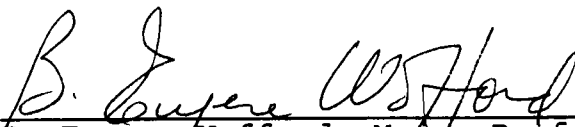


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THE VASCULAR FLORA OF WOLF COVE,
FRANKLIN COUNTY, TENNESSEE

A Thesis
Presented for the
Master of Science
Degree
The University of Tennessee, Knoxville

Richard Keith Clements

March 1987

DEDICATION

To my wife Heather, the most wonderful flower of all.

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ABSTRACT

Wolf Cove is a gorge on the Cumberland Plateau in Franklin County, Tennessee. The vascular flora of the gorge and surrounding Plateau surface was sampled for two full growing seasons in 1985 and 1986. A total of 812 collections were made comprising 576 species and lesser taxa in 327 genera and 107 families. Two hundred fourteen county records were established. Nine taxa are listed as Threatened or Special Concern in Tennessee. Three of these taxa are Federally listed in Category 2. Status reports on each of these taxa were prepared.

Distributions of the taxa were determined and the floristic elements ascertained. The flora has a strong influence of southern intraneous taxa and northern extraneous taxa, leading to insights on the Cumberland Plateau's role as a major pathway in Pleistocene plant migrations.

The Wolf Cove study area has been under consideration for acquisition by the State of Tennessee as a State Natural Area. The current landowners have designated it as part of the Carter Mountain Wildlife Management Area, a private holding utilized by hunters and trail bike riders. It is expected that this study will be useful in determining the future status of the study area.

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CHAPTER I

INTRODUCTION

Tennessee botanists are fortunate to live in a state with an incredible diversity of natural areas. Although botanical investigations of these areas offer excellent opportunities to gather valuable data, many of these sites have received little systematic floristic study. As more of Tennessee's landscape is being severely altered by man's activities (Committee for TN Rare Plants, 1978) the study of these areas is imperative. Data provided by floristic investigations serve not only to increase the understanding of the flora of Tennessee but also help assure preservation of an imperiled resource--our irreplaceable natural areas.

The Wolf Cove study area is a gorge dissecting the Cumberland Plateau in Franklin County, Tennessee. The area is characterized by gently rolling tableland punctuated by sheer sandstone cliffs giving way to a deep gorge over 4 km long. The gorge itself is composed of three separate and distinctive coves, each with a complement of rugged caves, sinkholes, and waterfalls. The area has been under consideration for acquisition and protection as a Tennessee State Natural Area (Paul Somers, personal communication). This floristic survey will provide important baseline information that will help ensure that this very interesting area will receive either private or State protection.

The main emphasis of this study was to observe, collect, and determine the vascular flora of the Wolf Cove study area. This information was compared to the results of other studies of Cumberland Plateau gorges in order to increase the understanding of gorge habitats and the Tennessee flora. The presence and status of rare plants were determined and evaluated with the expectation that this information will be of value to those with whom the future of this area rests.

CHAPTER II

THE STUDY AREA

Location

The study area is part of the southern Cumberland Plateau in Franklin County, Tennessee (Figure 1). The area includes three coves and the adjacent Cumberland Plateau surface lying between $35^{\circ} 02' 10''$ and $35^{\circ} 04' 20''$ north latitude, and between $86^{\circ} 01' 00''$ and $86^{\circ} 03' 00''$ west longitude. The area is ca. 22.5 km southeast of Winchester, Tennessee, the Franklin County Seat, and 11.3 km north of the Alabama state line. The area is mapped by the United States Geological Survey (U.S.G.S.) and the Tennessee Valley Authority (T.V.A.) on the Pitcher Ridge 7.5-minute topographic quadrangle.

The three coves form a deep gorge that drains into the Sinking Cove valley and eventually into the Tennessee River by way of Crow Creek. The three coves are: Cave Cove, at the head of the gorge; Farmer Cove, occupying the central area of the gorge; and Wolf Cove, an enormous sinkhole forming the most conspicuous feature of the study area (Figure 2). The surrounding Cumberland Plateau is included to the extent that it represents the watershed of the coves.

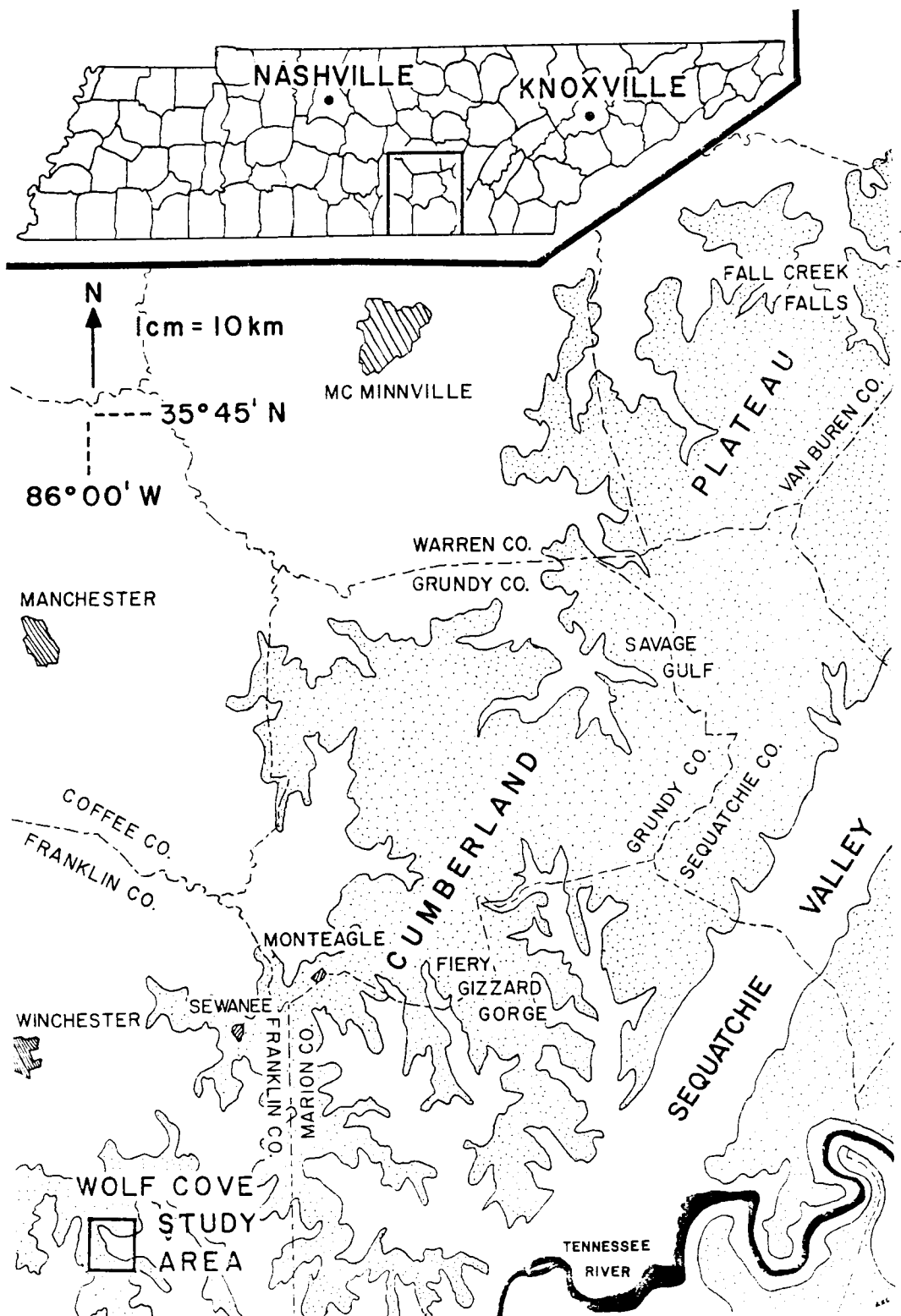


Figure 1. General Location of the Study Area.

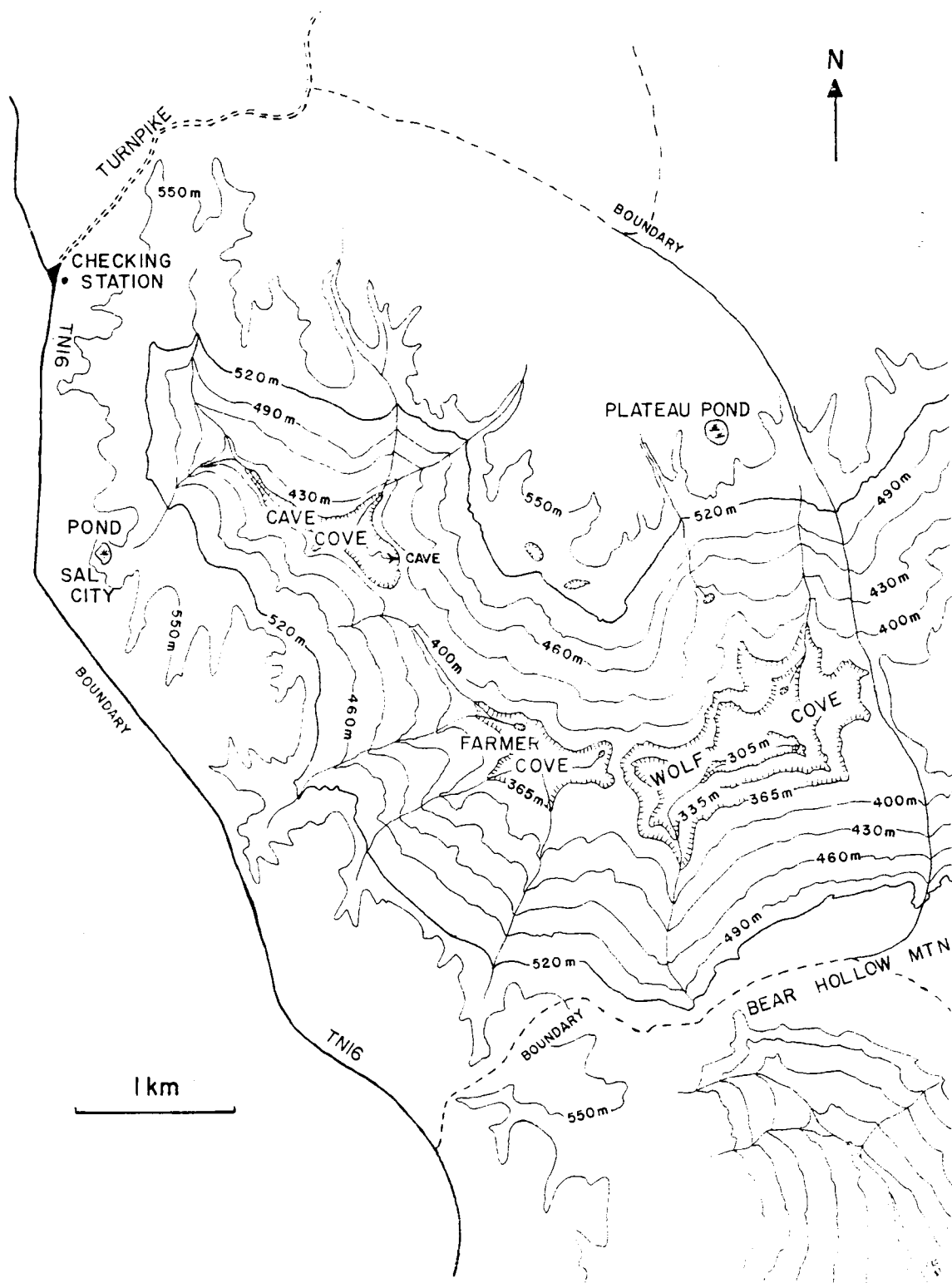


Figure 2. The Study Area.

Boundaries

The boundaries of the study area are: Tennessee Route 16 (TN16) from the Checking Station (located at Mile 23.5) to a jeep trail 4.0 km south, then east 2.0 km along the jeep trail on Bear Hollow Mountain, then north down the north-facing slope of the gorge and across the ridge (saddle) separating Wolf Cove and Sinking Cove. The boundary then continues north up the south-facing slope to the top of the gorge, then 1.2 km northwest to the intersection of two trails 0.8 km south of Cold Spring. The boundary then extends west along the larger jeep trail 1.2 km to the unimproved dirt road. This unimproved road, known as the Turnpike, forms the 1.6 km northwest boundary as it intersects TN16 at the Checking Station. The total area of the study site is ca. 1000 ha.

Roads and Trails

The Wolf Cove study area has an extensive network of roads and trails ranging from a hard-surface state secondary highway to ephemeral trail bike paths. The major trail system is illustrated in Figure 3. Some of the trails are marked on the Pitcher Ridge 7.5-minute quadrangle. Only TN16 and the Turnpike are named on the quadrangle; the other trails are named by the author for convenience when referring to various sites within the study area.

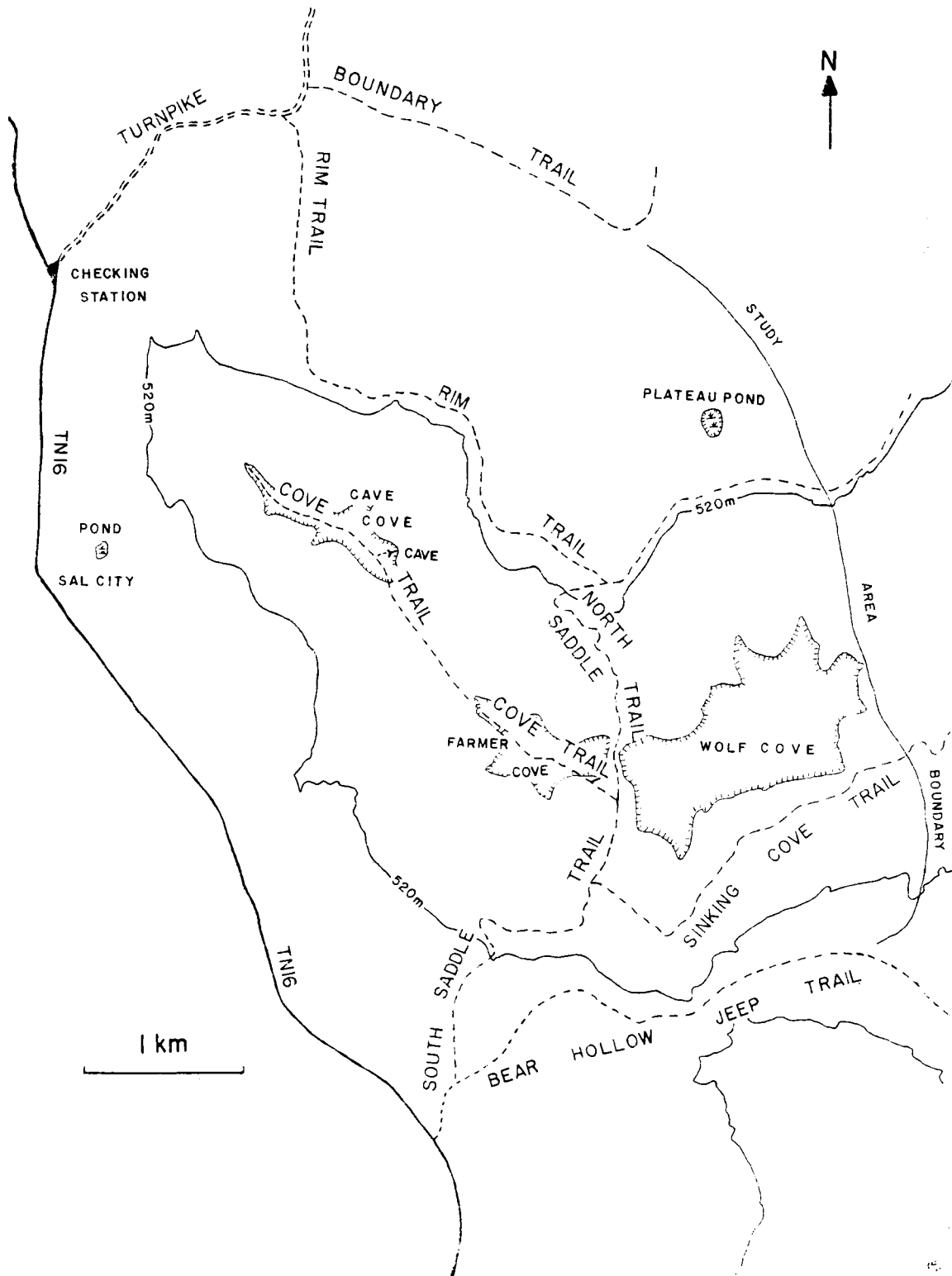


Figure 3. Roads and Trails of the Study Area.

Roads

The main access to the study area is via TN16, a recently constructed secondary highway. This road forms the 4.0 km long western boundary of the study area. Paved pullouts have been constructed at the heads of several side trails.

An unimproved dirt road called the Turnpike runs from TN16 to Cowan, Tennessee. This road forms the northwestern boundary of the study area and provides access to two major trails. A paved parking area is provided at the junction of the Turnpike and TN16 at the Checking Station.

Trails

Two major trails originate ca. 1.6 km along the Turnpike from the Checking Station. One is a Jeep trail herein called the Boundary Trail, as it is part of the northern boundary of the study area. The trail is shown to end abruptly in Figure 3, but in reality it takes a sharp turn north and leaves the study area. The second major trail, 1.5 km from the Checking Station, has been designated the Rim Trail. This trail proceeds due south from the Turnpike for 1.0 km until it reaches the rim of the coves. The Rim Trail then follows the edge of the coves for 4.0 km, to the eastern boundary of the study area.

The Rim Trail leads to another important path that is used as a competition motor bike trail. This path is called the North Saddle Trail, and it affords the easiest descent

into the coves from the north. This trail joins two other major trails on the Wolf Cove-Farmer Cove saddle.

Another major trail system originates 4.0 km south of the Checking Station along TN16. This trail branches 0.3 km from the TN16 pullout forming the Bear Hollow Jeep Trail and the South Saddle Trail. The Bear Hollow Jeep Trail meanders along the Cumberland Plateau surface on an arm of land known as Bear Hollow Mountain. This trail continues past the eastern boundary of the study area for several kilometers.

The South Saddle trail descends the southern escarpment of the plateau until it forks 1.6 km from the split of Bear Hollow Mountain Trail. The east fork is designated the Sinking Cove Trail and it slowly descends the escarpment to the floor of Sinking Cove, 1.6 km past the eastern boundary of the study area. The west fork continues the South Saddle Trail and it continues for 0.8 km to the Wolf Cove-Farmer Cove saddle where it joins the North Saddle Trail.

The last major trail begins on the south end of Wolf Cove-Farmer Cove saddle. This is the Cove Trail, and it runs ca. 3.6 km from the South Saddle Trail along the bottom of the gorge to a small waterfall at the northwest end of the floor of Cave Cove.

Physiography

The Cumberland Plateau of Tennessee and northern Alabama is the southern extension of the Allegheny Plateau

in the Appalachian Plateau Province (Fenneman, 1938). The Cumberland Plateau is ca. 400 km long in Tennessee and traverses the state in a northeast to southwest direction. The Plateau exhibits a sharply defined and relatively straight eastern escarpment and a highly dissected western and southern boundary.

Topography

The topography of the Cumberland Plateau is determined by the characteristics of the rocks from which it is formed (Fenneman, 1938). The study area is located in the southern portion of the Plateau in a region referred to as the "Cliff Section" (Braun, 1950). The area is characterized by a resistant sandstone caprock overlying less resistant sandstones and limestones. This situation creates a topography of gently undulating tableland and submaturely dissected valleys.

The elevations within the study area range from 550 m on the plateau surface to 295 m on the floor of Wolf Cove. A sheer sandstone cliff, ranging from 6.1 m to 46 m in height, surrounds the gorge. Cave Cove and Farmer Cove have a fairly steep but relatively constant drop of 250 meters per kilometer from the gorge rim to their respective floors. The descent to the floor of Wolf Cove is much more dramatic, dropping 91 m within 0.25 km, or 400 meters per kilometer. The topography of Wolf Cove is very rough, with one sheer cliff on the north escarpment which is 61 m high.

Drainage

The north and south facing slopes of the gorge are drained by eleven main streams, none of which are named on the Pitcher Ridge Quadrangle. Four streams drain Cave Cove, forming one streambed on the floor of the cove. This streambed eventually disappears into a large cave near the Farmer Cove saddle. No flowing water was observed in this streambed as the flow disappears at the base of a 2 m high waterfall at the northeast end of the cove floor. Farmer Cove is drained by four streams that combine forming one stream on the floor near the Wolf Cove Saddle. The flow of this stream vanishes down a drain hole at the base of the saddle. Three streams drain Wolf Cove. Two streams draining the northern slope disappear as spectacular waterfalls down small sinkholes. The main stream, flowing from the south rim, creates a channel the length of the cove floor before disappearing down a drain hole at the base of the Sinking Cove saddle.

Geology

Rocks

The rocks of the study area consist of erosion-resistant Pennsylvanian sandstones overlying less resistant Mississippian shales, siltstones, and limestones. The cap-rock is composed of the Warren Point Sandstone and the

Raccoon Mountain Formation of the Gizzard Group (Wilson, Jewell, and Luther, 1956). The lower Mississippian strata include the Pennington Formation, Bangor Limestone, and Monteagle Limestone (Ferguson and Stearns, 1968). The approximate locations of the various strata are mapped in Figure 4.

The Pennsylvanian rocks form a resistant cap ca. 37 m thick. The uppermost stratum throughout the study area is the Warren Point Sandstone which is ca. 2 to 19 m thick. This formation is composed of yellowish gray to gray fine- to coarse-grained sandstone with occasional areas of conglomerate (Ferguson and Stearns, 1968). Below the Warren Point Sandstone lies the Raccoon Mountain Formation. This formation consists of layers of olive brown to dark gray siltstone and shale. The Raccoon Mountain Formation forms a thin strip along the rim of the coves from 3 to 18 m thick. It is thickest on the rim surrounding Cave Cove and thinnest on the rim to the north and south of Farmer and Wolf coves (Ferguson and Stearns, 1968).

The Mississippian formations total ca. 213 m in thickness. The uppermost is the Pennington Formation which grades from shales to limestones to dolomitic limestones and siltstones to a depth of 98 m (Ferguson and Stearns, 1968). The Bangor Limestone forms the next unit in the series and is 85 m thick. It forms the floor of Cave Cove, the bulk of Farmer Cove, and the upper slopes of Wolf Cove. The Bangor

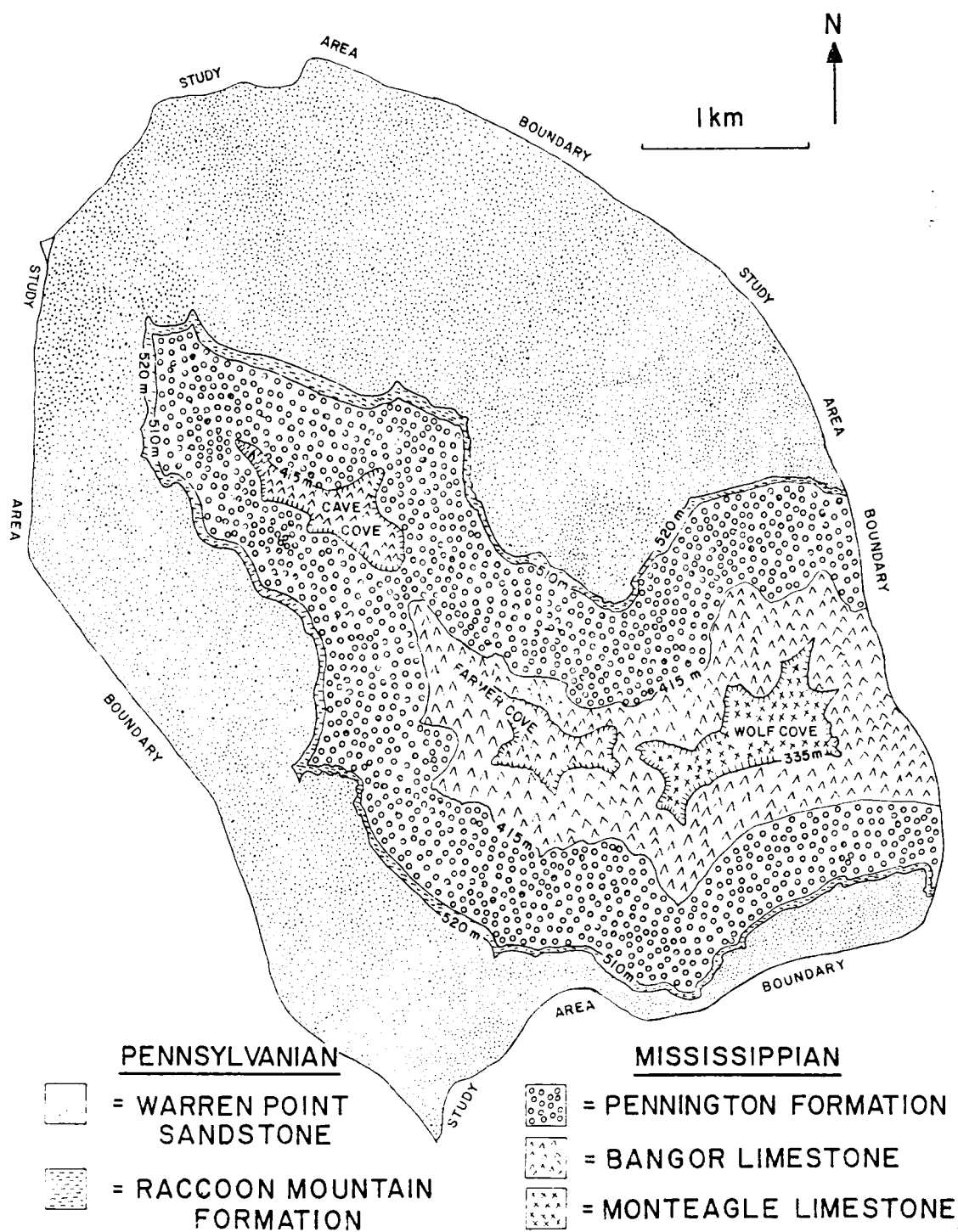


Figure 4. Geologic Strata of the Study Area.

Limestone is composed of fossil-fragmental, oolitic, and dolomitic limestones (Ferguson and Stearns, 1968). The deepest of the geologic formations exposed in the coves is the Monteagle Limestone which forms the midslopes and floor of Wolf Cove. The exposed depth of this formation is ca. 37 m. The Monteagle Limestone is composed of very fine- to coarse-grained limestones and contains oolitic, fossil-fragmental, and dolomitic beds. To the northeast this limestone is commercially quarried (Ferguson and Stearns, 1968).

Soils

The soils of the study area are described in a U.S.D.A. Soil Survey Report for Franklin County (Fox, Beesley, and Leighty, 1958). The soils mapped in the study area represent three soil associations formed of eight soil types. Three soil types are found on the Cumberland Plateau surface and represent one soil association. Five soil types of the remaining two associations occur in the coves.

The three soils of the Cumberland Plateau surrounding the study area belong to the Hartsells-Muskingum-Cotaco association. The most widespread is the Hartsells fine sandy loam, rolling and undulating phase. This is a sandy, strongly acid soil that is low in nutrients and organic matter. This soil currently supports a deciduous mixed oak forest (forests will be discussed in more detail in Chapter V). The other two soil types are restricted to the

drainages of the plateau surface. These are the Muskingum stony fine sandy loam, rolling phase and the Muskingum stony fine sandy loam, hilly phase. Both of these soils are strongly to very strongly acid and are low in nutrients and organic material. The parent material is the Warren Point Sandstone and outcrops of the bedrock are common in these soils. The main difference between these soils is the slope on which they form, the rolling phase occurring on 5-12% slopes and the hilly phase occurring on 12-25% slopes.

The soils of the gorge slopes and cove floors represent the Rockland, limestone--Rockland, sandstone--Stony land (Rockland) soil association. Three soil types of this association occur in the study area. The soils at the rim of the gorges belong to the Rockland sandstone, very steep (12-60+% slope) soil type. This soil is essentially non-existent, forming sporadically on the sheer, exposed rock faces of the rim cliffs. Below the vertical cliffs and the Rockland sandstone soil type is the Bouldery Colluvium, Jefferson Soil Material soil. This soil type has little true soil development and is composed of sandy colluvial materials washed down to a talus slope. The majority of the rest of the cove soil is the Rockland limestone, steep to very steep (25-60+% slope) type. This is a calcareous limestone soil characterized by bedrock ledges and outcrops. This soil supports a mesic deciduous forest throughout the

coves except on southern aspects where the bedrock is very close to the surface. These areas support a shrubby, open, glade-like vegetation.

The final two soil types occur in small areas on the floors of Farmer and Wolf Coves. The Jefferson stony fine sandy loam is in the Rockland association and is found at the foot of steep slopes. This is a very stony, strongly acid soil that is low in nutrients and organic materials. The Huntington fine sandy loam is associated with Lindside, Sequatchie, and Whitwell soils. It is located on the site of an old field that was at one time under cultivation in Farmer Cove.

Formations

Two important types of geologic formations occur in the study area. The cliffs and stream drainages surrounding the coves are erosional features contributing to microclimatic variation and local topographic variation due to the creation of talus slopes. Sinkholes and caves are solutional features that also affect local microclimate and topography.

The cliffs surrounding the study area are formed by sapping (Hack, 1966) as the underlying Mississippian rock is removed and the overlying Pennsylvanian sandstones break off. The resulting sandstone boulders form talus slopes up to 100 m below the cliffs. Springs flowing from the sandstone-limestone contact continue the removal of the underlying limestone, maintaining the sandstone sapping.

The coves, not including the common escarpment, are examples of dolines forming a uvala-like valley (Barr, 1961). These dolines are formed as the limestone is dissolved by a stream that disappears underground to join a subsurface drainage system. Ponors, the openings through which streams disappear, are numerous in the coves, especially at the bases of the saddles that separate the coves (Barr, 1961).

The Sinking Cove Cave System, which underlies much of the northern escarpment of the study area, is one of the most extensive cave systems in the southern Cumberland Plateau (Barr, 1961). This cave has a major entrance within Cave, Farmer, and Wolf coves and has been extensively explored and mapped. The Farmer Cove entrance was not observed in this study.

Numerous smaller sinkholes and waterfalls occur in the study area. A two meter high waterfall is found at the north end of the floor of Cave Cove along the main drainage. This small stream disappears into a ponor at the base of the falls. 0.8 km from this falls is the Cave Cove entrance to the Sinking Cove Cave System. The opening is ca. 10 m wide and 6 m high. The temperature near the mouth is noticeably cooler than the surrounding cove and forms a misty, foggy area during the summer months. Farmer Cove has an interesting drainage on its southern escarpment, but no waterfalls or caves were observed. A ponor occurs at

the base of the Farmer Cove-Wolf Cove saddle. Wolf Cove contains many small sinkholes, waterfalls, and ponors. Springs emerging from the Wolf Cove-Farmer Cove saddle form two small streams. The north stream disappears down a ponor at the bottom of a small sinkhole on the northwest floor of the cove. The southern stream meanders the length of the cove and disappears down a large ponor at the base of the Wolf Cove-Sinking Cove saddle. Three small sinkholes are found on the northeastern escarpment of the cove. One of these sinks is the entrance to a small cave which may connect to the Sinking Cove Cave system. The other two are each associated with an impressive cascade and waterfall, with the streams disappearing into ponors on their floors.

Climate

The climate of the southern Cumberland Plateau is primarily a function of regional topography (Dickson, 1960). The Cumberland Plateau, rising ca. 304.8 meters above the surrounding terrain, acts as a barrier to storms moving from west to east across Tennessee. Moist air is forced upward over the plateau and its moisture condenses out. This results in greater precipitation on the plateau compared to the Central Basin to the west and the Valley and Ridge Province to the east (Dickson, 1960).

Two peak periods of precipitation occur on the Cumberland Plateau. The first occurs during the winter and

early spring months due to the passage of large scale storms over Tennessee (Dickson, 1960). The second peak period occurs in midsummer due to locally intense convective thunderstorm activity. Average monthly precipitation for Sewanee, Tennessee, located 19.3 km northwest of the study area on the Plateau and Tullahoma, Tennessee, located 37 km to the northeast on the eastern Highland Rim, is listed along with monthly temperature averages in Table I.

The temperature of the Cumberland Plateau is generally somewhat lower than on the surrounding lowlands (Dickson, 1960). This is a function of the plateau's elevation. The coves within the study area show temperature variations with respect to aspect. Similar variations in small valleys have been described by Shanks and Norris (1950). North-facing slopes are usually be cooler and moister than the Plateau surface or south-facing slopes due to shading by the high cliffs. South-facing slopes are usually the hottest and driest areas due to more direct, and therefore more intense, insolation. In the winter, the coves are probably much cooler than the level uplands due to cold air drainage. This phenomenon could have a short-term effect on the flora of the coves as unusually low temperatures occurred in Tennessee during the winter of 1985.

The period of this study has been marked by both abnormal temperatures and precipitation patterns. Two major glaze storms have occurred in the past 26 years, one in 1960

Table I: Mean Precipitation (cm) and Temperatures ($^{\circ}\text{C}$)
for Two Stations Near the Study Area

Month	<u>Sewanee (Plateau)</u>		<u>Tullahoma (Highland Rim)</u>	
	Temp.	Precip.	Temp.	Precip.
JAN	4.0	15.5	5.3	15.7
FEB	4.5	14.7	6.1	14.9
MAR	8.8	16.0	9.9	15.4
APR	13.9	12.4	14.9	11.2
MAY	18.9	10.4	19.4	9.2
JUN	23.3	10.7	23.8	9.6
JUL	24.7	14.5	25.3	13.0
AUG	24.2	10.5	24.9	9.0
SEP	21.9	8.0	21.7	7.9
OCT	15.8	7.4	15.7	6.5
NOV	9.1	11.0	9.1	9.8
DEC	4.5	13.7	5.4	13.7
ANNUAL	14.5	144.8	14.7	135.8

Data from Dickson (1960), except Sewanee temperatures, which are after Perkins (1981). Dickson data covers 24 years; Perkins data covers 44 years.

(Clark, 1966) and one in 1985. Temperatures for a period during the winter of 1985 fell considerably lower than previous records across the Southeast. Crossville, Tennessee, recorded a low temperature of -29.4°C on January 21. These unusually low temperatures undoubtedly affected the flora of the region. During the spring of 1985 only one Rhododendron was observed to have surviving flower buds. No plants of Sanguinaria or flowers of Erythronium were observed in the coves during 1985. All three of these taxa were observed in full bloom in 1986, after a milder winter. 1985 marked the beginning of a severe drought throughout the Southeast lasting through the fall of 1986. Precipitation deficits reached 29.94 cm below normal on the Cumberland Plateau in 1985 and 35.63 cm below normal through August, 1986 for a total two-year deficit of 65.57 cm (United States Department of Commerce, 1985, 1986).

Habitats and Plant Communities

Thirteen distinctive habitats occur within the study area. Each of these habitats is characterized by distinctive plant communities and microclimates. Five of these habitats occur on the Cumberland Plateau surface and eight occur within the gorge. The specific compositions of these plant communities will be discussed in detail in Chapter V.

The five habitats that occur on the Cumberland Plateau are: 1) the plateau forest, 2) plateau swales, 3) sandstone outcrops, 4) Sal City Pond (an artificial pond), and 5) a natural upland pond. The eight habitats that occur within the gorge are: 1) cliff bases, 2) gorge slopes, 3) the floor of Cave Cove, 4) the floor of Farmer Cove, 5) the floor of Wolf Cove, 6) plateau drainages, 7) sinkholes and caves, and 8) limestone outcrops and glade-like areas. Representative locations of each of the habitats are labelled in Figure 5.

Wildlife

The wildlife within the study area appears to be typical of many areas on the Cumberland Plateau. Opossum, raccoon, squirrels, and white-tailed deer are common, the deer especially so. One coyote was observed in the area. The bird life is quite varied, with an abundance of pileated woodpeckers, thrushes, hawks, and vultures. Wild turkeys, grouse, scarlet tanagers, and barred owls were observed. Very little reptilian life was encountered, only an occasional garter or black rat snake and several lizards. Amphibian life was very common, with pools populated with green and leopard frogs, treefrogs, and newts. Red efts (larval newts) were common in the rich mesic woods of the coves. The moist woods, especially around sinks and caves, harbored large and diverse salamander populations.

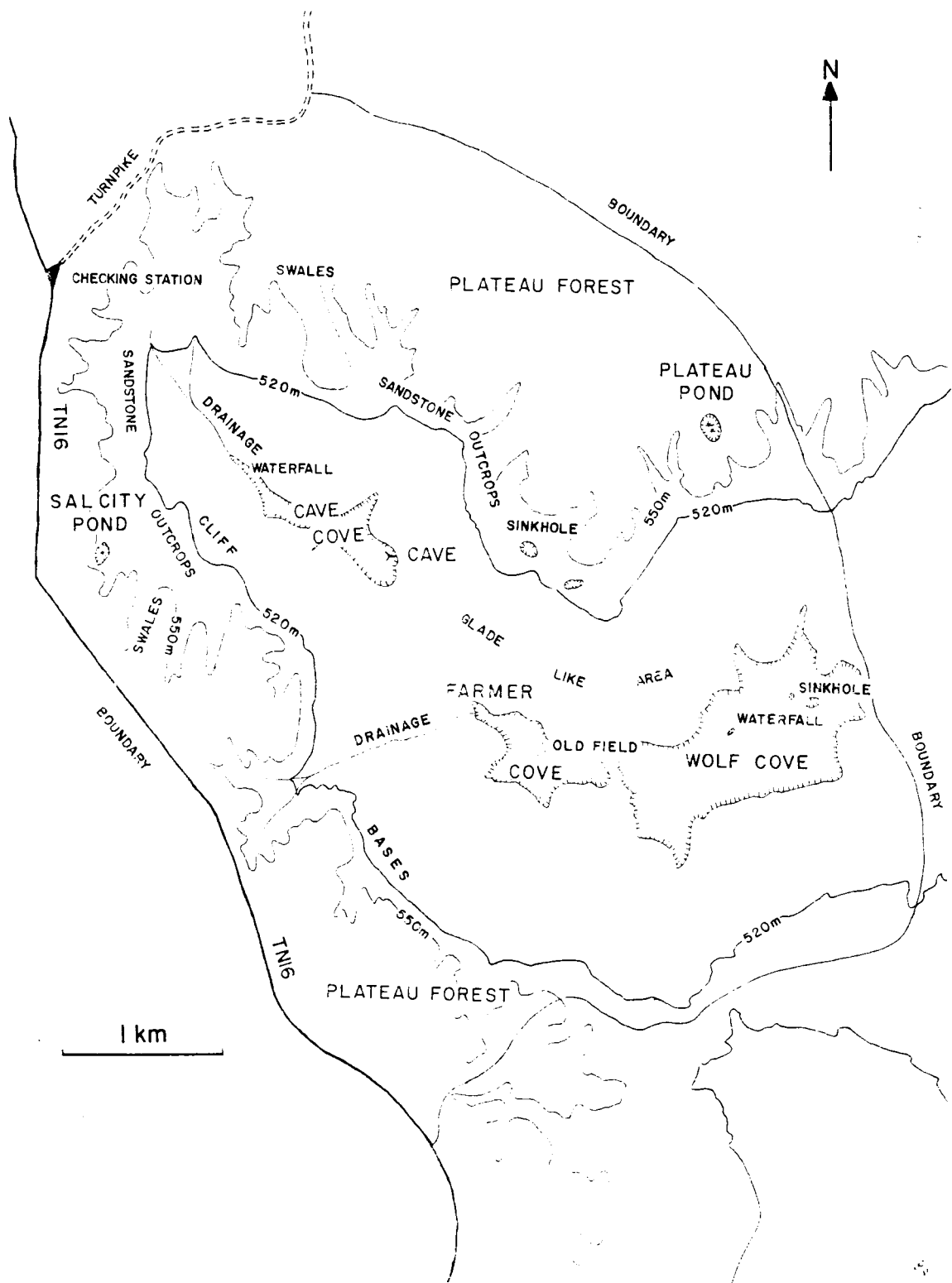


Figure 5. Representative Habitat Locations.

Several rare and endangered animals are known to occur in the lands adjacent to the study area and could very well be found in suitable habitats within the area. These are the Tennessee cave salamander (Gyrinophilus palleucus palleucus), the six-lined racerunner (Cnemidophorus sexlineatus sexlineatus), the green anole (Anolis carolinensis carolinensis), the gray bat (Myotis grisescens), and an endangered land snail (Anguispira picta) (Eagar, 1978). An eastern cougar has supposedly been sighted in a cove to the north of the study area (Paul Somers, pers. comm.). None of these animals were observed by participants in this study.

CHAPTER III

HISTORY OF THE STUDY AREA

Quaternary Vegetation

The changes in the vegetation of the southeastern United States during the Quaternary Period are well documented. Evidence of extreme variation in plant communities south of the glacial border has been obtained from studies of fossil pollen buried in sediments of Pleistocene age. These data have provided direct evidence as to the composition of the plant communities present during the Pleistocene to 30,000 years before present (B.P.).

Two theories have been put forth concerning the vegetation of the Pleistocene. Braun (1955) believed that the deciduous forests of the Southeast, especially the Mixed-Mesophytic forest, maintained more or less their present distributions as the ice sheets advanced. This theory is no longer generally accepted. Several ponds in the southeastern United States, with pollen-containing sediments reliably radiocarbon dated to 30,000 yr B.P., have been studied. The fossil pollen present usually can be identified to genus and often to species. The fossil pollen record reveals an excellent overview of the vegetational changes that have occurred in the Southeast during the Pleistocene.

Earliest Records- The Farmdalian Interstadial

The Farmdalian Interstadial of the Late Pleistocene began about 28,000 years ago and lasted until about 23,000 years ago (Watts, 1980). During this time, the southern margin of the Laurentide Ice Sheet was located in the Great Lakes area (Delcourt and Delcourt, 1981). Even though the climate was relatively warm, Watts (1973) believed that, due to the presence of spruce and fir pollen, the climate was cooler than at present on the southern Cumberland Plateau in northwest Georgia.

The vegetation of the period is not very well understood due to the scarcity of sites with reliable pollen records of sufficient age (Watts, 1980). Barry (1983) stated that many ponds in the Southeast formed as a result of decreased evaporation at the onset of the advance of the Laurentide Ice Sheet. Watts (1973) and Delcourt (1979) studied sediments in ponds near the southern Cumberland Plateau whose pollen records extended to Interstadial times.

Watts (1973) studied Green Pond in northwest Georgia near the southern limit of the Cumberland Plateau. Sediments dated 29,630 to 25,000 yr B.P. show a pollen rain of predominantly oak and hickory with little pine or herb pollen. Swamp cypress, a species now restricted to the Coastal Plain, Mississippi Embayment, and an isolated area in northeastern Alabama, was significant in the pollen rain. Chestnut, hornbeam, sweetgum, red maple, and beech pollen

were present. Watts believed that this assemblage represented a closed deciduous forest but not a Mixed-Mesophytic forest.

The flora began to change about 25,000 yr B.P. Watts (1973) reported a change to a sweetgum-swamp cypress dominated flora. Traces of hemlock and spruce pollen were present indicating a cooler environment. The upland deciduous forest began to give way to a more open vegetation characterized by conifers indicative of colder climates (Watts, 1973). The increase of swamp cypress, sweetgum, holly, and buttonbush indicated a change at Green Pond in northwest Alabama from an open lake to a cypress swamp. Most of the species represented in this pollen record occur today either in the same area or on the nearby coastal plain. Watts believed that this indicated a climate very similar to that of today.

Delcourt and Delcourt (1984a) postulated that early Interstadial broad-leaved deciduous forests had a distribution similar to their modern distribution. The pollen record of Anderson Pond on the Eastern Highland Rim has shown evidence of an Interstadial flora dominated by jack pine or red pine (Delcourt, 1979). Deciduous trees represented 23% of the pollen rain with spruce and fir present. This record comes from sediments determined to be 25,000 $\pm$ 3,000 years old. The error bars of this radiocarbon

measurement overlapped the beginning of Wisconsin glaciation when Diploxylon pine species were dominant on the Plateau.

Wisconsin Glaciation

The Interstadial climate began to change about 22,000 yr B.P. as the Laurentide Ice Sheet began its southward advance. A zonal weather pattern was established with the Polar Frontal Zone located to the south of the Cumberland Plateau (Delcourt and Delcourt, 1984b). The Polar Frontal Zone marked the boundary between the northern Boreal Forest and southern deciduous forests. The minimum winter temperature probably was not lower than -41°C since temperate taxa remained a part of the flora (Delcourt and Delcourt, 1984b).

As the ice sheets advanced, the plant communities before them were displaced southward. Tundra environments were located 300 km from the ice margin along the Appalachian mountains (Maxwell and Davis, 1972). At this latitude, treeline was only 800 meters above sea level, 200 meters above the Cumberland Plateau surface. Whitehead (1973) stated that boreal forests similar to those now located in Canada were displaced by as much as 1,100 km to the south. Pollen and macrofossil evidence from Middle Tennessee and northwestern Georgia have confirmed these hypotheses (Delcourt, 1979; Watts, 1970, 1973, 1975, 1980). This is contrary to Braun's (1955) theory that the present deciduous forests of the southeast have not moved in the

last several million years. Nonconnah Creek, in Memphis, Tennessee, has provided some fossil evidence of a refuge for southern hardwoods (Delcourt and Delcourt, 1984a). The Delcourts believe that the hardwoods survived in protected valleys along major Gulf Coast river drainages.

At Anderson Pond, Diploxylon pine and spruce dominated the flora with 75-87% and 7-22% of the pollen rain respectively (Delcourt, 1979). Jack pine was the most abundant conifer. Oak, ash, and hornbeam pollen occurred regularly, but the overall percentage of deciduous taxa is reduced from 23% to 6% by 18,000 yr B.P. Nonarboreal pollen was predominantly grass, sedge, alder, and hazelnut. Disturbed area and muddy lake shore taxa included hypericums, Umbelliferae, blackberries, violets, rushes and sedges.

In northwestern Georgia the vegetation consisted of 25-40% jack pine and/or red pine. Deciduous trees were abundant. Oak, hickory, and chestnut contributed 30-40% of the arboreal pollen rain. Spruce represented 1-2% of the pollen rain. Percentages of nonarboreal pollen were significant (Watts, 1970, 1975).

On the Cumberland Plateau of Middle Tennessee during the peak glacial period, 18,000 yr B.P., jack pine pollen increased to 87% and spruce and fir pollen percentages were reduced. Oak pollen represents 5-7% of the full-glacial

pollen rain. Ash, hornbeam, and hickory pollen were present. Nonarboreal pollen percentages were low which indicated a closed forest (Delcourt, 1979).

The full glacial vegetation of the Cumberland Plateau in northwestern Georgia may have been mostly herbaceous with local jack pine and spruce stands. Deciduous species may have occurred in protected coves. High percentages of deciduous pollen found on the Plateau may be due to upslope influx (Watts, 1975).

As the ice sheets began to retreat about 16,000 years ago the Polar Frontal Zone was displaced northward and the cool-climate species followed. In northwestern Georgia and Middle Tennessee jack pine declined rapidly to only about 25% of the pollen rain (Watts, 1970; Delcourt, 1979). Spruce pollen increased to 26% at 14,000 yr B.P. (Delcourt, 1979) before declining and eventually disappearing. Black spruce may have been the main species, as pollen of its parasite dwarf mistletoe was present in the pollen record (Watts, 1970). White pine and deciduous trees gradually became more abundant. Beech, buckeye, and sycamore became prevalent in the pollen record. Chestnut, blackgum, sweetgum, and ericaceous pollen were present (Watts, 1970) much as they are today.

The Holocene

The Holocene period began about 10,000 years ago and was marked by dramatic climatic change. The Polar Frontal

Zone became diffused and the climate of the Cumberland Plateau was governed by the Maritime Tropical Airmass in summer and the Pacific Airmass in winter (Delcourt and Delcourt, 1984b). The climate was cool and moist, which caused a great spread of mixed hardwoods northward (Delcourt and Delcourt, 1981, 1984b).

Beginning about 8,000 years B.P. a warm and dry climate, the Hypsithermal, characterized the Southeast. The Hypsithermal lasted until about 6,000 years B.P. when the climate began to moderate (Whitehead, 1973; Delcourt and Delcourt, 1981, 1984b). The current climate of the southern Cumberland Plateau has changed little since that time.

At Anderson Pond on the Eastern Highland Rim of Middle Tennessee deciduous taxa dominated the pollen rain of the early Holocene. Oak (53% of the arboreal pollen), ash, hornbeam, hickory, walnut, elm, and beech were important. During the Hypsithermal, chestnut, magnolia, sweetgum, and red maple became established. Swamp shrubs such as button-bush, alder, and Virginia willow increased in representation. From about 5,000 years ago to the present, mesic deciduous taxa have declined somewhat from around Anderson Pond, but the basic forests of the present have changed little (Delcourt, 1979).

The Holocene vegetation of northwestern Georgia changed in much the same way as the Anderson Pond vegetation (Watts, 1980, 1983). The jack pine forest was eliminated and

replaced by an oak forest. Chestnut, sweetgum, and sour gum were abundant along with rhododendron and Ericaceae at Pigeon Marsh (Watts, 1975). Beech, hornbeam, and butternut declined to insignificance. Southern pine pollen increased in the record of the mid-Holocene and is characteristic of the modern flora.

Past Human Influences

Information on past human activities in the study area was provided by Mr. Charles Cheston of Sewanee, Tennessee (personal communication). The study area property is part of an approximately 60,000 acre tract of land accumulated by the late Harry Lee Carter. The land is currently in the hands of his 14 heirs; Mr. Clyde Carter of Lookout Mountain, Tennessee, acts as spokesman for the heirs.

The study area is currently uninhabited but this has not always been the case. Many families have lived on the property as farmers, hunters, or speculators. Cabins existed in the area about 100 years ago, but no clear evidence of their existence remains. Occasional remains of fireplaces have been seen near the head of Cave Cove on the Cumberland Plateau surface. According to Mr. Cheston,

Many residents lived in cabins on the north aspect of the Cumberland Plateau since the soil on the benches was good, (no fertilizer to be had), coal sometimes available, sugar orchards tapped for sugar, micro-climate quite different than the southern aspect, less forest

fire, better trees and often a spring above the cabin with water conducted by hollow or split hollow logs.

Several sites of old stills were observed on the property. Old barrels, tubing, drums (with axe holes), and demijohns were seen, always in very secluded areas near small streams. Some of these sites appeared to be quite old, whereas others were undoubtedly very recent.

In 1903 the land about the study area was being logged by the Davidson and Benedict Lumber Company, the name of which was later changed to Davidson, Hicks, and Green Lumber Company. The company's sawmill was located in Cowan, Tennessee, until the Great Depression of the late 1920's put them out of business. This sawmill was part of "one of the last rail road logging operations in the Appalachian hardwoods" (Cheston, pers. comm.). The Rim Trail of the study area was probably an old railroad bed, as it is very straight and level and several piles of coal and clinkers can be found along it.

The area was part of a much larger parcel that was owned by Thomas J. Tyne. Mr. Tyne deeded approximately 50,000 acres, which had represented the land logged by the Davidson, Hicks, and Green Co., to Mr. Harry Lee Carter in the late 1930's. Mr. Carter added about 10,000 additional acres to the estate.

About 25-30 years ago, the Koppers Company set up six sawmills within the study area on the plateau near Cave and

Wolf coves. This operation lasted 5-6 years. Because of their extreme ruggedness, only the best timber was cut from the coves and many enormous beech, large maples, buckeyes, tulip poplars, basswood trees, and ashes are now found in Wolf Cove. Evidence of this timber operation is still found within Wolf Cove as large cables and pulleys that were left behind when the company ceased operations. Loblolly pine was planted on the cleared areas of the plateau, but only one tree was observed in the study area. The cutting was much more extensive on the plateau, and large trees are very infrequent.

The names of various places within the study area are derived from prominent topographic features, names of people, and animals seen or presumably sighted in the area. Cave Cove is named for a large cave found on the floor of the cove. Farmer Cove is named after Mr. Farmer, who actually cultivated the land on the floor of the cove in the 1910's. Mr. Cheston believes that the land on the floor of Farmer Cove was rented out to other farmers for several years after Mr. Farmer left. Wolf Cove is named for the sighting of a wolf in the area; similarly Bear Hollow Mountain is named for black bears. Sal City was named for a woman who lived in a cabin near the site.

Present Human Influences

The study area is currently included within a recently established area posted as the Carter Mountain Wildlife Management Area. The area is used in the fall and winter as a deer hunting preserve. The hunting is reputed to be excellent, and is by special permit only. The only structure in the study area is the Checking Station, located at the intersection of TN16 and the Turnpike.

During the spring and summer months, the area is used as a picnic area for groups traveling on 3- and 4- wheeled all-terrain vehicles (ATVs). Frequently, groups of ten or more of these vehicles are seen in the area. The area is also used by people riding trail bikes. These people have created a network of paths, sometimes up sheer rock outcrops and talus slopes, throughout the area. Some of the paths are marked with surveyor's ribbon and small signs tied to trees. These paths are used in trail bike competitions that occur in the area from time to time.

Past Botanical Surveys

Out of 799 collections from Franklin County on deposit at TENN only seven have been collected from the study area (Table II). All of these plants were re-collected during this study. The Tennessee Natural Heritage Program has sent botanists into the area for reconnaissance of the flora and plant communities, and a list of plants seen during these

Table II. Previous Collections from Study Area on Deposit at TENN.

Taxon	Collector	Date	Site
<u>Trichomanes boscianum</u> Sturm	V. Bates	12/29/78	Farmer Cove
<u>Carex albursina</u> Sheldon	A.M. Evans	5/20/79	Wolf Cove
<u>Carex austro-caroliniana</u> Bailey	A.M. Evans	5/20/79	Wolf Cove
<u>Carex careyana</u> Torrey	A.M. Evans	5/20/79	Wolf Cove
<u>Iodanthus pinnatifidus</u> (Michx.) Steud.	A.M. Evans	5/20/79	Wolf Cove
<u>Mitella diphylla</u> L.	A.M. Evans	5/20/79	Wolf Cove
<u>Synandra hispidula</u> (Michx.) Baillon	A.M. Evans	5/20/79	Wolf Cove

trips has been prepared. However, no systematic study, collection, and documentation of the flora has been previously attempted.

CHAPTER IV

METHODS

An inventory of previous collections of vascular plants from Franklin County was made based on records (dot maps and specimens) at The University of Tennessee Herbarium, Knoxville (TENN). Special note was made of collections from the study area and an attempt at relocation and re-collection was made. This inventory was the basis for determining County Record status.

Bi-weekly collection trips were made from April through October 1985 and March through October 1986, with each trip lasting one to two days. A total of 23 trips were made for a total of 32 full collecting days. Twenty people assisted in collecting specimens during the two collecting seasons, for a total of 71 people-collecting days.

Two areas were used as base camps for the various collecting trips. One of these was the Checking Station parking area. This area was desirable in that it afforded relatively easy access to the northern parts of the study area and the head of the gorge at Cave Cove (refer to Figure 3, page 7). The second area was a small grassy field along the South Saddle Trail approximately 100 m south of the South Saddle Trail and Bear Hollow Mountain Trail fork. This field marked the limit to which a non-four-wheel-drive vehicle could go from TN16, 0.3 km to the south. This point

provided convenient access to the north-facing escarpment of the gorge, Farmer Cove, and Wolf Cove. Overnight camps were made at either of these sites or at the small camping area called Sal City 0.8 km south of the Checking Station.

The first collecting trips were spent in becoming familiar with the area and the various habitats that occur there. The remainder of the time was used to investigate more thoroughly those areas that appeared to be unusual or floristically rich. The study area boundary, all of the major trails, the cove floors, the major drainages of the Plateau rim, and the north- and south-facing escarpments were surveyed at least once during the spring, summer, and fall of each collecting season. The more interesting habitats were visited regularly during each collecting season.

Lists of the rare and endangered plants of Tennessee, Alabama, and the Eastern United States were reviewed to determine which rare taxa may possibly be found in the area and the status of any collections suspected of being rare. Population status reports for each taxon determined to be rare were prepared according to the format used by Murrell (1985).

Plants collected during field trips were pressed as soon as possible and dried at TENN. When possible, tentative identifications were made in the field or prior to pressing. More precise identifications were made when the

specimens were dry using standard field manuals, especially Radford, Ahles, and Bell (1968), Gleason (1952), and Fernald (1950), and herbarium specimens on deposit at TENN.

Nomenclature follows for the most part that of Radford et al. Labels containing collection data for each specimen were typed and the collections were mounted and deposited as voucher specimens at TENN. Duplicate collections of many specimens were made to be used for exchange.

Using county dot maps at TENN, Gray's Manual of Botany, 8th edition (Fernald, 1950), and Radford et al. (1968), the floristic elements of the area were determined. This involved the determination of plant ranges and intraneous, extraneous, endemic (interior), disjunct, or exotic status for each taxon collected. Intraneous, extraneous, and endemic taxa were further evaluated based on whether the primary center of distribution is northern or southern.

CHAPTER V

RESULTS

Wolf Cove Flora

A total of 812 collections were made of the vascular plants in the Wolf Cove study area. This inventory was found to comprise 576 species and lesser taxa representing 327 genera and 107 families. Two hundred fourteen county records were established after a consensus of collections at the University of Tennessee, Knoxville, Herbarium (TENN) and the Vanderbilt University, Nashville, Herbarium (VDB). This brings the known Franklin County flora from 799 to 1013 taxa. Three hundred sixty-three taxa previously collected from Franklin County were re-collected. Fifty-seven percent of the total Franklin County flora is represented in the study area. Two specimens were not identifiable to the species level due to insufficient material. A complete breakdown of the flora is given in Table III and an annotated checklist of the flora is found in Appendix A.

Comparison With Other Cumberland Plateau Floras

Three floristic lists have been prepared for gorges on the Cumberland Plateau: Fall Creek Falls (Caplenor, 1965), Fiery Gizzard Gorge (Clark, 1966), and Savage Gulf (Wofford, Patrick, Phillippe, and Webb, 1979). These floristic lists

Table III. Summary of the Wolf Cove Flora

	Pteridophytes	Gymnosperms	Angiosperms ^a	Total
Families	11	2	12/82	107
Genera	18	2	66/241	327
Species and Lesser Taxa	30	3	124/419	576

^aThe first figure represents the number of Monocots; the second figure is the number of Dicots.

were compared with the Wolf Cove list in order to determine the similarities and differences in their respective floras. These comparisons will be among the criteria for determining the noteworthy status of Wolf Cove plants. Complete summaries of the similarities and differences in these floras at the family and species level can be found in Appendix B.

Comparisons at the Family Level

The floristic list of Fall Creek Falls contains 290 taxa in 193 genera and 88 families. Five families do not occur on the Wolf Cove list and 23 families of the Wolf Cove flora do not appear on the Fall Creek Falls list.

The list of the Fiery Gizzard Gorge flora consists of 604 taxa in 322 genera and 105 families. Ten of these families are not found on the Wolf Cove list and 12 of the Wolf Cove families are not included on the Fiery Gizzard list (see Appendix B). Three of these families are accounted for by changes in the nomenclature of the groups. Three families are found on the Fiery Gizzard list that do not occur on any of the other inventories.

The list of taxa found in Savage Gulf is composed of 680 taxa in 360 genera and 111 families. Fourteen families on the Savage Gulf list are not found on the Wolf Cove inventory and ten families of the Wolf Cove inventory do not occur on the Savage Gulf list. Two of the families that are found in Wolf Cove are combined into one different

family in the Savage Gulf flora. Five of the Wolf Cove families are unique among the floras of the gorges. A complete summary of the similarities and differences in these four floras at the family level can be found in Appendix B.

Comparison of the Number of Taxa

The taxa found only in the Wolf Cove study were determined. Five families and 79 taxa were found to occur in the Wolf Cove flora and in none of the other three. Nine families and 120 taxa were found in at least two of the three previous floras but not in the Wolf Cove flora.

Habitats and Plant Communities

The following descriptions of the habitats and plant communities that occur in the study area are based on general observations and impressions of the author. No attempt was made to systematically sample plots in the area to determine exact community composition.

Cumberland Plateau

Five distinctive habitats, with their own complements of plants, are found on the Cumberland Plateau in the study area surrounding the coves. These are named by the author as: 1) the plateau forest, 2) plateau streams and swales, 3) sandstone outcrops, 4) Sal City pond, and 5) the Plateau pond (refer to Figure 5, page 23). These terms are used in

the Annotated Checklist (Appendix A) to describe the areas where each taxon is characteristically found. Each of these habitats represents a distinctive environment with a characteristic assemblage of taxa.

The Plateau forest occurs on the dry, sandy, level to gently rolling surface of the Cumberland Plateau throughout the study area. It is dominated by Quercus spp. and Carya spp., i.e., Quercus alba, Quercus prinus, Quercus velutina, Quercus coccinea, Carya pallida, Carya glabra, and Carya tomentosa. Oxydendrum arboreum and Nyssa sylvatica are important overstory trees. In the understory, Cornus florida, Robinia pseudoacacia, Vaccinium arboreum, Vaccinium corymbosum, Sassafras albidum, and Rhododendron nudiflorum are important. The herb layer is generally sparse in the forest, but includes Hieracium venosum, Chimaphila maculata, Carex pensylvanica, Carex festucacea, Aster dumosis, Aster linariifolius, Aster patens, Antennaria plantaginifolia, Tephrosia virginiana, Thermopsis mollis, Solidago curtissii, and Solidago odora.

Throughout the Plateau forest are small streams and damp to wet depressions referred to as swales. These are easily distinguished by the presence of Sphagnum spp. moss and very lush fern growth, mainly Onoclea sensibilis, Thelypteris noveboracensis, Osmunda cinnamomea, and

Osmunda regalis var. spectabilis. Acer rubrum is a dominant tree in these areas. Viola primulifolia, Viola macloskeyi var. pallens, Parnassia asarifolia, Isotria verticillata, and Amianthemum muscaetoxicum are examples of herbaceous plants found in the swales.

Sandstone outcrops are common on the Cumberland Plateau, especially at the rim surrounding the coves. These areas are characteristically dry and open, with thin soil and sparse vegetation. Quercus prinus, Quercus stellata, and Oxydendrum arboreum are the dominant trees. In places where a stream flows over the rim, large Kalmia latifolia thickets form. Soils on the outcrops range in area from small pockets to a thin overall covering. Grasses dominate the herbaceous flora, usual are Danthonia sericea, Andropogon gerardii, and Stipa avenacea. Herbs of the outcrops include Hypericum gentianoides, Silene antirrhina, Bulbostylis capillaris, Liatris microcephala, Liatris scabra, Solidago odora, Polygala cutissii, and Talinum sp. Styrax grandifolia occurs on one outcrop north of Wolf Cove.

Sal City pond is an artificial pool created by an earthen dam along a stream near Sal City camping area. The stream flows year-round, and in the spring forms a pond approximately 500 m² in area. By midsummer the pond has essentially dried up and only the stream channel remains.

The pond is bordered by a thicket of Alnus serrulata and Rhus copallina. This site contains several taxa not found elsewhere in the study area. These include Scirpus cyperinus, Scirpus purshianus, Rhexia virginica, Sparganium americanum, Ludwigia alternifolia, Pluchea camphorata, Eupatorium capillifolium, and Alisma subcordatum.

The Plateau pond is a natural pond on the Plateau surface due north of Wolf Cove. It is ca. 2000 m² in size and persists throughout the year, although in the late summer the pool is reduced to a pool ca. 25 m² in area. It is bordered by a nearly impenetrable thicket of shrubs including Kalmia latifolia, Vaccinium arboreum, Lyonia ligustrina, Ilex opaca, and Sorbus arbutifolia. The Plateau pond, like Sal City pond, supports a flora that is unique within the study area. Cephalanthus occidentalis, Rynchospora corniculata, Dulichium arundinaceum, Isoetes engelmannii, and Leersia oryzoides are some of the characteristic taxa. The pond is drained to the south by a small ephemeral creek. This was the only locality in the study area for Hypericum walteri, Gentiana saponaria, Bartonia virginica, and Lobelia cardinalis.

Coves

Eight distinct habitats occur within the gorge and are easily distinguishable based on the vegetation and environment represented in each. These are designated 1) cliff

bases, 2) gorge slopes (north and south facing), 3) glade-like areas, 4) drainages from Plateau, 5) Cave Cove floor, 6) Farmer Cove floor, 7) Wolf Cove floor, and 8) caves and sinks (refer to Figure 5, page 23). These terms are used to describe localities and environments in the Annotated Checklist (Appendix A).

The bases of the sandstone cliffs that form the rim of the gorge represent a distinct change from the relatively xeric environments of the Plateau to the shaded, mesic forests of the coves. The sheer cliffs, often to 30 m or more high, are essentially bare except for crevices where ferns are rooted. The bases of the cliffs often form a small terrace 2-5 m wide of fine, sandy soil that ranges from moist to wet due to shading by the cliffs and many seeps and springs. Dryopteris marginalis, Silene rotundifolia, Saxifraga virginienensis, Heuchera parviflora, and Asplenium spp. are the most commonly encountered herbaceous plants. The difference in woody taxa between the Plateau surface and cliff bases is very pronounced. Acer saccharum ssp. nigrum, Cornus florida, Carpinus caroliniana, and Ostrya virginiana comprise the forest below the cliffs. Quercus prinus and Carya ovata may occur in the forests at the cliff bases.

The slopes of the gorge offer a variety of micro-habitats and plant communities. The north-facing slopes are generally covered with sandstone talus from the cliffs and

support an open, mesic forest with Tilia heterophylla, Liriodendron tulipifera, Nyssa sylvatica, Quercus prinus, Cercis canadensis, and Carya ovata. Representatives of the herb flora consist of grasses (Brachyelytrum erectum, Panicum commutatum), Campanula americana, Phlox amplifolia, Polygonum scandens var. cristatum, Tradescantia subaspera, Mimulus alatus, and Galium circaezans.

The slope flora of the south-facing slopes is very similar to that of the north-facing slopes except in areas where the slope increases and limestone crops out. These areas, in two bands on the south-facing slopes, are the glade-like habitats. The soil is very thin, dry, and stony. The forest opens up and consists mostly of scattered Carya ovata and Quercus prinus. Crataegus spp. become prominent, often forming impenetrable thickets. Plants associated with these glade-like areas include many calciphiles such as Rhus aromatica, Callicarpa americana, Ratibida pinnata, Eryngium yuccifolium, Manfreda virginica, Hystrix patula, Lithospermum canescens, and Juniperus virginiana.

Several ephemeral streams drain into the coves from the Plateau. The herbaceous flora around these damp areas is especially rich. The best example of such a drainage is the main Plateau drainage into Farmer Cove from the south rim of the Plateau. Taxa observed only along this and similar

drainages include Aristolochia macrophylla, Panax quinquefolius, Carex purpurifera, and Viola tripartita var. glaberrima.

The cove floors each offer distinctive habitats. The floor of Cave Cove consists of a mesic forest of Fagus grandifolia, Aesculus flava, Liriodendron tulipifera, Tilia heterophylla, Morus alba, Carpinus carolinianus, Cornus florida, Ostrya virginiana, Acer saccharum, and Asimina triloba. The herbaceous flora is rich, particularly in the spring. Representative taxa include Viola spp., Delphinium tricorne, Erythronium americanum, Caulophyllum thalictroides, Hydrastis canadensis, and Actaea pachypoda. The summer flora includes Synandra hispidula, Laportea canadensis, Campanula americana, Asteraceae, Verbena urticifolia, and Triphora trianthophora.

The floor of Farmer Cove has been in cultivation within the last 25-35 years. The floor is similar to Cave Cove except for the old fields which are returning to forest. These open areas contain Juniperus virginiana, Quercus velutina, Quercus falcata, Liquidambar styraciflua, Corylus americana, Ulmus alata, Juglans nigra, Juglans cinerea, and Pinus echinata. The pine appears to be planted. The herb flora includes grasses (Bromus purgans, Festuca pratense, Tridens flavus), Lonicera japonica, Pedicularis canadensis, Botrychium dissectum,

Ophioglossum vulgatum var. pycnostichum, Silene virginica, Spiranthes cernua, and various composites.

The floor of Wolf Cove appears to be the least disturbed site in the study area. The cove is the deepest (274.3 m to top of Plateau) and the most shaded. Occasional outcrops, sinkholes, and waterfalls are found in this cove. A rich mesic forest occupies the floor and slopes immediately adjacent to the floor. This forest is characterized by large (46-150 cm DBH) trees of Fagus grandifolia, Tilia heterophylla, Aesculus flava, Liriodendron tulipifera, Fraxinus americana var. biltmoreana, Magnolia acuminata, and Juglans nigra. Understory shrubs include Cornus florida, Lindera benzoin, Staphylea trifolia, Dirca palustris, and Hamamelis virginiana. The herb layer is rich in taxa that are rare or nonexistent elsewhere in the coves; many exhibit a Highland Rim affinity. These taxa include Dicentra cucullaria, Mertensia virginica, Carex careyana, Iodanthus pinnatifidus, Valeriana pauciflora, Trillium flexipes, Stylophorum diphyllum, and Polygonatum pubescens.

Numerous caves and sinkholes occur in the coves, notably in Cave and Wolf coves. A large cave is located on the floor of Cave Cove near the Farmer Cove saddle. The cool, moist air from this cave forms fog in the summertime,

creating a very moist and cool microclimate. Cystopteris bulbifera, Impatiens pallida, Astilbe biternata, and Triphora trianthophora are found in relative abundance in the vicinity of the cave mouth. In Wolf Cove, protected waterfalls flowing into sinkholes provide a similar micro-habitat, and the herbaceous growth is very lush.

Floristic Elements

The range of each taxon was established and assigned to one of four distribution categories (after Oxendine, 1971). Fernald (1950) was the primary source from which ranges were determined as he indicates whether the taxa have a primarily northern or southern center of distribution. Four general categories of plants were distinguished: 1) taxa with ranges that extend well beyond Tennessee, labelled "intraneous", 2) taxa for which Tennessee marks the limit of their range, labelled "extraneous", 3) taxa that are native to the Appalachian provinces of the Eastern United States and include Tennessee in their range (the "interior" taxa), and 4) taxa that are introduced to the flora from other countries. Within these categories six groups were established based upon whether the primary center of distribution is northern or southern (Oxendine, 1971) (Table IV). Groups I, II, and III represent the intraneous taxa; Groups IV and V represent the extraneous taxa; and Group VI the interior

Table IV. Range Characteristics and Floristic Elements of Wolf Cove Flora.

Group	Range	Example	No. of Taxa	Total ^a
I	S-Florida to Texas north to Canada	<u>Solidago nemoralis</u>	16	
	N-Canada south to Florida and Texas	<u>Cryptotaenia canadensis</u>	51	67 (11.7)
II	S-Florida to Texas north to New England or Upper Midwest	<u>Polygonatum biflorum</u>	113	
	N-New England and/or Upper Midwest south to Florida and Texas	<u>Tovara virginiana</u>	49	162 (28)
III	S-Florida and Texas to Central Midwest north to Va., W. Va., Ohio	<u>Spigelia marilandica</u>	97	
	N-Va., W. Va., Ohio and Central Midwest south to Florida and Texas	<u>Ligusticum canadense</u>	12	109 (19)

Table IV. (continued)

Group	Range	Example	No. of Taxa	Total ^a
IV	S-Tennessee north to New England and North-Central States	<u>Vaccinium vacillans</u>	15	85 (14.8)
	N-New England and North- Central States south to Tennessee	<u>Asclepias quadrifolia</u>	70	
V	S-Florida and Texas north to Tennessee	<u>Styrax grandifolia</u>	21	
	N-Canada south to Tennessee	<u>Corylus americana</u>	75	96 (16.7)
VI	S-Appalachian Interior north to Ohio, Pennsylvania, Kentucky, or Virginia	<u>Stewartia ovata</u>	8	27 (4.5)
	N-Appalachian Interior south to Tennessee, Georgia, and Alabama	<u>Parnassia asarifolia</u>	19	
VII	Introduced Taxa	<u>Lonicera japonica</u>	30	30 (5.3)

Table IV. (continued)

Group	Range	Example	No. of Taxa	^a Total
<u>Northern Species Total:</u> 276 (48.0) <u>Southern Species Total:</u> 270 (46.8)				
Intraneous	112 (40.6)	Intraneous	226 (83.6)	
Extraneous	145 (52.5)	Extraneous	36 (13.4)	
Interior	19 (6.9)	Interior	8 (3.0)	
Introduced Taxa: 30 (5.2)				
Total Taxa: 575 (100)				

^aNumbers in parentheses represent percentages.

Table format after Oxendine, 1971.

taxa. Group VII contains the introduced taxa for which no distinction of center of distribution is made.

Of the entire flora, 270 taxa (46.8%) have centers of distribution in the south and 276 taxa (48.0%) have northern centers of distribution. Thirty taxa (5.3%) are introductions to the flora. Of the intraneous taxa, 226 (66.8%) are of southern distribution and 112 (33.2%) have a northern distribution. Of the extraneous taxa, 36 (19.9%) are of southern distribution and 145 (80.1%) are of northern distribution. Of the interior taxa, 8 (29.6%) are southern and 19 (70.4%) are northern.

Rare Plants

The Rare Plant List of Tennessee (Tennessee Department of Conservation, 1986) was consulted to determine the presence of Endangered or Threatened (on the State and Federal level), or Special Concern (State level only), plants in the study area. At the State level, seven taxa are listed as Threatened in Tennessee with three of them currently Federally listed in Category 3C (no longer being considered for Federal listing due to lack of threat or being more abundant than previously thought) and one, Synandra hispidula, Federally listed in Category 2 (current information suggests that the taxon be listed Federally as Endangered or Threatened but more information is needed). Three taxa are listed as being of Special

Concern in Tennessee. Of these taxa, Helianthus eggertii and Polymnia laevigata, are Federally listed in Category 2. The taxa are listed and their status summarized in Table V.

Since the study area is located only 11.2 km from Jackson County, Alabama, the list of Endangered, Threatened, and Special Concern Plants of Alabama (Freeman, Causey, Short, and Haynes, 1979) was consulted to determine if any taxa found in the Wolf Cove study area are rare in Alabama. Twenty-eight Wolf Cove taxa are included on the Alabama list. These data are summarized in Table VI.

Table V. Tennessee Rare Plants in the Wolf Cove Study Area.

	Status		Taxa
	State	Federal	
I. Endangered			No taxa listed
II. Threatened			<u>Hieracium scabrum</u>
		3C	<u>Hydrastis canadensis</u>
		3C	<u>Panax quinquefolius</u>
		2	<u>Synandra hispidula</u>
		3C	<u>Talinum</u> sp. (Either <u>T. mengesii</u> or <u>T. teretifolium</u>)
			<u>Trichomanes boscianum</u>
III. Special Concern	2		<u>Helianthus eggertii</u>
		2	<u>Polymnia laevigata</u>
			<u>Spiranthes ovalis</u>

Table VI. Alabama Rare Plants in the Wolf Cove Study Area.

	Status		Taxa
	State	Federal	
I. Endangered			<u>Gentiana saponaria</u> (J) ^a
			<u>Gentiana villosa</u>
		3C	<u>Hydrastis canadensis</u> (J)*
		3C	<u>Panax quinquefolius</u> (J)*
			<u>Parnassia asarifolia</u> (J)
		2	<u>Synandra hispidula</u> (J)*
II. Threatened			<u>Asplenium ruta-muraria</u> (J)
			<u>Carex purpurifera</u> (J)
			<u>Cypripedium calceolus</u> var. <u>pubescens</u> (J)
			<u>Hypericum dolabriforme</u> (J)
			<u>Stylophorum diphyllum</u> (J)
			<u>Trichomanes boscianum</u> (J)*
III. Special Concern			<u>Actaea pachypoda</u> (J)
			<u>Aralia racemosa</u>
			<u>Athyrium pycnocarpon</u>
			<u>Dennstaedtia punctilobula</u> (J)
			<u>Dicentra cucullaria</u> (J)
			<u>Habenaria lacera</u> (J)
			<u>Isoetes engelmannii</u>
			<u>Isotria verticillata</u>

Table VI. (continued)

	Status		Taxa
	State	Federal	
III. Special Concern			<u>Monarda clinopodia</u> <u>Oxalis grandis</u> (J) <u>Polypodium virginianum</u> (J) <u>Salix humilis</u> (J) <u>Silene rotundifolia</u> <u>Stewartia ovata</u> (J) <u>Valeriana pauciflora</u> <u>Viola canadensis</u>

^a(J) signifies that the taxon occurs in Jackson County, Alabama, which is adjacent to the study area.

*Taxon is listed in Tennessee.

CHAPTER VI

DISCUSSION

Flora

Comparisons with Other Gorge Floras

The flora of Wolf Cove is similar to those reported by Caplenor (1955), Clark (1966), and Wofford et al. (1979) in other Cumberland Plateau gorges. There are, however, some interesting differences between the Wolf Cove flora and other gorge floras. These differences are based on the taxa that appear unique to or excluded from the Wolf Cove flora.

The floras have many taxa in common at all levels as expected due to their similarities in physiography, geology, climate, geographic location, and history (both botanical and human). However, each flora has a complement of taxa that are entirely unique. Five families and 79 taxa occur in the Wolf Cove area that do not occur in the inventories of other gorge floras (these taxa are listed in Appendix B). This may be due to differing collecting techniques and differences in the types of microhabitats that occur in each area. For example, Sparganium americanum, Dulichium arundinaceum, and Isoetes engelmannii occur in a pristine pond on the the Plateau surface in the Wolf Cove study area; these taxa are not found in any of the other floras and no mention of a natural, open, permanent pond is made in their

general descriptions. The taxa unique to the Wolf Cove area are denoted by a "#" symbol in the annotated checklist of the flora in Appendix A.

There are many taxa that occur in the other gorge floras but are missing in the Wolf Cove study area. Nine families and 120 species are found in at least two of the other three floras (Caplenor, 1955; Clark, 1966; and Wofford et al., 1979), but not in Wolf Cove. Four explanations may account for some of this discrepancy: 1) the proper microhabitats for these taxa are not present in the Wolf Cove area, 2) the taxa may have occurred in the area at one time but have since been extirpated due to habitat destruction by man, 3) recent unusual weather conditions may have reduced their numbers or aborted flowering, 4) the taxa may occur in the Wolf Cove area but have been overlooked. There are several taxa that are conspicuous by their absence (based on distribution, available habitat, conspicuousness in the other floras, and common observation in Cumberland Plateau gorges). For example, Tsuga canadensis, Acer pensylvanicum, Asclepias tuberosa, Itea virginica, Rhododendron calendulaceum, and Magnolia tripetala are easily recognized, relatively resistant to climatic abnormalities, common in Cumberland Plateau gorges, and absent in the Wolf Cove study area.

Noteworthy Taxa

Three major criteria are used to determine the noteworthy status of taxa in the Wolf Cove flora: 1) rarity, as denoted in the Tennessee Rare Plant List, 2) absence from similar areas on the Cumberland Plateau, and 3) distribution in Tennessee. A list of rare plants has been provided and will be discussed later. A list of taxa unique to the Wolf Cove flora is provided in Appendix B. The following discussion will deal with those taxa for which the study area represents an unusual point in their Tennessee distribution. This discussion will deal mainly with those taxa which do not normally occur on the Cumberland Plateau.

Two general categories of "noteworthy distribution" can be described. The first involves the occurrence of a plant in the study area with respect to its main distribution. In other words, if a plant occurs across the northern tier of Tennessee counties and in Wolf Cove in a southern tier county, this is considered a noteworthy range extension. The second category is the establishment of the first occurrence of a plant on the Cumberland Plateau. Twenty Wolf Cove taxa fall into one of these two categories.

Fourteen taxa are considered as being noteworthy extensions in the first category. Table VII provides the names and general distributions of each of these taxa. These taxa occur on the Plateau, but their presence in the Wolf Cove study area represents a two or more county

Table VII. Noteworthy Collections for the Cumberland Plateau.

Taxon	Range Comments
<u>Ophioglossum vulgatum</u> var. <u>pycnosticum</u>	Represents a three county range extension; normally in western and northeastern Tennessee.
<u>Bulbostylis capillaris</u>	Nine counties in southeastern Tennessee, known but not frequent on Plateau.
<u>Carex careyana</u>	Scattered over six counties of Plateau and Highland Rim; this collection represents a two county extension in range.*
<u>Carex festucacea</u>	Only collected from Montgomery and Franklin counties-probably more common in between than is represented in collections.*
<u>Scirpus purshianus</u>	Found in five counties to the north, and Polk County to the east; represents a four county range extension.
<u>Trillium catesbaei</u>	Usually found in extreme southeastern Tennessee, unusual for Plateau.
<u>Stipa avenacea</u>	Franklin County represents westernmost Tennessee county.
<u>Iodanthus pinnatifidus</u>	Collection represents the southernmost county in Tennessee.*
<u>Desmodium viridiflorum</u>	Usually found in East Tennessee and in the Ridge and Valley, and in White County. Not common on Plateau.
<u>Hypericum walteri</u>	Mainly in West Tennessee, rare on Plateau.
<u>Monarda clinopodia</u>	Mainly in East Tennessee, rare on Plateau.

Table VII. (continued).

Taxon	Range Comments
<u>Gillenia trifoliata</u>	Western edge of its range in Tennessee.
<u>Astilbe biternatum</u>	Western edge of its range in Tennessee
<u>Viola macloskeyi</u> var. <u>pallens</u>	Mostly in East and northeastern Tennessee, unusual for Plateau.

*Denotes taxa previously collected in Franklin County.

extension in their range. This may be due to inadequate collection, discontinuity of habitat, or genuine rarity.

Six taxa are found for the first time on the Cumberland Plateau based on distribution information available at the Herbarium of The University of Tennessee, Knoxville. These taxa are listed in Table VIII along with comments on their main range. The presence of these plants on the Plateau may be indicative of isolated unusual habitats on the Plateau or simply an increase in the understanding of the distribution of the plant.

Forests and Plant Communities

Cumberland Plateau

The forests of the Cumberland Plateau surface within the study area contain Mixed Oak and Chestnut Oak communities. This is based on general impressions of the author and comparisons of notes made in the field to other works on the vegetation of the Cumberland Plateau (Caplenor, 1965; Hinkle, 1978; Schmalzer, 1978; Wade, 1977). These two communities appear to dominate the Plateau surface within the study area.

The area of the plateau in the immediate vicinity of the rim on the north side of the coves appears to be a Chestnut Oak community. This classification is based on the dominance of chestnut oak, hickories, sourwood, and

Table VIII. First Time Collections on Cumberland Plateau.

Taxon	Range Comments
<u>Aster macrophyllus</u>	Normally from upper East TN.
<u>Bidens discoidea</u>	Normally from Western Highland Rim counties: Dickson, Sumner, and Robertson.
<u>Hieracium scabrum</u>	Known from Morgan and Johnson counties in East TN.
<u>Polygonum scandens</u> var. <u>cristatum</u>	Known from Wilson County in Middle TN; also from East TN.
<u>Styrax grandifolia</u>	Known mostly from the Western Highland Rim, this is the first Plateau collection on deposit at TENN, although Clark (1966) reports it from Fiery Gizzard Gorge in Marion County.
<u>Vitis riparia</u>	Generally scattered across TN, but this is the first from the Plateau.

black gum on the gently rolling, dry Plateau surface. Quercus rubra is listed as an associated canopy species (Schmalzer, 1978; Quarterman and Turner, 1972) but was not collected during this study. This may be due to the lack of this species in the sapling and understory layers. The understory layers correspond well to Hinkle's, Schmalzer's and Wade's descriptions of this forest type. This forest is common on the Plateau, occurring at Fall Creek Falls (Caplenor, 1965); Little Piney Creek and Little River Canyon (Sherman, 1958); Savage Gulf (Quarterman and Turner, 1972); and Big South Fork, Cumberland River (Safley, 1970). Hinkle (1978) noted that chestnut oak occasionally forms pure stands near the rims of ravines and gorges; this phenomenon also occurs to an extent on the Plateau rim to the north of the coves.

The majority of the Plateau within the study area corresponds to Hinkle's (1978) Mixed Oak forest. Black oak, white oak, and scarlet oak are listed as dominants in this community with sourwood and dogwood as important understory species. This community may owe its existence to the land use practices of the area, mainly logging. Hinkle believes that this may be a successional type, and that it may eventually give way to a white oak community. He also suggests that the idea of the presence of an "oak-hickory" community on the Cumberland Plateau is misleading due to the low importance value of hickory in the upland forests.

The streams and swales are difficult to classify qualitatively as a specific community type. They most closely resemble Hinkle's (1978) red maple-white oak-black gum community and Smith's (1977) streamside red maple community, but the similarity is very subjective. These habitats, located in areas of poorly drained soil, represent only a small portion of the entire Plateau surface in the study area. The major differences between it and the surrounding forest is an increase in red maple and a more lush herb layer. Mountain laurel and other ericaceous shrubs also occur more frequently in these areas than in the surrounding forest. Plot sampling and analysis would be necessary to define this habitat further.

Perkins (1981) described the vegetation of sandstone outcrops on the Cumberland Plateau. She indicated 157 vascular taxa as occurring on sandstone outcrops, and 97 of these are found in the Wolf Cove flora. Of these 97 taxa, 87 are recognized as a conspicuous part of the sandstone outcrop flora of the Wolf Cove study area. The rest occur in the vicinity of the outcrops or at the bases of the cliffs which the outcrops form. Braun (1950) described a similar outcrop flora for the Cumberland Plateau, with the exception of the presence of pine, which is absent from the outcrops of the Wolf Cove study area.

The Sal City pond is a highly disturbed area with a weedy flora in those areas that are not denuded by

all-terrain vehicles. The border of the pond is the only locality for alder that was observed. Several other taxa are restricted to this site within the study area. This may be due to the moist conditions that this pond provides in an otherwise xeric habitat.

The Plateau pond is quite distinct from Sal City pond in terms of its origin and plant communities. The pond is natural and apparently undisturbed (Paul Somers, pers. comm.). The soils surrounding this pond are deep and wet, which is not the case for those in the Sal City pond area, where they are sandy, open, and dry-moist. The pond supports submerged taxa (Isoetes) and emergent taxa (Dulichium and Rynchospora). Utricularia was not observed in the pond, but is reported from other Plateau ponds (B. E. Wofford, pers. comm.).

These two ponds represent unique habitats within the study area. The fact that they each support a distinctive type of flora is probably best explained in terms of man's influence upon them. Sal City pond represents a man-made and highly disturbed environment with many common and weedy taxa. It is also very young compared to the Plateau pond, which is similar to other natural Plateau ponds that have existed since before Wisconsin glaciation (Delcourt, 1979). The Plateau pond is much older and is undisturbed, probably owing to its concealment from the view of the nearest trail.

Coves

With the exception of an area of the south-facing slopes where limestone crops out, the forests of the coves in the study area are generally mixed-mesophytic in character in accordance with Braun's (1950) view of the composition and distribution of this forest type. Braun states:

The contrast between dry pine or oak forest of the plateau and the forest of the slopes below the cliffs (over which one can look from the edge of the plateau above) is extreme. Every such slope, unless at some time completely cleared, is occupied by mesophytic forest. Mixed-mesophytic forest occupies all except extreme situations, its composition varying with slope exposure.

Other studies of Cumberland Plateau forest have described the gorge forests as mixed-mesophytic and several segregates have been characterized (Braun, 1950; Caplenor, 1965; Hinkle, 1978; Sherman, 1978; Wade, 1977). The mesic forests of the study area do not appear to vary greatly in species composition although the forests differ in the amount of canopy closure, richness and lushness of the herb layer, and disturbance due to logging. The coves have been selectively cut once, but it appears as if more trees were taken from the upper coves (Farmer and Cave) than from Wolf Cove, probably due to much greater ease of removal. One interesting observation about the mesic forests of the coves

is the lack of Tsuga canadensis, Betula spp., and Magnolia spp. Because of the many segregate communities that have been described for this forest type and a lack of quantitative data from this study area, few comments will be made about particular cove forest communities.

Hinkle (1978) noted the presence of a chestnut oak community at the bases of sandstone cliffs and similar habitats throughout the Plateau. This community differs from the Plateau chestnut oak community due to the presence of mesic species in the canopy. This community is found at the bases of cliffs on the northern rim of the coves.

Open mesophytic forests occur on the upper slopes of the coves. These areas are usually covered with sandstone talus which may account for the openness and almost park-like character of these stands. The forest canopy closes gradually near the cove floors, and on the floors a relatively closed forest occurs.

Except where the activities of man have opened the forest, Cave Cove and Farmer Cove support a fairly uniform, closed, mixed-mesophytic forest. The trees are of moderate size and the herb layer is rich in the spring. A well used jeep trail traverses the floors of these two coves, and the edges of it support a weedy flora in the summer and fall. The biggest discontinuity in the forest occurs in Farmer Cove in an area that was under cultivation about 50-70 years ago. The field has been taken over by Lonicera japonica,

Juniperus virginiana, Liquidambar styraciflua, and, in one area, Pinus echinata. The small pine grove has probably been planted, as the trees are arranged in an orderly manner and Pinus echinata was not observed elsewhere in the area.

The most spectacular forest in the study area is found on the floor of Wolf Cove. Because of the near inaccessibility of the cove, only the best and most valuable timber was cut, and many huge trees remain. Fagus grandifolia is the dominant species with Aesculus flava, Fraxinus americana var. biltmoreana, Liriodendron tulipifera, Juglans nigra, and Tilia heterophylla. In addition to the large trees, a luxuriant herb layer is present from early spring through the fall. Many taxa, especially Highland Rim species, are found in this cove in abundance that otherwise are found rarely or not at all in the study area.

The Wolf Cove forest qualitatively resembles the virgin mixed-mesophytic forest of Savage Gulf (Quarterman and Turner, 1972; Sherman, 1978). Except for the absence of Tsuga canadensis, Quercus rubra, and Magnolia tripetala, the composition of the two forests is basically the same. This may be a reflection of the relatively undisturbed nature of Wolf Cove.

One of the most unusual communities encountered in the study area is the glade-like locality of the middle south-facing slopes. In these areas the Bangor limestone crops out reducing the soil depth and eliminating the large trees. Due to the lack of the trees, the resulting lack of shade, and the south-facing aspect, a very warm, xeric environment exists. This band begins on the slopes above the head of Farmer Cove and continues beyond out of the study area to the east.

Many of the plants that occur in these areas are distinctive and generally restricted to this habitat. Allium cernuum, Asclepias verticillata, Hypericum dolabriforme, Manfreda virginica, Monarda fistulosa, and Ratibida pinnata are listed by Baskin, Quarterman, and Caudle (1968) as being characteristic of, although not restricted to, cedar glades. Hypericum dolabriforme is listed as a glade endemic. Eryngium yuccifolium, although not listed in Baskin et al. or Quarterman, is restricted to the glade-like habitats in the study area. Many shrubs grow in this area, notably Callicarpa americana and Rhus aromatica, which also occur on the cedar glades of the Central Basin (Quarterman, 1948). None of these taxa occur on the Savage Gulf inventory (Wofford et al., 1979). Juniperus virginiana is present but not dominant. Cercis canadensis, Carya ovata, and Crataegus crus-galli are the main trees in this habitat, but they are widely spaced

in crevices and level areas where the soil is deeper. This is a very interesting habitat that merits further ecological study.

Floristic Elements

The taxa collected in this study were divided into floristic elements base on whether their inferred centers of distribution are primarily northern or southern. The taxa were very evenly divided between the northern element and the southern element. This is very similar to the result of an analysis of the herbs and shrubs of the Ridge and Valley Province of East Tennessee (Oxendine, 1971).

When the intraneous taxa are examined, the majority (225 out of 337, or 66.8%) are of primarily southern distribution (refer to Table IV, page 53). This result may be explained by the replacement of the northern taxa present at the end of Pleistocene glaciation with southern taxa that are presumably better adapted to warmer, drier conditions. The relatively flat Cumberland Plateau would provide an easy migration route for plants as they moved southward and northward as the result of climatic change. During the warm Hypsithermal period, many of the taxa less tolerant of heat and drought, and unable to find acceptable refugia, were probably removed from the flora (Harvill, 1984). The plants that make up the southern intraneous group tend to be (but are not always) those taxa that inhabit the drier, more

exposed areas of the Cumberland Plateau in the study area. It should be emphasized that this is the author's impression of the habitat distribution of the taxa, and other explanations could probably account for the higher percentage of southern taxa in the intraneous category.

One hundred forty-five of the extraneous taxa are of northern distribution as compared to 36 extraneous taxa of southern distribution, and the interior group shows a similar allocation of taxa (Table IV, page 53). These data also support the above supposition that northern taxa were pushed southward during glaciation (as detailed in Chapter III) and then retreated northward as the climate warmed. These northern taxa may have found refuge in the relatively cool, mesic gorges that were either present along major river drainages or were in the process of forming on the Plateau. The general impression of northern taxa occupying the cooler, more mesic coves and the southern taxa occupying the warmer, more xeric sites is maintained.

Rare Plants

Nine plants listed as Threatened or of Special Concern in Tennessee were collected in the study area. Three of these taxa, Synandra hispidula, Helianthus eggertii, and Polymnia laevigata are listed in Category 2 on the Federal list. Of these three taxa, only Helianthus eggertii appeared to be genuinely rare. Only one population was

discovered near the Sal City pond. The other two taxa were found fairly frequently in the coves. Polymnia laevigata often formed nearly impenetrable thickets on the upper mesic south-facing slopes and gave the impression of being a noxious weed. Synandra hispidula was frequently encountered on the floors of Cave and Wolf coves in rich mesic woods.

Of the six remaining taxa listed in Tennessee, three are Federally listed in Category 3C (no longer being considered for listing). This is interesting, because these taxa are genuinely rare in the study area, with few individuals found in one to several widely scattered localities. These six taxa are Hieracium scabrum, Hydrastis canadensis, Panax quinquefolius, Spiranthes ovalis, a Talinum sp., and Trichomanes boscianum. Status reports of all of the rare taxa are provided in Appendix C.

Twenty-eight Wolf Cove taxa appear on the Alabama rare plant list. Many of these are fairly frequent in Tennessee and in the study area, indicating that they may be near the southern limits of their distributions. A list of these taxa is found in Table VI, page 59.

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APPENDICES

APPENDIX A
ANNOTATED CHECKLIST OF
THE VASCULAR FLORA OF WOLF COVE

The format of the following checklist is adapted in part from Murrell (1985). The flora is divided into four groups: Pteridophyta (Ferns and Fern Allies), Spermatophyta--Gymnospermae (Gymnosperms), and Spermatophyta--Angiospermae (Flowering Plants). The Angiospermae is further divided into the Monocotyledoneae (Monocots) and the Dicotyledoneae (Dicots). Families are arranged alphabetically within each group and the name is centered in boldface lowercase letters. Genera are arranged alphabetically within each family and species are arranged alphabetically within each genus.

The scientific name, authority, and common name are given for the taxon. Not all of the plants have common names and little effort was made to research the names further than the standard manuals. Both scientific names and common names follow Radford et al. (1968) for the most part. Other primary sources include Gray's Manual (Fernald, 1950) and The New Britton and Brown Illustrated Flora (Gleason, 1952).

The occurrence of each taxon as observed by the author is given after the common name, if any. These are by no means intended to be an absolute measure of the abundance of each taxon. The terms used are those of Murrell (1986) and are as follows:

- | | |
|------------|--|
| Very rare | - A single locality, few individuals |
| Rare | - One or two localities, generally small populations |
| Scarce | - Several localities or scattered small populations |
| Infrequent | - Scattered localities throughout |
| Occasional | - Well distributed but not anywhere abundant |
| Frequent | - Generally encountered |
| Common | - Characteristic and dominant |

Following the indication of occurrence, general location and habitat characteristics are given. The following list is a guide to these locations:

- | | |
|--------------------|---|
| Plateau | - Cumberland Plateau, mostly flat to gently rolling land |
| Swales | - Usually damp depressions or old stream courses on the Plateau |
| Sandstone outcrops | - Dry, exposed outcrops of the Plateau, usually on the rim |
| Glade-like areas | - Dry, exposed outcrops of south-facing slopes |
| Slopes | - Gently to steeply descending land |

- | | |
|---------------|---|
| Cove floors | - Areas on or near the bottoms of the coves, usually level to very gently rolling |
| Saddles | - Ridges of land separating coves |
| Plateau Pond | - Small pond on the Plateau north of Wolf Cove |
| Sal City pond | - Small artificial pond on Plateau near the Sal City camping area |

Habitat notes attempt to include moisture availability, forest type, amount of cover, and type of community.

Following the habitat description is the collection number of the author for ease of reference. The specimens are on deposit at TENN.

The last part of the annotation will include important synonymy, references, and distribution information, including the native range of exotic taxa.

County records are indicated by a preceeding asterisk (*). Taxa found in the Wolf Cove flora but not on any other Cumberland Plateau gorge floristic list are indicated by a preceding number symbol (#).

ANNOTATED CHECKLIST OF THE VASCULAR FLORA
OF WOLF COVE

PTERIDOPHYTA

Aspidiaceae

Athyrium asplenioides (Michaux) A. A. Eaton. Southern Lady Fern. Occasional, on Plateau surface in damp swales. 200, 245, 381, 674

Athyrium pycnocarpon (Sprengel) Tidestrom. Glade Fern. Occasional, at the base of waterfalls and wet places in coves. 082

Athyrium thelypteroides (Michaux) Desvaux. Silvery Glade Fern. Infrequent, rich mesic woods on slopes and cove floors. 581, 679, 763

Cystopteris bulbifera (L.) Barnh. Bulblet Fern. Infrequent, at bases of waterfalls and seeps, especially at mouth of Cave Cove Cave. 149, 229

* Cystopteris protrusa (Weatherby) Bickn. Southern Fragile Fern. Rare, only observed on floor of Wolf Cove, rich mesophytic forest. 686

Onoclea sensibilis L. Sensitive Fern. Occasional, rich woods and Plateau swales. 659, 766

Polystichum acrosticoides (Michaux) Schott. Christmas Fern. Occasional, sandstone and dry-mesic woods. 148

Thelypteris hexagonoptera (Michaux) Weatherby. Broad Beech Fern. Occasional, rich mesic woods; floors of coves. 143

Thelypteris noveboracensis (L.) Nieuwland. New York Fern. Common, in Plateau swales, often forming lush stands. 134, 597

Aspleniaceae

Asplenium montanum Willd. Mountain Spleenwort. Very rare, only two small populations found on sandstone cliffs at edge of a sinkhole above Wolf Cove. 740

Asplenium pinnatifidum Muhl. Lobed Spleenwort. Very Rare, only one small population found on the face of a sandstone cliff above Cave Cove. 741

Aspleniaceae (continued)

Asplenium platyneuron (L.) Oakes. Ebony Spleenwort.
Infrequent, dry-mesic open woods, thin soils. 076, 308

Asplenium rhizophyllum L. Walking Fern. Frequent, on
limestone boulders in mesic woods on slopes and cove
floors. [Camptosorus rhizophyllum (L.) Link.] 147

*#Asplenium ruta-muraria L. Wall Rue. Very Rare, on
limestone boulders of Wolf Cove-Sinking Cove saddle in
mesic woods. 002

Blechnaceae

Woodwardia areolata (L.) Moore. Netted Chain Fern.
Rare, in Plateau swales. Damp-wet soil in oak woods.
752

Dennstaedtiaceae

Dennstaedtia punctilobula (Michaux) Moore. Hay-scented
Fern. Scarce, in Plateau swales. Damp-wet soil in oak
woods. 753

Dryopteraceae

Dryopteris marginalis (L.) A. Gray. Marginal Wood Fern.
Infrequent, in damp crevices of sandstone cliffs. 244

Hymenophyllaceae

Trichomanes boscianum Sturm. Filmy Bristle Fern. Very
rare, one locality beneath a sandstone ledge north of
Cave Cove. 744

Isoetaceae

Isoetes engelmannii A. Braun. Quillwort. Rare, one
thriving population in Plateau Pond north of Wolf Cove,
submerged in shallow water. 201

Ophioglossaceae

Botrychium dissectum Sprengle. Common Grape Fern.
Infrequent, in disturbed areas on floor of Farmer Cove.
591

Botrychium virginianum (L.) Swartz. Rattlesnake Fern.
Infrequent, in rich mesic woods on the slopes and
floors of the coves. 150

*#Ophioglossum vulgatum L. var. pycnostichum Fern.
Adder's Tongue Fern. Rare, one large population on
the floor of Farmer Cove in old field near Wolf Cove
saddle. 698

Osmundaceae

Osmunda cinnamomea L. Cinnamon Fern. Common, on
Plateau surface; often form extensive stands in
damp-wet swales. 099, 781

Osmunda claytoniana L. Interrupted Fern. Very rare,
one small population near a sandstone outcrop along the
trail to Wolf Cove. 356

Osmunda regalis L. var. spectabilis (Willd.) Gray.
Royal Fern. Common, in Plateau swales. Often with
Osmunda cinnamomea. 052

Polypodiaceae

Polypodium polypodioides (L.) Watt. Resurrection Fern.
Occasional, on south-facing slopes and talus boulders.
Dry to mesic, open woods. 120

Polypodium virginianum L. Rock Cap Fern. Scarce,
covering large sandstone boulders in the main drainage
of Cave Cove. Mesic woods. 041

Pteridaceae

Adiantum pedatum L. Maidenhair Fern. Frequent in
damp, seepy areas of mesophytic woods, especially in
Wolf Cove. 056

Pteridaceae (continued)

Pellea atropurpurea (L.) Link. Purple Cliffbrake.
Infrequent, dry crevices of exposed limestone.
Dry-mesic, open woods. 075

Pteridium aquilinum (L.) Kuhn. Bracken. Frequent on
Plateau surface, often in dry, sandy soil. 697

SPERMATOPHYTA

GYMNOSPERMAE

Cupressaceae

Juniperus virginiana L. Eastern Redcedar. Occasional,
most common in the old field on the floor of Farmer
Cove. 800

Pinaceae

* Pinus echinata Miller. Shortleaf Pine. Scarce, mostly
in a thicket (possibly artificially planted) in Farmer
Cove near Wolf Cove saddle. 560

Pinus taeda L. Loblolly Pine. Very rare, one tree near
TN16 at Sal City. Probably planted after logging. 279

ANGIOSPERMAE

MONOCOTYLEDONEAE

Alismataceae

- * Alisma subcordatum Raf. Water Plantain. Rare, one population observed in a sandy creekbed near Sal City Pond. 334

Amaryllidaceae

Hypoxis hirsuta (L.) Coville. Yellow Star Grass. Frequent, on Plateau surface, chiefly in damp areas. 053

Manfreda virginica (L.) Rose. Agave. Very rare, only two plants observed in a dry limestone crevice north of Cave Cove. 393b [Agave virginica L. in Radford.]

Araceae

Arisaema triphyllum (L.) Schott. Jack-in-the-Pulpit. Frequent, on slopes and floors of coves in mesic woods. 012

Commelinaceae

Tradescantia subaspera Ker. Spiderwort. Occasional, on slopes and floors of coves in mesic woods. 130, 304

Cyperaceae

Bulbostylis capillaris (L.) Clarke. Rare, in thin soil of a sandstone outcrop at the head of Cave Cove near the Turnpike. 618, 807

Carex abscondita Mackenzie. Sedge. Scarce, floor of Wolf Cove in rich, mesic woods near sinkhole. 812

Carex albursina Sheldon. Sedge. Infrequent, in rich, damp soil in mesic woods on the floors of the coves. 060, 094, 155

Carex austro-caroliniana Bailey. Sedge. Infrequent, in rich, damp soil in mesic woods on the floors of the coves. 032, 157, 215, 274

Cyperaceae (continued)

- Carex blanda Dewey. Sedge. Scarce, in moist, seepy places in mesic woods of the coves. 167
- # Carex careyana Torrey. Carey's Sedge. Scarce, in moist, seepy places in mesic woods of the coves. 162
- # Carex caroliniana Schweinitz. Carolina Sedge. Infrequent, on Plateau surface near pools, puddles, and streams. Open oak woods. 181, 383
- * Carex cephalophora Muhl. ex Willd. Sedge. Occasional, in moist, seepy places in mesic woods of slopes and coves. 105
- Carex complanata Torrey & Hooker. Sedge. Infrequent, on Plateau surface, dry soil in oak woods. 154
- * Carex crinita Lam.
var. gynandra (Schweinitz.) Schweinitz & Torrey. Sedge. Infrequent, on Plateau in and around pools; especially on the borders of the Plateau Pond north of Wolf Cove. 170
- # Carex debilis Michaux. Sedge. Scarce, in rich woods of the coves and north-facing slopes. 166
- * Carex debilis Michaux var. rudgei Bailey. Sedge. Occasional, on Plateau surface in damp depressions. Oak woods. 160, 198, 720
- Carex digitalis Willd. Sedge. Scarce, in open mesic woods of slopes below Sal City. 299
- # Carex festucacea Schkuhr. Fescue Sedge. Infrequent, damp areas on Plateau and on the floors of the coves. 165, 746
- Carex gigantea Rudge. Giant Sedge. Infrequent, on Plateau surface around wet depressions and the Plateau Pond. 203, 460, 699
- Carex intumescens Rudge. Inflated Sedge. Rare, on Plateau in damp depression near Plateau Pond north of Wolf Cove. 202
- Carex jamesii Schweinitz. James' Sedge. Infrequent, in damp, rich mesic woods, especially the floor of Wolf Cove. 098

Cyperaceae (continued)

- Carex lurida Wahlenberg. Sedge. Occasional, along streams and damp areas on Plateau and north-facing slopes. 111, 209
- # Carex nigromarginata Schw. Black-margined Sedge. Infrequent, moist soil in mesic woods. 159
- Carex oligocarpa Schkuhr. Few-fruited Sedge. Infrequent, moist soil in mesic woods. 164
- Carex pensylvanica Lam. Pennsylvania Sedge. Occasional, Plateau surface in oak woods. 054, 158
- * Carex plantaginea Lam. Plantain-leaved Sedge. Frequent, on seepy wet soil in mesic woods, especially the floors of the coves. 033
- *# Carex prasina Wahl. Sedge. Scarce, in rich, damp soil of mesic woods, especially Wolf Cove. 156
- Carex purpurifera Mackenzie. Purple-based Sedge. Rare, one locality along main drainage from the southern rim of the Plateau. Rich, mesic woods. 693
- Carex retroflexa Muhl. ex Schkuhr. Reflexed Sedge. Occasional, damp mesic woods among limestone outcrops and boulders. 078
- Carex rosea Schkuhr. Sedge. Occasional, damp places throughout. 169, 234
- *# Carex striatula Michaux. Sedge. Frequent, in mesic woods of the coves. 059, 079, 168
- Carex swanii (Fernald) Mackenzie. Swan's Sedge. Infrequent, dry woods on south-facing slopes above coves. 161
- * Carex virescens Muhl. Green Sedge. Infrequent, mesic woods of the coves, especially Cave Cove. 238, 479, 598
- # Carex vulpinoidea Michaux. Fox Sedge. Occasional, around wet pools and puddles on Plateau surface. 180
- *# Dulichium arundinaceum (L.) Britton. Three-way Sedge. Rare, shallow water on the north side of the Plateau Pond north of Wolf Cove. 153

Cyperaceae (continued)

- # Eleocharis microcarpa Torrey. Spikerush. Scarce, wet places on Plateau, especially around pond at Sal City. 425, 430

Eleocharis obtusa (Willd.) Schult. Rush. Frequent, wet places on Plateau, especially around pond at Sal City. 337

Rynchospora corniculata (Lam.) Gray. Beak Rush. Scarce, around Plateau Pond north of Wolf Cove and at the pond near Sal City. 461, 632

- *# Rynchospora glomerata (L.) Vahl. Beak Rush. Scarce, wet places on Plateau, especially around pond at Sal City. 290

- * Scirpus atrovirens Willd. Rush. Infrequent, on Plateau around damp to wet depression. 749

- * Scirpus cyperinus (L.) Kunth. Bulrush. Scarce, wet places on Plateau, especially around pond at Sal City. 467

- *# Scirpus purshianus Fern. Bulrush. Scarce, wet places on Plateau, especially around pond at Sal City. 428

- * Scleria oligantha Michaux. Nut Rush. Infrequent; dry, open woods on slopes of coves. 163, 228, 300

Dioscoriaceae

Dioscorea villosa L. Wild Yam. Infrequent, north-facing slopes in damp, mesic woods. 103

Iridaceae

Iris cristata Aiton. Dwarf Crested Iris. Infrequent, north-facing slopes along streambeds, mesic woods. 675

Sisyrinchium mucronatum Michaux

var. atlanticum (Bickn.) Ahles.

Blue-eyed Grass. Occasional, open woods of Plateau and slopes. 710, 719

Juncaceae

- * Juncus coriaceus Mackenzie. Hard Rush. Infrequent,
Plateau surface around pools and puddles. 363
- Juncus debilis Gray. Rush. Infrequent, Plateau surface
in wet, miry areas. 243
- Juncus effusus L. Rush. Infrequent, damp swampy areas
in coves. 263
- * Juncus repens Michaux. Rush. Common, on Plateau
surface and cove floors in wet, sandy soil. Especially
around Plateau Pond and pond near Sal City. 335, 635
- Luzula bulbosa (Wood) Rydberg. Wood Rush. Occasional,
on cove floors and south-facing slopes in dryish soil.
073, 653
- # Luzula echinata (Small) Hermann. Wood Rush.
Occasional, on Plateau surface near damp areas of
sandstone outcrops. 005, 028, 680

Liliaceae

- Allium canadense L. Wild Onion. Rare, Plateau surface
in weedy areas north of coves. 728
- *# Allium cernuum Roth ex Roemer. Nodding Onion. Very
rare, along trail north from Wolf Cove/Farmer Cove
saddle in dry glade-like area. 473
- # Amianthemum muscaetoxicum (Walt.) Gray. Fly-poison.
Very Rare, seen in two damp depressions on Plateau
surface north of coves. 192
- Chamaelirium luteum (L.) Gray. Devil's Bit. Rare,
scattered on Plateau surface in oak woods near Checking
Station on TN16. 731
- Disporum lanuginosum (Michaux) Nicholson. Yellow
Mandarin. Frequent, on slopes along and drainages into
coves. 451, 705
- * Erythronium americanum Ker. Trout Lily. Frequent,
floors of coves in damp, seepy areas. Especially around
creeks and springs. 646
- Medeola virginiana L. Indian Cucumber Root.
Infrequent, on Plateau surface along streams and on
cove slopes along drainages. 122

Liliaceae (continued)

- Polygonatum biflorum (Walter) Ell. Solomon's Seal.
Scarce, rich mesic woods, especially around drain on
Farmer Cove floor near Wolf Cove saddle. 661
- * Polygonatum pubescens (Willd.) Pursh. Downy Solomon's
Seal. Rare, in rich mesic woods on floor and
north-facing slope of Wolf Cove. 142
- Smilacina racemosa (L.) Desf. False Solomon's Seal.
Infrequent, in open to dense mesic woods on north-
facing slopes above coves. 104
- Smilax bona-nox L. Catbrier. Infrequent, on cove
floors in rich mesic woods. 230
- Smilax glauca Walter. Greenbrier. Scarce, in sandy
soil on Plateau surface, oak woods. 761
- Smilax hugeri (Small) Norton. Carrion Flower. Scarce,
floor of Cave Cove in rich mesic woods. 242
- Smilax rotundifolia L. Greenbrier. Frequent, through-
out area in mesic woods. 174, 239
- *# Trillium catesbaei Ell. Catesby's Trillium. Rare, only
observed on Plateau around head of Cave Cove and on
Cave Cove/Farmer Cove saddle. Mesic woods. 108
- Trillium cuneatum Raf. Little Sweet Betsy. Scarce, on
cove floors in mesic woods, especially around Cave Cove
cave. 045
- *# Trillium flexipes Raf. White Trillium. Infrequent, on
cove floors and north-facing slopes in rich mesic
woods. 067
- Uvularia grandiflora Smith. Bellwort. Infrequent, on
cove floors in rich mesic woods. 669, 760
- Veratrum sp. False Hellebore. Infrequent, on north-
facing slopes in rich, mesic woods. No specimens were
observed in flower, making identification to species
impossible. Several of the colonies were large (50-150
individuals). 576

Orchidaceae

Cypripedium calceolus L.

var. pubescens (Willd.) Correll.

Yellow Lady's Slipper. Occasional, on slopes and cove floors in open mesic woods. Many vegetative plants were observed, but very few in flower. Many appear to have been collected or eaten. 706

- * Goodyera pubescens (Willd.) R. Brown. Downy Rattlesnake Plantain. Scarce, on Plateau in open oak woods. Inconspicuous under leaf litter. 643

- # Habenaria lacera (Michaux) Lodd. Green Fringed Orchid. Rare, small population on floor of Farmer Cove in disturbed, sandy soil. 227

Isotria verticillata (Muhl. ex Willd.) Raf. Large Whorled Pogonia. Very rare, one small population in a streambed on the Plateau surface north of Cave Cove. 745

- * Malaxis unifolia Michaux. Green Adder's Mouth. Very rare, one small population along the trail north from Wolf Cove/Farmer Cove saddle. Open, mesic woods. 115

- *# Spiranthes cernua (L.) Richard. Nodding Ladies' Tresses. Scarce, individuals scattered about on the floor of Farmer Cove in old field. 797

- *# Spiranthes ovalis Lindley. Oval Ladies' Tresses. Very rare, one small population on the terrace at the bottom of Farmer Cove near Wolf Cove saddle. Only three plants seen. 615

Tipularia discolor (Pursh) Nuttall. Crane Fly Orchid. Scarce, on Plateau surface in damp-dry, open oak woods. 457

- * Triphora trianthophora (Swartz) Rydberg. Three Birds Orchid. Scarce, floor of coves in very rich mesic woods, especially near Cave Cove cave. 410

Poaceae

- * Agrostis perennans (Walt.) Tuckerm. Upland Grass. Occasional, on Plateau around sandstone outcrops. 487, 537

Poaceae (continued)

- * Andropogon gerardii Vitman. Big Bluestem, Turkeyfoot.
Frequent, on Plateau surface in grassy fields and
around sandstone outcrops. 568
- * Andropogon glomeratus (Walter) BSP. Broomsedge.
Infrequent, on Plateau surface around Sal City. 624
- Arundinaria gigantea Chapm. Giant Cane. Common, on
south-facing slopes in open mesic woods. 398
- Brachyelytrum erectum (Schreb.) Beauv. Common, on
north-facing slopes above coves in mesic woods. 357
- * Bromus purgans L. Brome Grass. Common, throughout
area. 175, 405, 437, 608
- Calamagrostis cinnoides (Muhl.) Bart. Infrequent, on
Plateau in open oak woods, especially around the head
of Cave Cove and Sal City pond. 483, 543, 548
- Chasmanthium latifolium (Michaux) Yates Infrequent, on
Plateau surface in open oak woods and on sandstone
boulders of slopes. 402
- * Chasmanthium sessiliflorum (Poir.) Yates Occasional, in
damp areas on Plateau, sandy soil in swales and near
creeks. 296, 336
- Danthonia sericea Nuttall. Wild Oat Grass. Occasional,
on Plateau surface in dry, sandy soil of sandstone
outcrops. 182, 718, 747
- Danthonia spicata (L.) Beauv. Poverty Grass.
Infrequent, on Plateau in damp depressions, swales, and
around outcrops in dry, open soil. 721
- * Diarrhena americana Beauv. Rare, on damp limestone
outcrops in rich mesic woods of the coves, especially
Wolf Cove. 145, 219
- * Digitaria ischaemum (Schreb.) Schreb. ex Muhl.
Crab Grass. Scarce, on Plateau surface near puddles
and pools, especially Sal City pond. 621
- * Digitaria sanguinalis (L.) Scopoli. Crab Grass.
Scarce, in glady areas north of coves; thin, dry, open
woods. 394 (Nat. from Old World)

Poaceae (continued)

- Elymus virginicus L. var. glabriflorus (Vasey) Bush
Wild Rye, Terrell Grass. Occasional, on Plateau and
south-facing slopes in dry, open woods. 261
- Eragrostis spectabilis (Pursh) Steud. Tumble-grass,
Petticoat-climber. Occasional, on Plateau in disturbed
areas, especially near TN16. 484, 776
- * Erianthus alopecuroides (L.) Ell. Woolly Beardgrass.
Infrequent, on Plateau near Sal City Swamp; also on
south-facing slopes above coves. 547
- * Festuca pratensis Hudson. Fescue. Common, planted
along shoulder on TN16 and Checking Station parking
area. 735 (Nat. from Eurasia)
- * Hystix patula Moench. Bottle Brush Grass. Infrequent,
on south-facing slopes above the coves in thin, dry
soil in open woods. 195
- *# Leersia oryzoides (L.) Sw. Rice Cutgrass. Rare, one
large population in the Plateau Pond at margins of
receding water. 794
- Leersia virginica Willd. Cutgrass. Frequent, on
Plateau around pools and puddles. Damp soil in oak
woods. 486
- # Lolium perenne L. Common Darnell. Rare, on Plateau in
weedy, disturbed area around the Checking Station. 362
(Nat. from Europe)
- Melica mutica Walt. Melic Grass. Infrequent, on
Plateau and cove floors in moist soil of open woods.
152, 662
- * Microstegium vimineum (Trinius) A. Camus. Occasional,
in open woods on Plateau. 808 (Nat. from Asia)
- *# Muhlenbergia sobolifera (Muhl.) Trin. Muhly.
Infrequent, north-facing talus slopes in open, mesic
woods. 307
- * Muhlenbergia tenuiflora (Willd.) BSP. Muhly.
Infrequent, on north-facing slopes in rich, mesic
woods. 350
- Panicum anceps Michaux. Panic Grass. Infrequent, on
Plateau in disturbed, weedy areas. 374b

Poaceae (continued)

- Panicum boscii Poiret. Bosc's Panic Grass. Common, on Plateau in dry-mesic oak woods. 806
- Panicum commutatum Schultes. Panic Grass. Frequent, on slopes in open woods and on Plateau in dry, open areas. 061, 081, 717, 722, 730
- Panicum dichotomum L. Panic Grass. Occasional, on Plateau in damp, disturbed areas. 177, 716, 723
- Panicum dichotomum L. var. ramulosum (Torrey) Lelong
Panic Grass. Rare, on Plateau in sandy soil near Sal City pond. 619 [Not in Radford; see Gleason 1952.]
- Panicum laxiflorum Lam. Panic Grass. Infrequent, on south-facing limestone slopes in thin, dry soil. Open woods. 391
- # Panicum ovale Ell. var. villosum (A. Gray) Lelong
Panic Grass. Infrequent. Plateau surface in dry, sandy, open woods. 729
[Panicum villosissimum Nash in Radford.]
- * Panicum polyanthes Schultes. Panic Grass. Infrequent, in disturbed areas of Plateau. Sandy soil in open woods. 176
- Panicum sphaerocarpon Ell. Panic Grass. Infrequent, on Plateau and north-facing talus slopes. 309
- *# Paspalum pubiflorum Rupr. Dallis Grass. Infrequent, in weedy disturbed areas of the Plateau. 772
- Poa cuspidata Nuttall. Common, on Plateau in moist places in open oak woods. 007
- * Schizachyrium scoparium Michaux. Little Bluestem.
Occasional, on Plateau in dry, open areas and around sandstone outcrops. 506
[Andropogon scoparius Michaux in Radford.]
- Setaria geniculata (Lam.) Beauv. Foxtail Grass.
Occasional, on Plateau in open, weedy, disturbed areas. 369, 533, 779
- * Sorghastrum nutans (L.) Nash. Indian Grass.
Infrequent, on Plateau in open, grassy areas and outcrops. 567

Poaceae (continued)

- Stipa avenacea L. Needle Grass. Frequent, on Plateau Rim in dry, open oak woods. 084
- * Tridens flavus (L.) Hitchc. Grease Grass. Frequent, on Plateau in open, disturbed woods and on cove floors in disturbed areas. 492

Sparganiaceae

- *#Sparganium americanum Nuttall. Bur Reed. Rare, only observed in pond near Sal City. 788

ANGIOSPERMAE

DICOTYLEDONEAE

Acanthaceae

- Ruellia caroliniensis (Walter) Steudel. Wild Petunia. Infrequent, on south-facing slopes and limestone outcrops. thin, dry, exposed areas to open woods. 258

Aceraceae

- Acer rubrum L. Red Maple. Common, on Plateau in damp swales and along creeks. 378
- Acer saccharum Marsh. ssp. nigrum (Michaux f.) Small. Sugar Maple. Occasional, on slopes and cove floors, mesic open woods. 420

Anacardiaceae

- Rhus aromatica Aiton. Fragrant Sumac. Scarce, on south-facing slopes on open, dry, exposed limestone outcrops or open woods. 114
- Rhus copallina L. Winged Sumac. Scarce, on Plateau in open disturbed areas, especially around the pond near Sal City. 278
- * Rhus radicans L. Poison Ivy. Occasional, on north-facing talus slopes in open mesic woods. 676

Annonaceae

Asimina triloba (L.) Dunal. Pawpaw. Common, in mesic woods of slopes and coves. 223, 649

Apiaceae

* Cryptotaenia canadensis (L.) DC. Honewort, Wild Chervil. Occasional, in coves in rich, mesic woods. 121, 406

* Daucus carota L. Queen Anne's Lace, Wild Carrot. Common, on Plateau surface in dry, open, disturbed areas. 375

Erigenia bulbosa (Michaux) Nuttall. Pepper and Salt. Harbinger-of-Spring. Frequent, in rich mesic woods of coves. 031

Eryngium yuccifolium Michaux. Rattlesnake Master. Scarce, on south-facing slopes in dry, open, limestone glade-like areas. 256

Ligusticum canadense (L.) Britton. Lovage. Occasional, on Plateau along shaded streams. 184

Osmorhiza claytonii (Michaux) Clarke. Sweet Cicely. Infrequent, in coves, in very rich, damp, mesic woods. 092

Oxypolis rigidior (L.) Raf. Cowbane. Rare, only one small population observed on Plateau near edge of Sal City pond. Moist, sandy soil in Alder thicket. 426

Sanicula canadensis L. Black Snakeroot. Occasional, on Plateau and in coves in moist soil of open woods. 179, 409

* Sanicula gregaria Bickn. Sanicle. Occasional, on floors of coves in rich mesic woods. Often in large, dense colonies. 124, 685

* Sanicula smallii Bickn. Small's Snakeroot. Infrequent, in mesic woods of north-facing slopes and coves. 348

* Sanicula trifoliata Bickn. Three-Leaved Sanicle. Scarce, on cove floors in mesic woods. 758

Taenidia integerrima (L.) Drude. Yellow Pimpernel. Infrequent, in dry, open woods to mesic woods of coves and slopes. 088

Apiaceae (continued)

- Thaspium barbinode (Michaux) Nuttall. Meadow Parsnip. Frequent, in coves in mesic woods, especially along streams. 657, 684, 700
- # Thaspium trifoliatum (L.) Gray. Three-Leaved Meadow Parsnip. Infrequent, on dry, exposed, south-facing limestone slopes. 116, 392

Apocynaceae

- # Apocynum cannabinum L. Dogbane. Rare, among limestone boulders in open mesic woods of Farmer Cove/Wolf Cove saddle. 399

Aquifoliaceae

- Ilex decidua Walter. Deciduous Holly. Infrequent, in open mesic woods on floors of coves. 562
- Ilex longipes Chapman. Infrequent, on Plateau in shrubby thickets and oak woods. 186, 627
- Ilex montana T. & G. Mountain Holly. Scarce, in thickets surrounding Plateau Pond. 138
- Ilex opaca Aiton. Evergreen Holly. Occasional, in damp places on Plateau. Open oak woods. 133

Araliaceae

- Aralia racemosa L. Spikenard. Occasional, in mesic woods of north-facing slopes, especially along seepy areas. 559
- Aralia spinosa L. Devil's Walkingstick. Occasional, in mesic woods of north-facing slopes, especially along seepy areas. 247
- * Panax quinquefolius L. Ginseng. Very rare, only two small populations seen, one along the major drainage into Farmer Cove from south Plateau rim; the other among limestone outcrops on north-facing slope below Bear Hollow Mountain. Both localities are rich, mesic woods. This plant may have seen collecting pressure in this area in the past which may account for it's rarity in the coves. 694

Aristolochiaceae

- * Aristolochia macrophylla Lam. Dutchman's Pipe. Very rare, only one small population seen in the major drainage into Farmer Cove from the south Plateau rim. Rich, mesic woods with Panax. 442, 695
- * Aristolochia serpentaria L. Virginia Snakeroot. Infrequent, on Plateau in open oak woods. Often partly buried in leaf litter and difficult to see. 677
- Asarum canadense L. Wild Ginger. Rare, on southern slopes near floor of Wolf Cove in rich, seepy mesic woods. 146

Asclepiadaceae

- Asclepias amplexicaulis Smith. Milkweed. Infrequent, on Plateau in open, dry, sandy soil in disturbed areas. 171
- Asclepias quadrifolia Jacquin. Four-Leaved Milkweed. Infrequent, in rich mesic woods of coves and north-facing slopes. 091
- Asclepias variegata L. Milkweed. Scarce, in disturbed, weedy areas and open woods of Plateau. Dry, sandy soil. 172
- # Asclepias verticillata L. Whorled-Leaved Milkweed. Scarce, on south-facing slopes in open, dry woods and glade-like areas. 390
- Matelea carolinensis (Jacquin) Woodson. Angle-Pod. Infrequent, on south-facing slopes in open, dry woods and glade-like areas. 119, 246

Asteraceae

- Achillea millefolium L. Yarrow. Infrequent, in weedy, disturbed areas throughout. 704 (Nat. from Europe)
- Ambrosia artemisiifolia L. Ragweed. Occasional, in open, disturbed, weedy areas of Plateau. 517, 782
- Antennaria plantaginifolia (L.) Richardson. Pussytoes. Common, along trails on Plateau, in oak woods. 040

Asteraceae (continued)

- * Arctium minus Schk. Common Burdock. Rare, on floor of Cave Cove at mouth of Cave, rich, open, mesic woods. 490 (Nat. from Europe)
- * Aster concolor L. Silvery Aster. Occasional, on Plateau in open, dry, weedy areas along trails. 569
- * Aster cordifolius L. Heart-Leaved Aster. Occasional, on Plateau in moist areas of open oak woods. 607
- * Aster dumosus L. Aster. Frequent, on Plateau in dry, open, weedy, disturbed areas. 432, 459, 511, 523
- Aster infirmus Michaux. Aster. Occasional, on Plateau in disturbed, weedy areas and open oak woods. 462, 519
- * Aster linariifolius L. Stiff-Leaved Aster. Frequent, on Plateau in dry, weedy, open sandy soil, especially around sandstone outcrops. 574
- * Aster macrophyllus L. Large-Leaved Aster. Occasional, on north-facing slopes in open mesic woods. 347
- * Aster patens Aiton. Late Purple Aster. Common, in disturbed areas along trails on Plateau. Open weedy areas and oak woods. 501, 505, 570, 614
- * Aster phlogifolius Muhl. ex Willd. Crooked-Stemmed Aster. Infrequent, on Plateau and slopes. Moist soil in oak or mesic woods. 601
- * Aster umbellatus Miller. White Aster. Occasional, on Plateau in weedy areas and in moist swales. 377, 789
- * Aster undulatus L. Wavy-Leaved Aster. Frequent, on Plateau in weedy areas and along trails in open oak woods. 455, 510, 228
- * Bidens bipinnata L. Spanish Needles. Infrequent, on cove floors in mesic woods and south-facing slopes in open, dry, glade-like areas. 395, 606
- * Bidens discoidea (T. & G.) Britton. Rare, on hummocks at the edge of Plateau Pond. Wet, mossy soil. 795
- * Bidens polylepis Blake. Scarce, in disturbed areas along TN16 in open, moist soil. 541

Asteraceae (continued)

- Cacalia muhlenbergii (Schultz-Bip.) Fern. Indian Plantain. Common, on north-facing slopes and cove floors in moist, rich mesic woods. 224
- * Cirsium altissimum (L.) Sprengel. Thistle. Infrequent, on mesic slopes; dry, glade-like south-facing slopes; and cove floors in open mesic woods. 424, 545, 809
[Carduus altissimus L. in Radford.]
- * Cirsium carolinianum (Walter) Fern. & Schubert. Carolina Thistle. Scarce, on south-facing slopes in dry, open, glade-like areas. 135
[Carduus carolinianus L. in Radford.]
- * Cirsium discolor (Muhl.) Sprengel. Thistle. Occasional, in weedy areas of Plateau. 515
[Carduus discolor (Muhl. ex Willd.) Nuttall in Radford.]
- Chrysanthemum leucanthemum L. Ox-Eyed Daisy. Frequent, in disturbed areas on Plateau. 733 (Nat. from Europe)
- * Conyza canadensis (L.) Cronquist. Butterweed. Occasional, in disturbed, weedy areas of Plateau. 531
[Erigeron canadensis L. in Radford.]
- Coreopsis major Walter. Tickseed. Common, on Plateau in open, weedy areas. 367
- * Elephantopus carolinianus Willd. Elephant's Foot. Common, on cove floors in weedy areas and open mesic woods. 496
- * Elephantopus tomentosus L. Elephant's Foot. Common, on Plateau in open oak woods and on mesic slopes. 478
- * Erechtites hieracifolia (L.) Raf. Fireweed. Occasional, on Plateau in disturbed, weedy areas and slopes in mesic woods. 599
- Erigeron annuus (L.) Pers. Daisy Fleabane. Common, in disturbed areas throughout. 527
- Erigeron pulchellus Michaux. Robin's Plantain. Frequent, throughout except in rich mesic woods. 062
- Erigeron strigosus Muhl. ex Willd. Fleabane. Occasional, on cove floors in open, weedy areas. 129

Asteraceae (continued)

- Eupatorium album L. White Thoroughwort. Occasional, on Plateau near moist areas and on north-facing slopes in mesic woods. 291, 360
- * Eupatorium capillifolium (Lam.) Small. Dog-Fennel. Rare, growing in wet soil in Sal City pond on Plateau. 622
- * Eupatorium coelestinum L. Argeratum. Scarce, on Plateau in grassy shoulder of TN16. Possibly a garden escape. 565
- * Eupatorium hyssopifolium L. Hyssop-Leaved Thoroughwort. Occasional, on Plateau along trails and in open oak woods. 530, 785
- * Eupatorium pilosum Walter. Boneset. Occasional, on Plateau in open sandy areas and oak woods. 429
- * Eupatorium rugosum Huttuyn. White Snake Root. Frequent, throughout in moist areas, particularly on the cove floors in mesic woods. 315, 551, 579
- * Eupatorium serotinum Michaux. Late-Flowering Thoroughwort. Frequent, on Plateau in open, disturbed, weedy areas at edge of oak woods. 522, 538, 778
- * Gnaphalium obtusifolium L. Everlasting. Occasional, throughout, in open, dry, weedy areas. 491, 613
- Gnaphalium purpureum L. Cudweed. Infrequent, on Plateau in open, disturbed areas. 726
- Helenium amarum (Raf.) H. Rock. Sneezeweed. Occasional, on Plateau in disturbed areas, especially the shoulder of TN16. 524, 775
- Helenium flexuosum Raf. Sneezeweed. Occasional, on Plateau on shoulder of TN16. 774
- * Helianthus decapetalus L. Sunflower. Infrequent, on cove floors in open, mesic woods. 414, 419
- * Helianthus eggertii Small. Sunflower. Rare, on Plateau in barren areas around Sal City pond. 434
- Helianthus hirsutus Raf. Sunflower. Occasional, on Plateau in open weedy areas. 373, 433

Asteraceae (continued)

- * Heterotheca graminifolia (Michaux) Shinn. Silky Golden Aster. Frequent, on Plateau in open areas and sandstone outcrops. 498
- * Heterotheca mariana (L.) Shinn. Golden Aster. Common, on Plateau, in dry, open areas throughout. 464, 502, 508, 526, 566, 623
- Hieracium gronovii L. Hawkweed. Common throughout, especially in mesic woods of slopes and coves. 359, 448, 504, 552
- *#Hieracium scabrum Michaux. Rough Hawkweed. Rare, on Plateau around Sal City Swamp. 466
- Hieracium venosum L. Rattlesnake Weed. Frequent, on Plateau along trails in open oak woods. 086, 751
- Krigia biflora (Walter) Blake. Two-Flowered Cynthia. Occasional, on Plateau in dry to moist soil of oak woods. 137, 702
- Krigia oppositifolia Raf. Infrequent, on cove floors near permanent pools in open areas. 074a
- Krigia virginica (L.) Willd. Infrequent, in damp open areas on Plateau and cove floors. 074b, 400
- *#Lactuca saligna L. Willow-Leaved Lettuce. Rare, on Plateau along grassy shoulder on TN16. 769 (Nat. from Europe)
- * Liatris aspera Michaux. Blazing Star. Occasional, on Plateau in disturbed areas along trails. 534a
- Liatris microcephala (Small) K. Schum. Blazing Star. Frequent, on Plateau on sandstone outcrops. 301
- *#Liatris scabra (Greene) Schum. Blazing Star. Occasional, on Plateau in disturbed areas along trails. 534b
- *#Liatris scariosa (L.) Willd. Blazing Star. Occasional, on Plateau in disturbed areas along trails. 512
- Liatris spicata (L.) Willd. Blazing Star. Scarce, on south-facing slopes in dry, open, glade-like areas. 471

Asteraceae (continued)

- Parthenium integrifolium L. Wild Quinine. Occasional,
on Plateau in disturbed, weedy areas and oak woods.
371, 539
- * Pluchea camphorata (L.) DC. Marsh Fleabane, Stinkweed.
Scarce, on Plateau at margins of Sal City pond.
620, 787
- # Polymnia laevigata Beadle. Smooth Leafcup. Common to
locally abundant in dense stands on south-facing mesic
slopes and smaller stands on cove floors. 345, 495,
582
- Polymnia uvedalia L. Bear's Foot. Infrequent, on dry,
south-facing slopes. 328
- * Prenanthes serpentaria Pursh. Gall-of-the-Earth.
Scarce, on Plateau along trails in oak woods. 616
- Pyrrophappus carolinianus (Walter) DC. Goat's Beard.
Occasional, on Plateau in dry, weedy, disturbed areas.
268
- *# Ratibida pinnata (Vent.) Barnh. Coneflower. Scarce, on
south-facing slopes in dry, open, glade-like areas.
257
- * Rudbeckia fulgida Aiton. Occasional, on cove floors in
open mesic woods. 404, 452
- * Rudbeckia hirta L. Black-Eyed Susan. Frequent,
on cove floors along trails in open mesic woods.
276, 417, 550
- * Rudbeckia triloba L. Scarce, on south-facing slopes in
dry, open, glade-like areas. 587
- Senecio aureus L. Golden Groundsel. Infrequent, on
slopes in rich mesic woods. 656
- Senecio glabellus Poiret. Butterweed. Occasional, on
cove floors in rich, mesic woods. 064
- Senecio smallii Britton. Groundsel. Infrequent, on
Plateau in damp depressions and swales. Oak woods.
714

Asteraceae (continued)

- Sericocarpus linifolius (L.) BSP. White-Topped Aster.
Frequent, on Plateau in open, dry areas around
sandstone outcrops and in damp swales. 191, 254, 341
[Aster solidagineus Michaux in Radford.]
- Silphium dentatum Ell. var. gatesii (Mohr) Ahles.
Infrequent, Plateau and slopes in open woods. 277, 445
- Solidago arguta Ait. var. caroliniana Gray.
Goldenrod. Infrequent, on Plateau around Sal City
pond. 343
- * Solidago canadensis L. var. scabra (Muhl.) T. & G.
Goldenrod. Infrequent, on Plateau along trails in open
oak woods. 514
- * Solidago curtissii T. & G. Goldenrod. Occasional, on
Plateau and north-facing slopes in open oak and mesic
woods. 456, 520, 549
- Solidago erecta Pursh. Tall Goldenrod. Occasional, on
Plateau in dry oak woods. 509
- Solidago flexicaulis L. Goldenrod. Occasional, on cove
floors in mesic woods. 805
- Solidago juncea Ait. Goldenrod. Infrequent, on
Plateau, especially weedy, disturbed areas. 609
- * Solidago nemoralis Ait. Woodland Goldenrod.
Occasional, on Plateau in oak woods and open weedy
areas. 536, 612
- * Solidago odora Ait. Sweet Goldenrod. Common, on
Plateau throughout. 380
- * Solidago rigida L. Stiff Goldenrod. Very rare, only a
few plants seen on south-facing slope in limestone
glade-like area. 421
- * Solidago rugosa Miller ssp. aspera (Aiton) Cronquist.
Goldenrod. Occasional, on Plateau in open, disturbed,
weedy areas. 521
- * Solidago speciosa Nuttall. Goldenrod. Occasional, on
Plateau along trails in open oak woods. 503
- Solidago ulmifolia Muhl. Elm-Leaved Goldenrod.
Occasional on Plateau in weedy areas along trail.
463, 532

Asteraceae (continued)

- * Taraxacum officinale Wiggers. Dandelion. Infrequent, on cove floors in moist soil of mesic woods. 802 (Nat. from Europe)
- * Verbesina alternifolia (L.) Britton ex Kearney. Wingstem. Occasional, on cove floors in mesic woods, usually near water. 553
- * Verbesina virginica L. Infrequent, on south-facing slopes in open, dry, glade-like areas. 546
- * Vernonia altissima Nuttall. Ironweed. Occasional, on north-facing slopes among talus boulders in mesic woods. 303

Vernonia flaccidifolia Small. Ironweed. Infrequent, on south-facing slopes in open, dry, glade-like areas. 324

Balsaminaceae

Impatiens pallida Nuttall. Pale Touch-Me-Not. Scarce, most plants observed in the vicinity of Cave Cove Cave. Very moist soil in open mesic woods. 267

Berberidaceae

- Caulophyllum thalictroides (L.) Michaux. Blue Cohosh. Occasional, in open mesic woods on cove floors. 020
- * Podophyllum peltatum L. May Apple. Occasional, on slopes and cove floors in open mesic woods. 101

Betulaceae

- Alnus serrulata (Ait.) Willd. Alder. Rare, one large population bordering Sal City pond. 292
- Carpinus caroliniana Walter. Ironwood. Occasional, on slopes and cove floors in open mesic woods. 651
- * Corylus americana Walter. Hazelnut. Frequent, on slopes and cove floors in open mesic woods. especially abundant on the floor of Farmer Cove at edge of old field. 030, 453, 593

Betulaceae (continued)

Ostrya virginiana (Miller) K. Koch. Hop-Hornbeam.
Occasional, on slopes and cove floors in open mesic woods. 386, 561, 589

Bignoniaceae

Anisostichus capreolata (L.) Bureau. Crossvine.
Infrequent, in dry open woods of south-facing slopes.
034 [Bignonia capreolata L.]

Campsis radicans (L.) Seemann. Trumpet Creeper.
Infrequent, on north-facing slopes in rich mesic woods, especially in seepy areas. 260

Boraginaceae

Cynoglossum virginianum L. Hound's Tongue. Common, on slopes and cove floors in open mesic woods. 072

Lithospermum canescens (Michaux) Lehmann.
Hoary Puccoon. Occasional, on south-facing slopes in open, dry, glade-like areas. 036

Lithospermum tuberosum Rugel ex DC. Puccoon. Slopes and cove floors in open mesic woods. 035

Mertensia virginica (L.) Persoon. Bluebells, Virginia Cowslip. Rare, only seen on Wolf Cove floor in a dense population in a rich, mesic forest. 026

Brassicaceae

Arabis canadensis L. Sickie Pod. Scarce, on south-facing slopes in open, dry-mesic woods. 196

Arabis laevigata (Muhl. ex Willd.) Poiret.
Smooth Rock Cress. Scarce, on cove floors in rich mesic woods, especially in Wolf Cove. 655

Cardamine laciniata Michaux. Cut-Leaved Toothwort.
Occasional, on cove floors in mesic woods. 650
[Dentaria laciniata Muhl. Cardamine concatenata (Michaux) Ahles in Radford.]

Cardamine diphylla (Michaux) Wood. Toothwort.
Occasional, on cove floors in mesic woods. 645
[Dentaria diphylla Michaux.]

Brassicaceae (continued)

- * Cardamine hirsuta L. Bittercress. Scarce, on cliff bases and creekbeds on Plateau in oak woods. 755 (Nat. from Europe)
- # Iodanthus pinnatifidus (Michaux) Steud. Purple Rocket. Rare, only observed on floor of Wolf Cove in rich mesic woods. 096

Campanulaceae

- Campanula americana L. Bellflower. Infrequent, on north-facing slopes and cove floors in open mesic woods. 298
- Lobelia cardinalis L. Cardinal Flower. Very rare, only one small population observed along streambed draining Plateau Pond. Rich, damp soil in oak woods. 458
- Lobelia inflata L. Indian Tobacco. Common throughout in open areas with damp soil. 286, 364, 416
- * Lobelia puberula Michaux. Lobelia. Common, on Plateau in dry to damp soil, mostly open, weedy, disturbed areas. 465, 525, 535, 572
- # Lobelia spicata Lam. Pale-Spike-Lobelia. Scarce, on south-facing slopes in open, glade-like areas of limestone outcrops. Dry, very open woods. 326
- Specularia perfoliata (L.) A. DC. Venus' Looking-glass. Infrequent, on south-facing slopes in open, glade-like areas of limestone outcrops. Dry, very open woods. 194

Caprifoliaceae

- Lonicera japonica Thunberg. Honeysuckle. Scarce, on floor of Farmer Cove in old field. Dry, open soil. 648 (Nat. from Asia)
- Lonicera sempervirens L. Coral Honeysuckle. Infrequent, on slopes in mesic woods and glade-like areas. 131
- Sambucus canadensis L. Elderberry. Scarce, on cove floors in very rich mesic woods. 580

Caprifoliaceae (continued)

Viburnum acerifolium L. Maple-Leaved Viburnum.

Frequent, on Plateau and north-facing slopes in moist woods. 085

- *#Viburnum prunifolium L. Black-Haw. Infrequent, on cove floors, especially Farmer Cove at edge of old field. Open woods. 592

Viburnum rufidulum Raf. Southern Black-Haw.

Infrequent, on Plateau and upper slopes in dry woods. 070, 384

Caryophyllaceae

- *#Silene antirrhina L. Sleepy Catchfly. Rare, only one small population on Plateau on sandstone outcrop north of Cave Cove. Thin, dry, exposed soil. 185

Silene rotundifolia Nuttall. Round-Leaved Catchfly.

Occasional, at base of cliffs in damp, sandy soil of open mesic woods. 737 Locally abundant.

- * Silene stellata (L.) Aiton. Bladder Campion.

Infrequent, on north-facing slopes in seepy areas of mesic woods. 353

Silene virginica L. Fire Pink. Occasional, on upper

slopes and open cove floors in dry-damp soil and open woods. 055

Stellaria pubera Michaux. Giant Chickweed. Occasional,

on north-facing slopes and cove floors in dryish, open woods. 008

- * Stellaria media (L.) Cyrillo. Chickweed. Infrequent,

on limestone outcrops of north-facing slopes. Mesic woods. 709 (Nat. from Eurasia)

Celastraceae

Euonymus americanus L. Hearts-a-Bustin'. Frequent, on

slopes and cove floors in open mesic woods. 376, 791 Most specimens are damaged due to intense browsing by deer.

Cistaceae

Lechea racemulosa Michaux. Pinweed. Frequent, on Plateau in open, weedy, dry places. 365

Convolvulaceae

Calystegia spithamea (L.) R. Brown. Bindweed. Scarce, on Plateau in open, weedy areas and on slopes on disturbed, open trails. 106

- * Ipomoea pandurata (L.) G. F. W. Meyer.
Wild Potato Vine. Occasional, on Plateau in dry, open areas. 368

Cornaceae

Cornus alternifolia L. f. Alternate-Leaved Dogwood.
Very rare, only one shrubby tree observed on the floor of Wolf Cove in very rich mesic woods. 151

Cornus florida L. Dogwood. Common throughout as an understory tree. 043, 666

Crassulaceae

Penthorum sedoides L. Ditch Stonecrop. Occasional, on north-facing slopes in seepy areas along trails. Mesic woods. 440

Sedum ternatum Michaux. Stonecrop. Occasional, on slopes on boulders and outcrops in damp soil of open, mesic woods. 058

Ebenaceae

Diospyros virginiana L. Persimmon. Scarce, on south-facing slopes in dry, open, glade-like areas and on cove floors in open mesic woods. 250

Ericaceae

Chimaphila maculata (L.) Pursh. Pipsissewa. Common, on Plateau throughout in dry oak woods. 173

Ericaceae (continued)

- Kalmia latifolia L. Mountain Laurel. Common, on Plateau along streams often forming impenetrable thickets. 102
- Lyonia ligustrina (L.) DC. Male-Berry. Scarce, on Plateau around Plateau Pond. Oak woods and ericaceous thickets. 313, 637
- Monotropa hypopithys L. Pine Sap. Infrequent, in moist areas on Plateau. Oak woods and mountain laurel thickets. 317, 480
- Monotropa uniflora L. Indian Pipe. Infrequent, on Plateau in oak woods and north facing slopes in mesic woods. 449
- Oxydendrum arboreum (L.) DC. Sourwood. Common, on Plateau as an understory tree in the oak forest. Also common around sandstone outcrops. 187, 801
- * Rhododendron alabamense Rheder. Occasional, on Plateau surface in oak woods. 665 Very fragrant.
- Rhododendron nudiflorum (L.) Torrey
forma glanduliferum (Porter) Fern.
Pinxter-Flower, Wild Azalea. Common, on Plateau in oak woods. 042, 667, 678
- *#Rhododendron roseum (Loisel.) Rehder. Pinxter-Flower. Scarce, on Plateau in oak woods and on north-facing slopes at base of cliffs in open mesic woods. 664, 668
- Vaccinium arboreum Marshall. Sparkleberry. Common, on Plateau in dry areas around sandstone outcrops, especially on Bear Hollow Mountain. 712
- * Vaccinium corymbosum L. Highbush Blueberry. Frequent, on Plateau in open areas at edge of oak woods, especially along trails. 136
- Vaccinium stamineum L. Deerberry. Common, on Plateau surface throughout in oak woods. 049, 071
- Vaccinium vacillans Torrey. Lowbush Blueberry. Frequent, on Plateau in open areas and in oak woods, essentially throughout. 003, 178

Euphorbiaceae

Acalypha virginica L. Three-Seeded Mercury. Scarce, on south-facing slopes in dry, open woods and limestone outcrops. 422

*#Croton capitatus Michaux. Hogwort. Rare, on Plateau on grassy shoulder of TN16. 771

Euphorbia corollata L. Flowering Spurge. Occasional, on Plateau in dry, open, weedy, disturbed areas. 370, 374a

* Euphorbia maculata L. Spurge. Occasional, on Plateau in dry, open, weedy, disturbed areas. 516, 773

Euphorbia mercurialina Michaux. Spurge. Occasional, on slopes and drainages in damp, open, mesic woods. 029, 057

Fabaceae

* Amphicarpa bracteata (L.) Fern. Hog-Peanut. Common, on slopes and cove floors in mesic woods, especially around seepy areas. 438, 557, 780

Cassia fasciculata Michaux. Partidge Pea. Occasional, on Plateau in dry areas along trail and on south-facing slopes in dry, glade-like areas. 469

* Cassia marilandica L. Wild Senna. Infrequent, on north-facing slopes in openings of rich mesic forest. 439

* Cassia nictitans L. Wild Sensitive Plant. Infrequent, on Plateau in dry, disturbed areas and oak woods. 403

*#Cassia obtusifolia L. Sicklepod. Scarce, on Plateau along shoulder of TN16. 770

*#Centrosema virginiana (L.) Benth. Butterfly Pea. Infrequent, on Plateau and south-facing slopes in dry, open, rocky areas. 320

Cercis canadensis L. Redbud. Common, on slopes in mesic woods and dry, glade-like areas. 218

Clitoria mariana L. Butterfly Pea. Infrequent, on Plateau and cove floors in dry, open weedy places. 249, 388, 583

Fabaceae (continued)

Desmodium glutinosum (Muhl. ex Willd.) Wood.

Beggar-Lice. Frequent, in moist places on Plateau and an slopes. 352, 401

*#Desmodium laevigatum (Nuttall) DC. Beggar-Lice.

Scarce, on Plateau and cove floors in dry, open weedy places. 507

* Desmodium paniculatum (L.) DC. Trefoil. Occasional, on north-facing slopes in mesic woods and open, disturbed areas on cove floors. 494, 556

Desmodium rotundifolium DC. Round-Leaved Trefoil.

Frequent, on Plateau in dry, grassy areas of open oak woods. 544

*#Desmodium viridiflorum (L.) DC. Beggar Ticks. Scarce, on Plateau in dry oak woods. 497

*#Gleditsia triacanthos L. Honey Locust. Very rare, one small population of saplings on floor of Cave Cove in open, disturbed area near cave. 413

* Lespedeza hirta (L.) Hornemann. Lespedeza. Occasional, on Plateau in dry, open, disturbed, weedy places. 611

Lespedeza intermedia (Wats.) Britton. Lespedeza.

Occasional, on south-facing slopes in dry, open, glade-like areas. 330

* Lespedeza stuevei Nuttall. Bush Clover. Frequent, on Plateau in dry, open areas. 485, 529

*#Lespedeza violacea (L.) Persoon. Purple Lespedeza. Occasional, on Plateau in open, weedy areas. 443, 610

Lespedeza virginica (L.) Britton. Lespedeza. Infrequent, on cove floors in open, dry, weedy areas. 493

Melilotus officinalis (L.) Lam. Sweet Yellow Clover. Occasional, on Plateau in open, weedy, disturbed areas. 727 (Nat. from Europe)

Psoralea psoralioides (Walt.) Cory

var. eglandulosa (Ell.) Freeman

Sampson's Snakeroot. Occasional, on Plateau in open oak woods, especially on Bear Hollow Mountain. 715

Fabaceae (continued)

- * Robinia pseudoacacia L. Black Locust. Frequent, on Plateau along old logging roads and trails in moist oak woods. 713

- Schrankia microphylla (Solander ex Smith) Macbride
Sensitive Brier. Occasional, on Plateau in open, weedy, disturbed areas. 282

- Stylosanthes biflora (L.) BSP. Pencil Flower.
Occasional, on Plateau in dry, sandy, open areas and dry, open areas of slopes. 358

- Tephrosia virginiana (L.) Persoon. Goat's Rue. Common, on Plateau in dry, open oak woods. 199

- Thermopsis mollis (Michaux) M. A. Curtis ex Gray
Bush Pea. Common, on Plateau in dry, open oak woods. 051

- * Trifolium campestre Schreber. Clover. Occasional, on cove floors in open, dry, weedy areas. 698
(Nat. from Europe)

- * Trifolium pratense L. Red Clover. Occasional, on Plateau in open, disturbed, weedy areas. 732
(Nat. from Eurasia)

- Vicia caroliniana Walt. Milk Vetch. Frequent, on slopes and cove floors in open, mesic woods. 014

Fagaceae

- Castanea dentata (Marshall) Borkh. American Chestnut.
Very rare, only one tree observed on north-facing slope of main drainage of Cave Cove. Open mesic woods. 596

- Fagus grandifolia Ehrhart. American Beech. Common, throughout coves on north-facing slopes and floors in mesic woods. 266

- * Quercus alba L. White Oak. Common, on Plateau and slopes in open woods. 297

- Quercus coccinea Muenchh. Scarlet Oak. Occasional on Plateau in open, dry woods. 625

- Quercus falcata Michaux. Southern Red Oak. Occasional, in dry, open areas throughout. 321, 790

Fagaceae (continued)

- Quercus marilandica Muenchh. Blackjack Oak.
Occasional, on Plateau near sandstone outcrops. 756
- Quercus prinus L. Chestnut Oak. Common, on Plateau
throughout. 446 [Quercus montana Willd.]
- Quercus shumardii Buckl. Shumard's Oak. Scarce, on
Plateau around Sal City pond. Dry, sandy soil in open
areas. 287, 289
- Quercus stellata Wang. Post Oak. Occasional, on
Plateau around sandstone outcrops. 109
- Quercus velutina Lam. Black Oak. Common, on Plateau
and in dry, open areas of slopes and coves. 288

Fumariaceae

- Dicentra cucullaria (L.) Bernh. Dutchman's Breeches.
Rare, on floor of Wolf Cove in damp soil of rich mesic
woods. 658

Gentianaceae

- * Bartonia virginica (L.) BSP. Scarce, on Plateau around
Plateau Pond in moist, shaded, mossy soil. 318
- Gentiana saponaria L. Soapwort-Gentian. Rare, on
Plateau along drainage of Plateau Pond in moist, mossy
soil. Oak woods. 626
- Gentiana villosa L. Sampson's Snakeroot. Rare, on
floor of Farmer Cove along edge of old field. Dry,
open woods. 796
- Obolaria virginica L. Pennywort. Occasional, on cove
floors and slopes in open, mesic woods. 038, 647
- Sabatia angularis (L.) Pursh. Rose Pink. Rare, few
individuals on south-facing slopes in dry, open,
glade-like areas. 325

Geraniaceae

- * Geranium carolinianum L. Wild Geranium. Occasional, on
cove floors in dry, open, weedy areas. 113

Geraniaceae (continued)

Geranium maculatum L. Wild Geranium. Frequent, on cove floors and slopes along drainages in open mesic woods. 021

Hamamelidaceae

Hamamelis virginiana L. Witch Hazel. Occasional, on cove floors in rich mesic woods near waterfalls and springs. 001, 603

Liquidambar styraciflua L. Sweetgum. Occasional, on cove floors in open areas, especially in Farmer Cove. 450

Hippocastanaceae

Aesculus flava Solander. Yellow Buckeye. Common, on cove floors in rich, mesic woods. 397, 604
[Aesculus octandra Marshall]

Hydrophyllaceae

Hydrophyllum canadense L. Waterleaf. Occasional, on cove floors in damp, rich mesic woods. 128

Phacelia bipinnatifida Michaux. Scorpion Weed. Occasional, on cove floors in moist, rich mesic woods. 048, 670

Hypericaceae

Hypericum stragalum P. Adams & Robson. Saint Andrew's Cross. Occasional on Plateau and slopes in dry, open, disturbed areas. 253 [Ascyrum hypericoides L. var. multicaule (Michaux) Fern.]

Hypericum denticulatum Walt. Coppery Saint John's-wort. Occasional, on Plateau in dry, open woods around sandstone outcrops and along trails. 193, 629

*#Hypericum dolabriforme Vent. Saint John's-wort. Very rare, only a few plants seen on south-facing slopes in dry, open, glade-like areas especially above Farmer Cove. 319

Hypericaceae (continued)

- Hypericum gentianoides (L.) BSP. Pinweed. Common, on Plateau on sandstone outcrops in very dry, thin, open soil. 306, 481
- Hypericum mutilum L. Saint John's-wort. Occasional, on Plateau in dry-damp, sandy, open areas, especially around Sal City pond. 294, 768
- *#Hypericum perforatum L. Common Saint John's-wort. Occasional, on Plateau in open, disturbed areas. 786 (Nat. from Europe)
- * Hypericum punctatum Lam. Speckled Saint John's-wort. Common throughout in open, dry, sandy soil of open woods. 208, 259, 379
- *#Hypericum walteri Gmelin. Pink Saint John's-wort. Rare, on seen on Plateau on south side of Plateau Pond on mossy hummocks and in shallow water. 636, 793

Juglandaceae

- Carya cordiformis (Wang.) K. Koch. Bitternut Hickory. Occasional, on south-facing slopes in dry, open, glade-like areas. 585
- * Carya glabra (Mill.) Sweet. Pignut Hickory. Occasional, on Plateau throughout in oak woods. 630
- Carya ovata K. Koch. Shagbark Hickory. Infrequent, on slopes in open mesic woods and dry glade-like areas. 323, 743
- Carya pallida (Ashe) Engler & Graebner. Sand Hickory. Common essentially throughout except in rich mesic woods of cove floors. A major constituent of the Plateau forest. 280, 338, 600
- Carya tomentosa (Poiret) Nuttall. Mockernut Hickory. Frequent, on Plateau in oak woods. 631
- * Juglans cinerea L. Butternut. Scarce, on cove floors in mesic woods. 331
- * Juglans nigra L. Black Walnut. Infrequent, on cove floors in open mesic woods, especially near the Farmer Cove/Wolf Cove saddle. 132, 590

Lamiaceae

- * Blephilia hirsuta (Pursh) Benth. Wood Mint.
Frequent, on cove floors in rich, mesic woods.
269, 408, 804
- * Collinsonia canadensis L. Horse Balm. Occasional, on
cove floors and on slopes along moist, shaded drainages
in rich mesic woods. 488
- Lycopus virginicus L. Water Horehound. Common
throughout on Plateau around wet areas and in coves
along drainages and wet sites. 285, 777
- * Monarda clinopodia L. Monarda. Infrequent, on Plateau
in small sinkholes near rim. Moist, mesic woods. 312
- # Monarda fistulosa L. Wild Bergamot. Occasional, on
south-facing slopes in dry, open, glade-like areas.
204
- Perilla frutescens (L.) Britton. Frequent, throughout
in moist-wet areas. 540, 803 (Int. from East Asia)
- Prunella vulgaris L. Heal-All. Common throughout in
moist-wet areas. 126, 366, 578
- * Pycnanthemum incanum (L.) Michaux. Mountain Mint.
Common, on Plateau and north-facing slopes in open
woods. 275, 305, 783, 784
- Salvia lyrata L. Lyre-Leaved Sage. Occasional, on cove
floors in open moist areas along trails at the edge of
the woods. 083
- *# Satureja vulgaris (L.) Fritsch. Basil. Infrequent, on
cove floors in open, mesic woods. 411
(Nat. from Europe)
- Scutellaria elliptica Muhl.
var. hirsuta (Short) Fern. Hairy Skullcap.
Frequent, throughout in coves and on slopes in mesic
woods and dry, glade-like areas. 225, 711
- # Synandra hispidula (Michaux) Baillon. Synandra.
Scarce, two main populations on floors of Cave and
Farmer coves in rich mesic woods. 095

Lauraceae

Lindera benzoin (L.) Blume. Spicebush. Frequent, on cove floors in damp areas of open mesic woods, especially around Cave Cove Cave. 069

Sassafras albidum (Nuttall) Nees. Sassafras. Frequent, on north-facing slopes in open mesic woods. 262

Linaceae

- * Linum virginianum L. Flax. Frequent, throughout in open woods, especially on cove floors and mesic slopes. 248, 361, 393a, 764

Loganiaceae

- * Spigelia marilandica L. Indian Pink. Rare, only a few plants seen on cove floors in rich, mesic woods. 140

Magnoliaceae

Liriodendron tulipifera L. Tulip Poplar. Frequent, in coves in mesic woods, occasionally on Plateau in moist areas. 100

Magnolia acuminata L. Cucumber Tree. Scarce, on south-facing slopes in dry, glade-like areas and in rich mesic woods of cove floors. 089

Melastomataceae

Rhexia mariana L. Meadow Beauty. Infrequent, on Plateau in open, weedy, disturbed areas. 444

Rhexia virginica L. Virginia Meadow Beauty. Infrequent, one large population around Sal City pond. 293

Menispermaceae

Menispermum canadense L. Canada Moonseed. Infrequent, on cove floors in rich, mesic woods. 241

Moraceae

- # Morus alba L. White Mulberry. Occasional, on cove floors in damp areas of open mesic woods. 555
(Nat. from Asia)

Morus rubra L. Red Mulberry. Occasional, on cove floors in rich mesic woods. 594

Nyssaceae

Nyssa sylvatica Marshall. Black Gum. Common throughout on Plateau in oak woods, especially near swales and other damp areas; also on north-facing slopes in open mesic woods. 252

Oleaceae

Chionanthus virginicus L. Fringetree. Scarce, on Plateau in oak woods. 628

Fraxinus americana L.

var. biltmoreana (Beadle) J. Wright ex Fern.
White Ash. Occasional, on cove floors in rich mesic woods. 144, 214

- * Fraxinus pennsylvanica Marsh. Green Ash. Scarce, on cove floors in rich mesic woods. 093

Ligustrum sinense Lour. Privet. Infrequent, on south-facing slopes in dry, open, glade-like areas. 327 (Int. from China)

Onagraceae

- * Circea lutetiana L.
ssp. canadensis (L.) Ascherson & Magnus
Enchanter's Nightshade. Frequent, on slopes along drainages and on cove floors in rich, damp-wet, mesic woods. 237, 265, 412

Ludwigia alternifolia L. Seedbox. Scarce, on Plateau in Sal City pond. 295

- * Oenothera biennis L. Evening Primrose. Rare, on shoulder of TN16. 767 Common, elsewhere in the vicinity.

Orobanchaceae

Conopholis americana (L.) Wallroth. Squawroot.

Occasional, on north-facing slopes in mesic woods. 107

* Epifagus virginiana (L.) Barton. Beech-Drops.

Occasional, on cove floors in open mesic woods. 563,

575 Often, but not always, under Beech.

Oxalidaceae

* Oxalis dillenii Jacquin. Yellow Wood Sorrel.

Occasional, on Plateau in swales and other damp places.
748

* Oxalis grandis Small. Giant Wood Sorrel. Occasional,
on north-facing slopes in open, mesic woods. 222

* Oxalis stricta L. Wood Sorrel. Occasional, on
north-facing slopes in open, mesic woods. 762

Oxalis violacea L. Violet Wood Sorrel. Occasional, on
Plateau around sandstone outcrops in thin, dry soil in
open woods. 050

Papaveraceae

Sanguinaria canadensis L. Bloodroot. Occasional, on
cove floors in rich mesic woods. 640

* Stylophorum diphyllum (Michaux) Nuttall.

Celandine Poppy. Occasional, on cove floors in rich,
mesic woods. 025

Passifloraceae

Passiflora incarnata L. Passionflower. Rare, on floor
of Farmer Cove at edge of old field. 798

* Passiflora lutea L. Passionflower. Scarce, on
south-facing slopes in open woods among sandstone
talus. 738

Phrymaceae

Phyrma leptostachya L. Lop-Seed. Occasional, on

Plateau in small mesic sinkholes on rim. Rich woods.
605

Phytolaccaceae

Phytolacca americana L. Pokeweed. Occasional, on cove floors in wet, rich, mesic woods, especially on floor of Cave Cove. 605

Plantaginaceae

- * Plantago lanceolata L. English Plantain. Occasional, on Plateau in dry, open, weedy, disturbed areas. 725 (Nat. from Europe)
- * Plantago rugelii Dcne. Rugel's Plantain. Occasional, on cove floors in moist open areas. 489

Platanaceae

* Platanus occidentalis L. Sycamore. Scarce, on cove floors along drainages in open mesic woods. 232

Polemoniaceae

Phlox amoena Sims. Sweet Phlox. Scarce, on south-facing slopes in dry, open, glade-like areas. 117

Phlox amplifolia Britton. Phlox. Occasional, on north-facing slopes in open mesic woods. 355

Phlox divaricata L. Blue Phlox. Infrequent, on Plateau in open oak woods. 010

Phlox maculata L. ssp. pyramidalis (Smith) Wherry
Phlox. Infrequent, on north-facing slopes in dry openings of open, mesic woods. 207

- * Phlox pilosa L. Phlox. Infrequent, on south-facing slopes in dry, open, glade-like areas. 118

Polygalaceae

Polygala curtissii Gray. Curtis' Milkwort. Common, on Plateau on sandstone outcrops and on dry woodland borders. 255, 372, 518, 571

Polygala senega L. Seneca Snakeroot. Occasional, on north-facing slopes in seepy areas of mesic woods. 217

Polygalaceae (continued)

- * Polygala verticillata L. Milkwort. Infrequent, on Plateau in dry sandy soil of open, disturbed areas. 427

Polygala verticillata L. var. ambigua (Nuttall) Wood
Milkwort. Occasional, on Plateau in dry sandy soil of open, disturbed areas. 340, 542

Polygonaceae

- * Polygonum cespitosum Blume
var. longisetum (DeBruyn) Stewart
Smartweed. Occasional, on cove floors and north-facing slopes in wet areas in mesic woods. 235, 441
(Nat. from Southeast Asia)
- * Polygonum persicaria L. Ladies' Thumb. Occasional, on Plateau in open areas around pools and puddles, especially around Sal City pond and the Plateau Pond. 431, 633 (Nat. from Europe)
- * Polygonum punctatum Ell. Smartweed. Occasional, throughout study area in moist-wet places. 558, 792
- * Polygonum punctatum Ell. var. leptostachyum Meissn.
Smartweed. Infrequent, on north-facing slopes in seepy areas in mesic woods. 206
- * Polygonum scandens L.
var. cristatum (Engelm. & Gray) Gleason
False Climbing Buckwheat. Infrequent, on north-facing slopes in open woods of sandstone talus slopes. Open, mesic woods. 302
- # Polygonum tenue Michaux. Slender Smartweed.
Infrequent, on Plateau in dry, thin soil of sandstone outcrops. 382
- Rumex acetosella L. Sheep Sorrel. Occasional, on cove floors in open, disturbed areas. 688
(Nat. from Europe)
- Rumex crispus L. Sour Dock. Occasional, on Plateau in disturbed areas. 281 (Nat. from Europe)
- * Tovara virginiana (L.) Raf. Jumpseed. Occasional, on slopes and cove floors in mesic woods. 310, 407

Portulacaceae

- * Claytonia caroliniana Michaux. Carolina Spring Beauty.
Infrequent, on cove floors in rich mesic woods.
Especially in Wolf Cove. 022
- # Claytonia virginica L. Spring Beauty. Frequent, on
cove floors in rich mesic woods. 016
- *# Talinum sp. Fameflower. Very rare, on Plateau on
sandstone outcrops. Specimen is either T. mengesii
Wolf or T. teretifolium Pursh, but sufficient
flowering material is not available to make a positive
determination. 482

Primulaceae

- Lysimachia lanceolata Walter. Fringed Loosestrife.
Infrequent, on cove floors in open, dry, disturbed
areas. 220
- Lysimachia quadrifolia L. Whorled Loosestrife.
Infrequent, on north-facing slopes along trails in open
mesic woods. 125
- * Samolus parviflorus Raf. Water Pimpernell. Infrequent,
on cove floors in wet areas in rich. mesic woods. 233

Ranunculaceae

- Actea pachypoda Ell. Baneberry. Occasional, on slopes
and cove floors in mesic woods. 068
- Delphinium tricornes Michaux. Larkspur. Common, on cove
floors in rich mesic woods. 065, 672
- Hepatica acutiloba DC. Hepatica. Infrequent, on slopes
along drainages and cove floors in rich mesic woods.
642
- * Hydrastis canadensis L. Golden Seal. Occasional, on
cove floors in rich mesic woods. 046
- # Ranunculus hispidus Michaux. Hairy Buttercup.
Occasional, on cove floors in open areas of mesic
woods. 037, 644, 660
- Ranunculus recurvatus Poir. Hooked Buttercup.
Infrequent, on cove floors in rich mesic woods. 090

Ranunculaceae (continued)

Thalictrum clavatum DC. Meadow Rue. Occasional, on cove floors near springs in rich mesic woods. 123, 240

Thalictrum thalictroides (L.) Boivin. Windflower.
Common, on slopes and cove floors in mesic woods. 017
[Anemonella thalictroides (L.) Spach.]

Xanthorhiza simplicissima Marshall. Yellowroot.
Occasional, on Plateau along streams in oak woods. 183

Rhamnaceae

Berchemia scandens (Hill) K. Koch. Rattan Vine. Rare,
on south-facing slopes in dry, open glade-like areas.
389

Rhamnus caroliniana Walter. Carolina Buckthorn.
Occasional, on south-facing slopes in dry, open
glade-like areas and on cove floors in open mesic
woods. 197, 418

Rosaceae

*# Agrimonia gryposepala Wallroth. Agrimony. Occasional,
on north-facing slopes in rich mesic woods. 354

Agrimonia pubescens Wallroth. Agrimony. Occasional, on
cove floors in open mesic woods along trails. 759, 799

Amelanchier arborea (Michaux F.) Fern. Serviceberry.
Infrequent, on Plateau and at cliff bases in moist
woods. 641

* Crataegus crus-galli L. Hawthorn. Occasional, on
south-facing slopes in dry, open, glade-like areas.
205

* Crataegus flava Ait. Hawthorn. Occasional, on
south-facing slopes in rich open woods to dry
glade-like areas. 077, 322

*# Duchesnea indica (Andrz.) Focke. Indian Strawberry.
Occasional, on cove floors in damp, disturbed areas of
mesic woods. 210 (Nat. from Asia)

* Geum canadense Jacquin. Avens. Occasional, on cove
floors and cliff bases in rich soil of mesic woods.
270, 387

Rosaceae (continued)

- # Geum virginianum L. Avens. Infrequent, on cove floors in rich, mesic woods. 436
- * Gillenia trifoliata (L.) Moench. Bowman's Root. Scarce, on Plateau in open oak woods. 765
- Potentilla simplex Michaux. Five-Finger. Occasional, on slopes, drainages, and cove floors in open mesic woods. 703
- * Prunus americana Marshall. Wild Plum. Scarce, on cove floors in open mesic woods. 127, 652
- Rubus argutus Link. Blackberry. Occasional, on Plateau in open, disturbed areas. 283
- Rubus flagellaris Willd. Dewberry. Occasional, on Plateau in dry, open, weedy areas. 750
- Sorbus arbutifolia (L.) Heynhold. Red Chokeberry. Scarce, on Plateau in moist soil around water. 639, 754 [Pyrus arbutifolia in Fernald, 1950]

Rubiaceae

- Cephalanthus occidentalis L. Buttonbush. Scarce, on Plateau around Plateau Pond. 316
- * Diodia teres Walter. Poor-Joe. Frequent, on Plateau in damp open places, especially around Sal City pond. 342
- Galium circaezans Michaux. Bedstraw. Occasional, on north-facing slopes in mesic woods. 349
- * Galium triflorum Michaux. Bedstraw. Occasional throughout, in dry-mesic woods of Plateau and coves. 190, 273, 346
- Houstonia caerulea L. Bluets. Common throughout, especially near open sandstone outcrops on Plateau and on moss-covered stream banks. 009
- Houstonia purpurea L. Bluets. Frequent, on Plateau in open, dry areas of oak woods. 087, 724, 734
- Mitchella repens L. Partridge Berry. Infrequent, on north-facing slopes at cliff bases and on cove floors in mesic woods. 139

Rutaceae

- *#Ptelea trifoliata L. Wafer Ash. Infrequent, on dry slopes and open areas of cove floors. 212

Salicaceae

- * Salix humilis Marshall. Upland Willow. Scarce, on Plateau at base of sandstone outcrops in open oak woods. 681

Saxifragaceae

Astilbe biternata (Vent.) Britton. False Goat's-Beard. Infrequent, on north-facing slopes and cove floors in seepy areas in rich mesic woods. 231

Heuchera americana L. Alum-Root. Common, in coves on damp ledges in open mesic woods. 236, 710

- * Heuchera parviflora Bartling. Alum-Root. Infrequent, on bases of sandstone cliffs in wet, seepy areas. mesic woods. 757

Hydrangea arborescens L. Occasional, on cove floors and along slope drainages in moist soil of open mesic woods. 211

Mitella diphylla L. Miterwort. Frequent, in slope drainages near running water in wet, moss-covered soil. Rich mesic woods. 015

Parnassia asarifolia Vent. Grass-of-Parnassus. Occasional, on Plateau along streams in wet, moss-covered soil. 595

- * Philadelphus hirsutus Nuttall. Mock Orange. Infrequent, on south-facing slopes in dry, glade-like areas. 226

Saxifraga virginensis Michaux. Early Saxifrage. Occasional, on north-facing slopes on rock outcrops in damp moss-covered soil of open woods. 006

Tiarella cordifolia L. Foamflower. Occasional, on cove floors in open, wet, seepy places. 110, 112

Scrophulariaceae

- * Aureolaria laevigata (Raf.) Raf. Smooth False Foxglove.
Occasional, on north-facing slopes and cove floors in
mesic woods. 251, 271
- *#Aureolaria pedicularia (L.) Raf. False Foxglove.
Infrequent, on Plateau along trails in open, disturbed
areas. 500
- Aureolaria virginica (L.) Pennell. Downy False
Foxglove. Occasional, on Plateau and cove floors in
dry, open, disturbed, weedy places. 454, 554
- *#Gerardia tenuifolia Vahl. Gerardia. Frequent, on
Plateau in open, grassy areas and clearings, dry soil.
499, 513, 573, 617
- * Mimulus alatus Aiton. Monkeyflower. Scarce, on
north-facing slopes in seepy areas in mesic woods. 351
- * Paulownia tomentosa (Thunb.) Stendel. Princess-Tree.
Rare, one tree observed on on north-facing slope along
trail in rich mesic woods. 221 (Nat. from East Asia)
- Pedicularis canadensis L. Wood Betony. Common, on cove
floors in dry, open areas along trails. 066, 671
- Penstemon canescens Britton. Beard-Tongue. Infrequent,
on north-facing slopes in open meic woods. 141, 708
- * Verbascum thapsus L. Common Mullein. Infrequent, on
Plateau in open, disturbed areas, especially along
TN16. 564 (Nat. from Europe)
- Veronica arvensis L. Corn-Speedwell. Occasional, on
cove floors in open, disturbed areas, especially on
floor of Farmer Cove in old field. 690
(Nat. from Europe)

Solanaceae

- Solanum carolinense L. Horse Nettle. Infrequent, on
Plateau in weedy, disturbed areas. 284

Staphyleaceae

- Staphylea trifolia L. Bladdernut. Occasional, on cove
floors in rich mesic woods along streams, especially on
the floor of Wolf Cove. 023

Styracaceae

- * Styrax grandifolia Aiton. Styrax. Very rare, one small population on Plateau on sandstone outcrop above Wolf Cove. 189. This represents a westward extension to the Cumberland Plateau.

Theaceae

Stewartia ovata (Cav.) Weatherby. Mountain Camellia. Rare, only a few trees observed on Plateau along streams and damp places in oak woods. 188

Thymelaeaceae

Dirca palustris L. Leatherwood. Infrequent, on cove floors in wet areas around seeps, springs, and waterfalls in rich mesic woods. 047

Tiliaceae

Tilia heterophylla Vent. Basswood. Common, on cove floors and north-facing slopes in rich mesic woods. 691, 707

Ulmaceae

Celtis laevigata Willd. Sugarberry. Infrequent, on cove floors in open mesic woods. 586

Celtis occidentalis L. var. georgiana (Small) Ahles Georgia Hackberry. Infrequent, on south-facing slopes in open woods of dry, glade-like areas. 742.
[Celtis tenuifolia Nutt. var. georgiana Small in Fernald, 1950]

- * Ulmus alata Michaux. Winged Elm. Infrequent, on south-facing slopes in open woods of dry, glade-like areas and on cove floors in dry, open areas. 213

Ulmus rubra Muhl. Slippery Elm. Infrequent, on cove floors and rocky slopes in mesic woods. 584

Urticaceae

- Laportea canadensis (L.) Weddell. Wood-Nettle. Common, on cove floors in wet, seepy areas of rich, mesic woods. 264
- * Parietaria pensylvanica Muhl. ex Willd. Pellitory. Infrequent, at cliff bases in seepy soil in mesic woods. 739
- * Pilea pumila (L.) Gray. Clearweed. Common, on cove floors in moist, rich mesic woods. 435, 602

Valerianaceae

- # Valeriana pauciflora Michaux. Valerian. Rare, only observed on floor of Wolf Cove in very rich mesic woods. 097

Verbenaceae

- Callicarpa americana L. Beauty-Berry. Scarce, on south-facing slopes in open woods of dry, glade-like areas. 314
- Verbena simplex Lehmann. Vervain. Occasional, on Plateau in open, disturbed areas. 736
- * Verbena urticifolia L. White Vervain. Frequent, on cove floors along streams and open wet places bordering mesic woods. 415

Violaceae

- Viola blanda Willd. Sweet White Violet. Occasional, on cove floors and slope drainages in moist soil of mesic woods. 024
- * Viola canadensis L. Canada Violet. Infrequent, on cove floors in very rich mesic woods. 682
- * Viola conspersa Reichenbach. Dog Violet. Occasional, on cove floors in mesic woods. 673
- Viola hastata Michaux. Halberd-Leaved Yellow Violet. Frequent, on Plateau in open oak woods. 004

Violaceae (continued)

* Viola macloskeyi Lloyd

var. pallens (Banks ex DC) C. L. Hitchcock
Macloskey's White Violet. Rare, on Plateau below
sandstone ledge along stream below mountain laurel
thickets. Wet, moss-covered soil. 683

Viola palmata L. Three-Lobed Violet. Infrequent, on
cove floors in submesic woods. 044

* Viola palmata L. var. triloba (Schw.) Ging. ex DC.
Three-Lobed Violet. Occasional, on north-facing slopes
along major drainages. 696 Not common in Middle
Tennessee. [Viola triloba Schw. var. dialata
(Ell.) Brainerd.]

Viola papilionacea Pursh. Common Purple Violet.
Occasional, on cove floors in rich mesic woods. 019

Viola pedata L. Bird's-foot Violet. Frequent, on
Plateau in open, dry, sandy areas. 027 Both color
phases are represented in the area.

Viola pensylvanica Michaux. Smooth Yellow Violet.
Occasional, on cove floors in damp, mesic woods. 018
[Viola eriocarpa Schwein. var. leiocarpa Fern. &
Weig. in Radford]

Viola primulifolia L. Primrose-Leaved Violet.
Infrequent, on Plateau in seepy areas and along streams
in shaded oak woods. 663

Viola rafinesquii Greene. Field Pansy. Occasional, on
cove floors in open dry, disturbed areas. 687.
[According to Fernald (1950), this taxon was
naturalized from Eurasia, but according to Radford it
is the only pansy native to North America!]

Viola rostrata Pursh. Long-Spurred Violet. Occasional,
on slopes, drainages, and cove floors in mesic woods.
011

Viola septemloba Leconte. Seven-Lobed Violet.
Infrequent, on north-facing slopes and drainages of
coves in mesic woods. 063
[Viola esculenta Ell.]

Viola striata Aiton. Cream Violet. Occasional, on cove
floors in mesic woods. 039

Violaceae (continued)

- * Viola tripartita Ell. var. glaberrima (DC) Harper
Three-Parted Violet. Occasional, on north-facing
slopes along major drainages. 692

Vitaceae

Parthenocissus quinquefolia (L.) Planchon.
Virginia Creeper. Occasional, on cove floors and
slopes in mesic woods. 272

Vitis aestivalis Michaux. Summer Grape. Occasional,
throughout coves in mesic woods to dry, open, glade-like
areas. 216, 329

*# Vitis riparia Michaux. Riverside Grape. Infrequent,
along major drainages of north-facing slopes in rich
mesic woods. 447

Vitis rotundifolia Michaux. Muscadine. Occasional, in
open woods on slopes and cove floors. 588

Vitis vulpina L. Fox Grape; Frost Grape. Occasional,
on dry south-facing slopes in open woods and in open,
glade-like areas. 385, 396

APPENDIX B

COMPARISONS OF FALL CREEK FALLS, FIERY GIZZARD GORGE,
AND SAVAGE GULF FLORAS TO THE WOLF COVE FLORA

COMPARISONS OF FALL CREEK FALLS, FIERY GIZZARD GORGE,
AND SAVAGE GULF FLORAS TO THE WOLF COVE FLORA

Family Level

Families not included in Wolf Cove Flora:

<u>Fall Creek Falls</u>	<u>Fiery Gizzard Gorge</u>	<u>Savage Gulf</u>
Buxaceae	Buxaceae	Buxaceae
Calycanthaceae	Calycanthaceae	Calycanthaceae
Lycopodiaceae	Chenopodiaceae	Haloragaceae
Selaginaceae	Curcubitaceae	Loranthaceae
Schizaceae	Loranthaceae	Lycopodiaceae
	Lycopodiaceae	Malvaceae
	Lythraceae	Santalaceae
	Malvaceae	Sapotaceae
	Sapotaceae	Schizaceae
	Simaroubaceae	Selaginaceae
		Simaroubaceae
		Typhaceae
		Vittariaceae
		Xyridaceae

Families included in the Wolf Cove flora but not found in the other floras (Fall Creek Falls, Fiery Gizzard, or Savage Gulf):

<u>Family:</u>	<u>Does not occur in:</u>
Alismataceae	Fall Creek Falls; Fiery Gizzard
Apocynaceae	Any of the three floras
Blechnaceae	Fall Creek Falls; Fiery Gizzard
Cistaceae	Fall Creek Falls
Commelinaceae	Fall Creek Falls
Convolvulaceae	Fall Creek Falls
Hymenophyllaceae	Fall Creek Falls; Fiery Gizzard
Hypericaceae	Fall Creek Falls
Iridaceae	Fall Creek Falls
Isoetaceae	Any of the three floras
Linaceae	Fall Creek Falls
Melastomataceae	Fall Creek Falls
Menispermaceae	Fiery Gizzard; Savage Gulf
Onagraceae	Fall Creek Falls
Phrymaceae	Fall Creek Falls
Phytolaccaceae	Fall Creek Falls
Plantaginaceae	Fall Creek Falls

Families included in the Wolf Cove flora but not found in the other floras (Fall Creek Falls, Fiery Gizzard, or Savage Gulf): (continued)

<u>Family:</u>	<u>Does not occur in:</u>
Polygalaceae	Fall Creek Falls
Rutaceae	Any of the three floras
Sparganiaceae	Any of the three floras
Staphyleaceae	Savage Gulf
Styracaceae	Fall Creek Falls; Savage Gulf
Thymelaeaceae	Fall Creek Falls
Valerianaceae	Any of the three floras

Species Level

Taxa found in two of the three floras (Fall Creek Falls, Fiery Gizzard Gorge, and Savage Gulf) but not in the Wolf Cove flora:

<u>Acalypha graciliens</u>	<u>Cerastium</u> spp.
<u>Acalypha rhomboidea</u>	<u>Chaerophyllum tainturieri</u>
<u>Acer negundo</u>	<u>Chelone glabra</u>
<u>Acer pensylvanicum</u>	<u>Cicuta maculata</u>
<u>Agrimonia rostellata</u>	<u>Cimicifuga racemosa</u>
<u>Ailanthus altissima</u>	<u>Cladastris kentukea</u>
<u>Ambrosia trifida</u>	<u>Clematis virginiana</u>
<u>Anemone quinquefolia</u>	<u>Corallorhiza odontorhiza</u>
<u>Anemone virginiana</u>	<u>Coreopsis tripteris</u>
<u>Antennaria solitaria</u>	<u>Cuscuta compacta</u>
<u>Apios americana</u>	<u>Cyperus</u> spp.
<u>Aplectrum hyemale</u>	<u>Cypripedium acaule</u>
<u>Aquilegia canadensis</u>	<u>Dactylis glomerata</u>
<u>Aristida dichotoma</u>	<u>Danthonia compressa</u>
<u>Asclepias tuberosa</u>	<u>Desmodium cuspidatum</u>
<u>Aster lateriflorus</u>	<u>Desmodium marilandicum</u>
<u>Betula</u> spp.	<u>Desmodium nudiflorum</u>
<u>Boehmeria cylindrica</u>	<u>Desmodium pauciflorum</u>
<u>Bumelia lycioides</u>	<u>Dioscorea batatas</u>
<u>Cacalia atriplicifolia</u>	<u>Disporum maculatum</u>
<u>Calycanthus</u> spp.	<u>Dryopteris goldiana</u>
<u>Carex amphibola</u>	<u>Dryopteris intermedia</u>
<u>Carex communis</u>	<u>Eleusine indica</u>
<u>Carex emmonsii</u>	<u>Epigea repens</u>
<u>Carex hirsutella</u>	<u>Festuca obtusa</u>
<u>Carex laxiflora</u>	<u>Galactica volubilis</u>
<u>Carya ovalis</u>	<u>Galium aparine</u>
<u>Ceanothus americanus</u>	<u>Galium latifolium</u>

Taxa found in two of the three floras (Fall Creek Falls, Fiery Gizzard Gorge, and Savage Gulf) but not in the Wolf Cove flora: (continued)

<u>Gratiola virginiana</u>	<u>Potentilla canadensis</u>
<u>Helianthus microcephala</u>	<u>Prenanthes altissima</u>
<u>Heliopsis helianthoides</u>	<u>Prunus serotina</u>
<u>Heuchera villosa</u>	<u>Pyrularia pubera</u>
<u>Hexastylis arifolia</u>	<u>Quercus muhlenbergii</u>
<u>Hieracium paniculata</u>	<u>Quercus rubra</u>
<u>Hybanthus concolor</u>	<u>Rhododendron arborescens</u>
<u>Hypericum nudiflorum</u>	<u>Rhododendron calendulaceum</u>
<u>Impatiens capensis</u>	<u>Rhododendron maximum</u>
<u>Itea virginica</u>	<u>Rhus glabra</u>
<u>Juncus marginatus</u>	<u>Ribes cynosbati</u>
<u>Juncus tenuis</u>	<u>Rubus hispidus</u>
<u>Lactuca floridana</u>	<u>Rubus occidentalis</u>
<u>Lespedeza cuneata</u>	<u>Salix caroliniana</u>
<u>Lespedeza repens</u>	<u>Salix nigra</u>
<u>Lindernia dubia</u>	<u>Sambucus pubens</u>
<u>Lycopodium spp.</u>	<u>Sisyrinchium angustifolium</u>
<u>Lygodium palmatum</u>	<u>Smilax hispida</u>
<u>Lysimachia tonsa</u>	<u>Sphenopholis nitida</u>
<u>Magnolia macrophylla</u>	<u>Trichostema dichotomum</u>
<u>Magnolia tripetala</u>	<u>Trillium erectum</u>
<u>Muhlenbergia sylvatica</u>	<u>Trillium grandiflorum</u>
<u>Orchis spectabilis</u>	<u>Trillium recurvatum</u>
<u>Pachysandra procumbens</u>	<u>Tsuga canadensis</u>
<u>Panicum clandestinum</u>	<u>Ulmus americana</u>
<u>Phlox carolina</u>	<u>Uvularia perfoliata</u>
<u>Phlox glaberrima</u>	<u>Uvularia sessilifolia</u>
<u>Phoradendron serotinum</u>	<u>Viburnum cassinoides</u>
<u>Physalis heterophylla</u>	<u>Viola affinis</u>
<u>Plantago virginica</u>	<u>Viola cucullata</u>
<u>Poa compressa</u>	<u>Viola hirsutula</u>
<u>Polymnia canadensis</u>	<u>Zizia aptera</u>

Total: 120 Taxa

Taxa found in the Wolf Cove flora but not in Fall Creek Falls, Fiery Gizzard, or Savage Gulf:

<u>Agrimonia gryposepala</u>	<u>Carex careyana</u>
<u>Allium cernuum</u>	<u>Carex caroliniana</u>
<u>Amianthemum muscaetoxicum</u>	<u>Carex debilis</u>
<u>Apocynum cannabinum</u>	<u>Carex festucacea</u>
<u>Asclepias verticillata</u>	<u>Carex nigromarginata</u>
<u>Asplenium ruta-muraria</u>	<u>Carex prasina</u>
<u>Aureolaria pedicularia</u>	<u>Carex striatula</u>
<u>Berchemia scandens</u>	<u>Carex vulpinoidea</u>
<u>Bulbostylis capillaris</u>	<u>Cassia obtusifolia</u>

Taxa found in the Wolf Cove flora but not in Fall Creek Falls,
Fiery Gizzard, or Savage Gulf: (continued)

Centrosema virginiana
Claytonia virginica
Croton capitatus
Desmodium laevigatum
Desmodium viridiflorum
Duchesnea indica
Dulichium arundinaceum
Eleocharis microcarpa
Gerardia tenuifolia
Geum virginianum
Gleditsia triacanthos
Habenaria lacera
Helianthus eggertii
Hieracium scabrum
Hypericum dolabriforme
Hypericum perforatum
Hypericum walteri
Iodanthus pinnatifidus
Isoetes engelmannii
Lactuca saligna
Leersia oryzoides
Lespedeza violacea
Lespedeza virginica
Liatris scabra
Liatris scariosa
Lithospermum canescens
Lolium perenne
Lobelia spicata
Luzula echinata
Melilotus officinalis
Mertensia virginica

Monarda fistulosa
Morus alba
Muhlenbergia sobolifera
Ophioglossum vulgatum
 var. pycnostichum
Osmunda claytoniana
Panicum ovale var. villosum
Paspalum pubiflorum
Polygonum tenue
Polymnia laevigata
Ptelea trifoliata
Ranunculus hispidus
Ratibida pinnata
Rhododendron roseum
Rhynchospora glomerata
Satureja vulgaris
Scirpus purshianus
Silene antirrhina
Sparganium americanum
Spiranthes cernua
Spiranthes ovalis
Synandra hispidula
Talinum sp.
Thaspium trifoliatum
Trillium catesbaei
Trillium flexipes
Valeriana pauciflora
Viburnum prunifolium
Viola septemloba
Vitis riparia
Vitis vulpina

Total: 79 taxa

APPENDIX C
RARE PLANT STATUS REPORTS

RARE PLANT STATUS REPORTS

The following status reports follow the format of Murrell (1985). The first part of the report contains information on the name, habitat, and general distribution of the plant. Following this introductory information, the site(s) within the study area where the plant was observed are described. Following the site description is a summary of possible threats to the population at that site as perceived by the author.

Status Report 1

Taxon: Helianthus eggertii Small

Common Name: Sunflower

Family: Asteraceae

Distribution: Known only from barrens of central Tennessee and east-central Kentucky.

Status: Special Concern in Tennessee.
Federally listed in Category 2.

Habitat: Rocky hills and "Oak Barrens" of Highland Rim.

Source: Beatley, 1963; Heiser, 1969.

Site #1: Sal City Pond.

Location: 1.2 km south of Checking Station parking area along TN16. Turnout on left leads to trail to Sal City pond. Pitcher Ridge Quadrangle. 550 m.

Site Description: The area of Sal City pond has been extensively used by off-road vehicles and is highly disturbed. The mixed oak forest is very open with weedy areas interspersed with denuded, hard-packed, sandy trails. About 2000 m² of land around the southeastern part of the pond area is in this condition.

Population Size and Vigor: Very few individuals of this plant were observed. Due to unfamiliarity with the taxon at the time of collection, no particular attention was given to recording the population status of this plant. The author estimates that 10-30 plants may occur in the area. The plants do not appear aggressive in colonizing the open habitat available to them, indicating that they may either be recent introductions to the area or they may be a weak or declining population.

Associates: Quercus alba, Quercus coccinea, Quercus velutina, Rhus copallina, Asclepias amplexicaulis, Schrankia microphylla, Festuca pratensis.

Threats: The plants are distributed around the border of the woods and in the open, weedy areas of the site. Continued use by careless off-road vehicle operators may prevent a more vigorous establishment of the population. The plants along the woodland borders are not perceived to be immediately threatened.

Status Report 2

Taxon: Hieracium scabrum Michaux

Common Name: Rough Hawkweed

Family: Asteraceae

Distribution: Southern Canada west to Minnesota, south to Maryland, upland to Georgia and eastern Tennessee, Kentucky, west to southern Illinois and Missouri. Previously from Johnson and Morgan counties in Tennessee.

Status: Threatened in Tennessee.
No Federal listing.

Habitat: Dry open woods, pastures, and clearings.

Source: Fernald, 1950.

Site #1: Sal City Pond.

Location: 1.2 km south of Checking Station parking area along TN16. Turnout on left leads to trail to Sal City pond. Pitcher Ridge Quadrangle. 550 m.

Site Description: The area of Sal City pond has been extensively used by off-road vehicles and is highly disturbed. The mixed oak forest is very open with weedy areas interspersed with denuded, hard-packed, sandy trails. About 2000 m² of land around the southeastern part of the pond area is in this condition.

Population Size and Vigor: The individuals of this sole population were scattered about the dry, open areas of the pond border. 20-30 individuals were observed. The plant appears to be adventive in the disturbed openings.

Associates: Quercus alba, Quercus coccinea, Quercus velutina, Rhus copallina, Asclepias amplexicaulis, Schrankia microphylla, Festuca pratensis.

Threats: The plants are distributed around the border of the woods and in the open, weedy areas of the site. Continued use by careless off-road vehicle operators may produce a more vigorous establishment of the population.

Status Report 3

Taxon: Hydrastis canadensis L.

Common Name: Golden Seal

Family: Ranunculaceae

Distribution: Keener (1977) gives the distribution as Missouri to Pennsylvania south except for Alabama, Florida, and Louisiana. Noted as rare in all sources.

Status: Threatened in Tennessee.
Federally listed in Category 3C.

Habitat: Rich woods.

Source: Fernald, 1950; Keener, 1977;
Radford et al., 1968.

Site #1: Floor of Cave Cove.

Location: The floor of Cave Cove is located east of the checking station and is the shallowest of the three coves at the head of the gorge. Elevation ca. 400 m. Pitcher Ridge Quadrangle.

Site Description: Rich mixed-mesophytic woods with a path terminating at a small waterfall on the west end and continuing to the Farmer Cove-Wolf Cove saddle. The plants occur on the trail edges and in the woods on either side.

Population Size and Vigor: 250-300 plants are scattered about the flat cove floor between the waterfall and the cave (at the eastern end of the cove). The plants are robust but no seed set was observed.

Associates: Tilia heterophylla, Fagus grandifolia, Aesculus flava, Acer saccharum, Morus rubra, Ostrya virginiana, Carpinus caroliniana, Cornus florida, Caulophyllum thalictroides, Viola spp., Delphinium tricornis.

Threats: The trail is used by dirt bikers and three-wheeler operators and sees some abuse. The plants are scattered throughout the woods on the floor of the cove, so the main population center does not appear threatened by trail abuse. The only other threat would be over-collection; Fernald (1950) and Keener (1977) cite over-collection for medicinal use and exacting ecological requirements as being the primary reasons for the plant's rarity throughout its range.

Site #2: Floor of Farmer Cove.

Location: Farmer Cove is the middle cove of the gorge system. The population occurs on the eastern end in a flat, relatively undisturbed area of mesic forest near the saddle with Wolf Cove. Elevation ca. 370 m. Pitcher Ridge Quadrangle.

Site Description: Rich mixed-mesophytic woods between two paths south of the old field near the saddle with Wolf Cove. The deciduous woods abuts an apparently planted shortleaf pine grove at the base of the saddle. A small stream flows through the site.

Associates: Tilia heterophylla, Fagus grandifolia, Acer saccharum, Pinus echinata, Ostrya virginiana, Carpinus caroliniana, Cornus florida, Caulophyllum thalictroides, Viola spp., Delphinium tricorne, Obolaria virginica.

Threats: Same as Site #1.

Status Report 4

Taxon: Panax quinquefolius L.

Common Name: Ginseng

Family: Araliaceae

Distribution: Southern Canada south to north Florida,
Alabama, Louisiana, and Oklahoma.

Status: Threatened in Tennessee.
Federally listed in Category 3C.

Habitat: Rich and cool mesic woods.

Source: Fernald, 1950; Radford et al., 1968.

Site #1: Farmer Cove Drainage.

Location: Head of the drainage begins 2.4 km south of
Checking Station along TN16, population located
ca. 0.8 km down drainage in open area.
Elevation ca. 460 m, Pitcher Ridge Quadrangle.

Site Description: Drop in ephemeral stream drainage where
the mixed-mesophytic forest opens in a damp, rich,
cliffy area. The canopy is nearly closed but the
ground receives spotty direct sunlight. The soil is
deep, rich, and moist.

Population Size and Vigor: Only ca. 3-10 plants in the
vicinity. Few appeared to be mature enough to flower.
Population may be larger in surrounding woods, but no
other plants were seen. Plants do not appear to be
vigorously reproducing.

Associates: Tilia heterophylla, Liriodendron
tulipifera, Aesculus flava, Ostrya virginiana,
Carpinus caroliniana, Aristolochia macrophylla,
Carex purpurifera, Viola tripartita var.
glaberrima.

Threats: The population is located in a very remote area that is probably not subject to much, if any, human disturbance. The plant is hunted extensively for its highly prized root which may account in part for its scarcity in the study area.

Site #2: Slope below Bear Hollow Mountain.

Location: North-facing slope around limestone outcrops above Wolf Cove. Elevation: 460 m, Pitcher Ridge Quadrangle.

Site Description: Mixed-mesophytic woods among limestone outcrops. The plants were growing on the limestone outcrop in soil collected in crevices.

Population Size and Vigor: Very small population, 3-4 plants were seen on outcrop. No other plants were seen in the area, although the forest is rich and may provide suitable habitat. Two of the plants were in bud, but reproduction appears slow if successful at all.

Associates: Tilia heterophylla, Liriodendron tulipifera, Aesculus flava, Ostrya virginiana, Carpinus caroliniana, Penstemon canescens, Heuchera americana.

Threats: Same as Site #1

Status Report 5

Taxon: Polymnia laevigata Beadle

Common Name: Smooth Leafcup

Family: Asteraceae

Distribution: Scattered in Alabama, Florida, Georgia, Missouri, and Tennessee.

Status: Special Concern in Tennessee.
Federally listed in Category 2.

Habitat: Mesic woods.

Source: Cronquist, 1980.

Site #1: North Saddle Trail.

Location: South facing slopes below cliffs above Farmer and Wolf coves, along trail and among limestone talus. This plant covers a large portion of the upper south-facing slopes. Elevation: ca. 490 m, Pitcher Ridge Quadrangle.

Site Description: Open, chestnut oak to mixed-mesophytic forest on sandstone talus slope. The plant occurs on the slope and in the thin soil covering the talus boulders. The area has one main competition motor bike trail, otherwise the topography is very rugged and undisturbed.

Population Size and Vigor: This plant is extremely vigorous, and probably numbers in the thousands. The plants appear to have good seed set, and seedlings are found in many areas below the main population on the slopes. The plants are often robust, attaining 2-2.5 m in height. The plants often form stands that must be literally hacked through.

Associates: Quercus prinus, Liriodendron tulipifera, Oxydendrum arboreum, Acer saccharum, Vitis spp., Cynoglossum virginianum, Sedum ternatum.

Threats: The author considers there to be no threats to this plant in the study area; on the contrary, it may be detrimental to the populations of other slope taxa.

Status Report 6

Taxon: Spiranthes ovalis Lindley

Common Name: Oval Ladies' Tresses

Family: Orchidaceae

Distribution: Virginia and West Virginia to southern Indiana, Illinois, Kentucky, and Missouri south to north Florida, Alabama, Mississippi, and east Texas.

Status: Special Concern in Tennessee.
No Federal listing.

Habitat: Rich, often calcareous, damp shady woods, thickets, and swamp margins.

Source: Fernald, 1950; Luer, 1975;
Radford et al., 1968.

Site #1: Floor of Farmer Cove near drain.

Location: Floor of Farmer Cove below Wolf Cove saddle near the hole where the stream disappears that drains the cove.

Site Description: Very rich mixed-mesophytic woods along stream terrace. The soil is very deep, moist, and rich.

Population Size and Vigor: Only 3 plants seen in 1985, although they are small and easily overlooked. No plants were seen in 1986.

Associates: Fagus grandifolia, Aesculus flava, Juglans cinerea, Juglans nigra, Tilia heterophylla, Lindera benzoin, Pilea pumila.

Threats: The site is removed from the mainstream of human disturbance in the form of off-road vehicle traffic. The site is probably subject to periodic flooding in the spring, but no immediate threat is perceived by the author.

Status Report 7

Taxon: Synandra hispidula (Michaux) Baillon

Common Name: Synandra

Family: Lamiaceae

Distribution: Virginia and West Virginia to Illinois,
south to Tennessee.

Status: Threatened in Tennessee.
Federally listed in Category 2.

Habitat: Wet woods, damp thickets, and stream banks, rich
mesic slopes.

Source: Fernald, 1950; Gleason, 1952;
Radford et al., 1968.

Site #1: Floor of Cave Cove.

Location: Floor of Cave Cove located east of the checking
station and is the shallowest of the three coves at the
head of the gorge. Elevation 400 m. Pitcher Ridge
Quadrangle.

Site Description: Rich mixed-mesophytic woods with a
path terminating at a small waterfall on the west end
and continuing to the Farmer Cove-Wolf Cove saddle.
The plants occur on the trail edges and in the woods
on either side.

Population Size and Vigor: The population consists of ca.
200-250 plants scattered along the trail and through
the woods. The plants appear to be annuals and have
been blooming well for two years with apparently high
seed set.

Associates: Tilia heterophylla, Fagus grandifolia,
Aesculus flava, Acer saccharum, Morus rubra,
Ostrya virginiana, Carpinus caroliniana, Cornus
florida, Caulophyllum thalictroides, Viola spp.,
Delphinium tricornes.

Threats: The trail is used by dirt bikers and three-wheeler operators and sees some abuse. The plants are scattered throughout the woods on the floor of the cove, so the main population center does not appear threatened by trail abuse.

Site #2: Floor of Wolf Cove.

Location: Western floor of Wolf Cove, the deepest cove of the gorge (Elevation ca. 300 m). The population occurs over the entire floor on either side of the main drainage channel.

Site Description: Very rich mixed-mesophytic woods. Soil is deep, rich, and periodically flooded. Herbaceous growth is very lush, especially in mid- to late-spring.

Population Size and Vigor: Plants appear very robust and well established. All plants observed were in bud or flower both in 1985 and 1986.

Associates: Fagus grandifolia, Liriodendron tulipifera, Aesculus flava, Fraxinus americana var. biltmoreana, Stylophorum diphyllum, Phacelia bipinnatifida, Iodanthus pinnatifidus, Mertensia virginica, Asclepias quadrifolia.

Threats: The remoteness and inaccessibility of the population appears to be beyond disturbance.

Status Report 8

Taxon: Talinum sp. (either T. mengesii W. Wolf or T. teretifolium Pursh).

Common Name: Fameflower

Family: Portulacaceae

Distribution: Georgia and Alabama north in barrens to Pennsylvania.

Status: Threatened in Tennessee.
Federally listed in Category 3C.

Habitat: Rock outcrops and dry sand.

Source: Fernald, 1950; Radford et al., 1968.

Site #1: Sandstone outcrop above Cave Cove.

Location: Sandstone outcrop ca. 10 m from turnpike from point just off of blacktop parking area.
Elevation 550 m. Pitcher Ridge Quadrangle.

Site Description: Very dry, open, weedy sandstone outcrop in very thin soil.

Population size and Vigor: Only one plant was seen, unknowingly collected with Hypericum gentianoides. No other plants were observed in 1985 or 1986. The material collected was past flowering and not identifiable to species. This plant may now be extirpated from the site.

Associates: Quercus prinus, Quercus stellata, Cornus florida, Hypericum gentianoides, Danthonia sericea, Liatris spp., Bulbostylis capillaris.

Threats: As stated previously, this taxon may now be extirpated at this site, but may occur in other similar habitats within the study area. The outcrops are not near any trails, and appear to lack substantial threat.

Status Report 9

Taxon: Trichomanes boscianum Sturm.

Common Name: Filmy Bristle Fern

Family: Hymenophyllaceae

Distribution: Georgia and Alabama north to Kentucky, West Virginia, and North Carolina.

Status: Threatened in Tennessee.

Habitat: Seepy, shaded crevices and overhangs, usually in acidic conditions.

Source: Radford et al., 1968.

Site #1: Sandstone outcrop above Cave Cove.

Location: Sandstone outcrop ca. 1.0 km from turnpike along a drainage off of the Rim Trail.
Elevation 550 m. Pitcher Ridge Quadrangle.

Site Description: Seepy sandstone overhang in shaded crevice.

Population size and Vigor: Only one tiny colony (6-8 cm across) was seen; only a small portion was collected. This plant has been collected elsewhere in the study area, but this was the only population observed during this study.

Associates: Quercus prinus, Cornus florida, Sorbus arbutifolia, Isotria verticillata.

Threats: This small population was extremely isolated and no immediate threat is identifiable.

VITA

Richard Keith Clements was born to Keith and Helen Clements in Cottonwood, Arizona on November 17, 1961. He received elementary education in Arizona, California, New Mexico, and Virginia. He graduated from Mundelein High School, Mundelein, Illinois, in June 1980. The following September he entered Tennessee Technological University, Cookeville, Tennessee. In June 1984 he was awarded a Bachelor of Science degree, cum laude, with a major in Biology.

In September 1984 he was accepted to the Graduate Program in Botany at the University of Tennessee, Knoxville, and was awarded a Graduate Assistantship. In January 1985 he was awarded a Graduate Teaching Assistantship. He recieved a Master of Science degree in Botany in March 1987.

He received the Citizens Bank Biology Award at Tennessee Tech in 1981 and a Science Alliance Excellence Award in 1986 at the University of Tennessee. He is a member of the Southern Appalachain Botanical Club, the Tennessee Native Plant Society, Tri-Beta Biological Honor Society, and is listed in Who's Who Among Students in American Universities and Colleges.