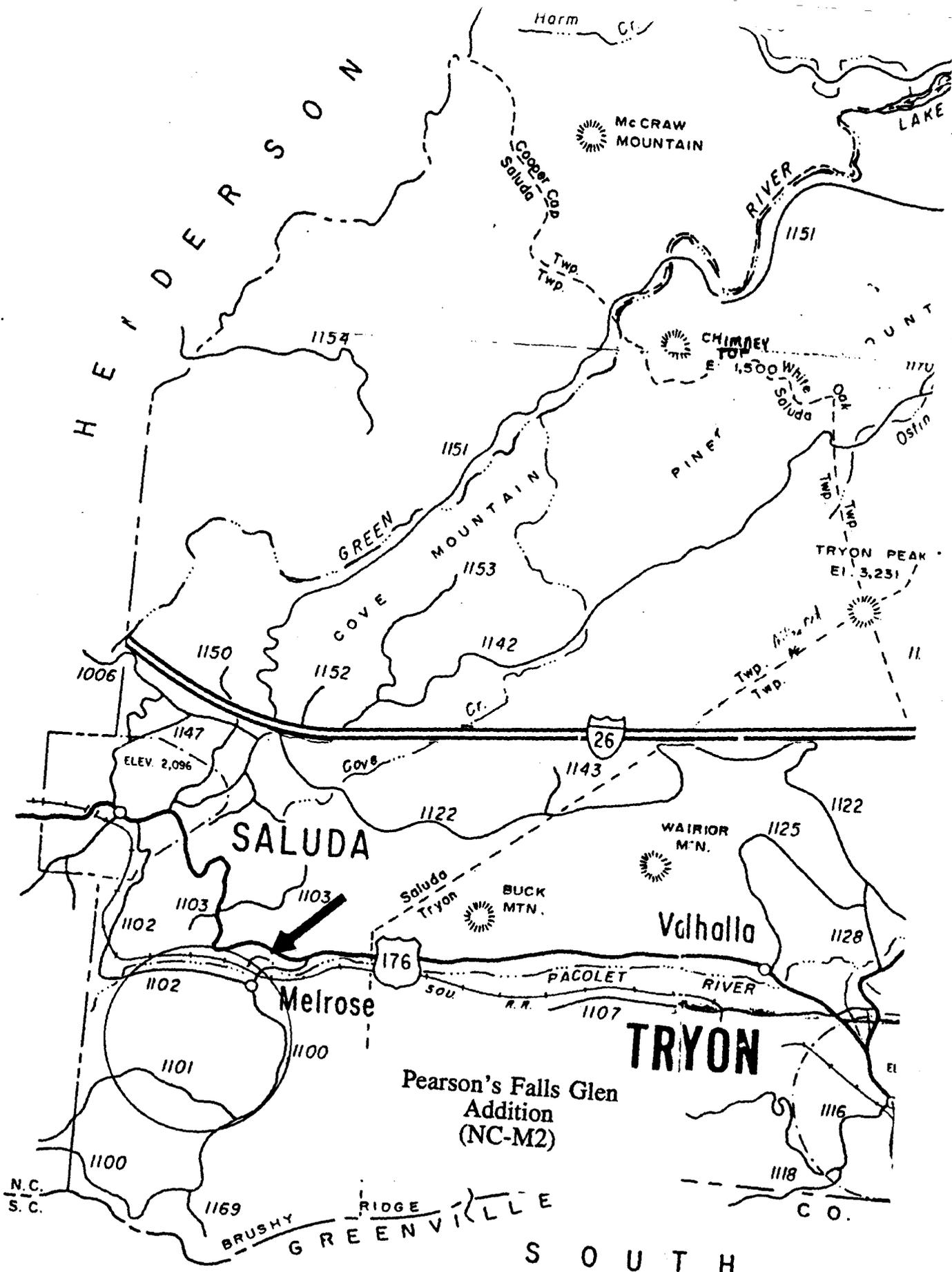
OWNERSHIP: Private

COMMENTS:

Although this site is not as rich or as mature in general as the Glen, it still is an excellent example of Rich Cove Forest and would add to the size and the significance of the Glen. This addition also would help consolidate the somewhat irregular boundary of the Glen and thus facilitate future management.

A private nature trail has been developed at this site by the landowner, and it is used regularly by a local hiking club. It should be possible to tie this trail into the existing nature trail at the Glen. Alternatively, it may be useful to maintain two separate trails, thus dispersing the heavy use that is now made of the Glen trails.

REFERENCES: Freeman 1953, Moore 1987, Peattie 1928-1931, Peattie, 1962, Schafale and Weakley, 1990, Stupka 1972, and Teal 1951.



SITE NAME: Buck Mtn - Cedar Cliff

SITE NUMBER: NC-M3

Size: ca. 260 acres

SITE SIGNIFICANCE: A(STATE)

LOCATION: Southwestern Polk County; ca. 3.4 miles WNW from the center of Tryon. Site name includes the two areas of the same name on the Saluda topo quad map.

QUAD MAP(S): Saluda

SIGNIFICANCE:

1. The primary significance of this site derives from the presence of several significantly-rare plant species. This site harbors Polk County's largest population of the globally-rare French Broad heartleaf (*Hexastylis rhombiformis*). This North Carolina endemic is known from fewer than 10 populations worldwide. Additional rare plant species at this site include divided-leaf ragwort (*Senecio millefolium*), Biltmore carrion-flower (*Smilax biltmoreana*), ginseng (*Panax quinquefolius*), littleleaf alumroot (*Heuchera parviflora*), and wafer ash (*Ptelea trifoliata*). This ragwort is endemic to the Carolinas and Georgia and is known from fewer than 20 populations in North Carolina. Southern thimbleweed (*Anemone berlandiera*) was reported from this site in 1955 by Oliver Freeman, but was not relocated during this survey, primarily because surveys were not at the best time of year for relocating this species.

2. The cedar cliffs portion of this site harbors a good example of a plant community that doesn't quite fit existing classifications. Low Elevation Rocky Summit is the community that best fits this site, but species characteristic of Piedmont Mafic Outcrop also are present. Both these communities are rare in N.C.

GENERAL DESCRIPTION:

This site is on the escarpment that forms the boundary between the Piedmont and Blue Ridge Physiographic Provinces. An abrupt transition in elevation of more than 1000 feet takes place over a very short distance from the southern base to the top of Cedar Cliff. The cliffs here consist of irregular fractured rock, with some extensive, nearly-vertical expanses of exposed rock, some fingers of boulder outcrop, some shelves and some overhanging ledges. The plant community here is missing the abundance of red cedar that one would expect from the name of the area, but the area may have had more cedar at one time. The presence of such species as southern thimbleweed, littleleaf alumroot, and wafer ash here suggest that there probably are some mafic rocks (probably amphibolite) mixed with the typically acidic rocks here.

The north-trending slopes and ravines north of Cedar Cliff are included in an area called Buck Mountain. The slopes here are relatively gentle and vary from dry to mesic in species composition. The top and upper slopes are occupied by Chestnut Oak Forest and an abundance

of Biltmore carrion-flower. The lower slopes and ravines are occupied by Dry-Mesic Oak-Hickory Forest which is quite variable in composition, especially in terms of the abundance of mountain laurel. French broad heartleaf is very abundant in places, especially where mountain laural is sparse.

Ginseng occurs in the most mesic variants of this community and Biltmore carrion-flower is common in the drier variants.

An old road leads to several houses on Buck Mountain, and a picnic shelter overlooks Cedar Cliff.

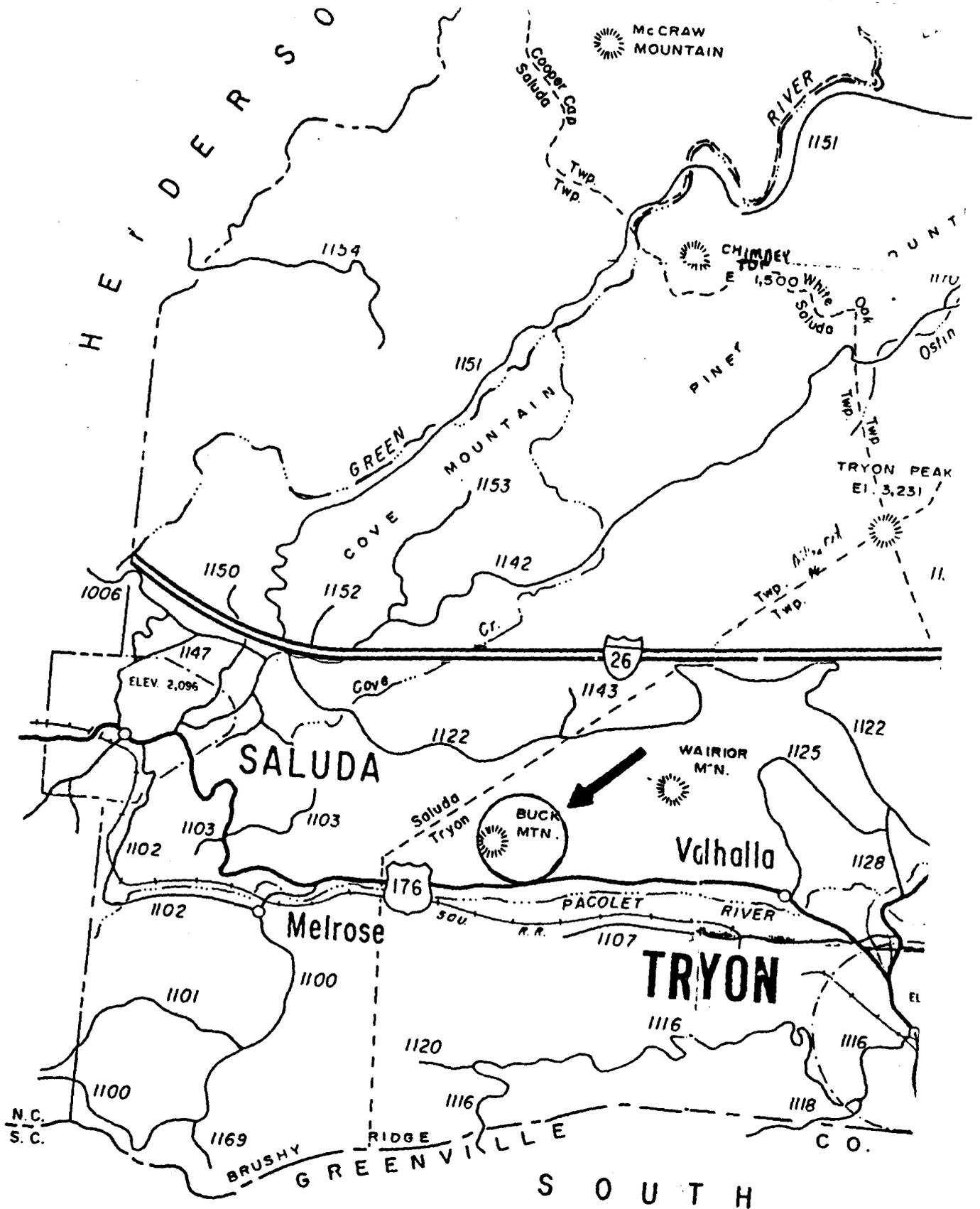
OWNERSHIP: Private

COMMENTS:

The top of Buck Mountain has already undergone some (past) residential development and more is presently underway just NE of the proposed project area. This area probably is best protected through conservation easements with interested landowners. Ideally, future development should be very restricted in scope and sited so as to minimize impact to the species and communities of concern.

Most of the Low Elevation Rocky Summit associated with Cedar Cliff is inaccessible and therefore not threatened by human activities. Only the accessible upper portions of the Cedar Cliff was surveyed, but all of the lower slopes were included in the proposed project boundary. The lower south-facing slopes here may not harbor Rocky Summit vegetation; this area needs further investigation.

REFERENCES: Rayner 1993a



Buck Mtn - Cedar Cliff
(NC-M3)

SITE NAME: Walcott Tract: Cove Creek/Bradley Falls

SITE NUMBER: NC-M4

Size: 585 acres

SITE SIGNIFICANCE: A (STATE)

LOCATION: West central Polk County; along Cove Creek, a tributary of the Green River in the Green River Cove; ca. 4 miles NE from the center of Saluda; access is via SR-1151.

QUAD MAP(S): Clifffield Mtn.

SIGNIFICANCE:

1. The occurrence here of numerous significantly-rare plants and two animals, is the primary source of the site's significance. Special status species here include French Broad heartleaf (*Hexastylis rhombiformis*), broadleaf coreopsis (*Coreopsis latifolia*), sweet white trillium (*Trillium simile*), Blue Ridge bindweed (*Calystegia sericata*), whorled horsebalm (*Collinsonia verticillata*), eastern woodrat (*Neotoma floridana*), and cerulean warbler (*Dendroica cerulea*). Including the remainder of the Cove Creek/Bradley Falls area, the population of this rare heartleaf is one of the largest in Polk County, and probably the largest in the world. Globally this heartleaf is known from fewer than 10 populations. Populations of the other special status species are all quite small, but still significant. Broad-leaf coreopsis is endemic to the mountains of Georgia and the Carolinas, and although it is not as rare as was once believed, it is still significantly rare. The same can be said for the whorled horsebalm; extensive searches in Polk County have nearly tripled the number of known populations in N.C., but the species is still significantly rare with well fewer than 100 populations worldwide. Other noteworthy species, i.e. species on the NHP's "Watch List", include whiteleaf sunflower (*Helianthus glaucophyllus*), butternut (*Juglans cinerea*), ginseng (*Panax quinquefolius*), littleleaf alumroot (*Heuchera parviflora*), climbing fern (*Lygodium palmatum*), and mock orange (*Philadelphus* sp.).

2. The scenic and wilderness qualities of the site are excellent. Bradley Falls is probably the largest and most scenic waterfall in Polk County. It is quite inaccessible but that only adds to the wildness of the site. The extremely rugged topography of the site in general makes access difficult. The steep gorge-like ravine walls and general inaccessibility gives the area a wilderness character that few areas its size can match.

3. Although none of the plant communities here is truly old-growth or exemplary of its type, the area does harbor a good diversity of plant communities in good condition, including Acidic Cove Forest, Rich Cove Forest, Canada Hemlock Forest,

Acid Cliff, Spray Cliff, Chestnut Oak Forest, Pine-Oak Heath, and Dry-Mesic Oak Hickory Forest.

4. Gaddy (1986) suggests that the area as a whole harbors an "interesting (and unusual) blend of Piedmont and Blue Ridge species ... eg. *Hepatica americana* and *Hepatica acutiloba* are both found here."

GENERAL DESCRIPTION:

This site includes the steep, gorge-like ravine along Cove Creek, beginning just above Bradley Falls and extending to the floodplain of the Green River at the mouth of Cove Creek. It also includes the moderate to very steep slopes associated with the mouth and lower section of Casey Branch and the easternmost extension of Cove Mountain. This site includes Bradley Falls and excludes the former agricultural fields on the floodplain of the Green River at the mouth of Cove Creek. Most of the site has been cut over in the last 50-75 years, but one small pocket of mature Rich Cove Forest is present at the base of Bradley Falls. Canada Hemlock Forest occupies much of the lower steep slopes along Cove Creek and Casey Branch, but scattered small areas of Rich Cove Forest interrupt this predominant community. Spray Cliff and Acidic Cliff communities are associated with Bradley Falls proper. Upper steep slopes and ridge tops are occupied by either Chestnut Oak Forest or Pine-Oak Heath. The relatively-gentle north-facing lower slopes of Cove Mountain harbor a Dry-Mesic Oak-Hickory Forest. This community also occupies some of the upper west slopes east of Bradley Falls. There are numerous small, dry-to-moist rock ledges in the area, as well as some areas with significant amounts of boulders, eg. just NW of Bradley Falls.

OWNERSHIP: North Carolina Wildlife Resources Commission

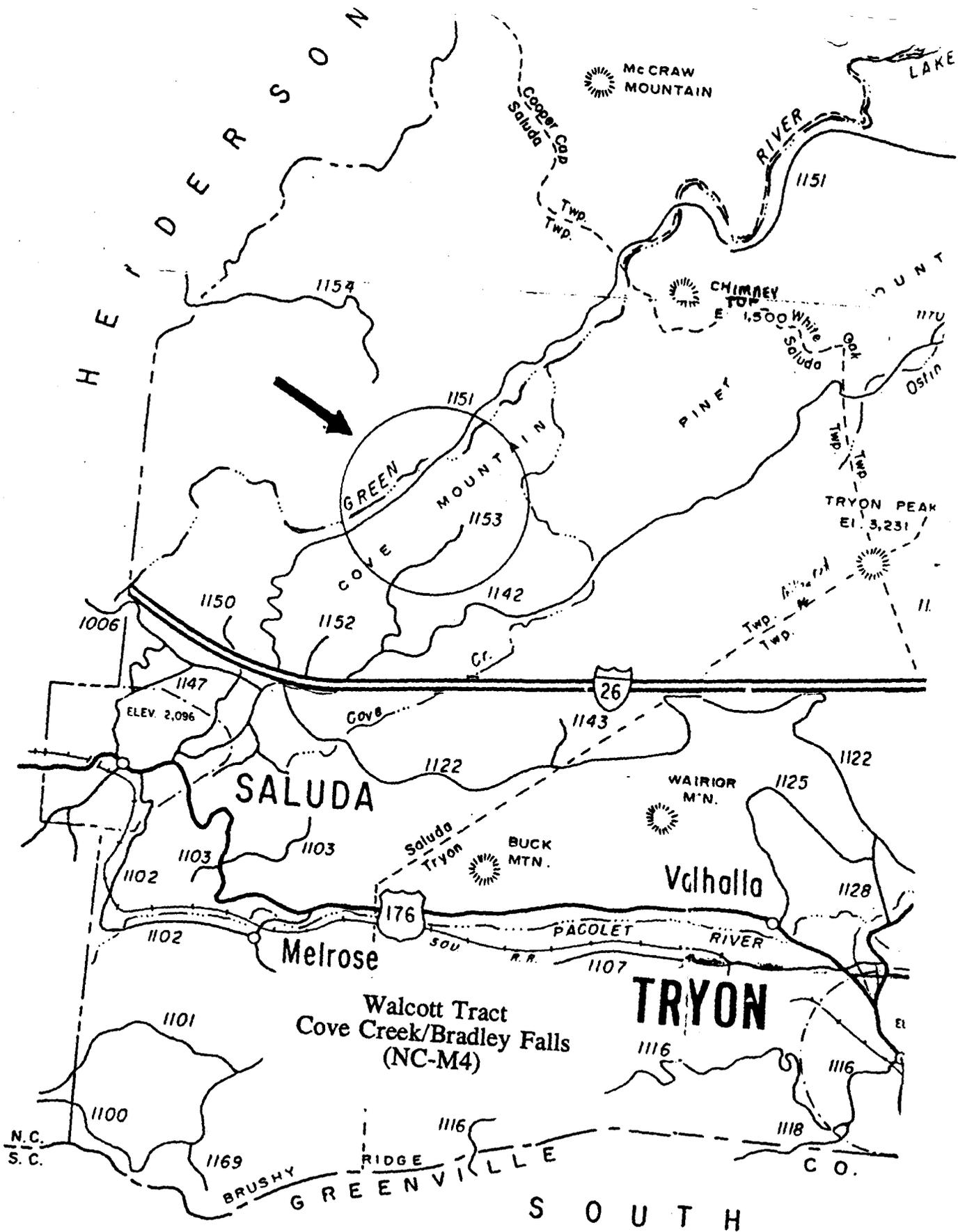
COMMENTS:

More detailed descriptions of this area and its significance are found in Gaddy (1986) and the Project Narrative for the Walcott Tract Acquisition (undated). I spent three full days and several half days surveying the Walcott Tract and the Cove Creek/Bradley Falls area as a whole. I agree with past investigators who recommended protection of these areas because of their significance as natural areas. A major emphasis of my recent field surveys was to determine how much of the Walcott Tract had natural significance worthy of dedication as part of a officially recognized natural area. The importance of Bradley Falls and the steep slopes along Cove Creek to the overall significance of the Cove Creek/Bradley Falls natural area is unquestioned. Bradley Falls is widely recognized as a significant scenic resource. Fourteen significantly-rare species are known from the area as a whole; of these, 12 are found in the Walcott Tract and eight are located outside the tract. The only rare species found only outside the Walcott Tract are a rare bittercress (*Cardamine*

flagellifera) and longstalk starwort (*Stellaria alsine*). Species found only within the Walcott Tract include the Cerulean warbler, whorled horsemint, butternut, climbing fern, and littleleaf alumroot. Are there parts of the Walcott Tract that do not contribute to the natural significance of the Cove Creek/Bradley Falls area? The upper slopes SW of Bradley Falls provide habitat and needed buffer for the nesting of the cerulean warbler. The slopes along Casey Branch provide habitat for French broad heartleaf and ginseng. The only portion of the Walcott Tract that is severely disturbed is the abandoned agricultural fields at the mouth of Cove Creek, and even that portion harbors a species of concern. Nesting material clearly identifiable as that of the eastern woodrat (*Neotoma floridana*) was found in one of the small abandoned outbuildings at the edge of the field. The status of the woodrat here needs to be more completely determined, as well as possible means of promoting it if it is present. The N- to NW-trending slopes and ridgetop associated with the easternmost extension of Cove Mountain were surveyed in some detail, and they are the only portions of the site without significantly-rare species. The communities found here included Chestnut Oak Forest and Pine-Oak Heath on the upper slopes and ridge tops and Dry-Mesic Oak-Hickory Forest on the lower slopes. These slopes are important to maintaining the wild and scenic character of the area as a whole and to providing buffer zone to the more significant parts of the property. They should be included as part of the protected natural area. The entire Walcott Tract, with the exception of the abandoned agricultural fields, should be included as part of the protected natural area.

Additional management concerns include 1) what to do with the streamside flat toward the mouth of Cove Creek that was planted in white pine some years ago and 2) what to do about the invasion of weedy species, particularly tree-of-heaven (*Ailanthus altissima*) and princess tree (*Paulownia tomentosa*); these species have invaded the area in significant numbers in places, particularly in canopy gaps in some of the Rich Cove Forest Community. Although not a natural part of this natural area, the white pines have been there long enough that they now look natural. I would advise against harvesting these trees because of the potential damage to other significant aspects of the area and the possible encouragement of invasion by additional weedy trees or herbs. Likewise, managers should be concerned about one potentially negative aspect associated with maintaining or creating wildlife openings, i.e. the fact that such openings might provide habitat for invasive woody or herbaceous species that might then invade the adjacent natural area. Tree-of-heaven, in particular, has already gained a significant foothold in the natural area, especially in the small pockets of Rich Cove Forest. What the impact of this and other weedy species will be long-term is unknown, but worthy of investigation. It may be prudent to kill these weedy trees via hand injection with herbicide.

REFERENCES: Gaddy 1986, N.C. Wildlife Resources Commission
undated, Rayner 1993b.



SITE NAME: Tryon Reservoir/Twin Lakes

SITE NUMBER; NC-M5 **Size:** A = 260 acres; B = 11 acres

SITE SIGNIFICANCE: B (REGIONAL)

LOCATION: Western Polk County, near the South Carolina state line; in the North Pacolet River valley.

QUAD MAP(S): Saluda

SIGNIFICANCE:

1. The primary significance of this natural area derives from the presence of a large population of the federally-endangered white irisette (*Sisyrinchium dichotomum*). The two sites of this project (A & B) harbor a total of 186 plants (clumps) of this rare irisette (blue-eyed grass), including 46 small, 55 medium and 85 large. This rare herb is known from fewer than 20 populations worldwide, and the heart of the species' range is Polk County.

2. Representative examples of two plant communities (Rich Cove Forest and Dry-Mesic Oak-Hickory Forest) occur here. The quality of these communities is fair-good.

GENERAL DESCRIPTION:

This natural area includes the crests, mid- and upper, generally north-facing slopes of a small portion of the North Pacolet River watershed. Site A includes the upper section of Big Fall Creek and some of the steep slopes west of Little Fall Creek. The headwaters of Big Fall Creek are not included in the present project boundary. Elevation ranges from 528 meters to 648 meters, and the forests are relatively young and the soil is undisturbed. A small pocket of mature forest is present northeast of and adjacent to the reservoir. The presence of white irisette suggests a circumneutral soil in at least parts of the Dry-Mesic Oak-Hickory Forest community, but few other calciphiles are present. Other plant communities at this site were not examined in any detail. Slopes along Big Fall Creek are quite scenic in places. Slopes along Big Fall Creek are more gentle than those along Little Fall Creek. Site A includes the Tryon Reservoir and some of the relatively gentle slopes upstream and adjacent to the reservoir. Slopes are rocky and/or steep in places, but not in areas harboring white irisette. Two well-maintained logging roads traverse the area, as well as several old abandoned logging roads. A new access road has just recently (1992) been cut into the area.

Site B includes most of the headwaters of a small ravine that drains into the

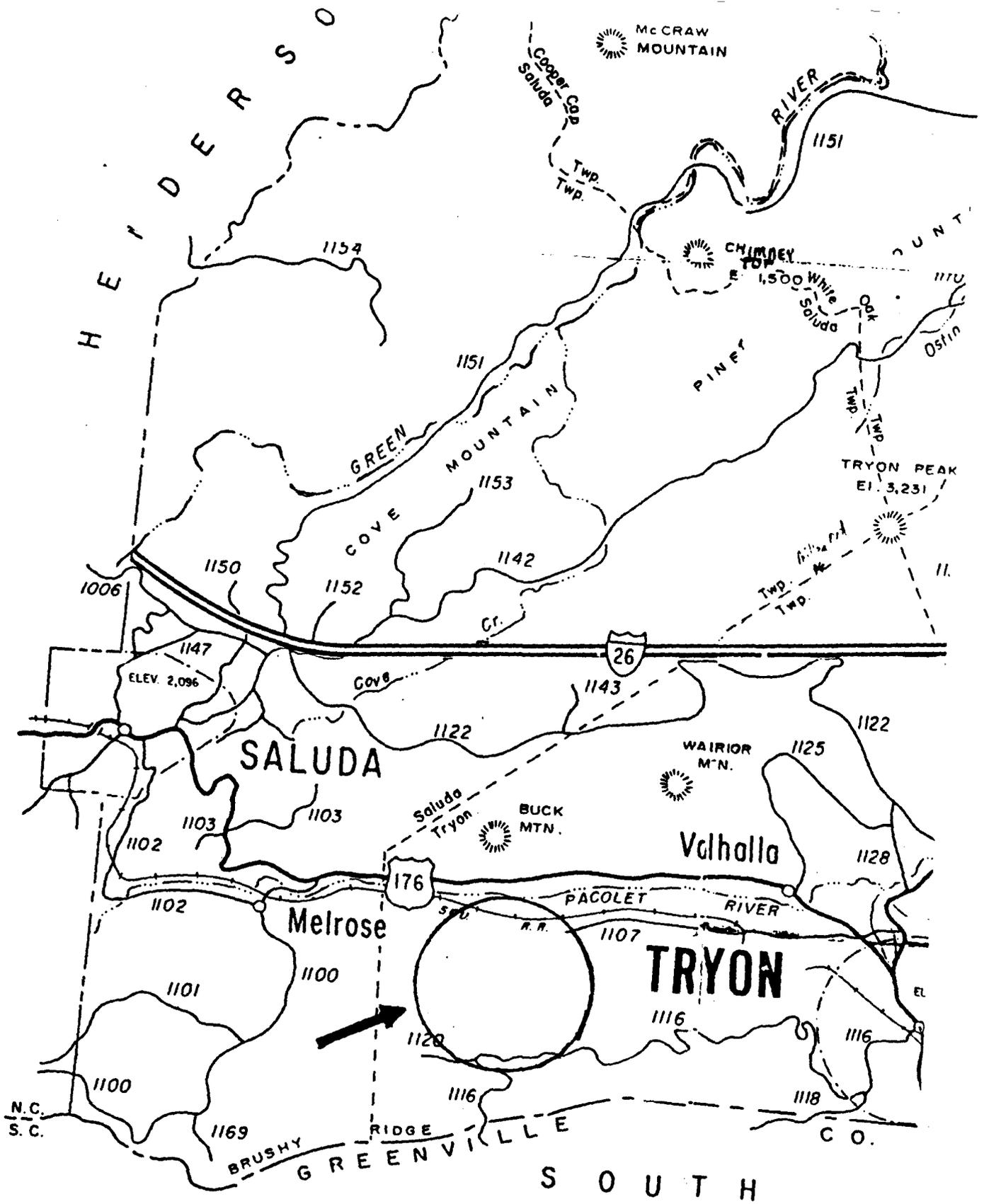
southerly of the "twin lakes". This site was probably logged 15-20 years ago. Trees here are young and mostly stump sprouts. This small site harbors an excellent population of white irisette. An access road into the upper (eastern) portion of this site suggests possible residential development.

OWNERSHIP: Public (City of Tryon) and Private

COMMENTS:

These two sites are here included as a single project because the primary significance of each is the same (i.e. the presence of significant populations of the federally-endangered white irisette), the main plant community of interest is the same (i.e. Dry-Mesic Oak-Hickory Forest), and the areas are in relatively close proximity. Land ownerships are different for the two sites, and protection of the sites should be pursued separately. Protecting the publicly owned part of Site A should be relatively straight-forward. Protecting the remainder may be difficult, since the recent cutting of a new access road into the area suggests that the area is slated for residential development. Individual landowners should be contacted about protecting suitable parts of their property. Likewise, the upgrading of an old logging road into the eastern portion of Site B suggests future residential development. No specific management is needed to maintain existing populations of white irisette. Residential development, of course, is likely to have detrimental effects unless it is carefully planned.

REFERENCES: Rayner 1993d



Tryon Reservoir
Twin Lakes
(NC-M5)

SITE NAME: Melrose Mtn. Complex

SITE NUMBER: NC-M6 and SC-M2

Size: ca. 340 acres

SITE SIGNIFICANCE: A (STATE)

LOCATION: Southwestern Polk County, NC and northeastern Greenville County, SC. The top of Melrose Mountain is 8000 feet west 5 degrees south from the westernmost point of the Tryon city limits; ca. 2.5 miles west 10 degrees north from the middle of Lake Lanier in Greenville County.

QUAD MAP(S): Saluda

SIGNIFICANCE:

1. The significance of this site derives mainly from the presence of several significantly-rare plant species. The federally-endangered white irisette (*Sisyrinchium dichotomum*) is present here in 16 colonies comprising 121 total plants. This is one of the largest known populations of this rare herb that is endemic to Polk and Henderson Counties in N.C. and Greenville County, S.C. Other rare plants here include broadleaf coreopsis (*Coreopsis latifolia*, a candidate for federal listing and another species with a very restricted range), mountain mint (*Pycnanthemum montanum*, a species considered "of regional concern" in S.C.), and Biltmore carrion-flower (*Smilax biltmoreana*, another species with a restricted distribution). Species reported (collected) by O.M. Freeman from Melrose Mountain, but not found during this survey, include mountain witch alder (*Fothergilla major*) and ash-leaved golden-banner (*Thermopsis fraxinifolia*). Other noteworthy species here include whiteleaf sunflower (*Helianthus glaucophyllus*), walking fern (*Asplenium rhizophyllum*), and mock orange (*Philadelphus hirsutus*).

2. An old-growth Oak-Hickory forest is present in part of the site. The extent of this representative example of a common community type is yet to be determined.

GENERAL DESCRIPTION:

This site is comprised of most of the south-trending slopes of Melrose Mountain, as well as the east-trending slopes north of the headwaters of Vaughn Creek, and the NE- and SW-trending slopes along the headwaters of a small unnamed branch of Vaughn Creek. The crest of Melrose Mountain is included in the site, as well as the few homes along the crest. Except for the crest of Melrose Mtn and the southeasternmost and westernmost corners of the property, slopes here are very steep and moderately to extremely stony. Soils in some of the area are deep and rich, but soils generally are acid and without a substantial organic component. Some small areas have a gravelly surface, probably as a result of erosion.

The significantly-rare plant species here are mostly associated with forests

described by N.C. biologists (Schafale and Weakley 1990) as Dry-Mesic Oak-Hickory Forest and by S.C. biologists (Nelson 1986) as Oak-Hickory Forest. Well-developed canopy, sub-canopy and shrub layers are present, and the herb layer varies considerably in density and diversity. Those forests of this type with a moderately dense and diverse herb layer fit these communities as described, but in many places high herb density and diversity are present; these forest are probably best described as Basic Oak-Hickory Forest or Montane Oak-Hickory Forest. Biologists with the N.C. Natural Heritage Program favor the Montane Oak-Hickory Forest designation. A portion of this site harbors a relatively old-growth example of the Oak-Hickory Forest type. Trees here average 26-35 inches in diameter. The extent of this mature forest needs to be determined. Upper slope leads and ridges in places harbor good examples of Chestnut Oak Forest (S.C. designation). The slopes along the headwaters of an unnamed branch of Vaughn Creek harbor Rich Cove Forest (N.C. designation).

Secondary Road 1116 in N.C. bisects the site, as does a large powerline right-of-way. Old logging roads traverse most of the area, even the very steep slopes above and below SR-1116.

OWNERSHIP: Private

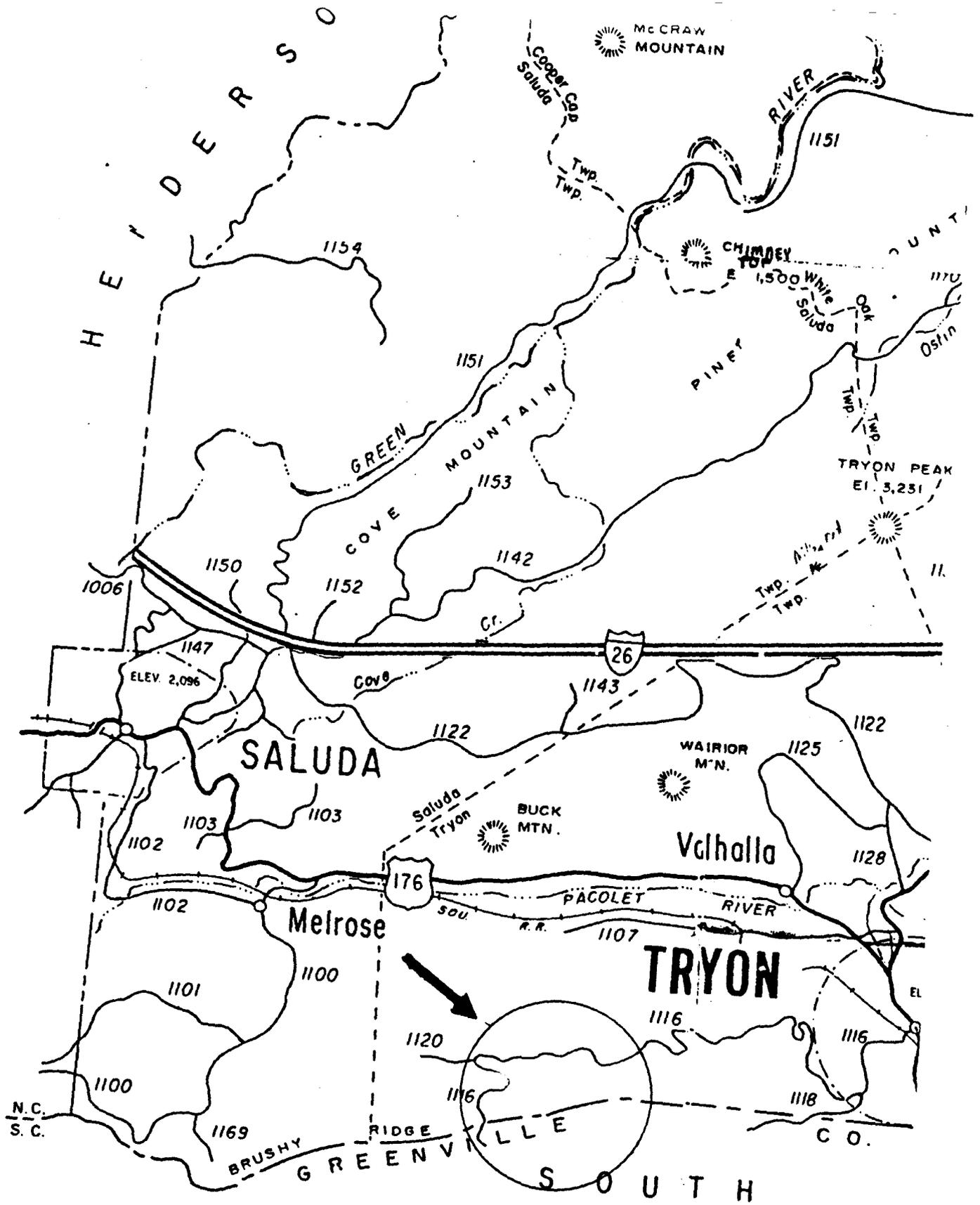
COMMENTS:

Most of this site is comprised of very steep slopes that are inaccessible and not likely to be subject to development. Slopes in the small westernmost and southeasternmost portions of the site are quite gentle, and residential development is a severe threat. Some weedy species are found along SR-1116 and the powerline R-O-Ws that traverse the site. Invasion of weedy species at present does not seem to be a problem, but it may become a problem in the future. A logging road off SR-319 in Greenville County near Rock Springs Church provides access to the southeastern portion of the site, and it has created some erosion problems. Off-road-vehicles may be a problem in the future. The communities and rare plant species here do not require active management for maintenance.

The northern boundary follows existing roads and thus is a logical and effective boundary. The southern boundary provides a minimal buffer zone of the species of concern. The eastern boundary is somewhat arbitrary, and additional work is needed to better define this boundary. The western project boundary abuts (just barely) lands of the Greenville Water Commission, lands that just recently (April 1993) have been placed under a conservation easement with the S.C. Nature Conservancy.

This site is listed here as of "state" significance. The presence of a federally-listed plant species suggests that a significance of "national" may be warranted.

REFERENCES: Rayner 1993e



Melrose Mtn. Complex
(NC-M6 and SC-M2)

SITE NAME: Melrose Mtn. Complex (North)

SITE NUMBER: NC-M7

Size: ca. 80 acres

SITE SIGNIFICANCE: B (REGIONAL)

LOCATION: Southwestern Polk County; the center of the proposed project is approximately 1.5 miles WNW from the center of Tryon.

QUAD MAP(S): Saluda

SIGNIFICANCE:

1. The primary significance of this site derives from the presence of significantly-rare plant species. This site harbors a relatively large population of the Federally-endangered white irisette (*Sisyrinchium dichotomum*). Two colonies here harbor 69 total plants; one colony harbors 68 plants, including 23 medium-sized plants and 36 large plants. Also present here are Biltmore carrion-flower and ginseng. Sweet white trillium, a species that is at the southern extent of its range in Polk County, also is probably present, but positive identification was not possible at the time of the site visit.

2. A good example of Rich Cove Forest is present here, a plant community that is quite abundant on the north-trending slopes in the North Pacolet River valley west of Tryon.

GENERAL DESCRIPTION:

This site includes the upper slopes east and north of the NE ridgetop of the multi-peaked Melrose Mountain. Aspects here include N, NW, NE, E, and SE. Slopes are very gentle at the crest in the southwestern portion of the property and steep to very steep (30-50%) and stony elsewhere. The top of the peak west of the property was recently (prior to June, 1991) cleared and bulldozed, presumably in preparation for residential development.

Only two plant communities are present here, Dry-Mesic Oak-Hickory Forest and Rich Cove Forest. The former community is quite small and it has been somewhat disturbed by site preparation for the adjacent development, i.e. some of the canopy has been removed. Nonetheless it is here that the well-developed population of white irisette occurs. Other significant species are found in the Rich Cove Forest community. Basswood (*Tilia* sp.) is particularly abundant here, and the tree, shrub, and (particularly) the herb layers are dense and diverse, as is typical of the community type. This community also has been partially impacted by the adjacent development.

OWNERSHIP: Private

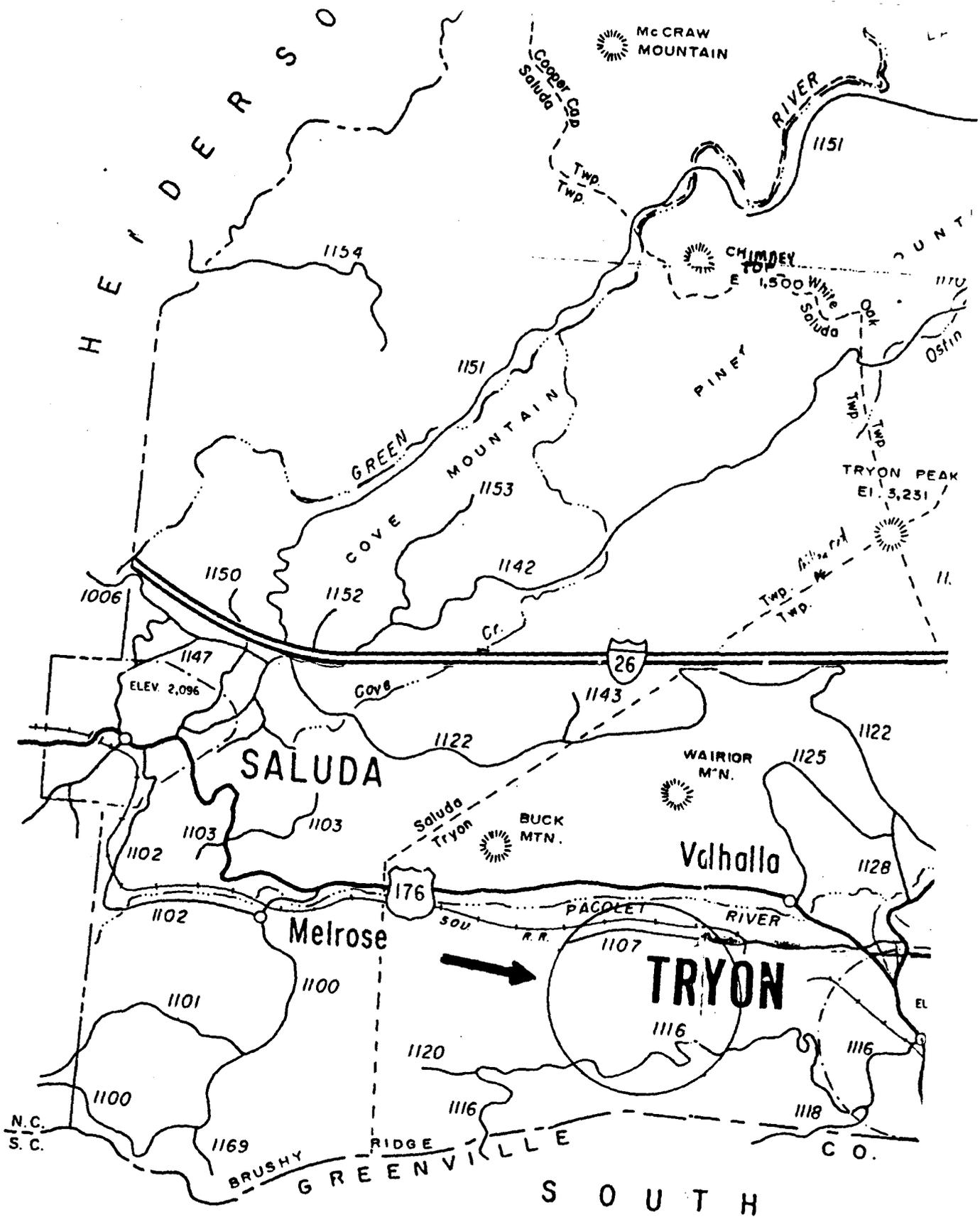
COMMENTS:

Because of the presumed development that will occur adjacent to the property, parts of the property are threatened. Some erosion occurred and considerable clearing debris was deposited in the site as a result of the initial land clearing. It is unknown how much additional disturbance has occurred to the area or how much additional development has occurred. If development has not occurred, it still may be relatively easy to protect the site. If development has occurred, then protection will require negotiation with individual landowners. Cleared land adjacent to the site may encourage invasion by weedy species. Such invasion had not occurred at the time of the site visit in June, 1991.

Active management will not be required to maintain the plants or communities of concern at this site, unless invasion by weedy species becomes a serious problem.

The northern and eastern boundaries are somewhat arbitrary. Additional survey is needed to assess the impact of additional development, to provide for better definition of the project boundaries, and to search for additional elements of concern in the Rich Cove Forest community.

REFERENCES: Rayner 1993f



Melrose Mountain
Complex (North)
(NC-M7)

SITE NAME: Rhodes French Broad Heartleaf

SITE NUMBER: NC-M8

Size: ca. 4 acres

SITE SIGNIFICANCE: B (REGIONAL)

LOCATION: Western Polk County; ca. 1.3 miles WNW from the center of Saluda; the site is just SW of the junction of SR-1106 and SR- 1122.

QUAD MAP(S): Saluda

SIGNIFICANCE:

1. The significance of this site derives entirely from the presence of a significantly-rare plant species, French Broad heartleaf (*Hexastylis rhombiformis*). A small population, consisting of 23 small plants and 9 medium-sized plants, is located here. This rare heartleaf is endemic to the low mountains of N.C. and few (less than 15?) populations are known worldwide. It was only recently described as a new species from populations discovered along the French Broad River. This is one of only four populations known in Polk County, and it is by far the smallest.

GENERAL DESCRIPTION:

This small site consists of the E- to ENE-trending slopes along an unnamed branch of Joel's Creek. It is basically the undeveloped side yard of a private residence just outside the town of Saluda. The stream is bounded by a narrow but thick zone of rosebay (*Rhododendron maximum*) and dog-hobble (*Leucothoe axillaris*). The woods upslope from this evergreen zone provide habitat for French Broad heartleaf and are dominated by a mix of species typically associated with Canada Hemlock Forest (especially near the stream) and Dry-Mesic Oak-Hickory Forest. These forests are quite young but are essentially undisturbed. Soils here are acidic based on species composition.

OWNERSHIP: Private

COMMENTS:

This is a small but significant and protectable site. The only management that this site might require concerns the invasion of the site by honeysuckle and the abundance of poison ivy. Attempts to control either species with herbicide would likely have negative consequences for French Broad heartleaf.

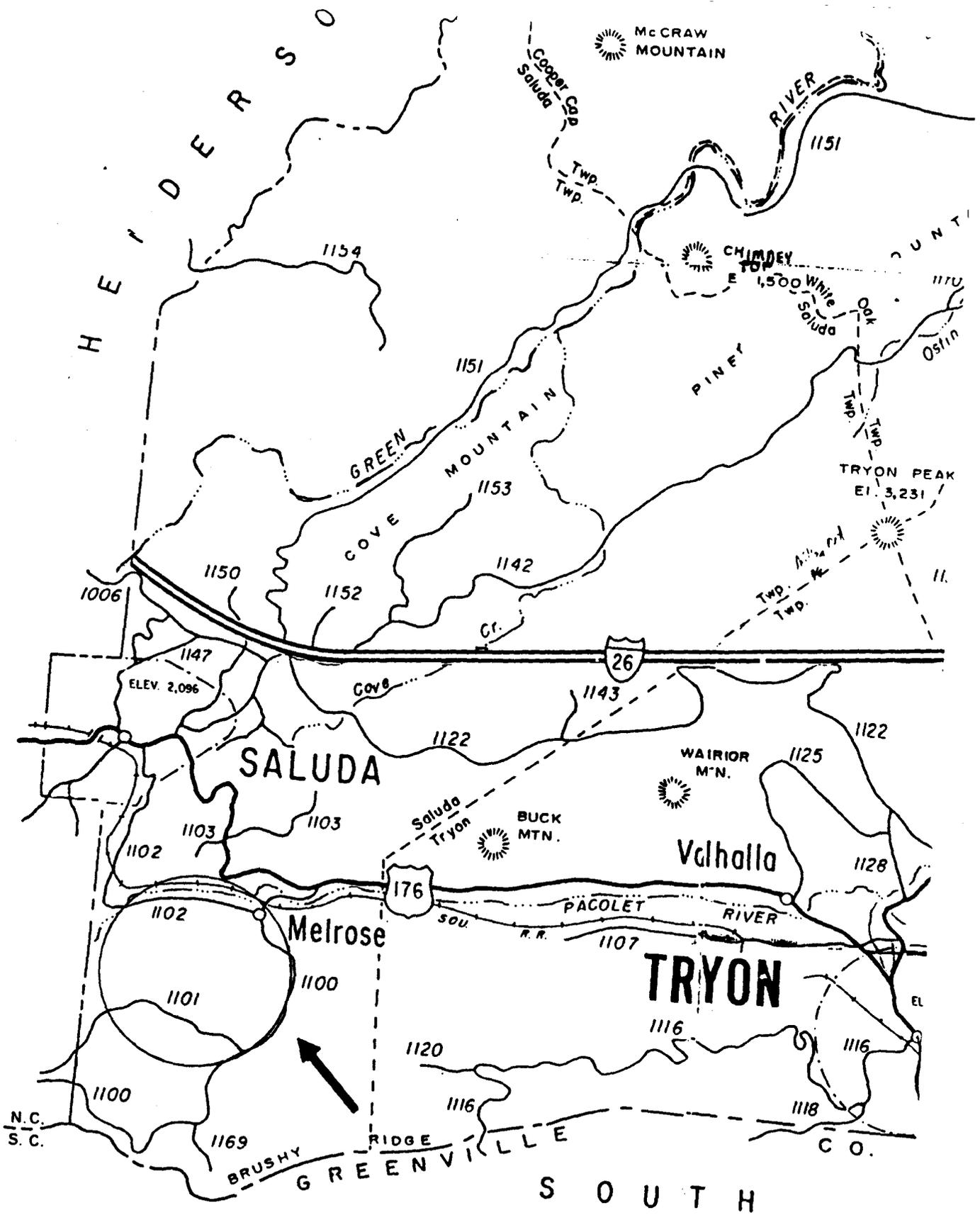
A business establishment on the highway above the owner's home has dumped trash, especially old tires, that have made their way downslope. Although unsightly,

this poses no threat to the heartleaf, since no plants presently occur in the area impacted by the trash.

The plant community here is described as a mix of species from two communities, Canada Hemlock Forest and Dry-Mesic Oak-Hickory Forest. Toward the stream species composition most resembles the former and well upslope it most resembles the latter. Well-developed examples of either community are not present here. Schafale and Weakley (1990) state that the Dry-Mesic Oak-Hickory Forest is predominantly a Piedmont community type, with only the possibility of examples occurring in the mountains. This site is definitely in the Blue Ridge Physiographic Province (mountains), but the dominance of the canopy by white oak seems to preclude inclusion of this community in the plant community one would expect to commonly occur adjacent to Canada Hemlock Forest, i.e. Acidic Cove Forest. Biologists with the N.C. Natural Heritage Program suggest a designation of Montane Oak-Hickory Forest may be appropriate.

The ranking of this site is low considering the rarity of the French Broad heartleaf because of the very small size of the population and the fact that the associated plant communities are only fair in quality and condition.

REFERENCES: Rayner 1993g



Rhodes French Broad
Heartleaf
(NC-M8)

Sp

SITE NAME: Wildcat Spur

SITE NUMBER: NC-M9

Size: ca. 90 acres

SITE SIGNIFICANCE: A (STATE)

LOCATION: Northwestern Polk County; near the Henderson County line.

QUAD MAP(S): Clifffield Mtn. and Bat Cave

SIGNIFICANCE:

1. An impressive list of significantly-rare plants is known or reported from this small, somewhat disturbed natural area, including white irisette (*Sisyrinchium dichotomum*), Allegheny cliff fern (*Woodsia scopulina*), divided-leaf ragwort (*Senecio millefolium*), Biltmore carrion-flower (*Smilax biltmoreana*), another carrion-flower (*Smilax lasioneura*), yellow honeysuckle (*Lonicera flava*), New England blazing star (*Liatris scariosa*), Small's beardtongue (*Penstemon smallii*), and a heartleaf skullcap (*Scutellaria ovata*). White irisette is federally-listed as endangered and is known from fewer than 20 populations worldwide, most of which are from the Pacolet area in Polk County N.C. and Greenville County, S.C. Four colonies comprising 32 plants are found here. Divided-leaf ragwort is endemic to the mountains of the Carolinas and Georgia; a hybrid between this ragwort and a much more common one (*Senecio anomymus*) is also found here. Allegheny cliff fern is rare east of the Mississippi and known from fewer than 10 populations in N.C.; two small colonies were found here. *Smilax lasioneura* is known from fewer than five populations in N.C. *Smilax biltmoreana* in N.C. once was known from fewer than 20 populations, but it has been found by this author to be quite common in Polk County. The other species mentioned above are on the NHP's "Watch List."

2. Most wide, gently-sloping ridges on rich soil in this part of N.C. are cultivated, usually as orchards. Although this site was once quite highly disturbed, it is fast recovering from disturbance, and it has the potential to become an outstanding natural area representing a fast disappearing topo-physiographic feature. Plant community composition here is mostly what one would expect in the absence of disturbance.

GENERAL DESCRIPTION:

This site includes the top of Wildcat Spur and the SW- extension of this broad, gently-sloping spur, as well as the headwaters of Bright's Creek. Slopes to the south and southeast especially are very steep and rocky, but very little of these slopes are included in this proposed project area. Some gently-sloping rock outcrops are

included, as well as some small boulder outcrops. According to the Clifffield Mountain quad map, about one-third of this area was cleared in 1946; these areas are now in forest and are recovering well from past disturbance.

Except for the steep rock outcrop areas, this entire site is occupied by variants of the Montane White Oak Forest or Montane Oak-Hickory Forest community types. The canopy is overwhelmingly dominated by white oak (*Quercus alba*), except in the headwaters of Bright's Creek, and a variety of sub-mesic hardwoods, including tulip poplar (*Liriodendron tulipifera*), red oak (*Q. rubra*), black oak (*Q. velutina*), shagbark hickory (*Carya ovata*), and American ash (*Fraxinus americana*). Shrub cover generally is sparse, and varies greatly in composition from mesic [spicebush (*Lindera benzoin*) dominated] to sub-xeric [dominated by blueberries (*Vaccinium pallidum* and *V. stamineum*)]. Herb cover also varies from relatively sparse to very dense: herb cover generally is quite sparse where colonies of white irisette are present. Poison ivy (*Rhus radicans*) and Virginia creeper (*Parthenocissus quinquefolia*) are very abundant and almost weedy in places. There is an apparently complete absence of such acid-loving species as mountain laurel (*Kalmia latifolia*) and great laurel (*Rhododendron maximum*), species that sometimes dominate the shrub layer of this community type.

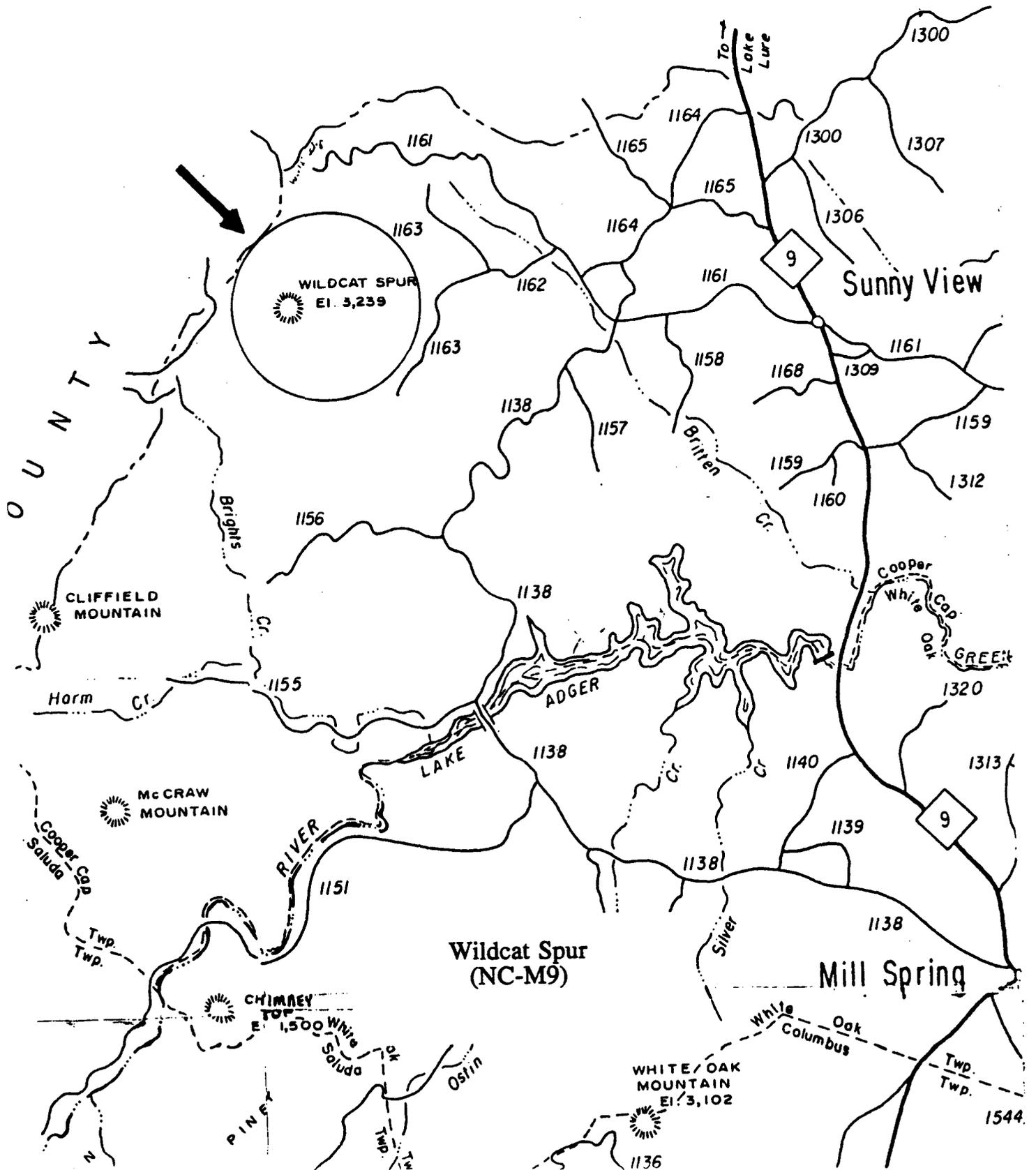
The few (?) small (?) rock outcrops at the edge of the steep E- to SW-facing slopes are in a somewhat unusual setting in that they are bounded by thick herb cover, at least along the upslope margins. Herb cover was so thick in places that access to the steep outcrop edge appeared to be difficult and dangerous, and due to a time constraint access was not attempted.

COMMENTS:

The list of significantly-rare plant species from this site is impressive, as is the list of potential rare species. The plant communities here in general are not impressive, although in general they are recovering well from disturbance. Since there is substantial acreage to the east and north of this proposed site that has yet to be surveyed, and since similar environments are becoming very rare, it is likely that the significance of this site will only increase in the future.

Considering the past disturbance to this site, the relative paucity of weedy species is surprising. Poison ivy has increased greatly in abundance, as has Virginia creeper, and both could become management problems in the future. Little active management should be required, other than the potential problem of weedy species. The extent of this problem needs to be more accurately determined, especially in the areas of rock and boulder outcrops.

REFERENCES: Rayner 1993i



SITE NAME: White Oak Mtn. (Dodge)

SITE NUMBER: NC-M10 **Size:** ca. 150 acres

SITE SIGNIFICANCE: AA (NATIONAL)

LOCATION: ca. 2.5 miles NW of Columbus in central southeastern Polk County.

QUAD MAP(S): Mill Spring

SIGNIFICANCE:

1. This site harbors numerous significantly-rare plant species, including white irisette (*Sisyrinchium dichotomum*), Allegheny cliff fern (*Woodsia scopulina*), broadleaf coreopsis (*Coreopsis latifolia*), Blue Ridge bindweed (*Calystegia sericata*), ash-leaved golden-banner (*Thermopsis fraxinifolia*), whiteleaf sunflower (*Helianthus glaucophyllus*), littleleaf alumroot (*Heuchera parviflora*), mock orange (*Philadelphus* sp.) and wafer ash (*Ptelea trifoliata*). This is the largest known population of the federally-endangered white irisette; 295 total plants occur here, which is nearly 15% of the known population in the Pacolet Area. Allegheny cliff fern is rare east of the Mississippi River and is known in N.C. from fewer than 10 populations; this is by far the largest of the four populations in the Pacolet Area. Broadleaf coreopsis has turned out to be locally abundant in the Pacolet Area, but it still is quite rare throughout its restricted range in the mountains of the Carolinas and Georgia. Blue Ridge bindweed and ash-leaved golden-banner are known from fewer than 20 populations in North Carolina; populations consisting of only a few plants are found here. The other plants listed above are on the NHP's "Watch List."

2. The natural communities here are in good quality and condition. The Montane White Oak Forest and the Montane Oak-Hickory Forest here are quite distinctive and worthy of protection in their own right. N.C. Natural Heritage Program biologists suggest that what I have called Montane White Oak Forest probably is just a segregate of Montane Oak-Hickory Forest, especially considering the low elevation.

3. This is the most significant and protectable portion of the diverse and highly ecologically significant White Oak Mountain complex.

GENERAL DESCRIPTION:

This site comprises the two northwesternmost peaks of the White Oak Mountain complex, including the broad, gently-sloping peaks, the upper, steep, north-facing slopes associated with these peaks, and the gently-sloping south-trending slopes. It

also contains the very head of Horse Creek, a NNE/SSW-trending ridge with large boulders, and a small Montane Acidic Cliff, which is probably best considered an inclusion in a Montane White Oak Forest. Slopes in general are stony, and rocks generally have significant amounts of amphibolite, which is high in calcium and weathers to produce rich soils. A large stone house is sited at the edge of the steep NE-trending slopes and a spectacular view of the adjacent mountains and the Ostin Creek valley is visible from the patio. A well-maintained access road leads to the house and barn, and old logging roads traverse the accessible portions of the property. The stone for the house was quarried on the property and the quarry is readily accessible, but not dangerous.

The plant communities here are in good quality and condition, and most of the communities are under the influence of higher than usual calcium levels. Distinguishing the various communities is sometimes difficult, because the boundaries separating the communities are often not distinct and pockets of one community may be present in another community. This is probably due to small scale changes in soil depth and mineral availability, as well as differences in aspect and elevation. Only communities harboring significantly-rare species are discussed here. The Montane White Oak Forest here generally is strongly dominated by white oak (*Quercus alba*), and the herb layer is generally quite lush and diverse, although not as lush as in some other areas of White Oak Mountain. Rare plant species here include broadleaf coreopsis, whiteleaf sunflower, and, associated with a small, steep, mossy cliff, streambank mock orange and wafer ash. Montane Oak-Hickory Forest is probably the most common natural community in this project area. The canopy is dominated by a variety of oaks, hickories and mesic/dry tree species, including white oak, red oak (*Quercus rubra*), pignut hickory (*Carya glabra*), shagbark hickory (*C. ovata*), tulip poplar (*Liriodendron tulipifera*), and black gum (*Nyssa sylvatica*). Flowering dogwood (*Cornus florida*) and sourwood (*Oxydendrum arboreum*) dominate the subcanopy, and the herb cover varies from sparse to quite rich and diverse. Rare plants here include white irisette, Blue Ridge bindweed, broadleaf coreopsis, whiteleaf sunflower, ash-leaved golden-banner, a gooseberry (*Ribes*) of unknown identity, and, associated with small to massive boulders on a NNE-trending slope, Allegheny cliff fern. One small population of ash-leaved golden-banner was found on a dry, narrow, NNE-trending ridge in a community that I've described as Chestnut Oak Forest. This small area harbors an interesting mix of dry and mesic species and may be best considered as a variant of the Montane Oak-Hickory Forest. A small Montane Acidic Cliff is located on the steep mid-slope of a NNE-trending ridge. Species here are typical of acid cliffs, but the exposed rocks in the forest just upslope from this cliff harbor a large population of Allegheny cliff fern and some small-flowered alumroot, species typical of more mafic rocks. It's clear from this and from the difficulty in delineating plant communities in general that this project area includes a jumbled mix of acidic and mafic rocks.

OWNERSHIP: Private

COMMENTS:

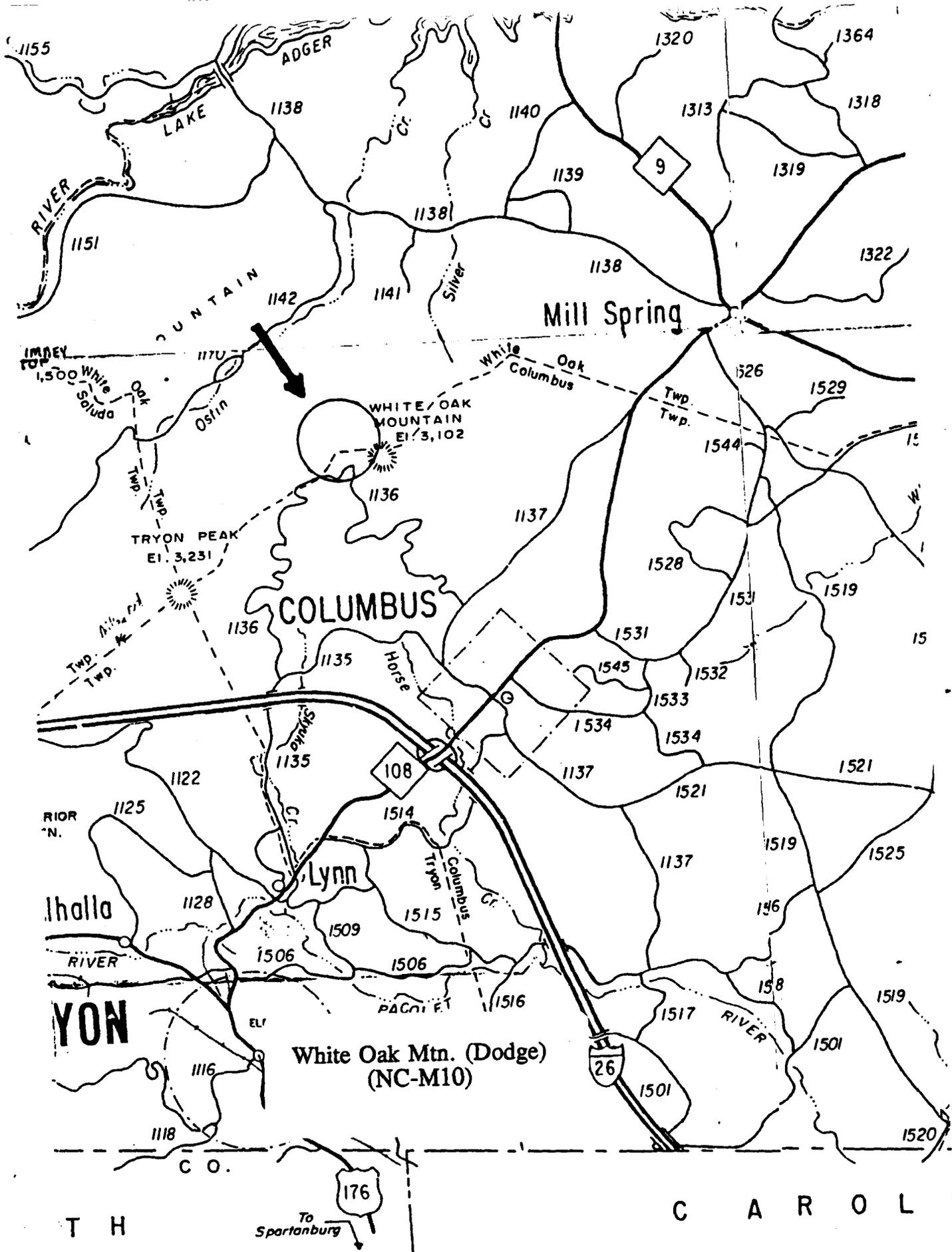
This is by far the most significant of the numerous significant tracts on White Oak Mountain. The rating of this site as of national significance is due to the excellent population of the federally-endangered white irisette and the numerous additional significantly-rare plant species and communities.

The identity of the gooseberry (*Ribes*) near the barn is undetermined because flowering material is necessary for positive identification, and the species hasn't flowered or fruited, at least in a year when it was visited by a botanist. The lack of flowering suggests to me that the species is not native to the area but was introduced to the area, probably from the mid-west.

Large-lot residential development already is present in the area, and lands to the south and east are slated for development into small residential lots. Ideally, the boundary of this project should be extended to the south until it abuts existing access roads and to the east to include a sizeable population of white irisette. Unfortunately, this includes lands that have already been subdivided into 6-8 residential lots.

The only active management that will be required here involves the removal of a small population of kudzu (*Pueraria lobata*) that is now present adjacent to the barn below the house. If left alone, this aggressive weed could become all but uncontrollable.

REFERENCES: Rayner 1993j, Pittillo 1976, Peattie 1928-1931.



SITE NAME: Tryon Peak

SITE NUMBER: NC-M11

Size: ca. 500 acres

SITE SIGNIFICANCE: AA (NATIONAL)

LOCATION: Southwestern (central) Polk County; about 3 miles WNW from Columbus.

QUAD MAP(S): Clifffield Mtn. and Mill Spring Quads

SIGNIFICANCE:

1. Numerous significantly-rare plant species are found here, including white irisette (*Sisyrinchium dichotomum*), divided-leaf ragwort (*Senecio millefolium*), sweet white trillium (*Trillium simile*), Biltmore sedge (*Carex biltmoreana*), Allegheny cliff fern (*Woodsia scopulina*), broadleaf coreopsis (*Coreopsis latifolia*), southern loosestrife (*Lysimachia tonsa*), whiteleaf sunflower (*Helianthus glaucophyllus*), streambank mock orange (*Philadelphus hirsutus*), scentless mock orange (*Philadelphus inodorus*), a heartleaf skullcap (*Scutellaria ovata*), littleleaf alumroot (*Heuchera parviflora*), wafer ash (*Ptelea trifoliata*), and leatherwood (*Dirca palustris*). Only a small population of the Federally-endangered white irisette is found here. Large populations of divided-leaf ragwort, a candidate for Federal listing and an endemic to the mountains of the Carolinas and Georgia, and Biltmore sedge, a former Federal candidate and southern Appalachian endemic, are found on the Montane Mafic Cliff community here. Fewer than ten populations of Allegheny cliff fern are known from North Carolina, and one of four Polk County populations, and the second largest, is found above these same cliffs. One enormous population and several small populations of broadleaf coreopsis are found here; this former Federal candidate for Federal listing is now known to be locally abundant in Polk County. The other species named above are all on the NHP's "Watch List," and all are indicators of basic or neutral soils.

2. The Montane Mafic Cliff natural community is rare in N.C. and this one is in very good condition, at least in part due to the steep, inaccessible nature of this community. At least nine of the significantly-rare plants potentially found in this community are found here.

GENERAL DESCRIPTION:

Tryon Peak is part of a series of peaks that seem to be part of the escarpment (long cliff or steep slope separating two more gently sloping surfaces) that typically separates the Blue Ridge Physiographic Province from the Piedmont Province. North- and south-trending slopes are very steep and generally rocky, with the

S-trending slope including an extensive, nearly vertical rock/cliff complex that is undoubtedly the most significant aspect of the site. The ridges sloping down from the top of Tryon Peak to the east (actually NE) and west are much more gently sloping. About 1.1 mile of the ridge and associated slopes to the west of the top are included in the project and about one-half mile of ridge and slopes to the northeast are included. The former development known as Rixhaven is included, as well as the radio and lookout towers on the top of the Peak.

Many of the natural communities here have been influenced by the high calcium associated with many of the rocks in the area. Black locust (*Robinia pseudo-acacia*) is present in all communities, attesting to past logging or other significant disturbance.

The Montane Mafic Cliff community is the most interesting and unusual community here. Vegetation necessarily is heterogeneous because of the mosaic of rock, shallow soil, and deep rich soil. The scattered trees and shrubs include chestnut oak (*Quercus prinus*), red cedar (*Juniperus virginiana*), fringe tree (*Chionanthus virginicus*), and sparkleberry (*Vaccinium arboreum*). Significantly-rare plant species here include divided-leaf ragwort, Biltmore sedge, Allegheny cliff fern, streambank mock orange, littleleaf alumroot, southern loosestrife and wafer ash. This cliff community is bounded upslope by a one-hundred-yard band of Montane Oak-Hickory Forest that includes a dense herb layer. White oak (*Quercus alba*) is the overwhelming canopy dominant and rare species include southern loosestrife and *Lonicera dioica* (a honeysuckle). Evergreen shrubs are absent from this community on the upper S-trending slopes, but mountain laurel (*Kalmia latifolia*) and species of *Rhododendron* are a part of this community on the N-trending, uppermost slopes.

Some of the west and SW-trending slopes at elevations between 2500 and 2700 feet are occupied by a Montane Oak-Hickory Forest natural community that harbors such rare species as white irisette, leatherwood, and scentless mock orange. The presence of these species is the only indication that the soils here are basic or neutral in pH.

The N-trending slopes in the western half of the project area harbor a natural community that seems to fit the description of the High Elevation Red Oak Forest, but is probably a variant of Rich Cove Forest. The canopy is dominated by tulip poplar (*Liriodendron tulipifera*), red oak (*Q. rubra*), black locust, sweet birch (*Betula lenta*), and basswood (*Tilia* sp.). The dominance of tulip poplar and red oak may be the result of past cutting. Herb cover is dense and quite diverse, including the following rarities; broadleaf coreopsis, whiteleaf sunflower, heartleaf skullcap, and wafer ash.

Chestnut Oak Forests, with and without a dense shrub layer of mountain laurel, rosebay (*Rhododendron maximum*) and Carolina rhododendron (*R. minus*), are

present in the area. Forest without these ericads and with some outcropped boulders harbors part of the population of Allegheny cliff fern here.

OWNERSHIP: Private, except for the very top of Tryon Peak

COMMENTS:

This site has been visited regularly by botanists since at least the 1920's. The most recent botanists to visit and rank the area, Gaddy (1986) and Pittillo (1976), both rank the area very highly.

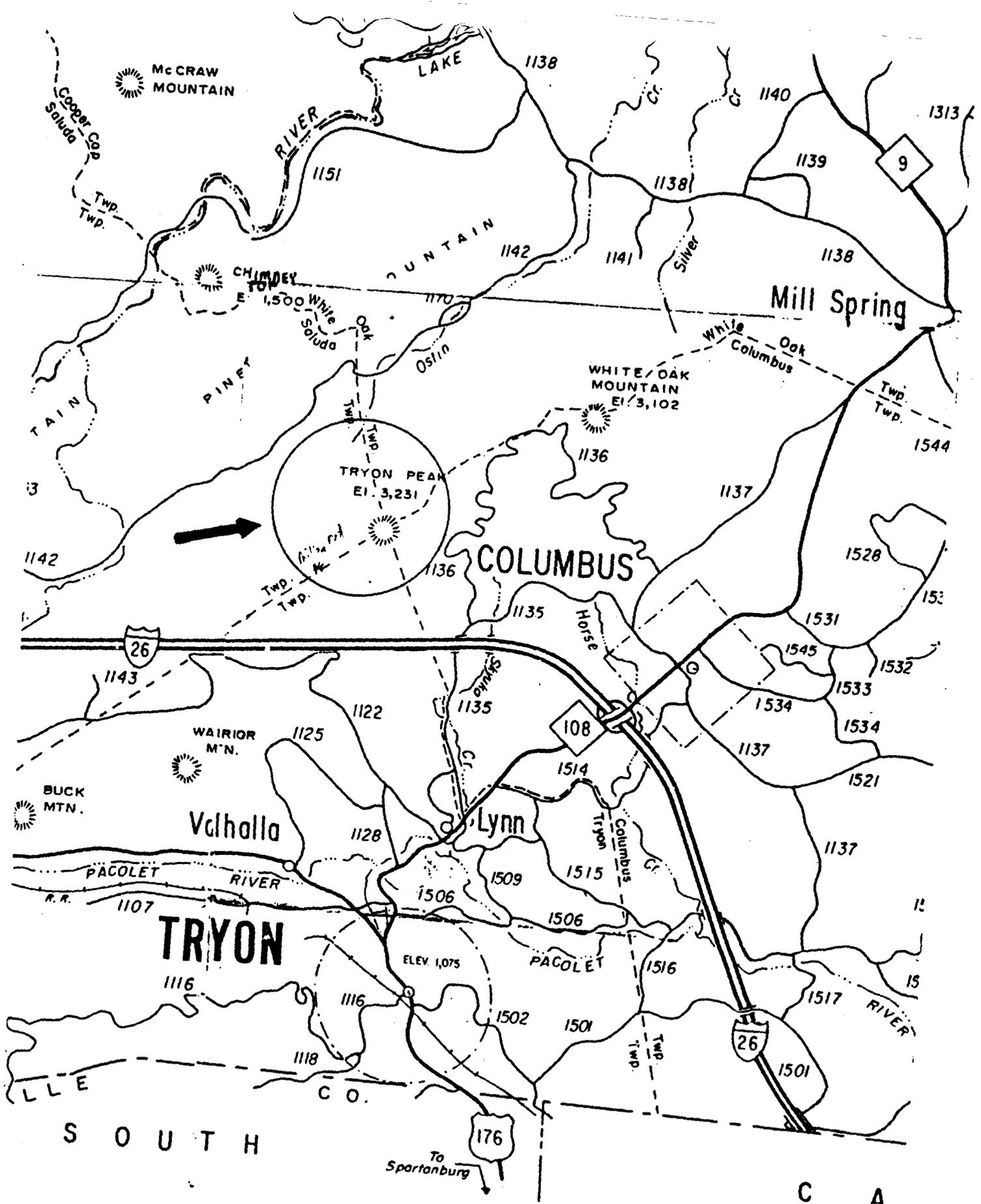
Increasing the size of the proposed project adds several natural communities and significantly-rare species and adds to the area's significance.

The western portion of the project, in particular, is recovering from serious past disturbance, but recovery seems to be progressing well.

The only active management that may be required is the control of weedy species. The nature and extent of this problem, if any, needs to be assessed. Weedy species are known to be abundant in the vicinity of Rixhaven.

Development is a potential threat. Development is proceeding on adjacent mountains, Miller Mountain and White Oak Mountain. The former Rixhaven development is one prime development area, as are the more gently sloping areas on ridges to the west and northeast of the Peak. Even if development does occur, the steep, rocky S- and N-trending slopes should not be impacted directly. Efforts should be made to minimize impact from adjacent development.

REFERENCES: Gaddy 1986, Pittillo 1976, Rayner 1993k.



Tryon Peak (NC-M11)

SITE NAME: Shunkanwahken Falls and Ravine

SITE NUMBER: NC-M12 **Size:** 50-60 acres

SITE SIGNIFICANCE: B (REGIONAL)

LOCATION: Southeastern (central) Polk County; 1-2 miles NNW of Columbus.

QUAD MAP(S): Mill Spring

SIGNIFICANCE:

1. Populations of several significantly-rare plants occur here, including Biltmore sedge (*Carex biltmoreana*), whorled horsebalm (*Collinsonia verticillata*), ginseng (*Panax quinquefolius*), and scentless mock orange (*Philadelphus inodorus*). A small population of Biltmore sedge occurs adjacent to the upper falls; this former candidate for federal listing is endemic to the southern Appalachians. Whorled horsebalm has been found to be locally abundant in Polk County, but this is the only N.C. county where it is found. This southern Appalachian endemic also is known from the Greenville County, S.C., portion of the Pacolet Area. A small population of ginseng is found here; this species is known from many populations in the mountains and Piedmont of N.C. and is of concern, because it can be collected and sold under specific regulations and because its abundance has been drastically affected by past uncontrolled collection and sale. The other species mentioned above are on the NHP's "Watch List."

This project includes good examples of several common natural community types, including Montane Acidic Cliff, Spray Cliff, and Canada Hemlock Forest.

Two scenic waterfalls are present, one of which has difficult access (lower falls) and one of which has easy access (upper falls). A scenic overlook is present at the highway SR-1136 crossing of Horse Creek.

GENERAL DESCRIPTION:

This site comprises two waterfalls and the associated ravines along Horse Creek on a steep upper slope of White Oak Mountain. The upper falls (Shunkanwahken Falls) consists of a scenic but not spectacular 2-3 step series of nearly vertical falls just above the crossing of Horse Creek on highway SR-1136, the primary access road to the development at the top of White Oak Mtn. The Lower Shunkanwahken Falls is much smaller than the upper and access is very difficult. Slopes in the project area as a whole are rocky and very steep, as indicated by the 1400 foot drop in elevation over a distance of only 3100 feet. Horse Creek in the project area contains a much larger volume of water than one might expect based on its position at the top of a steep slope, but there is substantial watershed above the project area. The upper falls area

includes Spray Cliff and Montane Acidic Cliff natural communities. The Spray Cliff community, as the name suggests, remains nearly constantly supplied with spray from the waterfall. Small pockets of soil are interspersed with bare rock. Characteristic herbs here include Carolina tassel-rue (*Trautvetteria carolinensis*), water-dropwort (*Oxypolis rigidior*) and the rare Biltmore sedge. Most of the area around the falls is part of a Montane Acidic Cliff community. The sparse canopy is dominated by chestnut oak (*Quercus prinus*), red cedar (*Juniperus virginiana*), and hickory (*Carya* sp.); scentless mock orange is quite abundant in the shrub layer. Rare species here include the scentless mock orange and littleleaf alumroot. The ravine below SR-1136 is dominated by Canada Hemlock Forest and is quite rich in general, in spite of the exposed south aspect. Canada hemlock (*Tsuga canadensis*) and tulip poplar (*Liriodendron tulipifera*) dominate the canopy, and spicebush (*Lindera benzoin*) and sweet shrub (*Calycanthus floridus*) dominate the tall shrub layer. The herb layer is quite rich and diverse and includes such rare species as ginseng, green violet, and horse gentian (*Triosteum* sp.). Whorled horsebalm is found in ravine area(s) with less dense herb cover. The lower falls and associated ravine need to be surveyed in more detail.

OWNERSHIP: Private

COMMENTS: The area is quite undisturbed except for a small strip just below SR-1136 where man-made talus from the building of the road is abundant and weedy species abound. Horse Creek has been dammed just above the project area to form a small lake. Maintaining full pool level in this lake may lessen the flow of Horse Creek and may negatively impact the spray cliff community. Development above the project area otherwise shouldn't impact this area. The slopes here are so steep that development in the project area should be precluded. This should ease efforts to protect the area.

Bigleaf scurfpea (*Psoralea macrophylla*) is known (globally) only from a collection by Edward C. Townsend in 1897 from "White Oaks Mt. Tryon" and from another collection in 1899 from "Trail White Oak Mt." Leonard (undated) writes, following considerable historical research, that, "The areas considered most likely to have been the site of the enigmatic trail, and hence, *Psoralea*, are: [the] area between Hemlock Shoals and Shunkawakan Falls, [and the] area between base of Shunkawakan Falls and the crest of the mountain....." In spite of extensive searches by Leonard and other botanists, this rare scurfpea has not been seen since the turn of the century. Discovery of this species in the project area would greatly increase the significance of the area.

Shunkanwahken is said to mean "skywater" in Cherokee (Gaddy 1986).

REFERENCES: Gaddy 1986, Leonard undated

SITE NAME: Miller Mountain

SITE NUMBER: NC-M13

Size: variable; one 30 acre tract

SITE SIGNIFICANCE: B (REGIONAL)

LOCATION: Southwest (central) Polk County; about 3 miles west of Columbus.

QUAD MAP(S): Clifffield Mtn. and Saluda

SIGNIFICANCE:

Numerous significantly-rare plants have been found in or reported from the area, including white irisette (*Sisyrinchium dichotomum*), broadleaf coreopsis (*Coreopsis latifolia*), a rare carrion-flower (*Smilax lasioneura*), Biltmore carrion-flower (*S. biltmoreana*), southern loosestrife (*Lysimachia tonsa*), whiteleaf sunflower (*Helianthus glaucophyllus*), scentless mock orange (*Philadelphus inodorus*), pink thoroughwort (*Eupatorium incarnatum*), green violet (*Hybanthus concolor*), Small's beardtongue (*Penstemon smallii*), and Harvey's beakrush (*Rhynchospora harveyi*). Three small colonies (21 plants total) of the Federally-endangered white irisette occur here. The second known population of *Smilax lasioneura* in the Pacolet area is found near one of the white irisette colonies. Two moderately-sized colonies of the southern Appalachian endemic, broadleaf coreopsis, occur in the southeastern portion of the area. Several populations of Biltmore carrion-flower are scattered on the mountain; the species is now known to be locally abundant in Polk County. With the exception of pink thoroughwort, the remaining species mentioned above are all on the NHP's "Watch List." Pink thoroughwort is known in N.C. from fewer than five populations and was collected here in the 1950's by O. M. Freeman; it was not relocated during this survey, but no effort was made in September, the heart of the species blooming period.

One small area is here recommended for protection. Additional locations of significantly-rare plants are also worthy of protection but were not specifically recommended because of the small size of the areas occupied and the lack of co-occurrence of other rare plants.

GENERAL DESCRIPTION:

Miller Mountain is a generally NE-trending series of peaks and ridges that is part of the escarpment that forms the boundary between the Blue Ridge and Piedmont Physiographic Provinces. Only the ridge tops and upper slopes are considered part of this project; nonetheless, elevation ranges from about 1800 feet in the southwestern portion of the area to 2585 feet in the northeastern part of the area. SE-trending

slopes generally are very steep and rocky and in places are quite disturbed. The NW-trending slopes are less to very much less steep. Ridgetops in much of the area are relatively gently sloping. The heads of numerous small streams originate here, one of which has had some of its gentle north slopes logged, bulldozed and transformed into a grassy picnic area. Although the steep SE-trending slopes are described by soil scientists as part of the Cleveland-Ashe Rock Outcrop Complex, no substantial cliffs or rock outcrops appear to be present.

Natural communities here are either Chestnut Oak Forest or Montane Oak-Hickory Forest. Some large cull trees are present, but generally the canopy consists of young trees. Most (all?) of the area has been logged in the past 30-50 years and the latter community in places strongly shows the effect of past logging or other disturbance. The area specifically recommended for protection is a Montane Oak-Hickory Forest and has a closed canopy, but much of it probably was once pasture. The canopy is dominated by species that respond to disturbance, i.e. tulip poplar (*Liriodendron tulipifera*) and black locust (*Robinia pseudo-acacia*). Additional canopy trees include black gum (*Nyssa sylvatica*), mockernut hickory (*Carya tomentosa*), red oak (*Quercus rubra*), and sweetgum (*Liquidambar styraciflua*). The subcanopy layer is essentially absent, and the shrub layer is poorly developed. Herb cover varies from sparse on the NNW slopes to rich and diverse on the upper SE slopes. In spite of this past disturbance, three rare plants occur here (i.e. white irisette, *Smilax lasioneura*, and Biltmore carrion-flower). Less disturbed forest occurs to the southwest and northeast, and the NW-trending slopes near the northeast project boundary harbor a small population of southern loosestrife. White oak (*Q. alba*), chestnut oak (*Q. prinus*), and red oak (*Q. rubra*) are much more abundant in those areas that are recovering only from logging disturbance and not from severe soil disturbance. Most of the other rare plant occurrences are in areas that are recovering from past logging.

OWNERSHIP: Private

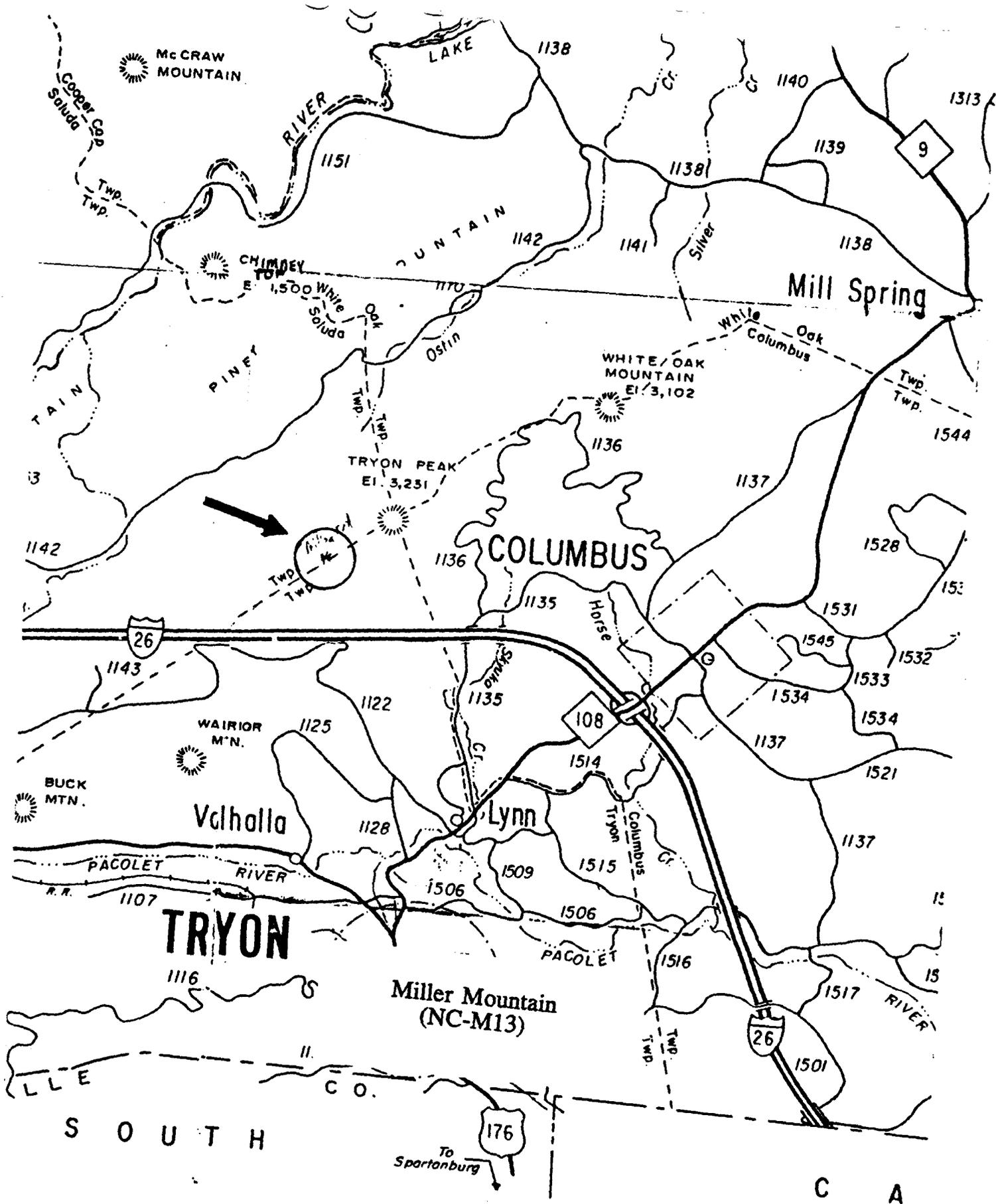
COMMENTS:

In spite of the numerous rare plants that have been found or reported from this site, there is not the possibility of a single large protection project in the area. The area as a whole has been logged and some places that are now in forest were once pasture or open fields. Access roads now traverse the upper slopes and additional roads are being built to allow development of some of the lower N-trending slopes. Although the area is definitely not the natural area it was in the 1950's when O. M. Freman made extensive herbarium collections, it still contains some small pockets that are worthy of protection. The one area recommended for protection in this document is by no means an undisturbed natural area, but parts are quite undisturbed and several highly significant rare plants are present. Pink thoroughwort, and Harvey's beakrush are only known in Polk County and the Pacolet Area from this

site.

A few houses have already been built here and much of the developable land has been subdivided into lots. Development is a severe threat, but it may be possible to protect the most significant lands by working with the developer or with individual landowners.

REFERENCES: Rayner 1993m



SITE NAME: Holbart's Cove: Cove Creek/Bradley Falls

SITE NUMBER: NC-M14

Size: ca. 1000 acres

SITE SIGNIFICANCE: A (STATE)

LOCATION: West central Polk County; along Cove Creek and above and below the Crossing of SR-1142.

QUAD MAP(S): Clifffield Mtn. and Saluda

SIGNIFICANCE:

1. Much of the verbage used to describe the significance of the Walcott Tract (Cove Creek - Bradley Falls) actually was verbage that described the combined Walcott Tract - Holbart's Cove area, i.e. Cove Creek - Bradley Falls as a whole (N.C. Wildlife resources Commission undated, N.C. Natural Heritage Program 1981). These summaries of site significance included 1. high diversity of plant communities, micro-habitats, physiography, and flora; 2. high value for continued research in botany, geology and archeology; 3. high recreational value for hiking, hunting, fishing, and nature study; and 4. the presence of numerous significantly-rare plants (and animals).

2. The numerous rare plants in Holbart's Cove include French Broad heartleaf (*Hexastysis rhombiformis*), a rare bittercress (*Cardamine flagellifera*), longstalk starwort (*Stellaria alsine*), broadleaf coreopsis (*Coreopsis latifolia*), Blue Ridge bindweed (*Calystegia sericata*), ginseng (*Panax quinquefolius*), scentless mock orange (*Philadelphus inodorus*), and whiteleaf sunflower (*Helianthus glaucophyllus*). The area also has high potential for other Special Status Species, including large fothergilla (*Fothergilla major*), white irisette (*Sisyrinchium dichotomum*), littleleaf alumroot (*Heuchera parviflora*) and several others. French Broad heartleaf is known globally from fewer than ten populations in three N.C. counties; a large population is found here. Longleaf starwort is known in N.C. from fewer than five populations, and this is the only one known in Polk County. Blue Ridge bindweed is known in N.C. from only two other counties, and this is one of only three populations in Polk County. Broadleaf coreopsis is found in 3-4 small pockets of rich woods; this endemic to the southern Appalachians is now known to be locally abundant in Polk County. Ginseng is known from more than 100 populations in N.C., including many in Polk County and the Pacolet Area; concern for this species relates to its substantial decline due to harvest for commercial purposes. Whiteleaf sunflower and scentless mock orange are frequent in suitable habitats in N.C.; they are on the NHP's "Watch List." Large fothergilla has been reported from this general area, but its exact location is unknown. A population of white irisette, a species federally-listed as endangered, is known from an area less than one-half mile from the southeastern

project boundary. Appropriate habitat for littleleaf heartleaf, a "Watch List" species, is believed to exist in the rock outcrop complex in the northern part of the property.

GENERAL DESCRIPTION:

This site includes much of the watershed of Cove Creek from the edge of the broad floodplain at its mouth at the Green River upstream for several miles to just south of the crossing of Cove Creek by Interstate Highway 26. Cove Creek is a tumbling, rocky mountain stream that flows generally northward; it drops nearly 700 feet in the area just described, 420 feet within the Walcott Tract and 340 feet within the Holbart's Cove Tract. Slopes here are not nearly as steep or rocky as in the Walcott Tract, but the area is every bit as scenic. It includes Little Bradley Falls with its associated spray cliffs and acidic cliffs, as well as many small rocky seeps that provide habitat for numerous salamanders. The forests are largely undisturbed, but no old growth forests are present; most of the area has at least been selectively logged in the past. Lower slopes generally are occupied by Canada Hemlock Forest, and most of the rare plant species are found here or in small inclusions of specialized microhabitat that seem to be a mix of several communities. The canopy is dominated by hemlock (*Tsuga canadensis*), sweet birch (*Betula lenta*), and white pine (*Pinus strobus*); the tall shrub layer varies from sparse to dense and is comprised mainly of rosebay (*Rhododendron maximum*), mountain laurel (*Kalmia latifolia*), and Carolina rhododendron (*Rhododendron minus*). The herb cover is usually sparse and foam flower (*Tiarella cordifolia*) and Christmas fern (*Polystichum acrostichoides*) are almost inevitably present. Rare plants here include French Broad heartleaf, a rare bittercress, sweet white trillium, and longstalk starwort; the latter two species are only found in a small microhabitat that harbors a combination of streamside and rich cove species. Small pockets of Rich Cove Forest are present, usually at the base of north-trending slopes. Species diagnostic of the community include yellow buckeye (*Aesculus octandra*), basswood (*Tilia* sp.), and ginseng (*Panax quinquefolius*). Rare plants include broadleaf coreopsis, whiteleaf sunflower, and ginseng. Spray Cliff and Montane Acidic Cliff natural communities surround the small but scenic Little Bradley Falls. Scentsless mock orange is the only rarity found here. Other natural communities and the rarities they harbor include Dry-Mesic Oak-Hickory Forest (Blue Ridge bindweed and broadleaf coreopsis), Chestnut Oak Forest (French Broad heartleaf), and Dry Oak-Hickory Forest (possibly large fothergilla).

OWNERSHIP: N.C. Wildlife Resources Commission

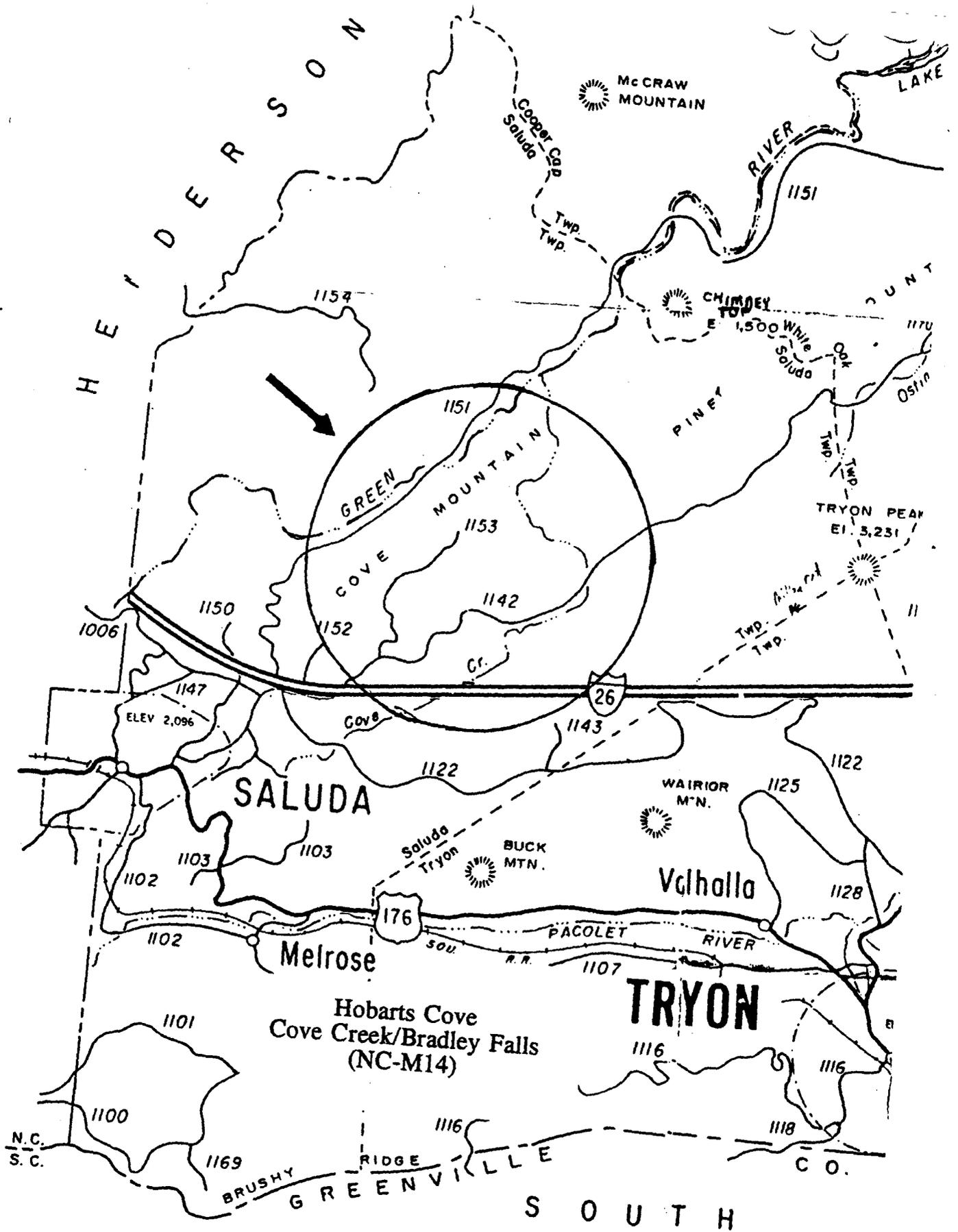
COMMENTS:

The Holbert's Cove: Cove Creek/Bradley Falls Natural Area should include the undisturbed portions of both the Walcott Tract and the Holbart's Cove Tract. The significance of each is lessened considerably when considered separate from the other. Since both tracts are in public ownership, the protection of the combined tracts

as a significant natural area should be vigorously pursued.

These tracts are already part of the N.C. Wildlife Resources Commission's "Gamelands," which are open to the public for hunting, fishing, hiking, and nature study. The Commission should be encouraged to limit "enhancement" of game and non-game animal populations to the few areas that are presently in fields or other early successional stages. Presently these openings are all near roads or at the margins of the property. Special concern should be given to the potential for newly-created wildlife openings to encourage the invasion of weedy species into undisturbed areas. See the 'Comments' section of the Walcott Tract site description for additional management concerns.

REFERENCES: N.C. Natural Heritage Program 1981, N.C. Wildlife Resources Commission undated, Rayner 1993n.



SITE NAME: Laurel Branch Rich Woods

SITE NUMBER: NC-M15

Size: ca. 75 acres

SITE SIGNIFICANCE: C (COUNTY)

LOCATION: West central Polk County; in the Green River Valley;
about 6 miles NNE from Saluda.

QUAD MAP(S): Clifffield Mtn.

SIGNIFICANCE:

1. This site includes a classic example of a Rich Cove Forest natural community, both in terms of its position on the landscape and in terms of plant species composition. The forests are undisturbed but canopy trees are rather young (12-15 " dbh).

2. Numerous rare plants are found here, but populations are small and none is highly ranked. A very small population of whorled horsebalm (*Collinsonia verticillata*) is found here; this southern Appalachian endemic is known in N.C. only from Polk County; it is now known to be locally abundant in Polk County. Biltmore carion-flower (*Smilax biltmoreana*) also is now known to be locally abundant in Polk County. Ginseng (*Panax quinquefolius*) is of concern because of its drastic decline in abundance as a result of collection for commercial purposes; it may be collected and sold under special regulations. Green violet (*Hybanthus concolor*) and glade fern (*Athyrium pycnocarpon*) are on the NHP's "Watch List." Sweet white trillium (*Trillium simile*) is abundant in parts of its wide range but is rare in N.C.; its presence here has not been verified.

GENERAL DESCRIPTION:

This site includes the steep to very steep slopes along a 3000+ foot-long section of a scenic, tumbling mountain stream, Laurel Branch. Most of the area is described by soil maps as part of several rock outcrop complexes, but there do not appear to be any extensive rock outcrops per se; the area simply has lots of boulders and stones. Elevation varies from 1200-2080 feet and Laurel Branch drops about 460 feet over a distance of about 3000 feet. The steepest stream drops are represented by three small waterfalls, the largest of which drops about 70 feet. The forest along the stream is mostly Rich Cove Forest, even along the waterfalls. The richest of these forests occur on colluvium that has accumulated at the base of some steep slopes. This is a typical physiography for this natural community, especially in its southern range in the southern mountains of the Carolinas and Georgia. Rocks here are abundant and generally moss-covered and herb density and diversity is very high. Characteristic

canopy trees include yellow buckeye (*Aesculus octandra*) and basswood (*Tilia* sp.), and a large number of different species compose the canopy. Characteristic herbs include blue cohosh (*Caulophyllum thalictroides*), Canada violet (*Viola canadensis*), a phacelia (*Phacelia bipinnatifida*), and walking fern (*Asplenium rhizophyllum*). Rare species here include ginseng, glade fern, green violet, and possibly sweet white trillium. Canada Hemlock Forest occupies some streamside slopes and a broad band of Dry-Mesic Oak-Hickory bounds the streamside rich woods. Whorled horsebalm occurs in the transition zone between these latter two communities. Exposed upslope areas on gentler slopes are occupied by Chestnut Oak Forest; some Biltmore carrion-flower occurs here. The streamside areas in particular are very scenic and much cooler than the surrounding woodlands in the warm summer months.

OWNERSHIP: Private

COMMENTS:

The small size of the area, the generally young canopy, and the absence of highly-ranked plant species combine to lower the significance of this area to County rather than Regional or Statewide significance. Nonetheless, this is one of the most scenic and pleasant sites in the Pacolet Area.

Canopy gaps are being invaded by tree-of-heaven (*Ailanthus altissima*). Active management (hand injection with herbicide?) is necessary to control this aggressive, non-native tree. Without treatment, the quality of the site, particularly the Rich Cove Forests, could be severely degraded. Control of aggressive weedy species probably is the only active management that will be required

REFERENCES: Rayner 1993o

SITE NAME: Green River Gorge

SITE NUMBER: NC-M16

Size: 1150+ acres

SITE SIGNIFICANCE: A (STATE)

LOCATION: Western Polk County: 2-3 miles NNE from Saluda.

QUAD MAP(S): Clifffield Mtn.

SIGNIFICANCE:

1. This is one of the several escarpment gorges that dissect the Blue Ridge Province. Escarpment gorges have long been recognized as significant biological and geological features. Relatively unique aspects of this gorge includes the "roaring" of the river as it passes through the 6-8 wide "narrows" and deep potholes in solid rock.

2. Numerous Special Status Species occur here, including French Broad heartleaf (*Hexastylis rhombiformis*), broadleaf coreopsis (*Coreopsis latifolia*), ginseng (*Panax quinquefolius*), longstalk sedge (*Carex pedunculata*), brome sedge (*C. bromoides*), Cherokee sedge (*C. cherokeensis*), sweet white trillium (*Trillium simile*), a rare bittercress (*Cardamine flagellifera*), the West Virginia white butterfly (*Pieris virginiensis*), and the rare mosses Pringle's eurhynchium (*Eurhynchium pringlei*) and Closter's brook-hypnum (*Hygrohypnum closteri*). French Broad heartleaf is known globally from only a few counties in North Carolina; the extent of this population is unknown, but large amounts of suitable habitat are present. Broadleaf coreopsis is restricted in distribution to the mountains of four southeastern states and was once considered for federal endangered or threatened status; it now is known to be locally abundant in Polk County. *Cardamine flagellifera* is somewhat restricted in distribution, but many small populations are known from Polk County. Except for the above-mentioned mosses, the other species above are widespread in distribution but rare in N.C. and the Pacolet Area. This is only the second known population of longstalk sedge in N.C., and one of fewer than five populations of Cherokee sedge. Sweet white trillium is locally abundant in Polk County. Ginseng is of concern because of its collection for commercial purposes; populations of this typical component of rich cove forests have declined significantly over the past 25 years. The West Virginia white butterfly is rare because its food plants (rare bittercresses) are rare. Little is known about the rare mosses listed above other than the fact that they have been reported from fewer than five populations in N.C.; their exact location is unknown.

3. Other noteworthy plant species here include littleleaf alumroot (*Heuchera parviflora*), whiteleaf sunflower (*Helianthus glaucophyllus*), three birds orchids (*Triphora trianthophora*), scentless mock orange (*Philadelphus inodorus*), and walking

fern (*Asplenium rhizophyllum*). The first four of the above species are on the NHP's "Watch List." Walking fern has an interesting habit of "walking" as it roots at the tips of its leaves.

4. The relatively undisturbed nature of the site as a whole, as well as the difficult access to most of the area gives the site a significant wilderness character. The rocky, tumbling Green River is very scenic, especially at the narrows and in the several hemock flats overlooking the river. Camp Creek and Pullium Creek also are very scenic, with their many ledges and small waterfalls. The Green River Gorge is simply one of the most pleasant natural areas in the Pacolet Area, although it is difficult to put into words exactly why this is the so.

GENERAL DESCRIPTION:

This site includes about two miles of the most gorge-like segment of the Green River as it dissects the Blue Ridge escarpment, the pronounced physiographic boundary that separates the mountainous Blue Ridge Province from the more gently-sloping Piedmont Province. It includes the Green River and associated slopes between the Henderson/Polk county line and the western edge of the Green River cove at the base of the winding staircase, western section of SR-1151. Elevation ranges from 1060 to 2200 feet, and the river itself drops about 460 feet over a length of two miles. Slopes are very steep and generally rocky and access is very limited. This site includes: the well-known feature known as the "narrows," a short river segment where the entire river is forced between rocks of a gorge 6-8 feet wide; deep scour potholes associated with the narrows; the lower segments of two major creeks, Camp Creek and Pulliam Creek, each of which has several small waterfalls and cliff faces; numerous small rock cliffs and seepages and some boulder fields; and two major islands in the Green River.

Although the soil maps for Polk County indicate the presence of only four soil types, it is likely that soils are considerably more diverse. I noted six different natural community types here, and most of the upper slopes, ridges and peaks in the area were not surveyed. Racine and Hardin (1975) prepared a vegetation map that included this entire area, and their map indicates the presence of many mixed oak-pine and mixed pine-oak communities. The most abundant community on lower slopes adjacent to the river is the Canada Hemlock Forest. Hemlock (*Tsuga canadensis*), tulip poplar (*Liriodendron tulipifera*), sweet birch (*Betula lenta*), and basswood (*Tilia* sp.) dominate the well-developed canopy. The shrub layer may be dense with rosebay (*Rhododendron maximum*) and other evergreen ericads, in which case the herb layer is poorly developed, or the understory may be dominated by deciduous species, in which case a well-developed and diverse herb layer may be present. Rare species in this community include French Broad heartleaf and *Cardamine flagellifera*, where rosebay is in moderate abundance, and broadleaf coreopsis, whiteleaf sunflower, and scentless mock orange where the rosebay is

absent.

Small pockets of Rich Cove Forest interrupt the Canada Hemlock Forest, particularly in sheltered coves and lower north slopes, but also in less sheltered sites where the soil is deep and rich. Tree, understory and herb diversity is high in this community, and rare species here include sweet white trillium, ginseng, longstalk sedge, walking fern, and, in seepages, Cardamine flagellifera. Large exposures of rock are not present in the area, but small exposures are abundant, often right adjacent to the river. Where overhangs are present, littleleaf alumroot is abundant. Rocky Bar and Shore natural community is present in a narrow band along the entire length of the Green River here. This community includes "Rock outcrops and gravel bars in or adjacent to rivers and streams, which are too rocky, too wet, or too severely flooded to support trees" (Schafale and Weakley 1990). Vegetation here is very variable, with sparse-to-dense herbs and shrubs. Usual shrubs include tag alder (*Alnus serrulata*), willow (*Salix sericea* and *S. nigra*), and Virginia willow (*Itea virginica*). Typical herbs include a variety of sedges (including the rare brome sedge and the rare Cherokee sedge), rushes (*Juncus* spp.), grasses, and forbs, including brook-saxifrage (*Boykinia aconitifolia*) and Carolina tassel-rue (*Trautvetteria carolinensis*). The two major islands in the river here are occupied by Montane Alluvial Forest dominated by river birch (*Betula nigra*). This community was not examined in detail because of the danger associated with the unpredictable water levels of the river; water rises rapidly and dangerously when hydropower is being generated from water releases at Lake Summit. Mid- to upper slopes are occupied by a variety of pine-oak and oak-dominated communities; these communities were not surveyed in detail.

OWNERSHIP: Private

COMMENTS:

The inaccessibility of the area makes detailed botanical survey very difficult. In spite of the existence of several published and unpublished reports on or including this area (Racine and Hardin 1975, Hardin and Shaw 1975, Pittillo 1975, and Gaddy 1986), the area still has not been surveyed in detail. Additional surveys will almost certainly add additional documentation to the significance of the area. It is likely, with additional documentation, that the area will be considered to be of statewide significance. It presently is borderline between regional and state significance.

Several narrow hemlock flats along the south slopes adjacent to the river are routinely used as unofficial primitive camping areas. This use may need to be controlled in the future.

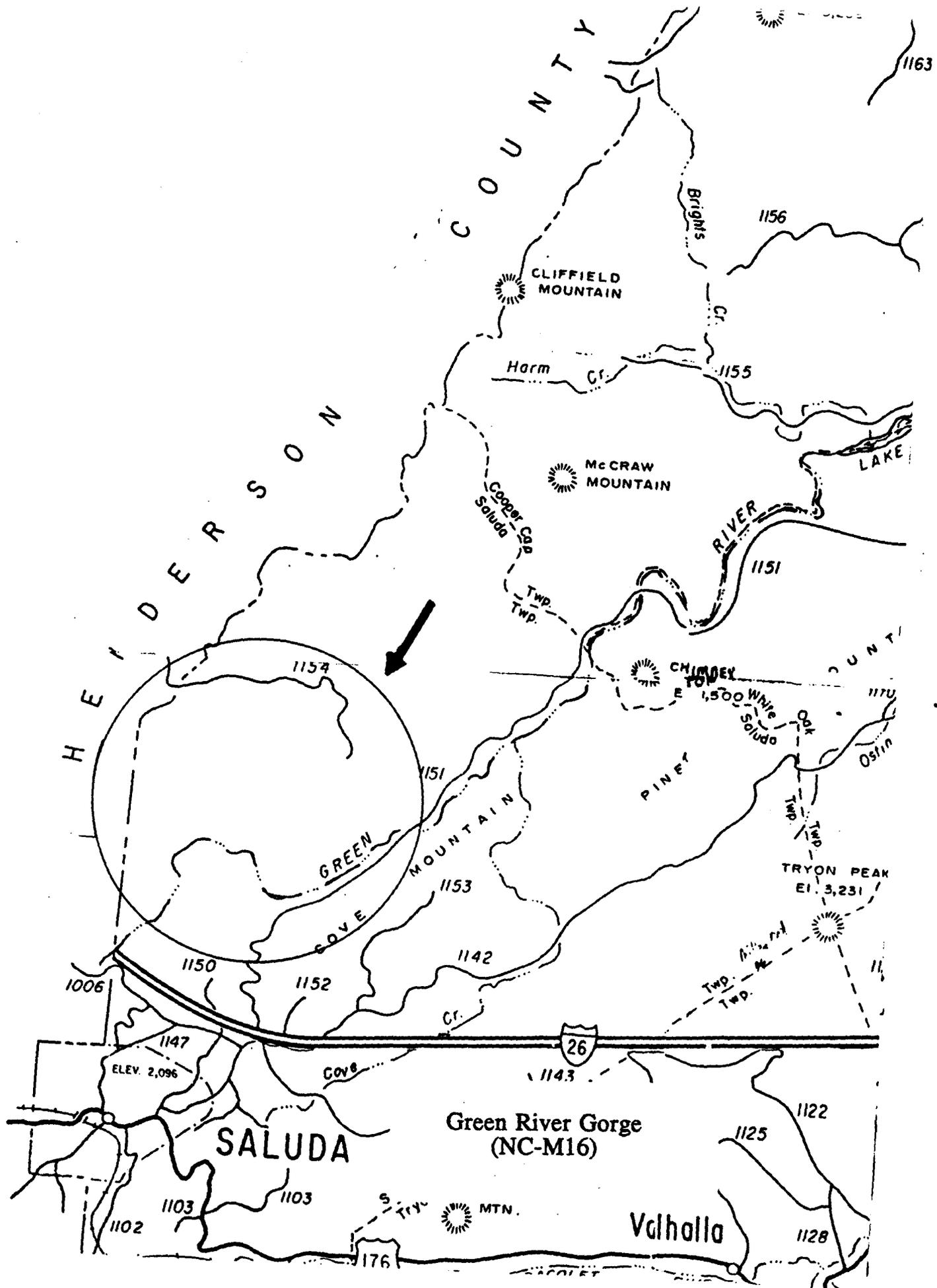
Tree-of-heaven (*Ailanthus altissima*) and princess tree (*Paulownia tomentosa*) have invaded some canopy gaps in rich woods. If not controlled, these species can

dramatically alter community composition. Hand-injection with herbicide may be the treatment of choice. Control of aggressive weedy species probably is not the only active management that will be required. Visitor use, and the problems created by that use, also need to be actively managed. Erosion from several "unofficial" access trails should be stopped, particularly the access trail to the "narrows."

Water level in the Green River can rise quickly to dangerous levels when water is released from Lake Summit for purposes of hydropower generation. This danger may preclude greater public access.

The proposed western property boundary obviously is arbitrary. It is very likely that some additional lands to the west are appropriately included in this natural area. A Preliminary Site Reconnaissance Survey by Heiman (1985), however, suggests that the logical western boundary, I-26, may not be the appropriate boundary. Heiman found the woodlands highly disturbed by logging, powerlines, road rights-of-way, and agriculture, at least the woodlands north of the Green River. Aerial reconnaissance would help assess the degree of disturbance.

REFERENCES: Gaddy 1986, Hardin and Shaw 1975, Heiman 1985,
Pittillo 1975, Racine and Hardin 1975, Rayner 1993q.



SITE NAME: Pearson's Falls Glen*

SITE NUMBER: NC-M17

Size: ca. 250 acres

SITE SIGNIFICANCE: A (STATE)

LOCATION: Southeastern Polk County; ca. 1.5 miles south of Saluda.

QUAD MAP(S): Saluda

SIGNIFICANCE:

1. The mature, second growth forest on the broad, steep, north-trending slope above the North Pacolet River is a high-quality, extensive example of the Rich Cove Forest natural community as defined by Schafale and Weakley (1990).

2. Several plant species of special interest in N.C. occur here, including; broadleaf coreopsis (*Coreopsis latifolia*), a member of the sunflower family which is recognized as a "threatened species" and which has in this study been found to be locally abundant in Polk County; ginseng (*Panax quinquefolius*), a species listed as a "species of special concern" because of widespread commercial collection; sweet white trillium (*Trillium simile*), a species that is rare in N.C. and which is near the southern limit of the species range here; a rare bittercress (*Cardamine flagellifera*), a species which is globally rare and rare in N.C.; mountain bittercress (*Cardamine rotundifolia*), a species which is known only from historic collections in N.C., two of which are in Polk County; three-birds orchid (*Triphora trianthophora*) is on the NHP's "Watch List;" and walking fern (*Asplenium rhizophyllum*), a species which is typically found in rich cove forests and which has the interesting habit of "walking" by rooting at the tips of its leaves (fronds).

3. The high diversity of plant species, particularly ones considered more typical of northern regions of the eastern U.S., at this low elevation, is considered exceptional. Several species that are endemic to the Appalachians region complement the diversity found here (Peattie 1962, Stupka 1972).

GENERAL DESCRIPTION:

This site consists of a series of long, steep, north-trending slopes above the North Pacolet River. A major creek, Colt Creek, bisects the site, and a scenic and well-known waterfall, Pearson's Falls, occurs along the creek. Part of the eastern portion of the property includes or is adjacent to Fork Creek. The most abundant community here, and the community for which the area is famous, is Rich Cove Forest. According to Peattie (1962) the soil here is mostly Porters loam and the pH was determined by Edgar T. Wherry to be neutral or "sweet," as expected for a well-developed rich cove forest. Moore (1987) provides the first in-depth description

of the forest. The closed canopy is dominated by characteristic cove species, including tulip poplar (*Liriodendron tulipifera*), basswood (*Tilia heterophylla*), sugar maple (*Acer saccharum*), white ash (*Fraxinus americana*), sweet birch (*Betula lenta*), and American beech (*Fagus grandifolia*). The subcanopy also is well-developed and is dominated by yellow buckeye (*Aesculus octandra*), hop hornbeam (*Ostrya virginiana*), ironwood (*Carpinus caroliniana*), cucumber tree (*Magnolia acuminata*), and umbrella tree (*M. fraseri*). The shrub layer is not particularly dense but is composed of many different species, including sweet shrub (*Calycanthus floridus*), witch hazel (*Hamamelis virginiana*), maple-leaved viburnum (*Viburnum acerifolia*), and strawberry bush (*Euonymus americanus*). The herb flora has been the focus of most of the writers who have described the Glen. The herb flora is dense and includes an exceptional variety, chiefly northern in affinity, but also including some with southern affinities and some Appalachian endemics (Stupka 1972). The sheltered ravine that includes Pearson's Falls exhibits a spectacular display of showy spring wildflowers, including at least four species of trillium [including the spectacular sweet white trillium (*Trillium simile*), Solomon's seal (*Polygonatum biflorum*), the sometimes-recognized large form of Solomon's seal (*P. canaliculatum*), yellow mandarin (*Disporum maculatum*), Dutchman's breeches (*Dicentra cucullaria*), fernleaf phacelia (*Phacelia bipinnatifida*), and additional species too numerous to mention]. Dripping outcrops along the trail to the falls also harbor some interesting species, including the tiny golden saxifrage (*Chrysosplenium americanum*) and carolina tassel-rue (*Trautvetteria carolinensis*). Although the fall flora is not as spectacular as the spring, the woodlands are still attractive and interesting at that time of year.

OWNERSHIP: Private

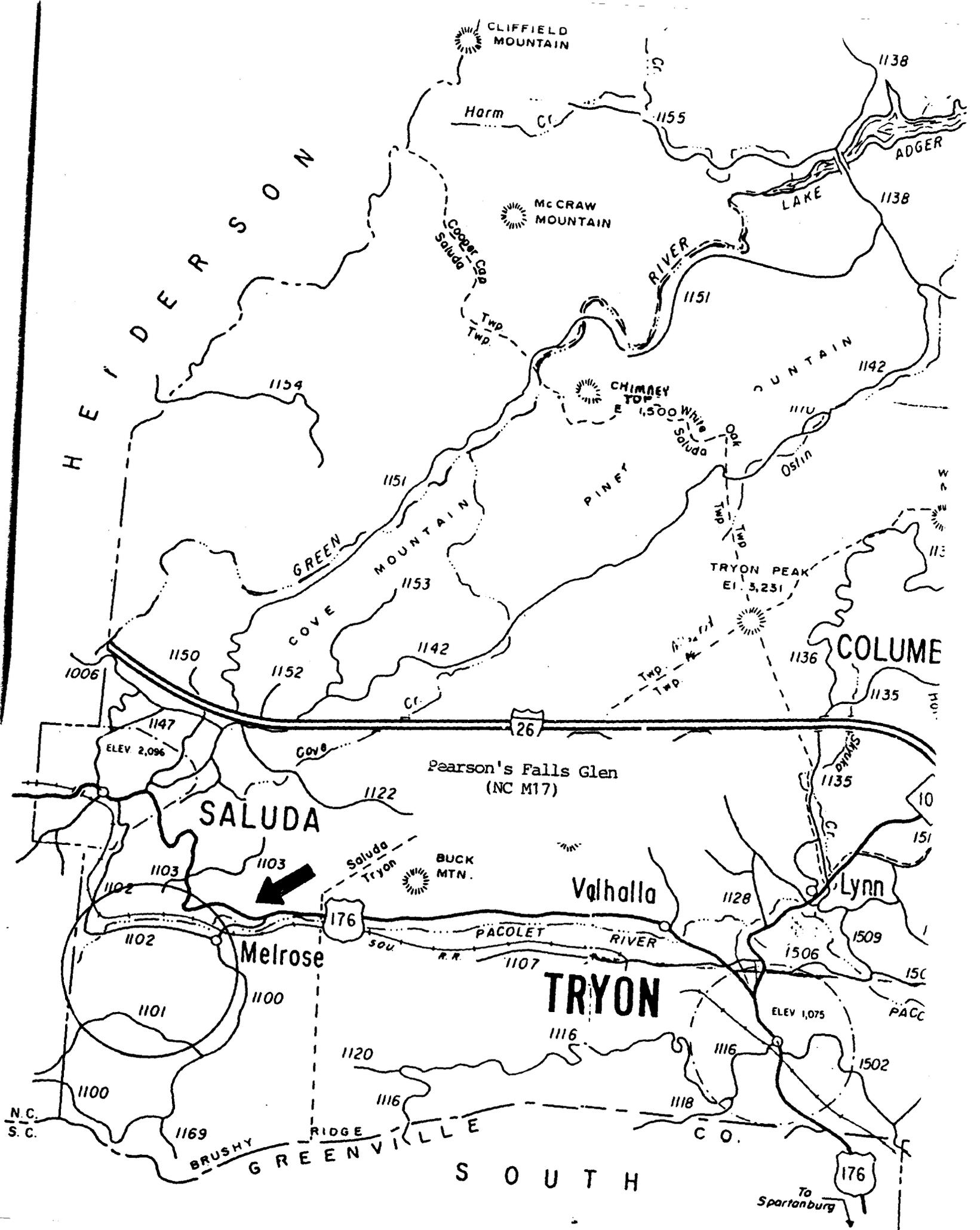
COMMENTS:

The spectacular display of wildflowers on the slopes and seeps here, especially along Colt Creek below Pearson's Falls, has caught the attention of botanists and naturalists since before the turn of the century. Well-known local (Tryon) naturalist and writer, Donald Culross Peattie, described in lyric prose the attributes and attractions of the area, as well as the activities and interests of other visitors to the Glen. He also made a significant contribution to our knowledge of the flora of the Pacolet Area by publishing an annotated flora of the Tryon Region of N.C. and S.C. in six parts between 1928 and 1931.

Pearson's Falls Glen is managed as a scenic natural attraction and has been since 1931 when it was purchased to prevent timber harvest. Public visitation is available for a small fee and with restrictions intended to protect the natural and scenic character of the area. The need for active management, i.e. for the control of exotic plant species, is unknown.

REFERENCES: Freeman 1953, Moore 1987, Peattie 1928-1931, Peattie 1962, Schafale and Weakley 1990, Stupka 1972, and Teal 1951.

***Note:** This account is based largely on the compilation by Julie Moore (1987), which was prepared as documentation needed for inclusion of the area in the registry of N.C. Natural Heritage Areas.



SITE NAME: Little Warrior Mountain Cave Natural Area*

SITE NUMBER: NC-M18

Size: ca. 4 acres

SITE SIGNIFICANCE: A (STATE)

LOCATION: Southwestern Polk County; about three miles northwest of Tryon.

QUAD MAP(S): Saluda

SIGNIFICANCE:

1. The primary significance of this area is as a geomorphic feature. The cave is one of the few known fissure caves in North Carolina. It is probably older than the well-known Linville Caverns, based on the age of the stalactites in the cave (Campbell 1986).

2. Brimley's cave spider (*Nesticus brimleyi*) occurs in the deep dark zone of the cave. This spider was previously known only from Bat Cave and the Rumbling Bald caves in Rutherford County (Gaddy 1986).

GENERAL DESCRIPTION:

This cave is a "fissure or tectonic cave found in granitic-gneissic rocks (migmatic granite-gneiss)" (Gaddy 1986). The cave is situated on the Blue Ridge escarpment at an elevation of ca. 1900 feet. It is on the eastern face of a ridge, just downslope from the top of the escarpment. The cave has several passageways, including a large chamber that is reached by descending a 15-20 foot ladder. There are a number of interesting rocks present inside the cave, with some striking colors noted, particularly a clay red color that is presumably caused by oxidation of iron from the rocks (Gaddy 1986).

The fissure cave (also called a fault cave) is less common in the Appalachian region than is the solution type cave, which is typically found in limestone areas. Bat Cave, in nearby Rutherford County, is the largest and most famous fissure cave in North Carolina and perhaps in the entire world (McIver 1981). Because fissure caves were formed by tectonic events such as faults or earthquakes, rather than by water solution in limestone, they tend to have few structures such as stalactites and stalagmites. Little Warrior Mountain Cave does contain stalactites, and Campbell (1986) suggests that their age indicates that the cave is probably older than the Linville Caverns, a well-known solution cave in N.C. Campbell also noted that the cave occurs in Hendersonville gneiss but that exposures of quartzite and amphibolite

are present also.

Gaddy (1986) noted the presence of the Jordan's salamander (*Plethodon jordani*) around the opening of the cave. This area seems suitable for the rare green salamander (*Aneides aeneus*), a candidate for Federal listing; none has been reported from the area. Several species of spiders are fairly common around the cave entrance, and camel or cave crickets are common in the first passageway. Spider diversity is less in the dark recesses, with only the cave orb weaver (*Meta menardii*) being found. The very dark zone of the cave is habitat for the rare Brimley's cave spider. This species was previously known only from Bat Cave and the Rumbling Bald caves in Rutherford County (Gaddy 1986). A fairly large population of bats (200-250) overwinter in the cave, but their identity has yet to be determined. There are several bat species on the NHP's list of rare and endangered animals, and most of these inhabit caves. Thus, there is the possibility that some of these bats might be rare in the state.

The forest surrounding the cave opening is dominated by chestnut oak (*Quercus prinus*) and scarlet oak (*Q. coccinea*). Rayner (1993) noted the presence here of the Significantly Rare Biltmore sedge (*Carex biltmoreana*). Gaddy (1986) also reported a hybrid blazing star (*Liatris turgida* X *regimontis*). Richer woods, Rich Cove Forest (possibly better described as Montane Oak-Hickory Forest), occur to the west of the cave and downslope. Noteworthy species include ginseng (*Panax quinquefolius*), a rare heartleaf skullcap (*Scutellaria ovata*), green violet (*Hybanthus concolor*), and well downslope, whorled horsebalm (*Collinsonia verticillata*). Herb diversity is high and cover is dense in the cove forest.

OWNERSHIP: Private

COMMENTS:

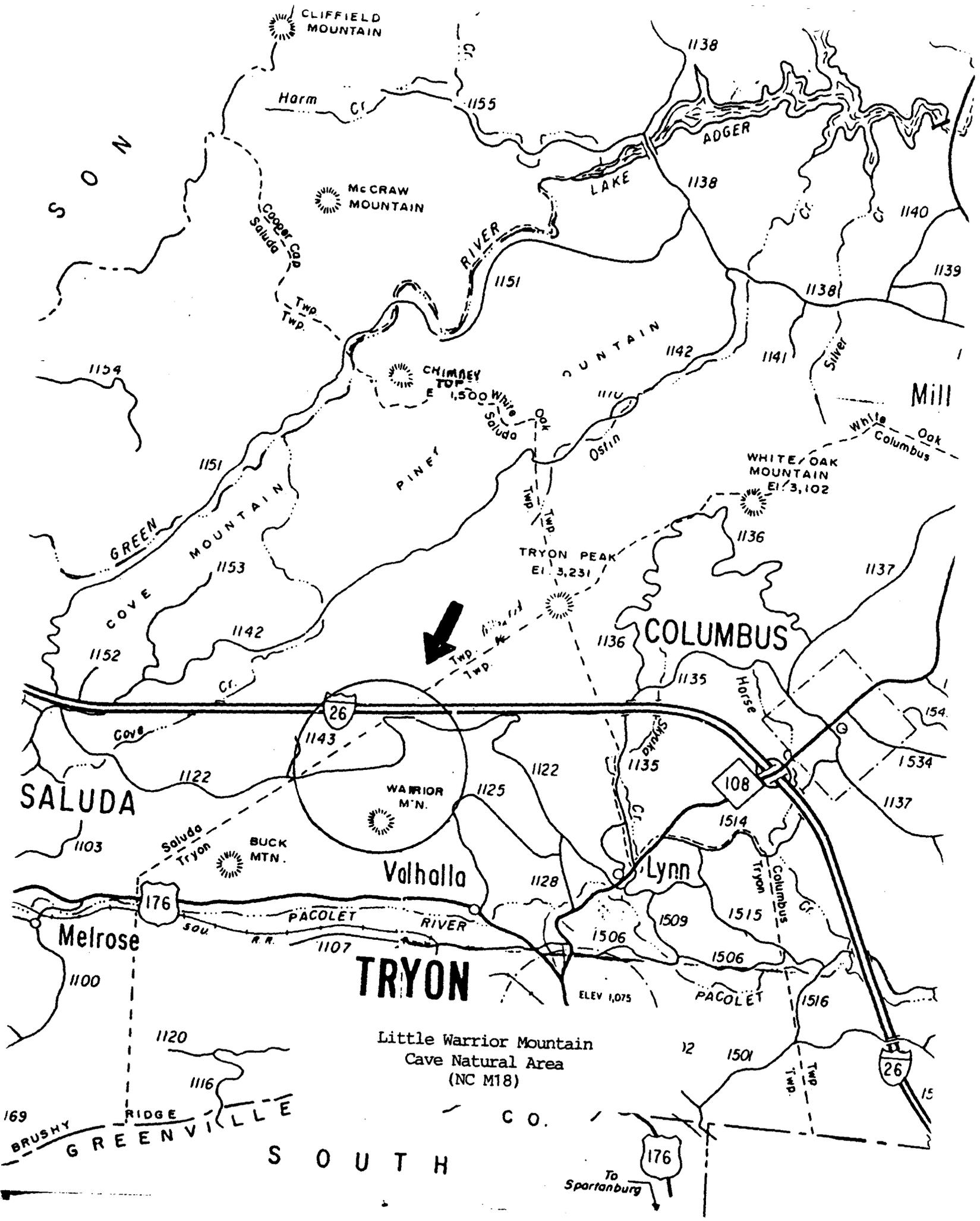
In 1987 the owners of this natural area had the site recognized as a N.C. Registered Natural Heritage Area. The owners allow classes and other groups to visit the site to study the geomorphic and natural features. In 1984 and 1985 about 250 people per year visited the site. Considering the high visitor usage, the cave has remained relatively free of damage. However, visitors have sprayed paint on some of the rocks, both inside and outside the cave. Some trash and garbage, mostly bottles and cans, have been deposited in the bottom chamber of the cave; the owners routinely remove this trash. Because of the risk of injury to inexperienced climbers and spelunkers, there is concern about lawsuits should such injuries occur. The owners may be forced to close the cave to all visitors.

The cave itself needs little management other than the removal of litter. The boundaries of the natural area, and possibly the entrance to the cave, perhaps should be posted with "Owner Registered Natural Heritage Area" signs that can be obtained

from the NHP. These metallic signs would notify visitors to the cave that the area is of significance to the natural diversity of the state and that the owner has voluntarily protected the site. It is hoped that the littering can be reduced by the erection of such signs. The NHP can provide additional management recommendations if littering continues.

REFERENCES: Campbell 1986, Dergance 1986, Gaddy 1986, LeGrand 1987, McIver 1981, Rayner 1993.

*Note: This report is a slightly modified version of LeGrand's "Little Warrior Mountain Cove", documentation for N.C. Registered Natural Heritage Area.



SITE NAME: North Greenville Watershed, Poinsett (North Saluda)
Reservoir and Vicinity

SITE NUMBER: SC-MI

SIZE: 19,268 + acres

SIZE SIGNIFICANCE: A (STATE)

LOCATION: Northern Greenville County; generally east of SR-17, north of SR-42, south of the North Carolina-South Carolina border and west of SR-118; ca. 21 miles north of Greenville.

QUAD MAP(S): Saluda, N.C.-S.C., Zirconia, N.C.-S.C. (The Zirconia quad contains the part of the site not included in this survey).

SIGNIFICANCE:

1. Twenty-four plant species that are considered rare, threatened or endangered in S.C. (see Table 1, Attachment), including one species Federally listed as endangered [white irisette (*Sisyrinchium dichotomum*)], one candidate for Federal listing [divided-leaf ragwort (*Senecio millefolium*)], and two former candidates for Federal listing [whiteleaf sunflower (*Helianthus glaucophyllus*) and broadleaf coreopsis (*Coreopsis latifolia*)].
2. The large size of the area and the fact that it encompasses an entire watershed that has not been disturbed since it was acquired in 1953-1957, makes this area a unique natural laboratory for addressing questions about how ecosystems function and how they change over time.
3. The large size of the area makes it especially valuable as a breeding area for neo-tropical migrant birds and as habitat for animals with large home ranges, such as the black bear and river otter. As the plant communities here continue to mature, they will play an increasingly important role in the protection of plants and animals associated with old growth communities.
4. This area provides habitat for at least one animal species of concern in S.C., the green salamander (*Aneides aeneus*). The green salamander is a candidate for federal listing as an endangered or threatened species.
5. A survey of aquatic insects here (Floyd et al. 1992) resulted in the discovery of one rare species of caddis fly (*Agarodes tetron*) known only from a few collection S.C. and Tennessee, as well S.C. distribution records (state records) for two additional caddis fly species.

GENERAL DESCRIPTION: This site includes the entire watershed associated with the North Saluda Reservoir and the head of the North Saluda River. It also includes substantial acreage east of the watershed boundary, including parts of Bryant Mtn., the head of the South Pacolet River, Hoghead Mtn., Round Mtn., Hogback Mtn., Hooker Ridge, and Rocky Spur. It contains good examples of most plant communities typically found in the mountains, including Acidic Cliff, Chestnut Oak Forest, Cove Forest, Granitic Dome, Hemlock Forest, Oak-Hickory Forest, Pine-Oak Heath, Rhododendren Thicket, Small Stream Forest and Talus Slope. High Elevation Seep and Upland Bog communities are not present and the Spray Cliff communities are poorly developed. The only substantial waterfalls on the property are "Big Falls" on Big Falls Creek and "Little Falls" on Little Falls Creek. A Basic Oak-Hickory Forest occurs on the upper S-trending slopes of Hogback Mtn. and harbors several rare species, including one of the few S.C. populations of the Federally-endangered white irisette (*Sisyrinchium dichotomum*).

No old growth communities are found here; apparently all but a few areas were lumbered between 1940 and 1954, prior to the filling of the reservoir in 1958. An exception to this may be the Basic Oak-Hickory Forest on Hogback Mtn., where trees average nearly two feet in diameter.

Although the area generally is not especially impressive in terms of forest maturity, the area's unspoiled, wilderness character is impressive.

OWNERSHIP: Greenville Water System, City of Greenville, S.C.

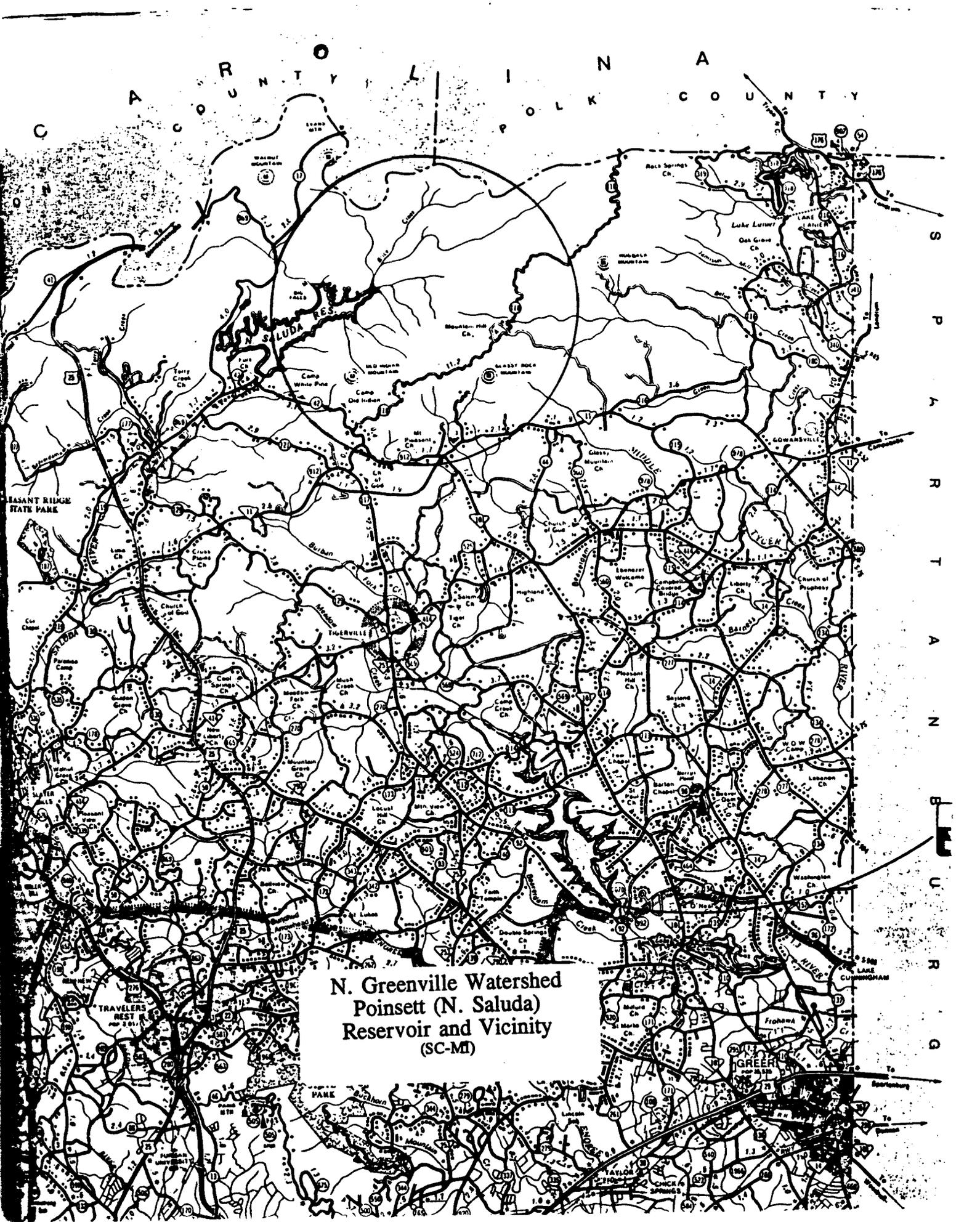
COMMENTS: Most of the rare, threatened or endangered plant species found at this site are associated either with rich woods (Cove Forest or Basic Oak-Hickory Forest) or with the Granitic Dome communities. The most significant of these are in habitats that are outside the North Saluda Watershed proper. The upper S-trending slopes of Hogback Mtn. harbor Basic Oak-Hickory Forest with white irisette (*Sisyrinchium dichotomum*), ginseng (*Panax quinquefolius*), sweet cicely (*Osmorhiza claytonii*) and mountain basil (*Pycnanthemum montanum*). Round Mtn. harbors an excellent Granitic Dome community with an abundance of the Federal candidate species, divided-leaf ragwort (*Senecio millefolium*) and yellow honeysuckle (*Lonicera flava*). The Talus Slope community below the Granitic Dome of Round Mtn. is quite rich in places and provides habitat for some ginseng. The slopes near the headwaters of the South Pacolet River harbor rich Cove Forest with waterleaf (*Hydrophyllum canadense*), broad-leaf tickseed (*Coreopsis latifolia*), jewelweed (*Impatiens pallida*), ginseng, tall bellwort (*Campanula americana*), turtlehead (*Chelone lyonii*), mountain basil, and possibly a heartleaf skullcap (*Scutellaria ovata*). Bryant Mtn. harbors wild lily-of-the-valley (*Convallaria majalis* var. *montana*), wild basil and Carolina tassel-rue (*Trautvetteria carolinensis*). Rocky Spur harbors whiteleaf sunflower (*Hellanthus glaucophyllus*) and a rare muhly grass (*Muhlenbergia sobolifera*).

All in all, the Greenville Water System lands outside the North Saluda Watershed are more important to the protection of significantly rare plants and plant communities in S.C. than are lands of the Watershed proper. Hogback Mtn. and Round Mtn. are the most significant areas in this site. Because of the presence of nationally significant species, both could be ranked of national significance, and both are worthy, on their own, of protection through the S.C. Heritage Trust Program. For all the reasons detailed under significance, the entire area is worthy of protection, and the lands outside the watershed proper provide for a significant portion of the entire site's significance.

A large number of occurrences of at least 10 significantly-rare plant species have been found along SR-16 (Plumley Rd; SR-118 on old maps). Although this suggests that searches in areas away from the road should result in the discovery of many more occurrences of these and other species, this is probably not true. In fact, these rare plant occurrences are concentrated in small pockets of just a few soil types that are quite rare at this site. It is likely that these areas, which tend to be dominated by mesic hardwoods and are relatively free of boulders, may have been selected by the designers of Plumley Road because they were some of the easiest and best areas to locate the road.

REFERENCES: Greenville Watersheds Study Committee 1992, Rayner
1993c

Note: In early 1993, the North Saluda Watershed (Poinsett Reservoir) and the Table Rock Reservoir (a total of 29,101 acres) were protected from future development through a conservation easement with the South Carolina Nature Conservancy.



N. Greenville Watershed
Poinsett (N. Saluda)
Reservoir and Vicinity
(SC-MT)

SASANT RIDGE
STATE PARK

TRAVELERS
REST

LAKE
CUMMINGSHAM

GREEN

S
P
A
R
T
A
N
B
U
R
G

Table 1 Endangered, Threatened and Rare Plant Species in the North Greenville Watershed, on Greenville Water System Lands

A. Seen by Rayner since 1990

Scientific and Common Names	Status			Habitat	Locations
	SC ¹	US ²	Global ³		
<i>Campanula americana</i> tall bellflower	S(T)		G ₅	rich woods over basic soils	Plumley Rd. (3 sites)
<i>Caulophyllum</i> <i>thalictroides</i> blue cohosh	S(T)		G ₄ G ₅	rich woods over basic soils	Brice Creek
<i>Chelone lyonii</i> a turtlehead	U		G ₅	rich woods over basic soils	Plumley Rd. (7 sites)
<i>Convallaria majalis</i> var. <i>montana</i> wild lily-of-the-valley	S(T)		G ₅	wooded slopes and caves Brushy Ridge	Plumley Rd. Bryant Mtn.
<i>Coreopsis latifolia</i> broad-leafed tickseed	N(E)	C3	G ₃	rich hardwood slope	Plumley Rd. (5) S. Pacolet Watershed Hogback Mtn.
<i>Helianthus glaucophyllus</i> whiteleaf sunflower	N(T)	C3	G ₃ -G ₄	rich hardwood slopes	Plumley Rd. Rocky Spur Brushy Ridge

Heuchera parviflora an alumroot	U		G ₄	shade under overhanging cliffs	Plumley Rd.
Hydrophyllum canadense a waterleaf	S(T)		G ₅	rich woods	Plumley Rd. Rich Mtn. S. Pacolet Watershed
Impatiens pallida jewel-weed	State Record		G ₅	wet woods	Plumley Rd.
Lonicera flava yellow honeysuckle	S(T)		G ₅	thin soils around rock outcrops	Round Mtn. Glassy Mtn. complex
Osmorhiza claytonii a sweet cicely	U		G ₅	mixed deciduous forests	Hogback Mtn. (2 sites)
Panax quinquefolius ginseng	R(T)		G ₄	rich woods, usually calcareous	Brice Creek S. Pacolet Watershed Plumley Rd. Hoghead Mtn.
Pycnanthemum montanum mountain basil	R(T)		G ₄ -G ₅	rich woods	Bryant Mtn. Plumley Rd. (2) Hogback Mtn. S. Pacolet Watershed Brushy Ridge
Senecio millefolium divided-leaf ragwort	R(T)	C2	G ₂ -G ₃	granitic domes, rock outcrops	Round Mtn.
Sisyrinchium dichotomum white irisette	State FE Record		G ₂	thin woods over amphibolite	Hogback Mtn.

Stachys latidens broad-toothed hedge-nettle	S(T)	G ₅	rocky slopes	Hogback Mtn. Hoghead Mtn.
Trautvetteria caroliniensis Carolina tassel-rue	U	G ₅	seepage slopes, moist streambanks	Hogback Mtn. (2 sites) Bryant Mtn.
Trillium simile	State Record	G?	rich coves	Brice Creek

B. Seen since 1970 and still believed to occur in the area.

Juglans cinerea white walnut	U	G ₅	cove forests, rich woods	North Saluda River Valley
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C. Seen prior to 1970, but not since; of uncertain presence in the area.

Asplenium pinnatifidum webbed spleenwort	R(E)	G ₄ -G ₅	dry rock crevices	Hogback Mtn.
Asplenium rhizophyllum walking fern	S(T)	G ₅	mossy boulders in rich woods	Brushy Ridge
Hackelia virginiana Virginia stickseed	U	G ₅	woodlands and thickets	Walnut Mtn.

Muhlenbergia sobolifera a muhly grass	State Record	G ₅	dripping cliffs & rocky slopes	Rocky Spur
Polygala paucifolia fringed milkwort	S(T)	G ₅	deciduous woods above 2000 feet elevation	Hogback Mtn.