AN ECOSYSTEMATIC SURVEY OF SELECTED AREAS OF THE HOT SPRINGS VALLEY, MADISON COUNTY, NORTH CAROLINA

by

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Objectives, Methods, and Format

The primary objective of this study was to elucidate the diversity of the vegetation of the Hot Springs Valley in western Madison County, North Carolina. Within this objective it was hoped that 1) vegetation types developed over the variety of geologic substrates in the valley would be identified, 2) populations of rare species would be located and inventoried, and 3) these vegetation types and populations would be fixed in time and space with clear description of the habitat, and clear description of the location of permanent plots.

Existing data in the various forms of herbarium specimens, previous site reports, geologic maps, and individuals with knowledge of plant populations in the study area were consulted. Field reconnaissance during the early portion of the field season of 1981 helped to clarify the subtly conflicting and confusing previous documentation, so that I can say that, given the limitations of the lone investigator, this report will greatly clarify our understanding of the occurrence of the rare species and unique vegetation types of this area.

Data collection in the field was modified from the methods of Radford et al. (1981). Within a 20 meter x 20 meter plot, each stem of the canopy was analyzed and determinations were made on the importance values of each species based upon its relative dominance and density within each plot. Total basal area (in square inches) for each species is presented as baseline data for future comparisons to determine the change in community structure. The subcanopy was analyzed in a similar fashion except where noted in this report. The shrub, vine, and herb strata were quantified using releve technique. Data on the abiotic components of each plot were taken in the manner of Radford et al. (1981), and all plot data was presented according to the site classification system of that publication; each plot is also considered in the discussion section of this report.

Selection of the plots was based on two criteria: 1) does this area represent the vegetation that is developed over the geologic substrate of the area immediately surrounding the proposed plot?, or 2) Is there a population of a rare species at this site? At those sites that harbored rare species, an inventory of the species is included in the data presentation of the plot.

Data collected on specific sites is put into its larger context in the Discussion section and in the species presence list of Appendix I which indicates the area(s) where each species occurred. Appendix II gives directions to the 3/4" diameter aluminum stakes which mark each plot, and shows the orientation of the plot in relation to this permanent corner.

Introduction

Areas included in this report are in Madison County, North Carolina, along the French Broad River from Deepwater Trestle to the North Carolina-Tennessee state line at Paint Rock Bluffs. USGS 7 1/2' quadrangles for the area are: Paint Rock, TN-NC; Hot Springs, NC-TN. The study area ranges from 1200' to 2000' in elevation, and is in the Southern Section of the Blue Ridge Province of the Appalachian Highlands.

Ownership: The French Broad Valley at Hot Springs is a mosaic of private and public ownership. A detailed report on land ownership of critical areas is being prepared for the NC Nature Conservancy; for the purposes of the present paper it will suffice to list the owners of the specific tracts where detailed vegetation work was done. Appendix II shows the location of these areas and gives directions so that they can be relocated.

Plots 1 - 8 are located on US Forest Service lands, French Broad District.

Plots 9 - 12 are on land owned by W.B. Fowler of Hot Springs.

Plot 13 is on land owned by Johnny Barrett of Hot Springs.

Plot 14 and 15 are on land owned by Anderson Investment Corporation, Asheville, NC.

Plot 16 is on the floodplain land owned by Elsie W. and C.L. Rudisill of Marshall, NC.

Land Use and Administration: The upper slopes of Lover's Leap Ridge are right of way for the Appalachian Trail which crosses the French Broad at Hot Springs. Sections of the USFS land along and above Paint Rock Road (CR 1304) have been timbered in the recent past. These lands are maintained as North Carolina game lands, and a section at Murray Branch is developed as a National Forest Recreation Area for access to the French Broad River.

The private lands along the French Broad are variously utilized. The few remaining wooded acres along the river (area of plots 9 - 13) are very steep and have historically been sources of timber. The outcrops and bluffs of the Shady Dolomite (Plot 9) were quarried early in this century, but the owner has no plans for any such operation in the near future. The good bottom lands on both sides of the river are used for agriculture and homesites. Mine Hollow and Ridge (Plots 14 and 15) was once mined for the Honaker Limestone, but since that

time only grazing and selective timbering has occurred.

Dangers to Integrity: The fragments of remaining natural areas sequestered on the steep slopes of the French Broad are but a fragment of the overall diversity of habitats that must once have occurred in this area. The species and habitats described in this report are at present in delicate balance with the activities of man in this valley. Major threats are road improvement, timbering, and residential construction. Expansion of the existing roadbed of the Southern Railway track along the river could significantly decrease the habitat for the uncommon calcareous outcrop species which are now less than 2 meters from the railbed. A more likely danger is the improvement or paving of the road leading along Stokely Hollow to the French Broad, and Paint Rock Road (CR 1304). The road along Lower Shut In Creek (CR 1303) will be paved by the summer of 1982, and the unique habitat of Mine Hollow and Ridge, less than 200 meters from this roadbed, now seems ripe for residential development. A more insidious danger to the area is the decimation of plant populations by botanists and day hikers who collect specimens and tromp around the fragile areas.

Public Sensitivity: The French Broad Valley is well known among the various botanical and garden club circles of the state. Local awareness of the unique geology and flora of the valley is minimal, even among landowners of critical sites. Visitor traffic has been stimulated by the recent establishment of several recreational outfitters that float the French Broad and various lodging facilities that cater to short visits by tourists. Conversations with some of these "repeat visitors" reveals their appreciation of the overall aesthetic appeal of the valley.

Significance and Protection Priority: High degree of state significance, recommended without reservation; the area is in some jeopardy.

Reasons for Significance Rating:

Presence of rare, threatened, or endangered vascular plant species. (See Table 1 for the legal status of these species; notes on the occurrence of these species within the French Broad Valley is presented in the Discussion):

Scientific Name	Common Name
Arabis lyrata	Lyre-leaved rockcress
Arabis patens	Spreading rockcress
Adlumia fungosa	Climbing fumatory
Asplenium resiliens	Blackstem spleenwort
Asplenium ruta-muraria	Wall-rue spleemwort
Buckleya distichophylla	Piratebush
Carex eburnea	Bristle-leaved sedge
Cheilanthes alabamensis	Alabama lip-fern
Cladrastis kentukea	Yellowwood
Corydalis sempervirens	Pale corydalis
Croton monanthogynus	Prarie-tea croton
Cystopteris bulbifera	Bulbet bladder fern
Dicentra eximia	Bleeding heart
Disporum maculatum	Nodding mandarin
Draba ramosissima	Branching draba
Elymus riparius	River bank wild ryegrass
Heuchera longiflora var. aceroides	Maple-leaved alum root
Heuchera pubescens	Marbled alumroot
Hydrastis canadensis	Goldenseal
Meehania cordata	Meehania
Melica nitens	Melic grass
Panax quinquefolium	Ginseng
Polymnia canadensis	Leaf-cup
Potamogeton foliosus	Leafy pondweed
Saxifraga caroliniana	Carolina saxifrage
Senecio pauperculus	Balsam groundsel
Thaspium pinnatifidum	Mountain thaspium

Presence of Unique Aquatic Fauna (Information from NC Natural Heritage Files):

Scientific Name	Common Name
Acipenser fulvescens	Lake Sturgeon

Carpiodes carpio	River carpsucker
Etheostoma maculatum	Spotted darter
Hiodon tergisus	Mooneye
Hybopsis monacha	Spotfin chub
Micropterus punctulatus	Spotted bass
Percina squamata	Olive darter
Polyodon spathula	Paddle fish

Presence of Unique Vascular Plant Communities:

1. *Quercus muehlenbergii-Juniperus virginiana* on xeric bluff of limestone at Mine Ridge.
2. *Quercus rubra-Acer saccharum*-Mixed hardwoods on Shady Dolomite and Rome Shale on the steep slopes between Stokely Hollow and Hot Springs.

Presence of Unique Habitat:

1. Xeric Limestone bluff at Mine Ridge.
2. Mesic cove developed over limestone at Mine Hollow.
3. Talus slopes at Paint Rock and Lover's Leap
4. Steep slopes and mesic ravines over Shady Dolomite near Sugartree Branch.
5. Bluff face of Shady Dolomite near Sugartree Branch.
6. Steep slopes and outcrops of calcareous shales with dolomite lenses on the Rome Shale along the steep slopes upriver from Stokely Hollow.
7. Steep slopes and ravines over variously metamorphosed carbonate rich rocks along Paint Rock Road.
8. River floodplain and river islands at Deepwater Bridge and Huff Island.

Presence of Unique Rock Types:

1. Only exposure of the Honaker Limestone Formation mapped in North Carolina, at Mine Hollow and Mine Ridge.
2. Only exposure of the Rome Shale Formation mapped in North Carolina, at

Stokely Hollow and the steep slopes between Stokely Hollow and Sugartree Branch.

3. The Shady Dolomite Formation outcrops only at Hot Springs and at a location near Linville Caverns in McDowell County.

Humanistic Features:

At several points along the French Broad River near Hot Springs the hiker is treated to magnificent views of the valley, most especially from atop Paint Rock and Lover's Leap. An overlook for motorists was once maintained along US 25-70 just east of Sugartree Branch, where one can observe the differentially eroded landscape of the valley: upstream the steep sandstone ridge of Lover's Leap stands in contrast to the wide bottomlands underlain by the softer sediments of dolomite and shales, and downstream the narrowing of the gorge is visible as the sandstones and slates are once again encountered by the river. The display of spring wildflowers through this valley is incredible; nowhere else has the author seen such a profusion of yellow trilliums (*Trillium cuneatum* var. *luteum*) as can be found along the steep slopes of the north facing bank of the river downstream from Sugartree Branch. Many groups make annual pilgrimages to this area to see the floral display.

The thermal springs from which the town takes its name were once famed throughout the east for the restorative powers of the mineral rich waters. A resort was operated sporadically for almost a century, and in its heyday many visitors spent the summer vacation at the elegant spa with its bathing tubs cut from marble and its own resident orchestra. Today tobacco and tomatoes are grown on what once was landscaped promenade grounds.

Table 1

Status of unique vascular plant species which have been documented from the Hot Springs area. Notes on the occurrence of these species can be found in the Discussion. An asterisk (*) indicates those species which were analyzed in population inventories at the study plots.

[1]Cooper, J.E, S.S. Robinson, and J.B. Funderburg (eds.). 1977. Endangered and Threatened Plants and Animals of North Carolina. N.C Museum of Natural History, Raleigh, NC.

Explanation of Status Categories in Cooper et al.:

EE - Endangered Endemic	TE - Threatened Endemic
ED - Endangered Disjunct	TD - Threatened Disjunct
EP - Endangered Peripheral	TP - Threatened Peripheral
ET - Endangered Throughout	TT - Threatened Throughout

[2]US Fish and Wildlife Service, US Department of Interior. 1980. Proposed Endangered and Threatened Plants. Federal Register, December 15, 1980.

[3]North Carolina Department of Agriculture, 1981. Protected Plants of North Carolina. Manuscript, Plant Conservation Program, North Carolina Department of Agriculture.

Species	Cooper et al.[1]	US Fish and Wildlife[2]	NC Plant Protection[3]
Adlumia fungosa	EP	-	-
Arabis lyrata *	TP	-	-
Arabis patens *	EP	-	-
Asplenium resiliens	TP	-	-

Table 1 continued

Species	Cooper et al.	US Fish and Wildlife	NC Plant Protection
Asplenium ruta-muraria	EP	-	-
Buckleya distichophylla *	ET	under review	endangered
Carex eburnea	EP	-	-
Cheilanthes alabamensis	EP	-	-
Cladrastis kentukea *	TT	-	special concern
Corydalis sempervirens	TP	-	-
Croton monanthogynus	EP	-	-
Cystopteris bulbifera	TP	-	-
Dicentra eximia	EP	-	-
Disporum maculatum *	TP	-	-
Draba ramosissima *	EP	-	-
Elymus riparius	TP	-	-
Heuchera longiflora var. *aceroides*	EP	-	-

Table 1 continued

Species	Cooper et al.	US Fish and Wildlife	NC Plant Protection
Heuchera pubescens	EP	-	-
Hydrastis canadensis *	TT	under review	endangered
Meehania cordata	TP	-	-
Melica nitens	TP	-	-
Panax quinquefolium *	TT	-	-
Phacelia purshii	EP	-	-
Polymnia canadensis *	TP	-	-
Potamogeton foliosus	EP	-	-
Saxifraga caroliniana	ET	-	-
Senecio pauperculus	EP	-	-
Thaspium pinnatifidum *	EP	-	-

General Discussion

The aboriginal Cherokee had several names for the different sections of the river that we now designate the French Broad; at Hot Springs, where the water cuts its final gap through the Unaka range, they called it Tahkeeostee, meaning "where the waters race."

Any description of Hot Springs must begin with this river which has historically had a primary role in shaping the landscape. Draining a watershed bounded by the west slope of Pisgah Ridge, the south slope of the Craggies, and the southwest flank of the Blue Ridge, the French Broad forms a major water gap through the Unaka mountains. For much of its journey through western North Carolina the river encounters variously metamorphosed and crystalline rocks, such as the mica gneiss and hornblende gneiss of Buncombe County and the Cranberry and Max Patch granites of middle Madison. Then it enters a 55 square mile area of the sedimentary and metamorphosed deposits of the Hot Springs window (see Oriel, 1950), and has exposed these rocks while carving its last miles before reaching the gentler terrain of the Ridge and Valley Province where it joins the Holston and is then called the Tennessee.

The study area for this report begins at Deepwater trestle. As one travels downriver from this point, the Unicoi Sandstone, Hampton Quartzite, and Erwin Quartzite are exposed. The town of Hot Springs sits on a fan of alluvium deposited by Spring Creek, a swiftly dropping stream draining from the south. Here the gorge of the French Broad widens into a gentler valley for approximately two miles as it cuts through the softer Shady Dolomite, Rome Shale, and Sandsuck Shale Formations. The valley then narrows again as the Unicoi Sandstone rises in steep slopes from the south facing bank. Intermittent beds of shale and slate in the Unicoi result in a series of steep slopes and gentle bottoms. As the state line approaches, the Chilhowee Sandstone is exposed as the large bluffs of Paint Rock.

Had a young botanist travelled this river in those early days of empire when there was real justification for calling it the "French Broad," or seen it later when a frontier sentinel blockhouse was in use atop Paint Rock, or even two generations later when Thomas Nuttall described new species from the shoals of this very stream farther west, he would surely have marveled at the diversity of habitat in the valley. Constantly shifting river islands and tall steep bluffs, precipitous slopes and gently sloping floodplains, xeric heath ridges and cool montane coves, all were found here. Today, the presence of several generations

of man in the valley has resulted in the cultivation of much of the arable land and the repeated timbering of the slopes.

The focus of this study is those areas along the river that remain relatively undisturbed by man, or are presently maintaining a tenuous balance with varying levels of human activity. The map provided at the end of Appendix II shows the location of the sites that were selected for vegetation analysis.

The Hot Springs Valley has interested local botanists for years because of the unusually high number of unique species present in the area. Several factors may account for the occurrence of these species which are rare in North Carolina: the calcareous influence of portions of the substrate; the proximity of the Ridge and Valley Province and the connecting migration corridor of the French Broad; and more recently the railroad track through the valley. Habitat diversity is increased by the river, gravity, and other landscaping processes. The floristic composition reflects this mosaic of habitat. 479 species and 95 families were found within the study areas of the valley. Had more effort been made to document species from the highly disturbed systems that were not the emphasis of the study, the number of taxa would greatly increase. Of the total number of species, several merit individual discussion because their occurrence in North Carolina is unique. To give equal treatment in the field to all these species and locations would have been an Herculean task and would have detracted from the primary emphasis of detailed analysis of habitat conditions at some of the more exemplary sites within the study area. Thus I hope that my comments will be easily segregated into several classes of observation: locations that were previously reported or documented; locations that I verified in the field; locations that I consider to have the highest concentration of a certain species; locations that were thoroughly analyzed; locations that I could not rediscover. Following this discussion of species, some of the salient features of the individual study plots will be described. These descriptions are meant to augment, not replace, the individual site analyses.

Discussion of Species

Notes on the occurence of these species is presented in Table 1 (pp.7-9). Distribution information was compiled from Fernald (1950), Gleason and Cronquist (1963). mountains, north to Quebec. O.M. Freeman (56,287, NCU 131138) collected this species in 1956 "One mile upriver from Hot Springs." This location was not found in 1981, nor was the species discovered at any other location within the study area.

Arabis lyrata (Lyre-leaved rockcress): Usually associated with limestone outcrops, ranges north in Canada, also in Japan. A.E Radford (8048, NCU 293,044) collected a specimen in 1954 on the south facing bank of the river on an exposure of Shady Dolomite. The label on the specimen reads "5 miles northwest of Hot Springs," but conversation with Dr. Radford revealed that the label was erroneous, and should read "0.5 miles..." This location was not rediscovered in 1981. The species was found at Paint Rock in 1981, growing in sandy organic soil near Plot 1. See Plot 1 analysis.

Arabis patens (Spreading rockcress): Numerous collections document this species' presence in the gorge. Ranges north to Penn., prefering moist, rocky calcareous woods, found in North Carolina in Madison and Swain Counties. The greatest concentration in the study area occurs on the Rome Shale Formation and the Shady Dolomite on the northeast facing side of the river. While occasional plants were found on the dolomite bluffs (Plot 9) and in the more sheltered mesic Sugartree Branch Ravine (Plot 11), the species is quite frequent along the northeast facing slopes above the river over the Rome Shale (as in Plot 13). On the opposite bank, along CR 1304, Arabis patens is found only very sporadically. The best population on this side of the river is in the first mesic ravine on private property upstream from the USFS boundary at Plot 5.

Asplenium resiliens (Blackstem spleenwort): Occurs in crevices of calcareous rocks, north to Penn., south to tropical America. At Hot Springs, this species is restricted to the dolomite bluffs (Plot 9) and the steep slope above the bluffs, and also occurs on the exposures of limestone at Mine Hollow (Plot 14) and Mine Ridge (Plot 15). The species was found nowhere else in the valley. Charlotte Jones-Roe,

presently working with Asplenium heteroresiliens on the North Carolina coastal plain, made determinations of my specimens and noted morphological characters that would suggest possible affinities with Asplenium heteroresiliens. These specimens (Dawson Sather 1369, 1531, 1604, 1624, 1978, 1997) have been sent to Dr. W.H. Wagner at Michigan, and will eventually be deposited at NCU.

Asplenium ruta-muraria (Wall-rue spleenwort): In crevices of calcareous rock, Vermont to Mich. and south along the mountains to Alabama. The species is found at two locations in the study area. The first is the small outcrops in the mesic woods above the dolomite bluffs (Plot 9, Plot 10). Another population is on exposures of the Honaker Limestone at Mine Hollow and Ridge. This population was not seen in 1981; in a personal communication with Julie H. Moore she reports this species occurring on the section of Mine Ridge leading down to the confluence of Mine Creek and Shut In Creek.

Buckleya distichophylla (Piratebush): A rare endemic of Southern Va., Tenn., and North Carolina, occurring at low altitudes in the mountains. Locations are in Buncombe, Haywood, Macon, Madison, and Swain Counties in NC. Early reports of the habitat preference of this species suggest an obligate parasitism on hemlock, but recent work by Musselman and Mann (1979) indicate that Buckleya is not host specific. The best population of piratebush in the study area is at Paint Rock Bluffs (Plots 1 and 2), and the absence of hemlock at Plot 2 would reinforce the laboratory results of Musselman and Mann. In Tennessee, near Paint Creek along the road ascending Paint Mountain, Buckleya occurs in greater numbers than along State Line Ridge, and in places is the subcanopy dominant. The population is said to extend sporadically for 7 miles along this road. Inidividuals also occur on the northwest facing bank of Paint Creek just upstream of its confluence with the French Broad. The variety of habitats that Buckleya occupies in this Paint Creek watershed area would make this an excellent study area for species biology work.

Carex eburnea (Bristle-leaved sedge): Occurs in calcareous soils in Canada, south to Tenn. and NC, west to Missouri and New Mexico. In North Carolina, it is found only on the Shady Dolomite bluff directly above the USGS benchmark at 1319' elevation (Plot 9).

Cheilanthes alabamensis (Alabama lip fern): Occurs on calcareous bluffs and rocks, southwest Va. and Tenn., then south and west to Ga., Texas, and Mexico. A single specimen (H.J. Oosting and L.E Anderson 34,312, NCU 92,531) from 1934 documents its presence at Hot Springs. The label reads "On Limestone Outcrop, bluff along French Broad, Hot Springs, 0.3 miles downstream from Bridge." In the summer of 1981, intensive searches were made on the large bluff of Shady Dolomite on the northeast facing bank, and also in the smaller dolomite exposures on the southwest facing bank, and the species was not relocated. The species is documented from only one other site in North Carolina.

Cladrastis kentukea (Yellowwood): Prefers rich woods and rocky bluffs in Ky., Ind., Missouri, west to Georgia and northern Alabama. Found in 7 mountain counties in North Carolina. The species occurs in 3 locations in the Hot Springs area. O.M. Freeman collected a specimen (59,204, WCU 176,996) in 1959 in "rich woods, 2 miles southeast of Hot Springs, near French Broad River." This location was not recovered in 1981. A single individual occurs at Plot 9, rooted in a crevice in the bluff face. The best location in the study area is at Plot 7, below Lover's Leap Ridge.

Corydalis sempervirens (Pale corydalis): Occurs in dry rocky woods, in the mountains at this southern part of its range, north to Newfoundland and Alaska. The species is not found in the study area below Deepwater trestle, but on a visit to the Laurel River in May 1980 there were scattered individuals along the rocks of the riverbank, downstream from the US 25-70 and NC 212 junction, and also along the railroad track embankment below the confluence of the Laurel and the French Broad. A specimen (S.W Leonard 4790, NCU 415,434) documents the species along this section of the railroad tracks.

Croton monanthogynus (Prarie tea croton): Prefers dry soil, Ohio to Lowa and Kansas, south to Fla., Texas, and New Mexico. A specimen collected by O.M. Freeman in 1959 (59,246, NCU 177,903) reads "dry soil, 3 miles NW of Hot Springs." This location was not relocated during the summer of 1981.

Cystopteris bulbifera (Bulbet bladder fern): Occurs on moist and often calcareous rocks, south to Ga., north to Newfoundland, west to Utah. Restricted in Hot Springs to the calcareous Shady Dolomite, Rome Shale, and Honaker Limestone Formations. The

plant shies away from xeric situations on these rocks, but is found frequently in mesic exposures and seepages. The best concentration occurs at the base of the north facing slope of Stokely Hollow, approximately 100 meters upstream on Stokely Creek from the railroad tracks.

Dicentra eximia (Bleeding heart): Grows in mountain woods, Penn. south to NC. O.M. Freeman collected a specimen (59,219, NCU 249,415) which reads "2 miles southeast of Hot Springs near the French Broad River." This location was not rediscovered in 1981. Several specimens have been collected from a site along the RR tracks at Deepwater trestle, and this was visited in 1981. This is a high disturbance location, maintained by Southern Railway and the utility company which has a power line paralleling the RR tracks and river here. The population begins 180' downstream from the trestle. Most individuals are restricted to the rock face in seepages or soil patches on ledges, but some are also established in the soil under the power line. No other populations were found in the study area.

Disporum maculatum (Nodding mandarin): In rich woods in the mountains, from northeast Ga. and northwest Alabama to NC, also in Ky. and southern Ohio, and disjunct to southern Michigan. Occurs in Jackson, Haywood, Buncombe, Madison, and Yancey Counties in NC. Plot 12 on the Shady Dolomite represents the only location found in the study area in 1981.

Draba ramosissima (Branching draba): Found in dry mountain woods, Maryland and Va. and W. Va., east to Ky, NC, and Tennessee. Numerous collections document this species' occurrence on both sides of the river below Hot Springs. Individuals of Draba ramosissima are scattered along the slopes for approximately one mile downriver along Paint Rock Road from the USFS boundary 3.2 miles west of US 25-70; see Plot 4 for a representative site analysis. Another large population is along the northeast facing exposure of the Shady Dolomite near Plot 9. Plants can also be found on the south facing exposure of Shady Dolomite, 0.2 to 0.3 miles downstream from the US 25-70 bridge.

Elymus riparius (River bank wild ryegrass): Occurs in moist woods and streambanks from Maine to NC and west to Wisconsin, Nebraska. This species has been reported from the confluence of the French Broad and Laurel Rivers (Wickland and Horton, 1978) and a specimen (A.E. Radford 7,268, NCU 54,636) documents its presence in "deciduous woods on limestone, 1 mile NW of Hot Springs." I collected

several specimens of Elymus from the general area of Radford's specimen, but upon comparison with NCU material, none proved to be Elymus riparius.

Rydberg to be a polymorphic species, and all specimens previously labeled Heuchera longiflora var. aceroides which are housed at NCU have been determined by Wells to be Heuchera longiflora Rydberg. Furthermore, all specimens from Hot Springs labeled Heuchera pubescens Pursh (S.W. Leonard 2527, NCU 356,465; Boufford 13,983, NCU 458,546; and others) have been determined by Wells to be H. longiflora although she maintains H. pubescens as a species at other locations in NC. Individuals of H. longiflora were found scattered throughout the study area, on both sides of the river, though never in any great concentrations.

Hydrastis canadensis (Goldenseal): Found in deep rich woods, north to Michigan and Minnesota, south to Va., Tenn., and Arkansas. The only location in the study area is on a mesic exposure of the Honaker Limestone in Mine Hollow; see Plot 14.

Meehania cordata (Meehania): Occurs in rich woods from sw Pennsylvania to Tenn. O.M. Freeman (59,205, NCU 177,871) collected this species "2 miles SE of Hot Springs near the French Broad River" in 1959, but the location was not relocated in 1981. No other locations for this species were found in the study area.

Melica nitens (Melic grass): Ranges from Pennsylvania to Va., and NC. A specimen collected by A.E. Radford (8,053, NCU 249,304) reads "Hardwood forest on French Broad River, 3 miles NW of Hot Springs." This location was not found in 1981. A later site visit with Dr. Radford disclosed a clump of the species on the Dolomite bluff at Plot 9.

Panax quinquefolium (ginseng): Occurs on mesic sites in eastern US, much exploited. Within the study area, several scattered individuals were found on the Rome Shale and the Shady Dolomite. At only one location (Plot 11) were there more than three individuals in close association.

Phacelia purshii (Pursh's phacelia): In moist woods or thickets, Pennsylvania to Minnesota, south to NC, Alabama, and Missouri. Occurs in Madison and Haywood Counties, NC. This annual is almost ubiquitous throughout the study area, with large populations occurring along Shut In Creek, Paint Rock Road, and the RR tracks on the left bank of the river. Also occurs along the drainage of the Laurel River below the junction of us 25-70 and NC 212, and along the RR tracks between the Laurel River and Deepwater trestle.

Polymnia canadensis (Leaf cup): Found in moist woods, talus slopes, and openings in Vermont and Ontario and Minnesota, south to Ga. and Arkansas. Individuals are scattered throughout the Hot Springs Valley, but the Greatest concentrations occur in the talus ravines on the right bank of the river (see Plots 3 and 7), and substantial numbers are found on boulders and disturbed soil at the base of the steep northfacing slopes along the RR tracks northwest of Hot Springs.

Potamogeton foliosus (leafy pondweed): In streams and ponds from Canada to Central America. A specimen (Ray Smith, NCU 407,437) documents this species from "Hot Springs, spring fed pond, 104°F", presumably the springs at the alluvial fan at Hot Springs. My unsuccessful attempt to relocate this species met with a cool reception from the caretaker of the property.

Saxifraga caroliniana (Carolina saxifrage): An endemic limited to seven mountain counties in Virginia and two in North Carolina. Reported from the Laurel River below the junction of US 25-70 and NC 212 (Wickland and Horton, 1978) but no specimens were seen. My collections of the genus Saxifraga during 1981 were made after the diagnostic features had faded, thus I can offer no insight into the species' occurrence in the study area.

Senecio pauperculus (Balsam groundsel): More common northward, in Canada, then south to New Mexico and southeast to Ga. A specimen (Emily Wood 905, NCU 457,243) from the area near plot 5 on CR 1304 was labeled as Senecio pauperculus, but was determined by L.J. Uttal in 1981 to be Senecio plattensis Nuttall. My specimens (Dawson Sather 1293, 2198) are being sent to Uttal for determination, and will be deposited at NCU. For the data presentation in this report, the specimen is called Senecio pauperculus Michaux. The area near Plot 5 along CR 1304 is the

only location in the study area for the species.

Thaspium pinnatifidum (Mountain thaspium): Occurs in mountain woods on circumneutral soils in North Carolina, Tennessee, Kentucky, and southwest Ohio; reported from Jackson and Madison Counties in North Carolina. Several specimens document the to the presence of a small population on Huff Island; my search of the island in 1981 revealed no individuals of the species.

Discussion of Sites

Plot 1.

Along the State Line Ridge between North Carolina and Tennessee, the backbone ridge of the Unakas descends to 1260 feet at the French Broad, where the river carved bluffs known since aboriginal times as the Painted Rock rise approximately 70 feet. The narrow, flat topped ridge here supports a sparse xeric plant community composed of *Pinus virginiana*, *Pinus strobus*, and *Quercus prinus*, with xeric herbs, graminoids, and reindeer lichen in the herb layer. On the river side of this ridge, the bluff face drops vertically, and the excellent views of the French Broad splitting around Huff Island are well worth the short climb from the roadbed below. On the north facing side of the ridge, the plant composition changes dramatically into a forest of hemlock, red oak, poplar, striped maple, and other mesophytic species. Occupying the abrupt ecotone is a stand of *Buckleya distichophylla* that runs along the ridge and saddle for several dozen meters until the flat topped portion of the ridge widens and ascends. At this point individuals or *Arabis lyrata* are scattered along the boulders on top of the ridge.

Plot 2.

Plot 2 is centered in another large concentration of *Buckleya distichophylla* along State Line Ridge. Rather than occupying the ecotone between the xeric and mesic, here the *Buckleya* is scattered over the steep, south facing upper slopes of the ridge. *Pinus virginiana* and *Quercus prinus* dominate the short canopy, with other xeric woody species represented in the subcanopy. The herb layer here is almost nonexistent, and little vegetation holds the soil in place. At various outcrops and fixed boulders, soil has built up on the upslope side and allows for the invasion of *Vaccinium* species. Plots 1 and 2 both represent phases that culminate in the xeric chestnut oak-heath that covers large areas of the south facing slopes of the State Line Ridge in the Valley.

The presence of *Buckleya* at Plot 2 is one of the enigmas of species habitat preference that cannot be answered here. The nearest hemlock is up and over the ridge, so most certainly the piratebush at this site is not in association with the roots of that conifer. This area and the site atop Paint Rock are both very xeric and offer habitat for this rare endemic shrub, yet in nearby Tennessee the species is scattered in the understory of a much more mesic community.

Plot 3.

Plot 3 is situated on the talus at the base of Paint Rock bluff, in close proximity but marked vegetational contrast to Plots 1 and 2. The 20 meter by 20 meter area of Plot 3 sits on a shelf that has developed a Typic Udorthent soil on the talus, and on the east and west margins of this shelf small ravines descend to the road. The "soil" in these ravines consists of organic matter adhering to the talus cobbles. The differences in plant composition over these differing topographic features justified the extension of the plot to include the sampling of each ravine.

Although this site faces south-southwest, insolation is intercepted not only by the ridge across the river but also by the thickly forested downstream end of Huff Island. Analysis of the site shows that *Acer saccharum* is present as seedlings, transgressives, and mature stems. Nowhere else on this side of the river does sugar maple attain such importance within a community. Woody species are noticeably absent from the talus ravines flanking the forested shelf. In early spring, *Phacelia bipinnatifida* covers these rocks, and gives way to the summer dominance of *Polymnia canadensis*.

The circumneutral soil that is an important habitat factor for several species below Paint Rock (i.e. *Acer saccharum*, *Rhamnus caroliniana*, *Staphylea trifolia*, *Polymnia canadensis*, and *Trillium cuneatum* var. *luteum*) cannot be purely a response to the siliceous sandstone talus. A possible explanation is the presence of some carbonate cement in scattered layers of the horizontally bedded bluffs, although there is no record of carbonate occurrence in the Chilhowee. Another plausible explanation is the recycling of bases present in the system by sugar maples, abundant at this location.

Plot 4.

The steep slopes along Paint Rock Road between Murray Branch and Jack Branch support forests that reflect both the southern exposure and previous levels of disturbance. The spurs descending from State Line Ridge have a well developed cover of chestnut oak-heath, and the slopes of these spur ridges grade from chestnut oak-heath to oak-hickory to virginia pine stands. This area is underlain by the Unicoi Sandstone, which also contains beds of metamorphosed slate. While the forest is very mosaic in its composition, the scattered presence of basophilic herb species here (i.e. *Amsonia tabernaemontana*, *Draba ramosissima*,

Arabis patens) indicates that calcareous cements may be present here. Indeed, the application of HCl produced effervescence on some, though not all, of the outcrops.

Plot 4 was selected for its concentration of Draba ramosissima in association with a calcareous slate. The plot lays in a ravine that descends to the river, bounded on the east by an outcrop of slate. The ravine's sandy skeletal soil with a high proportion of rock fragments supports a mixture of oaks and hickories. Soil development on the outcrop itself is minimal, and Draba ramosissima is found within these small pockets of gritty organics. Nye (1969) notes that this species is restricted to limestone in its Kentucky range, and elsewhere is also found on shale. The percentage of organic matter in the soil samples that Nye removed showed great variability (from 15% to 40%), and the soil reaction was always circumneutral. His observation that the plants always occurred where sunlight was readily available can be extended to its habitat preference in the Hot Springs Valley. This species, along with Amsonia tabernaemontana and Arabis patens, is scattered infrequently along this area of Paint Rock Road.

Plot 5.

Plot 5 lies near the contact between the Sandsuck Shale and the Unicoi Sandstone. This slope supports a mixture of species due to the proximity of the river, the circumneutral soil, and the opening maintained by CR 1304. Woody species present in this area (in addition to those given in the plot analysis) are: Asimina triloba, Diospyros virginiana, Ilex opaca, Juniperus virginiana, Liriodendron tulipifera, Robinia pseudo-acacia, Calycanthus floridus var. laevigatus, Vaccinium stamineum, Vaccinium vacillans, and Viburnum acerifolium. In the early spring, Phlox stolonifera forms a dense cover, to be overtopped by the abundant Thaspium pinnatifidum and other ground herbs in the summer.

Plots 6,7,8.

Plots 6,7, and 8 represent the transitional series from the steep, rocky slopes of Lover's Leap to the riverbank floodplain. Much of the river-facing side of Lover's Leap is thinly covered with xeric oaks, hickories, and pines. The herb layer along this slope is also sparse, and is better developed in the barely noticebale ravines that collect eroding materials of the slope. Plot 8 documents this upslope community with minimal soil development and sparse vegetation cover.

At the base of this slope, at Plot 7, a talus has developed. The resulting change in both the species composition and the density of the herb layer is dramatic. The talus here is deeper than a meter, and the "soil" here is similar to that of the talus ravines at Plot 3. Root position of the woody species could not be determined, but the herbs and vines root in the organics adhering to the talus. Numerous trailing vines and Polymnia canadensis share dominance on this belt of talus wherever the small openings allow for extra sunlight to enter. Ogle (1980) reports the occurrence of Polymnia canadensis on the lower slope and floodplain in his study area in southwestern Virginia, but in this valley the species is best developed on the talus slopes on the south facing side of the river. Several individuals of Cladrastis kentukea are scattered throughout this site.

The talus zone is abruptly truncated at the level bench of floodplain deposits that runs along the base of this slope. Once again, the species composition changes abruptly, in response to the sandy Udifluvent developed here. Area residents confirm that this is the old roadbed for the Buncombe turnpike that was a main avenue for stock drovers in the latter part of the 19th century. Today a thick canopy of alluvial species has reclaimed the roadbed. It is difficult to determine how much of the substrate here was affected by the presence of this road. The bench is noticeably free of talus that is abundant at the foot of the slope, and one must wonder what type of grading activites went on in years past to maintain this passage, or if the substrate conditions have always been maintained by river action. The herbaceous layer here is extremely diverse; many of the species listed in region C in the master species list were collected along this bench which runs for 1/2 mile upriver from Hot Springs.

Plots 9, 10.

Plot 9 is located at the vertical bluffs of Shady Dolomite on the northeast facing bank of the river. The data presented in the site analysis represents only a species list of the area of these bluffs and their base at the RR tracks. This incongruous site harbors clambering vines and also some species found nowhere else in North Carolina, and gives a botanist reason to pause and evaluate his concept of a "weed." Several habitat features coincide here to maintain this unusual diversity of species. Large sheer exposures of the calcareous dolomite are unobstructed by any canopy vegetation while other exposures are in moister depressions in the bluff face, and numerous crevices allow for soil pockets of

varying sizes to build up. At the base of the cliffs is a region of highly disturbed substrate adjacent to the RR tracks. These habitats could conceivably offer a foothold for many species that have migrated over slow time up the river corridor of the Tennessee drainage or have hopped a quick ride on railroad cars.

Above the bluffs is a narrow area of forest that is sandwiched between the railroad and US 25-70. Plot 10 represents this area's concentration of basophilic species (i.e. Acer saccharum, Quercus muehlenbergii, Cercis canadensis, Dirca palustris, Asplenium ruta-muraria). The series of small spur ridges and eroded ravines descending to the river is punctuated by occasional outcrops, so that diverse habitats are displayed in this thin band of forest.

Plot 11

With a name like Sugartree Branch, it is not surprising that the dominant woody species in this mesic ravine is Acer saccharum. What must have once been a cove forest with big trees has now been reduced by timbering, and the mining operations of previous years reduced the extent of forested area along this intermittent stream. The site was selected for several reasons: the mesic cove forest in response to its sheltered northern aspect and basic substrate, the presence of Panax quinquefolium, Arabis patens, and numerous rich spring herbs, and the fact that recent fires (1974, and early 1981) have swept through this area.

The downslope adge of this plot is near the streambed, and the upslope edge nicks the corner of a disturbed and open old roadbed, where a lush growth of weedy species occurs. Numerous transgressives are present, perhaps in response to the recent fire history of the site.

Plots 12, 13.

Near the contact between the Shady Dolomite and Rome Shale, the only population of Disporum maculatum in the study area is found. The large number of small stems in this plot suggests recent disturbance of the area,and residents sya that the timber was cut from here "about 20 years ago." The species composition is that of a montane cove forest, with a high proportion of sugar maple.

An abandoned roadbed that runs from the old dolomite mines to Stokely Hollow forms the northern boundary of this plot, and along the bank of this road on exposures of the Shady Dolomite are the individuals of Disporum maculatum. Wofford et al. (1980) report that nodding mandarin is common on north facing slopes in

their study area in Tennessee. Ogle (1980) says that while the species is generally found in moist, rich deciduous woods, it is also found on dry ridge crests, and seems to have two distinct habitat preferences. In Plot 12 and on the slopes below, the concentration of rich spring herbs (most especially Trillium cuneatum var. luteum, Caulophyllum thalictroides, and Thalictrum dioicum) attain their lushest concentration in the study area. It is marvelous.

As one proceeds downriver along this roadbed toward Plot 13, the crumpled, vertically oriented beds of Rome Shale are exposed. This vertical orientation, combined with the loamy skeletal Udorthent soil, allows for less water retention on this part of the slope, and there is a subtle shift in species composition from the mesic setting at Sugartree Branch. Quercus prinus and Quercus muehlenbergii are more frequent in the canopy, while Ostrya virginiana and Hamamelis virginiana in the subcanopy reflect this hydrologic change.

Plots 14, 15.

The exposures of the Honaker Limestone at Mine Hollow and Mine Ridge allows for the development of both mesic and xeric plant communities. Plot 14 represents the mesic phase on the north facing bank of Mine Creek. The plot was placed here because of the occurrence of the only population of Hydrastis canadensis in the study area. The large outcrops at this plot limit the number of canopy species which can mature, so plot data was augmented with quarter point canopy data for the area surrounding the plot. Numerous transgressives of poplar are found along the creek, and in the hemlock stand south of this plot are abundant red maple seedlings and saplings. On these mesic exposures of the Honaker, Asplenium resiliens, Asplenium rhizophyllum, and Cystopteris bulbifera are frequent. Athyrium pycnocarpon forms good stands along some portions of this bottom.

The soil survey of Madison County in 1942 mapped this soil as a hill phase of the Muskingum loam. Their description alludes to the numerous fragments of limestone that were found within the clays and clay loam of this soil.

On the xeric bluff at Plot 15, a similar textured soil has developed in those few flats that allow for soil buildup between the series of outcrops. On both sites the soil reaction is circumneutral. The dominance of Quercus muehlenbergii and Juniperus virginiana at Plot 15 is in accordance with Braun's (1950) replacement series, in which Quercus muehlenbergii will largely replace Q. prinus on xeric calcareous sites. Plot 13 on the Rome Shale is intermediate in this series.

Plot 16.

Plot 16 is a floodplain dominated by *Acer saccharinum*, and is unique in the Carolinas. Very few floodplains are left in the mountains; most have long been converted to crops. The downstream portion of this floodplain has seen the construction of hotels, CCC camps, family dwellings, and is now in cultivation for tobacco and tomatoes. The upstream end, near Deepwater trestle, is in its natural condition. The data presented for Plot 16 was gathered by the Botany 235 class from UNC-CH in 1980.

This floodplain and Huff Island farther downstream allow one to observe species establishment in relation to river dynamics. The progression from annual grasses and forbs to perennial forbs (most noticeably *Justicia americana*) to the woody species is evident as one follows a downriver transect along Huff Island.

NATURAL AREA DIVERSITY SUMMARY

CLIMATE: A. Mesothermal; AA. Warm temperate. B. Cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period; BB. Cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. C. Similar to local climate; CC. Similar to natural area climate.

SOILS: A. (1,3,4,5,10-13, 16) Entisol, (2,5,8) Inceptisol, (7, 9) Not applicable, (14,15) Not determined; AA. (1,3,4,10-13) Orthent, (2,5,8) Ochrept, (6,16) Fluvent, (7,9) Not applicable, (14,15) Not determined. B. (1,3,4,10-13) Udorthent, (2,5,8) Dystrochrept, (6,1,6) Udifluvent, (7,9) Not applicable, (14,15) Not determined; BB. (1) Lithic Udorthent, (2) Lithic Dystrochrept, (3,4,10-13) Typic Udorthent, (5,8) Typic Dystrochrept, (6,16) Typic Udifluvent, (7,9) Not applicable, (14,15) Not determined. C. (1,3,13) Loamy skeletal, mixed, mesic, (2,6,16) Coarse loamy, mixed, mesic, (4,8) Sandy skeletal, mixed, mesic, (5) Loamy, mixed, mesic, (10,11,12,14,15) Fine loamy, mixed, mesic, (7,9) Not applicable; CC. Series not determined.

GEOLOGY: A. (1-3, 5-16) Sedimentary, (4) Metamorphic; AA. (1,2,3,5,6,7,8,16) Clastic, (9-15) Mixed clastic and chemical, (4) Metasedimentary. B. (1-8, 16) Siliceous, (9-12) Mixed calcareous, dolomitic, siliceous, (13) Mixed calcareous, dolomitic, ferruginous, siliceous, (14,15) Calcareous and siliceous; BB. (1-5, 8) Alluvial deposition, (6,16) Floodplain, (7) Talus, (9-12, 14, 15) Marine deposition, (13) Alluvial and marine deposition. C. (1,2) Hampton Formation sandstones, siltstones, mudstones, and shales, (3) Hampton Formation Sandstone, (4) Interbedded slates and partially metamorphosed mudstones of the Unicoi Formation, (5) Unicoi Formation Sandstone, (6,16) Interbedded, unconsolidated silts and sands, mixed with rock fragments, underlain by the Erwin Sandstone Formation, (7,8) Erwin Sandstone Formation, (9,10,11,12) Shady Dolomite, exposed as outcrops and bluffs, (13) Rome Shale Formation with lenses of fine grained to saccharoidal dolomite and dolomitic limestone, (14,15) Honaker Formation Limestone exposed as bluffs, outcrops, and in streamcuts. CC. (1) Hampton Formation exposed as 70' bluff and flat topped ridge of weathered fragments ranging from large outcrops to chips and fragments, horizontally bedded, (2) Hampton Formation densely exposed as outcrops and

boulders, (3) Hampton Formation exposed as talus boulders of fine grained to quartz sandstones, (4) Interbedded slates and partially metamorphosed mudstones of the Unicoi Formation sparsely exposed as outcrops, striking S 60°E and dipping S 190°W, (5) Unicoi sandstones to fine siltstones, present as saprolite and small cobbles on surface, (6,16) Interbedded unconsolidated silts and sands, mixed with rock fragments, underlain by the Erwin Sandstone Formation, (7) Erwin Formation sandstone and siltstone very densely exposed as talus, (8) Fine grained member of the Erwin Sandstone, densely exposed as outcrops, (9) Fine grained to saccharoidal dolomite and dolomitic limestone completely exposed as bluffs, (10) Fine grained to saccharoidal dolomite and dolomitic limestone sparsely exposed as outcrops, (11,12) Fine grained to saccharoidal dolomite and dolomitic limestone, very sparsely exposed as outcrops, (13) Rome Shale Formation with lenses of fine grained to saccharoidal dolomite and dolomitic limestone, striking N105°E and dipping N 8°W, densely exposed as outcrops, (14) Honaker Formation Limestone densely exposed as outcrops, (15) Honaker Formation Limestone very densely exposed as a series of small bluffs and outcrops.

HYDROLOGY: A. (1-5, 7-15) Terrestrial, (6,16) Riverine; AA. (1-5, 7-15) Dry mesic, (6,16) Upper perennial. B. Fresh; BB. (1-5, 7-15) Permanently exposed, (6,16) Intermittently flooded. C. Well drained; CC. (1) Well drained, wetted by fresh rains, (2-5, 7-15) Well drained, wetted by fresh rains and downslope drainage, (6) Well drained, wetted by fresh rains, occasional flooding, and downslope drainage from adjacent ridge, (16) Well drained, wetted by fresh rains and occasional flooding.

TOPOGRAPHY: A. Hills and Mountains; AA. Low and High Mountains. B. (1-5, 7,9-15) Water eroded mountain, (6,16) Water eroded river valley, (8) Water eroded ridge; BB. (1,2,3) Water eroded ridge, (4-10, 12,13,14,16) Water eroded slope, (11) Water eroded ravine,(15) Upper slopes and crest. C. (1) Ridgetop and upper portion of bluff, (2) Upper slope of ridge, (3) Base of water eroded ridge, (4) Partly sheltered, south facing, convex irregular lower slope, (5) Partly sheltered, southeast facing, concavoconvex, irregular lower slope, (6) Partly sheltered, west facing, nearly level, slightly irregular floodplain, (7,8) Partly sheltered, west facing, steep, convex, irregular lower slope, (9-13) Partly sheltered, east-northeast facing, concavoconvex lower slope, (14) Partly sheltered, east facing, nearly level

bottom, (15) Eastern end of ridge, (16) Sheltered, east-northeast facing, gently sloping, slightly irregular river floodplain; CC. (1) Partly sheltered, south to southwest facing, nearly level top of a southwest-northeast running ridge, (2) Partly sheltered, south facing, steep, irregular upper slope of an east-west running ridge, (3) Partly sheltered, south to southwest facing, moderately steep, irregular base of a southwest-northeast running ridge, (4) Partly sheltered, south-southeast facing, steep to very steep, convex irregular lower slope of State Line Ridge, (5) Partly sheltered, southeast facing, moderately steep to steep lower slope of State Line Ridge, (6) Partly sheltered, west facing, nearly level, slightly irregular floodplain, (7) Partly sheltered, west facing, steep, convex lower slope of Lover's Leap Ridge, (8) Partly sheltered, west facing, steep, convex lower slope of Lover's Leap Ridge, (9) Partly sheltered, east-northeast facing, extremely steep bluff at the base of the lower slope of Deer Park Mountain, (10) Partly sheltered, east-northeast facing, fairly level to moderately steep spur ridge and ravine of the moderately steep lower slope of Deer Park Mountain, (11) Sheltered, northeast facing, moderately steep ravine of the moderately steep lower slope of Deer Park Mountain, (12) Partly sheltered, north-northeast facing moderately steep base of the moderately steep slope of Deer Park Mountain, (13) Partly sheltered, east-northeast facing, moderately steep lower slope of Deer Park Mountain, (14) Sheltered, north-northeast facing, nearly level, irregular slope along the bottom of Mine Hollow, (15) Open, southeast facing, very rocky and irregular, very steep convex eastern end of an east-west running ridge, (16) Sheltered, east-northeast facing, gently sloping, slightly irregular river floodplain.

PHYSIOGRAPHY: A. Appalachian Highlands; AA. Blue Ridge Province. B. Southern Section; BB. (1-5) State Line Ridge, (6-8) Lover's Leap Ridge, (9-13, 16) Deer Park Mountain, (14) Mine Hollow, (15) Mine Ridge. C. (1,3) Paint Rock Bluff, (2) Polecat Hollow, (4,5) Lower slope of State Line Ridge, (6) Floodplain at base of Lover's Leap Ridge, (7,8) Lower slope of Lover's Leap Ridge, (9-13, 16) Lower slope of Deer Park Mountain, (14) Bottom of Mine Hollow, (15) Eastern end of Mine Ridge; CC. (1) Top of Paint Rock Bluff, underlain by the Early Cambrian Hampton Formation Sandstone, (2) Upper slope of Polecat Hollow, underlain by the Early Cambrian Hampton Formation Sandstone, (3) Base of Paint Rock Bluff, underlain by the Early Cambrian Hampton Formation Sandstone, (4) Lower south-southeast slope of State Line Ridge, underlain by

the Lower Cambrian Unicoi Formation Sandstone, (5) Lower southeast slope of State Line Ridge, underlain by the Unicoi Formation Sandstone, (6) Floodplain of recent sediments, underlain by the Lower Cambrian Erwin Formation Sandstone, (7,8) Lower west slope of Lover's Leap Ridge, underlain by the Lower Cambrian Erwin Formation Sandstone, (9) Bluffs on the lower slope of Deer Park Mountain, east of Sugartree Branch, underlain by the Lower Cambrian Shady Dolomite Formation, (10) Top of bluffs on the lower slope of Deer Park Mountain, east of Sugartree Branch, underlain by the Lower Cambrian Shady Dolomite Formation, (11) Lower northeast slope of Deer Park Mountain, at Sugartree Branch, underlain by the Lower Cambrian Shady Dolomite Formation, (12,13) Lower northeast slope of Deer Park Mountain, west of Sugartree Branch, underlain by the Lower Cambrian Shady Dolomite Formation, (14) North-northeast facing slope along the bottom of Mine Hollow, underlain by the Middle Cambrian Honaker Formation Limestone, (15) Southeast facing slope at the eastern end of Mine Ridge, underlain by the Middle Cambrian Honaker Formation Limestone, (16) Floodplain of recent sediments at the base of Deer Park Mountain, underlain by the Lower Cambrian Erwin Formation Sandstone.

VEGETATION:

(1) A. TERRESTRIAL NEEDLELEAF FOREST SYSTEM;

AA. Medium, excurrent, evergreen trees. B. Pine ridge; BB. Coniferalean-Mixed hardwoods. C. Pinus virginiana-Pinus strobus-Mixed hardwoods; CC. Pinus virginiana-Pinus strobus-Mixed hardwoods.

(2) A. TERRESTRIAL NEEDLELEAF FOREST SYSTEM;

AA. Medium, excurrent, evergreen trees. B. Pine slope; BB. Coniferalean-Fagalean. C. Pinus virginiana-Quercus prinus; CC. Pinus virginiana-Quercus prinus.

(3) A. TERRESTRIAL BROADLEAF FOREST SYSTEM;

AA. Medium and large, deliquescent, deciduous trees. B. Oak-maple slope; BB Fagalean-Sapindalean-Mixed hardwoods/Sapindalean-Fagalean-Mixed hardwoods///Mixed forbs, graminoids, and ferns. C. Quercus rubra-Acer saccharum-Mixed hardwoods; CC. Quercus rubra-Acer saccharum-Mixed Hardwoods/Acer saccharum-Ostrya virginiana-Mixed hardwoods/// Mixed forbs, graminoids, and ferns.

(4) A. TERRESTRIAL BROADLEAF FOREST SYSTEM;

AA. Medium, deliquescent trees. B. Oak slope; BB Fagales-Mixed hardwoods. C. Quercus rubra-Quercus prinus-Mixed hardwoods; CC. Quercus rubra-

AA. Medium, deliquescent, deciduous trees. B. Walnut-Oak slope; BB. Juglandales-Fagales/Urticales-Mixed hardwoods//Mixed forbs, graminoids, and ferns. C. Juglans nigra-Quercus rubra; CC. Juglans nigra-Quercus rubra/Ulmus alata-Mixed hardwoods//Mixed forbs, graminoids, and ferns.

(6) A. TERRESTRIAL BROADLEAF FOREST SYSTEM;

AA. Medium to large, deliquescent, deciduous trees. B. River birch-Mixed hardwood floodplain; BB. Fagalean-Mixed hardwoods/Fagalean-Mixed hardwoods//Mixed forbs, graminoids, and ferns. C. Betula nigra-Mixed hardwoods; CC. Betula nigra-Mixed hardwoods/Carpinus caroliniana-Mixed hardwoods//Mixed forbs, graminoids, and ferns.

(7) A. TERRESTRIAL BROADLEAF FOREST SYSTEM;

AA. Large and medium deliquescent trees. B. Mixed hardwood slope; BB. Fagales-Mixed Hardwood/Ebenales-Fagales-Hamamelidales//Mixed vines/Asterales. C. Quercus rubra-Mixed hardwoods; CC. Quercus rubra-Mixed hardwoods/Halesia carolina-Ostrya virginiana-Hamamelis virginiana-Mixed hardwoods//Mixed vines/Polymnia canadensis-Mixed herbs.

(8) A. TERRESTRIAL BROADLEAF FOREST SYSTEM;

AA. Medium, deliquescent, deciduous trees. B. Chestnut oak slope; BB. Fagalean-Mixed pines and hardwoods. C. Quercus prinus-Mixed pines and hardwoods; CC. Quercus prinus-Mixed pines and hardwoods.

(9) A. TERRESTRIAL HERB AND VINE SYSTEM;

AA. Herbs and vines of mixed growth forms. B. River bluff; BB, C, and CC not determined.

(10) A. TERRESTRIAL BROADLEAF FOREST SYSTEM;

AA. Large, deliquescent, deciduous trees. B. Mixed Oak-Sugar maple slope; BB. Fagalean-Sapindalean-Mixed hardwoods/Mixed hardwoods/// Mixed forbs, graminoids, and ferns. C. Quercus rubra-Acer saccharum-Mixed hardwoods; CC. Quercus rubra-Acer saccharum-Mixed hardwoods/ Mixed hardwoods///Mixed forbs, graminoids, and ferns.

(11) A. TERRESTRIAL BROADLEAF FOREST SYSTEM;

AA. Medium, deliquescent, deciduous trees. B. Sugar maple-Mixed hardwoods cove; BB. Sapindalean-Mixed hardwoods/(Rosalean-

Mixed hardwoods)///Mixed forbs, graminoids, and ferns. C. Acer saccharum-Mixed hardwoods; CC. Acer saccharum-Mixed hardwoods/(Mixed hardwoods)///Mixed forbs, graminoids, and ferns.

(12) A. TERRESTRIAL BROADLEAF FOREST SYSTEM;

AA. Medium, deliquescent, deciduous trees. B. Sugar maple-Mixed hardwoods slope; BB. Sapindalean-Mixed hardwoods/(Rosalean-Mixed hardwoods)/// Mixed forbs, graminoids, and ferns. C. Acer saccharum-Mixed hardwoods; CC. Acer saccharum-Mixed hardwoods/(Cercis canadensis-Mixed hardwoods)/// Mixed forbs, graminoids, and ferns.

(13) A. TERRESTRIAL BROADLEAF FOREST SYSTEM;

AA. Medium, deliquescent, deciduous trees. B. Red oak-Sugar maple-Mixed hardwood slope; BB. Fagalean-Sapindalean-Mixed hardwoods/Fagalean Mixed hardwoods///Mixed forbs, graminoids, and ferns. C. Quercus rubra-Acer saccharum-Mixed hardwoods; CC. Quercus rubra-Acer saccharum-Mixed hardwoods/Ostrya virginiana-Mixed hardwoods///Mixed forbs, graminoids, and ferns.

(14) A. TERRESTRIAL BROADLEAF FOREST SYSTEM;

AA. Large, deliquescent, deciduous trees. B. Mixed hardwoods cove; BB. Juglandalean-Magnolialean-Coniferalean-hardwood/Lauralean-Mixed hardwoods///Mixed forbs, graminoids, and ferns. C. Juglans nigra-Liriodendron tulipifera-Pinus strobus-Hardwood; CC. Juglans nigra-Liriodendron tulipifera-Pinus strobus-Hardwood/Lindera benzoin-Mixed hardwoods///Mixed forbs, graminoids, and ferns.

(15) A. TERRESTRIAL BROADLEAF FOREST SYSTEM;

AA. Medium, deliquescent, deciduous trees. B. Oak-Juniper slope; BB. Fagalean-Coniferalean-Mixed hardwoods/Dipsacalean-Fagalean-Mixed hardwood///Mixed forbs, graminoids, and ferns. C. Quercus muehlenbergii-Juniperus virginiana-Mixed hardwoods; CC. Quercus muehlenbergii-Juniperus virginiana-Mixed hardwoods/Viburnum prunifolium-Ostrya virginiana-Mixed hardwoods///Mixed forbs, graminoids, and ferns.

(16) A. TERRESTRIAL BROADLEAF FOREST SYSTEM;

AA. Medium and large, deliquescent, deciduous trees. B. Silver maple-Mixed hardwoods floodplain; BB. Sapindales-Mixed hardwoods////Poaceae. C. Acer saccharinum-Mixed bottomland hardwoods; CC. Acer saccharinum-Mixed bottomland hardwoods////Microstegium vimineum.

COMMUNITY DIVERSITY SUMMARY 1

Plot 1, Paint Rock Bluff

Terrestrial needleleaf forest system
Medium, excurrent, evergreen trees

Pine ridge
Canopy: Quercus prinus
Coniferalean-Mixed hardwoods

PINUS VIRGINIANA-PINUS STROBUS-MIXED HARDWOODS

Pinus virginiana-Pinus strobus-Mixed hardwoods

CLIMATE: A. Mesothermal; AA. Warm temperate. B. Cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period; BB. Cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. C. Similar to local climate; CC. Similar to natural area climate.

SOILS: A. Entisol; AA. Orthent. B. Udorthent; BB. Lithic Udorthent. C. Loamy-skeletal, mixed, mesic Lithic Udorthent; CC. Series not determined.

0-1 cm., organic duff.
A hor.: 1-2 cm., loamy sand, very dark gray, pH 4.2.
C hor.: 2-4+ cm., sandy loam filling interstices of weathered mudstones and sandstones, dark brown, pH 4.0.

GEOLOGY: A. Sedimentary; AA. Clastic. B. Siliceous; BB. Alluvial deposition. C. Hampton Formation sandstones, siltstones, mudstones, and shales; CC. Hampton Formation exposed as 70'bluff and flat topped ridge of weathered fragments ranging from large outcrops to chips and fragments, horizontally bedded.

HYDROLOGY: A. Terrestrial; AA. Dry-mesic. B. Fresh; BB. Permanently exposed. C. Well drained; CC. Well drained, wetted by fresh rains.

TOPOGRAPHY: A. Hills and Mountains; AA. Low and High Mountains. B. Water eroded mountain; BB. Water eroded ridge. C. Ridgetop and upper portion of bluff; CC. Partly sheltered, south to southwest facing, nearly level top of a southwest-northeast running ridge.

PHYSIOGRAPHY: A. Appalachian Highlands; AA. Blue Ridge Province. B. Southern Section; BB. State Line Ridge. C. Paint Rock Bluff; CC. Top of Paint Rock Bluff, underlain by the Hampton Formation Sandstone.

CANOPY: Pinus strobus - Height 30', dbh 25.0", age not determined.
Pinus virginiana - Height 12', dbh 7.8", age not determined.

CANOPY DOMINANTS: Pinus virginiana, Pinus strobus, Mixed hardwoods.

CANOPY PHYSIOGNOMY: Medium, excurrent, evergreen trees.

Canopy Analysis

Species	# of stems	total basal area	Rel. Den.	Rel. Dom.	IV
Pinus virginiana	31	698.1	46.3	28.0	74.3
Pinus strobus	7	1237.8	10.4	49.6	60.0
Quercus prinus	12	360.5	17.9	14.4	32.3
Tsuga canadensis	8	85.5	11.9	3.4	14.3
Quercus rubra	4	79.2	6.0	3.2	9.2
Juniperus virginiana	4	21.2	6.0	0.8	6.8
Quercus marilandica	1	11.3	1.5	0.5	2.0

Plot size: 6.6 m x 60 m Total basal area: 2493.6 inches^2, 16,083.7 cm^2

CANOPY SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

SUBCANOPY DOMINANTS: None.

SUBCANOPY PHYSIOGNOMY: Not applicable.

SUBCANOPY SPECIES PRESENT IN PLOT: A presence list with cover estimates is given. Subcanopy present only in the more mesic, north-facing side of the ridge. Small trees and transgressives:

Acer rubrum	20%
Amelanchier arborea var. laevis	5%
Carya glabra	R
Ilex opaca	R
Quercus prinus	5%
Quercus rubra	10%
Stewartia ovata	R
Tsuga canadensis	10%

SUBCANOPY SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

SHRUB LAYER DOMINANTS: None.

SHRUB LAYER PHYSIOGNOMY: Not applicable.

Shrub Analysis

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S
Normal shrubs						
Buckleya distichophylla	H11	3.1	3.1	3.1	-	-
Kalmia latifolia	H11	-	5.1	-	-	-
Philadelphus hirsutus	H11	-	-	-	-	R.1
Rhododendron maximum	H11	-	-	3.1	-	-
Tall dwarf shrubs						
Leucothoe axillaris var. editorum	H11	-	-	1.2	-	2.1
Vaccinium stamineum	H11	2.1	-	2.1	-	-
Vaccinium vacillans	H11	-	2.1	-	-	2.1

Number of releves: 5 Releve size 3 m x 3 m

SHRUB SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None

VINE LAYER DOMINANTS: None.

VINE LAYER PHYSIOGNOMY: Not applicable.

VINE SPECIES PRESENT IN PLOT: Woody vine: Anisostichus capreolata. Herbaceous vine: Smilax rotundifolia.

HERB LAYER DOMINANTS: None.

HERB LAYER PHYSIOGNOMY: Not applicable.

Herb Analysis

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S
Medium forbs						
Campanula divaricata	H7	-	-	-	1.1	1.1
Coreopsis major	H7	-	-	+.1	-	-
Galax aphylla	H13	2.2	1.1	1.1	-	-
Solidago juncea	H7	-	-	-	1.1	-

Herb Analysis (continued)

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S
Small forbs						
Hieraceum venosum	H13	-	-	+.1	-	+.1
Houstonia longifolia	H7	-	-	-	1.1	+.1
Lechea minor	H8	-	-	+.1	-	-
Very small forb						
Mitchella repens	H11	1.1	+.1	+.1	-	-
Medium graminoids						
Andropogon scoparius	H8	-	-	-	2.2	1.1
Danthonia spicata	H8	-	-	+.1	+.1	+.1
Medium ferns						
Asplenium platyneuron	H11	-	-	-	-	R.1
Polypodium virginianum	H11	4.5	1.4	1.1	-	-
Small fern						
Cheilanthes tomentosa	H11	-	-	-	+.1	-
Small lichen						
Cladonia sp.	H8	+.1	+.1	5.5	-	-

Number of releves: 5 Releve size: 1 m x 1 m

HERB SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: Medium forbs: Gnaphalium obtusifolium, Houstonia purpurea, Lilium michauxii, Lysimachia quadrifolia. Small forbs: Epigaea repens, Oxalis stricta.

SEEDLINGS PRESENT IN PLOT: Amelanchier arborea var. laevis, Ilex opaca, Tsuga canadensis.

COMMUNITY REFERENCES: None.

COMMUNITY DOCUMENTATION: Area analyzed during the summer of 1981 by Dawson Sather, Botany Department, University of North Carolina at Chapel Hill. Specimens deposited at NCU.

COMMUNITY ECOLOGICAL CHARACTERIZATION: Vegetationally: Coniferalean-Mixed hardwoods terrestrial needleleaf forest system with an open canopy of medium, excurrent, evergreen trees, a sparse subcanopy of deciduous and evergreen trees, a sparse

shrub layer of mixed shrubs, and a sparse herb layer of mixed forbs, graminoids, ferns, and fruticose lichens. Climatically: Warm temperate, mesothermal climate: similar to the natural area and local climate of cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period, and cooler than the sectional climate of cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. Pedologically: Loamy-skeletal, mixed, mesic Lithic Udorthent of undetermined series. Geologically: Clastic, alluvially deposited, siliceous sandstones, siltstones, mudstones, and shales of the Early Cambrian Hampton Formation, horizontally bedded, exposed as a 70' bluff and outcrops. Hydrologically: Well-drained, permanently exposed, dry-mesic terrestrial system wetted by fresh rains. Topographically: Partly sheltered, south to southeast facing, nearly level top of a southwest-northeast running ridge of a water eroded mountain in a region of Low and High Mountains. Temporally and Spatially: A topoedaphic climax of a lithosere on a south-southeast facing slope, underlain by the Early Cambrian Hampton Formation, at Paint Rock on State Line Ridge in the Southern Section of the Blue Ridge Province of the Appalachian Highlands.

POPULATION LEVEL INVENTORY OF *BUCKLEYA DISTICHOPHYLLA* AT PLOT 1

1. Locality Reconnaissance

   1. Site was first visited in May, 1980. This species had been documented from a site on Paint Creek in Madison Co., NC, and a substantial population exists in Greene Co., TN.

   2. Further reconnaissance during the summer of 1981 showed that this site and Plot 2 were the best concentrations of the *Buckleya distichophylla* which occurs occasionally for several hundred meters along State Line Ridge.

2. Authentication of Species.

   1. This species is distinctive in several characteristics: its basal branching, the lenticel patterning on the stems, and the distichous arrangement of the leaves. A voucher specimen was collected for this site (Dawson Sather 1301).

3. Precise Location.

   1. See Appendix II for directions to Plot 1. Plot 1 runs for 40 meters along the ridge; this inventory of June 27,1981 incorporates the subpopulation of *Buckleya distichophylla* that is in Plot 1 and extends 25 meters further along

the ridge.

4. Land Inventory.

1. See Introduction.

5. Population Inventory.

1. Population Size.

Units recognized were clumps of stems emerging from a central location; distance between stems in a clump did not exceed 2 dm. A total of 25 units were counted in this subpopulation along this 60 meters of State Line Ridge.

2. Unit distribution.

The average distribution of units is 1 unit every 2.4 linear meters along the ridge.

3. Unit Demography.

At the time of this inventory, fruit on mature female shrubs was approximately 2 cm. long. 3 size classes, and a sexual division within the mature class, were recognized:

A. Less than 2 dm. tall, vegetative only.

B. 2-12 dm. tall, vegetative only.

C. 12 dm. tall and larger, vegetative only, assumed male.

D. 12 dm. and larger, with fruit, female.

Class percentages and actual number of units per class:

Class	Percent	Total # of Units Counted
A	16%	4
B	12%	3
C	48%	12
D	24%	6

4. Unit Phenology.

Fruiting or vegetative units were used in class designation; see Unit Demography.

6. Habitat Inventory.

1. Population Habitat.

1 -7, Vegetation - Physiography, see Plot 1 Analysis.

8. Disturbance Evidence.

No evidence of disturbance seen.

2. Extrapopulation Habitat. See Discussion of Plot 1.

7. Threat Inventory.

1. Actual Threats.

The top of Paint Rock bluff is visited by very few dayhikers. A small trail leads up the west side of the bluff, but impact on top is barely visible.

2. Potential Threats.

No threats foreseen except increased visitor use. The site is very easily reached on foot.

POPULATION LEVEL INVENTORY OF ARABIS LYRATA AT PLOT 1

1. Locality Reconnaissance.

1. No earlier records for this species at Paint Rock are documented. The species was seen during the analysis of Plot 1.

2. Authentication of Species.

1. Specimen was keyed in the field and a voucher (Dawson Sather 1479) was compared to herbarium sheets at NCU.

3. Precise Location.

See Appendix II for directions to Plot 1. From eastern end of plot 1 proceed several meters east along the ridge to a small saddle, then 20 meters southeast of this saddle is an outcrop approximately 25' high. The *Arabis lyrata* is scattered for several meters to the east, on the river side of this outcrop.

4. Land Inventory.

See Introduction.

5. Population Inventory.

1. Population Size.

Population units were individual rosettes, averaging 4 cm. in diameter. A total of 45 rosettes were counted.

2. Unit Distribution.

The population occupies an area roughly 4 meters in diameter (12.5 m^2). Population density is approximately 3.6 units/m^2.

3. Unit Demography.

Two classes were recognized:

A: Rosette, vegetative only.

B: Rosette with branch and fruit (all emergent branches were fruiting).

Class percentages and actual number of units per class:

Class	Percent	Total # of Units Counted
A	47%	21
B	53%	24

Demography.

5. Unit Biotic Interrelationships.

No biotic interrelationships observed.

6. Unit Vigor.

All individuals were vigorous; leaves were in good condition and free from predation. All individuals that had emergent branches had one or more siliques (average number of siliques per plant not determined).

6. Habitat Inventory.

1. Population Habitat.

Although this population is outside the limits of Plot 1, the overall habitat here is similar to Plot 1.

1. Vegetation - see Plot 1 Analysis
2. Climate - see Plot 1 Analysis
3. Soils.

The substrate for Arabis lyrata at this site is sand and organics accumulated in cracks and small pockets and small flats on the rocky surface of the ridge. Depth under the individuals varies from 1 mm. to 10 mm.; the pH is 4.5. Numerous similar microhabitats exist at this location along State Line Ridge, yet no other individuals of Arabis lyrata were found.

4. Geology.

The State Line Ridge here is composed of variously textured sedimentary rocks (see Plot 1 Analysis). The species is usually reported from base-rich outcrops. Application of HCL produced no evidence of carbonate cement in this outcrop.

5. Topography is not uniform, and can be described as piles of very large rocks weathered from the ridge.

6. Hydrology - see Plot 1 Analysis

7. Physiography - see Plot 1 Analysis

2. Extrapopulation Habitat.

See Plot 1 Discussion.

7. Threat Inventory

1. Actual Threats.

Negligible - very little visitor use to the area.

2. Potential threats

None foreseen.

COMMUNITY DIVERSITY SUMMARY 2

Plot 2, Polecat Hollow

Terrestrial needleleaf forest system — Pine slope

Medium, excurrent, evergreen trees — Coniferales-Fagales

PINUS VIRGINIANA-QUERCUS PRINUS

Pinus virginiana-Quercus prinus

CLIMATE: A. Mesothermal; AA. Warm temperate. B. Cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period; BB. Cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. C. Similar to local climate; CC. Similar to natural area climate.

SOILS: A. Inceptisol; AA. Ochrept. B. Dystrochrept; BB. Lithic Dystrochrept. CC. Coarse-loamy, mixed, mesic Lithic Dystrochrept. CC. Series not determined.

O hor.: 0-3 cm., black loam, pH 4.2.

A hor.: 3-6 cm., very dark grayish brown sandy loam, pH 4.0.

C hor.: 6-30 cm., pale brown loamy sand, pH 4.4.

GEOLOGY: A. Sedimentary; AA. Clastic. B. Siliceous; BB. Alluvial deposition. C. Hampton Formation sandstones, siltstones, mudstones, and shales; CC. Hampton Formation densely exposed as outcrops and boulders.

HYDROLOGY: A. Terrestrial; AA. Dry-mesic. B. Fresh; BB. Permanently exposed. C. Well drained; CC. Well drained, wetted by fresh rains and downslope drainage.

TOPOGRAPHY: A. Hills and Mountains; AA. Low and High Mountains. B. Water eroded mountain; BB. Water eroded ridge. C. Upper slope of ridge; CC. Partly sheltered, south-facing, steep, irregular upper slope of an east-west running ridge.

PHYSIOGRAPHY: A. Appalachian Highlands; AA. Blue Ridge Province. B. Southern Section; BB. State Line Ridge. C. Polecat Hollow; CC. Upper slope of Polecat Hollow, underlain by the Hampton Formation Sandstone.

CANOPY: Pinus virginiana - Height 20', dbh 9.5", age not determined.

Quercus prinus - Height 20', dbh 12.0", age not determined.

CANOPY DOMINANTS: Pinus virginiana, Quercus prinus.

CANOPY PHYSIOGNOMY: Medium, excurrent, evergreen trees.

Canopy Analysis

Species	# of stems	total basal area	Rel. Den.	Rel. Dom.	IV
Pinus virginiana	19	487.7	73	51	124
Quercus prinus	7	468.7	27	49	76

Plot size: 20 m x 20 m Total basal area: 956.4 inches^2, 6,168.8 cm.^{2}

CANOPY SPECIES PRESENT, BUT NOT IN ANALYSIS: None.

SUBCANOPY DOMINANTS: None.

SUNCANOPY PHYSIOGNOMY: Not applicable.

SUBCANOPY SPECIES PRESENT IN PLOT: The subcanopy here is sparse (barely 25% cover) and less than 12' tall. A presence list with the percent contribution of each species within that 25% cover is given:

Small trees and transgressives:

Acer rubrum	R
Amelanchier arborea var. laevis	15%
Carya pallida	R
Nyssa sylvatica	10%
Oxydendrum arboreum	5%
Pinus virginiana	10%
Quercus marilandica	R
Quercus prinus	15%
Quercus rubra	25%

SUBCANOPY SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

SHRUB LAYER DOMINANTS: None.

SHRUB LAYER PHYSIOGNOMY: Not applicable.

Shrub Analysis

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S
Normal shrub						
Buckleya distichophylla	H7	5.1	-	5.1	5.1	-

Shrub Analysis (continued)

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S
Tall dwarf shrubs						
Vaccinium vacillans	H11	1.2	+.1	-	1.2	-
Vaccinium stamineum	H11	-	-	-	-	5.5

Number of releves: 5 Releve size: 1 m x 1 m

SHRUB SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: Normal shrub: Kalmia latifolia.

VINE LAYER DOMINANTS: None.

VINE LAYER PHYSIOGNOMY: Not applicable.

VINE SPECIES PRESENT IN PLOT: Woody vine: Rhus radicans. Herbaceous vine: Smilax rotundifolia.

HERB LAYER DOMINANTS: None.

HERB LAYER PHYSIOGNOMY: Not applicable.

Herb Analysis

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S
Medium forbs						
Coreopsis major	H7	+.1	+.1	-	+.1	-
Solidago juncea	H7	+.1	+.1	R.1	1.2	-
Small forbs						
Hieraceum venosum	H13	+.1	-	-	+.1	R.1
Houstonia purpurea	H7	R.1	+.1	-	-	+.1
Medium graminoids						
Andropogon scoparius	H8	-	-	2.3	2.3	1.1
Panicum sp.	H8	-	+.1	R.1	-	-
Panicum sp.	H8	-	-	-	-	1.1

Number of releves: 5 Releve size: 1 m x 1 m

HERB SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: Medium forbs: Lespedeza sp., Pycnanthemum sp.. Small forbs: Clitoria mariana, Penstemon smallii. Medium graminoid: Danthonia spicata.

SEEDLINGS PRESENT IN PLOT: Fagus grandifolia, Pinus virginiana, Quercus falcata, Sassafras albidum.

COMMUNITY REFERENCES: None.

COMMUNITY DOCUMENTATION: Area analyzed during the summer of 1981 by Dawson Sather, Botany Department, University of North Carolina at Chapel Hill. Specimens deposited at NCU.

COMMUNITY ECOLOGICAL CHARACTERIZATION: Vegetationally: Coniferalean-Fagalean terrestrial needleleaf forest system with an open canopy of medium, excurrent, evergreen trees, a sparse subcanopy of deciduous and evergreen trees, a very sparse shrub layer of mixed shrubs, a very sparse vine layer of woody and herbaceous vines, and a very sparse herb layer of mixed forbs and graminoids. Climatically: Warm temperate, mesothermal climate: similar to the natural area and local climate of cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period, and cooler than the sectional climate of cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. Pedologically: Coarse loamy, mixed, mesic Lithic Dystrochrept of undetermined series. Geologically: Clastic, alluvially deposited, siliceous sandstones of the Hampton Formation, densely exposed as outcrops and boulders. Hydrologically: Well-drained, permanently exposed, dry-mesic terrestrial system wetted by fresh rains and downslope drainage. Topographically: Partly sheltered, south facing, steep upper slope of an east-west running ridge of a water eroded mountain in a region of Low and High Mountains. Temporally and Spatially: A seral stage of a lithosere on a south facing slope, underlain by the Early Cambrian Hampton Formation, at Polecat Hollow on State Line Ridge in the Southern Section of the Blue Ridge Province of the Appalachian Highlands.

POPULATION LEVEL INVENTORY OF BUCKLEYA DISTICHOPHYLLA AT PLOT 2

1. Locality Reconnaisance.

1. Exploration along State Line Ridge during the summer of 1981 showed that this site and Plot 1 were the best concentrations of Buckleya distichophylla ,

which occurs occasionally for several hundred meters along State Line Ridge.

2. Authentication of Species.

1. This species is distinctive in several characteristics: its basal branching, the lenticel patterning on the stems, and the distichous arrangement of the leaves. A voucher specimen was collected for this site (Dawson Sather 1301).

3. Precise Location.

1. See appendix II for directions to Plot 2.

4. Land Inventory.

1. See Introduction.

5. Population Inventory.

1. Population Size.

Units recognized were clumps of stems emerging from a central location; distance between stems in a clump did not exceed 2 dm. A total of 37 units were counted in this 20 m x 20 m subpopulation.

2. Unit Distribution.

The average distribution of units is approximately 1 per 10 square meters.

3. Unit Demography.

At the time of this inventory (June 24, 1981), fruit on mature female shrubs was approximately 2 cm. long. 3 size classes, and a sexual division within the mature class, were recognized:

A. Less than 2 dm. tall, vegetative only.

B. 2-12 dm. tall, vegetative only.

C. 12 dm. tall and larger, vegetative only, assumed male.

D. 12 dm. and larger, with fruit, female.

Class percentages and actual number of units per class:

Class	Percent	Total # of Units Counted
A	5.4%	2
B	16.2%	6
C	51.4%	19
D	27.0%	10

4. Unit Phenology.

Fruiting or vegetative units were used in class designation for Unit Demography.

5. Unit Biotic Interrelationships.

No biotic interrelationships were observed.

6. Unit Vigor.

All individuals were vigorous with the exception of one larger clump which bore 2 stems that were dead from the base. This same individual had seven other healthy stems.

6. Habitat Inventory.

1. Population Habitat.

See Plot 2 Analysis.

2. Extrapopulation Habitat.

See Plot 2 Discussion.

7. Threat Inventory.

1. Actual Threats.

None seen.

2. Potential Threats.

Timbering is a potential threat.

COMMUNITY DIVERSITY SUMMARY 3

Plot 3, Paint Rock *Polymnia* slope

Terrestrial broadleaf forest system

Medium and large, deliquescent, deciduous trees

Oak-maple slope

Canopy: *Carya cordiformis*

Fagalean-Sapindalean-Mixed Hardwoods/Sapindalean-Fagalean-Mixed Hardwoods///Mixed forbs, graminoids, and ferns.

QUERCUS RUBRA-ACER SACCHARUM-MIXED HARDWOODS/ACER SACCHARUM-OSTRYA VIRGINIANA-MIXED HARDWOODS///MIXED FORBS, GRAMINOIDS, & FERNS

Quercus rubra-Acer saccharum-Mixed hardwoods

CLIMATE: A. Mesothermal; AA. Warm temperate. B. Cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period; BB. Cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. C. Similar to local climate; CC. Similar to natural area climate.

SOILS: A. Entisol; AA. Orthent. B. Udorthent; BB. Typic Udorthent. C. Loamy-skeletal, mixed, mesic Typic Udorthent; CC. Series not determined.

A hor.: 0-4 cm., very dark grayish brown sandy loam filling interstices between fist-sized talus, pH 5.8.

B hor.: 4-26 cm., yellowish brown loamy sand filling interstices between fist sized talus, pH 5.6.

Talus firm packed past 26 cm.

GEOLOGY: A. Sedimentary; AA. Clastic. B. Siliceous; BB. Alluvial deposition. C. Hampton Formation Sandstone; CC. Hampton Formation Sandstones exposed as talus boulders of fine grained to quartz sandstones.

HYDROLOGY: Terrestrial; AA. Dry-mesic. B. Fresh; BB. Permanently exposed. C. Well drained; CC. Well drained, wetted by fresh rains and downslope drainage.

TOPOGRAPHY: A. Hills and Mountains; AA. Low and High Mountains. B. Water eroded mountain; BB. Water eroded ridge. C. Base of water eroded ridge; CC. Partly sheltered, south to southwest facing, moderately steep, irregular base of a southwest-northeast running ridge.

PHYSIOGRAPHY: A. Appalachian Highlands; AA. Blue Ridge Province. B. Southern

Section; BB. State Line Ridge. C. Paint Rock Bluff; CC. Base of Paint Rock Bluff, underlain by the Hampton Formation Sandstone.

CANOPY: Quercus rubra - Height 45', dbh 21.0", age not determined.
Acer saccharum - Height 30', dbh 8.2", age not determined.

CANOPY DOMINANTS: Quercus rubra, Acer saccharum, Mixed hardwoods

CANOPY PHYSIOGNOMY: Medium and large, deliquescent, deciduous trees.

Canopy Analysis

Species	# of stems	total basal area	Rel. Den.	Rel. Dom.	IV
Quercus rubra	7	1073.4	30.4	59.6	90.0
Acer saccharum	9	252.0	39.1	14.0	53.1
Carya cordiformis	5	368.4	21.7	20.4	42.1
Quercus alba	1	70.9	4.3	3.9	8.2
Quercus prinus	1	38.5	4.3	2.1	6.4

Plot size: 20 m x 20 m Total basal area: 1,803.2 in^2, 13,433.8 $cm.^2$

CANOPY SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

SUBCANOPY DOMINANTS: Acer saccharum, Ostrya virginiana.

SUBCANOPY PHYSIOGNOMY: Small and medium deliquescent, deciduous trees and transgressives.

Subcanopy Analysis

Species	# of stems	total basal area	Rel. Den.	Rel. Dom.	IV
Acer saccharum	11	26.0	52.4	20.7	73.1
Ostrya virginiana	6	53.2	28.6	42.4	71.0
Cornus florida	1	26.4	4.7	21.0	25.0
Carya cordiformis	2	18.8	9.5	15.0	24.5
Fraxinus americana	1	1.0	4.7	0.6	5.3

Plot size: 20 m x 20 m Total basal area: 125.4 $in.^2$, 808.8 $cm.^2$

SUBCANOPY SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: Diospyros virginiana, Prunus serotina, Ulmus alata, Ulmus rubra.

SHRUB LAYER DOMINANTS: None.

SHRUB LAYER PHYSIOGNOMY: Not applicable.

SHRUB SPECIES PRESENT IN PLOT: Normal shrubs: Viburnum acerifolium. Typical dwarf shrubs: Ceanothus americanus, Euonymus americanus.

VINE LAYER DOMINANTS: None.

VINE LAYER PHYSIOGNOMY: Not applicable.

Vine Analysis

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S
Woody vines						
Anisostichus capreolata	H16	+.1	-	-	-	-
Campsis radicans	H16	+.1	-	-	-	-
Lonicera japonica	H19	-	-	+.1	-	-
Parthenocissus quinquefolia	H18	-	+.1	+.1	+.1	-
Herbaceous vines						
Amphicarpa bracteata	H18	-	-	-	-	+.1

Number of releves: 5 Releve size: 1 m x 1 m

VINE SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

HERB LAYER DOMINANTS: None.

HERB LAYER PHYSIOGNOMY: Not applicable.

Herb Analysis: Continued.

Herb Analysis

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S
Tall forbs						
Aster acuminatus	H7	1.1	-	-	+.1	R.1
Cacalia atriplicifolia	H7	R.1	-	-	-	-
Desmodium sp.	H7	R.1	+.1	-	2.1	+.1
Helianthus microcephalus	H7	-	-	+.1	-	-
Monarda clinopodia	H7	-	+.1	-	-	+.1
Uvularia perfoliata	H7	+.1	-	-	-	-
Medium forbs						
Arabis laevigata	H7	-	R.1	-	-	-
Aster divaricatus	H7	-	-	R.1	-	-
Commelina virginica	H11	-	-	+.1	-	-
Galium triflorum	H7	-	-	+.1	-	-
Heuchera americana	H7	-	R.1	-	-	-
Smilacina racemosa	H11	+.1	-	R.1	R.1	-
Thalictrum dioicum	H7	+.1	-	-	-	-
Zizia trifoliata	H7	-	R.1	-	-	-
Medium graminoids						
Carex pennsylvanica var. distans	H8	+.1	+.1	-	+.1	-
Panicum sp.	H8	-	+.1	-	-	-
Large fern						
Polystichum acrostichoides	H11	-	-	-	R.1	-
Medium fern						
Asplenium platyneuron	H11	-	R.1	-	-	R.1

Number of releves: 5 Releve size: 1 m x 1 m

HERB SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: Tall forbs: *Verbesina alternifolia*. Medium forbs: *Hydrophyllum virginianum*, *Lactuca floridana*, *Scrophularia marilandica*. Small forb: *Saxifraga* sp.

SEEDLINGS PRESENT IN PLOT: *Acer saccharum*, *Carya* sp., *Cornus florida*, *Ostrya virginiana*, *Quercus rubra*, *Pinus strobus*, *Prunus serotina*.

Analysis of East Ravine

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S
Sapling						
Ulmus rubra		-	-	R.1	-	-
Woody vines						
Campsis radicans	H16	3.1	-	-	-	2.1
Lonicera japonica	H19	5.1	5.1	2.1	2.1	5.1
Parthenocissus quinquefolia	H18	3.1	+.1	-	-	-
Herbaceous vine						
Amphicarpa bracteata	H19	-	+.1	-	-	-
Tall forb						
Polymnia canadensis	H7	-	2.1	2.1	2.1	3.1

OTHER SPECIES PRESENT, BUT NOT IN ANALYSIS: None.

Analysis of West Ravine

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S
Sapling						
Ulmus rubra		R.1	-	-	-	R.1
Woody vines						
Anisostichus capreolata	H16	-	-	-	R.1	R.1
Campsis radicans	H16	-	2.1	-	-	-
Lonicera japonica	H19	-	-	-	R.1	2.1
Parthenocissus quinquefolia	H18	1.1	2.1	-	-	-
Vitis rotundifolia	H18	3.1	-	-	-	-
Herbaceous vines						
Amphicarpa bracteata	H19	-	-	-	-	R.1
Menispermum canadense	H19	-	-	-	R.1	2.1
Tall forb						
Polymnia canadensis	H7	5.1	3.1	3.1	1.1	2.1

Analysis of West Ravine (continued)

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S
Medium forbs						
Arisaema triphyllum	H7	-	-	-	R.1	-
Hybanthus concolor	H7	-	-	-	+.1	-
Pilea pumila	H7	-	-	+.1	+.1	-
Small forb						
Hydrophyllum virginianum	H7	1.1	-	+.1	2.1	-
Small graminoid						
Microstegium vimineum	H8	-	-	-	-	+.1

OTHER SPECIES PRESENT, BUT NOT IN ANALYSIS: None.

COMMUNITY REFERENCES: None.

COMMUNITY DOCUMENTATION: Area analyzed during the summer of 1981 by Dawson Sather, Botany Department, University of North Carolina at Chapel Hill. Specimens deposited at NCU.

COMMUNITY ECOLOGICAL CHARACTERIZATION: Vegetationally: Fagalean-Sapindalean-Mixed hardwoods/Sapindalean-Fagalean-Mixed hardwoods///Mixed forbs, graminoids, and ferns terrestrial broadleaf forest system with a closed canopy of medium and large, deliquescent, deciduous trees, a closed subcanopy of small and medium, deliquescent, deciduous trees and transgressives, a very sparse shrub layer of mixed shrubs, a sparse vine layer of woody and herbaceous vines, and a closed herb layer of mixed forbs, graminoids, and ferns. Climatically: Warm temperate, mesothermal climate: similar to the natural area and local climate of cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period, and cooler than the sectional climate of cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. Pedologically: Loamy-skeletal, mixed, mesic Typic Udorthent of undetermined series. Geologically: Clastic, alluvially deposited, siliceous, fine grained to quartz sandstones of the Early Cambrian Hampton Formation, exposed as talus boulders. Hydrologically: Well-drained, permanently exposed, dry mesic, terrestrial broadleaf forest system wetted by fresh

rains and downslope drainage. Topographically: Partly sheltered, south to southwest facing, moderately steep, irregular base of a southwest-northeast running ridge of a water eroded mountain in a region of Low and High Mountains. Temporally and Spatially: A seral stage of a lithosere on a south to southwest facing slope, underlain by the early Cambrian Hampton Formation, at Paint Rock on State Line Ridge in the Southern Section of the Blue Ridge Province of the Appalachian Highlands.

POPULATION LEVEL INVENTORY OF *POLYMNIA CANADENSIS* AT PLOT 3

1. Locality Reconnaissance.

   1. Site was first visited in May, 1980. The species had been previously documented from the French Broad Valley at Hot Springs.

   2. Further reconnaissance in 1981 showed that the talus ravines below Paint Rock are prime habitat for *Polymnia canadensis*.

2. Authentication of Species.

   1. Herbarium specimens were studied before field visits; a voucher specimen (Dawson Sather 1918) was collected.

3. Precise Location.

   See Appendix II for directions to Plot 3. The concentrations of *Polymnia canadensis* occur in the talus ravines on the east and west edges of the 20m x 20m area of Plot 3.

4. Land Inventory.

   1. See Introduction.

5. Population Inventory.

   1. Population Size.

      Individual plants were recognized as units, determined by emergence of one to several stems from a common root. In the east ravine, a total of 57 units were counted; the number was 64 in the west ravine.

   2. Unit Distribution.

      The average distribution of units in the two ravines is 1 per 3 1/2 square meters.

   3. Unit Demography.

      At the time of this inventory (July 29, 1981) the species was near its peak of flowering. Two size classes were recognized, and a distinction made between those units which were purely vegetative and those which had one or more inflorescences present:

A. Individual plants, less than 2 dm. tall, vegetative only.

B. Individual plants, more than 2 dm. tall, vegetative only.

C. Individual plants, more than 2 dm. tall, with one or more inflorescences present, or buds formed.

Class percentages and actual number of units per class:

	Class	Percent	Total # of Units Counted
East Ravine:	A	17.5%	10
	B	15.8%	9
	C	66.7%	38
West Ravine:	A	29.7%	19
	B	21.8%	14
	C	48.4%	31

4. Unit Phenology.

Flowering or vegetative units were used in class designation for Unit Demography.

5. Unit Biotic Interrelationships.

No Biotic interrelationships observed.

6. Unit Vigor.

The majority of the units were robust on the talus ravines. No evidence of predation was seen.

6. Habitat Inventory.

1. Population Habitat.

1. Vegetation - see Plot 3 analysis, east and west ravines.
2. Climate - see Plot 3 analysis.
3. Soils.

The soil in the ravines that support the largest concentrations of Polymnia canadensis consists of dark organic matter, pH 6.6, adhering to the talus. This organic matter lays on those cobble surfaces that are nearly level, leaving open much of the area between the rocks. The roots of Polymnia canadensis rarely descend more than 10 cm into the jumbled ravine substrate, but grow laterally along the thin spots of soil.

4. Geology.

The talus is composed of fine grained to quartz sandstones, varying in size from approximately fist size to football size.

5. Hydrology.

Drainage through the top portion of the loose talus is excessive, but the soil ahering to the rocks was moist, even during the dry summer of 1981.

6. Topography.

The talus filled ravines below Paint Rock Bluff are approximately 10 meters wide, and run from the bluff to CR 1304. The area gently undulates from ravine to shelf to ravine, etc., for approximately 300 meters along the road. The best defined ravines, and also the highest concentrations of Polymnia canadensis, are near Plot 3.

7. Physiography - see Plot 3 analysis.

2. Extrapopulation Habitat.

See Plot 3 discussion.

7. Threat Inventory.

1. Actual threats.

Although the populations of Polymnia canadensis descend to the roadside, disruption of the substrate by human clambering seems unlikely. A more real threat is the possibility of timbering; an area of Polecat Hollow, 400 meters upstream from these populations, was cut in 1978.

2. Potential threats.

Aside from possible logging, the only foreseeable major threat would be an enlargement of CR 1304.

COMMUNITY DIVERSITY SUMMARY 4

Plot 4, Jack Branch *Draba* slope

Terrestrial broadleaf forest system
Medium, deliquescent trees

Oak slope
Canopy: *Carya glabra*
Fagales-mixed hardwoods

QUERCUS RUBRA-QUERCUS PRINUS-MIXED HARDWOODS

Quercus rubra-Quercus prinus-mixed hardwoods

CLIMATE: A. Mesothermal; AA. Warm temperate. B. Cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period; BB. Cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. C. Similar to local climate; CC. Similar to natural area climate.

SOILS: A. Entisol; AA. Orthent. B. Udorthent; BB. Typic Udorthent. C. Sandy-skeletal, mixed, mesic, non-acidic Typic Udorthent. CC. Series not determined.

A hor.: 0-8 cm., dark brown loamy sand, pH 5.6

C hor.: 8-50+ cm., yellowish red sandy loam intermixed with chips of slate (chips 77% by weight), pH. 5.8

GEOLOGY: A. Metamorphic; AA. Metasedimentary. B. Siliceous; BB. Alluvial deposition. C. Interbedded slates and partially metamorphosed mudstones of the Unicoi Formation. CC. Interbedded slates and partially metamorphosed mudstones of the Unicoi Formation sparsely exposed as outcrops, striking S 60°E and dipping S 190°W.

HYDROLOGY: A. Terrestrial; AA. Dry-mesic. B. Fresh; BB. Permanently exposed. C. Well-drained; CC. Well-drained, wetted by fresh rains and downslope drainage.

TOPOGRAPHY: A. Hills and Mountains; AA. Low and High Mountains. B. Water-eroded mountain; BB. Water-eroded slope. C. Partly sheltered, south facing, convex, irregular lower slope of State Line Ridge; CC. Partly sheltered, south-southeast-facing, steep to very steep, convex irregular lower slope of State Line Ridge.

PHYSIOGRAPHY: A. Appalachian Highlands; AA. Blue Ridge Province. B. Southern Section; BB. State Line Ridge. C. Lower slope of State Line Ridge; CC. Lower south-southest slope of State Line Ridge, underlain by the Lower

Cambrian Unicoi Formation.

CANOPY: Quercus rubra - Height 20', dbh 12.4", age not determined.
Quercus prinus - Height 20', dbh 9.2, age not determined.

CANOPY DOMINANTS: Quercus rubra, Quercus prinus.

CANOPY PHYSIOGNOMY: Medium, deliquescent trees.

Canopy Analysis

Species	# of stems	total basal area	Rel. Den.	Rel. Dom.	IV
Quercus rubra	12	391.3	37.5	40.2	77.7
Quercus prinus	9	301.8	28.1	31.0	59.1
Carya glabra	5	94.1	15.6	9.7	25.3
Carya ovalis	3	42.4	9.4	4.4	13.8
Fraxinus americana var. biltmoreana	2	63.0	6.3	6.5	12.8
Juniperus virginiana	1	80.1	3.1	8.2	11.3

Plot size: 20 m x 20 m Total basal area: 972.7 in^2, 7246.6 cm^2

CANOPY SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

SUBCANOPY: No well developed subcanopy present; only a species list completed:
Small trees and transgressives:
Cercis canadensis, Cornus florida, Carya glabra, Carya ovalis, Robinia pseudo-acacia, Sassafras albidum.

SUBCANOPY SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

SHRUB LAYER DOMINANTS: None.

SHRUB LAYER PHYSIOGNOMY: Not applicable.

Shrub Analysis

Species	GF	$C^1_{\cdot}S$	$C^2_{\cdot}S$	$C^3_{\cdot}S$	$C^4_{\cdot}S$	$C^5_{\cdot}S$
Normal shrubs						
Philadelphus hirsutus	H7	1.1	-	-	-	-

Shrub Analysis (continued)

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S
Normal shrubs						
Viburnum acerifolium	H7	-	1.1	-	-	1.1
Tall dwarf shrub						
Vaccinium stamineum	H11	1.1	-	2.2	-	-
Typical dwarf shrub						
Ceanothus americanus	H7	-	-	-	+.1	-

Number of releves: 5 Releve size: 1 m x 1 m

SHRUB SPECIES IN PLOT, BUT NOT IN ANALYSIS: None.

VINE LAYER DOMINANTS: None.

VINE LAYER PHYSIOGNOMY: Not applicable.

VINE SPECIES PRESENT IN PLOT: Woody vines: Parthenocissus quinquefolia, Rhus radicans, Vitis baileyana, Vitis rotundifolia. Herbaceous vines: Menispermum canadense, Smilax bona-nox.

HERB LAYER DOMINANTS: None.

HERB LAYER PHYSIOGNOMY: Not applicable.

Herb Analysis

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S
Tall forbs						
Amsonia tabernaemontana	H7	-	-	-	1.1	-
Helianthus divaricatus	H11	-	-	-	-	R.1
Scrophularia marilandica	H7	-	-	R.1	-	-
Silene stellata	H7	-	-	-	+.1	-
Vicia angustifolia	H7	-	-	-	-	+.1
Medium forbs						
Arabis laevigata	H14	-	-	R.1	-	-

Herb Analysis (continued)

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S
Medium forbs						
Aster divaricatus	H11	1.2	-	-	+.1	+.1
Asclepias tuberosa	H7	-	-	R.1	+.1	-
Commelina virginica	H11	-	+.1	-	-	-
Houstonia purpurea	H7	-	-	-	-	+.1
Silene virginica	H7	-	-	-	-	+.1
Solidago juncea	H11	+.1	-	-	-	-
Tradescantia subaspera	H11	+.1	-	-	-	-
Small forbs						
Campanula divaricata	H7	-	1.1	-	-	-
Draba ramosissima	H14	+.1	+.1	+.1	-	-
Very small forb						
Opuntia humifusa	H15	-	R.1	-	-	-
Tall graminoid						
Andropogon scoparius	H8	-	1.2	+.1	-	-
Small graminoids						
Carex sp.	H8	R.1	-	-	-	-
Panicum sp.	H8	-	-	-	+.1	+.1
Medium fern						
Asplenium platyneuron	H11	-	-	-	R.1	R.1
Small ferns						
Cheilanthes tomentosa	H11	-	R.1	2.1	-	-
Polypodium polypodioides	H11	1.2	1.1	+.1	-	-

Number of releves: 5 Releve size: 1 m x 1 m

HERB SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: Tall forb: Astragalus canadensis. Medium forbs: Clitoria mariana, Heuchera americana, Hieraceum venosum, Penstemon smallii, Taenidia integerrima. Small forbs: Antennaria plantaginifolia, Desmodium sp., Galium pilosum. Medium graminoids: Danthonia spicata. Medium fern: Woodsia obtusa.

SEEDLINGS PRESENT IN PLOT: Carya tomentosa, Celtis occidentalis, Cercis canadensis, Fraxinus americana var. biltmoreana, Pinus echinata, Robinia pseudo-acacia, Sassafras albidum.

COMMUNITY REFERENCES: None.

COMMUNITY DOCUMENTATION: Area analyzed during the summer of 1981 by Dawson Sather, Botany Department, University of North Carolina at Chapel Hill. Specimens deposited at NCU.

COMMUNITY ECOLOGICAL CHARACTERIZATION: Vegetationally: Fagalean-mixed hardwoods terrestrial broadleaf forest system with a closed canopy of medium, deliquescent, deciduous trees, a sparse subcanopy of small, deliquescent trees and transgressives, a sparse shrub layer of mixed shrubs, and a sparse herb layer of mixed forbs, graminoids, and ferns. Climatically: Warm temperate, mesothermal climate: similar to the natural area and local climate of cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period, and cooler than the sectional climate of cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. Pedologically: Sandy-skeletal, mixed, mesic, non-acidic Typic Udorthent of undetermined series. Geologically: Metasedimentary, alluvially deposited slate and partially metamorphosed mudstones of the Unicoi Formation, sparsely exposed as outcrops, striking S 60°E and dipping S 190°W. Hydrologically Well-drained, permanently exposed, dry-mesic terrestrial system wetted by fresh rains and downslope drainage. Topographically: Partly sheltered, south-southeast-facing, steep to very steep, convex, irregular lower slope of a south-facing slope of a water eroded mountain in a region of Low and High Mountains. Temporally and Spatially: A seral stage of a lithosere on a south-facing slope, underlain by the Unicoi Formation, west of Jack Branch on State Line Ridge in the Southern Section of the Blue Ridge Province of the Appalachian Highlands.

POPULATION LEVEL INVENTORY OF DRABA RAMOSISSIMA AT PLOT 4

1. Locality Reconnaissance.

   1. Site was visited during the summer of 1981. The species had been reported from both sides of the French Broad River below Hot Springs.

2. Authentication of Species.

1. Herbarium sheets at NCU were examined before fieldwork was begun. A voucher specimen (Dawson Sather 1462) was collected.

3. Precise Location.

See Appendix II for directions to Plot 4. The Draba ramosissima is concentrated at the upslope eastern edge of the plot. For population analysis, a strip 10 meters wide was added to the eastern edge of the 20m x 20m plot.

4. Land Inventory.

See Introduction.

5. Population Inventory.

1. Population Size.

Units recognized were individual rosettes. A total of 61 units were counted in this 20m x 30m area.

2. Unit Distribution.

The majority of the units are clustered at the eastern side; density here was estimated at 1 unit per 4 m^2, though the units often clumped together.

3. Unit Demography.

There was much gradation in the size of the rosettes, but no distinction was made on the basis of size, since several of the smallest rosettes were fruiting. Two classes were recognized:

A. Inidividual rosettes, purely vegetative.

B. Individual rosettes, fruiting.

Class percentages and actual number of units per class:

Class	Percent	Total number of Units Counted
A	69%	42
B	31%	19

4. Unit Phenology.

Fruiting or vegetative units were used in class designation for Unit Demography.

5. Unit Biotic Interrelationships.

None observed.

6. Unit Vigor

Although there was a large range in the size of the rosettes, none showed evidence of predation.

6. Habitat Inventory.
   1. Population Habitat.
      1. Vegetation - See Plot 4 analysis.
      2. Climate - See Plot 4 analysis.
      3. Soils.

         The substrate for the Draba ramosissima is small, superficial pockets of soil developed in cracks of the outcrops. The pH of this soil averaged 6.2.

      4. Geology.

         Variable metamorphosis has occurred along this area of Paint Rock Road, and the less metamorphosed areas have eroded slightly more than the slates. The resulting topography is a series of long outcrops trending downslope with ravines in between. The Draba ramosissima, which occurs sporadically on circumneutral substrate throughout the gorge, is most concentrated on these harder slate outcrops where soil development is minimal.

      5. Hydrology - See Plot 4 analysis.
      6. Topography - See Plot 4 analysis.
      7. Physiography - See Plot 4 analysis.
   2. Extrapopulation Habitat.

      See Plot 4 Discussion.
7. Threat Inventory.
   1. Actual Threats.

      None.
   2. Potential threats.

      Logging of timber along these steep slopes could easily disrupt the substrate.

COMMUNITY DIVERSITY SUMMARY 5

Plot 5, Jack Branch *Thaspium* slope

Terrestrial broadleaf forest system
Medium, deliquescent, deciduous trees

Walnut-Oak slope
Canopy: *Ulmus rubra*
Juglandales-Fagales/Urticales-mixed hardwoods//mixed forbs, graminoids, and ferns

JUGLANS NIGRA-QUERCUS RUBRA/ULMUS ALATA-MIXED HARDWOODS// MIXED FORBS, GRAMINOIDS, & FERNS

Juglans nigra-Quercus rubra

CLIMATE: A. Mesothermal; AA. Warm temperate. B. Cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period; BB. Cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. C. Similar to local climate; CC. Similar to natural area climate.

SOILS: A. Inceptisol; AA. Ochrept. B. Dystrochrept; BB. Typic Dystrochrept. C. Loamy, mixed, mesic; CC. Loamy, mixed, mesic, Typic Dystrochrept.

A hor.: 0-15 cm., dark reddish brown loam, pH 7.0

B hor.: 15-71+ cm., dark reddish brown loamy sand, pH 6.8

GEOLOGY: A. Sedimentary: AA. Clastic. B. Siliceous; BB. Alluvial deposition. C. Unicoi Sandstone Formation; CC. Unicoi sandstones to fine siltstones, present as saprolite and small cobbles on surface.

HYDROLOGY: A. Terrestrial; AA. Dry-mesic. B. Fresh; BB. Permanently exposed. C. Well-drained; CC. Well-drained, wetted by fresh rains and downslope drainage.

TOPOGRAPHY: A. Hills and Mountains. AA. Low and High Mountains. B. Water-eroded mountain; BB. Water-eroded slope. C. Partly sheltered, southeast-facing, concavoconvex, irregular lower slope of State Line Ridge; CC. Partly sheltered, southeast-facing, moderately steep to steep lower slope of State Line Ridge.

PHYSIOGRAPHY: A. Appalachian Highlands; AA. Blue Ridge Province. B. Southern Section; BB. State Line Ridge. C. Lower slope of State Line Ridge; CC. Lower southeast facing slope of State Line Ridge, underlain by the Lower Cambrian Unicoi Sandstone Formation.

CANOPY: Juglans nigra - Height 25', dbh 16.5", age not determined.
Quercus rubra - Height 38', dbh 23.0", age not determined.
CANOPY DOMINANTS: Juglans nigra, Quercus rubra.
CANOPY PHYSIOGNOMY: Medium, deliquescent, deciduous trees.

Canopy Analysis

Species	# of stems	total basal area	Rel. Den.	Rel. Dom.	IV
Juglans nigra	4	595.6	40.0	44.0	84.0
Quercus rubra	2	497.2	20.0	37.0	57.0
Ulmus rubra	2	111.7	20.0	8.2	28.2
Carya glabra	1	103.9	10.0	7.7	17.7
Carya tomentosa	1	47.8	10.0	3.5	13.5

Plot size: 20 m x 20 m Total basal area: 1356.2 in^2, 8868.2 $cm.^2$
CANOPY SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

SUBCANOPY: Ulmus alata - Height 14', dbh 6.4", age not determined.
SUBCANOPY DOMINANTS: Not applicable.
SUBCANOPY PHYSIOGNOMY: Not applicable.

Subcanopy analysis

Species	# of stems	total basal area	Rel. Den	Rel. Dom.	IV
Ulmus alata	6	125.2	15.3	36.6	51.9
Cercis canadensis	12	27.5	30.7	8.0	38.7
Fraxinus americana var. biltmoreana	4	79.1	10.3	23.1	33.4
Halesia carolina	4	38.1	10.3	11.1	21.4
Ostrya virginiana	4	32.5	10.3	9.5	19.8
Quercus muehlenbergii	4	13.9	10.3	4.0	14.3
Cornus florida	2	12.1	5.1	3.5	8.6

Subcanopy analysis (continued)

Species	# of stems	total basal area	Rel. Den.	Rel. Dom.	IV
Celtis laevigata	1	8.0	2.6	2.3	4.9
Carpinus caroliniana	1	4.5	2.6	1.3	3.9
Quercus prinus	1	1.0	2.6	0.3	2.9

SUBCANOPY SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

SHRUB LAYER DOMINANTS: None.

SHRUB LAYER PHYSIOGNOMY: Not applicable.

SHRUB ANALYSIS: Only a species list completed: Euonymus americanus.

VINE LAYER DOMINANTS: None.

VINE LAYER PHYSIOGNOMY: Not applicable.

Vine analysis

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S
Woody vines						
Lonicera japonica	H19	+.1	-	-	-	1.1
Parthenocissus quinquefolia	H16	-	-	-	-	R.1
Herbaceous vines						
Clematis viorna	H19	-	R.1	-	-	-
Smilax bona-nox	H18	-	-	-	-	R.1

Number of releves: 5 Releve size: 1 m x 1 m

VINE SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: Matelea obliqua.

HERB LAYER DOMINANTS: None.

HERB LAYER PHYSIOGNOMY: Not applicable.

Herb analysis

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S
Very tall forb						
Thaspium pinnatifidum	H7	-	-	1.1	3.1	1.1
Tall forbs						
Campanula americana	H7	+.1	-	-	-	R.1
Eupatorium rugosum	H7	+.1	1.1	R.1	+.1	+.1
Geum canadense	H7	-	+.1	+.1	+.1	+.1
Tradescantia subaspera	H7	R.1	+.1	R.1	-	-
Medium forbs						
Galium circaezans	H7	+.1	-	+.1	+.1	+.1
Galium triflorum	H7	-	+.1	-	-	-
Phryma leptostachya	H7	-	-	+.1	-	+.1
Sanicula canadensis	H7	-	-	-	+.1	-
Senecio aureus	H7	-	-	1.1	-	-
Tovara virginiana	H7	-	1.1	-	-	-
Small forbs						
Conopholis americana	H13	+.1	-	-	-	-
Sanguinaria canadensis	H11	-	-	-	+.1	R.1
Viola sp.	H7	-	-	-	R.1	-
Medium graminoid						
Panicum anceps	H8	+.1	-	1.1	+.1	-
Small graminoids						
Carex plantaginea	H8	1.1	-	-	-	-
Carex sp.	H8	-	+.1	+.1	+.1	R.1
Microstegium vimineum	H8	-	-	-	-	3.1
Medium fern						
Asplenium platyneuron	H11	-	R.1	R.1	-	-

Number of releves: 5 Releve size: 1 m x 1 m

HERB SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: Very tall forbs: *Cimicifuga racemosa*, *Astragalus canadensis*. Tall forbs: *Asclepias tuberosa*, *Lactuca floridana*. Medium forbs: *Commelina virginica*, *Desmodium glutinosum*, *Erigeron*

canadensis, Heuchera longiflora, Monarda clinopodia, Penstemon smallii. Tall graminoid: Bromus purgans. Medium fern: Woodsia obtusa.

SEEDLINGS PRESENT IN PLOT: Carya sp., Celtis laevigata, Cercis canadensis, Fraxinus americana var. biltmoreana, Prunus serotina, Quercus rubra, Sassafras albidum.

COMMUNITY REFERENCES: None.

COMMUNITY DOCUMENTATION: Area analyzed during the summer of 1981 by Dawson Sather, Botany Department, University of North Carolina at Chapel Hill. Specimens deposited at NCU.

COMMUNITY ECOLOGICAL CHARACTERIZATION: Vegetationally: Juglandalean-Fagalean/Urticalean-mixed hardwood terrestrial broadleaf forest system with a closed canopy of medium, deliquescent, deciduous trees, a closed subcanopy of small, deliquescent, deciduous trees, a sparse vine layer of mixed vines, and a closed herb layer of very tall to very small mixed forbs, graminoids, and ferns. Climatically: Warm temperate, mesothermal climate: similar to the natural area and local climate of cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period, and cooler than the sectional climate of cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. Pedologically: Loamy, mixed, mesic Typic Dystrochrept of undetermined series. Geologically: Clastic, alluvially deposited, siliceous sandstones to siltstones of the Unicoi Sandstone Formation, present as saprolite and small cobbles on the surface. Hydrologically: Well-drained, permanently exposed, dry mesic terrestrial system, wetted by fresh rains and downslope drainage. Topographically: Partly sheltered, southeast-facing, moderately steep to steeply sloping irregular lower slope of a southeast-facing slope of a water eroded mountain in a region of Low and High Mountains. Temporally and Spatially: A topoedaphic climax of a lithosere on a southeast-facing slope, underlain by the Unicoi Sandstone Formation, east of Jack Branch on State Line Ridge in the Southern Section of the Blue Ridge Province of the Appalachian Highlands.

POPULATION LEVEL INVENTORY OF THASPIUM PINNATIFIDUM AT PLOT 5

1. Locality Reconnaissance.

   1. Site was first visited during the summer of 1981. Further reconnaisaance showed that this site was the only location for this species on public lands.

Attempts to locate two other reported sites were not effective (a- Steven W. Leonard 2460, NCU 343380, "along railroad, 2 mi. south of Hot Springs"; b- Site report of presence of Thaspium pinnatifidum on Huff Island, Wickland and Horton 1978.).

2. Authentication of Species.

Specimens at NCU were examined before visiting site. A voucher specimen (Dawson Sather 1298) was collected.

3. Precise Location.

See Appendix II for directions to Plot 5. The population of Thaspium pinnatifidum is centered here and individuals are found in a radius of several dozen meters around the plot. There is also a population in a mesic ravine approximately 0.1 mile upstream from plot 5, on private land, along CR 1304.

4. Land Inventory.

See Introduction.

5. Population Inventory.

1. Population Size.

Units recognized were single plants, each emergent from its own root system. A total of 255 units were counted in this 20m x 20m area.

2. Unit distribution.

Average distribution of units is approximately 1 unit per 1.6 m^2.

3. Unit Demography.

The species was in fruit at the time of this inventory (June 22, 1981). Two size classes were recognized, and a distinction was made between fruiting and purely vegetative units.

A. Less than 10 cm tall, purely vegetative.

B. More than 10 cm tall, purely vegetative.

C. More than 10 cm tall, fruit present.

Class percentages and actual number of units per class:

Class	Percent	Total # of Units Counted
A	17.2%	44
B	51.4%	131
C	31.4%	80

4. Unit Phenology.

Fruiting or vegetative units were used in class designation in Unit Demography.

5. Unit Biotic Interrelationships.

None observed.

6. Unit Vigor.

By the time of this inventory, the units were in the early stages of losing their above ground parts for the season. They were in varying stages of drooping, although they seemed free from external predation.

6. Habitat Inventory.

1. Population Habitat.

See Plot 5 analysis; no significant microhabitat features were noticed that differ from the plot analysis.

2. Extrapopulation Habitat.

See Discussion of Plot 5.

7. Threat Inventory.

1. Actual Threats.

None seen except for road maintenance which includes the mowing of a small strip of vegetation along the roadside of CR 1304.

2. Potential Threats.

Possible expansion of CR 1304 is a potential threat. Timbering in this location is also a possibility.

COMMUNITY DIVERSITY SUMMARY 6

Plot 6, Lover's Leap Floodplain

Terrestrial broadleaf forest system
Medium to large, deliquescent, deciduous trees

River birch-mixed hardwood floodplain
Canopy: Platanus occidentalis, Acer rubrum.
Subcanopy: Ostrya virginiana, Liquidambar styraciflua.
Fagalean-mixed hardwoods/Fagalean-mixed hardwoods//mixed forbs, graminoids, and ferns.

BETULA NIGRA-MIXED HARDWOODS/CARPINUS CAROLINIANA-MIXED HARDWOODS// MIXED FORBS, GRAMINOIDS, AND FERNS

Betula nigra-mixed hardwoods

CLIMATE: A. Mesothermal; AA. Warm temperate. B. Cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period; BB. Cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. C. Similar to local climate; CC. Similar to natural area climate.

SOILS: A. Entisol; AA. Fluvent. B. Udifluvent; BB. Typic Udifluvent. C. Coarse loamy, mixed, mesic Typic Udifluvent. CC. Series not determined.

A1 hor.: 0-10 cm., dark yellowish brown sandy loam, pH 5.4.

A2 hor.: 10-60 cm., yellowish brown medium coarse sand, pH 6.2.

GEOLOGY: A. Sedimentary; AA. Clastic. B. Siliceous; BB. Floodplain. C. Interbedded, unconsolidated silts and sands, mixed with rock fragments, underlain by the Erwin Sandstone Formation. CC. Similar to the natural area.

HYDROLOGY: A. Riverine; AA. Intermittent. B. Fresh; BB. Intermittently flooded. C. Well drained, wetted by fresh rains, occasional flooding, and downslope drainage from adjacent ridge; CC. Similar to natural area.

TOPOGRAPHY: A. Hills and Mountains; AA. Low and High Mountains. B. Water eroded river valley. BB. Water eroded slope. C. Partly sheltered, west-facing, nearly level, slightly irregular floodplain; CC. Similar to the natural area.

PHYSIOGRAPHY: A. Appalachian Highlands; AA. Blue Ridge Province. B. Southern Section; BB. Lover's Leap Ridge. C. Floodplain at base of Lover's Leap Ridge; CC. Floodplain of recent sediments, underlain by the Erwin Formation Sandstone.

CANOPY: Betula nigra - Height 50', dbh 25.0", age not determined.
CANOPY DOMINANTS: Betula nigra, mixed hardwoods.
CANOPY PHYSIOGNOMY: Medium to large, deliquescent, deciduous trees.

Canopy Analysis

Species	# of stems	total basal area	Rel. Den.	Rel. Dom.	IV
Betula nigra	4	1212.6	21.0	32.5	53.5
Platanus occidentalis	1	790.9	5.2	21.2	26.4
Acer rubrum	2	428.1	10.5	11.5	22.0
Ilex opaca	2	205.1	10.5	5.5	16.0
Salix nigra	2	165.9	10.5	4.4	14.9
Robinia pseudo-acacia	1	283.5	5.2	7.6	12.8
Ulmus rubra	1	283.5	5.2	7.6	12.8
Prunus serotina	2	53.9	10.5	1.4	11.9
Pinus strobus	1	146.0	5.2	3.9	9.1
Quercus rubra	1	59.4	5.2	1.6	6.8
Fraxinus americana var. biltmoreana	1	56.6	5.2	1.5	6.7
Halesia carolina	1	50.3	5.2	1.3	6.5

Plot size: 10 m x 40 m Total basal area: 3,735.8 in^2, 27,831.7 cm^2
CANOPY SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

SUBCANOPY: Carpinus caroliniana - Height 16', dbh 6.5", age not determined.
SUBCANOPY DOMINANTS: Carpinus caroliniana, mixed hardwoods.
SUBCANOPY PHYSIOGNOMY: Small, deliquescent, deciduous trees.

Subcanopy Analysis

Species	# of stems	total basal area	Rel. Den.	Rel. Dom.	IV
Carpinus caroliniana	28	336.9	58.3	67.9	126.2
Ostrya virginiana	6	70.8	12.5	14.3	26.8
Liquidambar styraciflua	4	48.7	14.3	9.8	24.1
Hamamelis virginiana	4	4.8	14.3	1.0	15.3
Ulmus alata	3	4.5	6.3	0.9	7.2
Cercis canadensis	1	20.4	2.1	4.1	6.2
Ilex opaca	1	8.6	2.1	1.7	3.8
Cornus florida	1	1.5	2.1	0.3	2.4

Plot size: 10 m x 40 m Total basal area: 496.2 inches^2, 3,696.7 cm.^{2}

SUBCANOPY SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None

SHRUB LAYER DOMINANTS: None

SHRUB LAYER PHYSIOGNOMY: Not applicable.

Shrub Analysis

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S	6 C.S	7 C.S	8 C.S
Tall dwarf shrub									
Leucothoe recurva	H11	-	-	-	-	-	-	-	3.1
Typical dwarf shrub									
Euonymus americanus	H10	-	R.1	-	1.1	-	-	-	-

Number of releves: 8 Releve size: 1 m x 1 m

SHRUB SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

VINE LAYER DOMINANTS: None.

VINE LAYER PHYSIOGNOMY: Not applicable.

Vine Analysis

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S	6 C.S	7 C.S	8 C.S
Woody vines									
Anisostichus capreolata	H16	-	+.1	-	+.1	-	-	-	-
Lonicera japonica	H19	2.1	-	-	-	-	-	-	-
Parthenocissus quinquefolia	H16	-	1.1	+.1	1.1	-	+.1	2.1	-
Rhus radicans	H16	+.1	-	-	+.1	1.1	+.1	+.1	+.1
Herbaceous vines									
Amphicarpa bracteata	H19	3.1	-	3.1	-	3.1	-	1.1	-
Clematis viorna	H19	-	R.1	-	-	-	-	-	-
Menispermum canadense	H19	-	-	R.1	-	-	-	-	-
Smilax rotundifolia	H18	-	R.1	R.1	R.1	-	-	-	-

Number of releves: 8 Releve size: 1 m x 1 m

VINE SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

HERB LAYER DOMINANTS: None.

HERB LAYER PHYSIOGNOMY: Not applicable.

Herb Analysis

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S	6 C.S	7 C.S	8 C.S
Tall forbs									
Eupatorium fistulosum	H7	-	-	-	-	-	+.1	-	-
Impatiens capensis	H7	-	-	-	-	-	-	R.1	-
Medium forbs									
Arisaema triphyllum	H7	-	+.1	-	-	-	-	-	-
Aster divaricatus	H7	-	1.1	1.1	-	1.1	-	1.1	-
Aster sp.	H7	-	-	-	-	-	2.1	-	3.1
Polygonatum biflorum	H11	-	-	-	-	-	-	1.1	-
Sanicula canadensis	H7	-	+.1	+.1	R.1	-	-	-	-
Tradescantia subaspera	H7	-	-	R.1	-	-	-	-	-

Herb Analysis (continued)

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S	6 C.S	7 C.S	8 C.S
Small forbs									
Tipularia discolor	H13	-	-	-	-	-	-	R.1	-
Viola papilionacea	H13	-	-	+.1	-	-	-	-	-
Tall graminoid									
Elymus virginicus	H8	-	-	+.1	+.1	-	-	-	-
Medium graminoid									
Agrostis sp.	H8	-	-	-	-	-	1.1	-	2.1
Small graminoids									
Carex laxiflora	H8	1.1	1.1	-	-	+.1	-	-	-
Microstegium vimineum	H8	-	-	-	3.1	-	1.1	2.1	-
Panicum dichotomum	H8	-	-	-	-	-	2.1	-	-
Medium fern									
Asplenium platyneuron	H11	-	-	-	-	1.1	-	R.1	-

Number of releves: 5 Releve size: 1 m x 1 m

HERB SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: Tall forbs: Aureolaria sp., Verbesina alternifolia. Medium forbs: Arabis laevigata, Desmodium sp., Smilacina racemosa, Thalictrum dioicum, Vicia angustifolia. Small forbs: Cardamine bulbosa, Chimaphila maculata, Conopholis americana, Houstonia longifolia, Oxalis stricta, Trifolium repens. Tall graminoid: Bromus purgans. Tall fern: Polystichum acrostichoides. Medium fern: Dryopteris marginalis, Woodsia obtusa.

SEEDLINGS PRESENT IN PLOT: Carya sp., Carpinus caroliniana, Fraxinus americana var. biltmoreana, Hamemelis virginiana, Ostrya virginiana, Quercus rubra, Tsuga canadensis.

COMMUNITY REFERENCES: None.

COMMUNITY DOCUMENTATION: Area analyzed during the summer of 1981 by Dawson Sather, Botany Department, University of North Carolina at Chapel Hill. Specimens deposited at NCU.

COMMUNITY ECOLOGICAL CHARACTERIZATION: Vegetationally: Fagalean-mixed hardwoods/

Fagalean-mixed hardwoods//Mixed forbs, graminoids, and ferns terrestrial broadleaf forest system with a closed canopy of medium to large, deliquescent, deciduous trees, a closed subcanopy of small, deliquescent, deciduous trees, a very sparse shrub layer of mixed shrubs, a sparse vine layer of mixed climbing and trailing vines, and a closed herb layer of mixed forbs, graminoids, and ferns. Climatically: Warm temperate, mesothermal climate: similar to the natural area and local climate of cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period, and cooler than the sectional climate of cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. Pedologically: Coarse loamy, mixed, mesic, Typic Udifluvent of undetermined series. Geologically: Clastic, siliceous floodplain deposit of interbedded and unconsolidated silts and sands, mixed with larger rock fragments, underlain by the Erwin Sandstone Formation. Hydrologically: Well-drained, intermittently flooded, intermittent riverine system, wetted by fresh rains, occasional flooding, and downslope drainage from adjacent ridge. Topographically: Partly sheltered, west-facing, nearly level, slightly irregular floodplain at the base of a west-facing slope of a water eroded slope in a region of Low and High Mountains. Temporally and Spatially: A disclimax of a psammosere on a floodplain of recent alluvial sediments underlain by the Erwin Sandstone Formation on the French Broad River at the base of Lover's Leap Ridge in the Southern Section of the Blue Ridge Province of the Appalachian Highlands.

COMMUNITY DIVERSITY SUMMARY 7

Plot 7, Lover's Leap *Cladrastis* Slope

Terrestrial broadleaf forest system
Large and medium deliquescent trees

Mixed hardwood slope
Canopy: *Celtis laevigata*, *Cladrastis kentukea*, *Tilia floridana*. Subcanopy: *Ulmus alata*.
Fagales-mixed hardwoods/Ebenales-Fagales-Hamamelidales//mixed vines/Asterales

QUERCUS RUBRA-MIXED HARDWOODS/HALESIA CAROLINA-OSTRYA VIRGINIANA-HAMAMELIS VIRGINIANA-MIXED HARDWOODS//MIXED VINES/POLYMNIA CANADENSIS-MIXED HERBS

Quercus rubra-mixed hardwoods

CLIMATE: A. Mesothermal; AA. Warm temperate. B. Cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period; BB. Cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. C. Similar to local climate; CC. Similar to natural area climate.

SOILS: A-CC undetermined; "soil" consists of undifferentiated organics (black, pH 6.8) adhering to talus boulders for a depth of 120+ cm.

GEOLOGY: A. Sedimentary; AA. Clastic. B. Siliceous; BB. Talus. C. Erwin Formation sandstone exposed as ledges, outcrops, and talus. CC. Erwin Formation fine sandstone and siltstone very densely exposed as talus.

HYDROLOGY: A. Terrestrial; AA. Dry-mesic. B. Fresh; BB. Permanently exposed. C. Well-drained; CC. Well-drained, wetted by fresh rains and downslope drainage.

TOPOGRAPHY: A. Hills and Mountains; AA. Low and High Mountains. B. Water-eroded mountain; BB. Water-eroded slope. C. Partly sheltered, west facing, steep, convex, irregular slope of Lover's Leap Ridge; CC. Partly sheltered, west facing, steep, convex, lower slope of Lover's Leap Ridge.

PHYSIOGRAPHY: A. Appalachian Highlands; AA. Blue Ridge province. B. Southern Section; BB. Lover's Leap Ridge. C. Lower slope of Lover's Leap Ridge; CC. Lower west slope of Lover's Leap Ridge, underlain by Lower Cambrian Erwin Formation.

CANOPY: Quercus rubra - Height 60', dbh 33.3", age not determined.

CANOPY DOMINANTS: Quercus rubra-mixed hardwoods.

CANOPY PHYSIOGNOMY: Large and medium deliquescent trees.

Canopy Analysis

Species	# of stems	total basal area	Rel. Den.	Rel. Dom.	IV
Quercus rubra	3	1164.8	9.1	64.8	73.9
Celtis laevigata	10	122.0	30.3	6.8	37.1
Cladrastis kentukea	5	160.4	15.2	8.9	24.1
Tilia floridana	5	159.6	15.2	8.9	24.1
Ulmus rubra	4	98.5	12.1	5.5	17.6
Carya tomentosa	3	41.3	9.1	2.3	11.4
Carya glabra	2	19.8	6.0	1.1	7.1
Juglans cinerea	1	47.8	3.0	2.7	5.7

Plot size: 20 m x 20 m Total basal area: 1796.2 inches^2, 13,381.7 cm.^{2}

CANOPY SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None

SUBCANOPY: Halesia carolina, height 12', dbh 5.3", age not determined.

SUBCANOPY PHYSIOGNOMY: Small, deliquescent, deciduous trees.

Subcanopy Analysis

Species	# of stems	total basal area	Rel. Den.	Rel. Dom.	IV
Halesia carolina	8	59.3	19.0	39.8	58.0
Ostrya virginiana	6	57.5	14.3	38.6	52.9
Hamamelis virginiana	19	11.2	45.2	7.5	52.7
Ulmus alata	6	9.3	14.3	6.2	20.5
Carpinus caroliniana	1	9.1	2.4	6.1	8.5
Fraxinus americana var. biltmoreana	2	2.5	4.7	1.7	6.4

Plot size: 20 m x 20 m Total basal area: 148.9 inches^2 , 1,109.3 cm.^{2}

SUBCANOPY SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

SHRUB LAYER: No shrub species present in plot.

VINE LAYER DOMINANTS: None.

VINE LAYER PHYSIOGNOMY: Not applicable.

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S
Woody vines						
Anisostichus capreolata	H18	R.1	-	+.1	-	-
Campsis radicans	H16	-	-	+.1	-	-
Parthenocissus quinquefolia	H18	-	-	+.1	-	-
Rhus radicans	H18	R.1	-	-	R.1	-
Vitis rotundifolia	H18	R.1	-	-	-	-
Herbaceous vines						
Dioscorea villosa var. villosa	H19	-	-	R.1	-	-
Menispermum canadensis	H19	R.1	1.1	+.1	-	-

Number of releves: 5 Releve size: 1 m x 1 m

VINE SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: Herbaceous vine: Amphicarpa bracteata

HERB LAYER DOMINANTS: Polymnia canadensis.

HERB LAYER PHYSIOGNOMY: Tall, caulescent forbs.

Herb Analysis

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S
Very tall forb						
Phytolacca americana	H7	R.1	-	-	-	-
Tall forb						
Polymnia canadensis	H7	4.1	3.1	-	-	5.1

Herb Analysis (continued)

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S
Medium forbs						
Aster divaricatus	H11	-	-	-	3.1	-
Hybanthus concolor	H7	-	-	1.1	-	-
Solanum americanum	H7	-	3.1	-	-	-

Number of releves: 5 Releve size: 1 m x 1 m

HERB SPECIES PRESENT IN PLOT BUT NOT IN ANALYSIS: Tall forb: Scrophularia marilandica.

COMMUNITY REFERENCES: None.

COMMUNITY DOCUMENTATION: Area analyzed during the summer of 1981 by Dawson Sather, Botany Department, University of North Carolina at Chapel Hill. Specimens deposited at NCU.

COMMUNITY ECOLOGICAL CHARACTERIZATION: Vegetationally: Fagalean-mixed hardwoods/Ebenalean-Fagalean-Hamamelidalean//mixed vines/Asteralean terrestrial broad-leaf forest system with a closed canopy of large and medium deliquescent, deciduous trees, an open subcanopy of small, deliquescent, deciduous trees, a sparse layer of mixed vines, and a closed herb layer of tall, caulescent herbs. Climatically: Warm temperate, mesothermal climate: similar to the natural area and local climate of cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period, and cooler than the sectional climate of cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. Pedologically: Thin layers of organic soil adhering to sandstone talus boulders. Geologically: Clastic, alluvially deposited, siliceous sandstone and siltstone very densely exposed as talus. Hydrologically: Well-drained, permanently exposed, dry-mesic terrestrial system wetted by fresh rains and downslope drainage. Topographically: Partly sheltered, west facing, steep, bouldery lower slope of a west facing slope of a water eroded mountain in a region of low and high mountains. Temporally and Spatially: A seral stage of a talus

lithosere on a west-facing slope, underlain by Lower Cambrian Erwin sandstone, at the base of Lover's Leap Ridge in the Southern Section of the Blue Ridge Province of the Appalachian Highlands.

POPULATION LEVEL INVENTORY OF POLYMNIA CANADENSIS AT PLOT 7

1. Locality Reconnaissance.
   1. Site was first visited in summer of 1981. Conversation with Julie Moore of NC Natural Heritage Program and Don McLeod of Mars Hill College prompted the site visit and subsequent analysis.
   2. The population of *Polymnia canadensis* was analyzed on August 1, 1981.
2. Authentication of Species.
   Herbarium specimens from NCU were studied and a voucher specimen (Dawson Sather 1918) was collected.
3. Precise Location.
   See Appendix II for directions to Plot 7.
4. Land Inventory.
   See Introduction.
5. Population Inventory.
   1. Population Size.
      Individual plants were recognized as units, as determined by the emergence of one to several stems from a common root. A total of 199 units were counted in this 20m x 20m area.
   2. Unit Distribution.
      Average distribution is 1 unit per 2 m^2.
   3. Unit Demography.
      At the time of this inventory, *Polymnia canadensis* was near its peak of flowering. Two size classes were recognized, and a distinction was made between those units which were purely vegetative and those which had one or more inflorescences present.
      A. Individual plants, less than 2 dm. tall, vegetative only.
      B. Individual plants, more than 2 dm. tall, vegetative only.
      C. Individual plants, more than 2 dm. tall, with one or more inflorescences present, or buds formed.

Class percentages and actual number of units per class:

Class	Percent	Total # of Units Counted
A	33.2%	66
B	40.2%	80
C	26.6%	53

4. Unit Phenology.

Flowering or vegetative units were used in class designation for Unit Demography.

5. Unit Biotic Interrelationships.

None observed.

6. Unit Vigor.

All units seemed robust, although there was a large range in the size of the units. No evidence of predation was observed.

6. Habitat Inventory.

1. Population Habitat.

See Analysis and Discussion of Plot 7.

2. Extrapopulation Habitat.

See Discussion of Plot 7.

7. Threat Inventory.

1. Actual Threats.

None seen.

2. Potential Threats.

None foreseen except possible timbering.

POPULATION LEVEL INVENTORY OF CLADRASTIS KENTUKEA AT PLOT 7

1. Locality Reconnaissance.

1. The population of *Cladrastis kentukea* was analyzed July 3, 1981.

2. Authentication of Species.

1. Herbarium sheets were examined before field visits. A voucher specimen (Dawson Sather 1428) was collected.

3. Precise Location.

1. See Appendix II for Plot 7. The *Cladrastis kentukea* in Plot 7 and just upstream from Plot 7.

4. Land Inventory.

See Introduction.

5. Population Inventory.

1,2,3. Population Size, Distribution, and Demography.

Units recognized were individuals of Cladrastis kentukea scattered along the slope. Of the 6 individuals seen, 3 were single boled and 3 were multiple boled. Bearings to individuals and descriptions of each individual are provided.

From the stake marking Plot 6 and 7 (see Appendix II), follow these bearings to individuals 1 - 5:

1. 33°N for 45 feet; single stem, dbh 7.2".
2. 135°ESE for 41 feet; single stem, dbh 6.2".
3. 140°ESE for 70 feet; multiple boled tree. Diameter of entire area of stems is 75", measured at ground level at the upslope boles and at breast height at the downslope boles. Two dozen sucker sprouts less than 5 cm. dbh are present. The five boles larger than 5 cm dbh are (clockwise from the left upslope bole): 2.6", 6.5", 5.1", 8.8", 7.2".
4. 150°ESE, 104 feet; single stem, dbh 5.6".
5. 160°ESE, 82 feet; 3 boles. From downstream bole, diameters are: 5.1", 8.8", 7.2".

To reach individual 6, take bearing from the upstream bole of individual 5, bearing 165° along the slope to the 3 boled individual. Clockwise from downstream bole, diameters are: 1.5", 3.8", 9.4".

4. Unit Phenology.

All 6 individuals had fruit present in July 3, 1981.

5. Unit Biotic Interrelationships.

None observed.

6. Unit vigor.

All units seemed vigorous and free from predation.

6. Habitat Inventory.

1. Population Habitat.

See Plot 7 analysis.

2. Extrapopulation Habitat.

See Plot 7 Discussion.

7. Threat Inventory

1. Actual Threats - None seen.
2. Potential Threats - None foreseen except for timbering.

COMMUNITY DIVERSITY SUMMARY 8

Plot 8, Lover's Leap Oak slope

Terrestrial broadleaf forest system
Medium, deliquescent, deciduous trees

Chestnut Oak slope
Canopy: Quercus rubra, Pinus virginiana.
Fagalean-mixed pines and hardwoods.

QUERCUS PRINUS-MIXED PINES AND HARDWOODS

Quercus prinus-mixed pines and hardwoods

CLIMATE: A. Mesothermal; AA. Warm temperate. B. Cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period; BB. Cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. C. Similar to local climate; CC. Similar to natural area climate.

SOILS: A. Inceptisol; AA. Ochrept. B. Dystrochrept; BB. Typic Dystrochrept. C. Sandy skeletal, mixed, mesic Typic Dystrochrept. CC. Series not determined.

A hor.: 0-8 cm., dark grayish brown loamy sand, 77% fragments by weight, pH 4.5.

C hor.: 8-50+ cm., yellowish brown loamy sand, 67% fragments by weight, pH 4.2.

GEOLOGY: A. Sedimentary; AA. Clastic. B. Siliceous; BB. Alluvial deposition. C. Erwin Formation Sandstone; CC. Fine-grained member of the Erwin Formation Sandstone, densely exposed as outcrops.

HYDROLOGY: A. Terrestrial; AA. Dry-mesic. B. Fresh; BB. Permanently exposed. C. Well drained; CC. Well drained, wetted by fresh rains and downslope drainage.

TOPOGRAPHY: A. Hills and Mountains; AA. Low and High Mountains. B. Water eroded ridge; BB. Water eroded slope. C. Partly sheltered, west-facing, steep, convex irregular slope of Lover's Leap Ridge; CC. Partly sheltered, west-facing, steep, convex, lower slope of Lover's Leap Ridge.

PHYSIOGRAPHY: A. Appalachian Highlands; AA. Blue Ridge Province. B. Southern Section; BB. Lover's Leap Ridge. C. Lower slope of Lover's Leap Ridge;

CC. Lower slope of Lover's Leap Ridge, underlain by Lower Cambrian Erwin Sandstone Formation.

CANOPY: Quercus prinus - Height 30', dbh 14.5", age not determined.
CANOPY DOMINANTS: Quercus prinus-mixed pines and hardwoods.
CANOPY PHYSIOGNOMY: Medium, deliquescent, deciduous trees.

Canopy Analysis

Species	# of stems	total basal area	Rel. Den.	Rel. Dom.	IV
Quercus prinus	23	1010.3	54.7	62.3	117.0
Quercus rubra	6	331.6	14.3	20.5	34.8
Pinus virginiana	6	142.0	14.3	8.8	23.1
Pinus strobus	4	110.8	9.5	6.8	16.3
Acer rubrum	3	26.6	7.1	1.6	8.7

Plot size: 20 m x 20 m Total basal area: 1621.3 inches^2, 12,078.7 cm.^{2}
CANOPY SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

SUBCANOPY: Carya ovalis - Height 9', dbh 1.0", age not determined.
SUBCANOPY DOMINANTS: Carya ovalis-mixed hardwoods.
SUBCANOPY PHYSIOGNOMY: Small, deliquescent, deciduous trees.

Subcanopy Analysis

Species	# of stems	total basal area	Rel. Den.	Rel. Dom.	IV
Carya ovalis	11	11.0	55.0	38.3	93.3
Amelanchier arborea var. laevis	1	8.6	5.0	30.0	35.0
Sassafras albidum	4	4.2	20.0	14.6	34.6
Carya glabra	1	1.8	5.0	6.3	11.3
Ulmus alata	1	1.1	5.0	3.8	8.8
Hamamelis virginiana	1	1.0	5.0	3.5	8.5
Ostrya virginiana	1	1.0	5.0	3.5	8.5

Plot size: 20 m x 20 m Total basal area: 28.7 inches^2, 213.8 cm.^{2}

SUBCANOPY SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

SHRUB LAYER DOMINANTS: None.

SHRUB LAYER PHYSIOGNOMY: Not applicable.

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S
Tall dwarf shrubs						
Vaccinium stamineum	H11	-	-	-	2.1	-
Vaccinium vacillans	H11	-	-	-	-	1.1

Number of releves: 5 Releve size: 1 m x 1 m

SHRUB SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

VINE LAYER DOMINANTS: None.

VINE LAYER PHYSIOGNOMY: Not applicable.

VINE SPECIES PRESENT IN PLOT: Woody vine: Parthenocissus quinquefolia.

HERB LAYER DOMINANTS: None.

HERB LAYER PHYSIOGNOMY: Not applicable.

Herb Analysis

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S
Tall forbs						
Aureolaria laevigata	H7	-	R.1	-	+.1	-
Solidago juncea	H7	-	+.1	+.1	-	-
Small forbs						
Campanula divaricata	H7	+.1	-	-	-	-
Hieraceum venosum	H13	-	-	+.1	-	+.1
Houstonia longifolia	H7	-	+.1	-	-	-

Herb Analysis (continued)

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S
Medium graminoid						
Danthonia spicata	H8	2.1	3.1	1.1	1.1	-
Medium ferns						
Asplenium platyneuron	H11	-	-	-	-	R.1
Polypodium virginianum	H11	1.2	-	-	-	-

Number of releves: 5 Relve size: 1 m x 1 m

HERB SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

SEEDLINGS PRESENT IN PLOT: Acer rubrum, Liquidambar styraciflua, Quercus rubra, Tsuga canadensis, Ulmus alata.

COMMUNITY REFERENCES: None.

COMMUNITY DOCUMENTATION: Area analyzed during the summer of 1981 by Dawson Sather, Botany Department, University of North Carolina at Chapel Hill. Specimens deposited at NCU.

COMMUNITY ECOLOGICAL CHARACTERIZATION: Vegetationally: Fagalean-mixed pines and hardwoods terrestrial broadleaf forest system with a closed canopy of medium, deliquescent, deciduous trees, a sparse subcanopy of small, deliquescent, deciduous trees, a very sparse shrub layer of rhizomatous shrubs, a very sparse vine layer of woody vines, and a sparse herb layer of mixed forbs, graminoids, and ferns. Climatically: Warm temperate, mesothermal climate: similar to the natural area climate and local climate of cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period, and cooler than the sectional climate of cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. Pedologically: Sandy skeletal, mixed, mesic, Typic Dystrochrept of undetermined series. Geologically: Clastic, siliceous, alluvially deposited fine-grained sandstones of the Erwin Formation, densely exposed as outcrops. Hydrologically: Well drained, permanently exposed, dry mesic terrestrial system wetted by fresh rains and downslope drainage. Topographically: Partly sheltered, west-facing,

steep, convex, irregular lower slope of a west-facing slope of a water eroded ridge in a region of Low and High Mountains. Temporally and Spatially: A seral stage of a lithosere on a west-facing slope, underlain by the Lower Cambrian Erwin Formation, at Lover's Leap Ridge in the Southern Section of the Blue Ridge Province of the Appalachian Highlands.

COMMUNITY DIVERSITY SUMMARY 9

Plot 9, Shady Dolomite Bluff

Terrestrial herb and vine system — River bluff
Herbs and Vines of mixed growth forms — BB, C, & CC not determined

CLIMATE: A. Mesothermal; AA. Warm temperate. B. Cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period; BB. Cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. C. Similar to local climate; CC. Similar to natural area climate.

SOILS: Not applicable.

GEOLOGY: A. Sedimentary; AA. Mixed clastic and chemical. B. Mixed calcareous, dolomitic, and siliceous; BB. Marine deposition. C. Shady Dolomite Formation exposed as outcrops and 50' bluffs; CC. Fine grained to saccharoidal dolomite and dolomitic limestones completely exposed as bluffs.

HYDROLOGY: A. Terrestrial; AA. Dry-mesic. B. Fresh; BB. Permanently exposed. C. Well drained; CC. Well drained, wetted by fresh rains.

TOPOGRAPHY: A. Hills and Mountains; AA. Low and High Mountains. b. Water eroded mountain; BB. Water eroded slope. C. Partly sheltered, concavoconvex, irregular lower slope of Deer Park Mountain; CC. Partly sheltered, east-northeast facing, extremely steep bluff at the lower slope of Deer Park Mountain.

PHYSIOGRAPHY: A. Appalachian Highlands; AA. Blue Ridge Province. B. Southern Section; BB. Deer Park Mountain. C. Lower slope of Deer Park Mountain; CC. Bluff of Shady Dolomite at river edge on the lower slope of Deer Park Mountain, east of Sugartree Branch.

VEGETATION ANALYSIS: Due to the precipitous nature of this site, no quantitative data was collected. The following species list represents the vegetation on the sheer cliff face and at the base of the cliff.

Medium trees: Acer rubrum, Acer negundo, Cladrastis kentukea, Robinia pseudoacacia. Small trees: Ptelea trifoliata, Rhus copallina, Staphylea trifolia. Normal shrubs: Hydrangea arborescens, Philadelphus hirsutus, Rubus sp., Sambucus canadensis. Woody vines: Anisostichus capreolata, Aristolochia macrophylla, Campsis radicans, Parthenocissus quinquefolia, Polygonum sp., Rhus

radicans. Herbaceous vines: Clematis virginiana, Cuscuta sp. Very tall forb: Phytolacca americana. Tall forbs: Ambrosia artemisiifolia, Anthriscus scandicina, Campanula americana, Saponaria officinalis, Scrophularia marilandica, Urtica dioica. Medium forbs: Alliaria petiolata, Aquilegia canadensis, Asparagus officinalis, Chenopodium album, Chrysanthemum leucanthemum, Cichorium intybus, Galinsoga quadriradiata, Heuchera americana, Heuchera villosa, Hydrophyllum macrophyllum, Hydrophyllum virginianum, Monarda clinopodia, Parietaria pensylvanica, Penstemon smalli, Phacelia purshii, Sonchus asper, Specularia perfoliata, Stellaria media, Torilis arvensis, Tradescantia subaspera. Small forbs: Arabis patens, Campanula divaricata, Cerastium glomeratum, Corydalis flavula, Draba ramosissima. Tall graminoids: Bromus purgans, Bromus commutatus, Elymus sp. Medium graminoids: Carex eburnea, Carex sp., Dactylis glomerata, Festuca obtusa, Melica nitens, Phleum pratense. Small graminoid: Setaria viridis. Tall fern: Cystopteris bulbifera. Medium ferns: Cystopteris protrusa, Polypodium virginianum. Small ferns: Asplenium resiliens, Asplenium rhizophyllum, Asplenium ruta-muraria, Asplenium trichomanes, Botrychium virginianum, Cheilanthes tomentosa, Pellaea atropurpurea.

COMMUNITY REFERENCES: None.

COMMUNITY DOCUMENTATION: Area analyzed during the summer of 1981 by Dawson Sather, Botany Department, University of North Carolina at Chapel Hill. Specimens deposited at NCU.

COMMUNITY ECOLOGICAL CHARACTERIZATION: Vegetationally: Terrestrial Herb and Vine system with herbs and vines of mixed growth forms. Climatically: Warm temperate, mesothermal climate: similar to the natural area and local climate of cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period, and cooler than the sectional climate of cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. Pedologically: Not applicable. Geologically: Mixed clastic and chemical, marine deposited calcareous, dolomitic, and siliceous fine grained to saccharoidal dolomite and dolomitic limestone of the Shady Dolomite Formation, completely exposed as bluffs. Hydrologically: Well drained, permanently exposed, dry mesic terrestrial system wetted by fresh rains and downslope drainage. Topographically: Partly sheltered, east-

northeast facing, extremely steep bluff. Temporally and Spatially: A seral stage of a lithosere on an east-northeast facing slope, underlain by the Lower Cambrian Shady Dolomite Formation east of Sugartree Branch on Deer Park Mountain in the Southern Section of the Blue Ridge Province of the Appalachian Highlands.

COMMUNITY DIVERSITY SUMMARY 10

Plot 10, Hot Springs Shady Dolomite Slope

Terrestrial broadleaf forest system
Large, deliquescent, deciduous trees

Mixed Oak-Sugar Maple slope
Canopy: *Quercus muehlenbergii*.
Subcanopy: *Cercis canadensis*, *Ostrya virginiana*, *Fraxinus americana* var. *biltmoreana*, *Acer saccharum*, *Cornus florida*.
Fagalean-Sapindalean-mixed hardwoods/Mixed hardwoods///Mixed forbs, graminoids, and ferns.

QUERCUS RUBRA-ACER SACCHARUM-MIXED HARDWOODS/MIXED HARDWOODS/// MIXED FORBS, GRAMINOIDS, AND FERNS

Quercus rubra-Acer saccharum-mixed hardwoods

CLIMATE: A. Mesothermal; AA. Warm temperate. B. Cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period; BB. Cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. C. Similar to local climate; CC. Similar to natural area climate.

SOILS: A. Entisol; AA. Orthent. B. Udorthent; BB. Typic Udorthent. C. Fine loamy, mixed, mesic, Typic Udorthent. CC. Series not determined.

A hor.: 0-10 cm., dark brown loam, pH 7.2.
B1 hor.: 10-23 cm., very dark grayish brown fine loam, pH 7.4.
B2 hor.: 23-55 cm., strong brown loam, pH 6.8.

GEOLOGY: A. Sedimentary; AA. Mixed clastic and chemical. B. Mixed calcareous, dolomitic, and siliceous; BB. Marine deposition. C. Shady Dolomite Formation exposed as outcrops and 50' bluffs; CC. Fine-grained to saccharoidal dolomite and dolomitic limestones sparsely exposed as outcrops.

HYDROLOGY: A. Terrestrial; AA. Dry-mesic. B. Fresh; BB. Permanently exposed. C. Well-drained; CC. Well-drained, wetted by fresh rains and downslope drainage.

TOPOGRAPHY: A. Hills and Mountains; AA. Low and High Mountains. B. Water eroded mountain; BB. Water eroded slope. C. Partly sheltered, east-northeast-facing,

concavoconvex, irregular, lower slope of Deer Park Mountain; CC, Partly sheltered, east-northeast-facing, fairly level to moderately steep spur ridge and ravine of the moderately steep lower slope of Deer Park Mountain

CANOPY: Quercus rubra - Height 50', dbh 21.3", age not determined.
Acer saccharum - Height 35', dbh 15.9", age not determined.
CANOPY DOMINANTS: Quercus rubra-Acer saccharum-Mixed hardwoods.
CANOPY PHYSIOGNOMY: Large, deliquescent, deciduous trees.

Canopy Analysis

Species	# of stems	total basal area	Rel. Den.	Rel. Dom.	IV
Quercus rubra	5	1208.4	23.8	45.1	68.9
Acer saccharum	6	677.0	28.5	25.3	53.8
Quercus muehlenbergii	4	479.1	19.0	17.9	36.9
Robinia pseudo-acacia	2	140.2	9.5	5.2	14.7
Quercus velutina	2	104.6	9.5	3.9	13.4
Fraxinus americana var. biltmoreana	2	71.6	9.5	2.7	12.2

Plot size: 20 m x 20 m Total basal area: 2680.9 inches^2, 19,972.7 cm.^{2}
CANOPY SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

SUBCANOPY DOMINANTS: Mixed hardwoods.
SUBCANOPY PHYSIOGNOMY: Small, deliquescent, deciduous trees and transgressives.

Subcanopy Analysis

Species	# of stems	total basal area	Rel. Den.	Rel. Dom.	IV
Cercis canadensis	6	17.7	30.0	19.5	49.5
Ostrya virginiana	3	25.3	15.0	27.8	42.8
Fraxinus americana var. biltmoreana	3	20.1	15.0	22.1	37.1

Subcanopy Analysis (continued)

Species	# of stems	total basal area	Rel. Den.	Rel. Dom.	IV
Acer saccharum	4	6.8	20.0	7.5	27.5
Cornus florida	2	14.3	10.0	15.7	25.7
Carya glabra	1	3.8	5.0	4.2	9.2

Plot size: 20 m x 20 m Total basal area: 90.8 inches^2, 676.5 cm^2

SUBCANOPY SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

SHRUB LAYER DOMINANTS: None.

SHRUB LAYER PHYSIOGNOMY: Not applicable.

SHRUB SPECIES PRESENT IN PLOT: Tall shrubs: *Pyrularia pubera*. Normal shrubs: *Dirca palustris*, *Viburnum acerifolium*.

VINE LAYER DOMINANTS: None.

VINE LAYER PHYSIOGNOMY: Not applicable.

Vine Analysis

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S	6 C.S	7 C.S	8 C.S
Woody vines									
Anisostichus capreolata	H16	+.1	-	-	-	-	-	-	-
Aristolochia macrophylla	H19	-	-	-	-	1.1	-	-	-
Parthenocissus quinquefolia	H16	-	-	-	-	1.1	R.1	-	-
Vitis aestivalis	H18	-	-	R.1	-	-	-	-	-
Herbaceous vines									
Dioscorea villosa	H19	-	-	-	-	-	-	+.1	1.1
Smilax rotundifolia	H18	-	-	-	R.1	-	-	-	-

Releve size: 1 m x 1 m Number of releves: 8

VINE SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

HERB LAYER DOMINANTS: None.

HERB LAYER PHYSIOGNOMY: Not applicable.

Herb Analysis

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S	6 C.S	7 C.S	8 C.S
Tall forbs									
Aster sp.	H7	-	-	+.1	1.1	1.1	-	-	-
Aureolaria flava	H7	-	-	-	3.1	-	-	-	-
Cimicifuga racemosa	H7	-	-	-	-	-	-	-	1.1
Collinsonia canadensis	H11	-	-	-	-	-	-	-	1.1
Eupatorium rugosum	H7	-	1.1	-	-	-	-	-	-
Geranium maculatum	H7	-	-	-	-	-	-	-	+.1
Helianthus divaricatus	H7	+.1	-	-	-	-	-	-	-
Silene stellata	H7	-	-	-	-	-	-	2.1	-
Solidago juncea	H7	R.1	-	-	-	-	-	-	-
Solidago sphacelata	H7	R.1	-	-	-	-	-	-	-
Thaspium barbinode	H7	-	-	-	-	+.1	-	-	R.1
Uvularia grandiflora	H7	-	-	-	-	-	-	-	1.1
Medium forbs									
Arisaema triphyllum	H7	-	-	-	-	-	-	+.1	-
Aster divaricatus	H7	-	-	3.1	-	-	+.1	+.1	-
Erigeron pulchellus	H7	+.1	+.1	-	-	-	-	-	-
Hybanthus concolor	H7	4.1	R.1	1.1	-	+.1	1.1	-	-
Monarda clinopodia	H7	-	-	R.1	-	1.1	-	-	-
Oxalis stricta	H7	-	-	-	-	-	R.1	+.1	-
Small forbs									
Hepatica acutiloba	H7	-	-	-	-	-	-	1.1	-
Iris verna var. smalliana	H11	-	-	-	-	-	3.1	-	-
Sanguinaria canadensis	H11	-	-	-	-	-	-	R.1	1.1
Thalictrum dioicum	H7	+.1	+.1	1.1	+.1	1.1	3.1	-	+.1
Viola sp.	H13	1.1	-	-	-	-	+.1	+.1	-
Very tall graminoid									
Brachyrlytrum erectum	H8	1.1	-	-	-	-	-	3.1	-

Herb Analysis (continued)

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S	6 C.S	7 C.S	8 C.S
Tall graminoid									
Bromus purgans	H8	+.1	+.1	1.1	-	-	-	-	-
Medium graminoid									
Carex sp.	H8	R.1	1.1	-	-	R.1	-	+.1	-
Small graminoid									
Carex plantaginea	H8	-	+.1	-	-	-	-	-	-
Medium fern									
Asplenium platyneuron	H11	-	-	R.1	-	-	-	-	-

Number of releves: 8 Releve size: 1 m x 1 m

HERB SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: Medium forbs: Sanicula canadensis, Smilacina racemosa, Uvularia perfoliata, Zizia trifoliata. Small forbs: Conopholis americana, Draba ramosissima. Large fern: Polystichum acrostichoides. Small fern: Asplenium ruta-muraria.

SEEDLINGS PRESENT IN PLOT: Acer saccharum, Anisostichus capreolata, Quercus alba, Quercus muehlenbergii, Sassafras albidum, Viburnum acerifolium.

COMMUNITY REFERENCES: None.

COMMUNITY DOCUMENTATION: Area analyzed during the summer of 1981 by Dawson Sather, Botany Department, University of North Carolina at Chapel Hill. Specimens deposited at NCU.

COMMUNITY ECOLOGICAL CHARACTERIZATION: Vegetationally: Fagalean-Sapindalean-Mixed Hardwoods/Mixed hardwoods///Mixed forbs, graminoids, and ferns terrestrial broadleaf forest system with a closed canopy of large, deliquescent, deciduous trees, a closed subcanopy of medium to small, deliquescent deciduous trees and transgressives, a sparse shrub layer of tall and normal, caulescent, deciduous shrubs, a very sparse layer of trailing and climbing vines, and a closed herb layer of mixed forbs, graminoids, and ferns. Climatically: Warm temperate, mesothermal climate: similar to the natural area and local climate of cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period, and cooler

than the sectional climate of cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. Pedologically: Fine loamy, mixed, mesic, Typic Udorthent of undetermined series. Geologically: Mixed clastic and chemical, marine deposited calcareous, dolomitic, and siliceous fine grained to saccharoidal dolomite and dolomitic limestone of the Shady Dolomite Formation, sparsely exposed as outcrops. Hydrologically: Well drained, permanently exposed, dry mesic terrestrial system wetted by fresh rains and downslope drainage. Topographically: Partly sheltered, east-northeast-facing, fairly level to moderately steep, irregular, concavoconvex lower slope. Temporally and Spatially: A topoedaphic climax of a lithosere on an east-northeast-facing slope, underlain by the Lower Cambrian Shady Dolomite Formation east of Sugartree Branch on Deer Park Mountain in the Southern Section of the Blue Ridge Province of the Appalachian Highlands.

COMMUNITY DIVERSITY SUMMARY 11

Plot 11, Sugartree Branch

Terrestrial broadleaf forest system
Medium, deliquescent, deciduous trees

Sugar maple-Mixed hardwoods cove.
Canopy: *Robinia pseudo-acacia*, *Carya cordiformis*, *Quercus muehlenbergii*.
Sapindalean-Mixed hardwoods/(Rosalean-Mixed hardwoods)///Mixed forbs, graminoids, and ferns.

ACER SACCHARUM-MIXED HARDWOODS/(MIXED HARDWOODS)///MIXED FORBS, GRAMINOIDS, AND FERNS

Acer saccharum-Mixed hardwoods

CLIMATE: A. Mesothermal; AA. Warm temperate. B. Cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period; BB. Cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. C. Similar to local climate; CC. Similar to natural area climate.

SOILS: A. Entisol; AA. Orthent. B. Udorthent; BB. Typic Udorthent. C. Fine loamy, mixed, mesic; CC. Series not determined.

A1 hor.: 1-12 cm, very dusky red sandy clay loam, pH 7.0.
A2 hor.: 12-21 cm, dark reddish brown loam, pH 7.0.
B hor.: 21-38+ cm, dark brown clay loam, pH 7.0.

GEOLOGY: A. Sedimentary; AA. Mixed clastic and chemical. B. Mixed calcareous, dolomitic, and siliceous; BB. Marine deposition. C. Shady Dolomite Formation exposed as outcrops and bluffs. CC. Fine grained to saccharoidal dolomite and dolomitic limestone, very sparsely exposed as outcrops.

HYDROLOGY: A. Terrestrial; AA. Dry mesic. B. Fresh; BB. Permanently exposed. C. Well drained; CC. Well drained, wetted by fresh rains and downslope drainage.

TOPOGRAPHY: A. Hills and Mountains; AA. Low and High Mountains. B. Water eroded mountain; BB. Water eroded ravine. C. Partly sheltered, east-northeast-facing, concavoconvex, irregular lower slope of Deer Park Mountain; CC. Sheltered,

northeast-facing, moderately steep ravine of the moderately steep lower slope of Deer Park Mountain.

PHYSIOGRAPHY: A. Appalachian Highlands; AA. Blue Ridge Province. B. Southern Section; BB. Deer Park Mountain. C. Lower slope of Deer Park Mountain; CC. Lower northeast slope of Deer Park Mountain, at Sugartree Branch, underlain by the Lower Cambrian Shady Dolomite Formation.

CANOPY: Acer saccharum - Height 30', dbh 11.6", age not determined.
Carya cordiformis - Height 30', dbh 13.4", age not determined.

CANOPY DOMINANTS: Acer saccharum-Mixed hardwoods.

CANOPY PHYSIOGNOMY: Medium, deliquescent, deciduous trees.

Canopy Analysis

Species	# of stems	total basal area	Rel. Den.	Rel. Dom.	IV
Acer saccharum	36	468.3	45.0	26.7	71.7
Robinia pseudo-acacia	12	395.7	15.0	22.5	37.5
Carya cordiformis	7	474.4	8.8	27.0	35.8
Quercus muehlenbergii	12	99.8	15.0	5.7	20.7
Fraxinus americana var. biltmoreana	5	168.2	6.3	9.6	15.9
Ulmus rubra	3	53.4	3.7	3.0	6.7
Liriodendron tulipifera	3	44.9	3.7	2.6	6.3
Aesculus octandra	1	41.9	1.3	2.4	3.7
Quercus rubra	1	9.1	1.3	0.5	1.8

Plot size: 20 m x 20 m Total basal area: 1755.7 in^2, 13,080.0 $cm.^2$

CANOPY SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

SUBCANOPY: Cercis canadensis - Height 9', dbh 3.2", age not determined.

SUBCANOPY DOMINANTS: None.

SUBCANOPY PHYSIOGNOMY: Not applicable.

Subcanopy Analysis

Species	# of stems	total basal area	Rel. Den.	Rel. Dom.	IV
Cercis canadensis	3	20.8	33.3	51.1	84.4
Sassafras albidum	1	14.5	11.1	35.6	46.7
Lindera benzoin	3	3.1	33.3	7.6	40.9
Corylus americana	2	2.3	22.2	5.6	27.8

Plot size: 20 m x 20 m Total basal area: 40.7 inches^2, 262.5 cm.^{2}

SUBCANOPY SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

SHRUB LAYER DOMINANATS: None.

SHRUB LAYER PHYSIOGNOMY: Not applicable.

SHRUB SPECIES PRESENT IN PLOT: Normal shrub: Hydrangea arborescens.

VINE LAYER DOMINANTS: None.

VINE LAYER PHYSIOGNOMY: Not applicable.

Vine Analysis

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S	6 C.S
Woody vines							
Anisostichus capreolata	H16	-	-	-	-	-	+.1
Vitis rotundifolia	H18	-	-	1.1	-	-	-
Herbaceous vines							
Cuscuta sp.	H19	-	-	-	-	-	1.1
Dioscorea villosa	H19	-	+.1	-	-	-	-

Number of releves: 6 Releve size: 1 m x 1 m

VINE SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: Woody vine: Vitis baileyana.

HERB LAYER DOMINANTS: None

HERB LAYER PHYSIOGNOMY: Not applicable:

Herb Analysis

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S	6 C.S
Tall forbs							
Cimicifuga racemosa	H7	3.1	R.1	-	-	-	1.1
Geranium maculatum	H7	R.1	-	R.1	-	+.1	-
Impatiens pallida	H7	-	-	-	-	-	3.1
Laportea canadensis	H7	2.1	-	-	R.1	-	-
Verbesina alternifolia	H7	-	-	-	-	-	3.1
Medium forbs							
Arabis patens	H7	-	-	+.1	-	-	-
Arisaema triphyllum	H7	+.1	R.1	R.1	-	2.1	-
Galium triflorum	H7	-	-	-	-	-	4.1
Oxalis stricta	H7	-	-	-	-	-	+.1
Panax quinquefolium	H7	-	3.1	-	-	-	-
Pilea pumila	H7	-	-	-	-	-	1.1
Solanum carolinense	H7	-	-	-	-	-	+.1
Solidago flexicaulis	H7	-	+.1	1.1	-	2.1	2.1
Small forbs							
Sanguinaria canadensis	H11	-	-	-	R.1	-	-
Thalictrum clavatum	H7	+.1	-	-	+.1	1.1	-
Viola canadensis	H7	3.1	1.1	-	+.1	3.1	-
Viola sp.	H7	-	-	1.1	-	2.1	
Very small forb							
Sedum ternatum	H7	-	-	+.1	+.1	-	-
Tall fern							
Cystopteris bulbifera	H11	-	-	+.1	1.1	-	-
Medium fern							
Adiantum pedatum	H11	-	-	R.1	R.1	5.1	-
Very small fern							
Asplenium rhizophyllum	H11	-	-	-	+.1	-	-

Number of releves: 6 Releve size: 1 m x 1 m

HERB SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: Tall forbs: Acalypha rhomboidea, Ambrosia trifida, Caulophyllum thalictroides, Circaea lutetiana ssp. canadensis, Collinsonia canadensis, Eupatorium rugosum, Phlox sp., Phytolacca americana, Polymnia canadensis, Polymnia uvedalia, Stachys clingmanii, Thaspium barbinode. Medium forbs: Campanula americana, Heuchera villosa, Monarda clinopodia, Podophyllum peltatum, Solanum americanum, Trillium cuneatum var. luteum. Small forb: Cardamine diphylla. Small graminoid: Carex plantaginea. Tall fern: Polystichum acrostichoides.

SEEDLINGS PRESENT IN PLOT: Acer saccharum, Ailanthus altissima, Cercis canadensis, Fraxinus sp., Lindera benzoin, Liriodendron tulipifera, Quercus muehlenbergii, Sassafras albidum, Ulmus rubra.

COMMUNITY REFERENCES: None.

COMMUNITY DOCUMENTATION: Area analyzed during the summer of 1981 by Dawson Sather, Botany Department, University of North Carolina at Chapel Hill. Specimens deposited at NCU.

COMMUNITY ECOLOGICAL CHARACTERIZATION: Vegetationally: Sapindalean-Mixed hardwoods/(Rosalean-Mixed hardwoods)///Mixed forbs, graminoids, and ferns terrestrial broadleaf forest system with a closed canopy of medium, deliquescent, deciduous trees, an open subcanopy of small, deliquescent, deciduous trees, a very sparse shrub layer of normal shrubs, a very sparse vine layer of climbing and trailing, woody and herbaceous vines, and a closed herb layer of mixed forbs, graminoids, and ferns. Climatically: Warm temperate, mesothermal climate: similar to the natural area and local climate of cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period, and cooler than the sectional climate of cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. Pedologically: Fine loamy, mixed, mesic, Typic Udorthent of undetermined series. Geologically: Mixed clastic and chemical, marine deposited, dolomitic, calcareous, and siliceous fine grained to saccharoidal dolomite and dolomitic limestone of the Shady Dolomite Formation, very sparsely exposed as outcrops. Hydrologically: Well drained, permanently exposed, dry mesic terrestrial system wetted by fresh rains and downslope drainage. Topographically: Sheltered, northeast-facing moderately steep ravine of an east-northeast facing slope of a water eroded mountain in a region of Low and High Mountains. Temporally

and Spatially: A topoedaphic climax of a lithosere in a northeast facing ravine, underlain by the Lower Cambrian Shady Dolomite Formation, at Sugartree Branch on Deer Park Mountain in the Southern Section of the Blue Ridge Mountains of the Appalachian Highlands.

POPULATION LEVEL INVENTORY OF *PANAX QUINQUEFOLIUM* AT PLOT 11

1. Locality Reconnaissance.

   1. Site was first visited in April, 1979. While occasional ginseng was seen on the north facing side of the valley, this was the best concentration of the species.

2. Authentication of Species.

   1. Species is very distinctive in the field. A voucher specimen consisting of one leaf (Dawson Sather 1501) was collected.

3. Precise Location.

   See Appendix II for directions to Plot 11. The *Panax quinquefolium* is found at the downslope north corner of the plot.

4. Population Inventory.

   1. Population Size.

      Units recognized were individual plants. A total of 7 units were counted.

   2. Unit Distribution.

      All 7 units were clustered in an area of 4 x 4 meters.

   3. Unit Demography.

      At the time of this inventory (July 24, 1981) the ginseng had young developing fruit. All seven units were in fruit. Only one class was recognized.

   4. Unit Phenology.

      All 7 units were in fruit at the time of this inventory.

   5. Unit Biotic Interrelationships.

      None observed.

   6. Unit Vigor.

      No individuals showed evidence of predation. The largest plant was 33 cm. tall.

6. Habitat Inventory.

   1. Population Habitat.

      See Plot 11 analysis and discussion.

2. Extrapopulation Habitat.

See Plot 11 discussion.

7. Threat Inventory.

1. Actual Threats.

Extermination by gathering for sale is a real possibility.

2. Potential Threats.

Same as actual threats.

POPULATION LEVEL INVENTORY OF ARABIS PATENS AT PLOT 11

1. Locality Reconnaissance.

1. Site was first visited in April 1979. This location does not contain the highest concentration of Arabis patens in the gorge, but population analysis was done since the fire that recently swept through this ravine may have reduced the numbers of this species, and this data can be compared to later counts.

2. Authentication of Species.

Herbarium specimens were studied before field work was begun. A voucher specimen (Dawson Sather 1504) was collected.

3. Precise Location.

See Appendix II for directions to Plot 11. Arabis patens is on a small outcrop at the western downslope edge of Plot 11.

4. Land Inventory.

See Introduction.

5. Population Inventory.

1. Population Size.

Units recognized were individual plants. A total of 7 units were counted in Plot 11.

2. Unit Distribution.

Three small shelves of an outcrop at the downslope edge of Plot 11 support the 7 plants of Arabis patens; no attempts were made to quantify average distribution.

3. Unit Demography.

At the time of this inventory (July 24, 1981) the species was in fruit. Three classes were recognized.

A. Plants with rosettes of basal leaves only.

B. Plants with one fruiting stem present.

C. Plants with three fruiting stems present.

Class percentages and actual number of units per class:

Class	Percent	Total # of Units Counted
A	57.1%	4
B	28.6%	2
C	14.3%	1

4. Unit Phenology.

   Fruiting or vegetative units were used in class designation for Unit Demography.

5. Unit Biotic Interrelationships.

   None observed.

6. Unit Vigor.

   All fruiting units were vigorous and seemed free from predation.

6. Habitat Inventory.

   1. Population Habitat.

      See Plot 11 analysis and discussion.

   2. Extrapopulation Habitat.

      See Plot 11 discussion.

7. Threat Inventory.

   1. Actual Threats.

      None seen.

   2. Potential Threats.

      None seen.

COMMUNITY DIVERSITY SUMMARY 12

Plot 12, Stokely Hollow *Disporum* slope

Terrestrial broadleaf forest system
Medium, deliquescent, deciduous trees

Sugar maple-Mixed hardwoods slope
Canopy: *Tilia floridana*, *Robinia pseudo-acacia*, *Liriodendron tulipifera*.
Sapindalean-Mixed hardwoods/(Rosalean-Mixed hardwoods)///Mixed forbs, graminoids, and ferns.

ACER SACCHARUM-MIXED HARDWOODS/(CERCIS CANADENSIS-MIXED HARDWOODS)///MIXED FORBS, GRAMINOIDS, AND FERNS

Acer saccharum-Mixed hardwoods

CLIMATE: A. Mesothermal; AA. Warm temperate. B. Cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period; BB. Cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. C. Similar to local climate; CC. Similar to natural area climate.

Soils: A. Entisol; AA. Orthent. B. Udorthent; BB. Typic Udorthent. C. Fine loamy, mixed, mesic, Typic Udorthent. CC. Series not determined.

A hor.: 0-6 cm., dark yellowish brown loam, pH 6.2.

B hor.: 6-50+ cm., strong brown clay loam, pH 6.0.

GEOLOGY: A. Sedimentary; AA. Mixed clastic and chemical. B. Mixed calcareous, dolomitic, and siliceous; BB. Marine deposition. C. Shady Dolomite Formation, exposed as outcrops and bluffs. CC. Fine grained dolomite, very sparsely exposed as outcrops.

HYDROLOGY: A. Terrestrial; AA. Dry mesic. B. Fresh; BB. Permanently exposed. C. Well drained; CC. Well drained, wetted by fresh rains and downslope drainage.

TOPOGRAPHY: A. Hills and Mountains; AA. Low and High Mountains. B. Water eroded mountain; BB. Water eroded slope. C. Partly sheltered, east-northeast-facing, concavoconvex, irregular lower slope of Deer Park Mountain; CC. Partly sheltered, north-northeast facing, moderately steep base of the moderately steep

slope of Deer Park Mountain.

PHYSIOGRAPHY: A. Appalachian Highlands; AA. Blue Ridge Province. B. Southern Section; BB. Deer Park Mountain. C. Lower slope of Deer Park Mountain; CC. Lower northeast slope of Deer Park Mountain, west of Sugartree Branch, underlain by the Lower Cambrian Shady Dolomite Formation.

CANOPY: Acer saccharum - Height 30', dbh 16.0", age not determined.

CANOPY DOMINANTS: Acer saccharum-Mixed hardwoods.

CANOPY PHYSIOGNOMY: Medium, deliquescent, deciduous trees.

Canopy Analysis

Species	# of stems	total basal area	Rel. Den.	Rel. Dom.	IV
Acer saccharum	19	831.7	31.6	50.7	82.3
Tilia floridana	8	201.0	13.3	12.3	25.6
Robinia pseudo-acacia	6	240.0	10.0	14.6	24.6
Liriodendron tulipifera	7	142.2	11.7	8.7	20.4
Ulmus rubra	6	22.1	10.0	1.3	11.3
Juglans nigra	3	92.3	5.0	5.6	10.6
Quercus rubra	3	57.7	5.0	3.5	8.5
Quercus muehlenbergii	4	3.8	6.7	0.2	6.9
Prunus serotina	1	36.6	1.7	2.2	3.9
Carya cordiformis	1	10.2	1.7	0.6	2.3
Aesculus octandra	1	1.5	1.7	0.1	1.8
Fraxinus americana var. biltmoreana	1	1.0	1.7	0.1	1.8

Plot size: 20 m x 20 m Total basal area: 1639.8 inches^2, 12,216.5 cm.^{2}

CANOPY SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

SUBCANOPY: Sassafras albidum - Height 13', dbh 3.1", age not determined.

SUBCANOPY DOMINANTS: Cercis canadensis-Mixed hardwoods.

SUBCANOPY PHYSIOGNOMY: Small, deliquescent, deciduous trees.

Subcanopy Analysis

Species	# of stems	total basal area	Rel. Den.	Rel. Dom.	IV
Cercis canadensis	2	7.5	40.0	31.3	71.3
Morus rubra	1	8.0	20.0	33.3	53.3
Sassafras albidum	1	7.5	20.0	31.3	51.3
Lindera benzoin	1	1.0	20.0	4.2	24.2

Plot size: 20 m x 20 m Total basal area: 24.0 inches^2, 154.8 cm.^{2}

SUBCANOPY SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

SHRUB LAYER DOMINANT: None.

SHRUB LAYER PHYSIOGNOMY: Not applicable.

SHRUB SPECIES PRESENT IN PLOT: Normal shrubs: Calycanthus floridus var. laevigatus, Hydrangea arborescens, Sambucus canadensis.

VINE LAYER DOMINANTS: None.

VINE LAYER PHYSIOGNOMY: Not applicable.

VINE SPECIES PRESENT IN PLOT: Woody vines: Aristolochia macrophylla, Lonicera japonica, Vitis rotundifolia. Herbaceous vine: Dioscorea villosa.

HERB LAYER DOMINANATS: None.

HERB LAYER PHYSIOGNOMY: Not applicable.

HERB ANALYSIS: Continued.

Herb Analysis

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S	6 C.S	7 C.S	8 C.S	9 C.S	10 C.S
Tall forbs											
Arabis laevigata	H7	-	+.1	-	-	-	-	-	-	-	-
Cimicifuga racemosa	H7	-	-	-	+.1	+.1	-	3.1	-	3.1	1.1
Collinsonia canadensis	H11	-	R.1	-	-	-	-	-	-	-	-
Impatiens pallida	H7	-	+.1	+.1	-	-	-	+.1	-	+.1	-
Laportea canadensis	H7	-	-	-	5.1	-	4.1	-	-	-	-
Osmorhiza claytonii	H7	-	R.1	-	-	-	-	-	-	-	-
Phlox amplifolia	H7	-	R.1	+.1	-	-	-	-	-	-	-
Polymnia canadensis	H7	-	2.1	R.1	-	-	-	-	1.1	R.1	-
Thaspium barbinode	H7	+.1	-	-	-	-	-	-	-	-	-
Medium forbs											
Arisaema triphyllum	H7	-	-	-	R.1	-	-	-	-	+.1	1.1
Aster divaricatus	H7	2.3	-	2.3	-	-	-	-	2.3	-	1.3
Disporum maculatum	H7	-	+.1	+.1	-	-	-	-	-	-	-
Pilea pumila	H7	-	-	-	+.1	-	-	-	-	-	-
Polygonatum biflorum	H11	1.1	-	-	-	1.1	+.1	-	+.1	R.1	R.1
Sanicula gregaria	H7	-	-	-	-	2.1	1.1	1.1	-	-	-
Smilacina racemosa	H11	-	-	-	-	-	-	R.1	1.1	-	-
Trillium cuneatum var. luteum	H11	-	-	-	-	-	-	-	-	-	+.1
Uvularia perfoliata	H11	-	-	-	-	1.1	-	-	-	-	-

Herb Analysis (continued)

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S	6 C.S	7 C.S	8 C.S	9 C.S	10 C.S
Small forbs											
Sanguinaria canadensis	H11	-	1.1	+.1	+.1	-	+.1	2.1	1.1	-	+.1
Thalictrum sp.	H7	1.1	-	+.1	-	-	-	-	-	-	-
Tall fern											
Polystichum acrostichoides	H11	-	-	R.1							
Medium ferns											
Adiantum pedatum	H11	-	-	-	-	+.1	-	-	-	-	+.1
Cystopteris protrusa	H11	-	-	+.1	-	-	-	-	-	-	-
Small fern											
Botrychium virginianum	H11	-	-	-	-	-	-	R.1	-	-	-

Number of releves: 10 Releve size: 1 m x 1 m

HERB SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: Tall forbs: Astilbe biternata, Caulophyllum thalictroides, Eupatorium purpureum, Geum canadense, Solidago curtisii. Medium forbs: Agrimonia pubescens, Cryptotaenia canadensis, Hybanthus concolor, Oxalis stricta, Sanicula trifoliata, Tovara virginiana. Small forb: Viola canadensis. Medium graminoid: Carex sp. Tall fern: Athyrium pycnocarpon.

SEEDLINGS PRESENT IN PLOT: Acer saccharum, Aesculus octandra, Lindera benzoin, Quercus muehlenbergii, Sassafras albidum, Ulmus rubra.

COMMUNITY REFERENCES: None.

COMMUNITY DOCUMENTATION: Area analyzed during the summer of 1981 by Dawson Sather, Botany Department, University of North Carolina at Chapel Hill. Specimens deposited at NCU.

COMMUNITY ECOLOGICAL CHARACTERIZATION: Vegetationally: Sapindalean-Mixed hardwoods/(Rosalean-mixed hardwoods)///Mixed forbs, graminoids, and ferns terrestrial broadleaf forest system with a closed canopy of medium, deliquescent, deciduous trees, an open subcanopy of small, deliquescent, deciduous trees, a very sparse shrub layer of normal shrubs, a very sparse vine layer of mixed vines, and a closed herb layer of mixed forbs, graminoids and ferns. Climatically: Warm temperate, mesothermal climate: similar to the natural area and local climate of cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period, and cooler than the sectional climate of cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. Pedologically: Fine loamy, mixed, mesic, Typic Udorthent of undetermined series. Geologically: Mixed clastic and chemical, marine deposited, dolomitic, calcareous, and siliceous fine grained dolomite of the Shady Dolomite Formation very sparsely exposed as outcrops. Hydrologically: Well drained, permanently exposed, dry mesic terrestrial system, wetted by fresh rains and downslope drainage. Topographically: Partly sheltered, north-northeast-facing lower slope of an east-northeast facing slope of a water eroded mountain in a region of Low and High Mountains. Temporally and Spatially: A topoedaphic climax of a lithosere on a north-northeast facing slope, underlain by the Lower Cambrian Shady Dolomite Formation, west of Sugartree Branch on Deer Park Mountain in the Southern Section of the Blue Ridge Province of the Appalachian Highlands.

POPULATION LEVEL INVENTORY OF *DISPORUM MACULATUM* AT PLOT 12

1. Locality Reconnaissance.

   Herbarium specimen (G.F Beaven 264, Duke 31969) from 1935 documented the occurrence of this species downriver of Hot Springs. This location was found during the summer of 1981.

2. Authentication of Species.

   This species had been previously encountered in Buncombe Co., NC. A voucher

specimen (Dawson Sather 1669) was collected.

3. Precise Location.

See Appendix II for directions to Plot 12.

4. Land Inventory.

See Introduction.

5. Population Inventory.

1. Population Size.

Units recognized were individual stems emergent from the rhizome. A total of 25 units were counted in Plot 12.

2. Unit Distribution

The Disporum maculatum is clustered on the northern edge of Plot 12, at the bank of an old dirt road that runs from the old dolomite mines to the railroad tracks at Stokely Hollow.

3. Unit Demography.

At the time of this inventory (July 13, 1981), the Disporum maculatum was in fruit. Three classes were recognized.

A. Plants less than 2 dm. tall, vegetative only.

B. Plants more than 2 dm. tall, vegetative only.

C. Plants more than 2 dm. tall, fruit present.

Class percentages and actual number of units per class:

Class	Percent	Total # of Units Counted
A	16.0%	4
B	40.0%	10
C	44.0%	11

4. Unit Phenology.

Fruiting or vegetative units were used in class designation in Unit Demography.

6. Habitat Inventory.

1. Population Habitat.

See Plot 12 analysis and discussion.

2. Extrapopulation Habitat.

See Plot 12 Discussion.

7. Threat Inventory.

1. Actual Threats.

None seen.

2. Potential Threats.

This land has been selectively timbered in the past, and nearby families cut firewood from the slope below this plot. Increased intensity of cutting seems to be the only potential threat.

COMMUNITY DIVERSITY SUMMARY 13

Plot 13, Stokely Hollow *Arabis patens* slope

Terrestrial broadleaf forest system
Medium, deliquescent, deciduous trees

Red oak-Sugar maple-Mixed hardwood slope
Canopy: *Quercus muehlenbergii*, *Quercus prinus*.
Subcanopy: *Acer saccharum*.
Fagalean-Sapindalean-Mixed hardwoods/ Fagalean-Mixed hardwoods///Mixed forbs, graminoids, and ferns.

QUERCUS RUBRA-ACER SACCHARUM-MIXED HARDWOODS/OSTRYA VIRGINIANA-MIXED HARDWOODS///MIXED FORBS, GRAMINOIDS, AND FERNS

Quercus rubra-Acer saccharum-Mixed hardwoods

CLIMATE: A. Mesothermal; AA. Warm temperate. B. Cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period; BB. Cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. C. Similar to local climate; CC. Similar to natural area climate.

SOILS: A. Entisol; AA. Orthent. B. Udorthent; BB. Typic Udorthent. C. Loamy-skeletal, mixed, mesic, Typic Udorthent. CC. Series undetermined.

No horizon change for 60 cm.:
- at 5 cm., brown sandy loam, pH 7.0.
- at 45 cm., brown sandy loam, pH 7.0.

GEOLOGY: A. Sedimentary; AA. Mixed clastic and chemical. B. Mixed calcareous, dolomitic, ferruginous, and siliceous; BB. Alluvial and marine deposition. C. Rome Shale Formation with lenses of fine grained to saccharoidal dolomite and dolomitic limestone. CC. Rome Shale Formation with lenses of fine grained to saccharoidal dolomite and dolomitic limestone, striking N 105°E and dipping N 8°W, densely exposed as outcrops.

HYDROLOGY: A. Terrestrial; AA. Dry mesic. B. Fresh; BB. Permanently exposed. C. Well drained; CC. Well drained, wetted by fresh rains and downslope drainage.

TOPOGRAPHY: A. Hills and Mountains; AA. Low and High Mountains. B. Water eroded

mountain; BB. Water eroded slope. C. Partly sheltered, east-northeast-facing, concavoconvex, irregular lower slope of Deer Park Mountain; CC. Partly sheltered, east-northeast-facing, moderately steep base of the moderately steep lower slope of Deer Park Mountain.

PHYSIOGRAPHY: A. Appalachian Highlands; AA. Blue Ridge Province. B. Southern Section; BB. Deer Park Mountain. C. Lower slope of Deer Park Mountain. CC. Lower northeast slope of Deer Park Mountain, west of Sugartree Branch, underlain by the Middle Cambrian Rome Shale Formation.

CANOPY: Quercus rubra - Height 32', dbh 16.4", age not determined.
Acer saccharum - Height 24', dbh 10.5", age not determined.

CANOPY DOMINANTS: Quercus rubra, Acer saccharum, Mixed hardwoods.

CANOPY PHYSIOGNOMY: Medium, deliquescent, deciduous trees.

Canopy Analysis

Species	# of stems	total basal area	Rel. Den.	Rel. Dom.	IV
Quercus rubra	9	842.7	25.7	32.9	58.6
Acer saccharum	11	530.5	31.4	20.7	52.1
Quercus muehlenbergii	6	810.1	17.1	31.6	48.7
Quercus prinus	4	260.5	11.4	10.2	21.6
Fraxinus americana var. americana	3	91.2	8.6	3.6	12.2
Tilia heterophylla	2	26.7	5.7	1.0	6.7

Plot size: 20 m x 20 m Total basal area: 2,561.7 inches^2, 16,523 cm.^{2}

CANOPY SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

SUBCANOPY: Ostrya virginiana - Height 19', dbh 10.4", age not determined.

SUBCANOPY DOMINANTS: Ostrya virginiana-Mixed hardwoods.

SUBCANOPY PHYSIOGNOMY: Small, deliquescent, deciduous trees.

Subcanopy Analysis

Species	# of stems	total basal area	Rel. Den.	Rel. Dom.	IV
Ostrya virginiana	3	68.4	20.0	77.1	97.1
Acer saccharum	3	3.5	20.0	3.9	23.9
Tilia heterophylla	2	3.0	13.3	3.4	16.7
Cercis canadensis	2	2.6	13.3	2.9	16.2
Cornus florida	1	6.2	6.7	7.0	13.7
Carya glabra	1	2.0	6.7	2.2	8.9
Aesculus octandra	1	1.0	6.7	1.1	7.8
Fraxinus americana var. americana	1	1.0	6.7	1.1	7.8
Hamamelis virginiana	1	1.0	6.7	1.1	7.8

Plot size: 20 m x 20 m Total basal area: 88.7 inches^2, 928.8 cm.^{2}

SUBCANOPY SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

SHRUB LAYER DOMINANTS: None.

SHRUB LAYER PHYSIOGNOMY: Not applicable.

SHRUB SPECIES PRESENT IN PLOT: Normal shrubs: *Philadelphus hirsutus*, *Viburnum acerifolium*.

VINE LAYER DOMINANTS: None.

VINE LAYER PHYSIOGNOMY: Not applicable.

VINE SPECIES PRESENT IN PLOT: Woody vines: *Parthenocissus quinquefolia*, *Rhus radicans*. Herbaceous vines: *Dioscorea villosa*.

HERB LAYER DOMINANTS: None.

HERB LAYER PHYSIOGNOMY: Not applicable.

HERB LAYER ANALYSIS: Continued.

Herb Analysis

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S	6 C.S	7 C.S	8 C.S	9 C.S	10 C.S
Tall forbs											
Cimicifuga racemosa	H7	-	-	R.1	-	-	2.1	2.1	-	-	-
Taenidia integerrima	H7	R.1	R.1	-	+.1	-	+.1	-	-	-	-
Uvularia grandiflora	H11	R.1	-	-	-	-	+.1	-	-	-	-
Medium forbs											
Arabis patens	H7	+.1	2.1	-	-	-	-	-	-	3.1	2.1
Aster divaricatus	H7	-	+.1	-	-	R.1	-	+.1	+.1	-	-
Aster undulatus	H7	R.1	-	-	-	-	-	-	-	-	-
Desmodium sp.	H7	R.1	-	-	-	-	-	-	-	-	-
Heuchera villosa	H13	-	-	R.1	-	-	-	-	-	-	-
Hybanthus concolor	H7	3.1	-	-	-	-	-	R.1	-	-	-
Monarda clinopodia	H7	-	-	-	-	-	R.1	R.1	-	-	-
Polygonatum biflorum	H11	-	-	-	-	R.1	-	-	-	R.1	-
Smilacina racemosa	H11	-	-	-	-	-	+.1	1.1	1.1	-	-
Small forbs											
Hepatica acutiloba	H13	-	-	-	-	+.1	-	-	-	-	-
Iris verna var. smalliana	H11	-	-	-	-	3.3	-	-	-	-	-
Thalictrum dioicum	H7	+.1	+.1	-	R.1	+.1	+.1	R.1	+.1	+.1	1.1
Very small forb											
Sedum ternatum	H15	-	+.1	+.1	+.1	+.1	-	-	-	-	1.1
Medium graminoid											
Carex plantaginea	H8	-	-	-	+.1	-	R.1	R.1	R.1	-	-

Herb Analysis (continued)

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S	6 C.S	7 C.S	8 C.S	9 C.S	10 C.S
Tall fern											
Cystopteris bulbifera	H11	-	-	1.1	+.1	-	-	-	-	-	-
Medium ferns											
Adiantum pedatum	H11	-	-	-	-	-	-	-	3.1	-	-
Asplenium platyneuron	H11	-	-	-	-	-	-	-	-	R.1	+.1
Dryopteris marginalis	H11	-	-	-	-	-	-	2.1	-	-	-
Small fern											
Asplenium rhizophyllum	H11	-	-	-	3.3	-	-	-	-	-	-

Number of releves: 10 Releve size: 1 m x 1 m

HERB SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: Tall forbs: Helianthus microcephalus, Polymnia canadensis. Medium forbs: Disporum maculatum, Penstemon smallii, Sanicula trifoliata, Thaspium barbinode. Small forb: Houstonia longifolia. Medium fern: Pellaea atropurpurea. Small fern: Polypodium polypodioides.

SEEDLINGS PRESENT IN PLOT: Acer saccharum, Carya sp., Cercis canadensis, Fraxinus americana var. americana, Quercus prinus, Quercus rubra, Robinia pseudo-acacia, Sassafras albidum.

COMMUNITY REFERENCES: None.

COMMUNITY DOCUMENTATION: Area analyzed during the summer of 1981 by Dawson Sather, Department of Botany, University of North Carolina at Chapel Hill. Specimens deposited at NCU.

COMMUNITY ECOLOGICAL CHARACTERIZATION: Vegetationally: Fagalean-Sapindalean-Mixed hardwoods/Fagalean-Mixed hardwoods///Mixed forbs, graminoids and ferns terrestrial broadleaf forest system with a closed canopy of medium, deliquescent, deciduous trees, a closed subcanopy of small, deliquescent, deciduous trees and transgressives, a very sparse shrub layer of normal shrubs, a very sparse vine layer of woody and herbaceous vines, and a closed herb layer of mixed forbs, graminoids, and ferns. Climatically: Warm temperate, mesothermal climate: similar to the natural area climate and local climate of cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period, and cooler than the sectional climate of cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. Pedologically: Loamy skeletal, mixed, mesic, Typic Udorthent of undetermined series. Geologically: Mixed clastic and chemical, alluvially and marine deposited mixed calcareous, dolomitic, ferruginous and siliceous Rome Shale with lenses of fine grained to saccharoidal dolomite and dolomitic limestone, striking N 105°E and dipping N 8°W, densely exposed as outcrops. Hydrologically: Well drained, permanently exposed, dry mesic terrestrial system wetted by fresh rains and downslope drainage. Topographically: Partly sheltered, east-northeast-facing, moderately steep base of the moderately steep lower slope of a water eroded mountain in a region of Low and High Mountains. Temporally and Spatially: A seral stage of a lithosere on a lower east-northeast-facing slope, underlain by the Middle Cambrian Rome Shale Formation, on Deer Park Mountain, west of Sugartree Branch, in the Southern Section of the Blue Ridge Province of the Appalachian Highlands.

POPULATION LEVEL INVENTORY OF *ARABIS PATENS* AT PLOT 13

1. Locality Reconnaissance.

   1. This site was first visited in 1981. Individuals of *Arabis patens* are scattered along the steep slope of the north facing bank of the French Broad from Hot Springs to Stokely Hollow, but this location had the greatest concentration of the species.

2. Authentication of Species.

   Herbarium sheets were studied before fieldwork was begun. A voucher specimen (Dawson Sather 1504) was collected.

3. Precise Location.

See Appendix II for directions to Plot 13.

4. Land Inventory.

See Introduction.

5. Population Inventory.

1. Population Size.

Units recognized were individual plants. Some had one to several stems, some were present as basal leaves only. A total of 95 units were counted in Plot 13.

2. Unit Distribution.

Distribution within the plot is approximately 1 unit per 4 meter^2.

3. Unit Demography.

At the time of this inventory (July 19, 1981) the species was in fruit. All units in this plot that had one or more stems emergent above the rosette had fruit present. Five classes were recognized:

A. Plants with rosettes or basal leaves only.

B. Plants with one fruiting stem present.

C. Plants with two fruiting stems present.

D. Plants with three fruiting stems present.

E. Plants with more than three fruiting stems present.

Class percentages and actual number of units per class:

Class	Percent	Total # of Units Counted
A	51.6%	49
B	35.8%	34
C	8.4%	8
D	2.1%	2
E	2.1%	2

4. Unit Phenology.

Fruiting or vegetative units were used in class designation for Unit Demography.

5. Unit Biotic Interrelationsips.

None observed.

6. Unit Vigor.

All fruiting stems were vigorous and seemed free from predation.

6. Habitat Inventory.
   1. Population Habitat.
      See Plot 13 analysis.
   2. Extrapopulation habitat.
      See Plot 13 Discussion.
7. Threat Inventory.
   1. Actual Threats.
      During the summer of 1981 a discarded clothes washing machine was thrown down the slope and wiped out several *Arabis patens*. The garbage on this slope attests to the regularity with which dumping occurs from above.
   2. Potential Threats.
      Timbering operations could easily upset this fragile slope.

COMMUNITY DIVERSITY SUMMARY 14

Plot 14, Mine Hollow *Hydrastis* slope

Terrestrial broadleaf forest system
Large, deliquescent, deciduous trees

Mixed hardwoods cove
Canopy: *Tilia floridana*
Juglandalean-Magnolialean-Coniferalean-hardwood/Lauralean-Mixed hardwoods///Mixed forbs, graminoids, and ferns.

JUGLANS NIGRA-LIRIODENDRON TULIPIFERA-PINUS STROBUS-HARDWOOD/ LINDERA BENZOIN-MIXED HARDWOODS///MIXED FORBS, GRAMINOIDS, AND FERNS

Juglans nigra-Liriodendron tulipifera-Pinus strobus-Hardwood

CLIMATE: A. Mesothermal; AA. Warm temperate. B. Cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period; BB. Cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. C. Similar to local climate; CC. Similar to natural area climate.

SOILS: A. - BB. Not determined. C. Fine loamy, mixed, mesic. CC. Series not determined; see discussion for Plot 14.

A hor.: 0-14 cm., dark brown clay loam, pH 7.0.

GEOLOGY: A. Sedimentary; AA. Mixed clastic and chemical. B. Calcareous and siliceous; BB. Marine deposition. C. Honaker Formation Limestone exposed as bluffs, outcrops, and in streamcuts. CC. Honaker Formation Limestone densely exposed as outcrops.

HYDROLOGY: A. Terrestrial; AA. Dry-mesic. B. Fresh; BB. Permanently exposed. C. Well drained; CC. Well drained, wetted by fresh rains and downslope drainage.

TOPOGRAPHY: A. Hills and Mountains; AA. Low and High Mountains. B. Water eroded mountain; BB. Water eroded slope. C. Partly sheltered, east-facing, nearly level, slightly irregular bottom of Mine Hollow; CC. Sheltered, north-northeast-facing, nearly level, irregular slope along the bottom of Mine Hollow.

PHYSIOGRAPHY: A. Appalachian Highlands; AA. Blue Ridge Province. B. Southern

Section; BB. Mine Hollow. C. Bottom of Mine Hollow; CC. North-northeast-facing slope along the bottom of Mine Hollow, underlain by the Middle Cambrian Honaker Formation Limestone.

CANOPY: Juglans nigra - Height not determined, dbh 24.6", age not determined.
Liriodendron tulipifera - Height 55', dbh 21.2", age not determined.

CANOPY DOMINANTS: Juglans nigra, Liriodendron tulipifera, Pinus strobus

CANOPY PHYSIOGNOMY: Large, deliquescent, deciduous trees.

Canopy Analysis

Species	# of stems	total basal area	Rel. Den.	Rel. Dom.	IV
Juglans nigra	1	475.3	25.0	31.2	56.2
Liriodendron tulipifera	1	363.1	25.0	27.3	52.3
Pinus strobus	1	353.0	25.0	26.9	51.9
Tilia floridana	1	103.9	25.0	14.6	39.6

Plot size: 20 m x 20m Total basal area: 1,295.3 inches^2, 8,354.7 cm.^{2}

CANOPY SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

CANOPY ANALYSIS: Data from quarter point analysis of area contiguous to Plot 14:

Species	Rel Freq.	Rel. Den.	Rel. Dom.	IV
Pinus strobus	23.5	37.5	40.2	101.2
Platanus occidentalis	11.7	12.5	18.6	42.8
Liriodendron tulipifera	11.7	12.5	3.0	27.2
Ulmus rubra	11.7	8.3	5.7	25.7
Fagus grandifolia	5.9	4.2	14.0	25.1
Celtis laevigata	5.9	4.2	5.4	15.5
Robinia pseudo-acacia	5.9	4.2	4.0	14.1
Carya cordiformis	5.9	4.2	3.6	13.7
Fraxinus americana var. biltmoreana	5.9	4.2	2.5	12.6
Ostrya virginiana	5.9	4.2	2.0	12.1
Tsuga canadensis	5.9	4.2	0.9	11.0

Number of points: 6 d: 22.4'

SUBCANOPY: Lindera benzoin - Height 12', dbh and age not determined.

SUBCANOPY DOMINANTS: None.

SUBCANOPY PHYSIOGNOMY: Not applicable.

SUBCANOPY SPECIES PRESENT IN PLOT: Presence list with cover estimates:

Acer rubrum	R
Betula lenta	R
Celtis laevigata	R
Cercis canadensis	10%
Cornus florida	5%
Fraxinus americana var. biltmoreana	5%
Lindera benzoin	40%
Liriodendron tulipifera	5%
Quercus muehlenbergii	R
Tsuga canadensis	5%
Ulmus rubra	10%

SUBCANOPY SPECIES PRESENT, BUT NOT IN ANALYSIS: None.

SHRUB LAYER DOMINANTS: None.

SHRUB LAYER PHYSIOGNOMY: Not applicable.

SHRUB SPECIES PRESENT IN PLOT: Tall dwarf shrub: Euonymus americanus.

VINE LAYER DOMINANT: None.

VINE LAYER PHYSIOGNOMY: Not applicable.

VINE SPECIES PRESENT IN PLOT: Woody vines: Lonicera japonica, Parthenocissus quinquefolia, Rhus radicans. Herbaceous vine: Dioscorea villosa.

HERB LAYER DOMINANTS: None.

HERB LAYER PHYSIOGNOMY: Not applicable.

Herb Analysis

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S
Tall forbs						
Circaea lutetiana ssp. canadensis	H7	-	-	-	+.1	-

Herb Analysis (continued)

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S
Tall forbs						
Cryptotaenia canadensis	H7	-	-	-	+.1	+.1
Geum canadense	H7	+.1	-	-	-	R.1
Impatiens pallida	H7	+.1	1.1	-	1.1	-
Laportea canadensis	H7	4.1	-	-	1.1	+.1
Medium forbs						
Arisaema triphyllum	H7	-	-	+.1	-	R.1
Galium triflorum	H7	2.1	-	R.1	-	-
Hybanthus concolor	H7	2.1	1.1	1.1	1.1	2.2
Hydrastis canadensis	H11	-	-	-	4.4	3.3
Polygonatum biflorum	H11	-	-	+.1	-	-
Ranunculus recurvatus	H7	+.1	-	-	-	-
Small forbs						
Duchesnia indica	H14	-	-	+.1	+.1	2.1
Hepatica acutiloba	H13	+.1	-	-	-	-
Pilea pumila	H7	-	-	-	1.1	+.1
Thalictrum dioicum	H7	-	-	R.1	-	-
Viola papilionacea	H13	2.3	-	+.1	+.1	+.1
Very small forb						
Sedum ternatum	H15	2.3	2.2	1.2	1.2	1.2
Tall graminoid						
Bromus purgans	H8	-	+.1	-	-	-
Medium graminoids						
Carex laxiflora	H8	1.1	-	-	-	-
Panicum sp.	H8	+.1	-	-	-	-
Small graminoid						
Microstegium vimineum	H8	1.1	1.2	4.4	+.1	+.1
Tall ferns						
Cystopteris bulbifera	H11	-	-	-	1.1	+.1
Polystichum acrostichoides	H11	1.2	-	-	-	-
Small fern						
Asplenium rhizophyllum	H11	-	+.1	-	+.1	-

Number of releves: 5 Releve size: 1 m x 1 m

HERB SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: Tall forb: Cimicifuga racemosa. Medium forbs: Phryma leptostachya. Small forbs: Orchis spectabilis, Oxalis stricta, Sanguinaria canadensis. Medium fern: Adiantum pedatum. Small fern: Asplenium resiliens.

SEEDLINGS PRESENT IN PLOT: Acer rubrum, Fraxinus sp., Pinus strobus.

COMMUNITY REFERENCES: None.

COMMUNITY DOCUMENTATION: Area analyzed during the summer of 1981 by Dawson Sather, Botany Department, University of North Carolina at Chapel Hill. Specimens deposited at NCU.

COMMUNITY ECOLOGICAL CHARACTERIZATION: Vegetationally: Juglandalean-Magnolialean-Coniferalean-Hardwood/Lauralean-Mixed hardwoods///Mixed forbs, graminoids, and ferns terrestrial broadleaf forest system with a closed canopy of large, deliquescent, deciduous trees, a closed subcanopy of small, deliquescent, deciduous trees, a very sparse shrub layer of trailing shrubs, a very sparse vine layer of woody and herbaceous vines, and a closed herb layer of mixed forbs, graminoids, and ferns. Climatically: Warm temperate, mesothermal climate: similar to the natural area and local climate of cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period, and cooler than the sectional climate of cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. Pedologically: Fine-loamy, mixed, mesic soil of undetermined series. Geologically: Mixed clastic and chemical, marine deposited calcareous and siliceous limestone of the Honaker Formation, densely exposed as outcrops. Hydrologically: Well drained, permanently exposed, dry mesic terrestrial system wetted by fresh rains and downslope drainage. Topographically: Sheltered, north-northeast-facing, nearly level, irregular slope of an east-facing, nearly level, slightly irregular bottom on a water eroded mountain in a region of Low and High Mountains. Temporally and Spatially: A topoedaphic climax of a lithosere on a north-northeast-facing slope, underlain by the Middle Cambrian Honaker Limestone Formation, at Mine Hollow in the Southern Section of the Blue Ridge Province of the Appalachian Highlands.

POPULATION LEVEL INVENTORY OF HYDRASTIS CANADENSIS AT PLOT 14

1. Locality Reconnaissance.

Site was first visited in April, 1980. During the summer of 1981, further intensive searches were made in Mine Hollow for other individuals of *Hydrastis canadensis*. Plot 14 represents the only central location of goldenseal in the Hot Springs Valley that was found during this investigation. No other stems of this species were found along the base of the outcrop that follows the east-west flow of Mine Creek; 3 stems were found several meters north of the creek opposite Plot 14.

2. Authentication of Species.

1. This species is easily recognized in Flower and fruit. A voucher specimen for this site is at NCU (NCU 398206, Steve W. Leonard 3161).

3. Precise Location.

See Appendix II for directions to Plot 14.

4. Land Inventory.

See Introduction.

5. Population Inventory.

1. Population Size.

Due to the rhizomatous growth form of *Hydrastis canadensis*, only the above-ground stalks bearing one or more blades were recognized as units. A total of 173 stalks were counted.

2. Unit Distribution.

The goldenseal forms a lush cover during mid-summer in this very restricted area between the limestone outcrop and Mine Creek, reaching a peak density of approximately 35 stalks per meter^2.

3. Unit Demography.

At the time of this inventory (July 7, 1981), mature fruit was present. No stems showed evidence of fruit that had fallen off prior to the site visit. Above-ground stalks were split into 2 classes.

A. Above-ground stalks, purely vegetative.

B. Above-ground stalks, fruit present.

Class percentages and actual number of units per class:

Class	Percent	Total # of Units Counted
A	78%	135
B	22%	38

4. Unit Phenology.

Fruiting or vegetative units were used in class designation for Unit Demography.

5. Unit Biotic Interrelationships.

None observed.

6. Unit Vigor.

The plants here were uniformly vigorous and robust. All berries were black-red and ripe. No evidence of predation was seen.

6. Habitat Inventory.

1. Population Habitat.

1,2,3. Vegetatation, Climate, Soils - see Plot 14 analysis.

4. Geology.

The population occurs at the base of a limestone outcrop that trends east-west along the north facing slope of Mine Creek. While numerous small exposures occur in the area of the population, the goldenseal is not restricted to the exposed lime, but is rooted in the areas of soils developed between the major outcrops and the creek.

5,6,7. Hydrology, Topography, Physiography - see Plot 14 analysis.

2. Extrapopulation Habitat.

See Plot 14 discussion.

7. Threat Inventory.

1. Actual Threats.

A very small cave (little more than a crawl space several feet into the outcrop) several meters upstream from the population draws occasional traffic, enough that there is a small footpath leading to it off of the main trail up Mine Hollow. The small cave, and not the Hydrastis, seems to be the center of most visitors' attention.

2. Potential Threats.

This site is the most threatened of all sites studied in the Hot Springs Valley. During the summer of 1981 excavation and grading of CR 1303 along Lower Shut In was completed, and the road will soon be paved. The entire lower section of the Hollow, over 100 acres, is owned by the Anderson Investment Corporation of Asheville, NC. The gentle slope of the Hollow, now undeveloped, would make excellent homesites for subdivision were the owner so inclined. This threat far outshadows whatever danger herb collectors may present for this site.

COMMUNITY DIVERSITY SUMMARY 15

Plot 15, Mine Ridge

Terrestrial broadleaf forest system
Medium, deliquescent, deciduous trees

Oak-Juniper slope
Canopy: Quercus rubra
Fagalean-Coniferalean-Mixed hardwoods/Dipsicalean-Fagalean Mixed hardwoods///Mixed forbs, graminoids, and ferns.

QUERCUS MUEHLENBERGII-JUNIPERUS VIRGINIANA-MIXED HARDWOODS/VIBURNUM PRUNIFOLIUM-OSTRYA VIRGINIANA-MIXED HARDWOODS///MIXED FORBS, GRAMINOIDS, AND FERNS

Quercus muehlenbergii-Juniperus virginiana-Mixed hardwoods

CLIMATE: A. Mesothermal; AA. Warm temperate. B. Cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period; BB. Cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. C. Similar to local climate; CC. Similar to natural area climate.

SOILS: A. - BB. Not determined. C. Fine loamy, mixed, mesic. CC. Series not determined.

O1 hor.: 0-4 cm.

A hor.: 4-10 cm., dark brown clay loam, pH 7.0.

B hor.: 10-32 cm., dark reddish brown clay loam, pH 7.0.

GEOLOGY: A. Sedimentary; AA. Mixed clastic and chemical. B. Calcareous and siliceous; BB. Marine deposition. C. Honaker Formation Limestone exposed as bluffs, outcrops, and in streamcuts. CC. Honaker Formation Limestone very densely exposed as a series of small bluffs and outcrops.

HYDROLOGY: A. Terrestrial; AA. Dry-mesic. B. Fresh; BB. Permanently exposed. C. Well drained; CC. Well drained, wetted by fresh rains and downslope drainage.

TOPOGRAPHY: A. Hills and mountains; AA. Low and High Mountains. B. Water eroded mountain; BB. Upper slopes and crest. C. Eastern end of ridge; CC. Open, southeast-facing, very rocky and irregular, very steep, convex eastern end of an east-west runnung ridge.

PHYSIOGRAPHY: A. Appalachian Highlands; AA. Blue Ridge Province. B. Southern Section; BB. Mine Ridge. C. Eastern end of Mine Ridge; CC. Southeast-facing slope at the eastern end of Mine Ridge, underlain by the Middle Cambrian Honaker Limestone Formation.

CANOPY: Quercus muehlenbergii - Height 30', dbh 12.0", age not determined.
Juniperus virginiana - Height 35', dbh 15.5", age not determined.
CANOPY DOMINANTS: Quercus muehlenbergii, Juniperus virginiana, Mixed hardwoods.
CANOPY PHYSIOGNOMY: Medium, deliquescent, deciduous trees.

Canopy Analysis

Species	# of stems	total basal area	Rel. Den.	Rel. Dom.	IV
Quercus muehlenbergii	8	545.5	38.1	42.4	80.4
Juniperus virginiana	4	474.1	19.0	36.8	55.8
Quercus rubra	5	207.0	23.8	16.1	39.9
Carya cordiformis	2	42.5	9.5	3.3	12.8
Juglans nigra	2	19.2	9.5	1.5	11.0

Plot size: 20 m x 20 m Total basal area: 1,288.3 inches^2, 8,309.5 cm.^{2}
CANOPY SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

SUBCANOPY: Viburnum prunifolium - Height 12', dbh 3.0", age not determined.
Ostrya virginiana - Height 10', dbh 2.5", age not determined.
SUBCANOPY DOMINANTS: Viburnum prunifolium, Ostrya virginana, Mixed hardwoods.
SUBCANOPY PHYSIOGNOMY: Small, deliquescent, deciduous trees.

Subcanopy Analysis

Species	# of stems	total basal area	Rel. Den.	Rel. Dom.	IV
Viburnum prunifolium	40	33.0	52.6	23.4	76.0
Ostrya virginiana	16	44.5	21.1	31.6	52.7
Cornus florida	3	35.4	3.9	25.1	29.0

Subcanopy Analysis (continued)

Species	# of stems	total basal area	Rel. Den.	Rel. Dom.	IV
Cercis canadensis	7	9.4	9.2	6.7	15.9
Ulmus alata	3	12.0	3.9	8.5	12.4
Quercus rubra	2	1.7	2.6	1.2	3.8
Celtis occidentalis	1	2.5	1.3	1.8	3.1
Ulmus rubra	2	0.8	2.6	0.5	3.1
Fraxinus americana var. biltmoreana	1	1.1	1.3	0.8	2.1
Carya ovalis	1	0.5	1.3	0.4	1.7

Plot size: 20 m x 20 m Total basal area: 140.9 inches^2, 908.8 cm.^{2}

SUBCANOPY SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

SHRUB LAYER DOMINANTS: None.

SHRUB LAYER PHYSIOGNOMY: Not applicable.

SHRUB SPECIES PRESENT IN PLOT: Normal shrub: Philadelphus hirsutus.

VINE LAYER DOMINANATS: None.

VINE LAYER PHYSIOGNOMY: Not applicable.

Vine Analysis

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S	6 C.S	7 C.S	8 C.S
Woody vines									
Aristolochia macrophylla	H19	-	-	-	-	-	R.1	-	-
Parthenocissus quinquefolia	H16	-	-	-	-	1.1	-	-	-
Rhus radicans	H16	-	-	-	+.1	-	-	1.1	-
Vitis rotundifolia	H18	-	R.1	-	-	-	-	-	-
Vitis labrusca	H18	-	-	-	R.1	-	-	-	-
Herbaceous vine									
Smilax bona-nox	H18	-	R.1	-	-	+.1	-	-	-

Number of releves: 8 Releve size: 1 m x 1 m

VINE SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: None.

HERB LAYER DOMINANTS: None.

HERB LAYER PHYSIOGNOMY: Not applicable.

Herb Analysis

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S	6 C.S	7 C.S	8 C.S
Tall forbs									
Anemone virginiana	H7	+.1	R.1	R.1	-	-	-	-	-
Aureolaria sp.	H7	-	-	-	-	-	-	-	1.1
Helianthus divaricatus	H7	-	-	+.1	-	+.1	R.1	-	+.1
Solidago sphaceleta	H7	-	+.1	-	-	-	-	-	R.1
Medium forbs									
Agrimonia pubescens	H7	+.1	+.1	+.1	-	R.1	R.1	-	-
Arabis sp.	H7	-	-	-	-	-	R.1	-	R.1
Aster divaricatus	H7	3.2	-	-	+.1	-	-	2.1	+.1
Cynoglossum virginianum	H7	-	-	-	R.1	-	-	-	-
Desmodium glutinosum	H7	-	-	-	-	5.1	-	-	-
Erigeron pulchellus	H7	+.1	-	-	1.1	+.1	-	-	+.1
Galium circaezans	H7	-	-	-	-	-	+.1	-	+.1
Hybanthus concolor	H7	+.1	-	-	-	-	-	-	-
Monarda clinopodia	H7	-	-	+.1	-	-	-	-	-
Penstemon smallii	H7	-	-	-	-	-	-	+.1	-
Sanicula canadensis	H7	-	-	-	-	-	+.1	-	+.1
Taenidia integerrima	H7	-	-	-	-	-	-	-	+.1
Small forbs									
Clitoria mariana	H7	-	+.1	+.1	-	-	-	-	-
Hepatica acutiloba	H13	-	+.1	-	+.1	+.1	1.1	-	-
Iris verna var. smalliana	H11	1.1	-	-	-	-	-	-	-
Thalictrum sp.	H7	+.1	+.1	+.1	+.1	-	-	-	-
Viola sp.	H13	-	-	+.1	-	+.1	-	-	-

Herb Analysis (continued)

Species	GF	1 C.S	2 C.S	3 C.S	4 C.S	5 C.S	6 C.S	7 C.S	8 C.S
Very small forbs									
Hexastylis virginica	H11	-	-	-	-	-	R.1	-	-
Sedum ternatum	H15	-	-	-	-	-	-	+.1	+.1
Tall graminoid									
Bromus purgans	H8	-	-	-	-	-	-	-	+.1
Medium graminoids									
Carex laxiflora	H8	-	-	-	R.1	-	-	-	-
Carex plantaginea	H8	-	-	+.1	-	-	-	-	-
Muhlenbergia tenuifolia	H8	+.1	-	2.1	-	-	-	-	-
Panicum sp.	H8	-	+.1	1.1	+.1	+.1	1.1	-	+.1
Small ferns									
Asplenium platyneuron	H11	-	-	-	-	-	-	+.1	R.1
Asplenium resiliens	H11	-	R.1	-	-	-	-	R.1	R.1
Pellaea atropurpurea	H11	-	+.1	-	-	-	+.1	-	-

Number of releves: 8 Releve size: 1 m x 1 m

HERB SPECIES PRESENT IN PLOT, BUT NOT IN ANALYSIS: Medium forbs: *Arisaema triphyllum*, *Salvia lyrata*. Small forb: *Chimaphila maculata*. Medium graminoid: *Brachyelytrum erectum*. Small fern: *Botrychium dissectum*.

SEEDLINGS PRESENT IN PLOT: *Celtis* sp., *Cornus florida*, *Juniperus virginiana*, *Liriodendron tulipifera*, *Magnolia acuminata*, *Prunus serotina*, *Robinia pseudoacacia*, *Sassafras albidum*, *Ulmus rubra*.

COMMUNITY REFERENCES: None.

COMMUNITY DOCUMENTATION: Area analyzed during the summer of 1981 by Dawson Sather, Botany Department, University of North Carolina at Chapel Hill. Specimens deposited at NCU.

COMMUNITY ECOLOGICAL CHARACTERIZATION: *Vegetationally*: Fagalean-Coniferalean-Mixed hardwoods/Dipsicalean-Fagalean-Mixed hardwoods///Mixed forbs, graminoids, and ferns terrestrial broadleaf forest system with a closed canopy of medium, deliquescent, deciduous trees, a closed subcanopy of small, deliquescent, deciduous

trees, a very sparse shrub layer, a sparse vine layer of woody and herbaceous vines, and a closed herb layer of mixed forbs, graminoids, and ferns. Climatically: Warm temperate, mesothermal climate: similar to the natural area and local climate of cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, adn an average freeze-free period, and cooler than the sectional climate of cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. Pedologically: Fine loamy, mixed, mesic soil of undetermined series. Geologically: Mixed clastic and chemical, marine deposited, calcareous and siliceous limestone of the Honaker Formation, very densely exposed as a series of small bluffs and outcrops. Hydrologically: Well drained, permanently exposed, dry mesic terrestrial system wetted by fresh rains and downslope drainage. Topographically: Open, southeast facing, very rocky and irregular, steep, convex eastern end of an east-west running ridge in a region of Low and High Mountains. Temporally and Spatially: A seral stage of a lithosere on a southeast facing slope, underlain by the Middle Cambrian Honaker Limestone Formation, at Mine Ridge in the Southern Section of the Blue Ridge Province of the Appalachian Highlands.

COMMUNITY DIVERSITY SUMMARY 16

Rudisill's Floodplain

Terrestrial broadleaf forest system

Medium to large, deliquescent, deciduous trees

Silver maple-Mixed hardwoods floodplain

Sapindales-Mixed hardwoods////Poaceae

ACER SACCHARINUM-MIXED BOTTOMLAND HARDWOODS////MICROSTEGIUM VIMINEUM

Acer saccharinum-Mixed bottomland hardwoods

CLIMATE: A. Mesothermal; AA. Warm temperate. B. Cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period; BB. Cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. C. Similar ot local climate; CC. Similar to natural area climate.

SOILS: A. Entisol; AA. Fluvent. B. Udifluvent; BB. Typic Udifluvent. C. Coarse-loamy, mixed, mesic, Typic Udifluvent; CC. Series not determined.

A1: 0-18 in., brown to dark brown sandy loam, pH 5.0.

A2: 18-24 in., dark yellowish brown sandy loam, pH 5.0.

A3: 24-36 in., dark yellowish brown coarse sand, pH undetermined.

GEOLOGY: A. Sedimentary; AA. Clastic. B. Siliceous; BB. Floodplain. C. Interbedded, unconsolidated silts and sands, mixed with larger rock fragments; CC. Same as C.

HYDROLOGY: A. Riverine; AA. Upper perennial. B. Fresh; BB. Intermittently flooded. C. Well drained; CC. Well drained, wetted by fresh rains and occasional flooding.

TOPOGRAPHY: A. Hills and Mountains; AA. Low and High Mountains. B. Water eroded river valley; BB. Water eroded slope. C. Sheltered, east-northeast facing, gently sloping, slightly irregular floodplain; CC. Same as C.

PHYSIOGRAPHY: A. Appalachian Highlands; AA. Blue Ridge Province. B. Southern Section; BB. Deer Park Mountain. C. Lower slope of Deer Park Mountain; CC. Floodplain of recent sediments at the base of Deer Park Mountain, underlain by the Erwin Formation Sandstone.

CANOPY: Liquidambar styraciflua - Height 40', dbh 8", Age 120 years.
CANOPY DOMINANTS: Acer saccharinum-Mixed bottomland hardwoods
CANOPY PHYSIOGNOMY: Medium to large, deliquescent, deciduous trees.

Canopy Analysis

Species	Rel. Den.	Rel. Dom.	Rel. Freq.	IV
Acer saccharinum	37.5	47.4	21.4	106.3
Liquidambar styraciflua	16.7	32.7	21.4	70.8
Betula nigra	16.7	7.9	21.4	46.0
Robinia pseudo-acacia	8.3	3.3	14.3	25.9
Ulmus americana	12.5	5.1	7.1	24.7
Quercus velutina	4.2	2.3	7.1	13.6
Platanus occidentalis	4.2	1.2	7.1	12.5

# of points: 6 d: 8.0 meters # of individuals per acre: 207
CANOPY SPECIES PRESENT, BUT NOT IN ANALYSIS: Large tree: Celtis laevigata. Small tree: Fagus grandifolia.

SUBCANOPY: Height, dbh, and age not determined.
SUBCANOPY DOMINANTS: Halesia carolina-Mixed hardwoods.
SUBCANOPY PHYSIOGNOMY: Small to medium, deliquescent, deciduous trees.
SUBCANOPY ANALYSIS: Only a species presence list completed: Acer saccharinum, Betula nigra, Fagus grandifolia, Halesia carolina, Ilex opaca, Liquidambar styraciflua, Quercus velutina.

SHRUB LAYER DOMINANTS: None.
SHRUB LAYER PHYSIOGNOMY: Not applicable.
SHRUB SPECIES PRESENT: Small shrub: Euonymus americana.

VINE LAYER DOMINANTS: None.
VINE LAYER PHYSIOGNOMY: Not applicable.
VINE SPECIES PRESENT: Woody vines: Lonicera japonica, Rhus radicans. Herbaceous vine: Smilax sp.

HERB LAYER DOMINANTS: Microstegium vimineum.

HERB LAYER PHYSIOGNOMY: Medium, caulescent graminoid.

HERB SPECIES PRESENT: Medium graminoid: Microstegium vimineum. Fern ally: Equisetum arvense.

COMMUNITY REFERENCES: None.

COMMUNITY DOCUMENTATION: Area analyzed by Dr. A.E Radford's Botany 235 class, University of North Carolina at Chapel Hill, on September 19, 1980. Specimens deposited at NCU by L. Radford and W. Sheftall.

COMMUNITY ECOLOGICAL CHARACTERIZATION: Vegetationally: Sapindalean-Mixed hardwood////Poaceae terrestrial broadleaf forest system with a closed canopy of medium to large, deliquescent, deciduous trees, a sparse shrub layer, and a closed herb layer of medium graminoids. Climatically: Warm temperate, mesothermal climate: similar to the natural area and local climate of cool and moderately moist yearly, with warm and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period, and cooler than the sectional climate of cool and moist yearly, with moderately hot and moderately wet summers, moderately warm and moderately dry winters, and an average freeze-free period. Pedologically: Coarse loamy, mixed, mesic, Typic Udifluvent of undetermined series. Geologically: Clastic, siliceous, sedimentary river floodplain deposit consisting of interbedded, unconsolidated silts and sands, mixed with larger rocks fragments. Hydrologically: Well drained, intermittently flooded, upper perennial riverine system, wetted by fresh rains and occasional flooding. Topographically: Sheltered, east-northeast facing, gently sloping slightly irregular fllodplain in a broad north-south running portion of a river valley in a region of Low and High Mountains. Temporally and Spatially: A disclimax of a pelopsammosere on a river floodplain of recent alluvial sediments, underlain by the Lower Cambrian Erwin Formation Sandstone, on the French Broad River at the base of Deer Park Mountain in the Southern Section of the Blue Ridge Province of the Appalachian Highlands.

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APPENDIX I

Appendix I is the master species presence list for all vascular plants found within the study area. The families and species are arranged alphabetically within the major groups of Angiosperms, Gymnosperms, Ferns and Fern Allies.

Nomenclature follows Radford, Ahles, and Bell (1968), except in the Asteraceae (Cronquist, 1981) and the genus Heuchera (Wells 1977).

An asterisk (*) indicates a species' presence within these areas of the Hot Springs Valley:

- Numbers 1 - 16 refer to the 20 m x 20 m permanent plots.
- A refers to the Paint Rock area, from the NC-TN border at Paint Rock bluffs back upriver to Polecat Branch.
- B includes the area along CR 1304, from the USFS boundary at Plot 5 then downriver to Polecat Branch.
- C includes Lover's Leap Ridge and the slopes on the river side of that ridge, running upriver to Deepwater trestle.
- D includes the area that begins just west of Hot Springs and follows the northeast facing bank of the river to Sugartree Branch, north of US 25-70.
- E includes the area downriver from the north side of Sugartree Branch, along the river to Stokely Hollow, north of US 25-70.
- G refers to the length of the valley from Deepwater trestle to Paint Rock, exclusive of the areas enumerated above.

ANGIOSPERMS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G
Acanthaceae																							
Justicia americana (L.) Wahl.																		*					
Ruellia caroliniensis (Walker) Steudel																		*				*	
Aceraceae																							
Acer negundo L.									*									*		*	*	*	
Acer pensylvanicum L.																	*		*			*	
Acer rubrum L.	*	*				*		*	*					*			*	*	*	*	*	*	
Acer saccharinum L.																*							*
Acer saccharum Marshall ssp. *saccharum*			*							*	*	*	*				*	*		*	*	*	
Alismataceae																							
Alisma plantago-aquatica L.																							*
Anacardiaceae																							
Rhus copallina L.									*										*				
Rhus radicans L.		*		*		*	*		*				*	*	*		*	*	*	*	*	*	
Annonaceae																							
Asimina triloba (L.) Dunal.																	*	*		*	*	*	
Apiaceae																							
Anthriscus scandicina (Weber) Mansfield									*											*			
Cicuta maculata L.																							*
Cryptotaenia canadensis (L.) DC.												*		*						*	*	*	
Eryngium prostratum Nuttall																		*					
Osmorhiza claytonii (Michaux) Clarke												*								*	*	*	
Sanicula canadensis L.					*	*				*					*			*		*	*	*	
Sanicula gregaria Bicknell												*									*	*	
Sanicula trifoliata Bicknell												*	*							*	*		
Taenidia integerrima (L.) Drude				*									*		*			*		*	*	*	

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G
Thaspium barbinode (Michaux) Fernald										*	*	*	*							*	*	*	
Thaspium pinnatifidum (Buckley) Gray					*													*					
Thaspium trifoliatum (L.) Gray																						*	
Torilis arvensis (Hudson) Link									*											*	*		
Zizia trifoliata (Michaux)			*							*							*			*	*	*	
Apocynaceae																							
Amsonia tabernaemontana Walter				*														*					
Vinca minor																					*		
Aquifoliaceae																							
Ilex ambigua (Michaux) Torrey var. *montana* (T.& G.) Ahles																		*	*				
Ilex opaca Aiton	*					*											*	*	*	*	*	*	
Araceae																							
Arisaema triphyllum (L.) Schott			*			*				*	*	*		*	*		*	*	*	*	*	*	
Araliaceae																							
Aralia racemosa L.																			*		*		
Panax quinquefolium L.											*									*			
Aristolochiaceae																							
Aristolochia macrophylla Lam.									*	*		*			*					*	*		
Asarum canadense L.																				*	*	*	
Hexastylis virginica (L.) Small															*					*	*	*	
Hexastylis sp.																					*	*	
Asclepiadaceae																							
Asclepias incarnata L.																		*					
Asclepias tuberosa L.				*	*													*	*				
Asclepias sp.									*									*	*				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G
Matelea obliqua (Jacquin) Woodson					*													*					
Matelea sp.																		*	*				
Asteraceae																							
Ambrosia artemisiifolia (L.) BSP									*								*	*	*	*	*		
Ambrosia trifida L.											*										*		
Antennaria plantaginifolia Rydberg				*													*	*	*	*	*	*	
Arctium minus (Hill) Bernh.																				*			
Aster acuminatus Michaux			*														*	*					
Aster divaricatus L.			*	*		*	*			*		*	*		*		*	*	*	*	*	*	
Aster infirmus Michaux																		*					
Aster patens Aiton																		*					
Aster undulatus L.													*								*	*	
Aster sp.						*			*	*							*	*	*	*	*	*	
Cacalia atriplicifolia L.			*														*	*			*		
Chrysanthemum leucanthemum L.									*									*		*			
Cichorium intybus L.									*									*		*			
Conyza canadensis (L.) Cronquist																		*					
Coreopsis major Walter	*	*															*	*	*				
Elephantopus carolinianus Willd.																	*	*	*				
Elephantopus tomentosus L.																			*				
Erechtites hieracifolia (L.) Raf.																		*					
Erigeron annuus (L.) Persoon																		*					
Erigeron canadensis L.					*													*	*	*			
Erigeron pulchellus Michaux										*					*			*	*	*	*	*	
Erigeron strigosus var. *beyrichii* (Fischer & Meyer) A. Gray																		*					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G
Eupatorium fistulosum Barratt						*													*				
Eupatorium purpureum L.												*								*	*		
Eupatorium rugosum Houttuyn					*					*	*							*		*	*	*	
Eupatorium sessilifolium L.																		*					
Eupatorium sp.																		*				*	
Galinsoga quadriradiata Ruiz & Pavon									*											*	*		
Gnaphalium obtusifolium L.	*																*	*		*			
Helianthus divaricatus L.				*						*					*			*	*			*	
Helianthus microcephalus T. & G.			*										*				*				*		
Heliopsis helianthoides (L.) BSP																						*	
Hieraceum scabrum Michaux																	*					*	
Hieraceum venosum L.	*	*		*				*									*	*	*				
Lactuca floridana (L.) Gaertner			*		*												*	*	*	*			
Lactuca sp.																						*	
Polymnia canadensis L.			*				*		*		*	*	*				*	*	*	*	*		
Polymnia uvedalia L.											*						*			*			
Prenanthes trifoliata (Cassini) Fernald																		*					
Prenanthes sp.																			*				
Rudbeckia laciniata L.																				*		*	
Senecio anonymus A. Wood																		*			*	*	
Senecio aureus L.					*												*	*		*	*	*	
Senecio obovatus Muhl. ex. Willd.																						*	
Senecio pauperculus Michaux																		*					
Silphium compositum Michaux var. compositum																		*					
Solidago arguta Aiton																		*					

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G
Solidago curtissi T. & G.												*								*	*		
Solidago flexicaulis L.											*										*		
Solidago gigantea Aiton																					*		
Solidago juncea Aiton	*	*		*				*		*							*	*	*	*	*		
Solidago sphacelata Raf.										*					*					*	*	*	
Sonchus asper (L.) Hill									*									*		*			
Verbesina alternifolia (L.) Britt.			*			*					*						*	*	*	*	*	*	
Vernonia gigantea (Walter) Trelease ex Branner & Coville																		*					
Vernonia noveboracensis (L.) Walter																		*					
Vernonia occidentalis (L.) Walter																		*					
Balsaminaceae																							
Impatiens capensis Meerb.						*												*	*	*			
Impatiens pallida Nuttall											*	*		*						*	*	*	
Berberidaceae																							
Berberis thunbergii DC																				*	*		
Caulophyllum thalictroides (L.) Michaux											*	*								*	*	*	
Podophyllum peltatum L.											*									*	*	*	
Betulaceae																							
Alnus serrulata (Aiton) Willd.																		*	*	*	*	*	
Betula lenta L.														*					*	*		*	
Betula nigra L.						*			*								*	*	*	*	*		
Carpinus caroliniana Walter					*	*	*											*	*		*	*	
Corylus americana Walter											*							*	*	*	*	*	
Ostrya virginiana (Miller) K. Koch			*		*	*	*	*		*			*		*							*	
Bignoniaceae																							
Anisostichus capreolata	*		*			*	*		*	*	*						*	*	*	*	*	*	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G
Campsis radicans (L.) Seeman			*				*		*								*	*	*	*	*	*	
Boraginaceae																							
Cynoglossum virginianum L.															*							*	
Hackelia virginiana (L.) I.M. Johnson.																						*	
Brassicaceae																							
Alliaria petiolata (Bieb.) Cav. & Grande									*									*	*	*	*		
Arabis laevigata (Muhl. ex Willd.) Poiret			*	*		*						*					*	*	*	*	*	*	
Arabis lyrata L.																	*						
Arabis patens Sullivant									*		*		*					*		*	*		
Arabis sp.															*		*	*	*	*	*	*	
Cardamine bulbosa (Schreber) BSP						*													*				
Cardamine diphylla (Michaux) Wood											*							*	*	*	*	*	
Cardamine hirsuta L.																		*		*	*		
Draba rammosissima Desvaux				*					*	*								*		*			
Rorippa islandica (Oeder) Borbas																		*					
Cabombaceae																							
Brasenia schreberi Gmelin																		*					
Cactaceae																							
Opuntia humifusa (Raf.) Raf.																		*					
Calycanthaceae																							
Calycanthus floridus L. var. *laevigatus* (Willd.) T. & G.												*						*	*	*	*	*	
Campanulaceae																							
Campanula americana L.					*				*		*							*		*	*	*	
Campanula divaricata Michaux	*			*				*	*								*	*	*	*	*		
Lobelia amoena Michaux																		*					

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G
Lobelia cardinalis L.																		*					
Lobelia puberula Michaux																		*					
Lobelia sp.																		*					
Specularia perfoliata (L.) A. DC.									*										*	*	*		
Lonicera japonica Thunberg			*		*	*						*		*			*	*	*	*	*	*	
Sambucus canadensis L.									*			*						*		*	*		
Viburnum acerifolium L.			*	*						*			*				*	*	*	*	*		
Viburnum prunifolium L.															*							*	
Caryophyllaceae																							
Cerastium glomeratum Thullier									*									*		*	*		
Dianthus armeria L.																		*					
Paronychia canadensis (L.) Wood																		*			*		
Saponaria officinalis L.									*									*		*	*		
Silene antirrhina L.																		*		*	*		
Silene stellata (L.) Aiton f.				*						*								*		*	*	*	
Silene virginica L.				*													*	*	*	*	*	*	
Silene sp.																				*			
Stellaria media (L.) Cyrillo									*											*		*	
Stellaria pubera Michaux																				*			
Celastraceae																							
Euonymus americanus L.			*		*	*								*			*	*	*	*	*	*	
Chenopodiaceae																							
Chenopodium album L.									*									*		*			
Cistaceae																							
Lechea minor L.	*																*						

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G
Clethraceae																							
Clethra acuminata Michaux																	*						
Commelinaceae																							
Commelina communis L.																		*	*	*			
Commelina virginica L.			*	*	*												*	*					
Tradescantia subaspera Ker.				*	*	*			*									*	*	*	*		
Convolvulaceae																							
Cuscuta sp.									*		*					*		*		*	*		
Ipomoea sp.																		*					
Cornaceae																							
Cornus alternifolia L.f.																		*	*				
Cornus amomum Miller																		*	*				
Cornus florida L.			*	*	*	*				*			*	*	*		*	*	*	*	*	*	
Crassulaceae																							
Sedum ternatum Michaux											*		*	*	*		*	*	*	*	*	*	
Cyperaceae																							
Carex cephalophora Muhl. ex Schkuhr																		*					
Carex crinita Lam. var. *crinita*																		*					
Carex eburnea Boott.									*											*			
Carex intumescens Rudge																		*					
Carex laxiflora Lam.						*								*	*			*	*	*	*		
Carex pennsylvanica Lam. var. *distans* Peck			*														*						
Carex plantaginea Lam.					*					*		*	*		*			*		*	*	*	
Carex swanii (Fernald) Mackenzie																		*					
Carex sp.				*	*				*	*		*					*	*	*	*	*	*	
Eleocharis engelmanii Steudel																		*					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G
Eleocharis sp.																		*					
Diapensiaceae																							
Galax aphylla L.	*																*	*	*				
Dioscoreaceae																							
Dioscorea villosa L.							*			*	*	*	*	*				*	*	*	*	*	
Ebenaceae																							
Diospyros virginiana L.			*														*	*	*	*	*	*	
Ericaceae																							
Chimaphila maculata (L.) Pursh					*										*		*	*	*	*	*	*	
Epigaea repens L.	*																*	*	*				
Gaylussacia baccata (Wang.) K. Koch																		*	*				
Kalmia latifolia L.	*	*															*	*	*		*	*	
Leucothoe axillaris (Lam.) var. *editorum* (Fernald & Schubert) Ahles	*																*	*		*	*		
Lyonia ligustrina (L.) DC.																			*				
Monotropa uniflora L.																		*					
Oxydendrum arboreum (L.) DC.		*															*	*	*	*	*	*	
Rhododendron maximum L.	*																*	*	*	*	*	*	
Vaccinium stamineum L.	*	*		*				*									*	*	*	*	*	*	
Vaccinium vacillans Torrey	*	*						*									*	*	*	*	*	*	
Euphorbiaceae																							
Acalypha rhomboidea Raf.											*									*			
Euphorbia corollata L.																		*				*	
Euphorbia maculata L.																		*					
Fabaceae																							
Amorpha fruticosa L.																		*	*				

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G
Amphicarpa bracteata (L.) Fernald			*			*	*										*	*	*	*	*	*	
Apios americana Medicus																		*					
Astragalus canadensis L.				*	*													*	*				
Cassia nicitans L.																		*					
Cassia sp.																		*					
Cercis canadensis L.				*	*	*				*	*	*	*	*	*		*	*	*	*	*	*	
Cladrastis kentukea (Dum.-Cours.) Rudd							*		*										*	*			
Clitoria mariana L.		*		*											*		*	*		*		*	
Desmodium glutinosum (Muhl. ex Willd,) Wood					*										*			*				*	
Desmodium sp.			*	*		*							*				*	*	*	*	*	*	
Gleditsia triacanthos L.																	*	*	*				
Lathyrus venosus Muhl. ex Willd.																		*					
Lespedeza cuneata (DuMont) G. Don																		*					
Lespedeza hirta (L.) Horneman																		*	*				
Lespedeza virginica (L.) Britton																			*				
Lespedeza sp.																		*	*	*	*	*	
Robinia hispida L.																			*	*			
Robinia pseudo-acacia L.				*		*			*	*	*	*	*		*		*	*	*	*	*	*	
Stylosanthes biflora (L.) BSP																			*	*			
Tephrosia virginiana (L.) Pers.																			*	*			
Vicia angustifolia Reichard				*		*													*	*	*	*	
Vicia sp.																			*				
Fagaceae																							
Castanea dentata (Marshall) Borkh.																			*	*		*	
Castanea pumila (L.) Miller																				*			
Fagus grandifolia Ehrhart		*															*	*	*	*	*	*	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G
Quercus alba L.			*							*							*	*	*	*	*	*	
Quercus coccinea Muenchh																		*	*		*	*	
Quercus falcata Michaux		*																*				*	
Quercus marilandica Muenchh.	*	*															*	*	*			*	
Quercus muehlenbergii Engelm					*					*	*	*	*	*	*			*		*	*	*	
Quercus prinus L.	*	*	*	*	*			*					*				*	*	*	*	*	*	
Quercus rubra L. var. rubra																		*	*			*	
Quercus stellata Wang.																		*	*			*	
Quercus velutina Lam.										*							*	*	*	*	*	*	
Fumariaceae																							
Corydalis flavula (Raf.) DC.									*									*		*	*		
Corydalis sempervirens (L.) Persoon																							*
Geraniaceae																							
Geranium maculatum L.										*	*							*	*	*	*	*	
Hamamelidaceae																							
Hamamelis virginiana L.						*	*	*					*					*	*	*	*	*	
Liquidambar styraciflua L.						*		*										*	*	*	*	*	
Hippocastanaceae																							
Aesculus octandra Marshall											*	*		*				*		*	*	*	
Hydrophyllaceae																							
Hydrophyllum macrophyllum Nuttall									*								*	*		*	*		
Hydrophyllum virginianum L.			*						*								*	*	*	*	*	*	
Phacelia bipinnatifida Michaux																	*	*	*	*	*	*	
Phacelia purshii Buckley									*									*		*	*	*	
Hypericaceae																							
Hypericum mutilum L.																				*			

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G
Hypericum punctatum Lam.																	*	*	*				
Hypericum stragalum P. Adams & Robson																	*	*	*				
Iris verna L. var. smalliana Fernald										*			*		*			*		*		*	
Sisyrinchium mucronatum Michaux																		*	*				
Juglandaceae																							
Carya cordiformis (Wang.) K. Koch			*								*	*			*		*	*		*	*	*	
Carya glabra (Miller) Sweet	*			*	*		*	*		*			*				*	*	*	*	*	*	
Carya ovalis (Wang.) Sargent				*				*							*			*	*	*	*	*	
Carya pallida (Ashe) Engler & Graebner		*															*	*	*				
Carya tomentosa (Poiret) Nuttall				*	*		*											*	*	*	*	*	
Carya sp.						*							*										
Juglans cinerea L.							*											*	*				
Juglans nigra L.					*						*			*	*			*		*	*	*	
Juncaceae																							
Juncus subcaudatus (Engelm.) Coville & Blake																		*					
Juncus effusus L.																		*	*				
Luzula bulbosa (Wood) Rydberg																		*	*		*	*	
Lamiaceae																							
Collinsonia canadensis L.										*	*	*								*	*	*	
Cunila origanoides (L.) Britt.																			*				
Lycopus virginicus L.																				*		*	
Monarda clinopodia L.			*		*				*	*	*		*				*	*	*	*	*	*	
Monarda didyma L.																		*					
Prunella vulgaris L.																		*			*	*	
Pycnanthemum incanum (L.) Michaux																		*	*				

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G
Pycnanthemum sp.		*															*	*					
Salvia lyrata L.															*			*	*	*	*	*	
Scutellaria elliptica Muhl.																		*	*				
Scutellaria serrata Andrz.																					*		
Stachys clingmanii Small											*									*			
Lauraceae																							
Lindera benzoin (L.) Blume											*	*		*				*		*	*	*	
Sassafras albidum (Nuttall) Nees		*		*	*			*		*	*	*	*				*	*	*	*	*	*	
Liliaceae																							
Asparagus officinalis L.									*									*	*			*	
Disporum lanuginosum (Michaux) Nicholson																		*		*			
Disporum maculatum (Buckley) Britton												*	*							*	*		
Hemerocallis fulva L.																			*				
Lilium michauxii Poiret																	*						
Polygonatum biflorum (Walter) Ell.						*						*	*	*				*	*	*	*	*	
Smilacina racemosa (L.) Desf.			*			*				*		*	*				*	*	*	*	*	*	
Smilax bona-nox L.				*	*										*			*			*	*	
Smilax glauca Walter																	*	*				*	
Smilax rotundifolia L.	*	*				*				*							*	*	*	*	*	*	
Trillium cuneatum Raf. var. *luteum* (Muhl.) Ahles											*	*					*			*	*		
Uvularia grandiflora Smith										*			*							*	*	*	
Uvularia perfoliata L.			*							*		*					*	*	*	*	*	*	
Uvilaria pudica (Walter) Fernald																	*			*			
Lythraceae																							
Rotala ramosior (L.) Koehne																		*					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G
Magnoliaceae																							
Liriodendron tulipifera L.											*	*		*	*		*	*	*	*	*	*	
Magnolia acuminata L.															*			*				*	
Magnolia fraseri Walter																		*	*	*	*		
Magnolia tripetalla L.																		*					
Menispermaceae																							
Menispermum canadense L.			*	*		*	*										*	*	*				
Moraceae																							
Morus rubra L.												*						*		*	*	*	
Nyssaceae																							
Nyssa sylvatica Marshall var. *sylvatica*		*															*	*	*		*		
Orchidaceae																							
Cypripedium acaule																		*					
Goodyera pubescens (Willd.) R. Brown																			*			*	
Orchis spectabilis L.														*								*	
Tipularia discolor (Pursh) Nuttall						*													*				
Oleaceae																							
Fraxinus americana L. var *americana*			*										*				*	*	*	*	*		
Fraxinus americana L. var. *biltmoreana* (Beadle) J. Wright ex Fernald				*	*	*	*			*	*	*		*	*		*	*	*	*	*	*	
Fraxinus pennsylvanica Marshall																*		*		*			
Fraxinus sp.											*			*									
Onagraceae																							
Circaea lutetiana ssp. *canadensis* (L.) Ascherson & Magnus											*			*						*	*	*	
Ludwigia palustris (L.) Ell.																		*					
Oenothera biennis L.																	*	*		*			

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G
Orobanchaceae																							
Conopholis americana (L.) Wallroth					*	*					*							*	*	*	*	*	
Epifagus virginiana (L.) Barton																		*		*	*	*	
Orobanche uniflora L.																							*
Oxalidaceae																							
Oxalis florida Salisbury																			*				
Oxalis stricta L.	*					*				*	*	*		*			*	*	*	*	*	*	
Papaveraceae																							
Sanguinaria canadensis L.					*					*	*	*		*				*	*	*	*	*	
Phrymaceae																							
Phryma leptostachya L.					*									*				*	*			*	
Phytolacaceae																							
Phytolacca americana L.							*		*		*							*	*	*	*		
Platanaceae																							
Platanus occidentalis L.						*												*	*	*	*	*	
Poaceae																							
Agrostis sp.						*												*	*			*	
Andropogon scoparius Michaux	*	*		*													*	*	*	*	*		
Arundinaria gigantea (Walter) Muhl.																		*	*	*	*		
Brachyelytrum erectum (Schreber) Beauvois																							
Bromus commutatus Schraeder									*										*				
Bromus purgans L.					*	*			*	*				*	*			*	*	*	*	*	
Bromus sp.																		*					
Dactylis glomerata L.									*									*		*			
Danthonia spicata (L.) Beauvois ex R. & S.	*	*		*				*									*	*	*				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G
Deschampsia flexuosa (L.) Trinius																				*			
Echinochloa crusgalli (L.) Beauvois																		*					
Elymus virginicus L.						*												*	*	*	*		
Elymus sp.									*											*			
Festuca obtusa Biehler									*											*			
Glyceria melicaria (Michaux) Hubbard																		*					
Melica nitens Nuttall ex Scribner									*											*			
Muhlenbergia tenuifolia (Willd.) BSP															*							*	
Microstegium vimineum (Trinius) A. Camus			*		*		*							*		*	*	*	*	*	*	*	
Panicum anceps Michaux					*													*					
Panicum depauperatum Muhl.																		*	*				
Panicum dichotomiflorum Michaux																		*					
Panicum dichotomum L.						*													*				
Panicum sp.		*	*	*										*	*		*	*	*	*	*	*	
Phleum pratense L.									*											*			
Setaria viridis (L.) Beauvois									*											*			
Sorghum vulgare Persoon																				*			
Uniola latifolia Michaux																			*	*			
Polemoniaceae																							
Phlox amplifolia Britton												*									*		
Phlox stolonifera Sims					*													*			*	*	
Phlox sp.											*									*			
Polygalaceae																							
Polygala curtissii Gray																		*					
Polygonaceae																							
Polygonum caespitosum var. *longisetum* (DeBruyn) Stewart																				*			

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G
Polygonum convolvulus L.																			*				
Polygonum cuspidatum Siebold & Zucc.																			*	*	*		
Polygonum sp.									*											*	*		
Rumex crispus L.																		*					
Tovara virginiana (L.) Raf.					*							*						*			*	*	
Primulaceae																							
Lysimachia quadrifolia L.	*																	*	*				
Ranunculaceae																							
Anemone virginiana L.															*							*	
Aquilegia canadensis L.	*								*								*			*			
Cimicifuga racemosa Nuttall					*					*	*	*	*	*				*		*	*	*	
Clematis viorna L.					*	*												*	*				
Clematis virginiana L.									*											*	*		
Delphinium tricorne Michaux					*													*					
Hepatica acutiloba L.										*			*	*	*					*	*	*	
Hydrastis canadensis L.														*								*	
Ranunculus recurvatus Poiret														*						*	*	*	
Ranunculus sardous Crantz																		*					
Thalictrum clavatum DC											*									*	*		
Thalictrum dioicum			*			*				*			*	*			*	*	*	*	*	*	
Thalictrum thalictroides (L.) Boivin																		*				*	
Xanthorhiza simplicissima Marshall																				*			
Rhamnaceae																							
Ceanothus americanus L.			*	*													*	*					
Rhamnus caroliniana Walter																	*	*					

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G
Rosaceae																							
Agrimonia pubescens Wallroth												*			*						*	*	
Amelanchier arborea (Michaux f.) var. *laevis* (Wiegand) Ahles	*	*						*									*	*	*				
Crataegus sp.																		*					
Duchesnia indica (Andrz.) Focke														*				*				*	
Geum canadense Jacquin					*							*		*				*			*	*	
Potentilla canadensis L.																		*	*	*	*	*	
Potentilla simplex Michaux																		*					
Prunus serotina Ehrhart			*		*	*						*			*		*	*	*	*	*	*	
Rosa palustris Marshall																			*				
Rubus argutus Link																		*					
Rubus flagellaris Willd.																		*					
Rubus hispidus L.																			*				
Rubus sp.																		*		*	*		
Rubiaceae																							
Cephalanthus occidentalis L.																		*		*			
Diodia virginiana L.																		*					
Galium aparine L.																			*	*	*		
Galium circaezans Michaux					*										*			*				*	
Galium latifolium Michaux																		*					
Galium obtusum Bigelow																		*					
Galium pilosum Aiton				*														*					
Galium triflorum Michaux			*		*						*			*			*	*		*	*	*	
Houstonia longifolia Gaertner	*					*		*					*				*	*	*	*	*		
Houstonia purpurea L.	*	*		*													*	*	*	*	*		

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G
Mitchella repens L.	*																*	*	*				
Rutaceae																							
Ptelea trifoliata L.									*											*	*		
Salicaceae																							
Salix nigra Marshall						*											*	*	*	*	*		
Santalaceae																							
Buckleya distichophylla (Nuttall) Torrey	*	*															*						
Pyrularia pubera Michaux										*								*	*	*	*		
Saxifragaceae																							
Astilbe biternata (Vent.) Britton												*									*		
Heuchera americana L.			*	*					*									*		*	*		
Heuchera longiflora Rydberg					*												*	*		*	*	*	
Heuchera villosa Michaux									*		*		*							*	*	*	
Hydrangea arborescens L.									*		*	*								*	*	*	
Itea virginica L.																		*					
Mitella diphylla L.																						*	
Philadelphus hirsutus Nuttall	*			*					*				*		*		*	*		*	*	*	
Saxifraga virginiensis Michaux																			*				
Saxifraga sp.																	*	*	*	*	*	*	
Scrophulariaceae																							
Aureolaria flava (L.) Farwell										*										*			
Aureolaria laevigata (Raf.) Raf.								*											*				
Aureolaria sp.						*									*				*			*	
Gratiola viscidula Pennell																		*					
Gratiola sp.																		*					

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G
Linaria vulgaris Hill																		*					
Lindernia dubia (L.) Pennell																		*					
Mimulus ringens L.																		*					
Penstemon smallii Heller		*		*	*				*				*		*		*	*	*	*	*	*	
Scrophularia marilandica L.			*	*			*		*								*	*	*	*	*		
Verbascum thapsus L.																		*		*	*		
Veronica officinalis L.																		*		*			
Simaroubaceae																							
Ailanthus altissima (Miller) Swingle											*									*	*		
Solanaceae																							
Solanum americanum Miller							*				*								*	*			
Solanum carolinense L.											*							*		*	*	*	
Staphyleaceae																							
Staphylea trifolia L.									*								*	*		*			
Styracaceae																							
Halesia carolina L.					*	*	*										*	*	*	*	*		
Theaceae																							
Stewartia ovata (Cav.) Weatherby	*																*						
Thymelaeaceae																							
Dirca palustris L.										*										*			
Tiliaceae																							
Tilia floridana Small							*					*		*				*	*		*		
Tilia heterophylla Vent.													*				*	*	*	*	*	*	
Ulmaceae																							
Celtis laevigata Willd.					*		*							*			*	*	*	*	*	*	
Celtis occidentalis L.				*											*			*	*	*	*	*	

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G
Celtis occidentalis var. georgiana (Small) Ahles																		*	*				
Ulmus alata Michaux			*		*	*	*	*							*		*	*	*	*	*	*	
Ulmus americana L.																*		*					
Ulmus rubra Muhl.			*		*	*	*				*	*		*	*		*	*	*	*	*	*	
Urticaceae																							
Boehmeria cylindrica (L.) Swartz																			*	*	*	*	
Laportea canadensis (L.) Weddell											*	*						*	*	*	*	*	
Parietaria pensylvanica Muhl. ex Willd.									*											*			
Pilea pumila L. Gray			*								*	*		*			*	*	*	*	*	*	
Urtica dioica L.									*											*	*	*	
Verbenaceae																							
Verbena urticifolia L.																		*	*	*	*		
Violaceae																							
Hybanthus concolor			*				*			*		*	*	*	*		*	*	*	*	*	*	
Viola canadensis L.											*	*						*		*	*		
Viola papilionacea Pursh						*								*				*	*	*	*		
Viola sp.					*					*	*				*		*	*	*	*	*	*	
Vitaceae																							
Ampelopsis arborea (L.) Koehne																*							
Ampelopsis cordata Michaux																*							
Parthenocissus quinquefolia (L.) Planchon	*		*	*	*	*	*	*	*	*			*	*	*	*	*	*	*	*	*	*	
Vitis aestivalis Michaux										*										*			
Vitis baileyana Munson				*								*							*	*	*		
Vitis labrusca															*							*	
Vitis rotundifolia			*	*			*				*	*			*		*	*	*	*	*	*	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G
GYMNOSPERMS																							
Cupressaceae																							
Juniperus virginiana	*			*											*		*	*				*	
Pinaceae																							
Pinus echinata Miller				*														*				*	
Pinus pungens Lambert																	*	*	*				
Pinus rigida Miller																		*				*	
Pinus strobus L.	*		*			*		*						*			*	*	*		*	*	
Pinus virginiana Miller	*	*						*									*	*	*			*	
Tsuga canadensis (L.) Carr.	*					*		*						*			*	*	*	*	*	*	
FERNS AND FERN ALLIES																							
Aspidiaceae																							
Athyrium asplenioides (Michaux) A.A. Eaton																	*	*				*	
Athyrium pycnocarpon (Sprengel) Tidestrom												*								*	*	*	
Cystopteris bulbifera (L.) Bernh.									*		*		*	*						*	*	*	
Cystopteris protrusa (Weatherby) Blasdell									*			*								*	*	*	
Dryopteris marginalis (L.) Gray						*							*					*	*	*	*		
Onoclea sensibilis L.																		*					
Polystichum acrostichoides (Michaux) Schott			*		*					*	*	*		*			*	*	*	*	*	*	
Thelypteris hexagonoptera (Michaux) Weatherby																						*	
Thelypteris noveboracensis (L.) Nieuwland																	*	*	*	*	*	*	
Woodsia obtusa (Sprengel) Torrey				*	*	*												*	*				

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G
Aspleniaceae																							
Asplenium montanum Willd.																			*				
Asplenium platyneuron (L.) Oakes	*		*	*	*	*		*		*			*		*		*	*	*	*	*	*	
Asplenium resiliens Kunze									*					*	*					*	*	*	
Asplenium rhizophyllum L.									*		*		*	*						*	*	*	
Asplenium ruta-muraria L.									*	*										*		*	
Asplenium trichomanes L.									*									*		*			
Equisetaceae																							
Equisetum arvense L.																		*	*	*	*		
Equisetum hyemale L.																		*		*			
Lycopodiaceae																							
Lycopodium flabelliforme (Fernald) Blanchard																		*				*	
Lycopodium lucidulum Michaux																						*	
Ophioglossaceae																							
Botrychium dissectum Sprengel															*							*	
Botrychium virginianum (L.) Swartz									*			*								*	*	*	
Osmundaceae																							
Osmunda cinnamomea L.																		*					
Osmunda regalis var. *spectablis* (Willd.) Gray																		*					
Polypodiaceae																							
Polypodium polypodioides (L.) Watt.				*									*				*	*			*	*	
Polypodium virginianum L.	*							*	*								*	*	*	*	*	*	
Pteridaceae																							
Adiantum pedatum L.											*	*	*	*						*	*	*	

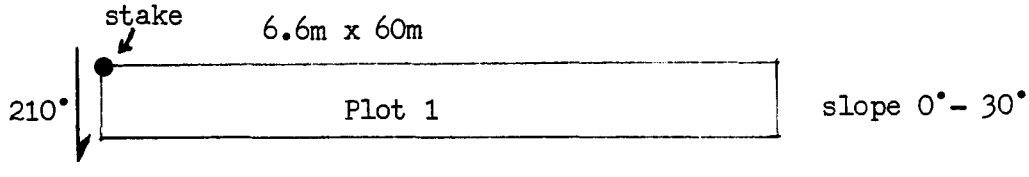
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	G
Cheilanthes lanosa (Michaux) DC Eaton																		*					
Cheilanthes tomentosa Link	*			*					*								*	*			*		
Dennstaedtia punctilobula (Michaux) Moore																	*	*				*	
Pellaea atropurpurea (L.) Link									*				*		*			*		*	*	*	
Pteridium aquilinum (L.) Kuhn																	*		*	*		*	

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 A B C D E F G

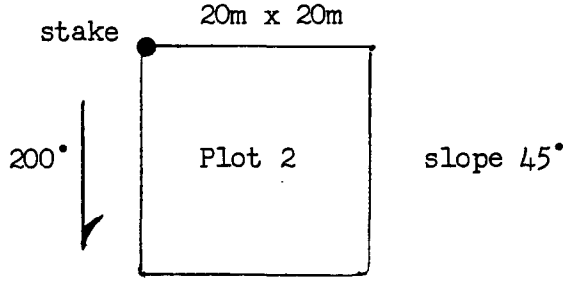
APPENDIX II

Appendix II contains directions to the study areas in this report, along with a diagram of each plot and information on its aspect and slope. A map is provided at the end of Appendix II which shows the location of the study areas.

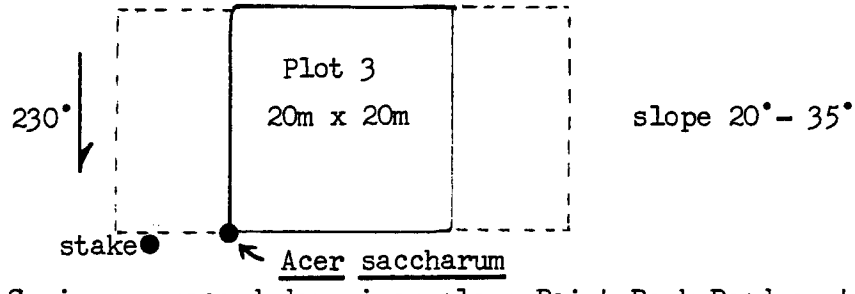
PLOT 1: From Hot Springs, proceed downriver along Paint Rock Road (CR 1304) on the north side of the river to the NC-TN state line. The road will turn right at the end of Paint Rock bluffs; at this bend ascend faint trail up the western edge of the bluff. At the top of the flat ridge, proceed east for 15 feet, then go downslope to the north for 11 feet to find stake, which is the northwest corner of the plot.



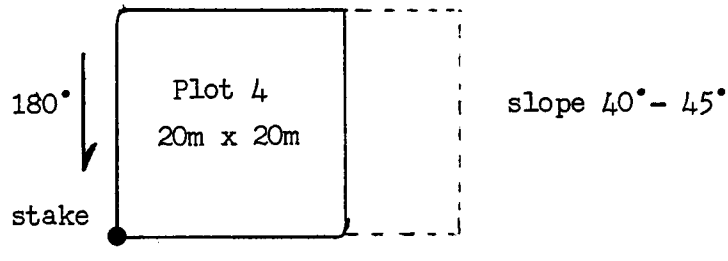
PLOT 2: From Plot 1, continue east along State Line Ridge to a small saddle. Ascend State Line Ridge, passing three Tennessee Wildlife Management Area signs. Sign # 1 is at the saddle, # 2 is along the ridge, and # 3 is along the ridge approximately 200 meters upridge from the saddle, fastened to a Pinus pungens. 30 feet due east from the third Tennessee Wildlife Management Area sign is a North Carolina Gamelands Bear Sanctuary sign on a Quercus prinus. From this Bear Sanctuary sign, go 15 feet due south to a Nyssa sylvatica, 2.7" dbh, and a stake which is the northwest corner of the plot.



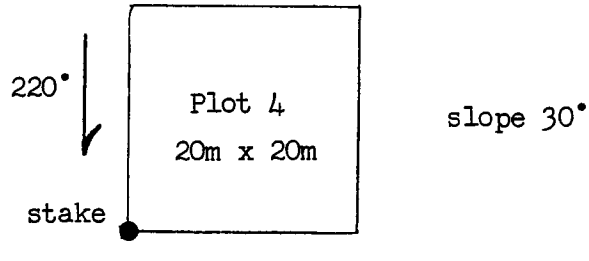
PLOT 3: From Hot Springs, proceed downriver along Paint Rock Road on the north side of the river (CR 1304) to the TN-NC state line. A Betula nigra here serves as a bearing tree, marked WC11. From this tree go 245 yards upstream on CR 1304 to a Juglans nigra six feet upslope of the road; a stake is behind this walnut. The talus slope at the east of this stake is the "west ravine." The southwest corner of the 20 x 20 meter plot is an Acer saccharum, bearing 130°SE, 25 feet from the stake.



PLOT 4: From Hot Springs, proceed downriver along Paint Rock Road on the north side of the river (CR 1304) approximately 3.5 miles to Jack Branch (USFS hiking trail was maintained here in 1981). From Jack Branch proceed downriver for 600 yards to a shallow ravine. On the roadbank here is a 9.0" dbh Juniperus virginiana; find stake here. From this stake proceed upslope for 70 yards, bearing 15°N, to a stake at a Quercus rubra, 5.4" dbh. Stake here marks southwest corner.



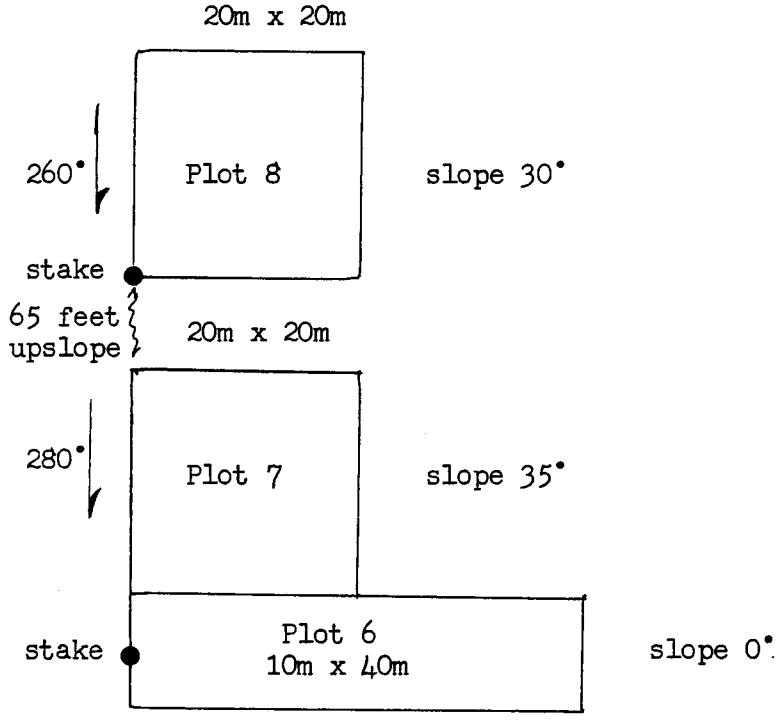
PLOT 5: From Hot Springs, proceed downriver along Paint Rock Road on the north side of the river (CR 1304) approximately 3.2 miles to USFS boundary. Proceed 210 yards downriver along this road to a stake at a Juniperus virginiana, 12.0" dbh, on the river side of the road. From this stake, bear 30°N. Twelve feet upslope from the road, behind a Fraxinus, 6.8" dbh, is the southwest corner stake.



PLOT 6: From the north edge of US 25-70 bridge over French Broad River, turn onto Paint Rock Road and descend approximately 60 yards to river. Turn left at this T junction, go upriver under bridge, park just past the bridge. Proceed on foot upstream along the river for about 1/2 mile until a bluff truncates the narrow floodplain path. At the bluff is a USFS bearing sign on a sweetgum; return downriver from this sign for 242 feet to a large rock, approximately 1 meter square, with a flat face on the upriver side. A stake is at the upriver face of this rock. The northeast corner of the plot is 18 feet from this stake, bearing 100°E.

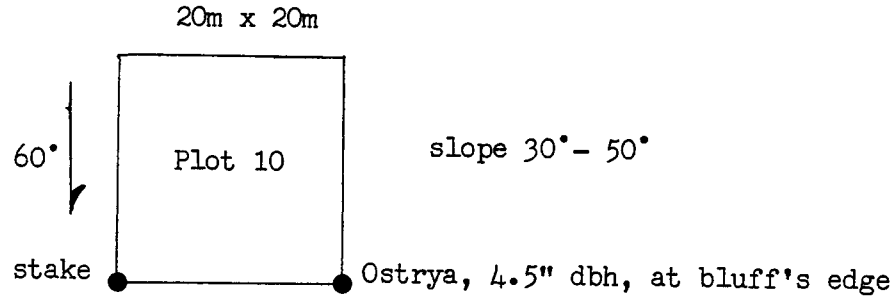
PLOT 7: The lower western downslope edge of Plot 7 is contiguous with the northern half of Plot 6.

PLOT 8: From the northeastern corner of Plot 7, ascend 65 feet bearing 80°E to a Quercus rubra which is 18.2" dbh. Here find a stake (sitting dead center in a ground-bees' nest) marking the northwest corner of the plot.

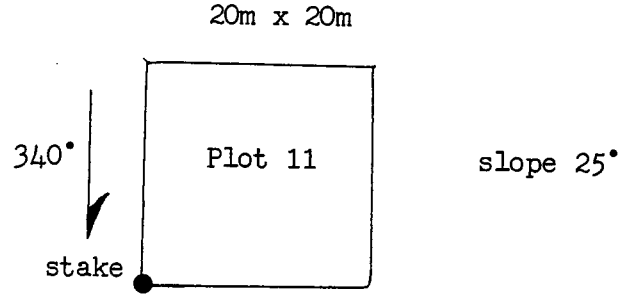


PLOT 9: Proceed downriver along the Southern Railway tracks for approximately 1 mile from Hot Springs. USGS Benchmark, which serves as a reference point for Plot 9, is approximately 75 feet upstream of Southern Railway milepost 180, and is sunken in the bluff face.

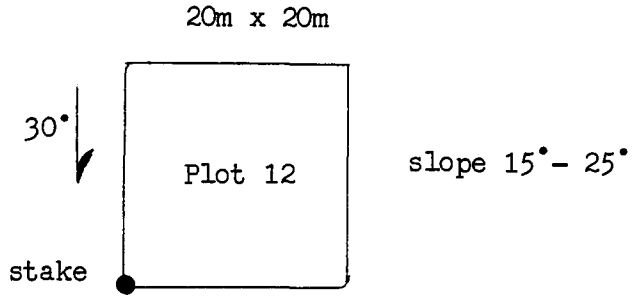
PLOT 10: Proceed downriver along Southern Railway tracks for approximately 1 mile from Hot Springs to Milepost 180, then backtrack upstream for 151 feet. Stake marking northeast corner of plot is 40 feet upslope, bearing 240°WSW.



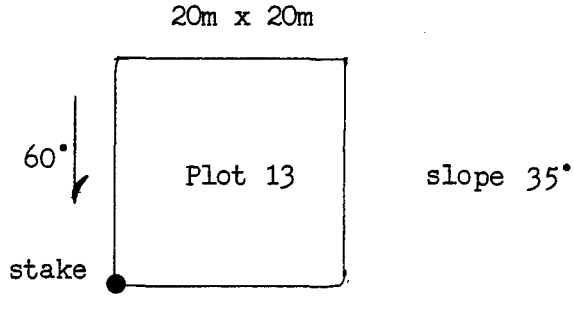
PLOT 11: Proceed west on US 25-70 from Hot Springs for approximately 1.2 miles to Sugartree Branch. On foot, travel down Sugartree Branch along dirt road to site of trailer in 1981, at the point where this road bends upslope along the bluff's edge to join US 25-70. From this trailer site, proceed approximately 120 feet bearing 330°N to stake which is the northwest corner of plot. Stake is set on an outcrop 30 feet above the base of the ravine, and is witnessed by an Acer saccharum 9.8" dbh, a Carya cordiformis 12.5" dbh, and a Cercis canadensis 3.1" dbh.



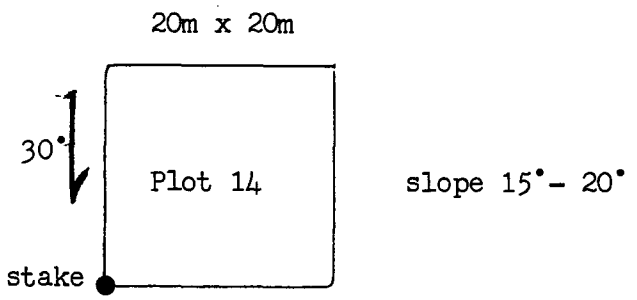
PLOT 12: Proceed west on US 25-70 from Hot Springs for approximately 2 miles to Stokely Hollow and descend road to Southern Railway tracks. Turn upriver and proceed approximately 1/2 mile, past the last house (a red tarpapered house, occupied in 1981, indicated on 1940 quadrangle as at road's end). Park in pulloff just upstream of this house, and see concrete retaining wall from earlier mining operations at the foot of the slope. Proceed up this slope bearing 240° to an abandoned dirt road and an abandoned shack at 1420' elevation. From the northwest corner of this shack, bear 320°NW for 48 feet to a stake marking the northeast corner of the plot. This road slabs the slope, gradually dropping in elevation.



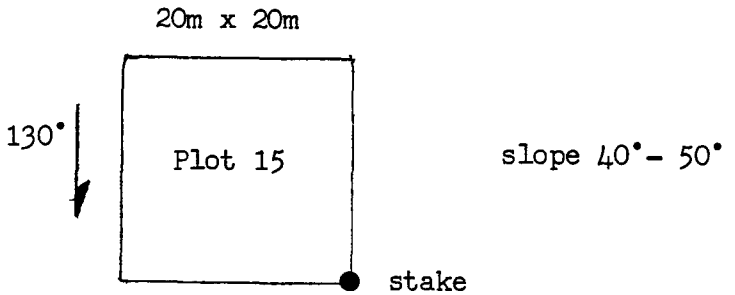
PLOT 13. See directions to Plot 12. From stake at Plot 12 follow road northwest for approximately 325 feet to stake marking northeast corner of Plot 13.

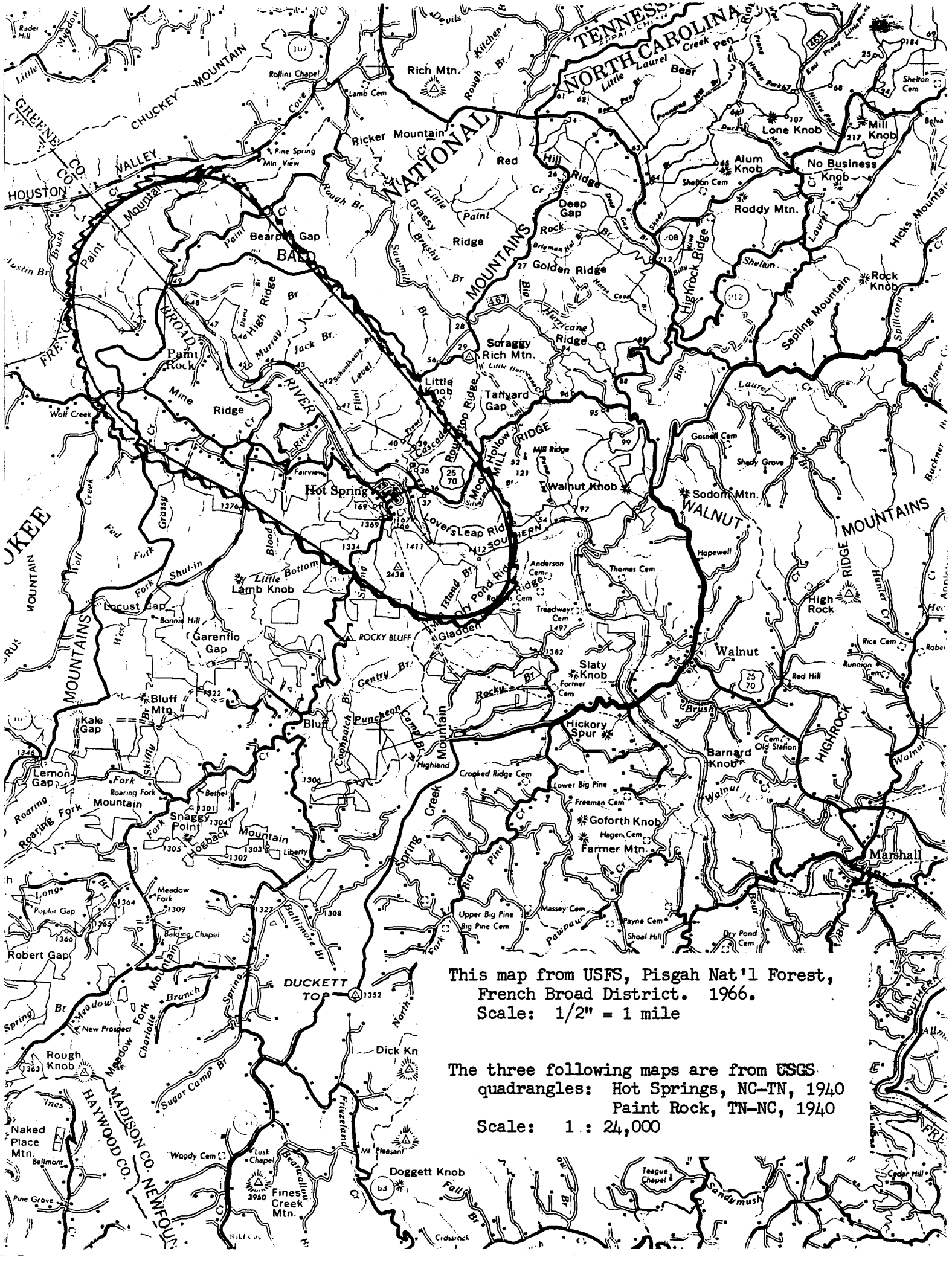


PLOT 14: Proceed west on US 25-70 for approximately 4.5 miles and turn right onto CR 1303 which follows Lower Shut In Creek. Approximately 100 yards down CR 1303, Mine Hollow joins Lower Shut In Creek. Ascend Mine Creek for 100 yards to faint trail leading south crossing creek to outcrops of Honaker Limestone. Stake marks northeast corner of plot.



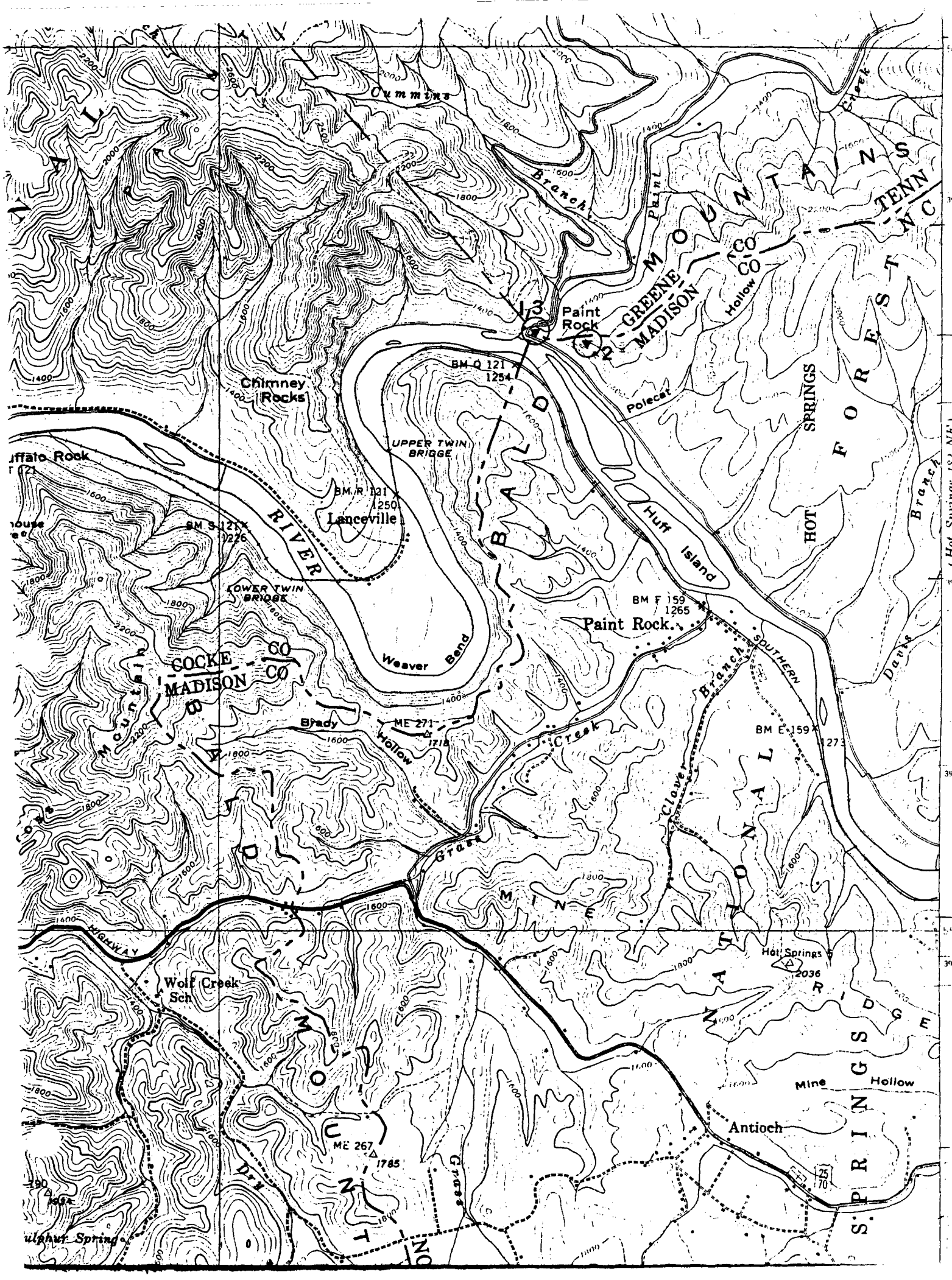
PLOT 15: Follow Plot 14 directions to confluence of Mine Hollow and Lower Shut In Creek. From this confluence proceed downstream along west side of Lower Shut In for 175 yards to the site of an abandoned rock foundation at the base of the slope. Then proceed upslope for 130 feet, bearing 310°W, to reach stake marking the east corner of the plot. Stake is 3 feet upslope from a 2-boled Quercus muehlenbergii, and 12 feet south of the entrance to a small cave.

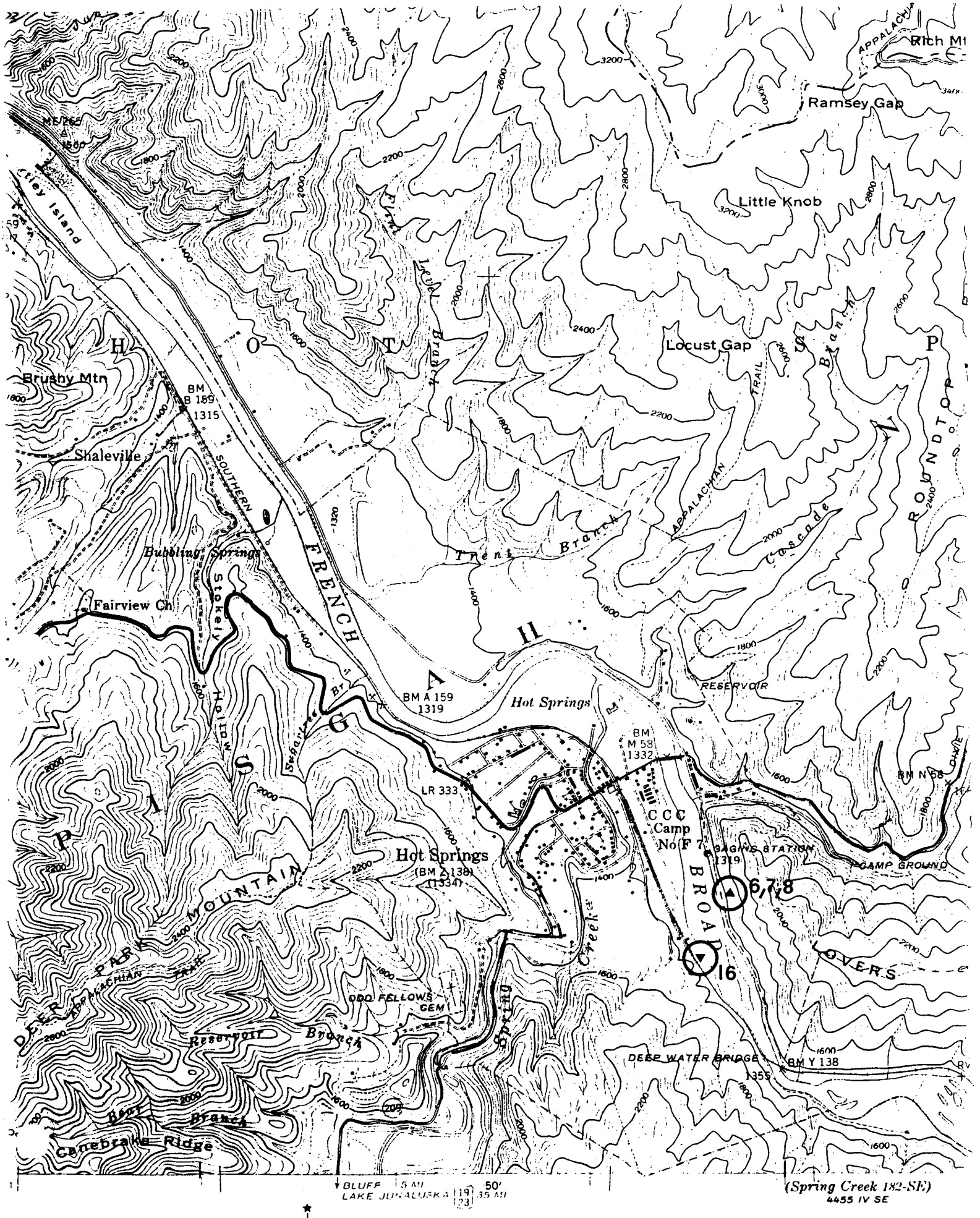




This map from USFS, Pisgah Nat'l Forest, French Broad District. 1966.
Scale: 1/2" = 1 mile

The three following maps are from USGS quadrangles: Hot Springs, NC-TN, 1940
Paint Rock, TN-NC, 1940
Scale: 1 : 24,000


Cummins
Branch
Plant
Creek
MOUNTAINS
TENN
NC
GREENE
MADISON
CO
CO
Hollow
Paint Rock
BM Q 121
1254
Chimney Rocks
Polecat
HOT SPRINGS
FOREST
UPPER TWIN BRIDGE
Buffalo Rock
BM R 121
1250
Lanceville
BM S 121
1226
RIVER
BALD
Huff Island
Branch
LOWER TWIN BRIDGE
BM F 159
1265
Paint Rock
Weaver Bend
COCKE
MADISON
CO
CO
Mount
Brady
Hollow
ME 271
1718
Creek
SOUTHERN
Davis
BM E 159
Clover
Branches
NATIONAL
Grass
MINE
HIGHWAY
Hot Springs
2036
RIDGE
Wolf Creek Sch
MOUNTAIN
Mine
Hollow
Antioch
ME 267
1785
Dry
Grass
Sulphur Spring
SPRINGS



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thority - 1940
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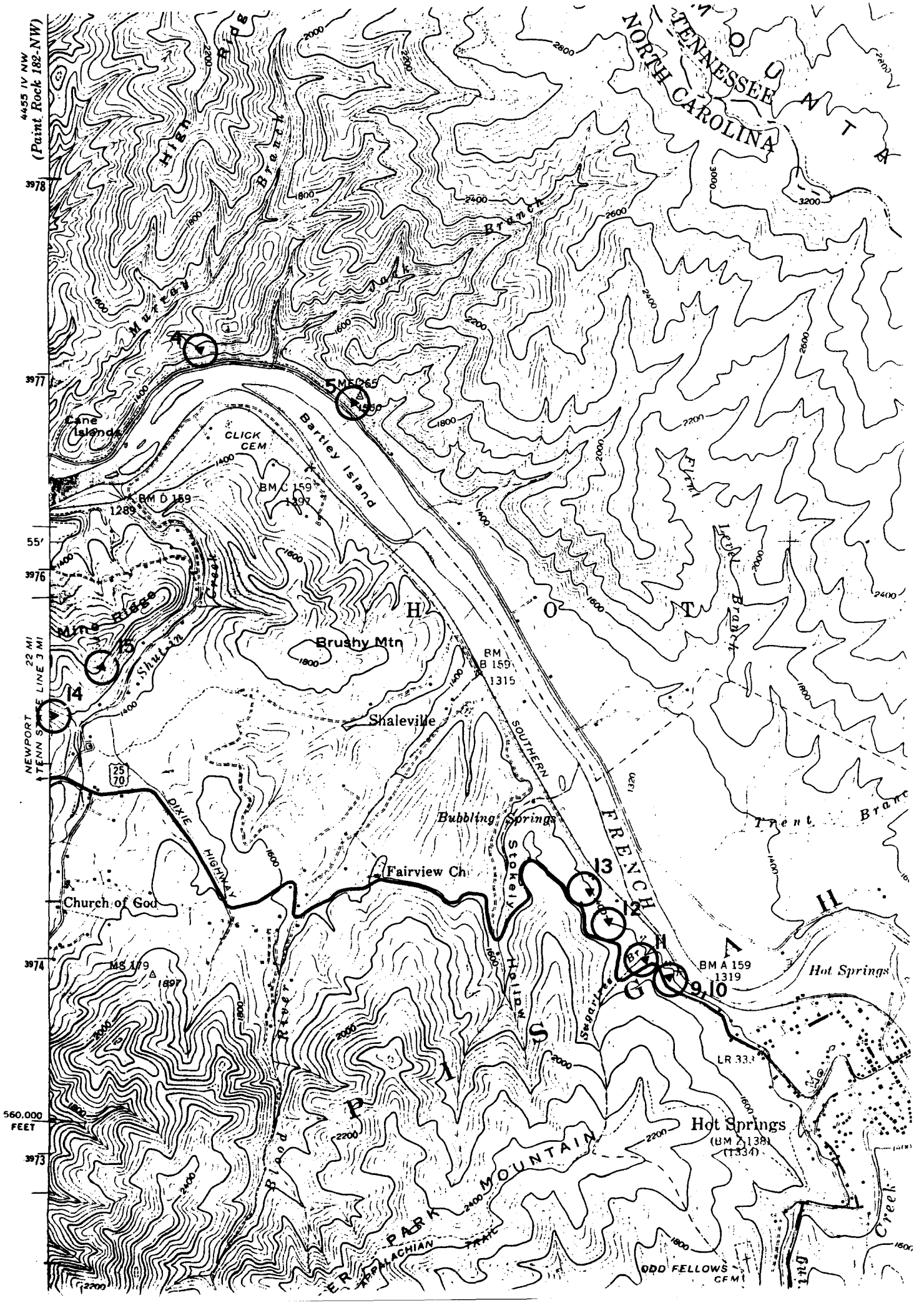
4455 IV NW
(Paint Rock 182-NW)
NORTH CAROLINA
TENNESSEE
Murray
High Ridge
Branch
Jack
Cane Islands
CLICK CEM
Bartley Island
BM C 159
1297
BM D 159
1289
Mine Ridge
Shulin Creek
Brushy Mtn
BM B 159
1315
Shaleville
SOUTHERN
FRENCH
Bubbling Springs
Stokely
Hollow
Fairview Ch
Church of God
DIXIE HIGHWAY
Blood River
Sequatchie
BM A 159
1319
Hot Springs
LR 333
Hot Springs
(BM X 138)
(1334)
PARK MOUNTAIN
APPALACHIAN TRAIL
ODD FELLOWS CEM
Trent Branch
Level Branch
NEWPORT
TENN STATE LINE 3 MI
22 MI
560,000 FEET
3978
3977
3976
3974
3973
55'
25
70
4
5
MS 265
1550
14
15
13
12
9,10
11
MS 179
1897