VASCULAR PLANT INVENTORY AND ECOLOGICAL COMMUNITY CLASSIFICATION FOR CUMBERLAND GAP NATIONAL HISTORICAL PARK

Report for the Vertebrate and Vascular Plant Inventories:
Appalachian Highlands and Cumberland/Piedmont Networks

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This report consists of the main report along with a series of appendices with information about the plants and plant (ecological) communities found at the site. Electronic files have been provided to the National Park Service in addition to hard copies. Current information on all communities described here can be found on NatureServe Explorer at www.natureserveexplorer.org.

Cover photo: Red cedar snag above White Rocks at Cumberland Gap National Historical Park. Photo by Rickie White.

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Summary

The first step in any effort to monitor the "vital signs" or ecological health of a tract of land is to develop a baseline from which to measure and gauge trends. We established a baseline for Cumberland Gap National Historical Park in three ways:

1) Ecologists from NatureServe and the Natural Heritage Network established 36 permanently marked one-hectare circular plots within the park in a grid system and another 24 circular plots in unique ecological areas that were not covered by the initial grid-based plot layout. In addition, ecologists established 41 observation points/quickplots inside the park boundary. The permanently marked plots are available to be used by researchers on studies ranging from bird point counts to individual plant monitoring.

2) Ecologists collected data on all unique vegetation communities within the park and identified 24 natural and nine human-modified or successional vegetation associations (unique ecological assemblages of plants) within the park boundary. Rare communities inside the park boundary include Cumberland Streamside Bog (G1?Q), Dry Calcareous Forest/Woodland (White Ash-Shagbark Hickory Type) (G1?), Swamp Forest-Bog Complex (Typic Type) (G2), Hi Lewis Pitch Pine Barrens (G2?), Montane Grape Opening (G2G3), and Southern Appalachian Mountain Laurel Bald (G2G3).

3) Ecologists collected and vouchered 139 specimens representing approximately 133 species, varieties, and subspecies new to the park. These vouchers were added to the existing list of vouchers already collected. The vouchers were delivered to NPS with the delivery of this report and will reside with the rest of the collection at the University of North Carolina Herbarium. The species count for the park stands now at 882 documented species (not including subspecies and varieties). NatureServe ecologists estimate that close to 100% of the vascular species of the park are documented. The most highly ranked species in terms of global rarity in the park is Ovate catchfly (*Silene ovata*) (G2).

Introduction

Effective management of natural resources in our national parks relies upon ready access to comprehensive and scientifically credible information on species and habitats found within park boundaries. NPS units are currently compiling the information needed to begin to assess the current state of natural resources at specific parks. With the passage of the National Parks Omnibus Management Act of 1998 by Congress, the National Park Service was given the mandate to "undertake a program of inventory and monitoring of National Park System resources to establish baseline information and to provide information on the long-term trends and the condition of National Park system resources." Funding for this initiative was appropriated in fiscal year 2000. In Summer 2002, NatureServe began work on the ecological community inventory portion of the project at Cumberland Gap National Historical Park.

Although Cumberland Gap National Historical Park preserves a significant cultural resource in the form of the gap itself, the park contains extremely varied geological and ecological resources as well. Due to underlying geology that produces the conditions for basic, neutral, and acidic soils within the park and relatively large elevational changes, the diversity of natural communities appears high for the size of the park. After assessing the past and current state of research in the park, we began to work on accomplishing three primary objectives:

1) Establish at least 39 permanent plots throughout the park for present and future monitoring purposes.
2) Document all ecological communities on the site as defined by the United States National Vegetation Classification (Grossman et al. 1998, Anderson et al. 1998).
3) Collect any species encountered in the park that have not already been documented and entered into NPSpecies.

The ultimate goal of the project is to deliver the information described in this report to all interested parties, and to inform land management, conservation priorities, and future research at the park. By supplying this data, we hope to ensure that future generations of visitors will visit a park that is both ecologically and historically intact.

Study Area

Cumberland Gap National Historical Park is located in the Cumberlands and Southern Ridge and Valley ecoregions (Bailey 1994) where the states of Tennessee, Virginia, and Kentucky converge. The park spans multiple counties, including Lee County, VA, Harlan and Bell Counties, KY, and Claiborne County, Tennessee.

The site is approximately 8297 hectares (20,502 acres) including a new addition that was just acquired after this report was completed. It is primarily composed of older second and third growth forests with areas such as Hensley Settlement that are maintained as

cultural human-maintained landscapes. Much of the park is covered by forests that are recovering from logging and grazing that occurred within the past century. Some of the park suffers from severe pine beetle outbreaks that have decimated the mature pine trees of the park.

Land History

Cumberland Gap was designated as a national historical park in 1940 to protect the historic character of the area where hundreds of thousands of people passed on their way to settle areas west of the Alleghenies (NPS GPO 2002). In addition to the hundreds of thousands who used the trail, there were many families that stayed to colonize the area around the gap. By the time of the Civil War, much of the land near the gap was deforested from logging and subsequent grazing allowed by settlers in the area. In addition, iron and coal extraction had occurred in certain sections of the park causing major and minor disruptions in the landscape.

Methods

The inventory and monitoring project covers three main areas: permanent plot establishment for future research in the park, a vascular plant species inventory of any plants not already found and vouchered for the park, and an ecological community inventory/classification of all the vegetation associations within the park according to the National Vegetation Classification (Grossman et al. 1998).

Permanent plot establishment

Judy Teague and Brigitte O'Donoghue from NatureServe used GIS layers supplied by the National Park Service's Cumberland Piedmont Network to set up a gridded system of one-hectare circular plots within the park boundary as mandated by the *Study Plan for Vertebrate and Vascular Plant Inventories* (Nichols 2000). They manipulated the GIS layers supplied to us with the program ArcView (ArcView 1992). We chose a 56-meter buffer around the current park boundary since each point represents the center of a one-hectare circular plot and we did not wish to sample any private holdings outside of the park. With this buffer in place, we established an evenly spaced grid system (we chose the approximate grid size of 1500 meters by 1500 meters *a priori* based on observations made by a team of park service personnel in 2000 (Nichols 2000)). At each north-south and east-west line, we recorded the coordinates for one grid point (Figure 1 and Table 1).

Once we had fully laid out the grid on paper using Arcview and then recorded all of the GPS coordinates for use onsite, we identified areas of the park that were most likely to hold unique associations not represented by the gridded points. We added points in various places, including the isolated wetland areas of the Shilalah Creek watershed, clifftop rock outcrops, and areas in very well protected steep valley bottoms. These areas all tended to be undersampled using grid sampling. We flagged these areas for visits and established plots there and in other suitable habitat that was not represented by the gridded plots.

Once at the park, we met with park personnel and local researchers, described the project's goals, and asked for their collaboration in the project. Through this process, we identified priority areas of the park for additional plot establishment and species inventory. In 2002-2004, we established 36 plots on the grid system and an additional 24 plots off of the grid in habitats not covered by any of the grid points (Figure 1). In addition, ecologists established 41 observation points/quickplots inside the park boundary. Using the GPS Garmin III+ and V units (Garmin Corp. 1999), we attempted to position ourselves within at least five meters of the "real" map location (the hypothetical location that we created in the lab prior to visiting the site). Once we were within five meters, we monumented each plot with a one foot piece of iron conduit and a small blue anodized aluminum tag with a distinctive number attached to an adjacent distinctive tree. General written directions to each permanent plot exist on the vegetation plot sheets filled out during the course of fieldwork and can also be found in the Access database archive of plot information held by the National Park Service. Due to variation

in signal strength, accuracy may be less than five meters in some cases. In 2003 and 2004, we recorded additional data at each point, visiting each point a second time at a different time of year to ensure that we had the most complete species list possible for each permanent plot.

Vegetation classification

After the establishment of each permanent one-hectare plot, we visually surveyed the area. We chose a representative and relatively homogenous 20 by 50-meter quadrat within the hectare in which to place our standardized vegetation monitoring plot. Within the quadrat, we measured environmental characteristics, identified every vascular plant to species where possible, and estimated cover values for all plants (see Appendix I for a blank version of the data sheets used). For each species found within the 20x50 meter quadrat, we assigned a cover value by strata and an overall cover value for the plot based on a modified Braun Blanquet cover class scale (Braun-Blanquet 1928). In addition, we searched for and identified any species within the full hectare that were not represented in the 20 by 50-meter sample. Finally, we returned in the spring of 2003 and 2004 to resample the plots to attempt to document any species that we had missed the previous summer.

Our team of ecologists and data managers examined the plot sheets for errors, entered the data into the National Park Service PLOTS database (NatureServe 2004), and assigned each plot to an association based on floristic composition and environmental factors using the National Vegetation Classification (Anderson et al. 1998, Grossman et al. 1998). We compared the plots with similar plots in other parks in the Cumberlands and Southern Ridge and Valley Province and also with written descriptions of each related classification unit. In addition, we thoroughly reviewed the existing literature to ensure that our product took into account previous studies (e.g. Braun 1942). Finally, we used PC-ORD to create a series of cluster analyses (McCune and Mefford 1999). The cluster analysis technique allowed us to feed our species cover data into the program so that the program could “cluster” similar plots together and break dissimilar plots apart from one another in a hierarchical tree (McCune and Grace 2002). Using a combination of the cluster analysis and our own qualitative analysis comparing the community plots to the existing NVC descriptions, we produced the draft park vegetation classification. This draft was then circulated and reviewed by natural heritage program staff and other experts who made final comments that were incorporated into the final ecological community classification document (Appendix III).

Those researchers interested in accessing this data should contact the archivist or resource manager at the park for details and specific plot locations.

Vascular plant inventory

Ecologists completed the species inventory for the park so that at least 90% of the vascular plant species in the park are documented/vouchered. While gathering plot data,

we occasionally discovered plant species within the plots that had not already been documented. We collected any new specimens encountered within the plots and recorded the GPS coordinates using our Garmin GPS unit. We pressed and thoroughly dried all specimens, identified any unknowns that could be identified, and then vouchered all new species according to National Park Service standards using the Integrated Taxonomic Information System (ITIS) as the naming standard (USDA 2004). Once the plot work was completed, we continued to look outside of the plots in areas that we felt might hold additional plant species new to the park.

To assess the success of past inventories, we used the program PC-ORD (McCune and Grace 2002, McCune and Mefford 1999) to create a species area curve using the data gathered at each one-hectare plot. In addition, we used a jackknife method within PC-ORD to estimate the total number of species found in the park (Palmer 1990). This method used the formula JACK1= SO + r1[n-1]/n where "SO" is the number of species observed in n quadrats, r1 is the number of species present in only one quadrat, and n is the number of plots sampled. First-order jackknife estimates often underestimate number of species as evidenced by the lowest estimate in our first-order jackknife (McCune and Grace 2002), so we used a variety of measures including first and second-order jacknife methods to attempt to find the best estimate of overall species diversity for the park.

Results

During the species inventory work, we encountered and collected 127 new species or varieties (Tables 2,3) that had not been confirmed previously from the park, adding to the list of 755 species already vouchered and documented for the park. We created 139 vouchers for the herbarium at Cumberland Gap National Historical Park (Table 3) from the plants we collected and photographed (some of those collected had already been collected under different names by previous researchers). These specimens are in addition to plants collected by previous researchers (Pounds, Patrick, and Hinkle 1989).

Using various estimates and assumptions explained in the methods section, the estimate for total number of species in the park ranged from 673 to 925 species. Excluding varieties, subspecies, and unidentifiable collections, researchers past and present have confirmed approximately 882 species within the park. In this case, it appears that all but the first-order jackknife estimate of all plots were underestimates since our actual park species list is well over 100% of the other three estimates (Table 4). Based on our own knowledge of the park combined with the species area curves generated, we believe that between 95 and 100% of the park's flora is now documented.

In addition to collecting all new plants encountered, we estimated what percentage of the flora in the park is now documented. Eliminating all varieties, subspecies, and questionable identifications and including previously collected specimens, we believe that researchers have documented a total of approximately 882 species for the park. The estimates of the number of total species in the park that we generated using PC-ORD based on the plot data taken throughout the park were 807 using all 60 full plots and the first-order jackknife method, 925 using all plots and the second-order jackknife method, 673 using just the 36 gridded plots and the first-order jackknife method, and 767 using just the gridded plots and the second-order jackknife method (Table 4). In addition, we calculated alpha (average species richness per plot), beta (measure of the heterogeneity of the data (alpha/gamma)), and gamma (total species overall plots) diversity values for the park based on information gathered from the plot data (Table 4). The alpha value for all plots combined was 73, the beta value was 8.4, and the gamma value was 611.

Using the information gathered in each plot, we discerned 33 distinct vegetation associations (NatureServe 2005) within ten distinct ecological systems (Comer et al. 2003) (Table 6). Twenty four of the 33 communities identified are considered "natural" as opposed to "semi-natural", "human modified/successional" or "exotic species dominated". Listed below are the common names of all of the communities. All communities have been mapped on the landscape by photointerpreters and/or documented with at least one vegetation plot. Those considered natural communities have names preceded by an asterisk in the list below.

Virginia Pine Successional Forest (CEGL002591)
Red-Cedar Successional Forest (CEGL007124)
*Southern Appalachian Acidic Mixed Hardwood Forest (CEGL008558)
*Central Interior Beech - White Oak Forest (CEGL007881)

Successional Black Walnut Forest (CEGL007879)
*Northern Mixed Mesophytic Forest (CEGL005222)
Interior Mid-to-Late-Successional Tuliptree-Hardwood Upland Forest (Acid Type) (CEGL007221)
Successional Tuliptree Forest (Circumneutral Type) (CEGL007220)
*Ridge and Valley Dry-Mesic White Oak-Hickory Forest (CEGL007240)
*Appalachian Montane Oak-Hickory Forest (Rich Type) (CEGL007692)
*Appalachian Montane Oak-Hickory Forest (Red Oak Type) (CEGL006192)
*Ridge and Valley Limestone Oak-Hickory Forest (CEGL004793)
*Chestnut Oak Forest (Xeric Ridge Type) (CEGL006271)
*Appalachian Montane Oak-Hickory Forest (Chestnut Oak Type) (CEGL007267)
*Chestnut Oak Forest (Mesic Slope Heath Type) (CEGL006286)
Southern Blue Ridge Successional Sassafras Forest (CEGL004096)
*Sycamore-Sweetgum Swamp Forest (CEGL007340)
*Cumberland/Appalachian Hemlock-Hardwood Cove Forest (CEGL008407)
*Southern Appalachian Eastern Hemlock Forest (Typic Type) (CEGL007136)
*Swamp Forest-Bog Complex (Typic Type) (CEGL007565)
*Blue Ridge Table Mountain Pine-Pitch Pine Woodland (Typic Type) (CEGL007097)
*Hi Lewis Pitch Pine Barrens (CEGL003617)
*Dry Calcareous Forest/Woodland (White Ash-Shagbark Hickory Type) (CEGL008458)
*Southern Appalachian Mountain Laurel Bald (CEGL003814)
Kudzu Vineland (CEGL003882)
Blackberry-Greenbrier Successional Shrubland Thicket (CEGL004732)
*Montane Grape Opening (CEGL003890)
*Saturated Alder Thicket (CEGL003912)
*Limestone Cliff Fragrant Sumac Shrubland (CEGL004393)
*Cumberland Sandstone Glade Heath Shrubland (CEGL008470)
Cultivated Meadow (CEGL004048)
*Southern Blue Ridge Beaver Pond Marsh (CEGL008433)
*Cumberland Streamside Bog (CEGL007771)

While working in the park, we also captured some digital images of plots and plants. These images are indexed (Table 7) and a selection of them can be seen in Appendix II.

Finally, we have included in this report an appendix describing all of the ecological communities for the park in detail (Appendix III) as well as the key to associations and ecological systems in the park (Appendix IV). This tool helps those with a basic understanding of vegetation to classify community types within the park quickly and easily.

Discussion/Conclusions

Species Inventory

At Cumberland Gap National Historical Park, ecologists with this project identified 33 ecological community types within or adjacent to the park boundary. These types range from bogs to dry-mesic forests to mountain balds. Although most of the acreage appears to be second and third growth forest, some of these second growth areas have not been disturbed for one hundred years or more. Many of the communities in the park are considered of conservation concern according to the global ranking system that NatureServe uses to rank community types. Of special note is the Dry Calcareous Forest/Woodland (White Ash-Shagbark Hickory Type) which is currently a "G1?" and the Cumberland Streamside Bog which is considered a "G1?Q". Both types are very poorly documented and so their status may change with more documentation, but they are both limited in their geographic and geologic ranges. In addition, the Hi Lewis Pitch Pine Barrens (G2?) are of significant conservation concern and warrant attention due to the lack of examples of this type combined with the impact of the pine bark beetle on the canopy trees of existing examples of this community.

As of the end of this project, there are 882 documented vascular plant species in the park boundary. No species in the park are considered federally threatened or endangered. There are also no species in the park that are on the "candidate" list for federal status. However, each adjacent state also keeps a list of state threatened and endangered species.

Virginia does not maintain a thorough list of species considered rare or threatened for the state. Instead, the state relies on "state ranks" or "S-Ranks" to express conservation status. Species with high S-Ranks are considered secure in their range whereas species with low S-Ranks are considered threatened. Ten species found in the park are considered S1 listed species in the state of Virginia. They include Michaux's Wood Aster (*Aster surculosus/Eurybia surculosa*), inland sedge (*Carex interior*), Alabama lipfern (*Cheilanthes alabamensis*), satincurls (*Clematis catesbyana*), Carolina coralbead (*Cocculus carolinus*), pear-hawthorn (*Crataegus calpodendron*), rock clubmoss (*Huperzia porophila*), bigleaf magnolia (*Magnolia macrophylla*), prairie rose (*Rosa setigera*), and ovate catchfly (*Silene ovata*) (Townsend 2005). It is beyond the scope of this project to identify which species occur within which of the three states that the park occurs in, but at least some of these 10 S1 species have suitable habitat on the Virginia side of the park.

In Tennessee, Porter's reedgrass (*Calamagrostis porterii*)(S1), pale corydalis (*Corydalis sempervirens*) (S1S2), pink lady's slipper (*Cypripedium acaule*) (S4), ginseng (*Panax quinquefolius*) (S3S4), and ovate catchfly (*Silene ovata*) (S2) are considered state endangered. Climbing fumitory (*Adlumia fungosa*) (S2), butternut (*Juglans cinerea*) (S3), and silvery nailwort (*Paronychia argyrocoma*) (S1S2) are considered state threatened. Round-leaf water cress (*Cardamine rotundifolia*) (S2S3) is considered a state species of concern. Finally, pink lady's slipper, ginseng, golden-seal (*Hydrastis canadensis*), and wild leek (*Allium tricoccum*) are considered to be heavily

"commercially exploited" species (TDNH 2005). Other species of note found in the park but rare in Tennessee are prairie rosinweed (*Silphium terebinthinaceum*) (S1), Appalachian sedge (*Carex appalachica*) (S1), halberd-leaf tearthumb (*Polygonum argyrocoma*) (S1S2), and Allegheny mountain buttercup (*Ranunculus allegheniensis*) (S1).

In Kentucky, a number of species that are present in the park are considered threatened (T), endangered (E), or species of concern (S). They are climbing fumitory (E, S1), fly-poison (*Amianthium muscitoxicum*) (T, S1S2), brook saxifrage (*Boykinia aconitifolia*) (T, S2), Porter's reedgrass (T, S2), Appalachian sedge (*Carex appalachica*) (T, S2?), Tarheel sedge (*Carex austrocaroliniana*) (S, S2S3), American chestnut (*Castanea dentata*) (E, S1?), Allegheny chinquapin (*Castanea pumila*) (T, S2), small yellow lady's slipper (*Cypripedium parviflorum*) (T,S2), wavy hairgrass (*Deschampsia flexuosa*) (T, S2), nodding mandrin (*Disporum maculatum*) (S, S3?), showy gentian (*Gentiana decora*) (S, S3), variable-leaved heartleaf (*Hexastylis heterophylla*) (S, S3S4), smooth veiny peavine (*Lathyrus venosus*) (S, S2S3), running clubmoss (*Lycopodium clavatum*) (E, S1?), false lily-of-the-valley (*Maianthemum canadense*) (T), Southern crabapple (*Malus angustifolia*) (S, S3S4), Appalachian sandwort (*Minuartia glabra*) (T, S1S2), silvery nailwort (E, S1), nettle-leaf sage (*Salvia urticifolia*) (E, S1), Michaux's saxifrage (*Saxifraga michauxii*) (T, S2), ovate catchfly (T, S1), Curtis' goldenrod (*Solidago curtisii*) (T, S2S3), Roan Mountain goldenrod (*Solidago roanensis*) (T, S1S2), painted trillium (*Trillium undulatum*) (T, S2), and Southern cranberry (*Vaccinium erythrocarpum*) (E, S1?) (KSNPC 2005).

According to our assessment, at least 12% (108 species) of the plant species in the park are not native to the continent (or in some cases, are native to the continent but exotic in the region). Most of these species were plantings or are harmless present day components of the flora that found their way into natural areas from plantings or errant seed mixes. However, at least 31 species found within the park are considered aggressive invasive species that are significant or severe threats in at least one of the three states the park is in and are actively outcompeting and replacing native species in other parts of the Southeast (see table 5 and Morse et al. 2004, Miller 2000, Tennessee Exotic Pest Plants Council 2001, Kentucky Exotic Pest Plants Council 2001). These species are probably the biggest single threat to the overall ecological health of the park at this point in time. Some species such as crown vetch (*Coronilla varia*), Johnson grass *(Sorghum halepense*), brome (*Bromus japonicus*), nodding thistle (*Carduus nutans*), Queen Anne's lace (*Daucus carota*), goose grass (*Eleusine indica*), foxtail grass (*Setaria viridis*), and common mullein (*Verbascum thaspus*) were introduced into fallow fields and eroding steep banks and have since outcompeted native old field species such as little bluestem (*Schizachyrium scoparium*). Other plants, such as mimosa (*Albizia julibrissin*), tree-of-heaven (*Ailanthus altissima*), sweet autumn clematis (*Clematis terniflora*), and princess tree (*Paulownia tomentosa*) take advantage of light gaps in the interior of forests and edges and threaten to displace native successional tree species. In the interior woods and forests, shrubs and vines such as Japanese honeysuckle (*Japanese honeysuckle*), Amur honeysuckle (*Lonicera mackii*), autumn olive (*Elaeagnus umbellata*), and common periwinkle (*Vinca minor*) have begun to colonize areas of the understory. At the time of

writing, floodplain areas and moist trailheads were beginning to see increases in a combination of exotics, but especially Nepalese browntop (*Microstegium vimineum*), multiflora rose (*Rosa multiflora*), and Japanese knotweed (*Polygonum cuspidatum*). Hedgeparsley (*Torilis japonica*) is another plant that is considered aggressive but is currently limited to scattered localities on wasteground in the park. Kudzu is a problem, especially in the areas of the park adjacent to steep railroad cuts or other embankments where the kudzu was planted to control erosion, such as the town of Cumberland Gap, TN. In areas where exotics have become a monoculture, removal should occur in conjunction with planting and seeding of natives to help prevent quick recolonization by the same or new invasive exotic species. The invasive exotic species whose removal would most benefit ecological processes in the park are probably the wetland species such as Nepalese browntop in addition to the upland species autumn olive, Johnson grass, princess tree, tree-of-heaven and mimosa.

Vegetation community analysis

The unit of association is the finest level of the vegetation classification and is defined as "a plant community type of definite floristic composition, uniform habitat conditions, and uniform physiognomy" (Grossman et al. 1998). Ecological community information such as that gathered for this project and described in Appendix III can be very useful as a management and monitoring tool for the parks. Once identified to the association level, it is possible for land managers on a local scale to use the ecological community information gathered by researchers throughout the association's range to make more informed decisions about how to manage locally. In addition to the information contained in Appendix III, we have included the "system" or broad ecological unit to which each association belongs, a global and local description for each association, specific information on the status of each association both globally and within the park, possible threats to the association in the park, plants of concern found in the park, and management concerns where they apply (see table 6).

Virginia Pine Successional Forest (CEGL002591)

Within the park, this community occurs in areas where canopy removal has created open conditions and where erosion has created little to no mineral soil. These conditions often exist in heavily impacted and exposed landscapes, but can sometimes occur in valley bottoms and other areas where severe human disturbance related to heavy logging and/or heavy agriculture has created the right conditions. These forests tend to be less than 50 years old and occur only in areas with moderate to high acidity levels. Other successional species such as Eastern red cedar (*Juniperus virginiana var. virginiana*) may colonize degraded areas of higher pH.

Within the park boundary, this forest is dominated by a heavy to moderate canopy of Virginia pine (*Pinus virginiana*). In the oldest examples of this community type, sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), and tuliptree (*Liriodendron tulipifera*) may begin to overtop the pine canopy. The shrub layer is

typically sparse to moderate and the herb stratum is typically very low diversity. Clonal species such as shining clubmoss (*Huperzia lucidula* or *Diphasiastrum digitatum*), vines such as poison ivy (*Toxicodendron radicans*), invasive exotics such as Japanese honeysuckle (*Lonicera japonica*) and Nepalese browntop (*Microstegium vimineum*), and the Christmas fern (*Polystichum acrosticoides*) may often colonize large sections of this community and may be high density, but generally there are few other species present. This community is challenging to map in the park due to the large number of examples that have been recently impacted by the pine beetle. At this time, many of these forests are transitioning from a canopy of 100% Virginia pine to a younger canopy with other successional species such as sweetgum and red maple as the key dominants.

This community occurs in small patches throughout the park (TN, KY, and VA) in areas of acidic soil that were heavily disturbed by logging, agriculture, or very severe fire.

Red-Cedar Successional Forest (CEGL007124)

This community is restricted to areas of neutral to high pH soils on recently abandoned agricultural land. It may not exist within the park boundary, but is present just outside the park boundary where grazing land has recently been abandoned. Although this community is considered a forest, many examples are young and may resemble either a woodland or shrubland in physiognomy.

Although Eastern red cedar is usually the most common canopy species in this community, many other woody species such as hickory spp., redbud, Virginia pine, and oak spp. can sometimes be common. The herb layer is patchy and ranges from very sparse under to fairly dense depending on canopy cover throughout particular stand. As with other successional communities, invasive exotic species can often dominate the herbaceous layer. Common invasives include Japanese honeysuckle and Nepalese browntop.

This community most likely only occurs on the Virginia side and small portions of the Tennessee side near the park. It has been documented just outside of the park boundary and may occur in small patches on the boundary.

Southern Appalachian Acidic Mixed Hardwood Forest (CEGL008558)

Within the park, this sub-mesic acidic community occurs intermingled with oak-hickory communities on lower and mid slopes throughout the Kentucky side of the park. This community may occur at various exposures and slopes. Most likely, this community developed in mid-elevation areas that were historically dominated by American chestnut (*Castanea dentata*). Many of these areas were probably historically fire-prone sites, with fairly deep soils.

Within the park the canopy of this community varies widely. Canopy dominants include a mixture of red maple, sweet pignut hickory (*Carya glabra*), and sometimes birch sweet birch (*Betula lenta*). Sourwood (*Oxydendrum arboreum*) and sassafras (*Sassafras albidum*) are common and fairly consistent understory dominants. The shrub layer can be sparse or can be dense with a high concentration of mountain laurel (*Kalmia latifolia*),

great rhododendron (*Rhododendron maximum*), or American holly (*Ilex opaca*). Blueberry spp. (*Vaccinium spp.*) and black huckleberry (*Gayllusacia baccata*) may also occur. The herb layer can vary widely, but is generally sparse.

Within the park, this community is most common on lower and mid slopes on the Kentucky side of the park.

Central Interior Beech - White Oak Forest (CEGL007881)
Within the park, stands occur on protected steep, acidic, north facing slopes near creeks on the Kentucky side of the park. They often intergrade further downslope with mesic hemlock community types and are often surrounded upslope and on the sides by dry-mesic oak communities.

The canopy is dominated by beech (*Fagus grandifolia*) with white oak (*Quercus alba*) sometimes serving as a codominant in the canopy. Subcanopy species can often include tuliptree (*Liriodendron tulipifera*), dogwood (*Cornus florida*), blackgum (*Nyssa sylvatica*), sassafras, and Eastern hophornbeam (*Ostrya virginiana*). Common herbaceous species often are Christmas fern, wild licorice (*Galium circaezans*), bare-stemmed tick-trefoil (*Desmodium nudiflorum*), yellow trout-lily (*Erythronium americanum*), sharp-lobed hepatica (*Hepatica nobilis var. obtusa*), beechdrops (*Epifagus virginiana*), heart-leaved foamflower (*Tiarella cordifolia var. collina*), American alumroot (*Heuchera americana*), common starwort (*Stellaria pubera*), and others.

This community is restricted to lower slopes in the Kentucky side of the park (with some small patches possible in Tennessee.

Successional Black Walnut Forest (CEGL007879)
Within the park, this community occurs in two distinct and disparate areas: floodplain bottoms that were disturbed heavily in the past and grew up as walnut groves, and narrow ridgetops with rich soil that have been impacted heavily by human and natural disturbance and contain small stands of successional trees, especially butternut and tuliptree. This community occurs in such small patches that it is most likely not mappable for the purposes of the vegetation mapping project.

This community has a canopy that is usually completely dominated or co-dominated by black walnut (*Juglans nigra*), sometimes with a high component of tuliptree as well. The herb layer is generally dense and diverse. Floodplain examples contain high concentrations of wingstem *(Verbesina alternifolia*) whereas ridgetop examples often have smaller proportions of wingstem but contain other herbaceous species as well.

This community occurs in very tiny patches on the ridgetop that straddles the Virginia/Kentucky line within the park. Therefore, it potentially occurs in all three Cumberland Gap park states.

Northern Mixed Mesophytic Forest (CEGL005222)

Within the park, this community occurs on protected slopes and ravines with nutrient rich neutral to basic soils. Elevation of the plots sampled in the park ranged from 1400 to 2800 feet in elevation. In some cases, this community may range high up on the slopes, but it is best developed in the most protected ravines in the park.

The tree canopy in the ravines can be quite tall, with shorter canopies as the community continues upslope and away from the most protected ravine areas. Tree species (all of which can compete for dominance depending upon the example) include tuliptree, sugar maple (*Acer saccharum*), red maple, yellow buckeye (*Aesculus flava*), white ash (*Fraxinus americana*), black cherry (*Prunus serotina*), basswood (*Tilia americana*) and northern red oak (*Quercus rubra*). The shrub layer can be moderately to heavily dominated by spicebush (*Lindera benzoin*) and/or paw paw (*Asimina triloba*). The herbaceous layer tends to be very diverse and rich. The most consistently high cover summer forb species is wood nettle (*Laportea canadensis*) although other species such as green violet (*Hybanthus concolor*), white baneberry (*Actaea pachypoda*), hoary skullcap (*Scutelleria incana*), poison ivy, and Canadian black-snakeroot (*Sanicula canadensis*) can all be heavy in cover in some examples. Spring ephemerals may also have very high cover in the early spring.

This community can be found throughout the Virginia, Kentucky, and Tennessee sides of the park in nutrient rich slopes.

Interior Mid-to-Late-Successional Tuliptree-Hardwood Upland Forest (Acid Type) (CEGL7221)
Within the park, this community is uncommon. Unlike the Successional Tuliptree Forest (Circumneutral Type), this community is found in areas of very acidic soils that were once clearcuts or old fields and occasionally along heavily disturbed mesic stream terraces.

Within the park, this community is always dominated by tuliptree but can have high cover of bigleaf magnolia (*Magnolia macrophylla*), black birch, and northern red oak in some examples. Understory and herbaceous species tolerant of acidic conditions can be common or at least consistently present. These include mountain laurel, common greenbrier (*Smilax rotundifolia*), Christmas fern, blackgum, sassafras, Indian cucumber-root (*Medeola virginiana*), chestnut oak (*Quercus prinus*), pink lady's slipper (*Cypripedium acaule*), downy rattlesnake-plantain (*Goodyera pubescens*), and partridge-berry (*Mitchella repens*).

This community is most likely restricted to the Kentucky side of the park where acidic soils exist.

Successional Tuliptree Forest (Circumneutral Type) (CEGL007220)
Within the park, this community is found on calcareous or other base-rich soils on protected slopes that are recovering from human caused disturbance such as agriculture, heavy grazing, or clearcutting between 40 and 80 years ago.

Within the park, stands are dominated by tuliptree, with only minor canopy coverage of species such as sweetgum and oak spp. The shrub layer is often dominated by species that like high pH such as spicebush and redbud. American hog-peanut (*Amphicarpea bracteata*) appears to be the most consistently common herbaceous species in this community within the park, though poison ivy is also common.

This type occurs in all parts of the park where human caused disturbance occurred between 40 and 80 years ago over basic/calcareous soils.

Ridge and Valley Dry-Mesic White Oak-Hickory Forest (CEGL007240)
Within the park, this community occurs on the lower slopes of the park below 2000 feet in elevation. On the Virginia side of the park, the differing geology occurs on different bands that run along the slope of the mountains. In this case, this community occurs predominantly on the lowest (third) band of vegetation towards the park boundary.

Within the park, this community generally has >50% cover of white oak, though shag-bark hickory (*Carya ovata*), northern red oak, scarlet oak (*Quercus coccinea*), and chestnut oak may co-dominate in some situations. A mixture of calciphilic and acidophilic trees exists in this type. Often, redbud and spicebush exist alongside blackgum, dogwood, and sourwood as understory or tall shrub layer trees. Unlike it's completely acidic counterpart, CEGL007267, this community does not have more than 5% cover of blueberry spp.

This community exists throughout the lower elevations on the Virginia side of the park ranging southwest into the Tennessee portion. It is not found on the Tennessee side due to a lack of appropriate geology.

Appalachian Montane Oak-Hickory Forest (Rich Type) (CEGL007692)
This forest occurs exclusively on the slopes on the Virginia side of the park into Tennessee. It occurs on exposed to slightly protected upper to mid to lower slopes and appears to often grade into cove forests (CEGL005222). Examples of this type at Cumberland Gap range from 1750-2800 feet in elevation and appear to occur in repeating bands of geologically similar substrate that run across the Virginia side slope of the park. Total base saturation (base status) of the plots in this park are generally above 50, though some examples on the edge of differing geological substrates may have base status in the 20's. pH is generally above 5.4. In most examples, soils are bouldery or at least rocky and can be very shallow. As you progress down the slope, the lower slope versions of this forest are much lower diversity and grade into CEGL007240.

The vegetation of this type varies greatly within the park. Canopies are generally dominated by northern red oak, black oak (*Quercus velutina*), or hickory but may also be co-dominated by white oak, southern red oak (*Quercus falcata*), tuliptree, white ash, and blackgum. The shrub layer is generally sparse to moderate and can include both acidic and basic loving species. The herbaceous layer is very diverse and usually contains 50-100% cover. High cover species include mayapple (*Podophyllum peltatum*), jack-in-the-

pulpit (*Arisaema triphyllum*), American hog-peanut, Northern maiden-hair fern (*Adiantum pedatum*), Canada horse-balm (*Collinsonia canadensis*), black bugbane *(Cimicifuga racemosa),* blue cohosh (*Caulophyllum thalictroides*), bloodroot (*Sanguinaria canadensis*), zigzag spiderwort (*Tradescantia subaspera*), broad beech fern (*Phegopteris hexagonoptera*), Christmas fern, Bosc's witchgrass (*Dichanthelium boscii*), bearded short-husk (*Brachyeletrum erectum*), etc. Herbaceous diversity is equal to or surpasses examples of cove forests in this park.

a)upper band = tends to be dominated by white oak, hickories, and canopy fairly diverse with some black oak in spots. Mixed oak with white oak and northern red oak with hickories

b) lower band -= almost purely northern red oak with few hickories

This community occurs in distinct bands running along the Virginia side of Cumberland Gap NHP and into the Tennessee part of the park. It is perhaps the most common community type on the Virginia side of the park.

Appalachian Montane Oak-Hickory Forest (Red Oak Type) (CEGL006192)
Within the park, this community occurs mostly above 2700 feet, but examples in more protected lower slopes exist down to 1500 feet elevation, where they intergrade with lower elevation types and coves (CEGL005222). This community generally exists on acidic soils with low to moderate base status.

Within the park, this community can be dominated by northern red oak or white oak or a combination of the two. Canopy species also may include cucumber magnolia (*Magnolia acuminata*), tuliptree, and chestnut oak. The shrub layer is generally sparse to moderate, but the herb layer is usually moderate to dense, with a high cover value of ferns such as New York fern (*Thelypteris noveboracensis*), Southern lady fern (*Athyrium asplenoides*), hay-scented fern (*Dennstaedtia punctiloba*), and/or cinnamon fern (*Osmunda cinnamonea*). The presence of high cover of ferns is one of the main distinctions between this community and some of the lower elevation oak communities in the park.

Ridge and Valley Limestone Oak-Hickory Forest (CEGL004793)
Within the park, this community exists on limestone substrate on steep to moderate Southeast facing slopes at around 1500 feet elevation. It occurs along a narrow band of exposed rock and shallow soils and may be too narrow to map along much of the slope.

Stands are dominated by a mixture of chinkapin oak (*Quercus muehlenbergii*) and white oak with northern red oak and black oak in smaller amounts. White ash, tuliptree, and black walnut may also be present in the canopy. The relatively open subcanopy contains redbud, slippery elm (*Ulmus rubra*), and paw paw are present as tall shrubs or small trees. Low shrubs include poison ivy and smooth black-haw (*Viburnum prunifolium*). Herbs present include round-leaf groundsel (*Packera obovata*), hairy wood brome grass (*Bromus pubescens*), bearded short-husk, white snakeroot (*Ageratina altissima*), little brown jug (*Hexastylis arifolia*), Canada horse-balm, wild crane's bill (*Geranium maculatum*), bloodroot, wild lily-of-the-valley (*Maianthemum racemosum*), hairy-jointed

meadow parsnip (*Thaspium barbinode*), rattlesnake root (*Prenanthes* sp.), and Christmas fern.

This community exists along the southeast facing slope of the Virginia side of the park. The community extends down into the Tennessee portion or the park but does not occur in Kentucky.

Chestnut Oak Forest (Xeric Ridge Type) (CEGL006271)
This community occurs over shallow soiled south facing slopes and also ridgetops within the park. Samples taken at CUGA range from a low of 1500 feet in elevation to the ridgetops at 3300 feet.

Canopies are strongly dominated by either chestnut oak or scarlet oak, sometimes intergrading into more mesic protected slope communities that have a higher component of white oak or more xeric exposed types with pitch pine (*Pinus rigida*) or Virginia pine. Typically, red maple is a large component of the understory. The shrub layer is dominated by ericaceous species, typically mountain laurel, and/or early lowbush blueberry (*Vaccinium pallidum*). The herb layer is typically sparse and includes subshrubs such as trailing arbutus (*Epigaea repens*) and teaberry (*Gaultheria procumbens*). Other common species include devil's-bit (*Chamaelirium luteum*), spotted wintergreen (*Chimaphila maculata*), beetleweed (*Galax urceolata*), Frasier magnolia (*Magnolia fraseri*), sassafras, horse-sugar (*Symplocos tinctoria*), common greenbrier, and glaucous-leaved greenbrier (*Smilax glauca*). This community is distinguished by its overall floristic composition, with a high abundance of acid-loving ericaceous species, which are indicative of this community's extremely infertile, acid soils.

This community occurs throughout the park on exposed ridges and south facing slopes with acidic soils.

Appalachian Oak-Hickory Forest (Chestnut Oak Type) (CEGL007267)
Within the park, this community is known from throughout the park on exposed ridges and slopes of various aspects (mostly northern to southwestern aspects). Examples range in elevation from 1200-2900 feet within the park.

Within the park, canopies of this community are usually dominated by either chestnut oak or scarlet oak (90% of occurrences). However, in some cases white oak or black oak may co-dominate. In addition, in areas with high maple invasion rates, red maple may begin to dominate the canopy as it matures. The understory and shrub layers are sparse. Blackgum, sassafras, red maple, and sourwood are commonly found in the understory. Early lowbush blueberry (*Vaccinium pallidum*) is the most common shrub component, often with 10% or more as a cover value. The herbaceous layer is generally sparse. The most common and consistent herbaceous species is bare-stemmed tick-trefoil (*Desmodium nudiflorum*). Other common species include spotted wintergreen, *Chimaphila maculata*, violet (*Viola spp.*), etc.

This community occurs scattered throughout the park at various aspects in exposed or semi-exposed positions at moderate elevations.

Chestnut Oak Forest (Mesic Slope Heath Type) (CEGL006286)
This community exists on lower to upper slopes in very sheltered positions, usually north facing slopes. It is more mesic than the less sheltered slopes adjacent to it.

Within the park, the canopy is generally a mixture of chestnut oak, red maple, and northern red oak. However some instances may have high components of black birch and tuliptree, especially if they have been disturbed recently or are in an ecotone with mixed mesophytic forests (CEGL005222). All examples have a moderate to high cover of great rhododendron.

Within the park, this community is fairly rare, but may occur throughout the park on any steep north facing protected slopes.

Southern Blue Ridge Successional Sassafras Forest (CEGL004096)
Within the park, this community occurs below 2500 feet on exposed slopes that were subject to catastrophic fire or partial clearcuts in recent history. Examples are found in the far southeastern part of the park, but probably range throughout the south facing slope on the Virginia side of the park.

This community is a fairly short lived community following catastrophic disturbance. Sassafras dominates the canopy until older successional trees such as oak species and hickory species recover and retake the canopy. Until then, sassafras always dominates. The understory is variable depending upon the substrate, but can range from very acidic to somewhat basic.

Although only found in the southeastern corner of the park, this community most likely exists in other areas in the Virginia and possibly Kentucky sides of the park.

Sycamore-Sweetgum Swamp Forest (CEGL007340)
Within the park, this community is restricted to the largest streams and largest floodplains. It is uncommon in the park and may be too small to map in most instances.

This community is dominated by sycamore (*Platanus occidentalis*) and sweetgum with other woody species including red maple, blackgum, and white oak as prominent canopy species. The tall shrub layer can be dense with species, especially paw paw and spicebush. The herbaceous layer can approach 100% cover. Common herbaceous species include the invasive exotic Nepalese browntop (*Microstegium vimineum*) as well as jack-in-the-pulpit, American hog-peanut, and New York fern.

This community is very uncommon within the park, only occurring along the largest stream floodplains.

Cumberland/Appalachian Hemlock-Hardwood Cove Forest (CEGL008407)
Within the park, this community occurs over acidic soils on the more protected slopes, most often as a transitional community between a hemlock dominated lower slope and a hardwood dominated midslope.

Within the park, this community contains a canopy dominated by *Tsuga canadensis* with canopy associates such as white oak, red maple, beech, and sweet birch. The shrub layer is sparse as is the herb layer. Some common species include fourleaf yam (*Dioscorea quaternata*), New York fern, Christmas fern, little brown jug, bare-stemmed tick-trefoil, partridge berry, Indian cucumber root, and others.

Within the park, this community is rare and exists on protected lower slopes on the Kentucky side of the park.

Southern Appalachian Eastern Hemlock Forest (Typic Type) (CEGL007136)
In the park, this community exists in lower protected slopes and some terraces in and near streams at moderate to high elevations (one example was found at 3000 feet).

In the park, the canopy of this community contains at least 50% cover of hemlock (*Tsuga canadensis*) along with many other co-dominants (red maple, chestnut oak, Fraser magnolia, blackgum, black oak). Understory species include Fraser magnolia, red maple, and umbrella magnolia (*Magnolia tripetala*), all at fairly low cover. The shrub layer is heavily dominated by great rhododendron but also with a component of mountain pepper-bush (*Clethra acuminata*). Where the shrub does not exist, some acid-loving herbs such as Indian cucumber root and spotted wintergreen are sometimes found at very low cover.

This community is rare but occurs in various areas on protected lower slopes and terraces near creeks on the Kentucky side of the park.

Swamp Forest-Bog Complex (Typic Type) (CEGL007565)
Within the park, this community only occurs in boggy situations within the bottomlands of the Martin's Fork watershed.

Within the park, this palustrine forest occurs as a mosaic with the open bog communities. The vegetation consists of a closed to open canopy of hemlock with a heavy shrub layer of great rhododendron. Spaghnum is present.

Blue Ridge Table Mountain Pine-Pitch Pine Woodland (Typic Type) (CEGL007097)

Within the park, this community is found on exposed ridges above 2000 feet. In general, these ridges are drier than most oak-dominated ridges due to shallow, rocky soils and have been subject to fire in the past 70 years.

Table Mountain pine (*Pinus pungens*) does not occur within the park, so all examples of this community in the park are dominated by a combination of pitch pine and Virginia

pine. Within the park, this community varies widely due to the effects of the pine bark beetle combined with fire suppression. The beetle has killed off much of the canopy of pine species in the park, and fire suppression has limited reproduction of pine in the park. Therefore, most of the remaining stands of this type within the park have either a very limited pine canopy or a recently killed pine canopy with a very dense understory of oaks and red maple that is quickly overtopping all other vegetation. Chestnut oak is often a component of the canopy and understory as well. In the understory layer sourwood and blackgum are sparse to dense. In the shrub layer, early lowbush blueberry (*Vaccinium pallidum*) is usually very common. Other shrubs include other blueberry species and mountain laurel. The herbaceous layer is very sparse. The most common herbs are usually spotted wintergreen, beetleweed, bracken fern (*Pteridium aquilinum*), teaberry, and trailing arbutus, although herbaceous species composition will vary within the range of this community. Glaucous leaved greenbrier is a common vine.

This community occurs throughout the park on heavily exposed south facing slopes with shallow soils. It is most common on the southern end of the park.

Hi Lewis Pitch Pine Barrens (CEGL003617)
Within the park, this community occurs in very isolated patches on south facing slopes with very shallow soils and exposed sandstone bedrock.

Within the park, this community is extremely rare and declining due to heavy pine beetle damage. The lone example documented from the park contained large diameter dead pitch or Virginia pine with a remaining cohort of live canopy chestnut oak trees. Sourwood dominated the subcanopy along with chestnut oak and blackjack oak (*Quercus marilandica*). Short shrubs such as early lowbush blueberry and black huckleberry were common. In the herbaceous layer, species included poverty oatgrass (*Danthonia spicata*), little bluestem (*Schizachyrium scoparium*), Indian grass (*Sorghastrum nutans*), goat's rue (*Tephrosia virginiana*), silkgrass (*Pityopsis graminifolia*), wood tickseed (*Coreposis major*), and other herbaceous species associated with barrens.

This community appears to only occur on south facing slopes in the southern park of the park near the border between Kentucky and Virginia.

Dry Calcareous Forest/Woodland (White Ash-Shagbark Hickory Type) (CEGL008458)
Within the park, this community occurs on a narrow band of limestone on the midslope of the Virginia side of the park. It appears to extend from near the Tennessee border to the northeastern corner of the park and beyond. The community ranges from 2000-2800 feet in elevation and tends to occur on very steep south to southwest facing slopes just above or below cliffs, caves, or other high relief features. The soils tend to be very rocky, with large to mid-size boulders commonly poking aboveground.

White ash, shag-bark hickory, and northern red oak are the most constant and abundant canopy trees. Red hickory (*Carya ovalis*) is a frequent canopy associate In the 6- to 10-m tall understory stratum, Eastern hophornbeam (*Ostrya virginiana*) is most common, along with slippery elm, and Eastern red-cedar. Redbud generally dominates the shrub layer,

with Carolina buckthorn (*Frangula caroliniana*), dogwood, and common hackberry (*Celtis occidentalis*) as more-or-less constant and common components. Eastern hophornbeam dominates the shrub layers of many plots as well. Poison ivy and Virginia creeper (*Parthenocissus quinquefolia*) are common woody vines that frequently reach into the shrub stratum, and fragrant sumac (*Rhus aromatica*) can often be very common as well. The herbaceous layer (mean stratum cover = 50%) is variable. White-flower leafcup (*Polymnia canadensis*), stiff-hair and small wood sunflower (*Helianthus hirsutus and microcephalus*), and nettle-leaf sage (*Salvia urticifolia*) are constant and relatively abundant herbs that assume great dominance over some areas.

Within the park, this community follows a narrow midslope band of limestone along the Virginia side slope and into Tennessee. It does not occur in Kentucky.

Southern Appalachian Mountain Laurel Bald (CEGL003814)
Within the park, this community occurs in very isolated patches at the highest elevations. It occurs over shallow soils on ridgetops that are prone to windfall, fire, and drought.

Within the park, this community may have an overarching tree canopy of sourwood, red maple, and blackgum, but it is mostly composed of shrubs in the tall and short shrub layers. The most common shrub species are Catawba rhododendron (*Rhododendron catawbiense*), and mountain laurel, though other shrub types may be present. The herbaceous layer is sparse (cover < 5%). It is distinguished from CEGL008470 by the presence of Catawba rhododendron and by the relative lack of stunted pine trees.

This community occurs only on the highest elevations above White Rocks within the park.

Kudzu Vineland (CEGL003882)
This community may not occur within the official park boundary, but is common just outside the park on the slopes around Cumberland Gap, TN, where it appears to have been planted to control erosion caused by the steep slopes of the railroad grade.

This community is dominated exclusively by kudzu (*Pueraria montana var. lobata*) where it is present, although newly colonized areas may still have some live canopy trees that may not have been overtopped yet.

This community occurs in highly disturbed slopes that were planted with kudzu in the early to mid-1900's in many areas surrounding the current park boundary.

Blackberry-Greenbrier Successional Shrubland Thicket (CEGL004732)
This community exists in areas that were recently plowed or mowed and then left fallow for 3-5 years.

Vegetation varies greatly, but most examples are dominated by sawtooth blackberry (*Rubus argutus*) with other shrub and herbaceous species present depending upon the exact age, the soil characteristics of the site, and the seed sources that are nearby.

This community exists throughout the park in areas that were recently plowed and/or heavily mowed and are recovering.

Montane Grape Opening (CEGL003890)
Within the park, this community exists in very small patches on steep, rocky areas that are subject to frequent windfall (2000-3000 feet). When severe windfall events occur, summer grape (*Vitis aestivalis*) sometimes colonizes the patch where trees once grew, hence creating a "grapehole".

Within the park, this community is dominated by summer grape and greenbrier species in the tall shrub layer. In addition, sawtooth blackberry and greenbrier species may be common in the short shrub layer. Within the park, this community is often found in a matrix of mixed mesophytic (5222) or rich ash-hickory (8458) forest or woodland.

This community occurs throughout the rich oak forests and coves of the mid slopes of the park.

Saturated Alder Thicket (CEGL003912)
Within the park, this community exists in small patches in shallow saturated environments usually formed through beaver activity on small and medium sized streams.

Within the park, this association accommodates all saturated stands of brook-side alder (*Alnus serrulata*)-dominated vegetation.

This community occurs along creeks that have been impounded by beaver dams.

Limestone Cliff Fragrant Sumac Shrubland (CEGL004393)
This community occurs on very shallow soils just above the cliffline of some limestone outcrop areas in the park. This open rocky shrubland grades quickly into woodland and forest vegetation and may only inhabit a strip of 2-5 meters in most places it is located.

Within the park, this community is dominated by fragrant sumac (*Rhus aromatica*). Overhanging trees from the adjacent woodland include chinkapin oak and Eastern red cedar.

This community is extremely rare and occurs only in areas of very shallow soil just on top of limestone cliffs.

Cumberland Sandstone Glade Heath Shrubland (CEGL008470)
This sandstone shrubland community occurs on shallow soiled sandstone rock outcrops along the ridge line of Cumberland Gap NHP. It exists as a shrubland with scrubby trees, especially pines and oaks interspersed throughout.

This community is distinguished from the other upland shrubland community in the park by the relative lack of Catawba rhododendron and by the common appearance of stunted trees such as pines and oaks throughout.

This community occurs throughout the sandstone rock outcroppings along the spine of the ridgeline that helps separate Kentucky from Virginia.

Cultivated Meadow (CEGL004048)
This association includes grassland pastures and hayfields, more-or-less cultural, though sometimes no longer actively maintained.

The dominant species in this alliance are the European 'tall or meadow fescues,' (*Lolium spp.*) but in this part of Kentucky bluegrasses are also common (*Poa* spp.). Other grass and herbaceous species may approach dominance in patches but the fescues and bluegrasses are overall the most dominant species in this type.

This community is the dominant type throughout the Hensley Settlement.

Southern Blue Ridge Beaver Pond Marsh (CEGL008433)
This association exists in beaver ponds along small creeks within the park.

Composition is highly variable from place to place and time to time. Soft rush (*Juncus effusus*) dominates. Other species may include sedges (*Carex spp.*, deertongue (*Dichanthelium clandestinum*), cutgrass (*Leersia spp.)*, Nepalese browntop, and many others.

This community occurs in areas where beaver dams have impounded small creeks and left very shallow saturated areas that have been colonized by herbaceous vegetation.

Cumberland Streamside Bog (CEGL007771)
Within the park, this community is restricted to a handful of locations along Martin's Fork where the floodplain widens and allows for flat areas adjacent to the streambed (elevations around 2500 feet).

This mostly herbaceous community is co-dominated by a number of herbaceous species including cinnamon fern, royal fern (*Osmunda regalis*), soft rush (*Juncus effusus*), stiff cowbane (*Oxypolis rigidior*, prickly bog sedge (*Carex atlantica ssp. atlantica*), violet spp. (*Viola spp.*), and many others along with a constant mat of sphagnum moss underneath the field layer. In addition, a number of shrubs are common in the community. These include maleberry (*Lyonia ligustrina*), American holly, mountain laurel, black chokeberry (*Photinia melanocarpa*), brook-side alder (*Alnus serrulata*), and others.

This community is restricted to flat land adjacent to Martin's Fork.

Ecological Community Summary

Of all of the parks in the Cumberland/Piedmont Network of the National Park Service, Cumberland Gap contains the largest unfragmented roadless area (14,000 acres). Because the land is so unfragmented and relatively undisturbed for the past 60+ years, most all of the ecological communities within the park are considered natural community types. The nine semi-natural/disturbed types tend to occur on the edges of the park or around the human-maintained Hensley settlement.

The most globally rare communities in the park are the Cumberland Streamside Bog (G1?Q), Dry Calcareous Forest/Woodland (White Ash-Shagbark Hickory Type) (G1?), Swamp Forest-Bog Complex (Typic Type) (G2), Hi Lewis Pitch Pine Barrens (G2?), Montane Grape Opening (G2G3), and Southern Appalachian Mountain Laurel Bald (G2G3).

The Cumberland Streamside Bog and Swamp Forest-Bog Complex (Typic Type) are local versions of a southern Appalachian bog. These ecological communities have fragile hydrology and are very sensitive to changes in climate and soil chemistry, so it is important to implement some form of occasional monitoring to look for early signs of any declining bog health. Potential threats include shrub and tree invasion leading to canopy closure, hemlock adelgid induced mortality, hydrological changes resulting from any upstream disturbance.

The Dry Calcareous Forest/Woodland (White Ash-Shagbark Hickory Type) is considered to be a rare type globally. Through its location on steep, unstable, rocky slopes, the canopy of this community type remains relatively open. The main threat to this type is most likely from invasive exotics such as tree-of-heaven and princess tree since they are adept at colonizing high /medium light rocky woodland areas such as this. At this time, these species are present in the park. It will be important to monitor the distribution and movement of these invasive species to ensure that they don't colonize these sensitive communities.

The Hi Lewis Pitch Pine Barrens is probably the most threatened community in the park due to the high level of die off of canopy pines from pine beetles over the past decade. As the pines continue to die off, it is possible that they will be replaced by either aggressive native trees such as red maple or aggressive exotics such as princess tree and tree-of-heaven. More study of this community is needed to determine how land management practices can best restore this community after pine beetle infestation. Fire may help hold back the invasion of hardwoods while the pines regenerate, but at this point there is not enough evidence to know for sure.

The montane grape opening is a small patch community that generally occurs below the minimum mapping unit and so will not appear on maps produced as a companion to this project. It consists of small areas disturbed by wind events or small rock slides and that have been subsequently taken over by grape vines. Due to the large canopy gap, this

community may also be susceptible to invasion by invasive exotic successional trees such as tree-of-heaven and princess tree.

The Southern Appalachian Mountain Laurel Bald occurs very sporadically in the highest elevations of the park. This small patch community is fairly stable where it exists. In some cases where the community exists on deep soils, it may be possible for trees to establish and form a canopy over the shrub layer, thereby changing the character of the community. But in shallow soils, this community is stable.

Other communities that are considered more common may also face serious threats in the coming decade. The Blue Ridge Table Mountain Pine-Pitch Pine Woodland (Typic Type) may become extirpated from the park if no pine regeneration occurs to replace the pines wiped out by the last wave of pine beetles. The Cumberland/Appalachian Hemlock-Hardwood Cove Forest will most likely lose all of its hemlock trees once the hemlock adelgid hits this area. The adelgid has already decimated populations nearby along the Blue Ridge Parkway (White, personal communication). The potential arrival of garlic mustard (*Alliaria petiolata*) in the next decade will most likely tremendously affect rich bottomland and cove forests in the park, especially the Northern Mixed Mesophytic Forest.

Some recommendations for future management of these community types and vegetation at the park include:

1) control highly invasive exotics in all communities, but especially those highly ranked community types and community types near floodplains.
2) Continue to protect high quality examples of all natural communities within the park. Although many natural communities in the park are globally common, the park probably protects some of the best high quality examples of these forests in this ecoregion.
3) Focus some effort on early detection of new invasive species before they become a problem in the park. Specifically, garlic mustard (*Alliaria petiolata*) is an understory herbaceous plant that is now very near to the park and has the potential to displace many of the native herbaceous plant species of the bottomlands and coves.

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Figure 1a Overview Map of Cumberland Gap National Historical Park with all permanent points marked at their actual location

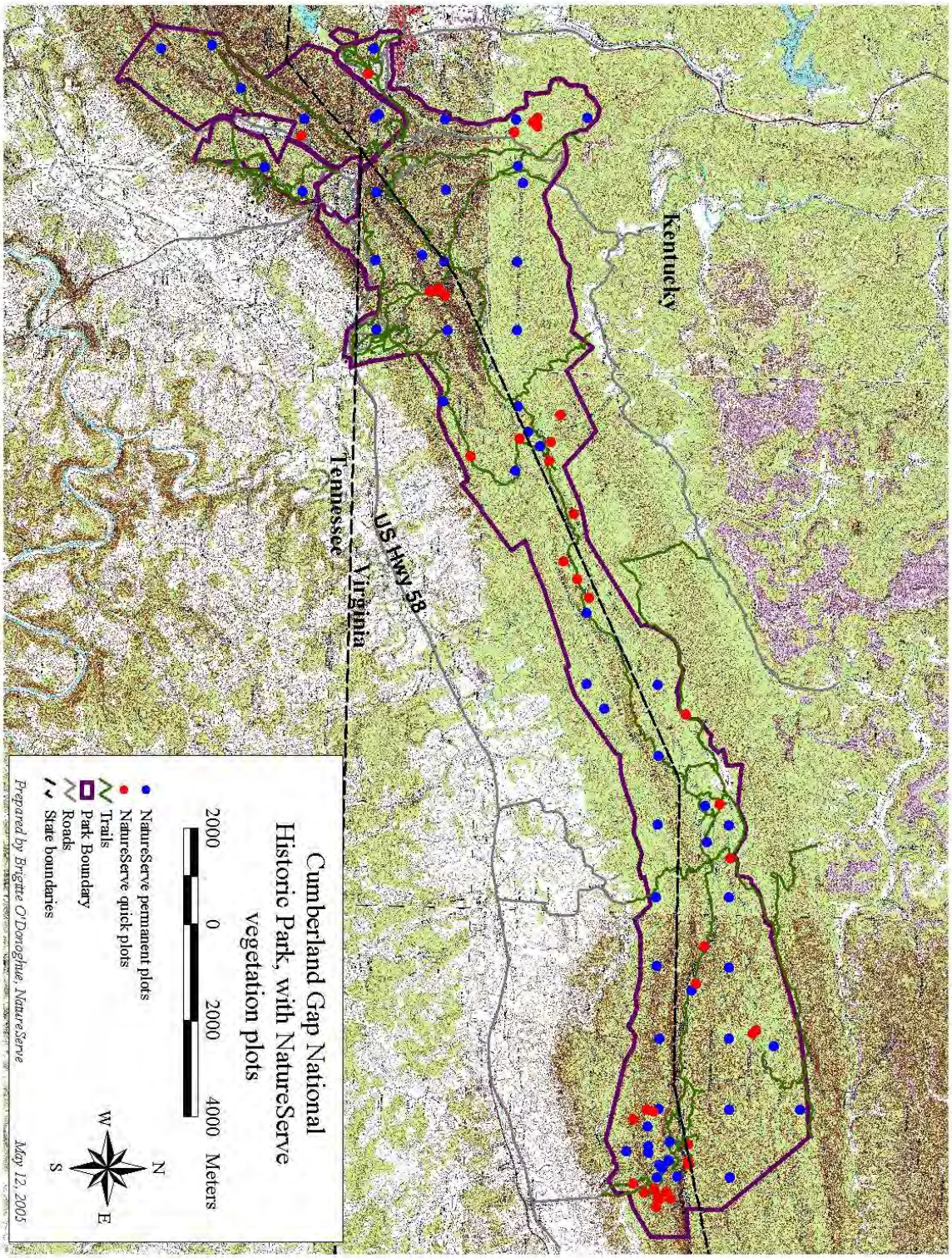


Figure 1b. Map of Cumberland Gap National Historical Park Southwest.

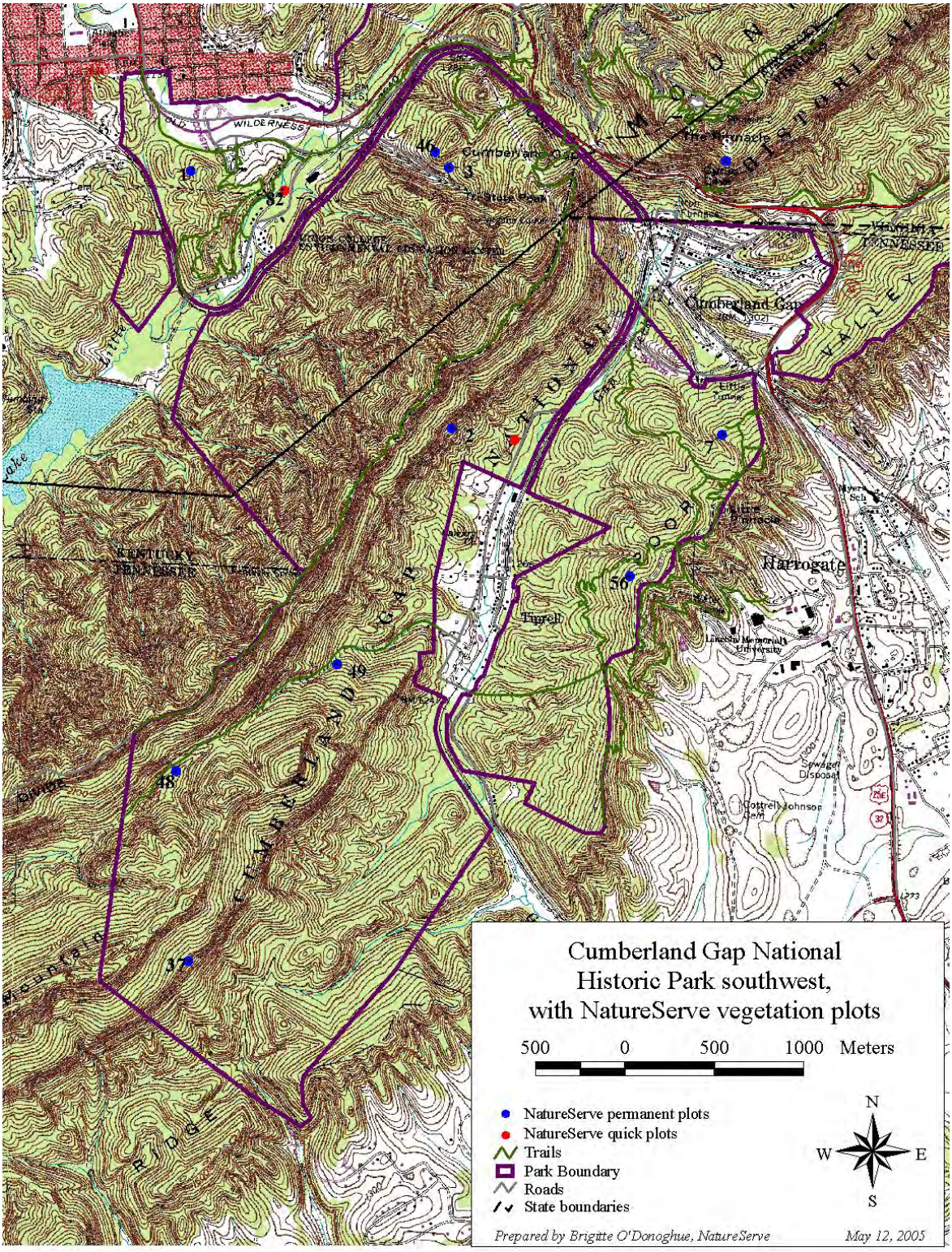


Figure 1c. Map of Cumberland Gap National Historical Park West.

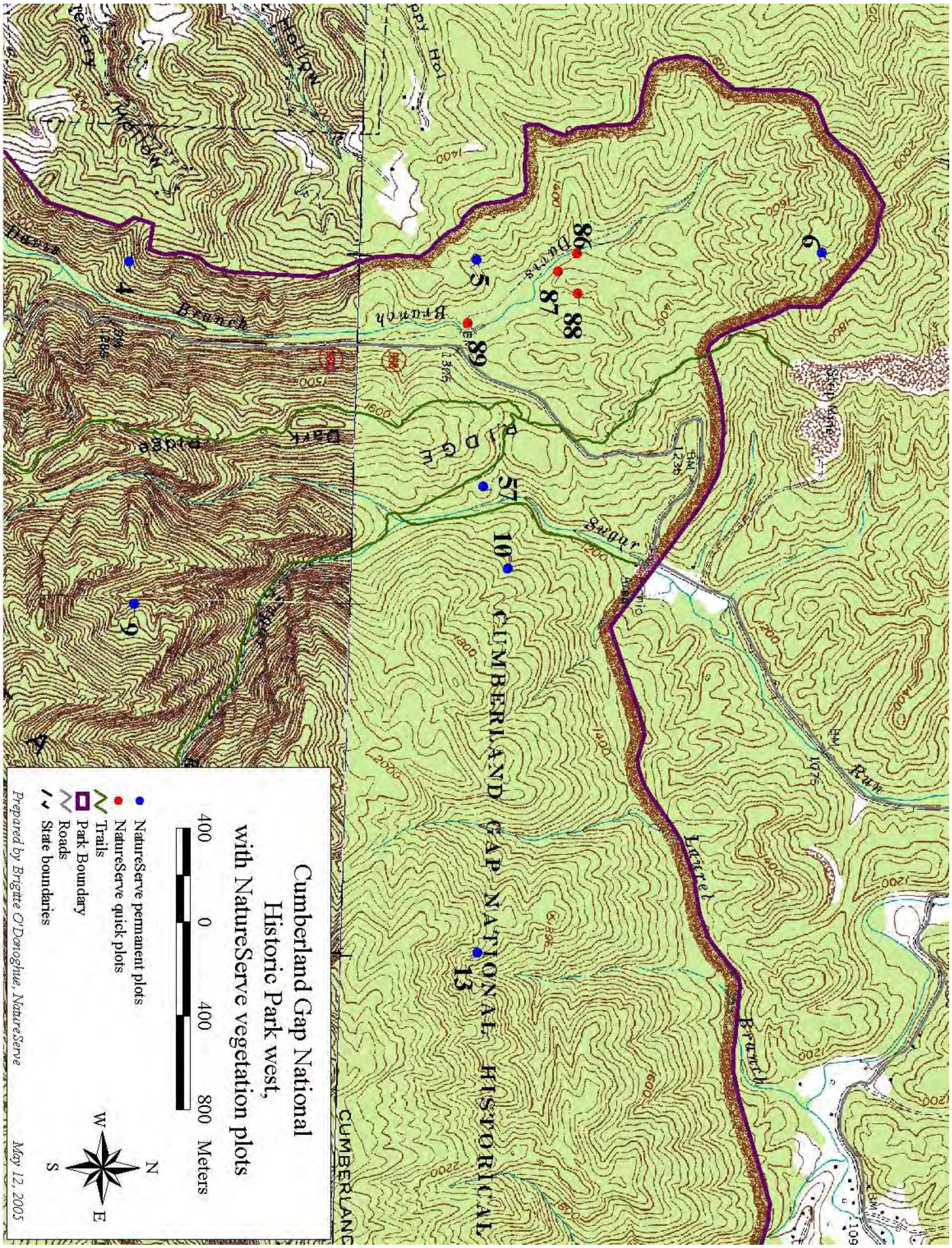


Figure 1d. Map of Cumberland Gap National Historical Park NorthWest.

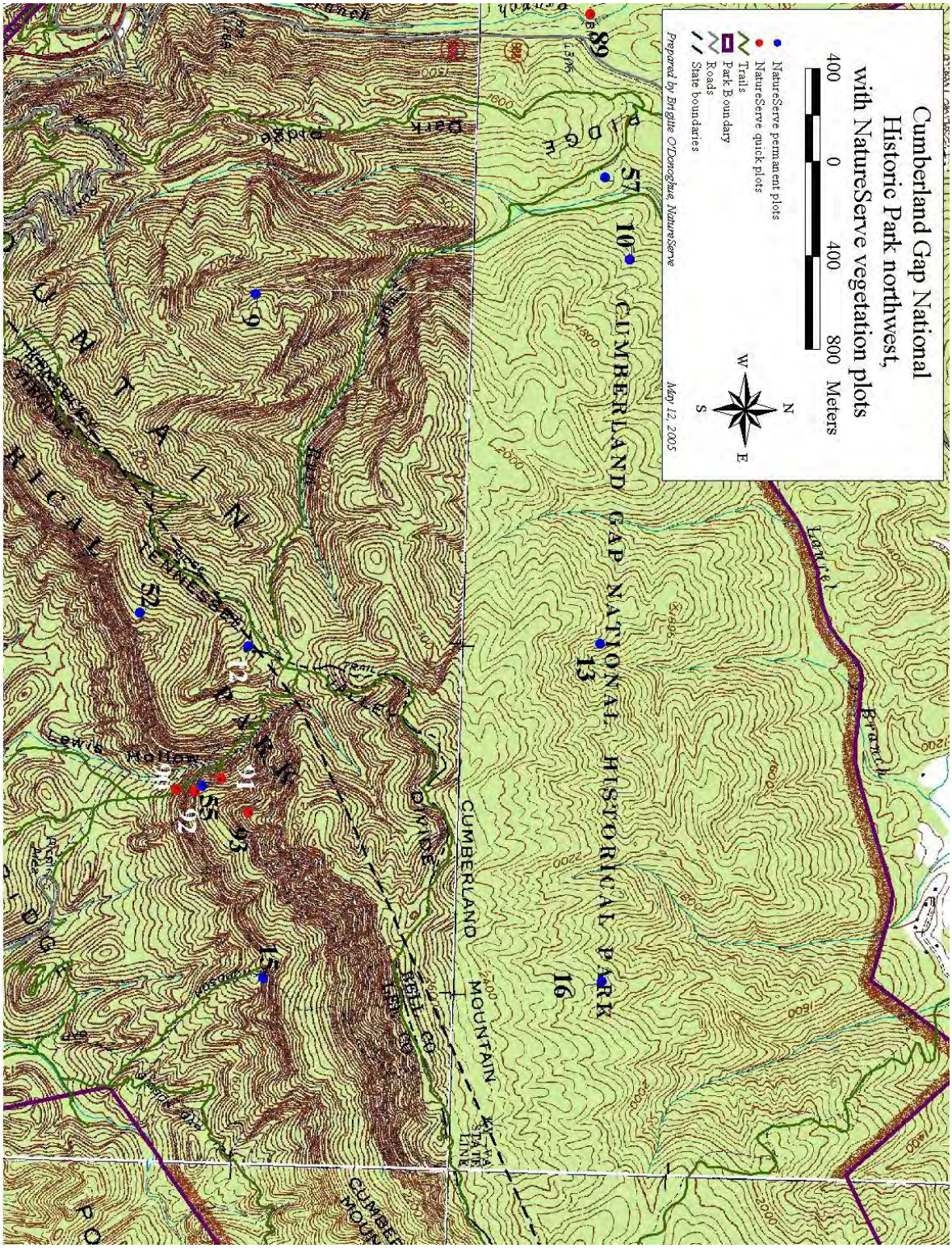


Figure 1e. Map of Cumberland Gap National Historical Park Central West.

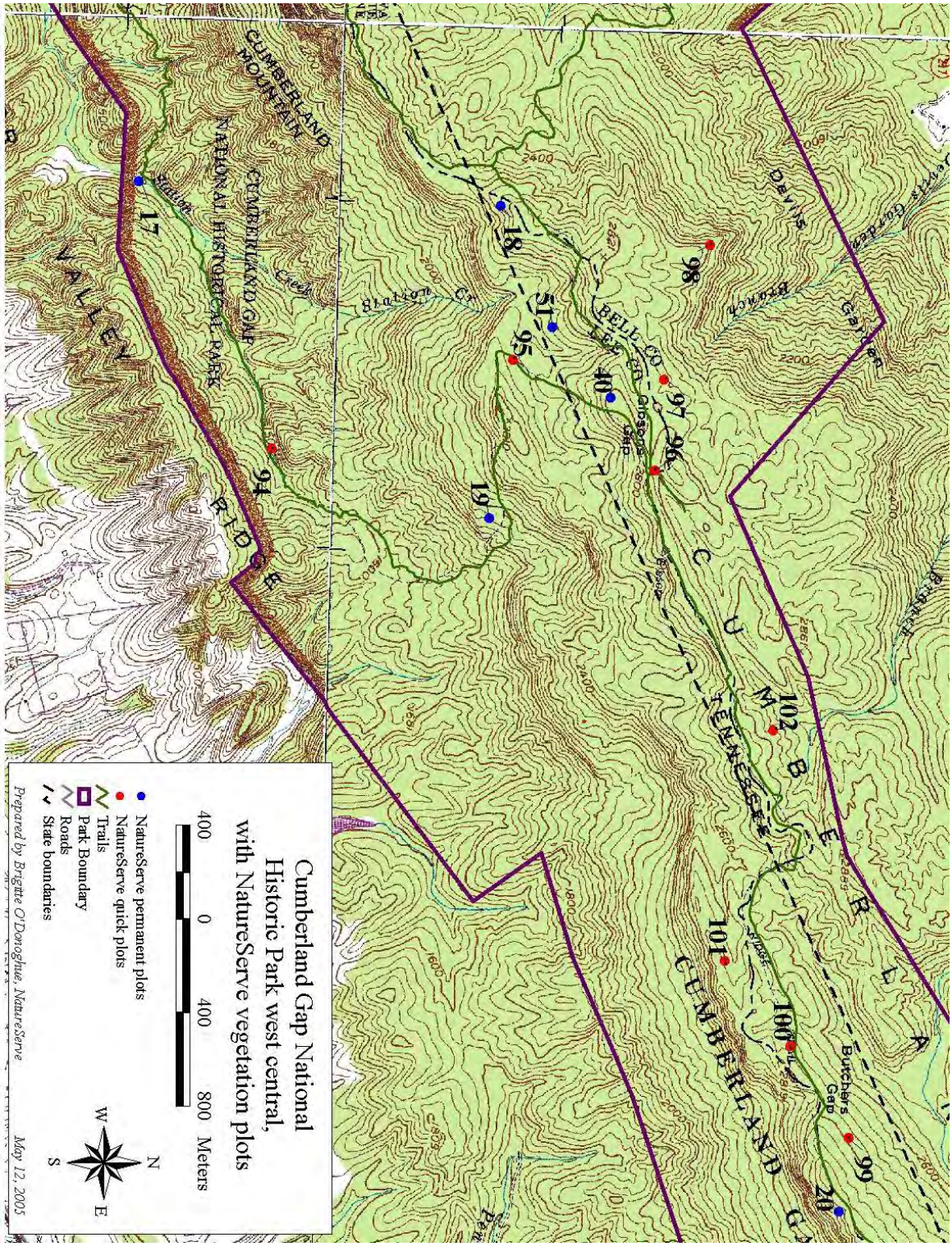


Figure 1f. Map of Cumberland Gap National Historical Park Central East.

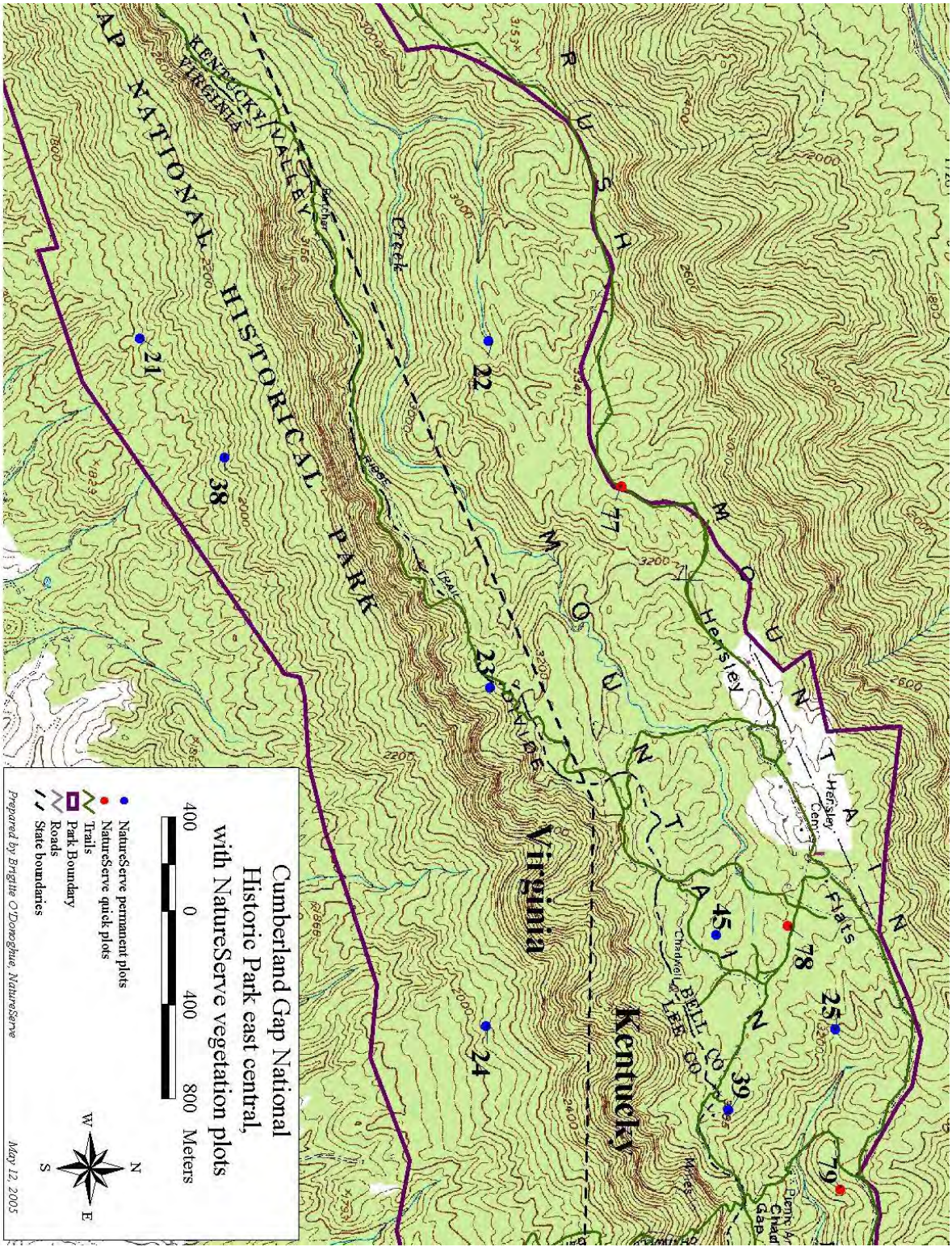


Figure 1g. Map of Cumberland Gap National Historical Park East.

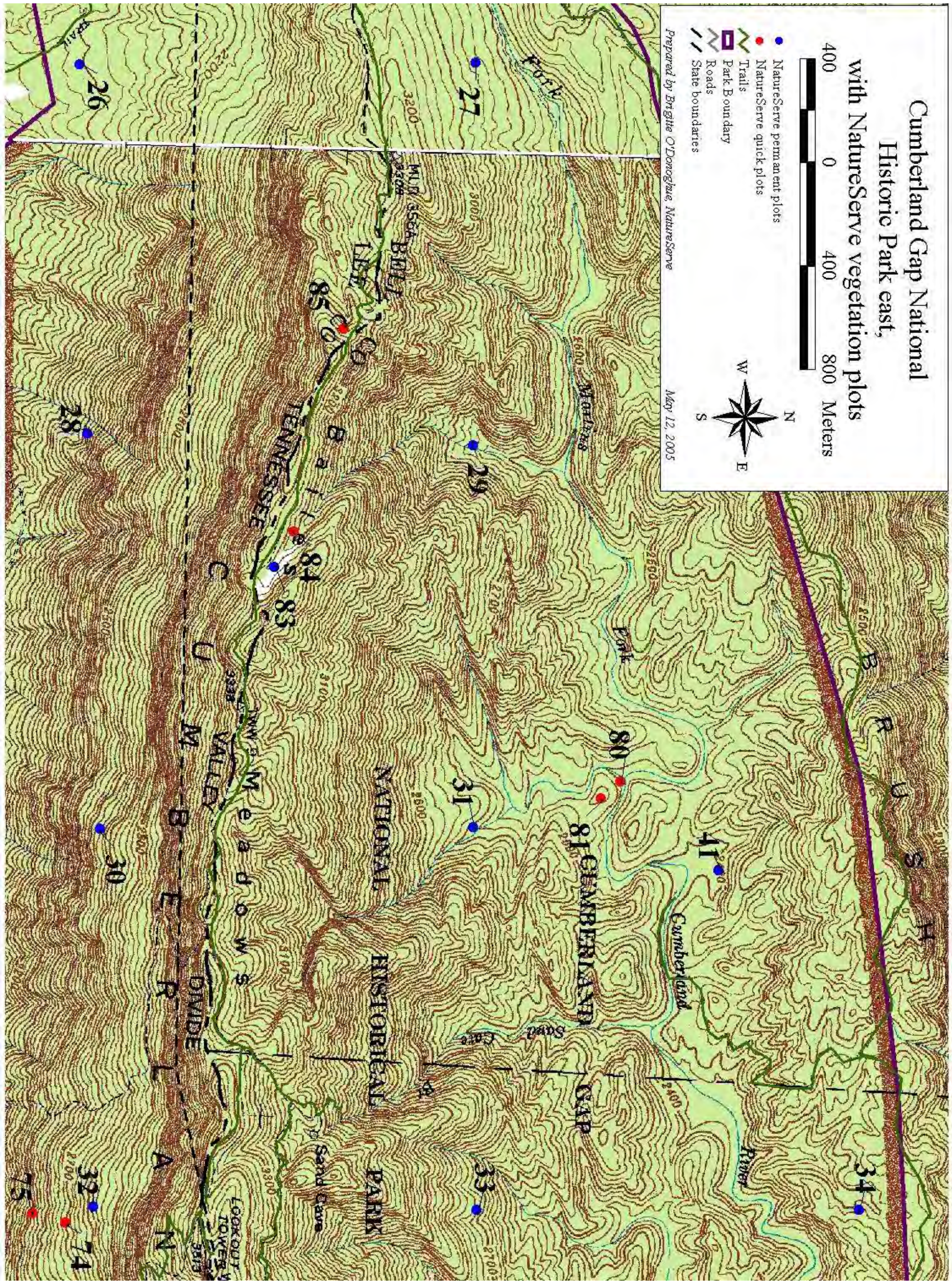


Figure 1h. Map of Cumberland Gap National Historical Park Southeast.

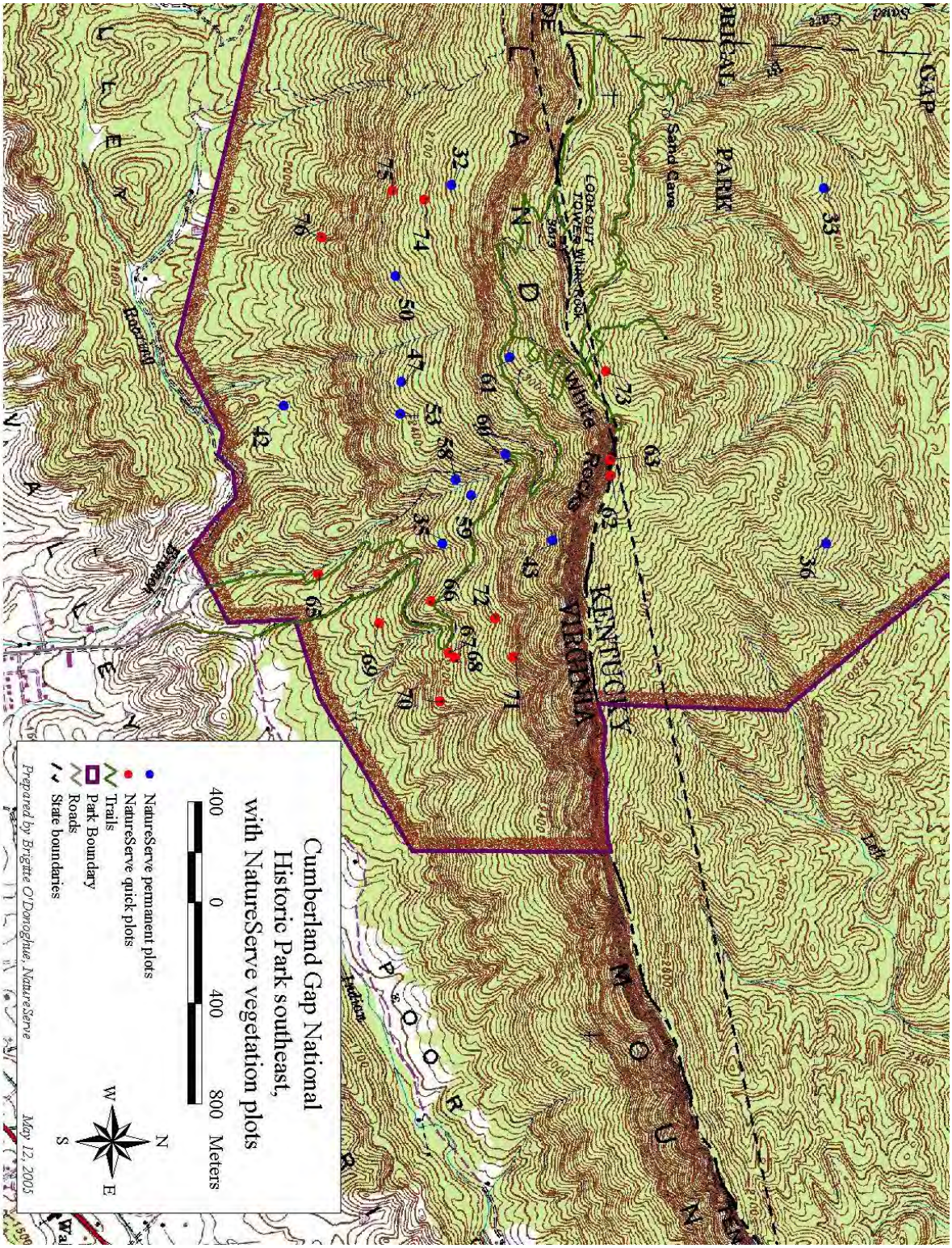
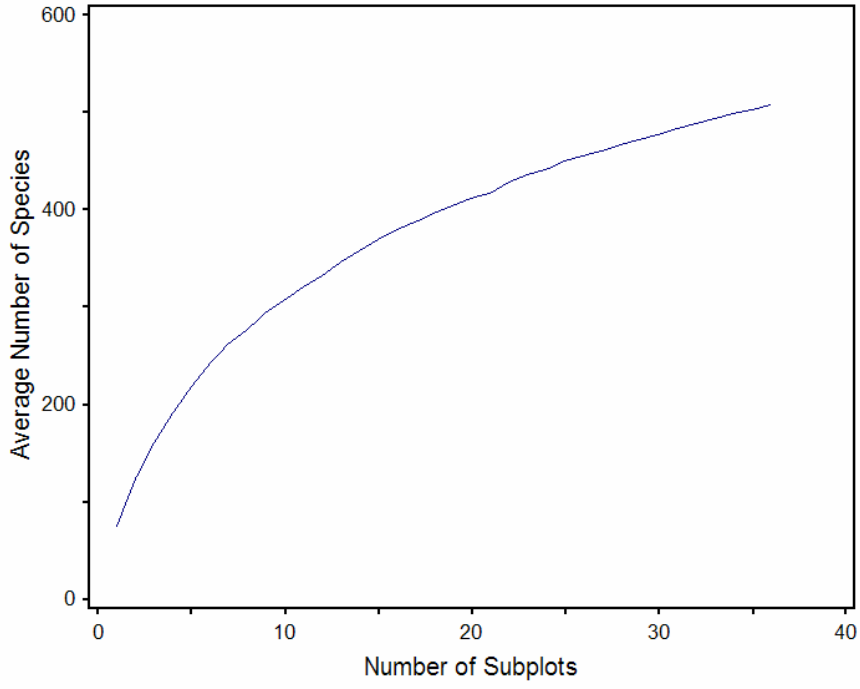


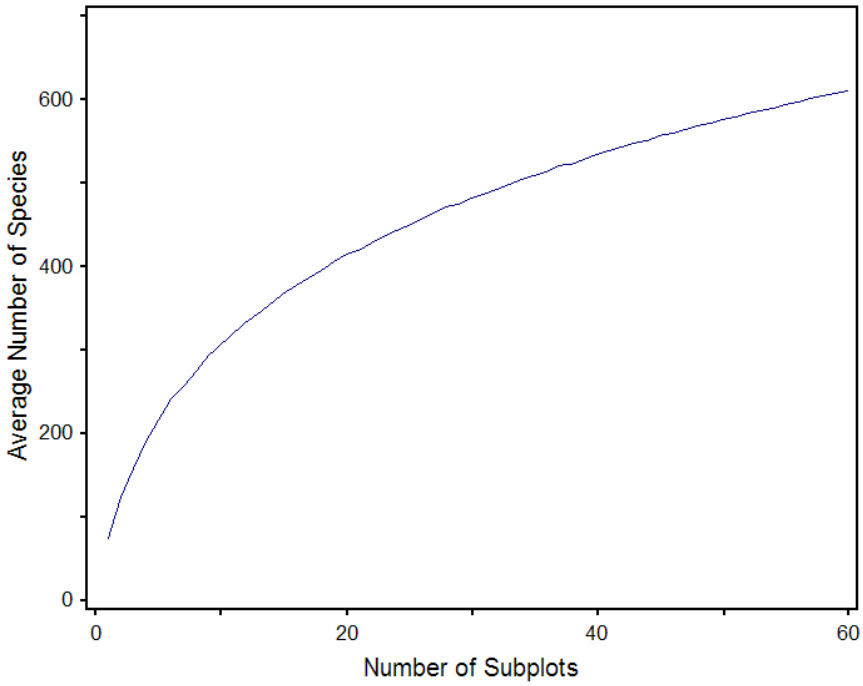
Figure 2. Species area curves for Cumberland Gap National Historical Park made using data from a)just 36 gridded plots in the park and b)all 60 plots.

a)



First-order jackknife estimate of number of species in park = 673
Second-order jackknife estimate of number of species in park = 767

b)



First-order jackknife estimate of number of species in park = 807
Second-order jackknife estimate of number of species in park = 925

Table 1. Plot numbers and locations for all permanent plots established at Cumberland Gap National Historical Park.

Plot Number	X Coordinate	Y Coordinate	Datum	Zone	Type of plot
CUGA.1	258615	4053953	NAD 27	17	Full
CUGA.2	260070	4052515	NAD 27	17	Full
CUGA.3	260055	4053969	NAD 27	17	Full
CUGA.4	260089	4055438	NAD 27	17	Full
CUGA.5	260081	4056917	NAD 27	17	Full
CUGA.6	260051	4058384	NAD 27	17	Full
CUGA.7	261577	4052476	NAD 27	17	Full
CUGA.8	261600	4054005	NAD 27	17	Full
CUGA.9	261546	4055458	NAD 27	17	Full
CUGA.10	261397	4057049	NAD 27	17	Full
CUGA.11	263003	4053983	NAD 27	17	Full
CUGA.12	263045	4055424	NAD 27	17	Full
CUGA.13	263035	4056922	NAD 27	17	Full
CUGA.14	264449	4054002	NAD 27	17	Full
CUGA.15	264458	4055488	NAD 27	17	Full
CUGA.16	264470	4056929	NAD 27	17	Full
CUGA.17	265951	4055398	NAD 27	17	Full
CUGA.18	266055	4056938	NAD 27	17	Full
CUGA.19	267387	4056891	NAD 27	17	Full
CUGA.20	270345	4058377	NAD 27	17	Full
CUGA.21	271823	4058374	NAD 27	17	Full
CUGA.22	271835	4059858	NAD 27	17	Full
CUGA.23	273310	4059863	NAD 27	17	Full
CUGA.24	274750	4059848	NAD 27	17	Full
CUGA.25	274765	4061333	NAD 27	17	Full
CUGA.26	276252	4059808	NAD 27	17	Full
CUGA.27	276247	4061332	NAD 27	17	Full
CUGA.28	277675	4059838	NAD 27	17	Full
CUGA.29	277720	4061323	NAD 27	17	Full
CUGA.30	279197	4059887	NAD 27	17	Full
CUGA.31	279193	4061322	NAD 27	17	Full
CUGA.32	280654	4059861	NAD 27	17	Full
CUGA.33	280667	4061336	NAD 27	17	Full
CUGA.34	280666	4062806	NAD 27	17	Full
CUGA.35	282075	4059825	NAD 27	17	Full
CUGA.36	282075	4061344	NAD 27	17	Full
CUGA.37	258601	4049542	NAD 27	17	Full
CUGA.38	272332	4058735	NAD 27	17	Full
CUGA.39	275108	4060877	NAD 27	17	Full
CUGA.40	266873	4057405	NAD 27	17	Full
CUGA.41	279357	4062266	NAD 27	17	Full

Plot Number	X Coordinate	Y Coordinate	Datum	Zone	Type of plot
CUGA.42	281528	4059198	NAD 27	17	Full
CUGA.43	282062	4060261	NAD 27	17	Full
CUGA.44	no plot exists				na
CUGA.45	274362	4060827	NAD 27	17	Full
CUGA.46	259977	4054056	NAD 27	17	Full
CUGA.47	281436	4059664	NAD 27	17	Full
CUGA.48	258532	4050602	NAD 27	17	Full
CUGA.49	259429	4051198	NAD 27	17	Full
CUGA.50	281015	4059641	NAD 27	17	Full
CUGA.51	266571	4057157	NAD 27	17	Full
CUGA.52	262902	4054964	NAD 27	17	Full
CUGA.53	281561	4059660	NAD 27	17	Full
CUGA.54	no plot exists				na
CUGA.55	263639	4055231	NAD 27	17	Full
CUGA.56	261064	4051688	NAD 27	17	Full
CUGA.57	261049	4056944	NAD 27	17	Full
CUGA.58	281823	4059877	NAD 27	17	Full
CUGA.59	281885	4059939	NAD 27	17	Full
CUGA.60	281720	4060076	NAD 27	17	Full
CUGA.61	281338	4060093	NAD 27	17	Full
CUGA.62	281807	4060492	NAD 27	17	Quick
CUGA.63	281743	4060491	NAD 27	17	Quick
CUGA.64	no data	no data	NAD 27	17	Quick
CUGA.65	282195	4059335	NAD 27	17	Quick
CUGA.66	282305	4059779	NAD 27	17	Quick
CUGA.67	282508	4059853	NAD 27	17	Quick
CUGA.68	282528	4059876	NAD 27	17	Quick
CUGA.69	282392	4059574	NAD 27	17	Quick
CUGA.70	282700	4059816	NAD 27	17	Quick
CUGA.71	282524	4060105	NAD 27	17	Quick
CUGA.72	282373	4060033	NAD 27	17	Quick
CUGA.73	281394	4060474	NAD 27	17	Quick
CUGA.74	280714	4059754	NAD 27	17	Quick
CUGA.75	280678	4059627	NAD 27	17	Quick
CUGA.76	280864	4059347	NAD 27	17	Quick
CUGA.77	272455	4060422	NAD 27	17	Quick
CUGA.78	274325	4061131	NAD 27	17	Quick
CUGA.79	275447	4061354	NAD 27	17	Quick
CUGA.80	279017	4061887	NAD 27	17	Quick
CUGA.81	279082	4061814	NAD 27	17	Quick
CUGA.82	259135	4053840	NAD 27	17	Quick
CUGA.83	278189	4060556	NAD 27	17	Full

Plot Number	X Coordinate	Y Coordinate	Datum	Zone	Type of plot
CUGA.84	278052	4060633	NAD 27	17	Quick
CUGA.85	277272	4060823	NAD 27	17	Quick
CUGA.86	260056	4057345	NAD27	17	Quick
CUGA.87	260133	4057265	NAD27	17	Quick
CUGA.88	260226	4057347	NAD27	17	Quick
CUGA.89	260353	4056879	NAD27	17	Quick
CUGA.90	263653	4055119	NAD27	17	Quick
CUGA.91	263607	4055310	NAD27	17	Quick
CUGA.92	263665	4055199	NAD27	17	Quick
CUGA.93	263753	4055427	NAD27	17	Quick
CUGA.94	267088	4055962	NAD27	17	Quick
CUGA.95	266713	4056990	NAD27	17	Quick
CUGA.96	267183	4057594	NAD27	17	Quick
CUGA.97	266796	4057634	NAD27	17	Quick
CUGA.98	266221	4057831	NAD27	17	Quick
CUGA.99	270031	4058420	NAD27	17	Quick
CUGA.100	269639	4058171	NAD27	17	Quick
CUGA.101	269276	4057892	NAD27	17	Quick
CUGA.102	268291	4058100	NAD27	17	Quick
CUGA.103	260420	4052450	NAD27	17	Quick

Table 2. List of all plants documented for Cumberland Gap National Historical Park ordered alphabetically by scientific name.

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Acalypha virginica	VIRGINIA THREESEED MERCURY	28195	NatureServe 2002/2003	G5	S5?	SNR	SNR
Acalypha virginica var. rhomboidea	COMMON COPPERLEAF	182109	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Acer negundo	BOX ELDER	28749	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Acer pensylvanicum	STRIPED MAPLE	28754	Pounds, Patrick, and Hinkle 1989	G5	S3S4	SNR	SNR
Acer rubrum	RED MAPLE	28728	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Acer saccharum	SUGAR MAPLE	28731	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Achillea millefolium	COMMON YARROW	35423	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNR	SNR
Acorus americanus	SWEETFLAG	182561	Pounds, Patrick, and Hinkle 1989	G5	S4	SNA	SNR
Acorus calamus	SWEETFLAG	42523	Pounds, Patrick, and Hinkle 1989	G4?	S4	SNR	SNR
Actaea pachypoda	WHITE BANEBERRY	18722	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Adiantum pedatum	NORTHERN MAIDENHAIR-FERN	17311	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Adlumia fungosa	CLIMBING FUMITORY	18897	Pounds, Patrick, and Hinkle 1989	G4	S1	S2	S3
Aesculus flava	YELLOW BUCKEYE	28717	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Agalinis tenuifolia	SLENDER FALSE-FOXGLOVE	33036	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Ageratina altissima var. altissima	WHITE SNAKEROOT	182398	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Ageratina aromatica	LESSER SNAKEROOT	36467	Pounds, Patrick, and Hinkle 1989	G4G5	S4	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Agrimonia gryposepala	TALL HAIRY GROOVEBUR	25095	Pounds, Patrick, and Hinkle 1989	G5	S1S2	SNR	SNR
Agrimonia parviflora	SWAMP AGRIMONY	25098	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Agrimonia pubescens	SOFT AGRIMONY	25099	NatureServe 2002/2003	G5	S5	SNR	SNR
Agrimonia rostellata	WOODLAND AGRIMONY	25100	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Agrostis hyemalis	WINTER BENTGRASS	40394	Pounds, Patrick, and Hinkle 1989	G5	S4S5	SNR	SNR
Agrostis perennans	PERENIAL BENTGRASS	40423	Pounds, Patrick, and Hinkle 1989	G5	S4S5	SNR	SNR
Agrostis stolonifera	SPREADING BENTGRASS	40400	Pounds, Patrick, and Hinkle 1989	G5	SNA	SNR	SNR
Ailanthus altissima	TREE-OF-HEAVEN	28827	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Albizia julibrissin	SILK TREE	26449	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Alisma subcordatum	BROAD-LEAVED WATER-PLANTAIN	38895	Pounds, Patrick, and Hinkle 1989	G4G5	S4S5	SNR	SNR
Allium cernuum	NODDING ONION	42721	Pounds, Patrick, and Hinkle 1989	G5	S3S4	SNR	SNR
Allium tricoccum	WILD LEEK	42672	Pounds, Patrick, and Hinkle 1989	G5	S4	S1S2	SNR
Allium vineale	WILD GARLIC	42637	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Alnus serrulata	BROOK-SIDE ALDER	19468	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Amaranthus spinosus	SPINY AMARANTH	20748	NatureServe 2002/2003	G5	SNA	SNR	SNR
Ambrosia artemisiifolia	ANNUAL RAGWEED	36496	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Ambrosia trifida var. trifida	GREAT RAGWEED	182422	NatureServe 2002/2003	G5	S5	SNR	SNR
Amelanchier arborea	DOWNY SERVICEBERRY	25110	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Amelanchier canadensis	CANADIAN SERVICEBERRY	25112	Pounds, Patrick, and	G5	SNA	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
			Hinkle 1989				
Amelanchier laevis	ALLEGHENY SERVICE-BERRY	182046	Pounds, Patrick, and Hinkle 1989	G4G5Q	S5	SNR	SNR
Amianthium muscitoxicum	FLY-POISON	42775	Pounds, Patrick, and Hinkle 1989	G4G5	S1S2	SNR	SNR
Amphicarpaea bracteata	AMERICAN HOG-PEANUT	182067	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Andropogon gerardii	BIG BLUESTEM	40462	NatureServe 2002/2003	G5	S5	SNR	SNR
Andropogon virginicus	BROOM-SEDGE	40456	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Anemone quinquefolia	WOOD ANEMONE	18448	Pounds, Patrick, and Hinkle 1989	G5	S3S4	SNR	SNR
Anemone virginiana	VIRGINIA ANEMONE	18451	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Angelica venenosa	HAIRY ANGELICA	29453	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Antennaria plantaginifolia	PLANTAIN-LEAF PUSSYTOES	36717	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Antennaria solitaria	SINGLE-HEAD PUSSYTOES	36756	Pounds, Patrick, and Hinkle 1989	G5	S4S5	SNR	SNR
Anthoxanthum odoratum	SWEET VERNALGRASS	41395	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Apios americana	AMERICAN GROUNDNUT	25390	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Aplectrum hyemale	PUTTYROOT	43489	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	S4S5
Apocynum cannabinum	INDIAN-HEMP	30157	Pounds, Patrick, and Hinkle 1989	G5	SNA	SNR	SNR
Aquilegia canadensis	WILD COLUMBINE	18730	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Arabis canadensis	SICKLEPOD	22678	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Arabis laevigata	SMOOTH ROCKCRESS	22706	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Arabis lyrata	LYRE-LEAF ROCKCRESS	22672	NatureServe 2002/2003	G5	S3?	SNR	SNR
Aralia nudicaulis	WILD SARSAPARILLA	29376	Pounds, Patrick, and Hinkle 1989	G5	S3?	SNR	SNR
Aralia racemosa	AMERICAN SPIKENARD	29377	Pounds, Patrick, and Hinkle 1989	G4G5	S4	SNR	SNR
Aralia spinosa	HERCULES CLUB	29378	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Arisaema dracontium	GREEN DRAGON	42529	Pounds, Patrick, and Hinkle 1989	G5	S4S5	SNR	SNR
Arisaema triphyllum	SWAMP JACK-IN-THE-PULPIT	42525	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Aristolochia macrophylla	PIPEVINE	18336	Pounds, Patrick, and Hinkle 1989	G5	S4S5	SNR	SNR
Aristolochia serpentaria	VIRGINIA SNAKEROOT	18342	Pounds, Patrick, and Hinkle 1989	G4	S4S5	SNR	SNR
Arnoglossum atriplicifolium	PALE INDIAN-PLANTAIN	36583	Pounds, Patrick, and Hinkle 1989	G4G5	S5	SNR	SNR
Aruncus dioicus	COMMON GOATSBEARD	25130	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SU
Arundinaria gigantea	GIANT CANE	40477	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Asarum canadense	CANADA WILD-GINGER	18353	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Asclepias exaltata	POKE MILKWEED	30266	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Asclepias incarnata	SWAMP MILKWEED	30241	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Asclepias quadrifolia	WHORLED MILKWEED	30297	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Asclepias syriaca	COMMON MILKWEED	30310	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Asclepias tuberosa	BUTTERFLY MILKWEED	30313	Pounds, Patrick, and Hinkle 1989	G5?	S5	SNR	SNR
Asclepias variegata	WHITE MILKWEED	30319	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Asclepias verticillata	WHORLED MILKWEED	30320	Pounds, Patrick, and Hinkle 1989	G5	S4?	SNR	SNR
Asclepias viridiflora	GREEN MILKWEED	30322	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Asimina triloba	PAWPAW	18117	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Asplenium montanum	MOUNTAIN SPLEENWORT	17351	Pounds, Patrick, and Hinkle 1989	G5	S4S5	SNR	SNR
Asplenium pinnatifidum	LOBED SPLEENWORT	17354	Pounds, Patrick, and Hinkle 1989	G4	S4	SNR	SNR
Asplenium platyneuron	EBONY SPLEENWORT	17355	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Asplenium resiliens	BLACK-STEM SPLEENWORT	17358	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Asplenium rhizophyllum	WALKING-FERN SPLEENWORT	17359	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Asplenium ruta-muraria	WALLRUE SPLEENWORT	192107	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Asplenium trichomanes	MAIDENHAIR SPLEENWORT	17364	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Aster acuminatus	WHORLED ASTER	35521	Pounds, Patrick, and Hinkle 1989	G5	S2S3	SNR	SNR
Aster cordifolius	HEART-LEAF ASTER	35552	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Aster divaricatus	WHITE WOOD-ASTER	35558	Pounds, Patrick, and Hinkle 1988	G5	S5	SNR	SNR
Aster dumosus	RICE-BUTTOM AMERICAN ASTER	35511	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Aster infirmus	CORNEL-LEAF ASTER	35591	Pounds, Patrick, and Hinkle 1989	G5	S4S5	SNR	SNR
Aster laevis var. concinnus	SMOOTH BLUE ASTER	193140	Pounds, Patrick, and Hinkle 1989	G5	S3S4	SNR	S3
Aster lateriflorus	STARVED ASTER	35601	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Aster lowrieanus	FALL ASTER	35606	Pounds, Patrick, and	G3G5 Q	SNR	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
			Hinkle 1989				
Aster oblongifolius	AROMATIC ASTER	35615	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	S4
Aster patens	LATE PURPLE ASTER	35624	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Aster pilosus var. pilosus	WHITE OLDFIELD ASTER	193246	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Aster prenanthoides	CROOKED-STEM ASTER	35637	Pounds, Patrick, and Hinkle 1989	G4G5	S5	SNR	SNR
Aster sagittifolius	ARROW-LEAVED ASTER	35645	Pounds, Patrick, and Hinkle 1989	GNR	SNR	SNR	SNR
Aster simplex	PANICLED ASTER	35514	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Aster surculosus	MICHAUX'S WOOD ASTER	35662	Pounds, Patrick, and Hinkle 1989	G4G5	S5	SNR	S1
Aster umbellatus	FLAT-TOP WHITE ASTER	35671	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Aster undulatus	WAXY-LEAVED ASTER	35672	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Athyrium asplenioides	SOUTHERN LADY FERN	17422	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Aureolaria flava	YELLOW FALSE-FOXGLOVE	33484	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Aureolaria laevigata	ENTIRE-LEAF YELLOW FALSE FOXGLOVE	33486	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Aureolaria pedicularia	FERNLEAF YELLOW FALSE-FOXGLOVE	33489	Pounds, Patrick, and Hinkle 1989	G5	S3?	SNR	SNR
Aureolaria virginica	DOWNY FALSE-FOXGLOVE	33490	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Avena sativa	COMMON OAT	41459	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Barbarea verna	EARLY YELLOWROCKET	22743	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Barbarea vulgaris	YELLOW ROCKET	22741	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Belamcanda chinensis	BLACKBERRY LILY	43280	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Berberis thunbergii	JAPANESE BARBERRY	18835	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Betula alleghaniensis	YELLOW BIRCH	19481	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Betula lenta	SWEET BIRCH	19487	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Betula nigra	RIVER BIRCH	19480	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Bidens bipinnata	SPANISH-NEEDLES	500993	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Bidens frondosa	DEVIL'S BEGGAR-TICKS	35707	Pounds, Patrick, and Hinkle 1989	G5	S5?	SNR	SNR
Bidens polylepis	AWNLESS BEGGAR-TICKS	35732	Pounds, Patrick, and Hinkle 1989	G5	S5?		
Bidens tripartita	THREE-LOBE BEGGAR-TICKS	35709	Pounds, Patrick, and Hinkle 1989	G5	S5?	SNR	SNR
Bignonia capreolata	CROSSVINE	34307	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Blephilia ciliata	DOWNY WOODMINT	32460	NatureServe 2002/2003	G5	S4	SNR	SNR
Blephilia hirsuta	HAIRY WOODMINT	32461	Pounds, Patrick, and Hinkle 1988	G5?	S5?	SNR	S3
Boehmeria cylindrica	FALSE NETTLE	19121	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Botrychium dissectum	CUTLEAF GRAPE-FERN	17171	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Botrychium virginianum	RATTLESNAKE FERN	17173	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Boykinia aconitifolia	BROOK SAXIFRAGE	24314	Pounds, Patrick, and Hinkle 1989	G4	S2	SNR	SNR
Brachyelytrum erectum	BEARDED SHORT-HUSK	41527	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Brassica napus	TURNIP	23060	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNA

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Brassica rapa	FIELD MUSTARD	23063	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Brickellia eupatorioides	FALSE BONESET	36875	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Bromus japonicus	JAPANESE BROME	40479	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Bromus pubescens	HAIRY WOOD BROME GRASS	40514	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Calamagrostis porteri	PORTER'S REEDGRASS	40562	Pounds, Patrick, and Hinkle 1989	G4	S2	S1	S3S4
Callitriche heterophylla	LARGE WATER-STARWORT	32053	Pounds, Patrick, and Hinkle 1989	G5	S4S5	SNR	SNR
Calystegia sepium	HEDGE BINDWEED	30650	Pounds, Patrick, and Hinkle 1989	G5	SNA	SNR	SNR
Campanula divaricata	SOUTHERN HAREBELL	34482	Pounds, Patrick, and Hinkle 1989	G4	S5	SNR	SNR
Campanulastrum americanum	TALL BELLFLOWER	501172	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Campsis radicans	TRUMPET CREEPER	34309	NatureServe 2002/2003	G5	S5	SNR	SNR
Capsella bursa-pastoris	COMMON SHEPHERD'S PURSE	22766	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Cardamine angustata	SLENDER TOOTHWORT	22778	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Cardamine concatenata	CUTLEAF TOOTHWORT	22787	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Cardamine diphylla	TWO-LEAF TOOTHWORT	22792	Pounds, Patrick, and Hinkle 1989	G5	S5	S3S4	S3
Cardamine hirsuta	HAIRY BITTER-CRESS	22797	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Cardamine pensylvanica	PENNSYLVANIA BITTER-CRESS	22772	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Cardamine rotundifolia	ROUND-LEAF WATER CRESS	22810	Pounds, Patrick, and Hinkle 1989	G4	S3S4	S2S3	S4
Carduus nutans	MUSK THISTLE	35787	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Carex abscondita	THICKET SEDGE	39475	BONAP County Database	G4G5	S3S4	SNR	SNR
Carex albicans var. albicans (synonym for Carex artitecta)	WHITETINGE SEDGE	39468	NatureServe 2002/2003	G5	SNR	SNR	SNR
Carex amphibola	EASTERN NARROWLEAF SEDGE	39491	NatureServe 2002/2003	G5	S5	SNR	SNR
Carex appalachica	APPALACHIAN SEDGE	39497	NatureServe 2002/2003	G4	S2?	S1	S4
Carex artitecta	DRY WOODS SEDGE	39468	Pounds, Patrick, and Hinkle 1989	GNR	SNR	SNR	SNR
Carex atlantica ssp. atlantica	PRICKLY BOG SEDGE	523747	NatureServe 2002/2003	G5	S4?	SNR	SNR
Carex austrocaroliniana	TARHEEL SEDGE	39514	Pounds, Patrick, and Hinkle 1989	G4	S3	S2S3	
Carex baileyi	BAILEY'S SEDGE	39376	Pounds, Patrick, and Hinkle 1989	G4	S4	SNR	SNR
Carex blanda	WOODLAND SEDGE	39379	Pounds, Patrick, and Hinkle 1989	G5?	S5	SNR	SNR
Carex bromoides	BROMELIKE SEDGE	39380	NatureServe 2002/2003	G5	S4?	SNR	SNR
Carex careyana	CAREY'S SEDGE	39541	Pounds, Patrick, and Hinkle 1989	G5	S4?	SNR	S3
Carex cephalophora	OVAL-LEAVED SEDGE	39383	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Carex cumberlandensis	CUMBERLAND SEDGE	-477	NatureServe 2002/2003	GNR	SNR	SNR	SNR
Carex debilis var. pubera	WHITE EDGE SEDGE	527086	Pounds, Patrick, and Hinkle 1989	G5	S3S4	SNR	SNR
Carex debilis var. rudgei	WHITE-EDGE SEDGE	527087	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Carex digitalis	SLENDER WOOD SEDGE	39576	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Carex frankii	FRANK'S SEDGE	39393	Plant list compiled by BONAP from its County Database, and converted to	G5	S5	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
			NPSpecies by I&M Office.				
Carex gracillima	GRACEFUL SEDGE	39620	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Carex gynandra	NODDING SEDGE	39623	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Carex hirsutella	FUZZY WUZZY SEDGE	39636	NatureServe 2002/2003	G5	S5	SNR	SNR
Carex interior	INLAND SEDGE	39652	NatureServe 2002/2003	G5	SNR	SNR	S1
Carex intumescens	BLADDER SEDGE	39403	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Carex jamesii	JAMES' SEDGE	39404	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Carex laevivaginata	SMOOTH-SHEATH SEDGE	39410	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Carex laxiculmis	SPREADING SEDGE	39411	NatureServe 2002/2003	G5	S3S4	SNR	SNR
Carex laxiflora	LOOSE-FLOWERED SEDGE	39662	Pounds, Patrick, and Hinkle 1989	G5	S5	S4	SNR
Carex leptalea	BRISTLY-STALK SEDGE	39669	Pounds, Patrick, and Hinkle 1989	G5	S3S4	SNR	SNR
Carex lucorum	BLUE RIDGE SEDGE	501241	Pounds, Patrick, and Hinkle 1989	G4	S5	SNR	S2
Carex lucorum var. lucorum	BLUE RIDGE SEDGE	527122	Pounds, Patrick, and Hinkle 1989	G4	SNR	SNA	SNA
Carex lurida	SHALLOW SEDGE	39414	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Carex mesochorea	MIDLAND SEDGE	39694	NatureServe 2002/2003	G4G5	S5	SNR	SU
Carex muehlenbergii var. enervis	MUHLENBERG'S SEDGE	527128	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SU
Carex nigromarginata	BLACK EDGE SEDGE	39719	NatureServe 2002/2003	G5	S4?	SNR	SNR
Carex normalis	GREATER STRAW SEDGE	39720	Pounds, Patrick, and	G5	S4?	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
			Hinkle 1989				
Carex pensylvanica	PENNSYLVANIA SEDGE	39749	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Carex platyphylla	BROAD-LEAVED SEDGE	39761	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Carex prasina	DROOPING SEDGE	39769	Pounds, Patrick, and Hinkle 1989	G4	S5	SNR	SNR
Carex projecta	NECKLACE SEDGE	39425	NatureServe 2002/2003	G5	S5	SNR	SNR
Carex purpurifera	PURPLE SEDGE	39776	Pounds, Patrick, and Hinkle 1989	G4?	S3S4	S3	S2
Carex radiata	STELLATE SEDGE	39778	Pounds, Patrick, and Hinkle 1989	G4	S2?	SNA	SNR
Carex rankii	RANK'S SEDGE	-476	Pounds, Patrick, and Hinkle 1989	GNR	SNR	SNR	SNR
Carex retroflexa	REFLEXED SEDGE	39782	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Carex rosea	ROSY SEDGE	39429	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Carex scabrata	ROUGH SEDGE	39795	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Carex striatula	LINED SEDGE	39822	Pounds, Patrick, and Hinkle 1989	G4G5	S3S4	SNR	SNR
Carex styloflexa	BENT SEDGE	39823	Pounds, Patrick, and Hinkle 1989	G4G5	S3S4	SNR	SNR
Carex swanii	SWAN SEDGE	39437	Pounds, Patrick, and Hinkle 1989	G5	S5?	SNR	SNR
Carex torta	TWISTED SEDGE	39848	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Carex tribuloides	BLUNT BROOM SEDGE	39438	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Carex virescens	RIBBED SEDGE	39867	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Carex vulpinoidea	FOX SEDGE	39442	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Carpinus caroliniana	AMERICAN HORNBEAM	19504	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Carya alba	MOCKERNUT HICKORY	501306	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Carya cordiformis	BITTER-NUT HICKORY	19227	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Carya glabra	SWEET PIGNUT HICKORY	19231	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Carya laciniosa	BIG SHELLBARK HICKORY	19235	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNA
Carya ovalis	RED HICKORY	19241	Pounds, Patrick, and Hinkle 1989	G5	S4?	SNR	SNR
Carya ovata	SHAG-BARK HICKORY	19243	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Carya pallida	SAND HICKORY	19244	NatureServe 2002/2003	G5	S4	SNR	SNR
Castanea dentata	AMERICAN CHESTNUT	19454	Pounds, Patrick, and Hinkle 1989	G4	S1?	S2S3	SNR
Castanea pumila	ALLEGHENY CHINQUAPIN	19457	Pounds, Patrick, and Hinkle 1989	G5	S2	SNR	SNR
Caulophyllum thalictroides	BLUE COHOSH	18840	Pounds, Patrick, and Hinkle 1989	G4G5	S4S5	SNR	SNR
Ceanothus americanus	NEW JERSEY TEA	28454	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Celastrus scandens	CLIMBING BITTERSWEET	27974	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Celtis occidentalis	COMMON HACKBERRY	19040	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Celtis occidentalis var. georgiana	COMMON HACKBERRY	533268	Pounds, Patrick, and Hinkle 1989	GNR	SNR	SNR	SNR
Cephalanthus occidentalis	COMMON BUTTONBUSH	34786	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Cerastium brachypodum	SHORTSTALK CHICKWEED	19950	NatureServe 2002/2003	G5	SNR	SNR	SNR
Cerastium vulgatum	COMMON MOUSE-EAR CHICKWEED	19968	Pounds, Patrick, and Hinkle 1989	GNR	SNR	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Cercis canadensis	EASTERN REDBUD	25782	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Chaenomeles speciosa	FLOWERING QUINCE	501502	NatureServe 2002/2003	GNR	SNA	SNA	
Chaerophyllum procumbens	SPREADING CHERVIL	29616	NatureServe 2002/2003	G5	S5	SNR	SNR
Chaerophyllum tainturieri	HAIRY-FRUIT CHERVIL	29617	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Chamaecrista fasciculata var. fasciculata	SLEEPINGPLANT	566216	NatureServe 2002/2003	G5	SNR	SNR	SNR
Chamaecrista nictitans ssp. nictitans	PARTRIDGE-PEA	523837	Pounds, Patrick, and Hinkle 1988	G5T5	SNR	SNR	SNR
Chamaelirium luteum	DEVIL'S-BIT	42894	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Chamaesyce maculata	DEVIL'S-BIT	501435	Pounds, Patrick, and Hinkle 1989	G5	S5	S5	S5
Chamaesyce nutans	EYEBANE	501442	NatureServe 2002/2003	G5	S5	SNR	SNR
Chasmanthium latifolium	INDIAN WOODOATS	41547	NatureServe 2002/2003	G5	S5	SNR	SNR
Cheilanthes alabamensis	ALABAMA LIPFERN	17434	Pounds, Patrick, and Hinkle 1989	G4G5	SH	SNR	S1
Cheilanthes lanosa	HAIRY LIPFERN	17448	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Chelone glabra	WHITE TURTLEHEAD	33182	Pounds, Patrick, and Hinkle 1989	G5	S4S5	SNR	SNR
Chenopodium album	WHITE GOOSEFOOT	20592	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Chenopodium ambrosioides	WORMSEED GOOSEFOOT	20590	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Chimaphila maculata	SPOTTED WINTERGREEN	23767	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Chrysopsis mariana	MARYLAND GOLDEN ASTER	202495	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Cichorium intybus	CHICORY	36763	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Cimicifuga racemosa	BLACK BUGBANE	18757	Pounds, Patrick, and Hinkle 1989	G4	S5	SNR	SNR
Cinna arundinacea	STOUT WOOD REED-GRASS	40583	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Cinna latifolia	SLENDER WOOD REEDGRASS	40584	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	S3
Circaea lutetiana ssp. canadensis	INTERMEDIATE ENCHANTER'S NIGHTSHADE	27569	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Cirsium discolor	FIELD THISTLE	36362	Pounds, Patrick, and Hinkle 1989	G5	SNA	SNR	SNR
Cirsium muticum	SWAMP THISTLE	36387	Pounds, Patrick, and Hinkle 1989	G5	S4S5	SNR	SNR
Cirsium vulgare	BULL THISTLE	36428	NatureServe 2002/2003	G5	SNA	SNA	SNR
Claytonia caroliniana	CAROLINA SPRING-BEAUTY	20385	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Claytonia virginica	NARROW-LEAVED SPRING BEAUTY	20382	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Clematis catesbyana	SATINCURLS	18691	NatureServe 2002/2003	G4G5	SH	SNR	S1
Clematis terniflora	JAPANESE VIRGIN'S-BOWER	18712	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Clematis viorna	VASE-VINE LEATHERFLOWER	18715	Pounds, Patrick, and Hinkle 1989	G5	S4S5	SNR	SNR
Clematis virginiana	VIRGINIA VIRGIN-BOWER	18716	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Clethra acuminata	MOUNTAIN PEPPER-BUSH	23457	Pounds, Patrick, and Hinkle 1989	G4	S5	SNR	SNR
Clinopodium vulgare	FIELD BASIL	501592	Pounds, Patrick, and Hinkle 1989	G5	SNA	SNR	SNR
Clintonia umbellulata	WHITE BLUEBEAD-LILY	42904	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Clitoria mariana	MARYLAND BUTTERFLY-PEA	26542	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Cocculus carolinus	CAROLINA CORALBEAD	18864	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	S1

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Collinsonia canadensis	CANADA HORSE-BALM	32474	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Commelina communis	ASIATIC DAYFLOWER	39127	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Conopholis americana	SQUAW-ROOT	34274	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Convallaria montana	AMERICAN LILY-OF-THE-VALLEY	511293	Pounds, Patrick, and Hinkle 1989	G4	S1	SNA	SNR
Convolvulus arvensis	FIELD BINDWEED	30705	NatureServe 2002/2003	G5	SNA	SNA	SNR
Conyza canadensis	CANADA HORSEWEED	37113	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Corallorrhiza odontorhiza	AUTUMN CORAL-ROOT	43525	Pounds, Patrick, and Hinkle 1989. Plant list compiled by BONAP from its County Database, and converted to NPSpecies by I&M Office.	G5	S4S5	SNR	S5
Corallorrhiza wisteriana	SPRING CORALROOT	43528	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	S3
Coreopsis lanceolata	LANCELEAF TICKSEED	37139	NatureServe 2002/2003	G5	SNA	SNR	SNR
Coreopsis major	WOOD TICKSEED	37143	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Coreopsis tripteris	TALL TICKSEED	37154	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Cornus alternifolia	ALTERNATE-LEAF DOGWOOD	27813	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Cornus florida	FLOWERING DOGWOOD	27806	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Coronilla varia	COMMON CROWN-VETCH	26553	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Corydalis sempervirens	PALE CORYDALIS	19010	Pounds, Patrick, and	G4G5	S3?	S1S2	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
			Hinkle 1989				
Corylus americana	AMERICAN HAZELNUT	19506	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Crataegus calpodendron	PEAR HAWTHORN	24547	NatureServe 2002/2003	G5	S4?	SNR	S1
Crataegus flabellata	FANLEAF HAWTHORN	24561	Pounds, Patrick, and Hinkle 1989	G4	SNA	SNR	SNR
Crataegus uniflora	DWARF HAWTHORN	24608	NatureServe 2002/2003	G5	S3?	SNR	SNR
Croton monanthogynus	PRAIRIE TEA	28283	NatureServe 2002/2003	G5	S5	SNR	S3
Cryptotaenia canadensis	CANADIAN HONEWORT	29475	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Cunila origanoides	COMMON DITTANY	32483	Pounds, Patrick, and Hinkle 1989	G5	S5	SNA	SNR
Cuscuta gronovii	SCALDWEED	30712	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Cynoglossum virginianum	WILD COMFREY	31891	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Cyperus dipsaciformis	TEASEL FLATSEDGE	511976	Pounds, Patrick, and Hinkle 1989	G4?	SNR	SNR	SNR
Cyperus strigosus	STRAW-COLORED FLATSEDGE	39901	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Cypripedium acaule	PINK LADY'S-SLIPPER	43534	Pounds, Patrick, and Hinkle 1989	G5	S4	S4	S5
Cypripedium parviflorum	SMALL YELLOW LADY'S-SLIPPER	501943	Pounds, Patrick, and Hinkle 1989	G5	S2	SNR	SNR
Cypripedium pubescens	LARGE YELLOW LADY'S-SLIPPER	501945	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Cystopteris bulbifera	BULBLET FERN	17481	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Cystopteris protrusa	LOWLAND BRITTLE FERN	17485	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Dactylis glomerata	ORCHARD GRASS	193446	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Danthonia compressa	FLATTENED OATGRASS	41637	NatureServe 2002/2003	G5	S3S4	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Danthonia sericea	SILKY OATGRASS	41635	Pounds, Patrick, and Hinkle 1989	G5?	SNR	SNR	SNR
Danthonia spicata	POVERTY OATGRASS	41642	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Daucus carota	QUEEN ANNE'S LACE	29477	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Delphinium tricorne	DWARF LARKSPUR	18515	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Dennstaedtia punctilobula	EASTERN HAY-SCENTED FERN	17491	Pounds, Patrick, and Hinkle 1989	G5	S4?	SNR	SNR
Deparia acrostichoides	SILVERY SPLEENWORT	501994	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Deschampsia flexuosa	WAVY HAIRGRASS	40595	NatureServe 2002/2003	G5	S2	SNR	SNR
Desmodium canescens	HOARY TICK-TREEFOIL	25792	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Desmodium dillenii	PERPLEXED TICK-TREFOIL	25796	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Desmodium glabellum	DILLENIUS' TICK-TREFOIL	25799	NatureServe 2002/2003	G5	SNR	SNR	SNR
Desmodium glutinosum	LARGE TICK-TREFOIL	25800	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Desmodium laevigatum	SMOOTH TICK-TREFOIL	25806	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Desmodium nudiflorum	BARE-STEMMED TICK-TREEFOIL	25812	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Desmodium obtusum	STIFF TICK-TREFOIL	502019	NatureServe 2002/2003	G4G5	SNR	SNR	SNR
Desmodium paniculatum	NARROW-LEAF TICK-TREFOIL	25815	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Desmodium rotundifolium	PROSTRATE TICK-TREEFOIL	502020	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Desmodium viridiflorum	VELVETY TICK-TREEFOIL	25833	Pounds, Patrick, and Hinkle 1989	G5?	SNR	SNR	SNR
Dianthus armeria	DEPTFORD-PINK	20276	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Diarrhena americana	AMERICAN BEAKGRAIN	41644	Pounds, Patrick, and Hinkle 1989	G4?	S5	SNR	S3
Dichanthelium acuminatum var. acuminatum	TAPERED ROSETTE GRASS	527684	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Dichanthelium acuminatum var. fasciculatum	WESTERN PANICGRASS	527685	NatureServe 2002/2003	G5	SNR	SNR	SNR
Dichanthelium boscii	BOSC'S WITCHGRASS	41655	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Dichanthelium clandestinum	DEERTONGUE	41656	NatureServe 2002/2003	G5?	SNR	SNR	SNR
Dichanthelium commutatum	VARIABLE WITCHGRASS	41647	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Dichanthelium dichotomum	CYPRESS WITCHGRASS	41659	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Dichanthelium dichotomum var. dichotomum	CYPRESS WITCHGRASS	527691	NatureServe 2002/2003	G5	SNR	SNR	S5
Dichanthelium latifolium	BROAD-LEAF WITCHGRASS	41648	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Dichanthelium laxiflorum	OPENFLOWER ROSETTE GRASS	41661	NatureServe 2002/2003	G5	SNR	SNR	SNR
Dichanthelium sphaerocarpon var. isophyllum	ROUNDFRUIT PANICGRASS	527701	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Dichanthelium sphaerocarpon var. sphaerocarpon	ROUNDFRUIT PANIC GRASS	527702	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Digitaria ciliaris	SOUTHERN CRABGRASS	40619	NatureServe 2002/2003	G5	SNR	SNR	SNR
Diodia virginiana	LARGER BUTTON-WEED	34790	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Dioscorea oppositifolia	CHINESE YAM	502075	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Dioscorea quaternata	FOURLEAF YAM	43371	NatureServe 2002/2003	G5	S5	SNR	SNR
Dioscorea villosa	YELLOW YAM	43367	Pounds, Patrick, and Hinkle 1989	G4G5	S5	SNR	SNR
Diospyros virginiana	PERSIMMON	23855	Pounds, Patrick, and	G5	S5	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
			Hinkle 1989				
Diplazium pycnocarpon	GLADE FERN	502095	Pounds, Patrick, and Hinkle 1989	G5	S4?	SNR	SNR
Dipsacus sylvestris	COMMON TEASEL	35406	Pounds, Patrick, and Hinkle 1989	GNR	SNR	SNR	SNA
Disporum lanuginosum	YELLOW MANDRIN	42919	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Disporum maculatum	NODDING MANDRIN	42920	Pounds, Patrick, and Hinkle 1989	G5	S3?	SNR	S3
Dryopteris goldiana	GOLDIE'S WOODFERN	17537	Pounds, Patrick, and Hinkle 1989	G4	S4	SNR	SNR
Dryopteris intermedia	EVERGREEN WOODFERN	17538	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Dryopteris marginalis	MARGINAL WOOD-FERN	17541	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Duchesnea indica	INDIAN MOCK-STRAWBERRY	25163	Pounds, Patrick, and Hinkle 1989	G5	SNA	SNA	SNR
Echinochloa crus-galli	BARNYARD GRASS	502210	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Elaeagnus umbellata	AUTUMN OLIVE	27776	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Eleocharis tenuis	SLENDER SPIKE-RUSH	40070	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Elephantopus carolinianus	CAROLINA ELEPHANT-FOOT	37297	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Elephantopus tomentosus	TOBACCOWEED	37300	Pounds, Patrick, and Hinkle 1989	G5	S3	SNR	SNR
Eleusine indica	INDIAN GOOSEGRASS	41692	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Elymus canadensis	NODDING WILD-RYE	40683	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	S2?
Elymus hystrix	BOTTLE-BRUSH GRASS	40698	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Elymus villosus	SLENDER WILD-RYE	40714	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Elymus virginicus	VIRGINIA WILD-RYE	40681	Pounds, Patrick, and	G5	S5	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
			Hinkle 1989				
Epifagus virginiana	BEECHDROPS	34276	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Epigaea repens	TRAILING ARBUTUS	23646	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Epilobium coloratum	PURPLE-LEAF WILLOW-HERB	27298	Pounds, Patrick, and Hinkle 1989	G5	S4?	SNR	SNR
Equisetum arvense	FIELD HORSETAIL	17152	NatureServe 2002/2003	G5	S5	SNR	SNR
Equisetum hyemale	ROUGH HORSETAIL	17154	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Eragrostis spectabilis	PURPLE LOVE-GRASS	40717	Pounds, Patrick, and Hinkle 1989	G5	S5?	SNR	SNR
Erechtites hieraciifolia	FIREWEED	37320	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Erigeron annuus	WHITE-TOP FLEABANE	35804	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Erigeron philadelphicus	PHILADELPHIA FLEABANE	35809	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Erigeron pulchellus	ROBIN PLANTAIN FLEABANE	35808	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Erigeron strigosus	DAISY FLEABANE	35951	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Eryngium yuccifolium	RATTLESNAKE-MASTER	29506	Pounds, Patrick, and Hinkle 1989	G5	S4?	SNR	S2
Erythronium americanum	YELLOW TROUT-LILY	196365	Pounds, Patrick, and Hinkle 1989	G5	S5	S5	SNR
Euonymus americanus	AMERICAN STRAWBERRY-BUSH	27947	Pounds, Patrick, and Hinkle 1989	G5	S5	SNA	SNR
Euonymus atropurpureus	WAHOO	27948	Pounds, Patrick, and Hinkle 1989	G5	S5	SNA	SNR
Eupatorium album	WHITE THOROUGHWORT	35982	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Eupatorium coelestinum	BLUE MISTFLOWER	502504	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Eupatorium fistulosum	HOLLOW JOE-PYE WEED	502509	Pounds, Patrick, and Hinkle 1989	G5?	S5	SNR	SNR
Eupatorium incarnatum	PINK THOROUGHWORT	502514	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	S2
Eupatorium purpureum	SWEET JOE-PYE WEED	502522	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Eupatorium rotundifolium var. ovatum	HAIRY BONESET	528120	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Eupatorium serotinum	LATE-FLOWERING THOROUGH-WORT	35981	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Eupatorium sessilifolium	UPLAND BONESET	36004	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Euphorbia corollata	FLOWERING SPURGE	28057	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Euphorbia dentata	TOOTHED SPURGE	502535	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Euphorbia mercurialina	MERCURY SPURGE	28101	Pounds, Patrick, and Hinkle 1989	G4	S1S2	SNR	SNA
Fagus grandifolia	AMERICAN BEECH	19462	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Festuca rubra	RED FESCUE	40796	NatureServe 2002/2003	G5	SNR	SNR	SNR
Festuca subverticillata	NODDING FESCUE	502612	Pounds, Patrick, and Hinkle 1989	G5	SNA	SNR	SNR
Forsythia viridissima	FORSYTHIA	32963	NatureServe 2002/2003	GNR	SNR	SNR	SNR
Fragaria virginiana	VIRGINIA STRAWBERRY	24639	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Frangula caroliniana	CAROLINA BUCKTHORN	506986	Pounds, Patrick, and Hinkle 1989	G5	SNA	SNR	S3
Fraxinus americana	WHITE ASH	32931	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Fraxinus pennsylvanica	GREEN ASH	32929	NatureServe 2002/2003	G5	S5	SNR	SNR
Galactia volubilis	DOWNY MILKPEA	26703	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Galax urceolata	BEETLEWEED	502705	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Galearis spectabilis	SHOWY ORCHIS	43591	Pounds, Patrick, and Hinkle 1989	G5	S5	S4	S5
Galinsoga quadriradiata	FRINGED QUICKWEED	37415	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Galium aparine	CATCHWEED BEDSTRAW	34797	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Galium circaezans	WILD LICORICE	34800	Pounds, Patrick, and Hinkle 1989	G5	SNA	SNR	SNR
Galium latifolium	PURPLE BEDSTRAW	34883	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Galium tinctorium	STIFF MARSH BEDSTRAW	34803	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Galium triflorum	SWEET-SCENT BEDSTRAW	34933	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Gamochaeta purpurea	SPOON-LEAF PURPLE EVERLASTING	37421	Pounds, Patrick, and Hinkle 1989	G5	SNA	SNR	SNR
Gaultheria procumbens	TEABERRY	23657	Pounds, Patrick, and Hinkle 1989	G5	SNA	SNR	SNR
Gaura biennis	BIENNIAL GAURA	27642	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Gaylussacia baccata	BLACK HUCKLEBERRY	23660	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Gentiana decora	SHOWY GENTIAN	29975	Pounds, Patrick, and Hinkle 1989	G4?	S3	SNR	S3S4
Gentiana villosa	STRIPED GENTIAN	29990	Pounds, Patrick, and Hinkle 1989	G4	S4?	SNR	SNR
Geranium carolinianum	CAROLINA CRANE'S-BILL	29105	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Geranium maculatum	WILD CRANE'S-BILL	29107	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Geum canadense	WHITE AVENS	24645	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Geum vernum	SPRING AVENS	24664	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	S3S4
Geum virginianum	PALE AVENS	24665	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Ginkgo biloba	MAIDENHAIR TREE	183269	Pounds, Patrick, and Hinkle 1989	GNR	SNA		SNA
Glechoma hederacea	GROUND IVY	502801	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Gleditsia triacanthos	HONEY-LOCUST	26714	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Glyceria melicaria	SLENDER MANNA GRASS	40849	Pounds, Patrick, and Hinkle 1989	G5	S3S4	SNR	SNR
Glyceria striata	FOWL MANNA-GRASS	40833	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Gnaphalium obtusifolium	BLUNT-LEAF RABBIT TOBACCO	36694	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Goodyera pubescens	DOWNY RATTLESNAKE-PLANTAIN	43594	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	S5
Gratiola virginiana	ROUNDFRUIT HEDGE-HYSSOP	33191	Pounds, Patrick, and Hinkle 1989	G4G5	S5	SNR	SNR
Hamamelis virginiana	AMERICAN WITCH-HAZEL	19033	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Hedeoma pulegioides	AMERICAN FALSE-PENNYROYAL	32520	NatureServe 2002/2003	G5	SNA	SNR	SNR
Hedyotis caerulea	QUAKER-LADIES	514490	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Helenium autumnale	COMMON SNEEZEWEED	36006	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Helenium flexuosum	PURPLE-HEAD SNEEZEWEED	36016	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Helianthus atrorubens	PURPLE-DISK SUNFLOWER	36620	Pounds, Patrick, and Hinkle 1989	G5	S3S4	SNR	SNR
Helianthus decapetalus	THIN-LEAVED SUNFLOWER	502923	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Helianthus divaricatus	WOODLAND SUNFLOWER	36636	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Helianthus hirsutus	STIFF-HAIR SUNFLOWER	36646	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	S3
Helianthus microcephalus	SMALL WOOD SUNFLOWER	36654	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Helianthus tuberosus	JERUSALEM ARTICHOKE	36691	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Heliopsis helianthoides	OX-EYE	37605	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Hemerocallis fulva	ORANGE DAYLILY	42943	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Hepatica americana	AMERICAN LIVERLEAF	514659	Pounds, Patrick, and Hinkle 1988	G5T5	S5	SNR	SNR
Hepatica nobilis var. acuta	SHARP-LOBED HEPATICA	528378	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Hesperis matronalis	DAMES ROCKET	23138	NatureServe 2002/2003	G4G5	SNA	SNA	SNR
Heuchera americana	AMERICAN ALUMROOT	24340	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Heuchera parviflora	LITTLE-LEAVED ALUMROOT	24365	Pounds, Patrick, and Hinkle 1989	G4	S5	SNR	S3
Heuchera villosa	HAIRY ALUMROOT	24377	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Hexalectris spicata	CRESTED CORALROOT	43608	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	S3
Hexastylis arifolia	LITTLE BROWN JUG	502983	Pounds, Patrick, and Hinkle 1989	G5	S5	S5	S3
Hexastylis heterophylla	VARIABLE-LEAVED HEARTLEAF	502985	Pounds, Patrick, and Hinkle 1989	G4G5Q	S3S4	SNR	SNR
Hibiscus syriacus	ROSE-OF-SHARON	21638	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Hieracium caespitosum	MEADOW HAWKWEED	503009	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Hieracium gronovii	HAIRY HAWKWEED	37710	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Hieracium paniculatum	PANICLED HAWKWEED	37718	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Hieracium scabrum	ROUGH HAWKWEED	37727	Pounds, Patrick, and Hinkle 1989	G5	S4	S2	SNR
Hieracium venosum	RATTLESNAKE HAWKWEED	37734	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Houstonia caerulea (also collected under Hedyotis caerulea by Pounds, Patrick, and Hinkle)	QUAKER-LADIES	35038	NatureServe 2002/2003	G5	S5	SNR	SNR
Houstonia longifolia	LONGLEAF BLUET	35045	Pounds, Patrick, and Hinkle 1989	G4G5	S5	SNR	SNR
Houstonia longifolia var. tenuifolia	SLENDER-LEAVED BLUETS	528494	Pounds, Patrick, and Hinkle 1989	G4G5Q	SNR	SNR	SNR
Houstonia purpurea	PURPLE BLUET	35051	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Huperzia porophila	ROCK CLUBMOSS	503084	Pounds, Patrick, and Hinkle 1989	G4	S5	SNR	S1
Hybanthus concolor	GREEN VIOLET	22026	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Hydrangea arborescens	WILD HYDRANGEA	24195	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Hydrastis canadensis	GOLDEN-SEAL	18781	Pounds, Patrick, and Hinkle 1989	G4	S4	S3	S3
Hydrophyllum macrophyllum	LARGELEAF WATERLEAF	31393	NatureServe 2002/2003	G5	S5	S4S5	S3
Hypericum gentianoides	ORANGE-GRASS ST. JOHN'S-WORT	21420	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Hypericum mutilum	SLENDER ST. JOHN'S-WORT	21421	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Hypericum punctatum	COMMON ST. JOHN'S-WORT	21422	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Hypericum stragulum	ST. ANDREW'S CROSS	515018	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Hypoxis hirsuta	EASTERN YELLOW STARGRASS	503146	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Ilex ambigua	CAROLINA HOLLY	27987	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Ilex montana	MOUNTAIN HOLLY	28002	NatureServe 2002/2003	G5	SNR	SNR	SNR
Ilex opaca	AMERICAN HOLLY	27982	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Impatiens capensis	SPOTTED JEWEL-WEED	29182	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Impatiens pallida	PALE JEWEL-WEED	29189	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Ionactis linariifolius	FLAXLEAF ASTER	507245	Pounds, Patrick, and Hinkle 1989	G5	SNA	SNR	SNR
Ipomoea hederacea	IVYLEAF MORNING-GLORY	503177	NatureServe 2002/2003	G5	SNA	SNR	SNR
Ipomoea pandurata	BIG-ROOT MORNING-GLORY	30786	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Ipomoea purpurea	TALL MORNING-GLORY	30789	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Iris cristata	CRESTED DWARF IRIS	43204	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Isotria verticillata	LARGE WHORLED POGONIA	43615	Pounds, Patrick, and Hinkle 1989	G5	S4S5	SNR	S5
Juglans cinerea	BUTTERNUT	19250	Pounds, Patrick, and Hinkle 1989	G3G4	S3	S3	S3?
Juglans nigra	BLACK WALNUT	19254	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Juncus debilis	WEAK RUSH	39231	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Juncus effusus	SOFT RUSH	39232	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Juncus interior	INLAND RUSH	39280	NatureServe 2002/2003	G4G5	S4?	SNR	SNR
Juncus subcaudatus	WOODS-RUSH	39316	Pounds, Patrick, and Hinkle 1989	G5	S1?	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Juncus tenuis	SLENDER RUSH	39243	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Juniperus virginiana	EASTERN RED CEDAR	18048	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Kalmia latifolia	MOUNTAIN LAUREL	23677	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Krigia biflora	TWO-FLOWERED DWARF DANDELION	37810	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	S4
Krigia virginica	DWARF DANDELION	37816	Pounds, Patrick, and Hinkle 1989	G5	S4?	SNR	SNR
Kummerowia stipulacea	KOREAN CLOVER	503293	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Kummerowia striata	COMMON KOREAN-CLOVER	503294	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Kyllinga brevifolioides	PASTURE FLATSEDGE	515529	Pounds, Patrick, and Hinkle 1989	GNR	S3?	SNA	SNA
Lactuca canadensis	CANADA LETTUCE	36596	Pounds, Patrick, and Hinkle 1989	G5	S4S5	SNR	SNR
Lactuca floridana	WOODLAND LETTUCE	36599	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Lactuca saligna	WILLOWLEAF LETTUCE	36606	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Lamium amplexicaule	COMMON DEADNETTLE	32539	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Lamium purpureum	PURPLE DEADNETTLE	32543	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Laportea canadensis	WOOD NETTLE	19127	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Lathyrus latifolius	BROAD-LEAF PEAVINE	25856	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Lathyrus venosus	SMOOTH VEINY PEAVINE	25886	Pounds, Patrick, and Hinkle 1989	G5	S2S3	SNR	SNR
Lechea racemulosa	ILLINOIS PINWEED	22295	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Leersia virginica	VIRGINIA CUTGRASS	40890	Pounds, Patrick, and	G5	S5	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
			Hinkle 1989				
Lemna minor	LESSER DUCKWEED	42590	Pounds, Patrick, and Hinkle 1989	G5	S4?	SNR	SNR
Lepidium campestre	FIELD PEPPERWEED	22954	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Lepidium virginicum	POOR-MAN'S PEPPER-GRASS	22955	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Lespedeza cuneata	CHINESE LESPEDEZA	25898	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Lespedeza frutescens	WAND BUSH-CLOVER	575841	NatureServe 2002/2003	G5	S4S5	SNR	SNR
Lespedeza hirta	HAIRY BUSH-CLOVER	25900	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Lespedeza intermedia	WAND BUSH-CLOVER	25903	Pounds, Patrick, and Hinkle 1989	G5	S4S5	SNR	SNR
Lespedeza procumbens	TRAILING BUSH-CLOVER	25907	Pounds, Patrick, and Hinkle 1989	G5	S4S5	SNR	SNR
Lespedeza repens	CREEPING BUSH-CLOVER	503402	Pounds, Patrick, and Hinkle 1989	G5	S4S5	SNR	SNR
Lespedeza virginica	SLENDER LESPEDEZA	25915	NatureServe 2002/2003	G5	S5	SNR	SNR
Leucanthemum vulgare	OXEYE DAISY	37903	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Liatris aspera	TALL GAY-FEATHER	37909	Pounds, Patrick, and Hinkle 1989	G4G5	S3S4	SNR	S3
Ligusticum canadense	LOVAGE	29528	Pounds, Patrick, and Hinkle 1989	G4	S4	SNR	SNR
Ligustrum amurense	AMUR PRIVET	32974	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNA
Lilium canadense	CANADA LILY	42732	NatureServe 2002/2003	G5	S4?	S3	SNR
Lindera benzoin	SPICEBUSH	18147	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Linum usitatissimum	COMMON FLAX	29226	NatureServe 2002/2003	GNR	SNA	SNA	SNA
Linum virginianum	VIRGINIA FLAX	29202	Pounds, Patrick, and Hinkle 1989	G4G5	S4S5	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Liparis liliifolia	LARGE TWAYBLADE	43622	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	S5
Liquidambar styraciflua	SWEET GUM	19027	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Liriodendron tulipifera	TULIP TREE	18086	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Lithospermum canescens	HOARY PUCCOON	31945	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Lithospermum latifolium	AMERICAN GROMWELL	31949	Pounds, Patrick, and Hinkle 1989	G4	S4?	SNR	S3
Lobelia cardinalis	CARDINAL FLOWER	34505	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Lobelia inflata	INDIAN-TOBACCO	34524	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Lobelia puberula	DOWNY LOBELIA	34529	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Lobelia siphilitica	GREAT BLUE LOBELIA	34531	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Lobelia spicata	PALE-SPIKED LOBELIA	34532	Pounds, Patrick, and Hinkle 1989	G5	S4S5	SNR	SNR
Lolium arundinaceum	TALL FESCUE	507979	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Lolium perenne	PERENNIAL RYEGRASS	40893	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Lolium perenne ssp. multiflorum	PERENNIAL RYEGRASS	524260	NatureServe 2002/2003	GNR	SNR	SNA	SNR
Lonicera dioica	LIMBER HONEYSUCKLE	35290	NatureServe 2002/2003	G5	S4	S2	SNR
Lonicera japonica	JAPANESE HONEYSUCKLE	35283	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Lonicera maackii	AMUR HONEYSUCKLE	35298	NatureServe 2002/2003	GNR	SNA	SNA	SNA
Lotus corniculatus	BIRDFOOD DEERVETCH	26362	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Ludwigia alternifolia	BUSHY SEEDBOX	27335	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Luzula acuminata	HAIRY WOODRUSH	39336	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Luzula bulbosa	SOUTHERN WOODRUSH	39338	Pounds, Patrick, and Hinkle 1989	G5	S4?	SNR	SNR
Luzula echinata	WOOD RUSH	39342	Pounds, Patrick, and Hinkle 1989	G5	S4?	SNR	SNR
Lycopodium clavatum	RUNNING CLUBMOSS	17024	NatureServe 2002/2003	G5	S1?	SNR	SNR
Lycopodium digitatum	SHINING CLUBMOSS	17028	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Lycopodium lucidulum	SHINING CLUBMOSS	503079	Pounds, Patrick, and Hinkle 1988	G5	S5	SNR	SNR
Lycopodium obscurum	TREE CLUBMOSS	17032	Pounds, Patrick, and Hinkle 1989	G5	S4S5	SNR	SNR
Lycopodium tristachyum	DEEP-ROOT CLUBMOSS	17037	Pounds, Patrick, and Hinkle 1989	G5	S4S5	SNR	SNR
Lycopus virginicus	VIRGINIA BUGLEWEED	32255	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Lygodium palmatum	CLIMBING FERN	17985	Pounds, Patrick, and Hinkle 1989	G4	S5	SNR	S3
Lyonia ligustrina	MALEBERRY	23559	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Lysimachia quadrifolia	WHORLED LOOSESTRIFE	23997	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Lysimachia tonsa	SOUTHERN LOOSESTRIFE	24001	Pounds, Patrick, and Hinkle 1989	G4	S4	S2S3	S4
Magnolia acuminata	CUCUMBER MAGNOLIA	18071	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Magnolia fraseri	FRASER MAGNOLIA	18073	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Magnolia macrophylla	BIGLEAF MAGNOLIA	18075	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	S1
Magnolia tripetala	UMBRELLA MAGNOLIA	18077	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Maianthemum canadense	FALSE LILY-OF-THE-VALLEY	503653	Pounds, Patrick, and Hinkle 1989	G5	S2	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Maianthemum racemosum ssp. racemosum	FALSE SOLOMON'S-SEAL	524297	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Malaxis unifolia	GREEN ADDER'S-MOUTH	43647	Pounds, Patrick, and Hinkle 1989	G5	S4?	SNR	S5
Malus angustifolia	SOUTHERN CRABAPPLE	25255	Pounds, Patrick, and Hinkle 1989	G5?	S3S4	SNR	SNR
Malus pumila	APPLE	25262	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Malva neglecta	COMMON MALLOW	21836	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Marrubium vulgare	COMMON HOARHOUND	32561	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Medeola virginiana	INDIAN CUCUMBER-ROOT	42963	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Medicago lupulina	BLACK MEDICK	503721	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Melampyrum lineare	AMERICAN COW-WHEAT	33651	Pounds, Patrick, and Hinkle 1989	G5	S2	SNR	SNR
Melilotus albus	WHITE SWEET-CLOVER	516979	Pounds, Patrick, and Hinkle 1989	GNR	SNR	SNR	SNR
Melilotus officinalis	YELLOW SWEETCLOVER	26150	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Menispermum canadense	CANADA MOONSEED	18871	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Microstegium vimineum	NEPALESE BROWNTOP	503829	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Mimulus alatus	SHARP-WING MONKEYFLOWER	33234	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Minuartia glabra	APPALACHIAN SANDWORT	19995	Pounds, Patrick, and Hinkle 1989	G4	S1S2	S3	SNR
Miscanthus sinensis	CHINESE SILVERGRASS	41874	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Mitchella repens	PARTRIDGE-BERRY	35063	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Mitella diphylla	TWO-LEAF BISHOP'S-CAP	24407	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Mollugo verticillata	GREEN CARPET-WEED	19899	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Monarda clinopodia	BASIL BEE-BALM	32288	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Monotropa hypopithys	AMERICAN PINESAP	503871	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Monotropa uniflora	INDIAN-PIPE	23778	Pounds, Patrick, and Hinkle 1989	G5	S5?	SNR	SNR
Morus rubra	RED MULBERRY	19070	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Muhlenbergia frondosa	WIRESTEM MUHLY	41915	NatureServe 2002/2003	G5	S4S5	SNR	SNR
Muhlenbergia schreberi	SCHREBER MUHLY	41939	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Muhlenbergia sobolifera	CLIFF MUHLY	41941	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Muhlenbergia tenuiflora	SLENDER MUHLY	41943	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Myosotis arvensis	FIELD FORGET-ME-NOT	31692	NatureServe 2002/2003	GNR	SNA	SNA	SNA
Myosotis macrosperma	LARGESEED FORGET-ME-NOT	31695	NatureServe 2002/2003	G5	S4S5	SNR	SNR
Nasturtium officinale	NASTURTIUM	23255	Pounds, Patrick, and Hinkle 19889	GNR	SNR	SNR	SNR
Nyssa sylvatica	BLACK GUM	27821	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Obolaria virginica	VIRGINIA PENNYWORT	30104	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Oenothera biennis	COMMON EVENING-PRIMROSE	27368	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Onoclea sensibilis	SENSITIVE FERN	17637	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Ophioglossum pycnostichum	ADDERS TONGUE	517792	Pounds, Patrick, and Hinkle 1989	G5	S4?		
Ophioglossum vulgatum var. pycnostichum	SOUTHEASTERN ADDER'S TONGUE	537989	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Orobanche uniflora	ONE-FLOWERED BROOMRAPE	34300	Pounds, Patrick, and Hinkle 1989	G5	S4?	SNR	SNR
Osmorhiza claytonii	HAIRY SWEET-CICELY	29789	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Osmorhiza longistylis	SMOOTHER SWEET-CICELY	29791	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Osmunda cinnamomea	CINNAMON FERN	17219	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Osmunda claytoniana	INTERRUPTED FERN	17220	Pounds, Patrick, and Hinkle 1989	G5	S4?	SNR	SNR
Osmunda regalis var. spectabilis	ROYAL FERN	529314	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Ostrya virginiana	EASTERN HOP-HORNBEAM	19511	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Oxalis dillenii	DILLEN'S WOODSORREL	29074	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Oxalis grandis	GREAT YELLOW WOOD-SORREL	29083	Pounds, Patrick, and Hinkle 1989	G4G5	S5	SNR	SNR
Oxalis montana	WHITE WOOD-SORREL	29090	Pounds, Patrick, and Hinkle 1989	G5	S4?	SNR	SNR
Oxalis stricta	UPRIGHT YELLOW WOOD-SORREL	29095	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Oxalis violacea	VIOLET WOOD-SORREL	29098	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Oxydendrum arboreum	SOURWOOD	23690	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Oxypolis rigidior	STIFF COWBANE	29544	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Panax quinquefolius	AMERICAN GINSENG	29399	Pounds, Patrick, and Hinkle 1989	G4	S5	S3S4	S3S4
Panicum anceps	BEAKED PANIC GRASS	40904	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Panicum capillare	COMMON PANIC GRASS	40914	NatureServe 2002/2003	G5	S5	SNR	SNR
Panicum dichotomiflorum	FALL PANIC GRASS	40908	Pounds, Patrick, and Hinkle 1989	G5	S4S5	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Panicum gattingeri	GATTINGER'S PANIC GRASS	40933	Pounds, Patrick, and Hinkle 1989	G4	SNR	SNR	SU
Paronychia argyrocoma	SILVERY NAILWORT	20321	Pounds, Patrick, and Hinkle 1989	G4	S1	S1S2	S4
Paronychia canadensis	FORKED NAILWORT	20325	Pounds, Patrick, and Hinkle 1989	G5	S4?	SNR	SNR
Parthenocissus quinquefolia	VIRGINIA CREEPER	28602	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Paspalum dilatatum	DALLISGRASS	40997	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Paspalum pubiflorum	HAIRY-SEED PASPALUM	40994	Pounds, Patrick, and Hinkle 1989	G5	S4?	SNR	SNR
Paspalum setaceum	THIN PASPALUM	41042	NatureServe 2002/2003	G5	SNR	SNR	SNR
Passiflora lutea	YELLOW PASSIONFLOWER	22226	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Paulownia tomentosa	PRINCESS TREE	33460	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Pedicularis canadensis	CANADIAN LOUSEWORT	33362	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Pellaea atropurpurea	PURPLE-STEM CLIFF-BRAKE	17641	Pounds, Patrick, and Hinkle 1989	G5	S4S5	SNR	SNR
Penstemon canescens	GRAY BEARDTONGUE	33846	Pounds, Patrick, and Hinkle 1989	G4	S5	SNR	SNR
Penstemon digitalis	TALUS SLOPE PENSTEMON	33881	NatureServe 2002/2003	G5	S5	SNR	SNR
Penstemon pallidus	PALE BEARDTONGUE	33967	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SU
Perilla frutescens	BEEF-STEAK PLANT	32634	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Phacelia bipinnatifida	FERNLEAF PHACELIA	31459	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	S3
Phacelia purshii	MIAMI-MIST	504279	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	S3
Phaseolus polystachios	WILD KIDNEY BEAN	504291	Pounds, Patrick, and Hinkle 1989	G4	S4S5	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Phegopteris hexagonoptera	BROAD BEECH FERN	504296	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Philadelphus hirsutus	STREAMBANK MOCK-ORANGE	24427	Pounds, Patrick, and Hinkle 1989	G5	S3S4	SNR	S3
Phleum pratense	MEADOW TIMOTHY	41062	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Phlox amplifolia	LARGE-LEAVED PHLOX	30911	Pounds, Patrick, and Hinkle 1989	G3G5	S4S5	SNR	S2
Phlox carolina	THICK-LEAVED PHLOX	30921	Pounds, Patrick, and Hinkle 1989	G5?	SNA	SNR	SNR
Phlox divaricata	WILD BLUE PHLOX	30934	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Phlox maculata	SPOTTED PHLOX	30961	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Phlox paniculata	FALL PHLOX	30973	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Phoradendron leucarpum	AMERICAN MISTLETOE	504341	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Photinia melanocarpa	BLACK CHOKEBERRY	565397	NatureServe 2002/2003	G5	S4S5	SNR	SNR
Phryma leptostachya	LOPSEED	504348	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Physalis heterophylla	CLAMMY GROUND-CHERRY	30601	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Physalis virginiana	VIRGINIA GROUND-CHERRY	30612	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Physostegia virginiana	OBEDIENT-PLANT	32391	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Phytolacca americana	COMMON POKEWEED	19523	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Pilea pumila	CANADA CLEARWEED	19130	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Pinus rigida	PITCH PINE	183376	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Pinus virginiana	VIRGINIA PINE	183394	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Pityopsis graminifolia var. graminifolia	SILKGRASS	136350	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Plantago lanceolata	ENGLISH PLANTAIN	32874	Pounds, Patrick, and Hinkle 1989	G5	SNA	SNA	SNR
Plantago major	GREAT PLANTAIN	32887	Pounds, Patrick, and Hinkle 1989	G5	SNA	SNA	SNR
Plantago rugelii	BLACK-SEED PLANTAIN	504439	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Plantago virginica	PALE-SEEDED PLANTAIN	32895	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Platanthera ciliaris	YELLOW FRINGED ORCHID	43413	Pounds, Patrick, and Hinkle 1989	G5	S3S4	SNR	S3S4
Platanthera clavellata	SMALL GREEN WOODLAND ORCHID	43423	Pounds, Patrick, and Hinkle 1989	G5	S4	S4?	S5
Platanthera flava	PALE GREEN ORCHID	43414	Pounds, Patrick, and Hinkle 1989	G4	S4?	SNR	S3
Platanthera lacera	GREEN FRINGED ORCHID	43430	Pounds, Patrick, and Hinkle 1989	G5	S4?	SNR	S3S4
Platanus occidentalis	SYCAMORE	19020	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Pleopeltis polypodioides	RESURRECTION FERN	504451	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Poa alsodes	GROVE BLUEGRASS	41104	NatureServe 2002/2003	G4G5	S4S5	SNR	S3
Poa annua	ANNUAL BLUEGRASS	41107	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Poa autumnalis	AUTUMN BLUEGRASS	41111	NatureServe 2002/2003	G5	S5	SNR	SNR
Poa compressa	CANADA BLUEGRASS	41082	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Poa cuspidata	EARLY BLUEGRASS	41122	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Poa pratensis	KENTUCKY BLUEGRASS	41088	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNR	SNR
Poa sylvestris	WOODLAND BLUEGRASS	41162	NatureServe 2002/2003	G5	S5	SNR	SNR
Poa trivialis	ROUGH BLUEGRASS	41163	NatureServe 2002/2003	GNR	SNA	SNA	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Podophyllum peltatum	MAY APPLE	18850	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Polygala sanguinea	FIELD MILKWORT	29314	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Polygala senega	SENECA SNAKEROOT	29316	Pounds, Patrick, and Hinkle 1989	G4G5	S4?	SNR	SNR
Polygonatum biflorum	COMMON SOLOMON'S-SEAL	43006	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Polygonum arifolium	HALBERD-LEAF TEARTHUMB	20849	Pounds, Patrick, and Hinkle 1989	G5	S4?	S1	SNR
Polygonum aviculare	PROSTRATE KNOTWEED	20876	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Polygonum caespitosum var. longisetum	ORIENTAL LADYSTHUMB	566299	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Polygonum cuspidatum	JAPANESE KNOTWEED	20889	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Polygonum pensylvanicum	PENNSYLVANIA SMARTWEED	20861	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Polygonum persicaria	LADY'S THUMB	20915	Pounds, Patrick, and Hinkle 1989	G3G5	SNA	SNR	SNR
Polygonum punctatum	DOTTED SMARTWEED	20862	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Polygonum sagittatum	ARROW-LEAVED TEARTHUMB	20863	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Polygonum scandens	CLIMBING FALSE-BUCKWHEAT	20924	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Polygonum virginianum	VIRGINIA KNOTWEED	20931	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Polymnia canadensis	WHITE-FLOWER LEAFCUP	36438	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Polypodium virginianum	ROCK POLYPODY	17242	Pounds, Patrick, and Hinkle 1989	G5	S5	S4S5	SNR
Polystichum acrostichoides	CHRISTMAS FERN	17675	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Porteranthus trifoliatus	BOWMAN'S-ROOT	25285	Pounds, Patrick, and	G4G5	S4?	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
			Hinkle 1989				
Potentilla canadensis	CANADA CINQUEFOIL	24698	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Potentilla norvegica	NORWEGIAN CINQUEFOIL	24730	Pounds, Patrick, and Hinkle 1989	G5	S4S5	SNR	SNR
Potentilla recta	SULPHUR CINQUEFOIL	24742	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Potentilla simplex	OLD-FIELD CINQUEFOIL	24751	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Prenanthes altissima	TALL RATTLESNAKE-ROOT	38273	Pounds, Patrick, and Hinkle 1989	G5?	S5	SNR	SNR
Prunella vulgaris	SELF-HEAL	32381	Pounds, Patrick, and Hinkle 1989	G5	SNA	SNR	SNR
Prunus americana	AMERICAN PLUM	24763	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Prunus angustifolia	CHICKASAW PLUM	24768	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Prunus persica	PEACH	24765	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Prunus serotina	WILD BLACK CHERRY	24764	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Ptelea trifoliata	WAFER-ASH	28992	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Ptelea trifoliata ssp. trifoliata var. mollis	WAFER-ASH	531766	NatureServe 2002/2003	G5	S5	SNR	SNR
Pteridium aquilinum	BRACKEN FERN	17224	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Pueraria montana var. lobata	KUDZU	529930	Pounds, Patrick, and Hinkle 1989	GNR	SNR	SNA	SNR
Pycnanthemum incanum	HOARY MOUNTAIN-MINT	32662	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Pycnanthemum pycnanthemoides	SOUTHERN MOUNTAIN-MINT	32667	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Pyrrhopappus carolinianus	CAROLINA FALSE-DANDELION	38324	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Pyrularia pubera	BUFFALO-NUT	504705	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Pyrus communis	COMMON PEAR	25295	NatureServe 2002/2003	G5	SNA	SNA	SNR
Quercus alba	WHITE OAK	19290	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Quercus coccinea	SCARLET OAK	19288	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Quercus falcata	SOUTHERN RED OAK	19277	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Quercus marilandica	BLACKJACK OAK	19374	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Quercus muehlenbergii	CHINKAPIN OAK	504714	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Quercus phellos	WILLOW OAK	19282	NatureServe 2002/2003	G5	S5	SNR	SNR
Quercus prinus	CHESTNUT OAK	195058	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Quercus rubra	NORTHERN RED OAK	19408	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Quercus velutina	BLACK OAK	19447	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Ranunculus abortivus	KIDNEY-LEAVED BUTTERCUP	18559	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Ranunculus acris	TALL BUTTER-CUP	18583	Pounds, Patrick, and Hinkle 1989	G5	SNA	SNR	SNR
Ranunculus allegheniensis	ALLEGHENY MOUNTAIN BUTTERCUP	18586	NatureServe 2002/2003	G4G5	S3S4	S1	SNR
Ranunculus bulbosus	BULBOUS BUTTERCUP	18594	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Ranunculus hispidus	HISPID BUTTERCUP	18613	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Ranunculus recurvatus	BLISTERWORT	18641	Pounds, Patrick, and Hinkle 1989	G5	SNA	SNR	SNR
Rhododendron catawbiense	CATAWBA RHODODENDRON	23714	Pounds, Patrick, and Hinkle 1989	G5	S2S3	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Rhododendron cumberlandense	CUMBERLAND RHODODENDRON	504750	Pounds, Patrick, and Hinkle 1989	G4?	SNR	S3	S3
Rhododendron maximum	GREAT RHODODENDRON	23721	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Rhododendron minus	CAROLINA RHODODENDRON	23722	NatureServe 2002/2003	G4	SNA	S2S3	
Rhododendron prinophyllum	EARLY AZALEA	23727	Pounds, Patrick, and Hinkle 1989	G5	S3S4	SNR	SNR
Rhus aromatica	FRAGRANT SUMAC	28779	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Rhus copallinum	WINGED SUMAC	504754	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Rhus glabra	SMOOTH SUMAC	28782	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Rhynchospora capitellata	BROWNISH BEAKRUSH	40145	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Robinia hispida	BRISTLY LOCUST	26191	Pounds, Patrick, and Hinkle 1989	G4	SU	SNR	SNR
Robinia hispida var. rosea	BRISTLY LOCUST	530084	BONAP County Database	G4	S2S3	SNR	SNR
Robinia pseudoacacia	BLACK LOCUST	504804	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Rosa carolina var. carolina	CAROLINA ROSE	530107	NatureServe 2002/2003	G5	SNR	SNR	SNR
Rosa multiflora	MULTIFLORA ROSE	24833	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Rosa setigera	PRAIRIE ROSE	24839	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	S1
Rosa virginiana	VIRGINIA ROSE	24810	Pounds, Patrick, and Hinkle 1989	G5	SNA	SH	SNR
Rosa wichuraiana	MEMORIAL ROSE	24846	Pounds, Patrick, and Hinkle 1989	GNR	SNA		SNR
Rubus allegheniensis	ALLEGHENY BLACKBERRY	24866	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Rubus argutus	sawtooth blackberry	24877	NatureServe 2002/2003	G5	S5	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Rubus cuneifolius	SAWTOOTH BLACKBERRY	24905	NatureServe 2002/2003	G5	SNA	SNR	SNR
Rubus flagellaris	SAND BLACKBERRY	24921	NatureServe 2002/2003	G5	S5	SNR	SNR
Rubus hispidus	SAND BLACKBERRY	24943	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Rubus occidentalis	BLACK RASPBERRY	24854	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Rubus odoratus	PURPLE FLOWERING RASPBERRY	24997	Pounds, Patrick, and Hinkle 1989	G5	S4?	SNR	SNR
Rubus pensilvanicus	PENNSYLVANIA BLACKBERRY	504874	NatureServe 2002/2003	G5	SNR	SNR	SNR
Rudbeckia fulgida	ORANGE CONEFLOWER	36770	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Rudbeckia fulgida var. umbrosa	ORANGE CONEFLOWER	530166	NatureServe 2002/2003	G5	SNR	SNR	SNR
Rudbeckia hirta	BLACK-EYED SUSAN	36765	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Rudbeckia laciniata	CUT-LEAVED CONEFLOWER	36775	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Rudbeckia triloba	BROWN-EYED SUSAN	36784	Pounds, Patrick, and Hinkle 1989	G4	S5	SNR	SNR
Ruellia caroliniensis	CAROLINA PETUNIA	34373	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Ruellia purshiana	PURSH'S WILD-PETUNIA	34388	Pounds, Patrick, and Hinkle 1989	G5	SNR	S1S2	SNR
Rumex acetosella	SHEEP SORREL	20934	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Rumex crispus	CURLY DOCK	20937	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Rumex obtusifolius	BITTER DOCK	20939	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Sabatia angularis	SQUARE-STEMMED ROSE PINK	30005	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Saccharum alopecuroidum	SILVER PLUME GRASS	504929	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Sagittaria latifolia	BROADLEAF ARROWHEAD	38908	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Salix humilis	TALL PRAIRIE WILLOW	22546	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Salix nigra	BLACK WILLOW	22484	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Salix occidentalis	DWARF GRAY WILLOW	520867	Pounds, Patrick, and Hinkle 1989	G5	S5?		
Salix tristis	DWARF PRAIRIE WILLOW	520924	Pounds, Patrick, and Hinkle 1989	G5T4T5	SNR	SNR	SNR
Salvia lyrata	LYRE-LEAF SAGE	32690	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Salvia urticifolia	NETTLE-LEAF SAGE	32750	Pounds, Patrick, and Hinkle 1989	G5	S1	SNR	SNR
Sambucus canadensis	COMMON ELDERBERRY	35317	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Samolus parviflorus	WATER-PIMPERNEL	24037	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Sanguinaria canadensis	BLOODROOT	18990	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Sanicula canadensis	CANADIAN BLACK-SNAKEROOT	29850	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Sanicula gregaria	CLUSTERED BLACK-SNAKEROOT	29853	Pounds, Patrick, and Hinkle 1989	G4	SNR	SNR	SNR
Sanicula smallii	SMALL'S BLACK-SNAKEROOT	29860	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Saponaria officinalis	BOUNCING-BET	20039	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Sassafras albidum	SASSAFRAS	18158	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Saxifraga michauxii	MICHAUX'S SAXIFRAGE	24284	Pounds, Patrick, and Hinkle 1989	G4G5	S2	SNR	SNR
Schizachyrium scoparium	LITTLE BLUESTEM	42076	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Scirpus cyperinus	COTTONGRASS BULRUSH	40228	Pounds, Patrick, and	G5	S5	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
			Hinkle 1989				
Scirpus polyphyllus	LEAFY BULRUSH	40274	Pounds, Patrick, and Hinkle 1989	G5	S4S5	SNR	SNR
Scutellaria elliptica	HAIRY SKULLCAP	32796	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Scutellaria elliptica var. hirsuta	HAIRY SKULLCAP	196140	NatureServe 2002/2003	G5	SNR	SNR	SNR
Scutellaria incana	HOARY SKULLCAP	32770	NatureServe 2002/2003	G5	S5?	SNR	S2
Scutellaria serrata	SHOWY SKULLCAP	32778	Pounds, Patrick, and Hinkle 1989	G4G5	S3?	SNR	SNR
Sedum ternatum	WOOD STONECROP	24184	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Senecio aureus	GOLDEN RAGWORT	36091	Pounds, Patrick, and Hinkle 1989	G5	S4S5	SNR	SNR
Senecio obovatus	ROUND-LEAF GROUNDSEL	36164	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Senecio smallii	SMALL'S RAGWORT	518137	Pounds, Patrick, and Hinkle 1989	G5	S4S5	SNR	SNR
Senna marilandica	MARYLAND SENNA	505160	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Sericocarpus linifolius	NARROWLEAF WHITETOP ASTER	508090	NatureServe 2002/2003	G5	S5	SNR	SNR
Setaria glauca	YELLOW FOXTAIL	41246	Pounds, Patrick, and Hinkle 1989	GNR	SNR	SNR	SNR
Setaria parviflora	BRISTLY FOXTAIL	505191	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Setaria viridis	GREEN BRISTLE GRASS	41231	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Sicyos angulatus	ONE-SEED BUR-CUCUMBER	22402	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Sida spinosa	PRICKLY FANPETALS	21732	NatureServe 2002/2003	G5?	SNA	SNA	SNR
Silene ovata	OVATE CATCHFLY	20100	Pounds, Patrick, and Hinkle 1989	G2G3	S1	S2	S1
Silene rotundifolia	ROUNDLEAF CATCHFLY	20114	Pounds, Patrick, and	G4	S5	SNR	S2

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
			Hinkle 1989				
Silene virginica	FIRE PINK	20141	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Silphium asteriscus	STARRY ROSIN-WEED	38387	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SU
Silphium terebinthinaceum	PRAIRIE ROSINWEED	38411	Pounds, Patrick, and Hinkle 1988	G4G5	S4?	S1	S2
Silphium trifoliatum	THREE-LEAVED ROSINWEED	505235	Pounds, Patrick, and Hinkle 1989	G4?	S5	S3S4	SNR
Silphium trifoliatum var. latifolium	WHORLED ROSINWEED	530390	Pounds, Patrick, and Hinkle 1989	G4?	SNR	SNR	SNR
Silphium trifoliatum var. trifoliatum	THREE-LEAVED ROSINWEED	530391	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Sinapis arvensis	CORN-MUSTARD	23310	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Sisyrinchium albidum	WHITE BLUE-EYED GRASS	43241	NatureServe 2002/2003	G5?	S5	SNR	S2
Sisyrinchium angustifolium	POINTED BLUE-EYED-GRASS	43240	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Smallanthus uvedalius	YELLOW-FLOWERED LEAFCUP	505252	Pounds, Patrick, and Hinkle 1989	G4G5	S5	SNA	SNR
Smilax bona-nox	SAW GREENBRIER	43341	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Smilax glauca	GLAUCOUS-LEAVED GREENBRIER	43342	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Smilax herbacea	SMOOTH CARRION-FLOWER	43356	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Smilax hispida	BRISTLY GREENBRIER	43343	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Smilax hugeri	HUGER'S CARRION-FLOWER	505254	Pounds, Patrick, and Hinkle 1989	G4	S4S5	SNR	SNA
Smilax pulverulenta	DOWNY CARRION-FLOWER	505257	Pounds, Patrick, and Hinkle 1989	G4G5	S4?	SNR	SNR
Smilax rotundifolia	COMMON GREENBRIER	43346	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Smilax tamnoides	BRISTLY GREENBRIER	43348	NatureServe 2002/2003	G5	S5	SNR	SNR
Solanum carolinense	CAROLINA HORSE-NETTLE	30413	Pounds, Patrick, and Hinkle 1989	G5	S5?	SNR	SNR
Solanum nigrum	BLACK NIGHTSHADE	565525	NatureServe 2002/2003	GNR	SNR	SNA	SNA
Solidago arguta var. arguta	CUT-LEAVED GOLDEN-ROD	530436	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Solidago arguta var. caroliniana	ATLANTIC GOLDENROD	530438	Pounds, Patrick, and Hinkle 1989	G5	SU	SNR	SNR
Solidago bicolor	WHITE GOLDENROD	36234	Pounds, Patrick, and Hinkle 1989	G5	S5?	SNR	SNR
Solidago caesia	BLUESTEM GOLDENROD	36238	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Solidago canadensis	CANADA GOLDENROD	36224	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Solidago canadensis var. scabra	CANADA GOLDENROD	530448	NatureServe 2002/2003	G5	SNR	SNR	SNR
Solidago curtisii	CURTIS' GOLDENROD	36242	Pounds, Patrick, and Hinkle 1989	G4G5 Q	S2S3	S4	SNR
Solidago erecta	SLENDER GOLDENROD	36252	Pounds, Patrick, and Hinkle 1989	G5	S5?	SNR	SNR
Solidago flaccidifolia	APPALACHIAN GOLDEN-ROD	36255	Pounds, Patrick, and Hinkle 1989	G5	S4?	SNR	SU
Solidago flexicaulis	BROAD-LEAVED GOLDENROD	36257	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Solidago gigantea	LATE GOLDENROD	36259	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Solidago nemoralis	GRAY GOLDENROD	36281	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SU
Solidago odora	ANISE-SCENTED GOLDENROD	36284	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Solidago patula	ROUNDLEAF GOLDENROD	36288	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	S3S4
Solidago rigida var. rigida	STIFF GOLDENROD	524709	Pounds, Patrick, and Hinkle 1989	G5	S3S4	SNR	S2

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Solidago roanensis	ROAN MOUNTAIN GOLDENROD	36298	Pounds, Patrick, and Hinkle 1989	G4G5	S1S2	SNR	SNR
Solidago rugosa ssp. rugosa var. rugosa	ROUGH-LEAF GOLDENROD	531821	Pounds, Patrick, and Hinkle 1989	G5	S4S5	SNR	SNR
Solidago sphacelata	AUTUMN GOLDENROD	36312	Pounds, Patrick, and Hinkle 1989	G4G5	S4	S4	SNR
Solidago ulmifolia var. ulmifolia	ELMLEAF GOLDENROD	530489	NatureServe 2002/2003	G5	S5	SNR	SNR
Sonchus asper	SPINY-LEAF SOWTHISTLE	38424	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Sorghastrum nutans	YELLOW INDIAN-GRASS	42102	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Sorghum halepense	JOHNSONGRASS	42111	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Sparganium americanum	AMERICAN BUR-REED	42313	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Sphenopholis nitida	SHINY WEDGE GRASS	41281	Pounds, Patrick, and Hinkle 1989	G5	S4S5	SNR	SNR
Sphenopholis obtusata	PRAIRIE WEDGESCALE	41279	NatureServe 2002/2003	G5	S5?	SNR	SNR
Spiraea prunifolia	BRIDAL-WREATH	25337	Pounds, Patrick, and Hinkle 1989	G5	SNA	SNA	SNR
Spiranthes cernua	NODDING LADIES'-TRESSES	43444	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Spiranthes lacera var. gracilis	SOUTHERN SLENDER LADIES'TRESSES	530529	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Spiranthes ovalis	LESSER LADIES'-TRESSES	43451	Pounds, Patrick, and Hinkle 1989	G5	S4S5	S3	SNR
Spiranthes vernalis	TWISTED LADIES'-TRESSES	43453	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Stachys nuttallii	NUTTALL'S HEDGE-NETTLE	521940	Pounds, Patrick, and Hinkle 1989	G5?	S5	SNR	SNR
Stellaria media	COMMON STARWORT	20169	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Stellaria pubera	GIANT CHICKWEED	20193	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Symphoricarpos orbiculatus	CORAL-BERRY	35337	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Symphyotrichum phlogifolium	PHLOX-LEAF ASTER	522233	NatureServe 2002/2003	G5	SNR	SNR	SNR
Taenidia integerrima	YELLOW PIMPERNELL	29875	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Taraxacum officinale	COMMON DANDELION	36213	Pounds, Patrick, and Hinkle 1989	G5	SNA	SNR	SNR
Tephrosia virginiana	GOAT'S-RUE	26998	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Teucrium canadense var. canadense	CANADA GERMANDER	530630	NatureServe 2002/2003	G5	SNA	SNR	SNR
Thalictrum clavatum	MOUNTAIN MEADOW-RUE	18663	Pounds, Patrick, and Hinkle 1989	G4	SNR	SNR	SNR
Thalictrum dioicum	EARLY MEADOWRUE	18669	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Thalictrum pubescens	TALL MEADOW-RUE	18678	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Thalictrum revolutum	WAXLEAF MEADOWRUE	18660	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Thalictrum thalictroides	WINDFLOWER	18683	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Thaspium barbinode	HAIRY-JOINTED MEADOW-PARSNIP	29888	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Thaspium trifoliatum	PURPLE MEADOW-PARSNIP	29890	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Thelypteris noveboracensis	NEW YORK FERN	17261	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Tiarella cordifolia	HEART-LEAVED FOAM-FLOWER	24530	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Tilia americana	AMERICAN BASSWOOD	21536	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Tilia americana var. heterophylla	WHITE BASSWOOD	530692	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Tipularia discolor	CRIPPLED CRANEFLY	43703	NatureServe 2002/2003	G4G5	S5	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Torilis arvensis	FIELD HEDGE-PARSLEY	29894	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNA
Toxicodendron radicans	POISON IVY	28821	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Tradescantia ohiensis	OHIO SPIDERWORT	39169	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Tradescantia subaspera	ZIGZAG SPIDERWORT	39176	NatureServe 2002/2003	G5	S5?	SNR	S3
Tradescantia virginiana	VIRGINIA SPIDERWORT	39178	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Trautvetteria caroliniensis var. caroliniensis	CAROLINA BUGBANE	531134	NatureServe 2002/2003	G5	SNR	SNR	SNR
Trichostema brachiatum	FALSE PENNYROYAL	32372	Pounds, Patrick, and Hinkle 1989	G4G5	SNR	SNR	SNR
Trichostema dichotomum	FORKED BLUECURLS	32364	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Tridens flavus	TALL PURPLE-TOP FLUFFGRASS	42227	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Trifolium campestre	LOW HOP CLOVER	26231	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Trifolium hybridum	ALSIKE CLOVER	26261	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Trifolium pratense	RED CLOVER	26313	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Trifolium repens	WHITE CLOVER	26206	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Trillium erectum	STINKING BENJAMIN	43070	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Trillium grandiflorum	LARGE-FLOWERED WAKEROBIN	43074	Pounds, Patrick, and Hinkle 1989	G5	S4	SNR	SNR
Trillium sulcatum	FURROWED WAKEROBIN	505594	Pounds, Patrick, and Hinkle 1989	G4	S5	S3	SNR
Trillium undulatum	PAINTED TRILLIUM	43092	Pounds, Patrick, and Hinkle 1989	G5	S2	SNR	SNR
Triodanis perfoliata var. perfoliata	CLASPING VENUS' LOOKING-	530743	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
	GLASS						
Triosteum aurantiacum	HORSE-GENTIAN	505596	Pounds, Patrick, and Hinkle 1989	G5	S5?	SNR	S3
Tsuga canadensis	EASTERN HEMLOCK	183397	Pounds, Patrick, and Hinkle 1989	G5	SNA	SNR	SNR
Typha latifolia	BROAD-LEAF CATTAIL	42326	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Ulmus alata	WINGED ELM	19051	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Ulmus americana	AMERICAN ELM	19049	Pounds, Patrick, and Hinkle 1989	G5?	S5	SNR	SNR
Ulmus rubra	SLIPPERY ELM	19050	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Uvularia grandiflora	LARGE-FLOWERED BELLWORT	43109	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Uvularia perfoliata	PERFOLIATE BELLWORT	43110	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Uvularia sessilifolia	SESSILE-LEAF BELLWORT	43112	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Vaccinium constablaei	HIGHBUSH BLUEBERRY	23573	Pounds, Patrick, and Hinkle 1988	G5	S5	SNR	S5
Vaccinium erythrocarpum	SOUTHERN MOUNTAIN CRANBERRY	23593	Pounds, Patrick, and Hinkle 1989	G5	S1?	SNR	SNR
Vaccinium pallidum	EARLY LOWBUSH BLUEBERRY	23610	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Vaccinium stamineum	SQUAW HUCKLEBERRY	23615	Pounds, Patrick, and Hinkle 1988	G5	S5	SNR	SNR
Valerianella locusta	LEWISTON CORNSALAD	35392	NatureServe 2002/2003	G5	SNA	SNA	SNR
Verbascum blattaria	MOTH MULLEIN	33389	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Verbascum thapsus	GREAT MULLEIN	33394	Pounds, Patrick, and Hinkle 1989	GNR	SNA	SNA	SNR
Verbena urticifolia	WHITE VERVAIN	32127	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Verbesina alternifolia	WINGSTEM	38597	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Verbesina occidentalis	YELLOW CROWNBEARD	38610	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Verbesina virginica var. virginica	WHITE CROWNBEARD	530792	NatureServe 2002/2003	G5	SNR	SNR	S3
Vernonia gigantea	GIANT IRONWEED	38634	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Vernonia gigantea ssp. gigantea	IRONWEED	38635	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Veronica arvensis	CORN SPEEDWELL	33411	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Veronica officinalis	GYPSY-WEED	33398	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Veronica serpyllifolia	THYME-LEAVED SPEEDWELL	33423	Pounds, Patrick, and Hinkle 1989	G5	SNA	SNR	SNR
Viburnum acerifolium	MAPLE-LEAF ARROWOOD	35255	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Viburnum nudum var. cassinoides (was called Viburnum cassinoides)	NORTHERN WILD-RAISIN	35250	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Viburnum opulus	EUREOPEAN CRANBERRYBUSH	35270	NatureServe 2002/2003	G5	SNA		SNR
Viburnum prunifolium	SMOOTH BLACK-HAW	35253	Pounds, Patrick, and Hinkle 1989	G5	S5?	SNR	SNR
Viburnum rufidulum	RUSTY BLACKHAW	35274	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	S3
Vicia caroliniana	CAROLINA WOOD VETCH	26334	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Vicia sativa ssp. nigra	GARDEN VETCH	524809	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Vinca minor	COMMON PERIWINKLE	30238	NatureServe 2002/2003	GNR	SNA	SNA	SNR
Viola affinis	SAND VIOLET	22035	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	S4
Viola bicolor	FIELD PANSY	22047	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
Viola blanda	SMOOTH WHITE VIOLET	22050	Pounds, Patrick, and Hinkle 1989	G4G5	S5	SNR	SNR
Viola canadensis	CANADA VIOLET	22053	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Viola conspersa	AMERICAN BOG VIOLET	22060	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Viola cucullata	MARSH BLUE VIOLET	505709	Pounds, Patrick, and Hinkle 1989	G4G5	S5	SNR	SNR
Viola hastata	HALBERD-LEAVED YELLOW VIOLET	22086	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Viola hirsutula	SOUTHERN WOOD VIOLET	22087	Pounds, Patrick, and Hinkle 1989	G4	S5	SNR	SNR
Viola macloskeyi ssp. pallens	SMOOTH WHITE VIOLET	524820	Pounds, Patrick, and Hinkle 1989	G5	SNA	SNR	SNR
Viola palmata	PALMATE-LEAVED VIOLET	22125	Pounds, Patrick, and Hinkle 1989	G5	S5?	SNR	SNR
Viola palmata var. sororia	WOOLLY BLUE VIOLET	541726	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Viola palmata var. triloba	THREE-LOBED VIOLET	541727	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Viola papilionacea	COMMON BLUE VIOLET	22127	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Viola pedata	BIRD'S-FOOT VIOLET	22130	Pounds, Patrick, and Hinkle 1989	G5	S5?	SNR	SNR
Viola pubescens var. eriocarpon	DOWNY YELLOW VIOLET	541738	Pounds, Patrick, and Hinkle 1989	G5	SNR		
Viola rotundifolia	ROUNDLEAF VIOLET	22159	Pounds, Patrick, and Hinkle 1989	G5	S3S4	SNR	SNR
Viola sagittata	ARROW-LEAVED VIOLET	22162	Pounds, Patrick, and Hinkle 1989	G5	S3?	SNR	SNR
Viola striata	STRIPED VIOLET	22171	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Vitis aestivalis	SUMMER GRAPE	28607	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Vitis cinerea	PIGEON GRAPE	28615	Pounds, Patrick, and	G4G5	S4?	SNR	SNR

Latin Name	CommonName	TSN #	Data Source	Grank	Srank KY	Srank TN	Srank VA
			Hinkle 1989				
Vitis cinerea var. baileyana	GRAYBARK GRAPE	530854	NatureServe 2002/2003	G5	SNR	SNR	SNR
Vitis rotundifolia	MUSCADINE GRAPE	28609	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Vitis vulpina	WINTER GRAPE	28610	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR
Waldsteinia fragarioides	BARREN STRAWBERRY	505735	Pounds, Patrick, and Hinkle 1989	G5	S3S4	SNR	SNR
Woodsia obtusa	BLUNT-LOBE WOODSIA	17744	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Woodsia scopulina	ROCKY MOUNTAIN WOODSIA	17747	Pounds, Patrick, and Hinkle 1989	G5	SNA	SNA	SNA
Woodwardia areolata	NETTED CHAINFERN	17749	Pounds, Patrick, and Hinkle 1989	G5	S4?	SNR	SNR
Xanthium strumarium	ROUGH COCKLEBUR	38692	NatureServe 2002/2003	G5	S5?	SNR	SNR
Yucca filamentosa	COMMON YUCCA	43140	Pounds, Patrick, and Hinkle 1989	G5	SNR	SNR	SNR
Zizia aptera	GOLDEN ALEXANDER	29905	Pounds, Patrick, and Hinkle 1989	G5	S5	SNR	SNR

*Key to Numeric Rank for Granks (G) and Sranks (S)
G1 = Critically imperiled globally
G2 = Imperiled globally
G3 = Rare or uncommon
G4 = Widespread, abundant, and apparently secure, but with cause for long-term concern
G5 = Demonstrably widespread, abundant and secure
G? = Unranked
GNR = Not ranked
S1 = Critically imperiled statewide
S2 = Imperiled statewide
S3 = Rare or uncommon
S4 = Widespread, abundant, and apparently secure, but with cause for long-term concern in the state
S5 = Demonstrably widespread, abundant and secure in the state
S? = Unranked
SNR = Not ranked
SNA = Exotic species
n/a = not ranked (usually because only genus was identified)
Qualifiers:
? = Inexact numeric rank
Q = Questionable taxonomy

Table 3. List of vouchers collected at Cumberland Gap National Historical Park.

Latin Name	Common Name	TSN	Catalog#	Accession#	Collector	Habitat
Acalypha virginica	Virginia threeseed mercury	28195	CUGA 03971	CUGA-0299	John F. Townsend	Open, disturbed W-facing moderately steep slope a base of limestone cliff.
Agrimonia pubescens	soft agrimony	25099	CUGA 03972	CUGA-0299	Nancy E. Van Alstine	Upland forest edge adjacent to mowed lawn.
Allium vineale	wild garlic	42637	CUGA 03973	CUGA-0299	Allen Belden Jr	Edge of paved trail along ridgecrest. Open Pinus virginiana woodland.
Amaranthus spinosus	spiny amaranth	20748	CUGA 03974	CUGA-0299	John F. Townsend	S-facing slope in bed of revegetating old US 58.
Ambrosia trifida var. trifida	great ragweed	182422	CUGA 03975	CUGA-0299	Allen Belden Jr	Moist open thicket between gravel road and small stream.
Andropogon gerardii	big bluestem	40462	CUGA 03976	CUGA-0299	John F. Townsend	Open edge of woodland adjacent to road cut. Moderately steep S-facing slope. Limestone substrate.
Anthoxanthum odoratum	sweet vernalgrass	41395	CUGA 04094	CUGA-0299	Nancy E. Van Alstine	Periodically mowed roadside strip.
Arabis lyrata	lyre-leaf rockcress	22672	CUGA 04095	CUGA-0299	Allen Belden Jr	Limestone woodland on moderately steep SW-facing slope.
Avena sativa	common oat	41459	CUGA 04096	CUGA-0299	Nancy E. Van Alstine	Revegetating roadbed of old US 58.
Barbarea verna	early yellowrocket	22743	CUGA 04097	CUGA-0299	Allen Belden Jr	Open, disturbed W-facing moderately steep slope at base of limestone cliff.

Latin Name	Common Name	TSN	Catalog#	Accession#	Collector	Habitat
Berberis thunbergii	Japanese barberry	18835	CUGA 03977	CUGA-0299	Allen Belden Jr	Disturbed acidic forest underlain by sandstone. Near paved road.
Blephilia ciliata	downy woodmint	32460	CUGA 03978	CUGA-0299	Claude Bailey, R. McCoy	Disturbed Virginia pine successional
Brassica rapa	field mustard	23063	CUGA 04098	CUGA-0299	Allen Belden Jr	Recently revegetated roadbed of old US 58.
Campsis radicans	trumpet creeper	34309	CUGA 04099	CUGA-0299	Allen Belden Jr	Limestone woodland on moderately steep SW-facing slope.
Carex albicans	whitetinge sedge	565042	CUGA 03979	CUGA-0299	John F. Townsend	Rich, steeply sloping, mesic hardwood forest.
Carex amphibola	eastern narrowleaf sedge	39491	CUGA 03980	CUGA-0299	Allen Belden Jr	Well-shaded mesic forest along Station Creek.
Carex appalachica	Appalachian sedge	39497	CUGA 03981	CUGA-0299	John F. Townsend	Sub-mesic hardwood forest with abundant fern cover.
Carex atlantica ssp. atlantica	prickly bog sedge	523747	CUGA 03982	CUGA-0299	Kim Feeman	Bog
Carex bromoides	bromelike sedge	39380	CUGA 04101	CUGA-0299	Allen Belden Jr	Headwater spring seep in rich calcareous forest.
Carex cumberlandensis	Cumberland sedge	-477	CUGA 03983	CUGA-0299	John F. Townsend	Trailside near small stream crossing
Carex hirsutella	fuzzy wuzzy sedge	39636	CUGA 03985	CUGA-0299	Allen Belden Jr	Edge of paved trail along ridgecrest. Open Pinus virginiana woodland.
Carex interior?	Inland sedge	39652	CUGA 03986	CUGA-0299	Claude Bailey	Disturbed Virginia pine successional
Carex laxiculmis	spreading sedge	39411	CUGA 03986	CUGA-0299	Allen Belden Jr	Well-shaded mesic forest along Station Creek.

Latin Name	Common Name	TSN	Catalog#	Accession#	Collector	Habitat
Carex mesochorea	midland sedge	39694	CUGA 03987	CUGA-0299	Kim Feeman	Near beaver pond
Carex nigromarginata	black edge sedge	39719	CUGA 03988	CUGA-0299	John F. Townsend	Dry, pitch pine upland hardwood forest with some rock outcrops.
Carex projecta	necklace sedge	39425	CUGA 03989	CUGA-0299	Kim Feeman	around beaver pond
Carya pallida	sand hickory	19244	CUGA 03990	CUGA-0299	Carl W. Nordman, R. McCoy	Dry Oak - pine forest w/ red maple, somewhat steep SW facing slope.
Cerastium brachypodum	shortstalk chickweed	19950	CUGA 03991	CUGA-0299	Allen Belden Jr	Edge of paved trail along ridgecrest. Open Pinus virginiana woodland.
Chaenomeles speciosa	flowering quince	508022	CUGA 03992	CUGA-0299	Kim Feeman	old home site along Sugar Creek
Chaerophyllum procumbens	spreading chervil	29616	CUGA 04102	CUGA-0299	Allen Belden Jr	Moist open ditch adjacent to road.
Chamaecrista fasciculata var. fasciculata	sleepingplant	566216	CUGA 03993	CUGA-0299	John F. Townsend	Moderately steep, open SSW-facing slope planted with grasses.
Chamaesyce nutans	eyebane	501442	CUGA 03994	CUGA-0299	Allen Belden Jr	Well-drained open road edge.
Chasmanthium latifolium	Indian woodoats	41547	CUGA 03995	CUGA-0299	John F. Townsend	Open edge of forest adjacent to road cut. Steep S-facing slope.
Cirsium vulgare	bull thistle	36428	CUGA 03997	CUGA-0299	Allen Belden Jr	Open edge of forest adjacent to paved trail.
Clematis catesbyana	satincurls	18691	CUGA 03998	CUGA-0299	John F. Townsend	Steep, open, mesic S-facing slope along trail.
Convolvulus arvensis	field bindweed	30705	CUGA 03984	CUGA-0299	Carl Nordman, Kim Feeman	Steep rocky slope above a cave
Coreopsis lanceolata	lanceleaf tickseed	37139	CUGA 03999	CUGA-0299	Claude Bailey	Steep rocky slope above a cave

Latin Name	Common Name	TSN	Catalog#	Accession#	Collector	Habitat
Crataegus calpodendron	pear hawthorn	24547	CUGA 04000	CUGA-0299	Kim Feeman	along Sugar Creek
Crataegus uniflora	dwarf hawthorn	24608	CUGA 04103	CUGA-0299	Allen Belden Jr	Open grassy clearing in acidic ridgetop forest.
Croton monanthogynus	prairie tea	28283	CUGA 04001	CUGA-0299	John F. Townsend	Open slope planted with grass species.
Danthonia compressa	flattened oatgrass	41637	CUGA 04002	CUGA-0299	John F. Townsend	Along ridge trail in upland hardwood forest.
Deschampsia flexuosa	wavy hairgrass	40595	CUGA 04104	CUGA-0299	Allen Belden Jr	Open base of sandstone cliff. Sandy soil.
Desmodium glabellum	Dillenius' ticktrefoil	25799	CUGA 04004	CUGA-0299	Allen Belden Jr	Open edge of forest adjacent to frequently mowed lawn around group campsite.
Desmodium obtusum	stiff ticktrefoil	502019	CUGA 04005	CUGA-0299	John F. Townsend	Limestone woodland on moderately steep SW-facing slope.
Dichanthelium acuminatum var. fasciculatum	western panicgrass	527685	CUGA 04006	CUGA-0299	Carl W. Nordman, R. McCoy	Pinus virginiana and Liquidambar styraciflua forest somewhat steep NW-facing slope
Dichanthelium clandestinum	deertongue	41656	CUGA 04007	CUGA-0299	Nancy E. Van Alstine	Opening in floodplain of small stream.
Dichanthelium dichotomum var. dichotomum	cypress panicgrass	527691	CUGA 04003	CUGA-0299	Rickie White	Appalachian sub-xeric forest
Dichanthelium laxiflorum	openflower rosette grass	41661	CUGA 04008	CUGA-0299	Kim Feeman	Sugar Creek woods: red maple, hemlock
Digitaria ciliaris	southern crabgrass	40619	CUGA 04009	CUGA-0299	Allen Belden Jr	Frequently mowed open lawn at road edge.
Dioscorea quaternata	fourleaf yam	43371	CUGA 04010	CUGA-0299	John F. Townsend	Sub-mesic hardwood forest with abundant fern cover.

Latin Name	Common Name	TSN	Catalog#	Accession#	Collector	Habitat
Echinochloa crus-galli	barnyardgrass	502210	CUGA 04011	CUGA-0299	John F. Townsend	Gentle, SW-facing slope of revegetating spoil pile adjacent to parking lot.
Elaeagnus umbellata	autumn olive	27776	CUGA 04012	CUGA-0299	Claude Bailey, R. McCoy	Impacted Virginia Pine successional
Eleusine indica	Indian goosegrass	41692	CUGA 04013	CUGA-0299	Nancy E. Van Alstine	Gravelly mowed strip along edge of road.
Equisetum arvense	field horsetail	17152	CUGA 04014	CUGA-0299	Nancy E. Van Alstine	Opening in floodplain of small stream.
Festuca rubra	red fescue	40796	CUGA 04015	CUGA-0299	Allen Belden Jr	Edge of paved trail along ridgecrest. Open Pinus virginiana woodland.
Forsythia viridissima	greenstem forsythia	32963	CUGA 04016	CUGA-0299	Kim Feeman	old home site along Sugar Creek
Fraxinus pennsylvanica	green ash	32929	CUGA 04017	CUGA-0299	John F. Townsend	Well-shaded mesic forest along Station Creek.
Hedeoma pulegioides	American false pennyroyal	32520	CUGA 04018	CUGA-0299	John F. Townsend	Small grassy opening in stunted forest at south rim above sandstone cliff
Hemerocallis fulva	orange daylily	42943	CUGA 04019	CUGA-0299	Allen Belden Jr	Open edge of disturbed ridgeline woodland adjacent to trail.
Hesperis matronalis	dames rocket	23138	CUGA 04105	CUGA-0299	Allen Belden Jr	Open, disturbed W-facing moderately steep slope at base of limestone cliff.
Houstonia caerulea	Quaker-ladies	35038	CUGA 04020	CUGA-0299	Rickie White	Appalachian sub-xeric forest
Hydrophyllum macrophyllum	largeleaf waterleaf	31393	CUGA 04033	CUGA-0299	Allen Belden Jr	Very rich cove forest underlain by limestone.
Ilex montana	mountain holly	28002	CUGA 04034	CUGA-0299	John F. Townsend	Scrubby forest at top of sandstone cliff.

Latin Name	Common Name	TSN	Catalog#	Accession#	Collector	Habitat
Ipomoea hederacea	ivyleaf morining-glory	503177	CUGA 04035	CUGA-0299	John F. Townsend	Moderately steep, open SSW-facing slope planted with grasses.
Ipomoea purpurea	tall morning-glory	30789	CUGA 04036	CUGA-0299	John F. Townsend	Moderately steep, open SSW-facing slope planted with grasses.
Juncus interior	inland rush	39280	CUGA 04037	CUGA-0299	Claude Bailey, R. McCoy	Impacted Virginia Pine successional
Kummerowia stipulacea	Korean clover	503293	CUGA 04038	CUGA-0299	Allen Belden Jr	Moist open ditch at road edge.
Lactuca saligna	willowleaf lettuce	36606	CUGA 04039	CUGA-0299	Allen Belden Jr	Moist open ditch at road edge.
Lepidium campestre	field pepperweed	22954	CUGA 04107	CUGA-0299	Nancy E. Van Alstine	Periodically mowed field adjacent to road.
Lespedeza cuneata	Chinese lespedeza	25898	CUGA 04040	CUGA-0299	Allen Belden Jr	Infrequently mowed field adjacent to road.
Lespedeza frutescens	shrubby lespedeza	515841	CUGA 04041	CUGA-0299	John F. Townsend	Limestone woodland on moderately steep SW-facing slope.
Lespedeza virginica	slender lespedeza	25915	CUGA 04042	CUGA-0299	John F. Townsend	Limestone woodland on moderately steep SW-facing slope.
Lilium canadense	Canada lily	42732	CUGA 04043	CUGA-0299	Claude Bailey	4x4 roadside
Linum usitatissimum	common flax	29226	CUGA 04044	CUGA-0299	John F. Townsend	Open, disturbed W-facing moderately steep slope a base of limestone cliff.
Lolium arundinaceum	tall fescue	507979	CUGA 04045	CUGA-0299	John F. Townsend	Edge of trail in upland hardwoods.
Lolium perenne ssp. multiflorum	perennial rye grass	524260	CUGA 04046	CUGA-0299	Claude Bailey, R. McCoy	Impacted Virginia Pine successional
Lonicera dioica	limber honeysuckle	35290	CUGA 04047	CUGA-0299	John F. Townsend	Limestone woodland on moderately

Latin Name	Common Name	TSN	Catalog#	Accession#	Collector	Habitat
						steep SW-facing slope.
Lonicera maackii	Amur honeysuckle	35298	CUGA 04048	CUGA-0299	John F. Townsend	Limestone woodland on moderately steep SW-facing slope.
Lotus corniculatus	birdfoot deervetch	26362	CUGA 04049	CUGA-0299	Allen Belden Jr	Infrequently mowed field at edge of road.
Lycopodium clavatum	running clubmoss	17024	CUGA 04068	CUGA-0299	Carl Nordman, Rickie White, Mark Whited	moderately steep, northeast-facing slope with non-oak hardwoods
Malus pumila	apple	25262	CUGA 04108	CUGA-0299	Nancy E. Van Alstine	Disturbed area along ridgeline trail
Malva neglecta	common mallow	21836	CUGA 04109	CUGA-0299	Allen Belden Jr	Periodically mowed open clearing adjacent to parking lot.
Medicago lupulina	black medick	503721	CUGA 04110	CUGA-0299	Claude Bailey, Roger McCoy	Dry Oak - pine forest w/ red maple, somewhat steep SW facing slope.
Miscanthus sinensis	Chinese silvergrass	41874	CUGA 04050	CUGA-0299	John F. Townsend	Upper, SE-facing bank above old, revegetating road bed of US 58. Near forest edge.
Muhlenbergia frondosa	wirestem muhly	41915	CUGA 04100	CUGA-0299	Carl Nordman, Rickie White, Mark Whited	rocky open dry slope
Myosotis arvensis	field forget-me-not	31692	CUGA 04051	CUGA-0299	Carl W. Nordman, R. McCoy	Pinus virginiana and Liquidambar styraciflua forest somewhat steep NW-facing slope

Latin Name	Common Name	TSN	Catalog#	Accession#	Collector	Habitat
Myosotis macrosperma	largeseed forget me not	31695	CUGA 04111	CUGA-0299	Allen Belden Jr	Moist open ditch adjacent to road.
Panicum capillare	common panic grass	40914	CUGA 04052	CUGA-0299	Allen Belden Jr	Moist open thicket between gravel road and small stream.
Paspalum dilatatum	dallisgrass	40997	CUGA 04053	CUGA-0299	Allen Belden Jr	Moist open ditch at road edge.
Paspalum setaceum	thin paspalum	41042	CUGA 04054	CUGA-0299	Claude Bailey, R. McCoy	Impacted Virginia Pine successional
Penstemon digitalis	talus slope penstemon	33881	CUGA 04055	CUGA-0299	John F. Townsend	Woods next to stone wall on edge of parking lot.
Photinia melanocarpa	black chokeberry	565397	CUGA 04056	CUGA-0299	John F. Townsend	Shallow soil depression in undulating sandstone at top of cliff.
Poa alsodes	grove bluegrass	41104	CUGA 04057	CUGA-0299	Kim Feeman	along Sugar Creek
Poa annua	annual bluegrass	41107	CUGA 04058	CUGA-0299	Allen Belden Jr	Edge of parking lot.
Poa autumnalis	autumn bluegrass	41111	CUGA 04106	CUGA-0299	John F. Townsend	Trailside in dry, upland mixed hardwoods
Poa compressa	Canada bluegrass	41082	CUGA 04059	CUGA-0299	Allen Belden Jr	Trailside in dry, upland mixed hardwoods.
Poa sylvestris	woodland bluegrass	41162	CUGA 04060	CUGA-0299	Allen Belden Jr	Forested mesic floodplain of small stream (Station Creek).
Poa trivialis	rough bluegrass	41163	CUGA 04061	CUGA-0299	Allen Belden Jr	Edge of paved trail along ridgecrest. Open Pinus virginiana woodland.
Polygonum aviculare	prostrate knotweed	20876	CUGA 04062	CUGA-0299	John F. Townsend	Open slope planted with grass species.
Polygonum caespitosum var. longisetum	oriental ladysthumb	566299	CUGA 04063	CUGA-0299	Nancy E. Van Alstine	Open edge between gravelled road and moist thicket.
Ptelea trifoliata ssp. trifoliata var. mollis	common hoptree	531766	CUGA 04120	CUGA-0299	Carl Nordman, Kim	Steep rocky slope above a cave

Latin Name	Common Name	TSN	Catalog#	Accession#	Collector	Habitat
					Feeman	
Pyrus communis	common pear	25295	CUGA 04064	CUGA-0299	Allen Belden Jr	Steep rocky slope above a cave
Quercus phellos	willow oak	19282	CUGA 04065	CUGA-0299	Carl W. Nordman, R. McCoy	Pinus virginiana and Liquidambar styraciflua forest somewhat steep NW-facing slope
Ranunculus allegheniensis	Allegheny Mountain buttercup	18586	CUGA 04112	CUGA-0299	Allen Belden Jr	Grassy opening in acidic ridgecrest woodland.
Rhododendron minus	Carolina rhododendron	23722	CUGA 04066	CUGA-0299	John F. Townsend	Steep ravine edge at edge of paved trail.
Rosa carolina var. carolina	Carolina rose	530107	CUGA 04069	CUGA-0299	John F. Townsend	Woodland at edge of ledgy S-facing limestone cliff.
Rosa multiflora	multiflora rose	24833	CUGA 04070	CUGA-0299	Nancy E. Van Alstine	Upland forest edge adjacent to mowed lawn.
Rubus argutus	sawtooth blackberry	24877	CUGA 04071	CUGA-0299	Claude Bailey, R. McCoy	Impacted Virginia Pine successional
Rubus cuneifolius	sand blackberry	24905	CUGA 04072	CUGA-0299	John F. Townsend	Dense thicket within opening in stunted forest at S rim above sandstone cliff.
Rubus flagellaris	sand blackberry	24921	CUGA 04073	CUGA-0299	Allen Belden Jr	Dry calcareous woodland underlain by limestone.
Rubus pensilvanicus	Pennsylvania blackberry	504874	CUGA 04113	CUGA-0299	Nancy E. Van Alstine	Rich cove forest on S-facing steep slope.
Rudbeckia fulgida var. umbrosa	orange coneflower	530166	CUGA 04074	CUGA-0299	John F. Townsend	Rich open forest along trail.
Scutellaria elliptica var. hirsuta	hairy skullcap	196140	CUGA 04075	CUGA-0299	Rob Evans, Carl W. Nordman	Sugar Run Hemlock
Scutellaria incana	hoary skullcap	32770	CUGA 04076	CUGA-0299	Claude Bailey	Mixed hardwood rich cove

Latin Name	Common Name	TSN	Catalog#	Accession#	Collector	Habitat
Sericocarpus linifolius	narrowleaf whitetop aster	508090	CUGA 04077	CUGA-0299	Rob Evans, Carl W. Nordman	Pitch pine, black jack oak barrens
Sida spinosa	prickly fanpetals	21732	CUGA 04078	CUGA-0299	Allen Belden Jr	Frequently mowed open lawn at road edge.
Sinapis arvensis	Corn-mustard	23310	CUGA 04114	CUGA-0299	Allen Belden Jr	Periodically mowed open clearing adjacent to parking lot. Clay soil.
Sisyrinchium albidum	white blueeyed grass	43241	CUGA 04079	CUGA-0299	John F. Townsend	Dry limestone slope with hardwood canopy.
Smilax tamnoides	bristly greenbrier	43348	CUGA 04080	CUGA-0299	John F. Townsend	Open woodland at base of limestone cliff.
Solanum nigrum	black nightshade	565525	CUGA 04081	CUGA-0299	John F. Townsend	Base of small seepy sandstone outcrop along trail throught open forest. Steep SE-facing slope.
Solidago canadensis var. scabra	tall goldenrod	530448	CUGA 04082	CUGA-0299	Nancy E. Van Alstine	Thickly vegetated field in floodplain of small drainage. NW-facing gentle slope.
Solidago ulmifolia var. ulmifolia	elmleaf goldenrod	530489	CUGA 04083	CUGA-0299	John F. Townsend	Limestone woodland on moderately steep SW-facing slope.
Sorghum halepense	Johnsongrass	42111	CUGA 04084	CUGA-0299	Allen Belden Jr	Moist open ditch along road.
Sphenopholis obtusata	prairie wedgescale	41279	CUGA 04085	CUGA-0299	Allen Belden Jr	Edge of trail through recently burned rich cove forest.
Symphyotrichum phlogifolium	thinleaf late purple aster	522233	CUGA 04086	CUGA-0299	Allen Belden Jr	Well drained open road edge.
Teucrium canadense var. canadense	Canada germander	530630	CUGA 04087	CUGA-0299	Allen Belden Jr	Moist open ditch along road.

Latin Name	Common Name	TSN	Catalog#	Accession#	Collector	Habitat
Tipularia discolor	crippled cranefly	43703	CUGA 04088	CUGA-0299	R. McCoy, Claude Bailey	Dry oak-hickory forest
Tradescantia subaspera	zigzag spiderwort	39176	CUGA 04089	CUGA-0299	Claude Bailey	Steep hillslope bedrock outcrop
Trautvetteria caroliniensis var. caroliniensis	Carolina bugbane	531134	CUGA 04121	CUGA-0299	Carl Nordman, Rickie White, Mark Whited	Isolated herbaceous wetland
Trifolium hybridum	alsike clover	26261	CUGA 04115	CUGA-0299	Allen Belden Jr	Periodically mowed open clearing adjacent to parking lot.
Valerianella locusta	Lewiston cornsalad	35392	CUGA 04116	CUGA-0299	Allen Belden Jr	Periodically mowed open clearing adjacent to parking lot.
Verbascum blattaria	moth mullein	33389	CUGA 04090	CUGA-0299	Nancy E. Van Alstine	Open, gravelly level roadside strip.
Verbesina virginica var. virginica	white crownbeard	530792	CUGA 04091	CUGA-0299	Allen Belden Jr	Infrequently mowed field adjacent to road.
Veronica arvensis	corn speedwell	33411	CUGA 04117	CUGA-0299	Allen Belden Jr	Open, frequently mowed lawn.
Viburnum opulus	Highbush cranberry	35270	CUGA 04092	CUGA-0299	Kim Feeman	old home site along Sugar Creek
Vicia sativa ssp. nigra	garden vetch	524809	CUGA 04118	CUGA-0299	Claude Bailey, Roger McCoy	Dry Oak - pine forest w/ red maple, somewhat steep SW-facing slope.
Vinca minor	common periwinkle	30238	CUGA 04093	CUGA-0299	Allen Belden Jr	Edge of paved trail along ridgecrest. Open Pinus virginiana woodland.
Vitis cinerea var. baileyana	graybark grape	530854	CUGA 04122	CUGA-0299	Carl Nordman, Kim Feeman	Steep rocky slope above a cave

Latin Name	Common Name	TSN	Catalog#	Accession#	Collector	Habitat
Xanthium strumarium	rough cocklebur	38692	CUGA 04119	CUGA-0299	Allen Belden Jr	Periodically mowed open clearing adjacent to parking lot. Clay soil.

Table 4. Tables of vascular plant diversity measures and species total estimates for Cumberland Gap National Historical Park

	Diversity Measures			
	N	alpha	beta	Gamma
Gridded plots only	36	74	6.9	508
All plots	60	73	8.4	611
Total for park				882

alpha = average species richness per plot

beta = measure of the heterogeneity of the data (gamma/alpha)

gamma = total species for all plots/park

	Estimate of # of species in park	If estimate is correct, % of species confirmed for park (based on 882 species confirmed)
First-order jackknife estimate (all plots)	807	109%
Second-order jackknife estimate (all plots)	925	95%
First-order jackknife estimate (gridded plots)	673	131%
Second-order jackknife estimate (gridded plots)	767	115%

Table 5. Exotic plant species at Cumberland Gap National Historical Park.

Latin Name	CommonName	tsn	Exotic status	National I-Rank (if it exists)
Achillea millefolium	COMMON YARROW	35423	Exotic but not considered invasive	
Ailanthus altissima	TREE-OF-HEAVEN	28827	VA low invasiveness, KY and TN Severe Threat, USFS known to be invasive and persistent	Medium/Low
Albizia julibrissin	SILK TREE	26449	VA= Medium invasiveness; KY=Significant threat; TN = Severe threat, USFS = known to be invasive and persistent	Medium/Low
Allium vineale	WILD GARLIC	42637	VA= Medium invasiveness; KY= no threat; TN = Lesser threat; USFS = suspected to be invasive	Medium/Insignificant
Anthoxanthum odoratum	SWEET VERNALGRASS	41395	Exotic but not considered invasive	
Avena sativa	COMMON OAT	41459	Exotic but not considered invasive	
Barbarea verna	EARLY YELLOWROCKET	22743	KY = Lesser threat	
Barbarea vulgaris	YELLOW ROCKET	22741	Exotic but not considered invasive	
Belamcanda chinensis	BLACKBERRY LILY	43280	Exotic but not considered invasive	
Berberis thunbergii	JAPANESE BARBERRY	18835	USFS known to be invasive and persistent; KY and TN = Significant Threat; VA = Medium invasiveness	High/Medium
Brassica napus	TURNIP	23060	Exotic but not considered invasive	
Brassica rapa	FIELD MUSTARD	23063	Exotic but not considered invasive	
Bromus japonicus	JAPANESE BROME	40479	TN=Significant threat	

Latin Name	CommonName	tsn	Exotic status	National I-Rank (if it exists)
Capsella bursa-pastoris	COMMON SHEPHERD'S PURSE	22766	Exotic but not considered invasive	Insignificant
Cardamine hirsuta	HAIRY BITTER-CRESS	22797	Exotic but not considered invasive	
Carduus nutans	MUSK THISTLE	35787	USFS suspected to be invasive; KY=Severe Threat; TN = Significant Threat; VA = Medium invasiveness	High/Low
Cerastium vulgatum	COMMON MOUSE-EAR CHICKWEED	19968	Exotic but not considered invasive	
Chaenomeles speciosa	FLOWERING QUINCE	508022	Exotic but not considered invasive	
Chenopodium ambrosioides	WORMSEED GOOSEFOOT	20590	KY=Lesser threat	
Cichorium intybus	CHICORY	36763	TN=Lesser Threat	Medium/Insignificant
Clematis terniflora	JAPANESE VIRGIN'S-BOWER	18712	TN=Significant threat	
Commelina communis	ASIATIC DAYFLOWER	39127	VA=Low invasiveness; KY=Lesser threat	
Coronilla varia	COMMON CROWN-VETCH	26553	USFS suspected to be invasive; KY=Severe Threat	High
Dactylis glomerata	ORCHARD GRASS	193446	VA=Low invasiveness	Medium/Insignificant
Daucus carota	QUEEN ANNE'S LACE	29477	TN=Significant threat;KY=Significant threat	Low
Dianthus armeria	DEPTFORD-PINK	20276	KY=Lesser threat	
Dioscorea oppositifolia	CHINESE YAM	502075	USFS known to be invasive and persistent; KY and TN = Severe Threat	High/Low
Dipsacus sylvestris	COMMON TEASEL	35406	Invasive elsewhere in U.S. but not in southern U.S.	
Echinochloa crus-galli	BARNYARD GRASS	502210	KY=Lesser threat	Medium/Insignificant

Latin Name	CommonName	tsn	Exotic status	National I-Rank (if it exists)
Elaeagnus umbellata	AUTUMN OLIVE	27776	USFS known to be invasive and persistent; TN and KY=Severe Threat; VA=Low invasiveness	High
Eleusine indica	INDIAN GOOSEGRASS	41692	KY=Significant threat	
Forsythia viridissima	FORSYTHIA	32963	Exotic but not considered invasive	
Galinsoga quadriradiata	FRINGED QUICKWEED	37415	Exotic but not considered invasive	
Ginkgo biloba	MAIDENHAIR TREE	183269	Exotic but not considered invasive	
Glechoma hederacea	GROUND IVY	502801	VA = Medium invasiveness; KY=Significant Threat; TN=Lesser Threat	Medium/Insignificant
Hemerocallis fulva	ORANGE DAYLILY	42943	KY=Lesser threat	Medium/Low
Hibiscus syriacus	ROSE-OF-SHARON	21638	Exotic but not considered invasive	
Hieracium caespitosum	MEADOW HAWKWEED	503009	Exotic but not considered invasive	Medium/Insignificant
Ipomoea purpurea	TALL MORNING-GLORY	30789	VA=Medium Invasiveness; KY=Significant Threat	Medium/Low
Kummerowia stipulacea	KOREAN CLOVER	503293	KY=Significant threat; TN=Lesser threat	
Kummerowia striata	COMMON KOREAN-CLOVER	503294	TN=Lesser Threat	
Kyllinga brevifolioides	PASTURE FLATSEDGE	515529	Exotic but not considered invasive	
Lactuca saligna	WILLOWLEAF LETTUCE	36606	KY=Lesser threat	
Lamium amplexicaule	COMMON DEADNETTLE	32539	KY=Lesser threat	
Lamium purpureum	PURPLE DEADNETTLE	32543	Exotic but not considered invasive	

Latin Name	CommonName	tsn	Exotic status	National I-Rank (if it exists)
Lathyrus latifolius	BROAD-LEAF PEAVINE	25856	Exotic but not considered invasive	
Lepidium campestre	FIELD PEPPERWEED	22954	Exotic but not considered invasive	
Lespedeza cuneata	CHINESE LESPEDEZA	25898	USFS known to be invasive and persistent; VA=Low invasiveness; KY and TN=Severe threat	Medium
Leucanthemum vulgare	OXEYE DAISY	37903	KY=Significant threat; TN=Lesser threat	Medium/Low
Ligustrum amurense	AMUR PRIVET	32974	Exotic but not considered invasive	
Linum usitatissimum	COMMON FLAX	29226	Exotic but not considered invasive	
Lolium arundinaceum	TALL FESCUE	507979	KY=Lesser threat	Medium
Lolium perenne	PERENNIAL RYEGRASS	40893	KY=Lesser threat	Medium
Lolium perenne ssp. multiflorum	PERENNIAL RYEGRASS	524260	KY=Lesser threat	Medium
Lonicera japonica	JAPANESE HONEYSUCKLE	35283	USFS known to be invasive and persistent; VA=High invasiveness; KY=Lesser Threat; TN=Severe threat	High/Medium
Lonicera maackii	AMUR HONEYSUCKLE	35298	USFS known to be invasive and persistent; VA=High invasiveness; KY=Significant Threat; TN=Severe threat	
Lotus corniculatus	BIRDFOOT DEERVETCH	26362	VA=Low invasiveness	Medium/Low
Malus pumila	APPLE	25262	Exotic but not considered invasive	
Malva neglecta	COMMON MALLOW	21836	Exotic but not considered invasive	

Latin Name	CommonName	tsn	Exotic status	National I-Rank (if it exists)
Marrubium vulgare	COMMON HOARHOUND	32561	Exotic but not considered invasive	Medium/Low
Medicago lupulina	BLACK MEDICK	503721	KY=Lesser threat	Medium/Insignificant
Melilotus albus	WHITE SWEET-CLOVER	516979	Exotic but not considered invasive	
Melilotus officinalis	YELLOW SWEETCLOVER	26150	Exotic invasive.	Medium/Low
Microstegium vimineum	NEPALESE BROWNTOP	503829	USFS known to be invasive and persistent; VA=Low invasiveness; KY and TN=Severe threat	High/Medium
Miscanthus sinensis	CHINESE SILVERGRASS	41874	USFS suspected to be invasive; KY=Lesser threat;KY=Severe Threat;TN=Significant Threat	High/Low
Mollugo verticillata	GREEN CARPET-WEED	19899	Exotic but not considered invasive	
Myosotis arvensis	FIELD FORGET-ME-NOT	31692	Exotic but not considered invasive	
Nasturtium officinale	TRUE WATERCRESS	23255	Exotic but not considered invasive	
Paspalum dilatatum	DALLISGRASS	40997	Exotic but not considered invasive	
Paulownia tomentosa	PRINCESS TREE	33460	VA=Medium Invasiveness; KY=Significant Threat;TN=Severe Threat	
Perilla frutescens	BEEF-STEAK PLANT	32634	VA=Low invasiveness	
Phleum pratense	MEADOW TIMOTHY	41062	Exotic but not considered invasive	
Poa annua	ANNUAL BLUEGRASS	41107	KY=Lesser threat	Medium/Insignificant
Poa compressa	CANADA BLUEGRASS	41082	VA=Medium invasiveness; KY=Lesser threat	High/Low

Latin Name	CommonName	tsn	Exotic status	National I-Rank (if it exists)
Poa pratensis	KENTUCKY BLUEGRASS	41088	KY=Significant threat	?
Poa trivialis	ROUGH BLUEGRASS	41163	VA=Medium invasiveness	?
Polygonum aviculare	PROSTRATE KNOTWEED	20876	Exotic but not considered invasive	
Polygonum caespitosum var. longisetum	ORIENTAL LADYSTHUMB	566299	Invasive	?
Polygonum cuspidatum	JAPANESE KNOTWEED	20889	USFS known to be invasive and persistent; VA=Low invasiveness; KY and TN=Severe threat	?
Potentilla recta	SULPHUR CINQUEFOIL	24742	KY=Lesser threat	High/Medium
Prunus persica	PEACH	24765	Exotic but not considered invasive	Insignificant
Pueraria montana var. lobata	KUDZU	529930	VA=Medium Invasiveness; KY=Significant Threat;TN=Severe Threat	Medium
Pyrus communis	COMMON PEAR	25295	Exotic	High/Low
Ranunculus bulbosus	BULBOUS BUTTERCUP	18594	KY=Lesser threat	?
Rosa multiflora	MULTIFLORA ROSE	24833	USFS known to be invasive and persistent; VA=Low invasiveness; KY and TN=Severe threat	Medium/Low
Rosa wichuraiana	MEMORIAL ROSE	24846	Exotic but not considered invasive	
Rumex acetosella	SHEEP SORREL	20934	VA=Medium invasiveness;KY=Significant threat	
Rumex crispus	CURLY DOCK	20937	VA=Medium invasiveness	
Rumex obtusifolius	BITTER DOCK	20939	Exotic but not considered invasive	
Saponaria officinalis	BOUNCING-BET	20039	Exotic but not considered invasive	Low/Insignificant

Latin Name	CommonName	tsn	Exotic status	National I-Rank (if it exists)
Setaria viridis	GREEN BRISTLE GRASS	41231	TN and KY=Significant Threat	?
Sinapis arvensis	CORN-MUSTARD	23310	Exotic but not considered invasive	
Solanum nigrum	BLACK NIGHTSHADE	565525	Exotic but not considered invasive	
Sonchus asper	SPINY-LEAF SOWTHISTLE	38424	Exotic but not considered invasive	
Sorghum halepense	JOHNSONGRASS	42111	USFS known to be invasive and persistent; VA=Low invasiveness; KY and TN=Severe threat	?
Stellaria media	COMMON CHICKWEED	20169	VA=Medium invasiveness; KY=Significant threat	
Torilis arvensis	FIELD HEDGE-PARSLEY	29894	TN=Significant Threat	?
Trifolium campestre	LOW HOP CLOVER	26231	Exotic but not considered invasive	
Trifolium hybridum	ALSIKE CLOVER	26261	Exotic but not considered invasive	Medium/Low
Trifolium pratense	RED CLOVER	26313	Exotic but not considered invasive	
Trifolium repens	WHITE CLOVER	26206	Exotic but not considered invasive	
Verbascum blattaria	MOTH MULLEIN	33389	Exotic but not considered invasive	
Verbascum thapsus	GREAT MULLEIN	33394	TN=Significant Threat	Medium
Veronica arvensis	CORN SPEEDWELL	33411	Exotic but not considered invasive	
Viburnum opulus	HIGHBUSH CRANBERRY	35270	Exotic but not considered invasive	

Latin Name	CommonName	tsn	Exotic status	National I-Rank (if it exists)
Vicia sativa ssp. nigra	GARDEN VETCH	524809	Exotic	
Vinca minor	COMMON PERIWINKLE	30238	VA=Low invasiveness; KY and TN=Significant Threat	Low/Insignificant

"Severe Threat" - Exotic plant species that possess characteristics of invasive species and spread easily into native plant communities and displace native vegetation; includes species that are or could become widespread.

"Significant Threat" - Exotic plant species that possess characteristics of invasive species but are not presently considered to spread as easily into native plant communities as those species listed as "Severe Threat".

I-Rank Value Definitions (from Morse et al. 2004):

High: Species represents a severe threat to native species and ecological communities

Medium: Species represents a moderate threat to native species and ecological communities

Low: Species represents a significant but relatively low threat to native species and ecological communities

Insignificant: Species represents and insignificant threat to native species and ecological communities.

Blank: I-Rank not yet determined.

Table 6. Association numbers, plot numbers, and global ranks of all associations identified at Cumberland Gap National Historical Park.

CEGL #	Systems	Ecological Associations (Scientific name)	Ecological Associations (Name #2)	Ecological Associations (Name #3)	Plots	Global Rank
2591	Human Modified / Successional	*Pinus virginiana* Successional Forest	Virginia Pine Successional Forest	Virginia Pine Successional Forest	1,11,14, 49	GNA
7124	Human Modified / Successional	Juniperus virginiana var. virginiana – (Quercus sp.) Forest	Eastern Red Cedar – (Oak Sp.) Forest	Red-Cedar Successional Forest	No plots	GNA
8558	Southern Appalachian Oak Forest	*Acer rubrum* var. *rubrum - Betula (alleghaniensis, lenta) - Magnolia fraseri / (Rhododendron maximum, Kalmia latifolia)* Forest	Red Maple - (Yellow Birch, Sweet Birch) - Fraser Magnolia / (Great Rhododendron, Mountain Laurel) Forest	Southern Appalachian Acidic Mixed Hardwood Forest	80, 81	GNA
7881	South-Central Interior Mesophytic Forest	*Fagus grandifolia - Quercus alba / Cornus florida* Forest	American Beech - White Oak / Flowering Dogwood Forest	Central Interior Beech - White Oak Forest	87, 88	G4
7879	Human Modified / Successional	*Juglans nigra / Verbesina alternifolia* Forest	Black Walnut / Common Wingstem Forest	Successional Black Walnut Forest	No plots	GNA
5222	South Central Interior Mesophytic Forest	*Liriodendron tulipifera - Tilia americana* var. *heterophylla - Aesculus flava - Acer saccharum / Magnolia tripetala* Forest	Tuliptree - Appalachian Basswood - Yellow Buckeye - Sugar Maple / Umbrella Magnolia Forest	Northern Mixed Mesophytic Forest	5,32, 48, 49, 58, 59, 60, 72, 83	G4?
7221	Human Modified / Successional	*Liriodendron tulipifera - Quercus* spp. Forest	Tuliptree – Oak Spp. Forest	Interior Mid- to Late-Successional Tuliptree - Hardwood Upland Forest (Acid Type)	31	GNA
7220	Human Modified / Successional	*Liriodendron tulipifera / (Cercis canadensis) / (Lindera benzoin)* Forest	Tuliptree / (Redbud) / (Northern Spicebush) Forest	Successional Tuliptree Forest (Circumneutral Type)	6,37, 64	GNA
7240	Southern Appalachian Oak Forest	*Quercus alba - Quercus rubra - Carya ovata / Cercis*	White Oak - Northern Red Oak - Shagbark Hickory / Redbud -	*Ridge-and-Valley Dry-Mesic White*	24, 26, 42, 65, 94	G4

CEGL #	Systems	Ecological Associations (Scientific name)	Ecological Associations (Name #2)	Ecological Associations (Name #3)	Plots	Global Rank
		canadensis - Juniperus virginiana var. *virginiana* Forest	Eastern Red-cedar Forest	*Oak - Hickory Forest*		
7692	Southern Appalachian Oak Forest	*Quercus alba - Quercus rubra - Quercus prinus / Collinsonia canadensis - Podophyllum peltatum - Amphicarpaea bracteata* Forest	White Oak - Northern Red Oak - Rock Chestnut Oak / Richweed - May-apple - Hog-peanut Forest	Appalachian Montane Oak - Hickory Forest (Rich Type)		G3
6192	Southern Appalachian Oak Forest	*Quercus rubra - Acer rubrum / Calycanthus floridus - Pyrularia pubera / Thelypteris noveboracensis* Forest	Northern Red Oak - Red Maple / Sweet-shrub - Buffalonut / New York Fern Forest	Appalachian Montane Oak - Hickory Forest (Red Oak Type)	23, 25, 27, 29, 36, 73, 77, 84 (in part), 85, 97, 99	G4?
4793	Central Appalachian Alkaline Glade and Woodland	*Quercus muehlenbergii - Quercus alba / Cercis canadensis / Dirca palustris* Forest	Chinquapin Oak - White Oak / Redbud / Leatherwood Forest	Ridge and Valley Limestone Oak-Hickory Forest	2	G3Q
6271	Southern Appalachian Oak Forest	*Quercus (prinus, coccinea) / Kalmia latifolia / (Galax urceolata, Gaultheria procumbens)* Forest	(Rock Chestnut Oak, Scarlet Oak) / Mountain Laurel / (Galax, Wintergreen) Forest	Chestnut Oak Forest (Xeric Ridge Type)	3,10, 34, 40, 45, 51	G5
7267	Southern Appalachian Oak Forest	*Quercus prinus - (Quercus rubra) - Carya* spp. / *Oxydendrum arboreum - Cornus florida* Forest	Rock Chestnut Oak - (Northern Red Oak) - Hickory species / Sourwood - Flowering Dogwood Forest	Appalachian Oak Hickory Forest (Chestnut Oak Type)	4,7,9,12, 16, 18, 21, 33, 38, 56, 66, 69, 76, 78, 86, 96, 100, 101	G4G5
6286	Southern Appalachian Oak Forest	*Quercus prinus - Quercus rubra / Rhododendron maximum / Galax urceolata* Forest	Rock Chestnut Oak - Northern Red Oak / Great Rhododendron / Galax Forest	Chestnut Oak Forest (Mesic Slope Heath Type)	13, 22 (in part), 84 (in part), 95, 102	G4

CEGL #	Systems	Ecological Associations (Scientific name)	Ecological Associations (Name #2)	Ecological Associations (Name #3)	Plots	Global Rank
4096	Southern Appalachian Oak Forest	*Sassafras albidum* - *Quercus* spp. Forest	Sassafras - Oak species Forest	Southern Blue Ridge Successional Sassafras Forest	67, 68, 70	G5
7340	South-Central Interior Small Stream and Riparian	*Platanus occidentalis* - *Liquidambar styraciflua / Asimina triloba* Forest	Sycamore - Sweetgum / Common Pawpaw Forest	Sycamore - Sweetgum Swamp Forest	82	G5
8407	Appalachian (Hemlock)-Northern Hardwood Forest	*Tsuga canadensis* - *(Fagus grandifolia, Tilia americana* var. *heterophylla) / Magnolia tripetala* Forest	Eastern Hemlock - (American Beech, Appalachian Basswood) / Umbrella Magnolia Forest	Cumberland/Appalachian Hemlock - Hardwood Cove Forest	57	G4
7136	Appalachian (Hemlock)-Northern Hardwood Forest	*Tsuga canadensis / Rhododendron maximum - (Clethra acuminata, Leucothoe fontanesiana)* Forest	Eastern Hemlock / Great Rhododendron - (Mountain Sweet-pepperbush, Mountain Doghobble) Forest	Southern Appalachian Eastern Hemlock Forest (Typic Type)	22 (in part)	G3G4
7565	Southern and Central Appalachian Bog and Fen	*Tsuga canadensis* - *Acer rubrum* - *(Liriodendron tulipifera, Nyssa sylvatica) / Rhododendron maximum / Sphagnum* spp. Forest	Eastern Hemlock - Red Maple - (Tuliptree, Blackgum) / Great Rhododendron / Peatmoss species Forest	Swamp Forest-Bog Complex (Typic Type)	Near plot 41	G2
7097	Southern Appalachian Montane Pine Forest and Woodland	*Pinus pungens* - *Pinus rigida* - *(Quercus prinus) / Kalmia latifolia* - *Vaccinium pallidum* Woodland	Table Mountain Pine - Pitch Pine - (Rock Chestnut Oak) / Mountain Laurel - Hillside Blueberry Woodland	Blue Ridge Table Mountain Pine - Pitch Pine Woodland (Typic Type)	73, 93, 98	G3
3617	Southern Appalachian Montane Pine Forest and Woodland	*Pinus rigida / Schizachyrium scoparium* - *Sorghastrum nutans* - *Baptisia tinctoria* Woodland	Pitch Pine / Little Bluestem - Yellow Indiangrass - Honesty-weed Woodland	Hi Lewis Pitch Pine Barrens	46	G2?
8458	Central Appalachian Alkaline Glade and Woodland	*Fraxinus americana* - *Carya ovata / Frangula caroliniana / Helianthus hirsutus* Woodland	White Ash - Shagbark Hickory / Carolina Buckthorn / Whiskered Sunflower Woodland	Dry Calcareous Forest/Woodland (White Ash - Shagbark Hickory Type)	8,35, 55, 71, 75, 91, 92 (in part)	G1?

CEGL #	Systems	Ecological Associations (Scientific name)	Ecological Associations (Name #2)	Ecological Associations (Name #3)	Plots	Global Rank
3814	Southern Appalachian Grass and Shrub Bald	*Kalmia latifolia - Rhododendron catawbiense - (Gaylussacia baccata, Pieris floribunda, Vaccinium corymbosum)* Shrubland	Mountain Laurel - Catawba Rhododendron - (Black Huckleberry, Mountain Fetterbush, Highbush Blueberry) Shrubland	Southern Appalachian Mountain Laurel Bald	63	G2G3
3882	Human-Modified/Successional Community	*Pueraria montana* var. *lobata* Vine-Shrubland	Kudzu Vine-Shrubland	Kudzu Vineland	No plots	GNA
4732	Human-Modified/Successional Community	*Rubus (argutus, trivialis) - Smilax (glauca, rotundifolia)* Shrubland	(Southern Blackberry, Southern Dewberry) - (Whiteleaf Greenbrier, Common Greenbrier) Shrubland	Blackberry - Greenbrier Successional Shrubland Thicket	No plots	GNA
3890	Southern Appalachian Oak Forest	*Vitis aestivalis* Vine-Shrubland	Summer Grape Vine-Shrubland	Montane Grape Opening	74	G2G3
3912	South-Central Interior Small Stream and Riparian	*Alnus serrulata* Saturated Southern Shrubland	Smooth Alder Saturated Southern Shrubland	Saturated Alder Thicket	89 (in part)	G4
4393	Southern Interior Calcareous Cliff	*Rhus aromatica - Celtis tenuifolia / Carex eburnea* Shrubland	Fragrant Sumac - Georgia Hackberry / Bristleleaf Sedge Shrubland	Limestone Cliff Fragrant Sumac Shrubland	92 (in part)	G3
8470	Southern Appalachian Grass and Shrub Bald	*Kalmia latifolia - Gaylussacia (baccata, brachycera)* Cumberland Shrubland	Mountain Laurel - (Black Huckleberry, Box Huckleberry) Cumberland Shrubland	Cumberland Sandstone Glade Heath Shrubland	No plots	G3
4048	Human Modified / Successional	*Lolium (arundinaceum, pratense)* Herbaceous Vegetation	(Tall Fescue, Meadow Fescue) Herbaceous Vegetation	Cultivated Meadow	No plots	GNA
8433	South-Central Interior Small Stream and Riparian	*Juncus effusus - Chelone glabra - Scirpus* spp. Southern Blue Ridge Beaver Pond Herbaceous Vegetation	Soft Rush - White Turtlehead - Bulrush species Southern Blue Ridge Beaver Pond Herbaceous Vegetation	Southern Blue Ridge Beaver Pond Marsh	89 (in part)	G4?
7771	Southern and Central Appalachian Bog	*Carex gynandra - Scirpus cyperinus - Eriophorum virginicum*	Mountain Fringed Sedge - Woolgrass Bulrush - Tawny	Cumberland Streamside Bog	41	G1?Q

CEGL #	Systems	Ecological Associations (Scientific name)	Ecological Associations (Name #2)	Ecological Associations (Name #3)	Plots	Global Rank
	and Fen	- *Osmunda cinnamomea* Herbaceous Vegetation	Cotton-grass - Cinnamon Fern Herbaceous Vegetation			

Numeric rank

G1 = Critically imperiled globally

G2 = Imperiled globally

G3 = Rare or uncommon

G4 = Widespread, abundant, and apparently secure, but with cause for long-term concern

G5 = Demonstrably widespread, abundant and secure

GNA = Not ranked (usually because an exotic species dominated type or human modified)

Qualifiers:

? = Inexact numeric rank

Q = Questionable taxonomy

Table 7. Plot photo names and photo descriptions for Cumberland Gap National Historical Park.

Photo file name	Date taken	Description of photo
CUGA01canopy.jpg	6-5-2002	Plot 1
CUGA01Groundcedar.jpg	6-5-2002	Plot 1
CUGA01pinesnapping.jpg	6-5-2002	Plot 1
CUGA01understory.jpg	6-5-2002	Plot 1
CUGA02boulder.jpg	6-5-2002	Plot 1
CUGA02centerline.jpg	6-5-2002	Plot 2
CUGA02-veg.jpg	6-5-2002	Plot 2
CUGA02-woodydebris.jpg	6-5-2002	Plot 2
CUGA03Caryaspecies.jpg	6-5-2002	Plot 3
CUGA03centerline.jpg	6-5-2002	Plot 3
CUGA03draw.jpg	6-5-2002	Plot 3
CUGA03shrublayer.jpg	6-5-2002	Plot 3
CUGA04a.jpg	6-3-2002	Plot 4
CUGA04b.jpg	6-3-2002	Plot 4
CUGA04-ClaudeBailey.jpg	6-3-2002	Plot 4
CUGA04HW-RM-JC.jpg	6-3-2002	Plot 4
CUGA04-TeresaLeibfreid.jpg	6-4-2002	Plot 4
CUGA15NE.jpg	6-4-2002	Plot 15
CUGA15NW-withAllenBelden.jpg	6-4-2002	Plot 15
CUGA15SE.jpg	6-4-2002	Plot 15
CUGA15SW.jpg	6-4-2002	Plot 15
CUGA21East.jpg	6-4-2002	Plot 21
CUGA21North.jpg	6-4-2002	Plot 21
CUGA21South.jpg	6-4-2002	Plot 21
CUGA21West.jpg	6-4-2002	Plot 21
CUGA38a.jpg	6-4-2002	Plot 38
CUGA38b.jpg	6-4-2002	Plot 38
CUGA38c.jpg	6-4-2002	Plot 38
CUGA38d.jpg	6-4-2002	Plot 38
CUGA38-flameazalea.jpg	6-4-2002	Plot 38
CUGA46a.jpg	6-24-2002	Plot 46
CUGA46andCarl.jpg	6-24-2002	Plot 46
CUGA92a.jpg	6-14-2004	Plot 92
CUGAfromcliff.jpg	6-24-2002	Cliff shot from White Rocks
CUGA-MarkWhitedatWhiteRocks.jpg	6-14-2004	Mark Whited, photointerpreter
CUGAoldJUNIVIR.jpg	6-14-2004	Ancient Red cedar on cliff top
CUGAoldJUNIVIRb.jpg	6-14-2004	Ancient Red cedar on cliff top
CUGARattler1.jpg	6-15-2004	Rattlesnake
CUGARattler2.jpg	6-15-2004	Rattlesnake
CUGARattler3.jpg	6-15-2004	Rattlesnake
CUGARattler4.jpg	6-15-2004	Rattlesnake
CUGARattler5.jpg	6-15-2004	Rattlesnake
CUGARattler6.jpg	6-15-2004	Rattlesnake
CUGARattler7.jpg	6-15-2004	Rattlesnake
CUGARattler8.jpg	6-15-2004	Rattlesnake
CUGASnagatWhiteRocks.jpg	6-14-2004	Snag on top of White Rocks
Snag.jpg	4-20-2005	Tree snag

Appendix I Plot sheets used for permanent plots (formatted to fit in this report)

Location name _____ *Jurisdiction (State):____*
Location organization (NPS, USFS, etc.) _____
Air photo # (if known) ____ Polygon code (if known)_____ Subplot? Y or N Subplot Parent Code _____

Provisional community name_____

Classified community name_____
Classifier _____ Date_____

*TUSNVC Elcode*_____ *EONum-Suffix*_____
Sublocation (I.D.able feature on topo map)_____
USGS Quad name_____ *Quad code (if known)* _____
Survey date:_____ Surveyors:_____

Directions to permanent marker and to the plot (use reverse of sheet if necessary):

Vegetation Plot length (m)____ Plot width (m)____ Plot shape (rectangle?) _____ Permanent? Y or N

_Digital photos _Regular camera _No pictures taken Roll# or disc #_____ Frame #_____

Plot representativeness (is the matrix the same?)_____

_____

____ UTM ____ Lat/long (If lat/long, then values are _____ N _____ W

GPS Techniques/Equipment _____ GPS file name ___ ___ ___ ___ ___ ___ ___ ___

Field UTM X ___ ___ ___ ___ ___ ___ **m E** **Corrected UTM X** ___ ___ ___ ___ ___ ___ **m E**

Field UTM Y ___ ___ ___ ___ ___ ___ ___ **m N** **Corrected UTM Y** ___ ___ ___ ___ ___ ___ ___ **m N**

Coordinate accuracy _____ **m / ft** **UTM Zone**_____ **GPS location with respect to permanent marker if not 0,0: x___ y___**
_ *Estimated position marked on Topo. Sheet.* **Elevation** _____ **m / ft** topo map? altimeter? DEM? GPS?

Measured Slope _____ °
_ Flat 0 ° 0 %
_ Gentle 0-5 ° 1-9%
_ Mod 6-14 ° 10-25%
_ Somewhat steep
15-25 ° 26-49%
_ Steep27-45 ° 50-100%
_ Very steep
45-69 ° 101-275%
_ Abrupt
70-100 ° 276-300%
_ overhanging/sheltered
>100 ° >300%

Measured Aspect ___ ° (N=0 °)
_ Flat
_ Variable
_ N 338-22 °
_ NE 23-67 °
_ E 68-112 °
_ SE 113-157 °
_ S 158-202 °
_ SW 203-247 °
_ W 248-292 °
_ NW 293-337 °

Topographic Position
_ Interfluve (Ridge, summit or crest)
_ High Slope (upper slope, convex slope)
_ Midslope (middle slope)
_ Lowslope (lower slope, footslope)
_ Toeslope (alluvial toeslope)
_ Low level (terrace)
_ Channel bed

Landform (check most applicable)
_ Alluvial flat
_ Alluvial terrace
_ Bank
_ Bar
_ Bench
_ Cliff
_ Colluvial Slope
_ Cove
_ Debris Slide
_ Depression
_ Draw
_ Floodplain
_ Gap
_ Hanging valley
_ Knob
_ Midslope
_ Mima mound
_ Nose slope
_ Ravine
_ Ridge
_ Ridgetop bedrock outcrop
_ Saddle
_ Scour
_ Seep
_ Toe slope
_ Slope
_ Streambed
_ Slough
_ Streamhead

Geology

Igneous Rocks:

_ Granitic(Granite, Schyolite, Syenite, Trachyte)
_ Dioritic (Diorite, Dacite, Andesite)
_ Gabbroic (Gabbro, Basalt, Pyroxenite, Peridotite Diabase, Traprock)

Sedimentary Rocks:

_Conglomerates and Breccias
_Sandstone & conglomerate
_Siltstone (calcareous or noncalc)
_Shale (calcareous or noncalc)
_Limestone and Dolomite
_Gypsum
_Marl

Metamorphic Rocks:

_ Gneiss
_Schist
_Slate and Phyllite
_Marble
_ Serpentine (Ultramafic)

Y Other _____

Hydrologic Regime (check only for wetlands)
_ Intermittently flooded
_ Permanently flooded
_ Semipermanently flooded
_ Temporarily Flooded (e.g. floodplains)
_ Seasonally Flooded (e.g. seasonal ponds)
_ Saturated (e.g. bogs, perennial seeps)
_ Unknown
_ Not a wetland (Upland: XERIC : DRY - MESIC : MESIC)

Salinity/Halinity Modifiers:
Upland (N/A)
Coastal Tidal: Saltwater- Tidal
Coastal Tidal – Brackish
Coastal Tidal – Freshwater
Inland Saltwater
Inland Brackish seeps)
Unknown

Hydrology Evidence (Describe the hydrological factors that caused you to assign the type to the hydrologic regime that you chose.):

Environmental comments:

_____

Landscape comments:

Soil Texture:

_ Sand
_ Sandy loam
_ Loam
_ Silt loam
_ Clay loam
_ Clay
_ Peat
_ Muck

Soil Taxon Description: _____

_____

Drainage:

_ Rapidly drained
_ Well drained
_ Moderately well drained
_ Somewhat poorly drained
_ Poorly drained
_ Very poorly drained

Soil depth (optional):_____

Ground cover
(adds to 100%)

_____% Bedrock
_____% Large rocks (cobbles, boulders >10cm)
_____***% Small rocks (gravel, 0.2-10 cm)***
_____***% Bare soil***
_____% Litter, duff
_____% Wood (> 1 cm)
_____***% Water***
_____% Other _____
_____***% Sand (0.1-2 mm)***
_____% Bryophyte/lichen

Leaf type:
__Broad-leaved
__Needle-leaved
__Microphyllous
__Graminoid
__Broad-leaved herbaceous
__Pteridophyte
__Extremely xeromorphic

Leaf phenology (dominant stratum)

- Evergreen
_ Cold-deciduous
_ Drought-deciduous
_ Mixed evergreen-cold-deciduous
_ Mixed evergreen drought deciduous
_ Herb - Annual
_ Herb - Perennial

Physiognomic Class

_ Forest (closed tree canopy)
_ Woodland (open tree canopy)
_ Shrubland
_ Dwarf Shrubland
_ Herbaceous (less than 25% woody layers)
_ Nonvascular
_ Sparse Vegetation

DISTURBANCE

Natural and Anthropogenic Disturbance _ logging _ fire _ Hydrologic _ erosion _ trails/roads _ Agriculture _ grazing _ wind/ice damage _ Old Growth _ pine bk beetle _ exotic plants _ Fire Suppression _ dogwood anthracnose _ adelgid _ RCW _ ORV _ feral hogs Disturbance in plot, of type and severity (0-5, 0=no disturbance, 5= extreme disturbance): ___*human:*_____ ___*natural:*_____ ___ *fire:when?*_____ ___ *clear-cut: when?*_____ ___ *animal*_____	*Disturbance comments:* Current land use: *Former land use:*

Qualitative Assessment (Write a brief word picture of community. Describe variation within occurrence in terms of veg structure and environment. Describe dominant and characteristic species and inclusion communities (if present). If community occurs as a mosaic describe spatial distribution and associated community types . Describe to what degree the example by the assigned classification unit Include landscape context information (adjacent communities):

QUANTITATIVE VEGETATION SAMPLE

STRATA	STRATA **HEIGHT**	COVER CLASS	**DOMINANT/DIAGNOSTIC SPECIES**	Height scale	Cover cls
Emergent T1				**01** < .5m	**5%**
Tree canopy T2				**02** .5-1m	**10%**
Understory T3				**03** 1-2m	**20%**
Tall shrub S1				**04** 2-5m	**30%**
Short shrub S2				**05** 5-10m	**40%**
Herbaceous				**06** 15-20m	**50%**
Nonvascular				**07** 15-20m	**60%**
Vine/liana				**08 20-35m**	**70%**
Other notable species (indicators of distinctive conditions, e.g. high pH soil, elevation, geographic region, other particularly abundant species):				**09 35-50m**	**80%**
				10 >50m	**90%**
					100%

T1: *Emergent * ***T2:*** *Tree Canopy * ***T3*** *Subcanopy * ***S1*** *Tall Shrub (>1m; to 5m) * ***S2*** *Short Shrub (< 1m) * ***H*** *Herbaceous * ***N*** *Nonvascular * ***V*** *Vines (lianas) * ***E*** *Epiphytes*

SPECIES COMP AND COVER CLASS BY STRATUM (enter cover values for each stratum AND for Total cover)

T1	T2	T3	S1	S2	H	N	V	E	Total Cover	Name (7 letter code or full name)	Collected? Spec #?	Diagnostic?

Cover cls
1 trace
2 0.1-1%
3 1-2%
4 2-5%
5 5-10%
6 10-25%
7 25-50%
8 50-75%
9 75-95%
10 >95%

SPECIES COMPOSITION AND COVER/ABUNDANCE CLASS BY STRATUM

T 1	T 2	T3	S 1	S2	H	N	V	E	Total cover	Name (7 letter acronym or full name)	Collected? Spec #?	Diagn ostic?

Cover classes
1. trace
2. 0.1-1%
3. 1-2%
4. 2-5%
5. 5-10%
6. 10-25%
7. 25-50%
8. 50-75%
9. 75-95%
10. >95%

T1: Emergent

T2: Tree Can

T3 Subcanopy

S1 Tall Shrub (>1m; to 5m)

S2 Short Shrub (< 1m)

H Herbaceous

N Nonvascular

V Vines (lianas)

E Epiphytes

Appendix II Photos of selected plots of Cumberland Gap National Historical Park

Plot 4 with Claude Bailey, Tennessee Division of Natural Heritage

Plot 15.

Plot 21.

Plot 38.

Plot 46 with Carl Nordman, NatureServe.

The dangers of field work…

Appendix III Complete Report from Biotics of Ecological Communities Attributed to Cumberland Gap National Historical Park

INTERNATIONAL ECOLOGICAL
CLASSIFICATION STANDARD:

TERRESTRIAL ECOLOGICAL CLASSIFICATIONS

Cumberland Gap National Historical Park

2 February 2006

by

NatureServe

1101 Wilson Blvd., 15th floor
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This subset of the International Ecological Classification Standard covers vegetation associations attributed to Cumberland Gap National Historical Park. This classification has been developed in consultation with many individuals and agencies and incorporates information from a variety of publications and other classifications. Comments and suggestions regarding the contents of this subset should be directed to Mary J. Russo, Central Ecology Data Manager, Durham, NC <mary_russo@natureserve.org> and Rickie White, National Coordinator, USGS/NPS Vegetation Mapping Program, Arlington, VA <rickie_white@natureserve.org>.

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[1] NatureServe is an international organization including NatureServe regional offices, a NatureServe central office, U.S. State Natural Heritage Programs, and Conservation Data Centres (CDC) in Canada and Latin America and the Caribbean. Ecologists from the following organizations have contributed the development of the ecological systems classification:

United States
Central NatureServe Office, Arlington, VA; Eastern Regional Office, Boston, MA; Midwestern Regional Office, Minneapolis, MN; Southeastern Regional Office, Durham, NC; Western Regional Office, Boulder, CO; Alabama Natural Heritage Program, Montgomery AL; Alaska Natural Heritage Program, Anchorage, AK; Arizona Heritage Data Management Center, Phoenix AZ; Arkansas Natural Heritage Commission Little Rock, AR; Blue Ridge Parkway, Asheville, NC; California Natural Heritage Program, Sacramento, CA; Colorado Natural Heritage Program, Fort Collins, CO; Connecticut Natural Diversity Database, Hartford, CT; Delaware Natural Heritage Program, Smyrna, DE; District of Columbia Natural Heritage Program/National Capital Region Conservation Data Center, Washington DC; Florida Natural Areas Inventory, Tallahassee, FL; Georgia Natural Heritage Program, Social Circle, GA; Great Smoky Mountains National Park, Gatlinburg, TN; Gulf Islands National Seashore, Gulf Breeze, FL; Hawaii Natural Heritage Program, Honolulu, Hawaii; Idaho Conservation Data Center, Boise, ID; Illinois Natural Heritage Division/Illinois Natural Heritage Database Program, Springfield, IL; Indiana Natural Heritage Data Center, Indianapolis, IN; Iowa Natural Areas Inventory, Des Moines, IA; Kansas Natural Heritage Inventory, Lawrence, KS; Kentucky Natural Heritage Program, Frankfort, KY; Louisiana Natural Heritage Program, Baton Rouge, LA; Maine Natural Areas Program, Augusta, ME; Mammoth Cave National Park, Mammoth Cave, KY; Maryland Wildlife & Heritage Division, Annapolis, MD; Massachusetts Natural Heritage & Endangered Species Program, Westborough, MA; Michigan Natural Features Inventory, Lansing, MI; Minnesota Natural Heritage & Nongame Research and Minnesota County Biological Survey, St. Paul, MN; Mississippi Natural Heritage Program, Jackson, MI; Missouri Natural Heritage Database, Jefferson City, MO; Montana Natural Heritage Program, Helena, MT; National Forest in North Carolina, Asheville, NC; National Forests in Florida, Tallahassee, FL; National Park Service, Southeastern Regional Office, Atlanta, GA; Navajo Natural Heritage Program, Window Rock, AZ; Nebraska Natural Heritage Program, Lincoln, NE; Nevada Natural Heritage Program, Carson City, NV; New Hampshire Natural Heritage Inventory, Concord, NH; New Jersey Natural Heritage Program, Trenton, NJ; New Mexico Natural Heritage Program, Albuquerque , NM; New York Natural Heritage Program, Latham, NY; North Carolina Natural Heritage Program, Raleigh, NC; North Dakota Natural Heritage Inventory, Bismarck, ND; Ohio Natural Heritage Database, Columbus, OH; Oklahoma Natural Heritage Inventory, Norman, OK; Oregon Natural Heritage Program, Portland, OR; Pennsylvania Natural Diversity Inventory, PA; Rhode Island Natural Heritage Program, Providence, RI; South Carolina Heritage Trust, Columbia, SC; South Dakota Natural Heritage Data Base, Pierre, SD; Tennessee Division of Natural Heritage, Nashville, TN; Tennessee Valley Authority Heritage Program, Norris, TN; Texas Conservation Data Center, San Antonio, TX; Utah Natural Heritage Program, Salt Lake City, UT; Vermont Nongame & Natural Heritage Program, Waterbury, VT; Virginia Division of Natural Heritage, Richmond, VA; Washington Natural Heritage Program, Olympia, WA; West Virginia Natural Heritage Program, Elkins, WV; Wisconsin Natural Heritage Program, Madison, WI; Wyoming Natural Diversity Database, Laramie, WY

Canada
Alberta Natural Heritage Information Centre, Edmonton, AB, Canada; Atlantic Canada Conservation Data Centre, Sackville, New Brunswick, Canada; British Columbia Conservation Data Centre, Victoria, BC, Canada; Manitoba Conservation Data Centre. Winnipeg, MB, Canada; Ontario Natural Heritage Information Centre, Peterborough, ON, Canada; Quebec Conservation Data Centre, Quebec, QC, Canada; Saskatchewan Conservation Data Centre, Regina, SK, Canada; Yukon Conservation Data Centre, Yukon, Canada

Latin American and Caribbean
Centro de Datos para la Conservacion de Bolivia, La Paz , Bolivia; Centro de Datos para la Conservacion de Colombia, Cali,Valle, Columbia; Centro de Datos para la Conservacion de Ecuador, Quito, Ecuador; Centro de Datos para la Conservacion de Guatemala, Ciudad de Guatemala , Guatemala; Centro de Datos para la Conservacion de Panama, Querry Heights , Panama; Centro de Datos para la Conservacion de Paraguay, San Lorenzo , Paraguay; Centro de Datos para la Conservacion de Peru, Lima, Peru; Centro de Datos para la Conservacion de Sonora, Hermosillo, Sonora , Mexico; Netherlands Antilles Natural Heritage Program, Curacao , Netherlands Antilles; Puerto Rico-Departmento De Recursos Naturales Y Ambientales, Puerto Rico; Virgin Islands Conservation Data Center, St. Thomas, Virgin Islands.

NatureServe also has partnered with many International and United States Federal and State organizations, which have also contributed significantly to the development of the International Classification. Partners include the following The Nature Conservancy; Provincial Forest Ecosystem Classification Groups in Canada; Canadian Forest Service; Parks Canada; United States Forest Service; National GAP Analysis Program; United States National Park Service; United States Fish and Wildlife Service; United States Geological Survey; United States Department of Defense; Ecological Society of America; Environmental Protection Agency; Natural Resource Conservation Services; United States Department of Energy; and the Tennessee Valley Authority. Many individual state organizations and people from academic institutions have also contributed to the development of this classification.

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I. Forest

I.A.8.N.b. Rounded-crowned temperate or subpolar needle-leaved evergreen forest

Pinus virginiana Forest Alliance

Virginia Pine Successional Forest

***Pinus virginiana* Successional Forest**
Virginia Pine Successional Forest
Identifier: CEGL002591

Ecological System(s): Central Appalachian Dry Oak-Pine Forest (CES202.591)
Northeastern Interior Dry-Mesic Oak Forest (CES202.592)
Southern Appalachian Low Mountain Pine Forest (CES202.332)

ELEMENT CONCEPT

Global Summary: This community occurs in areas where canopy removal has created dry, open conditions and bare mineral soil, allowing for the establishment of *Pinus virginiana*. These habitats include old fields, old pastures, clearcuts, and burned or eroded areas. This forest typically has a very dense canopy of *Pinus virginiana* and little understory vegetation. The dense canopy may also include admixtures of other *Pinus* species (e.g., *Pinus taeda, Pinus echinata*) or other early successional deciduous trees (e.g., *Acer rubrum, Liquidambar styraciflua, Liriodendron tulipifera*). Associated woody and herbaceous species vary with geography but are typically ruderal or exotic species. Shrub and herb layers are frequently very sparse. Stands are short-lived, generally less than 75 years.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:

Cumberland Gap National Historical Park Environment: Within the park, this community occurs in areas where canopy removal has created open conditions and where erosion has created little to no mineral soil. These conditions often exist in heavily impacted and exposed landscapes, but can sometimes occur in valley bottoms and other areas where severe human disturbance related to heavy logging and/or heavy agriculture has created the right conditions. These forests tend to be less than 50 years old and occur only in areas with moderate to high acidity levels. Other successional species, such as *Juniperus virginiana var. virginiana*, may colonize degraded areas of higher pH.

Global Environment: This community occurs in areas where canopy removal has created open conditions and bare mineral soil, allowing for the establishment of *Pinus virginiana*. These conditions can include old fields, old pastures, clearcuts, and burned or eroded areas. In the Ridge and Valley of Tennessee, northeastern Monroe County, early successional forests with *Pinus virginiana* dominance were found on low slopes in areas that were cleared for agriculture prior to the 1970s, when Tellico Lake was created (Andreu and Tukman 1995). In the Central Appalachians, this vegetation occurs where soft shales have been farmed (primarily in valleys), resulting in stands with nothing but successional species in the understory. Soils underlying these communities are of two general types, i.e., those derived in residuum from calcareous shale and calcareous sandstone of the Middle Ordovician and those of some other origin. Series of the former type include Dandridge (Lithic Ruptic-Alfic Eutrochrepts), Tellico (Typic Rhododults), and Steekee (Ruptic-Ultic Dystrochrepts). Other soil series that this forest type may occur on include Litz, Dewey, Alcoa, Bland, Etowah, Lobdell and Neubert. All of these soils are well-drained and range in pH from moderate acid to very strongly acidic.

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: Within the park boundary, this forest is dominated by a heavy to moderate canopy of *Pinus virginiana*. In the oldest examples of this community type, *Liquidambar styraciflua, Acer rubrum,* and *Liriodendron tulipifera* may begin to overtop the pine canopy. The shrub layer is typically sparse to moderate, and the herb stratum is typically very low diversity. Clonal species such as *Lycopodium digitatum (= Diphasiastrum digitatum),* vines such as

Toxicodendron radicans, invasive exotics such as *Lonicera japonica* and *Microstegium vimineum*, and the fern *Polystichum acrostichoides* may often colonize large sections of this community and at high density, but generally there are few other species present.

Global Vegetation: This forest typically has a very dense canopy of *Pinus virginiana* and little understory vegetation. *Pinus taeda* or *Pinus echinata* may co-occur with *Pinus virginiana* in the canopy. The canopy can also have significant admixtures of early successional deciduous trees (e.g., *Acer rubrum, Liquidambar styraciflua, Liriodendron tulipifera*). Associated woody and herbaceous species vary with geography but are typically ruderal or exotic species. Shrub and herb strata are absent to sparse in coverage. In eastern Tennessee the subcanopy may contain *Acer saccharum* and *Cornus florida*; other associated species may include *Cercis canadensis, Parthenocissus quinquefolia, Lonicera japonica*, and *Microstegium vimineum* (Andreu and Tukman 1995). In the Central Appalachians, associates include *Pinus taeda, Pinus echinata*, and *Pinus rigida*. The dense ericaceous shrub stratum contains *Vaccinium* spp., *Gaylussacia* spp., *Kalmia latifolia*, and *Rhododendron* spp.

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Pinus virginiana*
Tree subcanopy	Broad-leaved deciduous tree	*Liquidambar styraciflua*
Herb (field)	Vine/Liana	*Lonicera japonica, Smilax glauca, Toxicodendron radicans*

Global

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Pinus virginiana*
Tree subcanopy	Needle-leaved tree	*Juniperus virginiana*
Tree subcanopy	Broad-leaved deciduous tree	*Acer rubrum, Cornus florida, Nyssa sylvatica, Oxydendrum arboreum*
Tall shrub/sapling	Broad-leaved deciduous tree	*Cornus florida, Nyssa sylvatica, Oxydendrum arboreum*
Tall shrub/sapling	Broad-leaved evergreen tree	*Vaccinium arboreum*
Tall shrub/sapling	Broad-leaved deciduous shrub	*Vaccinium stamineum*
Short shrub/sapling	Broad-leaved deciduous tree	*Cercis canadensis, Cornus florida, Oxydendrum arboreum, Quercus alba, Sassafras albidum*
Herb (field)	Vine/Liana	*Lonicera japonica, Smilax glauca, Toxicodendron radicans*

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park: *Lycopodium digitatum, Polystichum acrostichoides*
Global:

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:
Global:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (ruderal) (13-Jun-2000). This forest represents early-successional vegetation and is thus not of conservation concern.

CLASSIFICATION

Status: Standard
Classification Confidence: 1 - Strong
Cumberland Gap National Historical Park Comments: This community is challenging to map in the park due to the large number of examples that have been recently impacted by pine beetles. At this time, many of these forests are transitioning from a canopy of 100% *Pinus virginiana* to a younger canopy with other successional species, such as *Liquidambar styraciflua* and *Acer rubrum*, as the key dominants.

Global Comments: Early successional *Pinus virginiana* vegetation occurring over calcareous substrates is classed in *Pinus virginiana - Juniperus virginiana var. virginiana - Ulmus alata* Forest (CEGL007121) and has species indicative of calcareous substrates.

Global Similar Associations:

- *Pinus echinata* Early-Successional Forest (CEGL006327)--occurs in similar environments but is dominated (>50% of canopy) by *Pinus echinata* instead of *Pinus virginiana*.
- *Pinus taeda - Liquidambar styraciflua* Semi-natural Forest (CEGL008462)--is commonly found in the same area as CEGL002591 in the Piedmont. CEGL008462 contains at least 50% *Pinus taeda* in the canopy, whereas CEGL002591 is mostly *Pinus virginiana*.
- *Pinus taeda / Liquidambar styraciflua - Acer rubrum* var. *rubrum / Vaccinium stamineum* Forest (CEGL006011)--occurs in similar environments with similar disturbance histories but is dominated by (>50% of canopy) *Pinus taeda* instead of *Pinus virginiana*.
- *Pinus virginiana - Juniperus virginiana* var. *virginiana - Ulmus alata* Forest (CEGL007121)--on more calcareous or circumneutral substrates.
- *Pinus virginiana - Pinus (rigida, echinata) - (Quercus prinus) / Vaccinium pallidum* Forest (CEGL007119)--can have a very similar canopy in the Piedmont and Blue Ridge ecoregions, but CEGL007119 is generally created and maintained by fire and/or logging but not heavy plowing and/or erosion. CEGL002591 generally has signs of heavy agricultural use such as sparse herbaceous or shrub layers, large percentage of invasive exotics such as *Lonicera japonica* in the herbaceous layer, old plowlines, human debris, and extremely even-aged canopy, whereas CEGL007119 generally has a more intact herbaceous/shrub layer (especially *Vaccinium pallidum*) and less signs of severe human disturbance.

Global Related Concepts:

- IA7c. Xeric Virginia Pine Ridge Forest (Allard 1990) B
- Unclassified Old-Field Successional Forest (Fleming and Moorhead 2000) ?
- Virginia Pine - Oak: 78 (Eyre 1980) B
- Virginia Pine, RV (Pyne 1994) B
- Virginia Pine: 79 (Eyre 1980) B Xeric Pine Forest (Ambrose 1990a) B

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: This community occurs in small patches throughout the park (TN, KY, and VA) in areas of acidic soil that were heavily disturbed by logging, agriculture, or very severe fire.

Global Range: This successional community is possible in the Piedmont from Pennsylvania south to Alabama and ranges west into the Appalachians, Ridge and Valley, the Cumberland Plateau, and in scattered locales of the Interior Low Plateau.

Nations: US

States/Provinces: AL, GA, IN, KY, MD, NC, NJ, PA, SC, TN, VA, WV

USFS Ecoregions: 221Da:CCC, 221Ha:CCC, 221Hc:CCC, 221He:CCC, 221J:CC, 222Cg:CCC, 222Ej:CCC, 222En:CCC, 222Eo:CCC, 231Ae:CCC, 231Cd:CCC, M221Aa:CCC, M221Ab:CCC, M221Ac:CCC, M221Ca:CCP, M221Cb:CCP, M221Cc:CCP, M221Cd:CCC, M221Ce:CCP, M221Da:CCC, M221Db:CCC, M221Dc:CCC, M221Dd:CCC

Federal Lands: NPS (Big South Fork, Blue Ridge Parkway?, Cumberland Gap, Gettysburg, Great Smoky Mountains, Kings Mountain, Lincoln Birthplace, Little River Canyon?, Mammoth Cave, Natchez Trace, Obed, Shenandoah, Shiloh); TVA (Tellico); USFS (Bankhead, Chattahoochee, Cherokee, Daniel Boone, George Washington, Jefferson, Sumter, Uwharrie?)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:

Cumberland Gap National Historical Park Plots: CUGA.01, CUGA.11, CUGA.14, CUGA.39.

Local Description Authors: R. White

Global Description Authors: M. Andreu and M. Tukman, mod. K.D. Patterson

References: Allard 1990, Ambrose 1990a, Andreu and Tukman 1995, Eyre 1980, Fike 1999, Fleming and Coulling 2001, Fleming and Moorhead 2000, Nelson 1986, Patterson et al. 1999, Pyne 1994, Schmalzer and DeSelm 1982, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

I.A.8.N.c. Conical-crowned temperate or subpolar needle-leaved evergreen forest

Juniperus virginiana Semi-natural Forest Alliance

Red-cedar Successional Forest

***Juniperus virginiana* var. *virginiana* - *(Quercus* spp.) Forest**
Eastern Red-cedar - (Oak species) Forest
Identifier: CEGL007124

Ecological System(s): East Gulf Coastal Plain Northern Loess Plain Oak-Hickory Upland (CES203.482)

ELEMENT CONCEPT

Global Summary: This is a successional community dominated by a nearly monospecific *Juniperus virginiana var. virginiana* canopy. Species composition and cover are variable depending upon geographic location and disturbance history. Some examples are densely forested (75-100% total cover) with *Juniperus virginiana var. virginiana* and sparse subcanopy, shrub and herb strata. Other examples, especially those that are somewhat more open-canopied, are more species-rich and other tree species may enter the canopy in low levels of abundance. Species that may occur in the canopy include *Carya alba, Carya ovata, Cercis canadensis,* and *Pinus virginiana*. Various oaks (including *Quercus coccinea, Quercus falcata*, and *Quercus phellos*) may also be present, seeding in from adjacent oak-hardwood forests. The midstory is typically sparse, with canopy species as well as *Cornus florida, Ilex opaca, Liquidambar styraciflua*, and *Prunus serotina var. serotina*. In addition, *Frangula caroliniana* occurs in various strata. Herbs are patchy and typically include *Asplenium platyneuron, Chasmanthium laxum, Eupatorium* spp., *Polystichum acrostichoides*, and *Carex* spp.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:
Cumberland Gap National Historical Park Environment: This community is restricted to areas of neutral to high pH soils on recently abandoned agricultural land. This community may not exist within the park boundary but is present just outside the park boundary where grazing land has recently been abandoned. Although this community is considered a forest, many examples of this community are young and may resemble either a woodland or shrubland in physiognomy.
Global Environment: This community occurs in a variety of disturbed areas such as eroded soils on abandoned agricultural land (Andreu and Tukman 1995). In Kentucky this vegetation occurs throughout the state (Bluegrass region, Highland Rim, East Gulf Coastal Plain) on calcareous substrates or on abandoned agricultural land; acreage of this type has increased from presettlement. This type also includes the *Juniperus virginiana var. virginiana* woodland from Tellico Lake (Andreu and Tukman 1995) which occurs on drier sites with shallow, rocky soils.

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: Although *Juniperus virginiana var. virginiana* is usually the most common canopy species in this community, many other woody species, such as *Carya* spp., *Cercis canadensis, Pinus virginiana*, and *Quercus* spp., can sometimes be common. The herb layer is patchy and can be either very sparse or fairly dense depending upon how open the canopy of the example is. As with other successional communities, invasive exotic species can often dominate the herbaceous layer. Common invasives include *Lonicera japonica* and *Microstegium vimineum.*
Global Vegetation: Stands are dominated by *Juniperus virginiana var. virginiana*. A host of other woody species may also be present, some of which may occur in the canopy at low levels of abundance. These species include *Carya alba, Carya ovata, Cercis canadensis, Pinus virginiana, Quercus coccinea, Quercus*

falcata, and *Quercus phellos*. The midstory is typically sparse, with canopy species as well as *Cornus florida, Ilex opaca, Liquidambar styraciflua*, and *Prunus serotina var. serotina* (NatureServe Ecology unpubl. data). In addition, *Frangula caroliniana* occurs in various strata. Herbs are patchy and typically include *Asplenium platyneuron, Chasmanthium laxum, Eupatorium* spp., *Polystichum acrostichoides*, and *Carex* spp. The exotics *Lonicera japonica* and *Microstegium vimineum* may also be present.

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species
Tree subcanopy	Needle-leaved tree	*Juniperus virginiana* var. *virginiana*

Global

Stratum	Lifeform	Species
Tree subcanopy	Needle-leaved tree	*Juniperus virginiana* var. *virginiana*

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park:
Global:

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:
Global:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (ruderal) (3-Sep-2002). This forest represents early-successional, modified, or silviculturally managed vegetation and is thus not of conservation concern and does not receive a conservation status rank.

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Cumberland Gap National Historical Park Comments:
Global Comments: Originally described from Tellico Pilot Project (Ridge and Valley of Tennessee, northeastern Monroe County) based on 10 stands sampled by Andreu and Tukman (1995). This community is very closely related to *Juniperus virginiana* Woodland and to mixed juniper-oak forest types but is distinguished by the closed-canopy evergreen dominance of *Juniperus virginiana*. *Juniperus virginiana* woodlands may be equivalent to this type.
Global Similar Associations:

- *Juniperus virginiana* Midwest Forest (CEGL002593)
- *Juniperus virginiana* var. *virginiana / Rhus copallinum / Schizachyrium scoparium* Woodland (CEGL007704)

Global Related Concepts:

- Eastern Redcedar: 46 (Eyre 1980) B
- IB5a. Eastern Red Cedar Woodland (Allard 1990) ?
- Red cedar, RV (Pyne 1994) B

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: This community most likely only occurs on the Virginia side and small portions of the Tennessee side near the park. It has been documented just outside of the park boundary and may occur in small patches on the boundary.
Global Range: This community is widely distributed in the southeastern and central United States.
Nations: US
States/Provinces: AL, AR, GA, KY, LA, MS, NC, OK, SC, TN, VA, WV?
USFS Ecoregions: 221Hc:CCC, 222Ak:CCP, 222Cg:CCC, 222Eb:CCC, 222Ed:CCC, 222Eg:CCC, 222Ej:CCC, 222En:CCC, 222Eo:CCC, 222Lc:CCP, 222Me:CCP, 231:C, 251Cc:CC?, 251Ch:CCP, M221Be:CCC

Federal Lands: DOD (Arnold, Camp Gruber, J. Percy Priest); NPS (Big South Fork, Blue Ridge Parkway?, Chickamauga-Chattanooga, Chickasaw NRA, Cumberland Gap, Fort Donelson, Kings Mountain, Lincoln Birthplace, Mammoth Cave, Natchez Trace, Russell Cave, Shiloh, Stones River); TVA (Columbia, Tellico); USFS (Bankhead, Cherokee?, Daniel Boone, Ouachita)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots: None.
Local Description Authors: R. White
Global Description Authors: K.D. Patterson
References: Allard 1990, Andreu and Tukman 1995, Evans 1991, Eyre 1980, Gallyoun et al. 1996, Hoagland 2000, NatureServe Ecology - Southeastern U.S. unpubl. data, Pyne 1994, Rice 1960, Rosson 1995, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

I.B.2.N.a. Lowland or submontane cold-deciduous forest

Acer rubrum - Nyssa sylvatica - Magnolia fraseri Forest Alliance

Southern Appalachian Acidic Mixed Hardwood Forest

***Acer rubrum* var. *rubrum - Betula (alleghaniensis, lenta) - Magnolia fraseri / (Rhododendron maximum, Kalmia latifolia)* Forest**
Red Maple - (Yellow Birch, Sweet Birch) - Fraser Magnolia / (Great Rhododendron, Mountain Laurel) Forest
Identifier: CEGL008558

Ecological System(s): Southern Appalachian Oak Forest (CES202.886)

ELEMENT CONCEPT

Global Summary: This association includes submesic, potentially fire-exposed or heavily logged, mid and upper slopes in the southern Appalachians north to the Cumberlands. Canopy dominance may be shared by a number of species, including *Acer rubrum var. rubrum, Carya glabra, Magnolia fraseri, Halesia carolina, Nyssa sylvatica, Betula alleghaniensis var. alleghaniensis, Betula lenta, Oxydendrum arboreum*, and *Tsuga canadensis*, but the community's most distinctive character is the relative lack of dominance by any one species and the lack of oak species in the canopy. This community may occasionally be dominated by *Betula lenta* or *Betula alleghaniensis* with an extremely dense understory of *Rhododendron maximum*; it may intergrade with acidic cove forests farther downslope. The understory shrub layer is composed of a combination of *Kalmia latifolia* and *Rhododendron maximum*, though the cover is not consistently 100%. The proportion of *Kalmia* to *Rhododendron* varies widely through this association, with more xeric sites having a higher concentration of *Kalmia latifolia* than *Rhododendron maximum*. In addition, drier versions of this association tend to contain abundant *Sassafras albidum* in the understory, whereas the more mesic versions have lower densities of *Sassafras albidum*. The herb layer is generally sparse but may sometimes be dominated by a dense cover of ferns such as *Dennstaedtia punctilobula* or *Dryopteris marginalis*.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:
Cumberland Gap National Historical Park Environment: Within the park, this submesic acidic community occurs intermingled with oak-hickory communities on lower and midslopes throughout the Kentucky side of the park. This community may occur on various exposures and slopes. Most likely, this community developed in mid-elevation areas that were historically dominated by *Castanea dentata*. Many of these areas were probably historically fire-prone sites, with fairly deep soils.
Global Environment: This is a submesic forest found on moderate to steep terrain on upper slopes of many different aspects and positions in the Great Smoky Mountains National Park area at 760 to 1440 m (2500-4600 feet) in elevation and extending up the Blue Ridge into southern Virginia at the same altitude. Although tree sizes can be very large, this community is usually a late-successional community that

developed in mid-elevation areas that were historically dominated by *Castanea dentata*. As the *Castanea dentata* senesced and logging proceeded in remote sections of the park, the tree species now seen in the canopy began to be released from the understory to the canopy. This may explain why the community is so variable in its slope position, moisture regime, and elevation. The areas were probably historically fire-exposed sites before the suppression of landscape-scale fires. Soils are usually very deep.

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: Within the park, the canopy of this community varies widely. Canopy dominants include a mixture of *Acer rubrum, Carya glabra*, and sometimes *Betula lenta*. *Oxydendrum arboreum* and *Sassafras albidum* are common and fairly consistent understory dominants. The shrub layer can be sparse or can be dense with a high concentration of *Kalmia latifolia, Rhododendron maximum*, or *Ilex opaca*. *Vaccinium* spp. and *Gaylussacia baccata* may also occur. The herb layer can vary widely but is generally sparse.

Global Vegetation: The canopy of this alliance is typically shared by a wide range of species including *Acer rubrum var. rubrum, Betula alleghaniensis var. alleghaniensis, Betula lenta, Magnolia fraseri, Oxydendrum arboreum, Nyssa sylvatica*, and *Tsuga canadensis*. The understory includes some subcanopy trees such as *Ilex opaca var. opaca* or *Ilex montana*, and shrub species such as *Kalmia latifolia* and *Rhododendron maximum* can be very dense. The proportion of *Kalmia* to *Rhododendron* varies widely through this association, with more xeric sites having a higher concentration of *Kalmia latifolia* than *Rhododendron maximum*. In addition, drier versions of this association tend to contain abundant *Sassafras albidum* in the understory, whereas the more mesic versions have lower densities of *Sassafras albidum*. Although the herb layer is comprised mostly of small shrubs, seedlings, and evergreens, *Trillium undulatum, Goodyera pubescens*, and other acid-loving species can occasionally be found in this association.

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Acer rubrum* var. *rubrum*, *Nyssa sylvatica*
Tree subcanopy	Broad-leaved deciduous tree	*Oxydendrum arboreum*
Shrub/sapling (tall & short)	Broad-leaved evergreen shrub	*Kalmia latifolia*, *Rhododendron maximum*

Global

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Tsuga canadensis*
Tree canopy	Broad-leaved deciduous tree	*Acer rubrum* var. *rubrum*, *Betula alleghaniensis* var. *alleghaniensis*, *Betula lenta*, *Halesia carolina*, *Magnolia fraseri*, *Nyssa sylvatica*, *Oxydendrum arboreum*
Shrub/sapling (tall & short)	Broad-leaved evergreen tree	*Rhododendron maximum*
Shrub/sapling (tall & short)	Broad-leaved evergreen shrub	*Kalmia latifolia*

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park:
Global:

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:
Global:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (modified/managed) (9-Oct-2001). Ranked as modified due to the heavy effects logging had on most of these stands over the past 100 years. Stands of this type appear to have been modified by a combination of logging, chestnut death, and fire suppression. These are mature stands in the Great Smoky Mountains National Park.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Cumberland Gap National Historical Park Comments:
Global Comments: None of the communities listed as similar associations are very close to this association in canopy composition, but the understory of all of these associations is similar. Some examples of this community may resemble and even intergrade with acidic cove forest (CEGL007543) but usually occur high up on south- and even some north-facing slopes far from the concave cove areas. This community may begin to pick up species such as *Picea rubens* and *Prunus pensylvanica* at the highest parts of its elevational range in the southern Appalachians. In the Cumberlands, it definitely can intergrade with acidic coves, and the line between these communities is often hard to draw.
Global Similar Associations:

- *Liriodendron tulipifera - Betula lenta - Tsuga canadensis / Rhododendron maximum* Forest (CEGL007543)
- *Quercus (prinus, coccinea) / Kalmia latifolia / (Galax urceolata, Gaultheria procumbens)* Forest (CEGL006271)--oak-dominated.
- *Quercus alba - Quercus (rubra, prinus) / Rhododendron calendulaceum - Kalmia latifolia - (Gaylussacia ursina)* Forest (CEGL007230)
- *Quercus prinus - (Quercus rubra) - Carya* spp. / *Oxydendrum arboreum - Cornus florida* Forest (CEGL007267)--oak-dominated.
- *Quercus prinus - Quercus rubra / Rhododendron maximum / Galax urceolata* Forest (CEGL006286)

Global Related Concepts:

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: Within the park, this community is most common on lower and midslopes on the Kentucky side of the park.
Global Range: This association is documented only from the Great Smoky Mountains National Park and Cumberland Gap National Historical Park, but it may occur throughout the mid- to higher elevation exposed slopes of eastern Tennessee and western North Carolina, and possibly also into adjacent parts of Virginia and West Virginia.
Nations: US
States/Provinces: KY, NC, TN, VA?, WV?
USFS Ecoregions: M221Cc:CCC, M221Ce:CCC, M221Dc:CC?, M221Dd:CCC
Federal Lands: NPS (Blue Ridge Parkway, Cumberland Gap, Great Smoky Mountains)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots: CUGA.80, CUGA.81.
Local Description Authors: R. White
Global Description Authors: R. White
References: NatureServe Ecology - Southeastern U.S. unpubl. data, Southeastern Ecology Working Group n.d., TDNH unpubl. data

Fagus grandifolia - Quercus rubra - Quercus alba Forest Alliance

Central Interior Beech - White Oak Forest

***Fagus grandifolia - Quercus alba / Cornus florida* Forest**
American Beech - White Oak / Flowering Dogwood Forest
Identifier: CEGL007881

Ecological System(s): South-Central Interior Mesophytic Forest (CES202.887)
East Gulf Coastal Plain Northern Mesic Hardwood Slope Forest (CES203.477)

ELEMENT CONCEPT

Global Summary: This beech-white oak forest is found in the Interior Low Plateau of Tennessee, the Cumberland region of Kentucky, and adjacent areas of the Upper East Gulf Coastal Plain. Stands occur on mesic mid to lower slopes in moderately dissected terrain. Stand positions vary from north-facing slopes and low slopes to high terraces along streams. The vegetation is generally dominated by *Fagus grandifolia* with more or less *Quercus alba* depending on past logging history. Associated canopy and subcanopy species can include *Acer saccharum, Quercus muehlenbergii, Acer rubrum, Cornus florida, Ostrya virginiana*, and *Ilex opaca*. Shrubs which may be present include *Vaccinium stamineum, Viburnum acerifolium, Euonymus americanus*, and, in some occurrences, *Kalmia latifolia*. The herb layer can be relatively lush with such species as *Polystichum acrostichoides, Galium circaezans, Desmodium nudiflorum, Erythronium americanum, Hepatica nobilis var. obtusa, Epifagus virginiana, Tiarella cordifolia var. collina, Heuchera americana, Stellaria pubera, Podophyllum peltatum, Botrychium virginianum*, and others.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:

Cumberland Gap National Historical Park Environment: Within the park, stands occur on protected steep, acidic, north-facing slopes near creeks on the Kentucky side of the park. They often intergrade further downslope with mesic hemlock community types and are often surrounded upslope and on the sides by dry-mesic oak communities.

Global Environment: Stands occur on mesic mid to lower slopes in moderately dissected terrain. Stand positions vary from north-facing slopes and low slopes to more rocky stands (Franklin et al. 1993). At Land Between the Lakes, this community is restricted to deep limestone-derived soils of the Baxter Series and silty soils of the Brandon Series, generally on lower slopes with northwest, north, to southeast aspects (Franklin 1990).

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: The canopy is dominated by *Fagus grandifolia* with *Quercus alba* sometimes serving as a codominant in the canopy. Subcanopy species can often include *Liriodendron tulipifera, Cornus florida, Nyssa sylvatica, Sassafras albidum*, and *Ostrya virginiana*. Common herbaceous species often are *Polystichum acrostichoides, Galium circaezans, Desmodium nudiflorum, Erythronium americanum, Hepatica nobilis var. obtusa, Epifagus virginiana, Tiarella cordifolia var. collina, Heuchera americana, Stellaria pubera*, and others.

Global Vegetation: The vegetation is dominated by at least 40% *Fagus grandifolia* with more or less *Quercus alba* depending on past logging history. Associated canopy and subcanopy species can include *Liriodendron tulipifera, Acer saccharum, Quercus pagoda, Quercus rubra, Quercus coccinea, Cornus florida, Nyssa sylvatica*, *Sassafras albidum*, and *Ostrya virginiana* (Franklin 1990, NatureServe Ecology unpubl. data). Other potential species include *Quercus muehlenbergii, Acer rubrum*, and *Ilex opaca*. Shrubs which may be present include *Vaccinium stamineum, Viburnum acerifolium, Euonymus americanus*, and in some occurrences, *Kalmia latifolia*. The herb layer can be relatively lush with such species as *Polystichum acrostichoides, Galium circaezans, Desmodium nudiflorum, Erythronium americanum, Hepatica nobilis var. obtusa, Epifagus virginiana, Tiarella cordifolia var. collina, Heuchera americana, Stellaria pubera, Podophyllum peltatum, Botrychium virginianum*, and others. Campbell (2001) provides an extensive list of species for eastern Kentucky; see also NatureServe Ecology unpublished data from Fort Donelson.

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Fagus grandifolia, Quercus alba*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Fagus grandifolia, Quercus alba*

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park: *Polystichum acrostichoides*

Global: *Polystichum acrostichoides*

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:
Global:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4 (15-Dec-1999). This is not an inherently rare forest type, and many examples are still believed to be extant. The lack of element occurrences of this type does not reflect its relative abundance. Patch size may be small, but this is a somewhat widespread association (and may be merged with others as classification is resolved); many examples are still extant. Some stands have been impacted by removal of more valuable timber species (e.g., *Quercus alba*) and loss of herbaceous species diversity from the disturbance effects of logging. The Grank has been changed from G3G4 to G4 to reflect its true abundance.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Cumberland Gap National Historical Park Comments:
Global Comments: This association is similar to *Quercus alba - Fagus grandifolia / Hydrangea quercifolia - Viburnum acerifolium / Carex picta - Polystichum acrostichoides* Forest (CEGL007213), found in northern Alabama, but is more broadly defined and geographically distinct from it. The associations have been kept separate until more detailed floristic and range information can be obtained for this type (CEGL007881). CEGL007881 is often less species-rich than the current concept of CEGL007213. *Fagus grandifolia - Liriodendron tulipifera / Euonymus americanus / Athyrium filix-femina ssp. asplenioides* Forest (CEGL007201) is somewhat similar but lacks codominance by *Quercus* species. Information on species from stands in eastern Kentucky is provided by Campbell (2001), who tentatively crosswalks his 5C3 to this type. Further review is needed before incorporating his description.
Global Similar Associations:

- *Fagus grandifolia - Acer saccharum - Liriodendron tulipifera* Unglaciated Forest (CEGL002411)
- *Fagus grandifolia - Liriodendron tulipifera / Euonymus americanus / Athyrium filix-femina* ssp. *asplenioides* Forest (CEGL007201)
- *Fagus grandifolia* Ridge and Valley Forest (CEGL007200)
- *Quercus alba - (Liriodendron tulipifera, Liquidambar styraciflua) / Acer leucoderme / Calycanthus floridus / Athyrium filix-femina* Forest (CEGL008428)--of the southern Ridge and Valley.
- *Quercus alba - Fagus grandifolia / Hydrangea quercifolia - Viburnum acerifolium / Carex picta - Polystichum acrostichoides* Forest (CEGL007213)
- *Quercus alba - Quercus rubra - Quercus muehlenbergii / Cercis canadensis* Forest (CEGL002070)
- *Quercus rubra - Tilia americana* var. *heterophylla - Carya carolinae-septentrionalis / Acer (barbatum, leucoderme) / Hydrangea quercifolia* Forest (CEGL008488)

Global Related Concepts:

- *Acer saccharum - Quercus alba - Fagus grandifolia* type (Franklin et al. 1993) ?

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: This community is restricted to lower slopes in the Kentucky side of the park (with some small patches possible in Tennessee.
Global Range: This association was defined for the Interior Low Plateau of Tennessee. It ranges to the Cumberlands of Kentucky, and Upper East Gulf Coastal Plain in Tennessee, but more information is needed to determine its full range.
Nations: US
States/Provinces: AL?, IN?, KY, TN
USFS Ecoregions: 221Ha:CCC, 221Hc:CCC, 221He:CCC, 222Cg:CCC, 222Eb:CCP, 222Eg:CCC, 222Eh:CCP, 222Ei:CCP, 222Ek:CCP, 222Em:CCP, 222En:CCP, 222Eo:CCP
Federal Lands: NPS (Big South Fork, Cumberland Gap, Fort Donelson, Natchez Trace, Shiloh); USFS (Daniel Boone, Land Between the Lakes)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots: CUGA.87, CUGA.88.
Local Description Authors: R. White
Global Description Authors: M. Pyne, mod. C.W. Nordman
References: Campbell 2001, Evans 1991, Franklin et al. 1993, Franklin pers. comm., Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

Juglans nigra Forest Alliance

Successional Black Walnut Forest

***Juglans nigra / Verbesina alternifolia* Forest**
Black Walnut / Common Wingstem Forest
Identifier: CEGL007879

Ecological System(s): South-Central Interior Large Floodplain (CES202.705)

ELEMENT CONCEPT

Global Summary: This is a potentially widespread association. This community was sampled on former homesites along streams, possibly in association with circumneutral soils, at 460-610 m (1500-2000 feet) elevation in the Smokies, as well as on ridgetops and stream areas in the Cumberlands at 460-1070 m (1500-3500 feet). In addition, the association was sampled from the Piedmont of South Carolina in low-lying, poor-drainage areas from approximately 170 to 200 m (550-650 feet) in elevation. The community was originally defined from former homesites in Great Smoky Mountains National Park, where this association is an open, successional forest. *Juglans nigra* is often the sole canopy tree, though *Liriodendron tulipifera, Juglans cinerea, Robinia pseudoacacia, Morus rubra*, and *Aesculus flava* are codominants in some examples. The herb stratum is dominated by *Verbesina alternifolia*. Other herbs include *Amphicarpaea bracteata* and *Ambrosia trifida*. The exotics *Rosa multiflora* and *Microstegium vimineum* can be common in this community.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:
Cumberland Gap National Historical Park Environment: Within the park, this community occurs in two distinct and disparate areas: floodplain bottoms that were disturbed heavily in the past and grew up as walnut groves, and narrow ridgetops with rich soil that have been impacted heavily by human and natural disturbance and contain small stands of successional trees, especially *Juglans nigra* and *Liriodendron tulipifera*. This community occurs in such small patches that it is most likely not mappable for the purposes of the vegetation mapping project.
Global Environment: This community often occurs on former homesites along streams, possibly in association with circumneutral soils. It was originally defined from former homesites in Great Smoky Mountains National Park, where this association is an open, successional forest.

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: This community has a canopy that is usually completely dominated or codominated by *Juglans nigra*, sometimes with a high component of *Liriodendron tulipifera* as well. The herb layer is generally dense and diverse. Floodplain examples contain high concentrations of *Verbesina alternifolia*, whereas ridgetop examples often have smaller proportions of *Verbesina* but contain other herbaceous species as well.
Global Vegetation: *Juglans nigra* is often the sole canopy tree, though *Liriodendron tulipifera, Juglans cinerea, Celtis laevigata*, and *Aesculus flava* are dominant or codominant in some examples. The herb stratum is dominated by *Verbesina alternifolia* or *Microstegium vimineum*. Other herbs include *Amphicarpaea bracteata* and *Ambrosia trifida*. The exotic *Rosa multiflora* can be common in this community.

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Juglans nigra*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Juglans nigra*
Herb (field)	Forb	*Verbesina alternifolia*

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park: *Juglans nigra*
Global: *Juglans nigra, Rosa multiflora, Verbesina alternifolia*

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:
Global:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (ruderal) (2-Apr-2001). This vegetation represents vegetation created by anthropogenic disturbance and is thus not a conservation priority. Grank changed from GW to GD 2001-04-02 MP.

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Cumberland Gap National Historical Park Comments:
Global Comments: This association was described from Great Smoky Mountains National Park where this association is distinguished on air photography.
Global Similar Associations:
Global Related Concepts:

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: This community occurs in very tiny patches on the ridgetop that straddles the Virginia/Kentucky stateline within the park. Therefore, it potentially occurs in all three Cumberland Gap park states.
Global Range: This potentially widespread association is currently defined only for Tennessee but likely ranges into adjacent states.
Nations: US
States/Provinces: KY, NC, SC, TN, VA
USFS Ecoregions: 221Hc:CCC, 221Ja:C??, 231Aa:PPP, 231Ae:PPP, M221Cc:CCC, M221Ce:CCC, M221Dd:CCC
Federal Lands: NPS (Big South Fork, Blue Ridge Parkway?, Cumberland Gap, Great Smoky Mountains, Kings Mountain, Mammoth Cave, Ninety Six)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots: None.
Local Description Authors: R. White
Global Description Authors: K.D. Patterson, mod. R. White
References: NatureServe Ecology - Southeastern U.S. unpubl. data, Peet et al. unpubl. data 2002, Southeastern Ecology Working Group n.d., TDNH unpubl. data

Liriodendron tulipifera - Tilia americana var. *heterophylla - Aesculus flava - Acer saccharum* Forest Alliance

Northern Mixed Mesophytic Forest

***Liriodendron tulipifera - Tilia americana* var. *heterophylla - Aesculus flava - Acer saccharum / Magnolia tripetala* Forest**
Tuliptree - Appalachian Basswood - Yellow Buckeye - Sugar Maple / Umbrella Magnolia Forest
Identifier: CEGL005222

Ecological System(s): South-Central Interior Mesophytic Forest (CES202.887)

ELEMENT CONCEPT

Global Summary: This mixed mesophytic forest type is found primarily in the Central Appalachian, Western Allegheny Plateau, and Cumberland Plateau ecoregions of the United States. Stands occur on mesic slopes and steep ravines or bottoms. The tree canopy is often tall, closed and contains a variety of tree species, including *Acer saccharum, Acer rubrum, Fagus grandifolia, Fraxinus americana, Liriodendron tulipifera, Prunus serotina, Quercus alba,* and *Quercus rubra*. Trees indicative of the type include *Aesculus flava* and *Tilia americana var. heterophylla*. *Magnolia acuminata* occurs locally. Frequent vines and shrubs include *Asimina triloba, Carpinus caroliniana, Hamamelis virginiana, Lindera benzoin, Staphylea trifolia*, and, more locally, *Magnolia tripetala* and *Rhododendron maximum*. The herbaceous layer is extremely rich, including *Caulophyllum thalictroides, Actaea racemosa (= Cimicifuga racemosa), Claytonia virginica, Dicentra canadensis, Erythronium americanum, Laportea canadensis, Sanguinaria canadensis, Tiarella cordifolia, Trillium erectum, Trillium grandiflorum,* and many others.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:
Cumberland Gap National Historical Park Environment: Within the park, this community occurs on protected slopes and ravines with nutrient-rich neutral to basic soils. Elevation of the plots sampled in the park range from 425 to 855 m (1400-2800 feet) in elevation. In some cases, this community may range high up on the slopes, but it is best developed in the most protected ravines in the park.
Global Environment: Stands occur on mesic slopes and steep ravines or bottoms.

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: The tree canopy in the ravines can be quite tall, with shorter canopies as the community continues upslope and away from the most protected ravine areas. Tree species (all of which can compete for dominance depending upon the example) include *Liriodendron tulipifera, Acer saccharum, Acer rubrum, Aesculus flava, Fraxinus americana, Prunus serotina, Tilia americana,* and *Quercus rubra*. The shrub layer can be moderately to heavily dominated by *Lindera benzoin* and/or *Asimina triloba*. The herbaceous layer tends to be very diverse and rich. The most consistently high-cover summer forb species is *Laportea canadensis*, although other species, such as *Hybanthus concolor, Actaea pachypoda, Scutellaria incana, Toxicodendron radicans*, and *Sanicula canadensis*, can all be dense in cover in some examples. Spring ephemerals may also have very high cover in the early spring.
Global Vegetation: The tree canopy is often tall, closed and contains a variety of tree species, including *Acer saccharum, Acer rubrum, Fagus grandifolia, Fraxinus americana, Liriodendron tulipifera, Prunus serotina, Quercus alba,* and *Quercus rubra*. Trees indicative of the type include *Aesculus flava* and *Tilia americana var. heterophylla*. *Magnolia acuminata* occurs locally. Frequent vines and shrubs include *Asimina triloba, Carpinus caroliniana, Cornus florida, Hamamelis virginiana, Lindera benzoin, Staphylea trifolia,* and, more locally, *Magnolia tripetala* and *Rhododendron maximum*. The herbaceous layer is extremely rich, including *Caulophyllum thalictroides, Actaea racemosa (= Cimicifuga racemosa), Claytonia virginica, Dicentra canadensis, Erythronium americanum, Sanguinaria canadensis, Tiarella cordifolia, Trillium erectum, Trillium grandiflorum,* and many others (Anderson 1982, Fike 1999).

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Liriodendron tulipifera*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Lindera benzoin*
Herb (field)	Forb	*Laportea canadensis*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Liriodendron tulipifera*

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park: *Aesculus flava, Laportea canadensis, Lindera benzoin, Liriodendron tulipifera*
Global: *Liriodendron tulipifera*

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park: *Panax quinquefolius*
Global:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4? (30-Sep-2004). There are still issues with the precise geographic limits of this type and its relationship to similar types in adjacent regions. It represents the typical mesic cove forest of a fairly large area of the central interior eastern United States (from southern Pennsylvania and eastern Ohio south to West Virginia and Tennessee, with outliers in Indiana). Within this range, it only occurs in protected concave topographic positions. Although relatively secure and not highly threatened today, many stands have recovered from past episodes of timber removal and remain threatened by future timber harvests because of excellent site productivity. Much of the remaining acreage which is not formally protected is not of high quality. There are some protected stands on Federal lands (national parks, national forests) in the region. Forests of the region are vulnerable to decline from: (1) aluminum toxicity, related to acidification (from sulfates, exceeding 30 pounds per year per acre); (2) nitrogen deposition, which reduces the capacity of trees on the northern slopes to resist fungal infections; and (3) ozone deposition, which diminishes the photosynthetic capacity of trees, which in turn diminishes their roots. Invasive exotics, especially *Alliaria petiolata* (a shade-tolerant herb) and *Ailanthus altissima* (a tree which can become established in canopy gaps, mimicking the niche of *Liriodendron*), pose a serious threat to the integrity of this community's flora.

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Cumberland Gap National Historical Park Comments:
Global Comments: Trees indicative of the type include *Aesculus flava* and *Tilia americana var. heterophylla*. In Ohio, however, these are restricted to the more southern parts of Ohio, which, depending on the definition of the type, may restrict its concept. Stands strongly dominated by beech and maple go with the Beech - Maple Unglaciated Forest, *Fagus grandifolia - Acer saccharum - Liriodendron tulipifera* Unglaciated Forest (CEGL002411); by beech and white oak with the White Oak - Beech Western Allegheny Forest, *Quercus alba - Fagus grandifolia* Western Allegheny Plateau Forest (CEGL006144); and by at least 25% hemlock with the East-Central Hemlock Hardwood Forest, *Tsuga canadensis - Fagus grandifolia - Acer saccharum / (Hamamelis virginiana, Kalmia latifolia)* Forest (CEGL005043). In Indiana this type occurs in the southeastern part of the Bluegrass Region, where it is found on calcareous substrates, though further review is needed to determine whether these Indiana stands could be placed in CEGL002411. Mike Homoya of the Indiana Heritage Program has species lists, and stand information should be compiled for review. More information is needed to distinguish these more northern (Central Appalachian) mixed mesophytic forests from similar forests in the southern Appalachians. Further division may be warranted.
Global Similar Associations:

- *Fagus grandifolia - Acer saccharum - Liriodendron tulipifera* Unglaciated Forest (CEGL002411)
- *Fraxinus americana - Carya ovata / Frangula caroliniana / Helianthus hirsutus* Woodland (CEGL008458)--also does not generally have high cover of either *Aesculus flava* or *Tilia americana*, and it tends to be on drier mid- to upper slopes instead of ravine areas.

- *Liriodendron tulipifera - Tilia americana* var. *heterophylla - (Aesculus flava) / Actaea racemosa* Forest (CEGL007291)
- *Quercus alba - Fagus grandifolia* Western Allegheny Plateau Forest (CEGL006144)
- *Quercus alba - Quercus rubra - Quercus prinus / Collinsonia canadensis - Podophyllum peltatum - Amphicarpaea bracteata* Forest (CEGL007692)--does not have any *Aesculus flava* or *Tilia americana* in it.
- *Tsuga canadensis - Fagus grandifolia - Acer saccharum / (Hamamelis virginiana, Kalmia latifolia)* Forest (CEGL005043)

Global Related Concepts:

- IA5d. Typic Mesophytic Forest (Allard 1990) ?
- Mixed Mesophytic Forest (Braun 1950) B

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: This community can be found throughout the Virginia, Kentucky, and Tennessee sides of the park on nutrient-rich slopes.
Global Range: This type is found primarily in the Central Appalachian, Western Allegheny Plateau, and Cumberland Plateau regions of the United States, ranging from southern Pennsylvania and eastern Ohio south to West Virginia and Tennessee, with outliers in Indiana.
Nations: US
States/Provinces: IN, KY, OH, PA, TN, WV
USFS Ecoregions: 221Ea:CCC, 221Eb:CCC, 221Ec:CCC, 221Ed:CCC, 221Ee:CCC, 221Ef:CCC, 221Eg:CCC, 221Ha:CPP, 221Hc:CPP, 221He:CPP, 222E:CC, 222F:CC, M221Bb:CCC, M221Bd:CCC, M221Be:CCC, M221Cd:CCC
Federal Lands: DOD (Camp Dawson); NPS (Cumberland Gap, Lincoln Birthplace, Mammoth Cave); USFS (Daniel Boone, Monongahela)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots: CUGA.05, CUGA.32, CUGA.48, CUGA.49, CUGA.58, CUGA.59, CUGA.60, CUGA.72, CUGA.83.
Local Description Authors: R. White
Global Description Authors: D. Faber-Langendoen, L. Sneddon, and M. Pyne, mod. R. White
References: Allard 1990, Anderson 1982, Braun 1950, Evans 1991, Fike 1999, Midwestern Ecology Working Group n.d., TDNH unpubl. data

Liriodendron tulipifera Forest Alliance

Interior Mid- to Late-Successional Tuliptree - Hardwood Upland Forest (Acid Type)

***Liriodendron tulipifera - Quercus* spp. Forest**
Tuliptree - Oak species Forest
Identifier: CEGL007221

Ecological System(s): East Gulf Coastal Plain Southern Mesic Slope Forest (CES203.476)
Southern Interior Low Plateau Dry Oak Forest (CES202.898)
East Gulf Coastal Plain Northern Dry Upland Hardwood Forest (CES203.483)

ELEMENT CONCEPT

Global Summary: This semi-natural or successional community is one of several described upland associations dominated by *Liriodendron tulipifera*. Within its range, it differs from other described types based on the lack of a significant pine component and the absence of species affiliated with circumneutral conditions. Examples are common across large areas of the upland landscape which have been previously disturbed. Species found in stands attributable to this type may include a fairly diverse and varied

composition. *Acer rubrum, Quercus* spp., *Ilex opaca*, and occasionally *Liquidambar styraciflua* may be common in some stands of this type. These successional forests often follow cropping, clearcut logging, or other severe disturbance, and are successional to mixed *Quercus - Carya* forests. The oaks in these stands will frequently be multi-stemmed, resulting from coppicing.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:

Cumberland Gap National Historical Park Environment: Within the park, this community is uncommon. Unlike *Liriodendron tulipifera / (Cercis canadensis) - (Lindera benzoin)* Forest (CEGL007220), this community is found in areas of very acidic soils that were once clearcuts or old fields and occasionally along heavily disturbed mesic stream terraces.

Global Environment: These semi-natural upland deciduous forests are found primarily in areas which were once clearcuts, old fields, or were cleared by fire or other natural disturbances. These non-wetland forests are also found along mesic stream terraces.

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: Within the park, this community is always dominated by *Liriodendron tulipifera* but can have high cover of *Magnolia macrophylla, Betula lenta,* and *Quercus rubra* in some examples. Understory and herbaceous species tolerant of acidic conditions can be common or at least consistently present. These include *Kalmia latifolia, Smilax rotundifolia, Polystichum acrostichoides, Nyssa sylvatica, Sassafras albidum, Medeola virginiana, Quercus prinus (= Quercus montana), Cypripedium acaule, Goodyera pubescens,* and *Mitchella repens*.

Global Vegetation: The canopy of this semi-natural upland association is dominated by *Liriodendron tulipifera*. A variety of other species may also be present, including *Acer rubrum, Ilex opaca, Quercus alba, Quercus falcata, Quercus nigra, Quercus velutina, Cornus florida, Carya* spp., and other species (NatureServe Ecology unpubl. data).

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Liriodendron tulipifera*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Acer rubrum, Liriodendron tulipifera*
Tree subcanopy	Broad-leaved deciduous tree	*Acer rubrum*
Tall shrub/sapling	Broad-leaved deciduous shrub	*Cornus florida*

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park: *Liriodendron tulipifera, Mitchella repens*

Global:

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park: *Cypripedium acaule*

Global:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (ruderal) (19-Aug-2002). This forest represents early-successional vegetation and is thus not of conservation concern. This is a successional vegetation type composed of native species. Its conservation value is limited, but mature examples could provide buffer for communities of greater conservation value.

CLASSIFICATION

Status: Standard

Classification Confidence: 3 - Weak

Cumberland Gap National Historical Park Comments:

Global Comments: Within its range, it differs from other described types based on the lack of a significant pine component [see *Liriodendron tulipifera - Pinus taeda* Forest (CEGL007521)] and the absence of species affiliated with circumneutral conditions [see *Liriodendron tulipifera / (Cercis canadensis) / (Lindera benzoin)* Forest (CEGL007220)]; it is later successional and more diverse than

Liriodendron tulipifera Forest (CEGL007218) and tends to be found on more stable soil substrates and less steep slopes than *Liriodendron tulipifera - Robinia pseudoacacia* Forest (CEGL007219).

Global Similar Associations:

- *Liriodendron tulipifera - Acer negundo* Forest (CEGL007184)--a bottomland type.
- *Liriodendron tulipifera - Robinia pseudoacacia* Forest (CEGL007219)--is generally found on steeper slopes and/or shallow soils and with a more intense history of disturbance.
- *Liriodendron tulipifera / (Cercis canadensis) / (Lindera benzoin)* Forest (CEGL007220)--is generally found on calcareous or at least pH neutral soils.

Global Related Concepts:

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: This community is most likely restricted to the Kentucky side of the park where acidic soils exist.

Global Range: This association is known from the southern Cumberland Plateau, Piedmont, and Interior Low Plateau of the southeastern U.S. and may also occur in the Upper East Gulf Coastal Plain. It ranges north to the northern Piedmont of New Jersey. It is also known from Alabama, Georgia, Kentucky, Maryland, North Carolina, South Carolina, Tennessee, and possibly Virginia and Delaware.

Nations: US

States/Provinces: AL, GA, KY, NC, NJ, PA, SC, TN, VA?

USFS Ecoregions: 221Hc:CCC, 221He:CCC, 222Cg:CCC, 222D:CC, 222Eb:CCC, 222En:CCC, 222Eo:CCC, 231Aa:CCP, 231Ae:CCC, 231Bc:CCC, 231Bh:CCC, 231Cd:CCP, 231Dc:CCC

Federal Lands: DOD (Fort Benning); NPS (Big South Fork, Blue Ridge Parkway, Cowpens, Cumberland Gap, Guilford Courthouse, Kennesaw Mountain, Kings Mountain, Morristown, Natchez Trace, Ninety Six, Obed, Shiloh, Valley Forge); USFS (Bankhead, Daniel Boone, Oconee?, Talladega)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:

Cumberland Gap National Historical Park Plots: CUGA.31.

Local Description Authors: R. White

Global Description Authors: R.E. Evans and M. Pyne, mod. L.A. Sneddon and R. White

References: Ehrenfeld 1977, Gallyoun et al. 1996, Keever 1973, NatureServe Ecology - Southeastern U.S. unpubl. data, Overlease 1987, Russell and Schuyler 1988, Schmalzer and DeSelm 1982, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

Successional Tuliptree Forest (Circumneutral Type)

***Liriodendron tulipifera / (Cercis canadensis) / (Lindera benzoin)* Forest**
Tuliptree / (Redbud) / (Northern Spicebush) Forest
Identifier: CEGL007220

Ecological System(s): Appalachian (Hemlock)-Northern Hardwood Forest (CES202.593)
Southern Interior Low Plateau Dry Oak Forest (CES202.898)

ELEMENT CONCEPT

Global Summary: This semi-natural or successional community dominated by *Liriodendron tulipifera* occurs in the Ridge and Valley of Tennessee and Virginia, and the Central Appalachian, Piedmont and Inner Coastal Plain regions of Virginia, West Virginia, and Maryland. It may also occur in similar regions of Pennsylvania, Kentucky and Delaware. It is distinguished from other upland communities dominated by *Liriodendron tulipifera* by the presence of species associated with soils with moderately high base saturation levels (rich soils). Species found in stands attributable to this type may be fairly diverse and result in a varied composition. In addition to *Liriodendron tulipifera*, other canopy species may include *Liquidambar styraciflua, Acer saccharum, Robinia pseudoacacia, Juglans nigra, Fraxinus americana, Ulmus rubra, Quercus imbricaria, Quercus muehlenbergii*, and *Carya ovata*. Species often found in the subcanopy include *Acer saccharum, Cercis canadensis, Ulmus alata, Morus rubra*, and *Cornus florida*. Shrubs include saplings of the subcanopy and canopy species, as well as *Lindera benzoin, Symphoricarpos*

orbiculatus, Asimina triloba, Staphylea trifolia, Acer negundo, and *Juniperus virginiana var. virginiana*. Common herbaceous species include the exotics *Microstegium vimineum, Rubus phoenicolasius, Alliaria petiolata, Veronica hederifolia,* and *Lonicera japonica,* as well as *Toxicodendron radicans, Parthenocissus quinquefolia, Amphicarpaea bracteata,* and *Polystichum acrostichoides.* Examples in Fort Donelson that have been very heavily disturbed may have local dominance by *Celtis laevigata* and *Juglans nigra.*

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:

Cumberland Gap National Historical Park Environment: Within the park, this community is found on calcareous or other base-rich soils on protected slopes that are recovering from human-caused disturbance such as agriculture, heavy grazing, or clearcutting between 40 and 80 years ago.

Global Environment: These forests are found on disturbed mesic areas underlain by rich soils with moderately high base saturation levels. Soils may be underlain by a variety of geologic strata that weather to base-rich soils including limestone, dolomite, calcareous shale, shell deposits, metabasalts and granitic complexes. In Kentucky this association may occur on calcareous substrates in the Dripping Springs Escarpment. At Shenandoah National Park in Virginia, this community is underlain by Catoctin metabasalt or a pyroxene-bearing granitic complex.

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: Within the park, stands are dominated by *Liriodendron tulipifera*, with only minor canopy coverage of species such as *Liquidambar styraciflua* and *Quercus* spp. The shrub layer is often dominated by species that like high pH such as *Lindera benzoin* and *Cercis canadensis*. *Amphicarpaea bracteata* appears to be the most consistently common herbaceous species in this community within the park, though *Toxicodendron radicans* is also common.

Global Vegetation: Stands are dominated by *Liriodendron tulipifera* but also include various other species, including ones indicative of rich or circumneutral environments. Other species include *Liquidambar styraciflua, Acer saccharum, Robinia pseudoacacia, Juglans nigra, Fraxinus americana, Ulmus rubra, Quercus imbricaria, Quercus muehlenbergii,* and *Carya ovata* (NatureServe Ecology unpubl. data, VDNH unpubl. data). Species often found in the subcanopy include *Acer saccharum, Cercis canadensis, Ulmus alata, Morus rubra,* and *Cornus florida*. *Cercis canadensis* is often abundant on soils underlain by carbonate strata. Shrubs include saplings of the subcanopy and canopy species, as well as *Symphoricarpos orbiculatus, Lindera benzoin, Asimina triloba*, and *Juniperus virginiana var. virginiana*. *Lindera benzoin* is often abundant in occurrences of this community in the Central Appalachian, Piedmont and Inner Coastal Plain regions of Virginia, West Virginia, and Maryland. Common herbaceous species include the exotics *Microstegium vimineum, Rubus phoenicolasius, Alliaria petiolata, Veronica hederifolia,* and *Lonicera japonica,* as well as *Toxicodendron radicans, Parthenocissus quinquefolia,* and *Polystichum acrostichoides* (Andreu and Tukman 1995, NatureServe Ecology unpubl. data, VDNH unpubl. data).

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Liriodendron tulipifera*
Herb (field)	Forb	*Amphicarpaea bracteata*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Liriodendron tulipifera*

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park: *Amphicarpaea bracteata*, *Cercis canadensis*, *Lindera benzoin*, *Liriodendron tulipifera*

Global:

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:

Global:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (ruderal) (28-Oct-2003). This forest represents early-successional vegetation and is thus not of conservation concern. It is composed largely of native species, though exotics may be locally abundant. Its conservation value is limited, but mature examples could provide buffer for communities of greater conservation value.

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Cumberland Gap National Historical Park Comments:
Global Comments: This type was originally described from the work of Andreu and Tukman (1995) but was later modified to emphasize stands with moderately high base saturation levels. It is apparently a widespread successional forest of relatively fertile substrates in all provinces of the Mid-Atlantic states and in parts of the Southeast.
Global Similar Associations:

- *Liriodendron tulipifera - Pinus taeda* Forest (CEGL007521)--supports a significant pine component.
- *Liriodendron tulipifera - Quercus* spp. Forest (CEGL007221)--lacks species affiliated with circumneutral conditions.
- *Liriodendron tulipifera* Forest (CEGL007218)--is less diverse and earlier successional.

Global Related Concepts:

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: This type occurs in all parts of the park where human-caused disturbance occurred between 40 and 80 years ago over basic/calcareous soils.
Global Range: This type occurs in the Ridge and Valley of Tennessee, Upper East Gulf Coastal Plain of Mississippi, and the Central Appalachian, Piedmont and Inner Coastal Plain regions of Virginia, West Virginia, Maryland and possibly Pennsylvania, Kentucky and Delaware. Its full range is unknown.
Nations: US
States/Provinces: DC, DE?, KY?, MD, MS, PA?, TN, VA, WV
USFS Ecoregions: 221Hc:CCC, 221He:CCC, 221Jb:CCC, 222Eg:CCC, 231Ae:CCC, 231Al:CCC, 231Ap:CCC, 232Ad:CCC, M221Ab:CCC, M221Da:CCC
Federal Lands: NPS (Antietam, Blue Ridge Parkway, C&O Canal, Catoctin Mountain, Cumberland Gap, Fort Donelson, George Washington Parkway, Harpers Ferry, Lincoln Birthplace, Natchez Trace, National Capital-East, Obed, Rock Creek, Shenandoah, Vicksburg); TVA (Tellico); USFS (Cherokee?)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots: CUGA.06, CUGA.37, CUGA.64.
Local Description Authors: R. White
Global Description Authors: R.E. Evans, mod. M. Pyne, J. Teague, C.W. Nordman, R. White
References: Andreu and Tukman 1995, Lea 2003, Martin 1989, NatureServe Ecology - Southeastern U.S. unpubl. data, Southeastern Ecology Working Group n.d., TDNH unpubl. data

Quercus alba - (Quercus rubra, Carya spp.) Forest Alliance

Ridge-and-Valley Dry-Mesic White Oak - Hickory Forest

***Quercus alba - Quercus rubra - Carya ovata / Cercis canadensis - Juniperus virginiana* var. *virginiana* Forest**
White Oak - Northern Red Oak - Shagbark Hickory / Redbud - Eastern Red-cedar Forest
Identifier: CEGL007240

Ecological System(s): Allegheny-Cumberland Dry Oak Forest and Woodland (CES202.359)
Southern Appalachian Oak Forest (CES202.886)
Southern Ridge and Valley Dry Calcareous Forest (CES202.457)

ELEMENT CONCEPT

Global Summary: This dry-mesic late-successional Appalachian forest occurs on slopes with southerly aspects and well-drained upland soils. The canopy is dominated by *Quercus alba, Quercus rubra, Carya ovata*, and *Carya alba*. Other *Quercus* species are common in the canopy (*Quercus falcata, Quercus stellata, Quercus coccinea, Quercus muehlenbergii*, and *Quercus velutina*). Other canopy species can include *Pinus virginiana, Pinus echinata, Juniperus virginiana var. virginiana, Quercus prinus, Liriodendron tulipifera*, and *Fraxinus americana*. A mixture of calciphilic and acidophilic trees are present in the subcanopy, including *Juniperus virginiana var. virginiana, Cercis canadensis var. canadensis, Acer leucoderme, Nyssa sylvatica, Cornus florida, Acer rubrum*, and *Oxydendrum arboreum*. *Acer saccharum, Acer nigrum*, or *Acer leucoderme* are sometimes present in the canopy and are often common in the lower strata (subcanopy, tall-shrub, and low-shrub). Other species in the shrub strata include *Cornus florida, Juniperus virginiana var. virginiana, Ulmus alata, Cercis canadensis var. canadensis, Vaccinium stamineum, Vaccinium arboreum, Viburnum rufidulum, Frangula caroliniana*, and *Ostrya virginiana*. The herbaceous layer can be moderately dense to somewhat sparse. Possible herbaceous species are *Polystichum acrostichoides, Hexastylis arifolia var. ruthii, Dioscorea quaternata, Galium circaezans, Maianthemum racemosum ssp. racemosum, Parthenocissus quinquefolia, Toxicodendron radicans, Zizia aptera, Chamaelirium luteum, Desmodium nudiflorum, Desmodium rotundifolium*, and other *Desmodium* species.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:

Cumberland Gap National Historical Park Environment: Within the park, this community occurs on the lower slopes of the park below 610 m (2000 feet) in elevation. On the Virginia side of the park, the differing geology occurs on different bands that run along the slope of the mountains. In this case, this community occurs predominantly on the lowest (third) band of vegetation towards the park boundary.

Global Environment: This dry-mesic late-successional Appalachian forest occurs on slopes with southerly or westerly aspects and well-drained upland soils. This association is not (at this time) explicitly restricted to any particular geological substrates or soil types. This would be valuable information, as the flora seems to be at least somewhat oriented to a circumneutral substrate.

This forest is most often found on slopes with elevation ranging from 250 to 305 m (820-1000 feet) with a westerly aspect. Topographical position ranges from low slope to high slope. Slopes range from gentle to very steep (0-40+ degrees). These stands are underlain by soils weathered from calcareous shale and calcareous sandstone of the Middle Ordovician. These soils are slightly to very acidic and well-drained. Soil series of this type are Dandridge (Lithic Ruptic-Alfic Eutrochrepts), Tellico (Typic Rhododults), and Steekee (Ruptic-Ultic Dystrochrepts). These soils are slightly to very acidic and well drained to very well drained. Average depth of solum ranges from 43 cm (17 inches) (Dandridge series) to 147 cm (58 inches) (Tellico series). The combination of environmental factors and well-drained soils results in dry-mesic site conditions.

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: Within the park, this community generally has >50% cover of *Quercus alba*, though *Carya ovata, Quercus rubra, Quercus coccinea*, and *Quercus prinus* may codominate in some situations. A mixture of calciphilic and acidophilic trees exists in this type. Often, *Cercis canadensis* and *Lindera benzoin* exist alongside *Nyssa sylvatica, Cornus florida*, and *Oxydendrum arboreum* in the understory or tall-shrub layer. Unlike its completely acidic counterpart, *Quercus prinus - (Quercus rubra) - Carya* spp. / *Oxydendrum arboreum - Cornus florida* Forest (CEGL007267), this community does not have more than 5% cover of *Vaccinium* spp.

Global Vegetation: The canopy is generally closed (>75% cover) with gaps resulting from natural disturbance (i.e., mudslides, fire) and is dominated by *Quercus alba, Quercus rubra, Carya ovata*, and *Carya alba*. Other *Quercus* species are common in the canopy (*Quercus falcata, Quercus stellata, Quercus coccinea, Quercus muehlenbergii*, and *Quercus velutina*). Other canopy species can include *Pinus virginiana, Pinus echinata, Juniperus virginiana var. virginiana, Quercus prinus, Liriodendron tulipifera*, and *Fraxinus americana*. A mixture of calciphilic and acidophilic trees are present in the subcanopy, including *Juniperus virginiana var. virginiana, Cercis canadensis var. canadensis, Acer leucoderme, Nyssa sylvatica, Cornus florida, Acer rubrum*, and *Oxydendrum arboreum*. *Acer saccharum, Acer nigrum*, or *Acer leucoderme* are sometimes present in the canopy and are often common in the lower strata (subcanopy, tall-

shrub, and low-shrub). Other species in the shrub strata include *Cornus florida, Juniperus virginiana var. virginiana, Ulmus alata, Cercis canadensis var. canadensis, Vaccinium stamineum, Vaccinium arboreum, Viburnum rufidulum, Frangula caroliniana*, and *Ostrya virginiana*. The herbaceous layer can be moderately dense to somewhat sparse. Possible herbaceous species are *Polystichum acrostichoides, Hexastylis arifolia var. ruthii, Dioscorea quaternata, Galium circaezans, Maianthemum racemosum ssp. racemosum, Parthenocissus quinquefolia, Toxicodendron radicans, Zizia aptera, Chamaelirium luteum, Desmodium nudiflorum, Desmodium rotundifolium*, and other *Desmodium* species.

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species

Global

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Pinus virginiana*
Tree canopy	Broad-leaved deciduous tree	*Carya glabra*, *Carya ovata, Quercus alba*, *Quercus rubra*
Tree subcanopy	Needle-leaved tree	*Juniperus virginiana*
Tree subcanopy	Broad-leaved deciduous tree	*Acer saccharum*, *Carya ovata, Fraxinus americana*
Shrub/sapling (tall & short)	Vine/Liana	*Parthenocissus quinquefolia, Toxicodendron radicans*
Tall shrub/sapling	Needle-leaved tree	*Juniperus virginiana*
Tall shrub/sapling	Broad-leaved deciduous tree	*Acer saccharum*, *Carya alba, Cornus florida*, *Ulmus alata*
Short shrub/sapling	Broad-leaved deciduous tree	*Acer saccharum*, *Cercis canadensis, Fraxinus americana*, *Ostrya virginiana, Ulmus alata*
Herb (field)	Dwarf-shrub	*Chimaphila maculata*

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park:

Global: *Juniperus virginiana*, *Pinus virginiana*, *Quercus coccinea, Quercus falcata, Quercus muehlenbergii*, *Quercus stellata, Quercus velutina*

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:

Global:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4 (14-Jan-2000). This is not an inherently rare forest type. It is at least moderately widespread, and it is presumed to be relatively common throughout its range, although its full range is not known. It occurs on a variety of aspects and elevations, and it is not restricted to any highly specific geologic substrates. It is poorly documented through EOs, and not much data are available on the specific condition of examples of this type. Some stands have been impacted by removal of more valuable timber species and loss of herbaceous species diversity from the disturbance effects of logging. The Grank was formerly G3G5. Changing this to G4 helps to clarify its status and indicates that it is not a rare type.

CLASSIFICATION

Status: Standard

Classification Confidence: 2 - Moderate

Cumberland Gap National Historical Park Comments:

Global Comments: Described from Tellico Pilot Project (Ridge and Valley of Tennessee, northeastern Monroe County; 50 stands sampled) (Andreu and Tukman 1995). *Juniperus virginiana var. virginiana* is included in the name to indicate the relative xeric nature of this forest, until more information is available to define understory indicator species. This association is related to *Quercus alba - (Quercus rubra, Acer saccharum, Fagus grandifolia) / Aesculus flava* Forest (CEGL007233), a more mesic type described from the Tellico Pilot Project. May be similar to some limestone forests in Virginia's Ridge and Valley (G. Fleming pers. comm. 1997).

Global Similar Associations:
- *Quercus alba - (Quercus rubra, Acer saccharum, Fagus grandifolia) / Aesculus flava* Forest (CEGL007233)
- *Quercus alba - Carya (ovata, alba, glabra) - Pinus virginiana* Forest (CEGL007231)
- *Quercus alba - Quercus rubra - Quercus muehlenbergii / Cercis canadensis* Forest (CEGL002070)--is an apparently related type, but with chinquapin oak.
- *Quercus prinus - Quercus rubra - Carya* spp. *- Fraxinus americana / Cercis canadensis / Solidago sphacelata* Forest (CEGL008549)

Global Related Concepts:
- IA6i. Interior Upland Dry-Mesic Oak - Hickory Forest (Allard 1990) B
- Mixed Oak - Hickory Forest (Ambrose 1990a) B
- Oak - Hickory Forest (Oberholster 1993) B
- White Oak - Northern Red Oak, RV (Pyne 1994) B
- White Oak: 53 (Eyre 1980) B

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: This community exists throughout the lower elevations on the Virginia side of the park, ranging southwest into the Tennessee portion. It is not found on the Tennessee side due to a lack of appropriate geology.
Global Range: This association is at least a moderately widespread type, probably present throughout the Ridge and Valley from Alabama to Tennessee and possibly to Virginia, as well as adjacent Southern Blue Ridge. A comprehensive review of related types has not been completed.
Nations: US
States/Provinces: AL?, GA, KY?, TN, VA?
USFS Ecoregions: 221Hc:CCC, 221Jb:CCC, 222E:??, 231Cc:CCC, 231Da:CCC, 231Dc:CCC, M221Dd:CCC
Federal Lands: DOE (Oak Ridge); NPS (Big South Fork, Cumberland Gap, Great Smoky Mountains, Mammoth Cave); TVA (Tellico); USFS (Chattahoochee, Cherokee, Daniel Boone?)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots: CUGA.24, CUGA.26, CUGA.42, CUGA.65, CUGA.94.
Local Description Authors: R. White
Global Description Authors: M. Andreu and M. Tukman
References: Allard 1990, Ambrose 1990a, Andreu and Tukman 1995, Eyre 1980, Fleming pers. comm., NatureServe Ecology - Southeastern U.S. unpubl. data, Oberholster 1993, Pyne 1994, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

Appalachian Montane Oak - Hickory Forest (Rich Type)

***Quercus alba - Quercus rubra - Quercus prinus / Collinsonia canadensis - Podophyllum peltatum - Amphicarpaea bracteata* Forest**
White Oak - Northern Red Oak - Rock Chestnut Oak / Richweed - Mayapple - Hog-peanut Forest
Identifier: CEGL007692

Ecological System(s): Southern Appalachian Oak Forest (CES202.886)
Southern Piedmont Mesic Forest (CES202.342)

ELEMENT CONCEPT

Global Summary: This association includes forests dominated by *Quercus alba, Quercus velutina, Quercus rubra*, or *Carya glabra, Carya alba*, or *Carya ovalis*, occurring over circumneutral soils in the Southern Blue Ridge, adjacent inner Piedmont, and southern Ridge and Valley. These forests can occur across a broad elevation range (530-1375 m [1750-4500 feet]) in exposed topographic settings (upper

slopes), as well as on more protected sites (edges of coves). Presumed upper Piedmont examples may be at lower elevations (e.g., below 305 m [1000 feet]). Other species that can be important in the canopy include *Quercus coccinea, Quercus prinus*, and occasionally *Liriodendron tulipifera* where large gaps in the canopy have allowed for its generation On some sites, species more typical of "cove forests," such as *Fraxinus americana* or *Magnolia acuminata*, may form a very minor component. *Oxydendrum arboreum* and *Cornus florida* are common in the subcanopy. Heath species (*Rhododendron maximum* or *Kalmia latifolia*) are absent or very minor in the shrub stratum. On very high-base status soils, *Philadelphus hirsutus* or *Lindera benzoin* may be in the shrub stratum. The herbaceous stratum can be quite diverse and is characterized by mesic herbs and species associated with circumneutral soils, such as *Podophyllum peltatum, Arisaema triphyllum, Amphicarpaea bracteata, Adiantum pedatum, Collinsonia canadensis, Asplenium platyneuron, Brachyelytrum erectum, Actaea racemosa (= Cimicifuga racemosa), Caulophyllum thalictroides, Sanguinaria canadensis, Tradescantia subaspera, Euphorbia purpurea, Phegopteris hexagonoptera, Polystichum acrostichoides, Athyrium filix-femina ssp. asplenioides, Dennstaedtia punctilobula*, and *Dryopteris intermedia*.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:

Cumberland Gap National Historical Park Environment: This forest occurs exclusively on the slopes on the Virginia side of the park into Tennessee. It occurs on exposed to slightly protected upper to mid- to lower slopes and appears to often grade into cove forests (CEGL005222). Examples of this type at Cumberland Gap range from 530-855 m (1750-2800 feet) in elevation and appear to occur in repeating bands of geologically similar substrates that run across the Virginia side slope of the park. Base status of the plots in this park are generally above 50, though some examples on the edge of differing geological substrates may have base status in the 20s. pH is generally above 5.4. In most examples, soils are bouldery or at least rocky and can be very shallow. As you progress down the slope, the lower slope versions of this forest are much lower diversity and grade into *Quercus alba - Quercus rubra - Carya ovata / Cercis canadensis - Juniperus virginiana var. virginiana* Forest (CEGL007240).

Global Environment: This association includes forests codominated by *Quercus alba*, occurring over circumneutral soils in the Southern Blue Ridge and adjacent Piedmont. These forests can occur across a broad elevational range, from 610 to 1372 m (2000-4500 feet), and can occur in exposed topographic settings (upper slopes and broad ridgetops), as well as on more protected sites (edges of coves). Presumed upper Piedmont examples may be at lower elevations (e.g., below 305 m [1000 feet]).

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: The vegetation of this type varies greatly within the park. Canopies are generally dominated by *Quercus rubra, Quercus velutina*, or *Carya* spp. but may also be codominated by *Quercus alba, Quercus falcata, Liriodendron tulipifera, Fraxinus americana*, and *Nyssa sylvatica*. The shrub layer is generally sparse to moderate and can include both acidic- and basic-loving species. The herbaceous layer is very diverse and usually contains 50-100% cover. High-cover species include *Podophyllum peltatum, Arisaema triphyllum, Amphicarpaea bracteata, Adiantum pedatum, Collinsonia canadensis, Actaea racemosa (= Cimicifuga racemosa), Caulophyllum thalictroides, Sanguinaria canadensis, Tradescantia subaspera, Phegopteris hexagonoptera, Polystichum acrostichoides, Dichanthelium boscii, Brachyelytrum erectum*, etc. Herbaceous diversity is equal to or surpasses examples of cove forests in this park.

Global Vegetation: This association includes forests dominated by *Quercus alba*. Other species that can be important in the canopy include *Quercus rubra, Quercus coccinea, Quercus prinus, Quercus velutina, Carya glabra*, and *Carya alba*. On some sites, species more typical of "cove forests," such as *Fraxinus americana* or *Magnolia acuminata*, may form a very minor component. *Oxydendrum arboreum* and *Cornus florida* are common in the subcanopy. Heath species (*Rhododendron maximum* or *Kalmia latifolia*) are absent or very minor in the shrub stratum. On very high-base status soils, *Philadelphus hirsutus* or *Lindera benzoin* may be in the shrub stratum. Other woody species may include *Cercis canadensis, Viburnum acerifolium*, and *Ulmus alata*. The herbaceous stratum can be quite diverse and is characterized by mesic herbs and species associated with circumneutral soils, such as *Podophyllum peltatum, Arisaema triphyllum, Amphicarpaea bracteata, Adiantum pedatum, Collinsonia canadensis, Asplenium platyneuron, Actaea racemosa (= Cimicifuga racemosa), Caulophyllum thalictroides, Sanguinaria canadensis, Tradescantia subaspera, Euphorbia purpurea, Phegopteris hexagonoptera, Polystichum acrostichoides, Athyrium filix-femina ssp. asplenioides, Brachyelytrum erectum, Dennstaedtia punctilobula*, and *Dryopteris intermedia*. A

stand included here from Chilhowee Mountain in the Cherokee National Forest also includes *Ageratina altissima var. altissima, Arabis canadensis, Aristolochia serpentaria, Asplenium platyneuron, Desmodium nudiflorum, Hepatica nobilis var. obtusa, Monarda fistulosa, Sanicula canadensis, Scutellaria elliptica, Silene stellata, Smallanthus uvedalius, Solidago curtisii, Solidago simplex var. spathulata (= Solidago spathulata), Spigelia marilandica, Tradescantia subaspera,* and *Uvularia perfoliata*.

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species
Herb (field)	Vine/Liana	*Amphicarpaea bracteata*
Herb (field)	Forb	*Actaea racemosa, Collinsonia canadensis*

Global

Stratum	Lifeform	Species

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park: *Actaea racemosa, Amphicarpaea bracteata, Arisaema triphyllum, Brachyelytrum erectum, Collinsonia canadensis, Dichanthelium boscii, Polymnia canadensis*
Global: *Actaea racemosa, Adiantum pedatum, Amphicarpaea bracteata, Arisaema triphyllum, Caulophyllum thalictroides, Collinsonia canadensis, Podophyllum peltatum, Quercus alba, Sanguinaria canadensis*

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park: *Eupatorium steelei*
Global: *Ageratina altissima* var. *roanensis, Carex manhartii, Carex radfordii, Euphorbia purpurea, Helianthus glaucophyllus, Prosartes maculata, Silene ovata, Sisyrinchium dichotomum, Trillium rugelii*

CONSERVATION STATUS RANK

Global Rank & Reasons: G3 (17-May-2002). This montane oak-hickory forest is naturally limited to richer sites in the Southern Blue Ridge mountains and adjacent inner Piedmont. Later successional, unaltered occurrences are rare. Some stands have been impacted by removal of more valuable timber species (e.g., *Quercus alba*, other *Quercus* species) and the loss of herbaceous species diversity from the disturbance effects of logging.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Cumberland Gap National Historical Park Comments:
Global Comments: This association was originally defined based on occurrence information in the North Carolina Blue Ridge. More information is needed to better describe and define this association and its geographic distribution. Additional data on apparent occurrences have been collected in the Chattahoochee and Cherokee national forests.
Global Similar Associations:

- *Liriodendron tulipifera - Tilia americana* var. *heterophylla - Aesculus flava - Acer saccharum / Magnolia tripetala* Forest (CEGL005222)
- *Quercus rubra - Acer rubrum / Calycanthus floridus - Pyrularia pubera / Thelypteris noveboracensis* Forest (CEGL006192)
- *Quercus rubra - Tilia americana* var. *heterophylla - Halesia tetraptera* var. *monticola / Collinsonia canadensis - Tradescantia subaspera* Forest (CEGL007878)--is strongly dominated by *Quercus rubra*.

Global Related Concepts:

- Montane Oak-Hickory Forest (Basic Subtype) (Schafale 1998b) ?

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: This community occurs in distinct bands running along the Virginia side of Cumberland Gap NHP and into the Tennessee part of the park. It is perhaps the most common community type on the Virginia side of the park.
Global Range: This community occurs in the Piedmont and Southern Blue Ridge of the Carolinas, Georgia, Virginia, and Tennessee in the eastern United States.
Nations: US
States/Provinces: GA, NC, SC, TN, VA
USFS Ecoregions: 231Ad:CCC, M221Cc:CCC, M221Ce:CCC, M221Dc:CCC, M221Dd:CCC
Federal Lands: NPS (Blue Ridge Parkway, Cumberland Gap, Great Smoky Mountains); USFS (Chattahoochee, Cherokee, Pisgah)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots: CUGA.15, CUGA.19, CUGA.20, CUGA.28, CUGA.30, CUGA.43, CUGA.47, CUGA.50, CUGA.52, CUGA.53, CUGA.61.
Local Description Authors: R. White
Global Description Authors: M.P. Schafale, mod. T. Govus and R. White
References: NatureServe Ecology - Southeastern U.S. unpubl. data, Peet et al. unpubl. data 2002, Schafale 1998b, Schafale and Weakley 1990, Schafale pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

Appalachian Montane Oak - Hickory Forest (Red Oak Type)

***Quercus rubra - Acer rubrum / Calycanthus floridus - Pyrularia pubera / Thelypteris noveboracensis* Forest**
Northern Red Oak - Red Maple / Sweet-shrub - Buffalo-nut / New York Fern Forest
Identifier: CEGL006192

Ecological System(s): Northeastern Interior Dry-Mesic Oak Forest (CES202.592)
Southern Appalachian Oak Forest (CES202.886)

ELEMENT CONCEPT

Global Summary: This association includes *Quercus rubra* forests at intermediate elevations (mostly below 1065 m [3500 feet], ranging from 610-1220 m [2000-4000 feet]) in the Southern Blue Ridge Escarpment to the Cumberlands and Southern Ridge and Valley (455-1005 m [1500-3300 feet]), the Smoky Mountains and the Southern Blue Ridge, and may possibly range into adjacent areas of the Central Appalachians and Cumberland Plateau. These forests occur on mostly northern to eastern and southeastern, mid to upper, moderately steep slopes of intermediate exposure over acidic soils. The canopy is dominated by *Quercus rubra*, often with *Acer rubrum* and/or *Liriodendron tulipifera* codominating, and occasionally with a high component of *Quercus alba* in the canopy. Other minor canopy species may include *Betula lenta, Carya alba, Carya glabra, Halesia tetraptera, Quercus prinus*, and *Magnolia fraseri*. The subcanopy and sapling strata include the canopy species, as well as *Tsuga canadensis, Cornus florida, Acer pensylvanicum*, and *Oxydendrum arboreum*. The shrub stratum is typically sparse but may have local dominance by *Gaylussacia ursina* or *Rhododendron maximum*. Herbaceous cover is sparse to moderate but can be species-rich. Ferns can be locally dominant, typically *Thelypteris noveboracensis, Dennstaedtia punctilobula*, and *Athyrium filix-femina ssp. asplenioides*. This forest is distinguished from High Elevation Red Oak forests [see associations in *Quercus rubra* Montane Forest Alliance (A.272)] by the lack of species such as *Betula alleghaniensis, Ilex montana, Vaccinium simulatum*, and by lacking abundant *Hamamelis virginiana*, as well as its occurrence at lower elevations. In the Southern Blue Ridge Escarpment region, these montane oak-hickory forests seem to occupy environments intermediate between more protected forests dominated by *Quercus alba* and drier, more exposed *Quercus prinus* forests.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:
Cumberland Gap National Historical Park Environment: Within the park, this community occurs mostly above 820 m (2700 feet), but examples in more protected lower slopes exist down to 455 m (1500

feet) elevation, where they intergrade with lower elevation types and coves (CEGL005222). This community generally exists on acidic soils with low to moderate base status.

Global Environment: This association includes *Quercus rubra* forests at intermediate elevations (mostly below 1065 m [3500 feet], ranging from 610-1220 m [2000-4000 feet]) in the Southern Blue Ridge Escarpment to the Cumberlands and Southern Ridge and Valley (455-1005 m [1500-3300 feet]), the Smoky Mountains and the Southern Blue Ridge, and may possibly range into adjacent areas of the Central Appalachians and Cumberland Plateau. These forests occur on mostly northern to eastern and southeastern, mid to upper, moderately steep slopes of intermediate exposure over acidic soils. In the Southern Blue Ridge Escarpment region, these montane oak - hickory forests seem to occupy environments intermediate between more protected forests dominated by *Quercus alba* and drier, more exposed *Quercus prinus* forests.

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: Within the park, this community can be dominated by *Quercus rubra* or *Quercus alba* or a combination of the two. Canopy species also may include *Magnolia acuminata, Liriodendron tulipifera*, and *Quercus prinus*. The shrub layer is generally sparse to moderate, but the herb layer is usually moderate to dense, with a high cover value of ferns such as *Thelypteris noveboracensis, Athyrium filix-femina, Dennstaedtia punctilobula*, and/or *Osmunda cinnamomea*. The presence of high cover of ferns is one of the main distinctions between this community and some of the lower elevation oak communities in the park.

Global Vegetation: The canopy is dominated by *Quercus rubra*, often with *Acer rubrum* and/or *Liriodendron tulipifera* codominating, and occasionally with a high component of *Quercus alba* in the canopy. Other minor canopy species may include *Betula lenta, Carya alba, Carya glabra, Halesia tetraptera, Quercus prinus*, and *Magnolia fraseri*. The subcanopy and sapling strata include the canopy species, as well as *Halesia tetraptera, Betula lenta, Tsuga canadensis, Cornus florida, Acer pensylvanicum*, and *Oxydendrum arboreum*. The shrub stratum is typically sparse but may have local dominance by *Gaylussacia ursina* or *Rhododendron maximum*. Other typical species in the shrub stratum include *Castanea dentata, Calycanthus floridus, Pyrularia pubera, Rhododendron calendulaceum, Vaccinium corymbosum*, and *Viburnum acerifolium*. In the northernmost range of this association (northwestern North Carolina), *Calycanthus floridus* and *Gaylussacia ursina* are usually absent from the shrub layer. Herbaceous cover is sparse to moderate but can be species rich. Ferns can be locally dominant, typically *Thelypteris noveboracensis* and *Athyrium filix-femina ssp. asplenioides*. Other typical species include *Eurybia divaricata (= Aster divaricatus), Carex* spp. (e.g., *Carex aestivalis, Carex debilis, Carex digitalis, Carex laxiflora var. laxiflora, Carex pensylvanica), Chimaphila maculata (= var. maculata), Desmodium nudiflorum, Dioscorea quaternata, Eupatorium purpureum, Galium latifolium, Galax urceolata, Goodyera pubescens, Houstonia purpurea var. purpurea, Lysimachia quadrifolia, Maianthemum racemosum ssp. racemosum, Medeola virginiana, Polygonatum biflorum, Polystichum acrostichoides, Solidago curtisii (= Solidago caesia var. curtisii)*, and *Uvularia puberula*. Common vines are *Smilax rotundifolia, Smilax glauca*, and *Vitis aestivalis*.

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus alba, Quercus rubra*
Tree subcanopy	Broad-leaved deciduous tree	*Acer rubrum, Oxydendrum arboreum*
Herb (field)	Fern or fern ally	*Athyrium filix-femina, Dennstaedtia punctilobula, Thelypteris noveboracensis*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Acer rubrum, Quercus rubra*
Tree subcanopy	Broad-leaved deciduous tree	*Acer rubrum, Halesia tetraptera* var. *monticola, Oxydendrum arboreum*
Tree subcanopy	Broad-leaved deciduous shrub	*Pyrularia pubera*
Tall shrub/sapling	Broad-leaved deciduous shrub	*Calycanthus floridus*
Short shrub/sapling	Broad-leaved deciduous shrub	*Gaylussacia ursina*

Herb (field)	Dwarf-shrub	*Galax urceolata*
Herb (field)	Fern or fern ally	*Thelypteris noveboracensis*

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park: *Quercus rubra*
Global: *Calycanthus floridus, Pyrularia pubera, Quercus rubra*

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:
Global:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4? (3-Jan-2000). This community is uncommon but secure within its range. It is often overlooked in surveys or not recognized as distinct, thus it is much more common than the number of documented occurrences suggests. Resolution of taxonomic issues that distinguish this community from similar associations may lead to a range extension.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Cumberland Gap National Historical Park Comments:
Global Comments: This association was originally defined from the Chattooga Basin Project (S. Simon pers. comm.) and later refined with information from the Great Smoky Mountains. Global name and concept may need revision as more information becomes available. This association may be a subset of the more broadly defined *Quercus alba - Quercus (rubra, prinus) / Rhododendron calendulaceum - Kalmia latifolia - (Gaylussacia ursina)* Forest (CEGL007230) but is distinguished by the dominance of *Quercus rubra*, generally protected topographic setting, and may represent areas formerly dominated by *Quercus rubra* and *Castanea dentata*. This type replaced *Castanea dentata* in Virginia (G. Fleming pers. comm.).
Global Similar Associations:

- *Quercus alba - Quercus (rubra, prinus) / Rhododendron calendulaceum - Kalmia latifolia - (Gaylussacia ursina)* Forest (CEGL007230)--contains more than 50% *Quercus alba* in the canopy.
- *Quercus alba - Quercus rubra - Quercus prinus / Collinsonia canadensis - Podophyllum peltatum - Amphicarpaea bracteata* Forest (CEGL007692)--is usually dominated by *Quercus rubra, Quercus alba, Quercus velutina*, and/or *Carya* spp. but is generally not very high in fern cover and generally more diverse than CEGL006192.
- *Quercus rubra / (Vaccinium simulatum, Rhododendron calendulaceum) / (Dennstaedtia punctilobula, Thelypteris noveboracensis)* Forest (CEGL007300)--is a high-elevation forest.

Global Related Concepts:

- IA6h. Montane Oak - Hickory Forest (Allard 1990) B
- Montane Red Oak-Hickory Forest (Schafale 1998b) ?
- Oak - Chestnut - Hickory Forest (Ambrose 1990a) B

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: This community exists mostly on the upper slopes and broad ridges of the park, but occasionally ranges down to 455 m (1500 feet) in elevation on the Virginia side in acidic to neutral soil.
Global Range: This association is found in the Southern Blue Ridge Escarpment and Cumberlands/Southern Ridge and Valley, the Smoky Mountains and the Southern Blue Ridge, and may possibly range into adjacent areas of the Central Appalachians and Cumberland Plateau.
Nations: US
States/Provinces: GA, KY, NC, SC, TN, VA?
USFS Ecoregions: M221Cc:CCC, M221Ce:CCC, M221Dc:CCP, M221Dd:CCC
Federal Lands: NPS (Blue Ridge Parkway, Carl Sandburg Home, Cumberland Gap, Great Smoky Mountains); USFS (Chattahoochee, Nantahala, Sumter)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots: CUGA.23, CUGA.25, CUGA.27, CUGA.29, CUGA.36, CUGA.73, CUGA.77, CUGA.84 (in part), CUGA.85, CUGA.97, CUGA.99.
Local Description Authors: R. White
Global Description Authors: K.D. Patterson, mod. T. Govus and R. White
References: Allard 1990, Ambrose 1990a, Nelson 1986, Peet et al. unpubl. data 2002, Schafale 1998b, Schafale and Weakley 1990, Simon pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

Quercus muehlenbergii - (Acer saccharum) Forest Alliance

Ridge and Valley Limestone Oak - Hickory Forest

***Quercus muehlenbergii - Quercus alba / Cercis canadensis / Dirca palustris* Forest**
Chinquapin Oak - White Oak / Redbud / Leatherwood Forest
Identifier: CEGL004793

Ecological System(s): Southern Appalachian Oak Forest (CES202.886)
Central Appalachian Alkaline Glade and Woodland (CES202.602)

ELEMENT CONCEPT

Global Summary: These are rich forests on moderately steep slopes of the Ridge and Valley over dolomitic limestones of the Knox Group (for example Chapultepec and Copper Ridge dolomites). They are dominated by a mixture of *Quercus muehlenbergii* and *Quercus alba*, with *Quercus rubra* and *Quercus velutina* in smaller amounts. *Fraxinus americana, Liriodendron tulipifera,* and *Juglans nigra* may also be present in the canopy. The relatively open subcanopy contains *Acer saccharum* and *Juniperus virginiana var. virginiana*. *Cercis canadensis var. canadensis, Ulmus rubra,* and *Asimina triloba* are present as tall shrubs or small trees. Low shrubs include *Rhus aromatica var. aromatica, Dirca palustris, Viburnum prunifolium, Toxicodendron radicans,* and small individuals of *Aesculus flava.* Herbs present include *Ageratina altissima, Bromus pubescens, Brachyelytrum erectum, Hexastylis arifolia var. ruthii, Collinsonia canadensis, Sanicula odorata, Geranium maculatum, Euphorbia mercurialina, Sanguinaria canadensis, Maianthemum racemosum, Thaspium barbinode, Prenanthes* sp., and *Polystichum acrostichoides*. Some small patches of *Arundinaria gigantea* are also present. This association has been observed on the TNC Powell River Preserve and in Cumberland Gap National Historical Park, both in Claiborne County, Tennessee. It is likely found in adjacent Virginia (Lee County).

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:
Cumberland Gap National Historical Park Environment: Within the park, this community exists on limestone substrates on steep to moderate southeast-facing slopes at around 455 m (1500 feet) elevation. It occurs along a narrow band of exposed rock and shallow soils and may be too narrow to map along much of the slope.
Global Environment: The few examples of this community exist on south- to east-facing steep slopes underlain by limestone with fairly shallow soils.

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: Stands are dominated by a mixture of *Quercus muehlenbergii* and *Quercus alba*, with *Quercus rubra* and *Quercus velutina* in smaller amounts. *Fraxinus americana, Liriodendron tulipifera*, and *Juglans nigra* may also be present in the canopy. *Cercis canadensis var. canadensis, Ulmus rubra,* and *Asimina triloba* are present as tall shrubs or small trees. Low shrubs include *Toxicodendron radicans* and *Viburnum prunifolium*. Herbs present include *Packera obovata (= Senecio obovatus), Bromus pubescens, Brachyelytrum erectum, Ageratina altissima, Hexastylis arifolia, Collinsonia canadensis, Geranium maculatum, Sanguinaria canadensis, Maianthemum racemosum, Thaspium barbinode, Prenanthes* sp., and *Polystichum acrostichoides*.
Global Vegetation: Stands are dominated by a mixture of *Quercus muehlenbergii* and *Quercus alba*, with *Quercus rubra* and *Quercus velutina* in smaller amounts. *Fraxinus americana, Liriodendron tulipifera,* and

Juglans nigra may also be present in the canopy. The relatively open subcanopy contains *Acer saccharum* and *Juniperus virginiana var. virginiana*. *Cercis canadensis var. canadensis, Ulmus rubra,* and *Asimina triloba* are present as tall shrubs or small trees. Low shrubs include *Rhus aromatica var. aromatica, Dirca palustris, Toxicodendron radicans, Viburnum prunifolium,* and small individuals of *Aesculus flava*. Herbs present include *Bromus pubescens, Brachyelytrum erectum, Ageratina altissima, Hexastylis arifolia var. ruthii, Collinsonia canadensis, Sanicula odorata, Geranium maculatum, Euphorbia mercurialina, Sanguinaria canadensis, Maianthemum racemosum, Thaspium barbinode, Prenanthes* sp., and *Polystichum acrostichoides*. Some small patches of *Arundinaria gigantea* are also present.

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus muehlenbergii*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus muehlenbergii*

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park: *Bromus pubescens, Cercis canadensis, Quercus muehlenbergii*
Global: *Bromus pubescens, Cercis canadensis, Quercus muehlenbergii*

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:
Global:

CONSERVATION STATUS RANK

Global Rank & Reasons: G3Q (3-Sep-2002).

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Cumberland Gap National Historical Park Comments:
Global Comments:
Global Similar Associations:

- *Acer saccharum - Quercus muehlenbergii / Cercis canadensis* Forest (CEGL006017)--clearly related but more xeric and without oak dominance.

Global Related Concepts:

- IA6j. Interior Calcareous Oak-Hickory Forest (Allard 1990) ?

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: This community exists along the southeast-facing slope of the Virginia side of the park. The community extends down into the Tennessee portion of the park but does not occur in Kentucky.
Global Range: This association is found in the Ridge and Valley of Tennessee and Virginia.
Nations: US
States/Provinces: TN, VA
USFS Ecoregions: 221Hc:CCC, 221Ja:CCC
Federal Lands: NPS (Big South Fork, Cumberland Gap)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots: CUGA.02.
Local Description Authors: R. White
Global Description Authors: mod. M. Pyne and R. White

References: Allard 1990, NatureServe Ecology - Southeastern U.S. unpubl. data, Southeastern Ecology Working Group n.d., TDNH unpubl. data

Quercus prinus - (Quercus coccinea, Quercus velutina) Forest Alliance

Chestnut Oak Forest (Xeric Ridge Type)

***Quercus (prinus, coccinea) / Kalmia latifolia / (Galax urceolata, Gaultheria procumbens)* Forest (Rock Chestnut Oak, Scarlet Oak) / Mountain Laurel / (Galax, Wintergreen) Forest**
Identifier: CEGL006271

Ecological System(s): Southern Appalachian Oak Forest (CES202.886)

ELEMENT CONCEPT

Global Summary: This community includes xeric ridgetop and south-facing exposed slope forests in the Southern Blue Ridge, ranging south and east into the upper Piedmont, north into the Central Appalachians, and north and west into the Ridge and Valley. This community occurs over shallow, rocky soils, primarily on south- to west-facing slopes and ridgetops. The community description includes forests with canopies strongly dominated by *Quercus prinus* and/or *Quercus coccinea*, with lesser amounts of *Quercus velutina, Quercus rubra, Quercus falcata, Oxydendrum arboreum, Nyssa sylvatica*, and *Acer rubrum var. rubrum*, occurring over a typically dense shrub stratum dominated by ericaceous species. The shrub layer may vary between evergreen and deciduous dominance. Typical shrub species include *Kalmia latifolia, Rhododendron maximum, Vaccinium stamineum, Vaccinium pallidum, Gaylussacia ursina, Gaylussacia baccata*, and *Leucothoe recurva*. *Castanea dentata* may occur abundantly as root sprouts. The herb layer is typically sparse and includes subshrubs such as *Epigaea repens* and *Gaultheria procumbens*. Other common species include *Chamaelirium luteum, Chimaphila maculata, Galax urceolata, Magnolia fraseri, Sassafras albidum, Symplocos tinctoria, Smilax rotundifolia*, and *Smilax glauca*. This community is distinguished by its overall floristic composition, with a high abundance of acid-loving ericaceous species, which are indicative of this community's extremely infertile, acidic soils.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:
Cumberland Gap National Historical Park Environment: This community occurs over shallow-soiled south-facing slopes and also ridgetops within the park. Samples taken at the park range from a low of 455 m (1500 feet) in elevation to the ridgetops at 1005 m (3300 feet).
Global Environment: This community occurs over shallow, rocky soils, primarily on south- to west-facing slopes and ridgetops. This community includes xeric ridgetop forests in the Southern Blue Ridge, ranging south and east into the upper Piedmont and north into the Central Appalachians, and west into the Ridge and Valley.

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: Canopies are strongly dominated by either *Quercus prinus* or *Quercus coccinea*, sometimes intergrading into more mesic protected slope communities that have a higher component of *Quercus alba* or more xeric exposed types with *Pinus rigida* or *Pinus virginiana*. Typically, *Acer rubrum* is a large component of the understory. The shrub layer is dominated by ericaceous species, typically *Kalmia latifolia*, and/or *Vaccinium pallidum*. The herb layer is typically sparse and includes subshrubs such as *Epigaea repens* and *Gaultheria procumbens*. Other common species include *Chamaelirium luteum, Chimaphila maculata, Galax urceolata, Magnolia fraseri, Sassafras albidum, Symplocos tinctoria, Smilax rotundifolia*, and *Smilax glauca*. This community is distinguished by its overall floristic composition, with a high abundance of acid-loving ericaceous species, which are indicative of this community's extremely infertile, acidic soils.
Global Vegetation: Stands of this association are forests with canopies strongly dominated by *Quercus prinus* and/or *Quercus coccinea*, with lesser amounts of *Quercus velutina, Quercus rubra, Quercus falcata, Oxydendrum arboreum, Nyssa sylvatica*, and *Acer rubrum var. rubrum*, occurring over a typically dense shrub stratum dominated by ericaceous species. The shrub layer may vary between evergreen and deciduous dominance. Typical shrub species include *Kalmia latifolia, Rhododendron maximum, Vaccinium*

stamineum, Vaccinium pallidum, Gaylussacia ursina, Gaylussacia baccata, and *Leucothoe recurva*. *Castanea dentata* may occur abundantly as root sprouts. The herb layer is typically sparse and includes subshrubs such as *Epigaea repens* and *Gaultheria procumbens*. Other common species include *Chamaelirium luteum, Chimaphila maculata, Galax urceolata, Magnolia fraseri, Sassafras albidum, Symplocos tinctoria, Smilax rotundifolia*, and *Smilax glauca*. This community is distinguished by its overall floristic composition, with a high abundance of acid-loving ericaceous species, which are indicative of this community's extremely infertile, acid soils. In the Great Smoky Mountains *Acer rubrum* is often dominant or codominant in these forests, presumably on former American Chestnut (*Castanea dentata*) sites. In the Blue Ridge-Piedmont transition, below 853 m (2800 feet) elevation, where this community is often associated with *Pinus rigida* forests and woodlands, *Quercus falcata* may be a component of the canopy, and the shrub stratum is strongly dominated by *Vaccinium pallidum*.

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus coccinea, Quercus prinus*
Tree subcanopy	Broad-leaved deciduous tree	*Acer rubrum, Nyssa sylvatica*
Tall shrub/sapling	Broad-leaved deciduous shrub	*Vaccinium stamineum*
Tall shrub/sapling	Broad-leaved evergreen shrub	*Kalmia latifolia*
Short shrub/sapling	Broad-leaved deciduous tree	*Vaccinium pallidum*
Herb (field)	Dwarf-shrub	*Epigaea repens, Galax urceolata, Gaultheria procumbens*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus coccinea, Quercus prinus*
Tree subcanopy	Broad-leaved deciduous tree	*Acer rubrum, Nyssa sylvatica, Oxydendrum arboreum*
Tall shrub/sapling	Broad-leaved deciduous shrub	*Vaccinium stamineum*
Tall shrub/sapling	Broad-leaved evergreen shrub	*Kalmia latifolia*
Short shrub/sapling	Broad-leaved deciduous shrub	*Vaccinium pallidum*
Herb (field)	Dwarf-shrub	*Epigaea repens, Galax urceolata, Gaultheria procumbens*

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park: *Acer rubrum, Galax urceolata, Gaylussacia baccata, Kalmia latifolia, Nyssa sylvatica, Oxydendrum arboreum, Quercus coccinea, Quercus prinus, Vaccinium pallidum, Vaccinium stamineum*

Global: *Acer rubrum, Castanea dentata, Castanea pumila, Galax urceolata, Gaylussacia baccata, Kalmia latifolia, Nyssa sylvatica, Oxydendrum arboreum, Quercus coccinea, Quercus prinus, Rhododendron periclymenoides, Sassafras albidum, Vaccinium pallidum, Vaccinium stamineum*

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:

Global: *Monotropsis odorata, Smilax biltmoreana, Thermopsis fraxinifolia, Thermopsis mollis, Vaccinium hirsutum*

CONSERVATION STATUS RANK

Global Rank & Reasons: G5 (31-Dec-1997).

CLASSIFICATION

Status: Standard

Classification Confidence: 1 - Strong

Cumberland Gap National Historical Park Comments:

Global Comments: In the Great Smoky Mountains *Acer rubrum* is often dominant or codominant in these forests, presumably on former American chestnut (*Castanea dentata*) sites. In the Blue Ridge-Piedmont transition, below 853 m (2800 feet) elevation, where this community is often associated with *Pinus rigida* forests and woodlands, *Quercus falcata* may be a component of the canopy, and the shrub stratum is strongly dominated by *Vaccinium pallidum*. A similar association defined for the southern Cumberland

Plateau, *Quercus prinus - (Quercus coccinea) / Carya pallida / Vaccinium arboreum - Vaccinium pallidum* Forest (CEGL008431), occurs over sandstone or other geologies not as acid as the Blue Ridge type and lacks species indicative of the Blue Ridge association, such as *Kalmia latifolia, Gaylussacia ursina, Gaylussacia baccata*, and *Gaultheria procumbens*.

Global Similar Associations:

- *Acer rubrum* var. *rubrum - Betula (alleghaniensis, lenta) - Magnolia fraseri / (Rhododendron maximum, Kalmia latifolia)* Forest (CEGL008558)
- *Pinus virginiana - Pinus (rigida, echinata) - (Quercus prinus) / Vaccinium pallidum* Forest (CEGL007119)
- *Quercus alba - Quercus (coccinea, velutina, prinus) / Gaylussacia baccata* Forest (CEGL008521)
- *Quercus prinus - (Quercus coccinea) / Carya pallida / Vaccinium arboreum - Vaccinium pallidum* Forest (CEGL008431)--defined for the southern Cumberland Plateau and western fringe of the southern Blue Ridge, with more diverse shrubs.
- *Quercus prinus - (Quercus coccinea, Quercus velutina) / Kalmia latifolia / Vaccinium pallidum* Forest (CEGL006299)
- *Quercus prinus - Carya* spp. *- Quercus velutina / Vaccinium arboreum / Iris verna* var. *smalliana* Forest (CEGL007261)--defined for the lower Piedmont of Alabama and has Coastal Plain affinities.
- *Quercus prinus - Quercus (alba, coccinea, velutina) / Viburnum acerifolium - (Kalmia latifolia)* Forest (CEGL005023)--broadly defined type for the Appalachian Plateau and Interior Low Plateau.
- *Quercus prinus - Quercus (rubra, velutina) / Vaccinium angustifolium* Forest (CEGL006282)--defined for the Northern Piedmont, Central Appalachians; occurs on granite monadnocks.
- *Quercus prinus - Quercus rubra / Rhododendron maximum / Galax urceolata* Forest (CEGL006286)--is more mesic and has a higher component of *Rhododendron maximum* and relatively little *Kalmia latifolia*.

Global Related Concepts:

- *Quercus montana - Quercus coccinea / Vaccinium pallidum* Forest (Fleming and Moorhead 2000) ?
- *Quercus montana / Kalmia latifolia / Vaccinium pallidum* Association, *pro parte* (Rawinski et al. 1996) ?
- *Quercus prinus - Quercus coccinea / Kalmia latifolia / Vaccinium pallidum* Forest (Fleming and Coulling 2001) ?
- Chestnut Oak Forest (Dry Heath Subtype) (Schafale 1998b) ?
- Chestnut Oak Forests (McLeod 1988) ?
- Chestnut Oak type (Golden 1974) ?
- Chestnut Oak, BR, CUPL (Pyne 1994) ?
- Chestnut Oak-Chestnut Heath (Whittaker 1956) ?
- Chestnut Oak: 44 (Eyre 1980) B
- Chestnut oak-scarlet oak/ericad forest: (matrix) xeric, S- & SW-facing slopes (CAP pers. comm. 1998) ?
- IA6d. Chestnut Oak Slope and Ridge Forest (Allard 1990) B

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: This community occurs throughout the park on exposed ridges and south-facing slopes with acidic soils.

Global Range: The center of distribution for this community is the Southern Blue Ridge of southwestern Virginia, western North Carolina, eastern Tennessee, northeastern Georgia and northwestern South Carolina. It ranges south and east into the upper Piedmont and north into the Central Appalachians, and could possibly extend west into the Ridge and Valley and the Cumberlands of Kentucky.

Nations: US

States/Provinces: GA, KY, NC, SC, TN, VA:S5

USFS Ecoregions: 231Ag:CCC, M221Aa:CCC, M221Ab:CCC, M221Bd:CCC, M221Be:CCC, M221Ca:CPP, M221Cb:CPP, M221Cc:CPP, M221Ce:CPP, M221Da:CCC, M221Db:CCP, M221Dc:CCC, M221Dd:CCC

Federal Lands: NPS (Blue Ridge Parkway, Carl Sandburg Home, Cumberland Gap, Great Smoky Mountains); USFS (Chattahoochee, Cherokee, Daniel Boone, George Washington, Jefferson, Nantahala, Pisgah, Sumter)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots: CUGA.3, CUGA.10, CUGA.34, CUGA.40, CUGA.45, CUGA.51.
Local Description Authors: R. White
Global Description Authors: K.D. Patterson, mod. R. White
References: Allard 1990, CAP pers. comm. 1998, Evans 1991, Eyre 1980, Fleming and Coulling 2001, Fleming and Moorhead 2000, Fleming et al. 2001, Golden 1974, Major et al. 1999, McLeod 1988, NatureServe Ecology - Southeastern U.S. unpubl. data, Nelson 1986, Peet et al. unpubl. data 2002, Pyne 1994, Rawinski et al. 1996, Schafale 1998b, Schafale and Weakley 1990, Southeastern Ecology Working Group n.d., TDNH unpubl. data, VDNH 2003, Whittaker 1956

Quercus prinus - Quercus rubra Forest Alliance

Appalachian Montane Oak Hickory Forest (Chestnut Oak Type)

***Quercus prinus - (Quercus rubra) - Carya* spp. / *Oxydendrum arboreum - Cornus florida* Forest**
Rock Chestnut Oak - (Northern Red Oak) - Hickory species / Sourwood - Flowering Dogwood Forest
Identifier: CEGL007267

Ecological System(s): Southern Appalachian Oak Forest (CES202.886)

ELEMENT CONCEPT

Global Summary: This community is known from low to intermediate elevations of the Southern Blue Ridge escarpment, the Great Smoky Mountains, Piedmont transition areas, and into the Southern Ridge and Valley. It occurs on relatively exposed landforms below 915 m (3000 feet) elevation (365-885 m [1200-2900 feet]), on moderately steep to steep, convex, middle to upper slopes and ridges, with mostly northern to southwestern aspects. Canopies are dominated by *Quercus prinus*, with *Acer rubrum* often codominating. Other species that can have significant canopy coverage include *Carya glabra, Liriodendron tulipifera, Quercus coccinea, Quercus velutina,* and *Quercus rubra*. The subcanopy is commonly dominated by *Cornus florida*. Additional canopy and subcanopy species can include *Carya alba, Halesia tetraptera var. monticola, Nyssa sylvatica, Robinia pseudoacacia, Magnolia fraseri,* and *Oxydendrum arboreum*. The shrub stratum is sparse with no clear dominant. Some typical shrub species include *Gaylussacia ursina, Hydrangea arborescens, Hydrangea radiata, Kalmia latifolia, Magnolia fraseri, Sassafras albidum,* and, *Vaccinium pallidum*. Common vines are *Smilax rotundifolia, Smilax glauca, Vitis aestivalis, Vitis rotundifolia,* and *Vitis vulpina*. Herb cover is sparse, but diversity and species composition vary among occurrences. Some of the more typical species include *Eurybia divaricata (= Aster divaricatus), Chimaphila maculata, Desmodium nudiflorum, Dichanthelium* spp. (e.g., *Dichanthelium boscii, Dichanthelium commutatum, Dichanthelium dichotomum), Dioscorea quaternata, Galium latifolium, Houstonia purpurea, Lysimachia quadrifolia, Maianthemum racemosum ssp. racemosum, Polystichum acrostichoides, Prenanthes* spp., *Thalictrum thalictroides, Thelypteris noveboracensis, Uvularia perfoliata, Uvularia puberula, Uvularia sessilifolia,* and *Viola* spp. (e.g., *Viola blanda, Viola hastata, Viola X palmata, Viola tripartita*). Some occurrences may have areas of exposed rock.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:
Cumberland Gap National Historical Park Environment: Within the park, this community is known from throughout on exposed ridges and slopes of various aspects (mostly northern to southwestern aspects). Examples range in elevation from 365-885 m (1200-2900 feet) within the park.
Global Environment: This community is known from low to intermediate elevations of the Southern Blue Ridge escarpment, the Great Smoky Mountains, Piedmont transition areas, and into the Southern Ridge and Valley. It occurs on relatively exposed landforms below 915 m (3000 feet) elevation (365-885 m [1200-

2900 feet]), on moderately steep to steep, convex, middle to upper slopes and ridges, with mostly northern to southwestern aspects.

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: Within the park, canopies of this community are usually dominated by either *Quercus prinus* or *Quercus coccinea* (90% of occurrences). However, in some cases *Quercus alba* or *Quercus velutina* may codominate. In addition, in areas with high maple invasion rates, *Acer rubrum* may begin to dominate the canopy as it matures. The understory and shrub layers are sparse. *Nyssa sylvatica, Sassafras albidum, Acer rubrum*, and *Oxydendrum arboreum* are commonly found in the understory. *Vaccinium pallidum* is the most common shrub component, often with 10% or more as a cover value. The herbaceous layer is generally sparse. The most common and consistent herbaceous species is *Desmodium nudiflorum*. Other common species include *Chimaphila maculata, Viola* spp., etc.

Global Vegetation: The canopies of stands of this type are dominated by *Quercus prinus*, with *Acer rubrum* often codominating. Other species that can have significant canopy coverage include *Carya glabra, Liriodendron tulipifera, Quercus coccinea, Quercus velutina*, and *Quercus rubra*. The subcanopy is commonly dominated by *Cornus florida*. Additional canopy and subcanopy species can include *Carya alba, Halesia tetraptera var. monticola, Nyssa sylvatica, Robinia pseudoacacia, Magnolia fraseri*, and *Oxydendrum arboreum*. The shrub stratum is sparse with no clear dominant. Some typical shrub species include *Gaylussacia ursina, Hydrangea arborescens, Hydrangea radiata, Kalmia latifolia, Magnolia fraseri, Sassafras albidum*, and, *Vaccinium pallidum*. Common vines are *Smilax rotundifolia, Smilax glauca, Vitis aestivalis, Vitis rotundifolia*, and *Vitis vulpina*. Herb cover is sparse, but diversity and species composition vary among occurrences. Some of the more typical species include *Eurybia divaricata (= Aster divaricatus), Chimaphila maculata, Desmodium nudiflorum, Dichanthelium* spp. (e.g., *Dichanthelium boscii, Dichanthelium commutatum, Dichanthelium dichotomum), Dioscorea quaternata, Galium latifolium, Houstonia purpurea, Lysimachia quadrifolia, Maianthemum racemosum ssp. racemosum, Polystichum acrostichoides, Prenanthes* spp., *Thalictrum thalictroides, Thelypteris noveboracensis, Uvularia perfoliata, Uvularia puberula, Uvularia sessilifolia*, and *Viola* spp. (e.g., *Viola blanda, Viola hastata, Viola X palmata, Viola tripartita*).

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus coccinea, Quercus prinus*
Short shrub/sapling	Broad-leaved deciduous shrub	*Vaccinium pallidum*
Herb (field)	Forb	*Desmodium nudiflorum*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus prinus, Quercus rubra*
Tree subcanopy	Broad-leaved deciduous tree	*Cornus florida, Oxydendrum arboreum*

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park: *Acer rubrum, Desmodium nudiflorum, Oxydendrum arboreum, Quercus coccinea, Quercus prinus, Vaccinium pallidum*

Global: *Cornus florida, Oxydendrum arboreum, Quercus prinus, Quercus rubra*

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:

Global: *Ageratina altissima* var. *roanensis, Carex lucorum* var. *austrolucorum, Monotropsis odorata*

CONSERVATION STATUS RANK

Global Rank & Reasons: G4G5 (15-Aug-1997).

CLASSIFICATION

Status: Standard

Classification Confidence: 2 - Moderate

Cumberland Gap National Historical Park Comments:

Global Comments: This forest lacks the dense ericaceous shrub layer typical of other *Quercus prinus*-dominated forests in the Blue Ridge escarpment region and commonly has diverse herbaceous composition. It is distinguished from similar forests in the Ridge and Valley by lacking *Acer saccharum* and from Piedmont forests by the lack of *Quercus falcata* and *Quercus stellata*, and by the presence of species more typical of the southern Appalachians (*Magnolia fraseri, Halesia tetraptera*, and *Castanea dentata*). This association was originally defined from the Chattooga Basin Project (S. Simon pers. comm.) and later refined with information from the Great Smoky Mountains. The North Carolina Piedmont examples of this association are only montane transition areas, such as the Sauratown Mountains and Hanging Rock. It may become more widespread in the Piedmont of Virginia.

Global Similar Associations:

- *Acer rubrum* var. *rubrum - Betula (alleghaniensis, lenta) - Magnolia fraseri / (Rhododendron maximum, Kalmia latifolia)* Forest (CEGL008558)
- *Quercus alba - Quercus (rubra, prinus) / Rhododendron calendulaceum - Kalmia latifolia - (Gaylussacia ursina)* Forest (CEGL007230)--occurs at higher elevations and has a stronger white oak component.
- *Quercus prinus - Quercus rubra / Hamamelis virginiana* Forest (CEGL006057)
- *Quercus prinus - Quercus rubra / Rhododendron maximum / Galax urceolata* Forest (CEGL006286)

Global Related Concepts:

- Chestnut Oak Forest (Herb Subtype) (Schafale 1998b) ?
- IA6h. Montane Oak - Hickory Forest (Allard 1990) B
- Oak - Chestnut - Hickory Forest (Ambrose 1990a) B

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: This community occurs scattered throughout the park at various aspects in exposed or semi-exposed positions at moderate elevations.

Global Range: This community occurs in the Southern Blue Ridge, the Great Smoky Mountains, and Piedmont transition areas of western North Carolina, eastern Tennessee, northwestern South Carolina, and northeastern Georgia. In addition, it occurs in the Cumberlands area on the border between Virginia, Kentucky, and Tennessee. It extends marginally into the southwestern edge of the Virginia Blue Ridge.

Nations: US

States/Provinces: GA, KY, NC, SC, TN, VA

USFS Ecoregions: 231Aa:PPP, M221Cc:CCC, M221Ce:CCC, M221Dc:CCC, M221Dd:CCC

Federal Lands: NPS (Blue Ridge Parkway, Carl Sandburg Home, Cumberland Gap, Great Smoky Mountains); USFS (Chattahoochee, Cherokee, Nantahala, Pisgah, Sumter)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:

Cumberland Gap National Historical Park Plots: CUGA.4, CUGA.79, CUGA.12, CUGA.16, CUGA.18, CUGA.21, CUGA.33, CUGA.38, CUGA.56, CUGA.66, CUGA.69, CUGA.76, CUGA.78, CUGA.86, CUGA.96, CUGA.100, CUGA.101.

Local Description Authors: R. White

Global Description Authors: K.D. Patterson, mod. T. Govus and R. White

References: Allard 1990, Ambrose 1990a, NatureServe Ecology - Southeastern U.S. unpubl. data, Nelson 1986, Peet et al. unpubl. data 2002, Schafale 1998b, Schafale and Weakley 1990, Simon pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

Chestnut Oak Forest (Mesic Slope Heath Type)

***Quercus prinus - Quercus rubra / Rhododendron maximum / Galax urceolata* Forest**
Rock Chestnut Oak - Northern Red Oak / Great Rhododendron / Galax Forest
Identifier: CEGL006286

Ecological System(s): Southern Appalachian Oak Forest (CES202.886)

ELEMENT CONCEPT

Global Summary: This montane deciduous forest is known from protected, steep, north-facing slopes in the Southern Blue Ridge and ranges into adjacent areas of the upper Piedmont to the east and the Cumberlands to the west. This forest is found on moderate to very steep slopes with northerly exposures, on lower slope positions, typically at elevations between 760 and 1220 m (2500-4000 feet). It is dominated by *Quercus prinus*, usually with lesser amounts of *Quercus rubra* and/or *Acer rubrum*, and always occurring over a dense, very tall shrub stratum (2-6 m) of *Rhododendron maximum*. In some examples, this community may also be codominated or dominated by *Betula lenta*. In some areas, *Rhododendron minus* may dominate or *Tsuga canadensis* may have dense understory regeneration. Other common shrubs can include *Gaylussacia ursina* and *Kalmia latifolia*. Herbs are sparse. The ground cover is dominated by leaf litter, but *Galax urceolata* is found in most occurrences. Other herb species that can be typical include *Chimaphila maculata, Goodyera pubescens*, and *Polystichum acrostichoides*. Some examples may have sparse (woodland-like) canopies and occur in association with rock outcroppings. In the Great Smoky Mountains it was found consistently as a transitional band of vegetation, downslope from drier *Quercus prinus* ridgetop forests, *Quercus (prinus, coccinea) / Kalmia latifolia / (Galax urceolata, Gaultheria procumbens)* Forest (CEGL006271), and grading into acidic cove forests, *Liriodendron tulipifera - Betula lenta - Tsuga canadensis / Rhododendron maximum* Forest (CEGL007543) on the steep ravines below. At Cumberland Gap National Historical Park, this community can grade into mixed mesophytic forests, *Liriodendron tulipifera - Tilia americana var. heterophylla - Aesculus flava - Acer saccharum / Magnolia tripetala* Forest (CEGL005222), as well.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:

Cumberland Gap National Historical Park Environment: This community exists on lower to upper slopes in very sheltered positions, usually north-facing slopes. It is more mesic than the less sheltered slopes adjacent to it.

Global Environment: This montane deciduous forest is known from protected, steep, north-facing slopes in the Southern Blue Ridge and ranges into adjacent areas of the upper Piedmont to the east and the Cumberlands to the west. This is typically a midslope to lower slope type, but it can be found on upper slopes in a more sheltered position (M. Schafale pers. comm.). This forest is found on moderate to very steep slopes with northerly exposures, on lower slope positions, typically at elevations between 760 and 1220 m (2500-4000 feet).

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: Within the park, the canopy is generally a mixture of *Quercus prinus, Acer rubrum*, and *Quercus rubra*. However, some instances may have high components of *Betula lenta* and *Liriodendron tulipifera*, especially if they have been disturbed recently or are in an ecotone with mixed mesophytic forests (CEGL005222). All examples have a moderate to high cover of *Rhododendron maximum*.

Global Vegetation: It is dominated by *Quercus prinus*, usually with lesser amounts of *Quercus rubra* and/or *Acer rubrum*, and always occurring over a dense, very tall shrub stratum (2-6 m) of *Rhododendron maximum*. In some examples, this community may also be codominated or dominated by *Betula lenta*. In some areas, *Rhododendron minus* may dominate or *Tsuga canadensis* may have dense understory regeneration. Other common shrubs can include *Gaylussacia ursina* and *Kalmia latifolia*. Herbs are sparse. The ground cover is dominated by leaf litter, but *Galax urceolata* is found in most occurrences. Other herb species that can be typical include *Chimaphila maculata, Goodyera pubescens*, and *Polystichum acrostichoides*. Some examples may have sparse (woodland-like) canopies and occur in association with rock outcroppings. In the Great Smoky Mountains it was found consistently as a transitional band of vegetation, downslope from drier *Quercus prinus* ridgetop forests, *Quercus (prinus, coccinea) / Kalmia latifolia / (Galax urceolata, Gaultheria procumbens)* Forest (CEGL006271), and grading into acidic cove forests, *Liriodendron tulipifera - Betula lenta - Tsuga canadensis / Rhododendron maximum* Forest (CEGL007543) on the steep ravines below. At Cumberland Gap National Historical Park, this community can grade into mixed mesophytic forests (CEGL005222) as well.

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Acer rubrum, Quercus prinus*
Tall shrub/sapling	Broad-leaved evergreen shrub	*Rhododendron maximum*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus prinus, Quercus rubra*
Tall shrub/sapling	Broad-leaved evergreen tree	*Rhododendron maximum*

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park: *Acer rubrum, Quercus prinus, Rhododendron maximum*
Global: *Galax urceolata, Quercus prinus, Quercus rubra, Rhododendron maximum*

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:
Global:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4 (21-Dec-1999). This community is uncommon, but not rare, throughout most of its range. As currently defined, it is a regional endemic, found only in the Southern Blue Ridge and adjacent regions of the upper Piedmont and Cumberlands. This community is often overlooked or not distinguished separately in inventories; thus, it is more common than the number of documented occurrences suggests.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Cumberland Gap National Historical Park Comments:
Global Comments: This association is more protected and more mesic than *Quercus (prinus, coccinea) / Kalmia latifolia / (Galax urceolata, Gaultheria procumbens)* Forest (CEGL006271). It occurs at lower elevations and on more protected topographic positions than *Quercus rubra / (Kalmia latifolia, Rhododendron maximum) / Galax urceolata* Forest (CEGL007299). It is much less diverse than *Quercus prinus - (Quercus rubra) - Carya* spp. / *Oxydendrum arboreum - Cornus florida* Forest (CEGL007267), lacking the diverse herbaceous and woody components found in that association.
Global Similar Associations:

- *Acer rubrum* var. *rubrum - Betula (alleghaniensis, lenta) - Magnolia fraseri / (Rhododendron maximum, Kalmia latifolia)* Forest (CEGL008558)
- *Quercus (prinus, coccinea) / Kalmia latifolia / (Galax urceolata, Gaultheria procumbens)* Forest (CEGL006271)
- *Quercus prinus - (Quercus rubra) - Carya* spp. / *Oxydendrum arboreum - Cornus florida* Forest (CEGL007267)
- *Quercus rubra / (Kalmia latifolia, Rhododendron maximum) / Galax urceolata* Forest (CEGL007299)

Global Related Concepts:

- Chestnut Oak Forest (Rhododendron Subtype) (Schafale 1998b) ?
- IA6d. Chestnut Oak Slope and Ridge Forest (Allard 1990)

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: Within the park, this community is fairly rare but may occur throughout the park on any steep north-facing protected slope.
Global Range: This community occurs in the Southern Blue Ridge of northeastern Georgia, northwestern South Carolina, north through eastern Tennessee and western North Carolina and into the Cumberlands of Kentucky and Virginia. Its range extends into the upper Piedmont of North Carolina and possibly into Virginia's Blue Ridge.
Nations: US
States/Provinces: GA, KY, NC, SC, TN, VA
USFS Ecoregions: M221A:C?, M221B:C?, M221Cc:CCC, M221Ce:CCC, M221Dc:CCC, M221Dd:CCC

Federal Lands: NPS (Blue Ridge Parkway, Carl Sandburg Home, Cumberland Gap, Great Smoky Mountains); USFS (Chattahoochee, Cherokee, Nantahala, Sumter)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots: CUGA.13, CUGA.22 (in part), CUGA.84 (in part), CUGA.95, CUGA.102.
Local Description Authors: R. White
Global Description Authors: K.D. Patterson, mod. R. White
References: Allard 1990, NatureServe Ecology - Southeastern U.S. unpubl. data, Peet et al. unpubl. data 2002, Schafale 1998b, Schafale and Weakley 1990, Schafale pers. comm., Simon pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

Sassafras albidum Forest Alliance

Southern Blue Ridge Successional Sassafras Forest

***Sassafras albidum* - *Quercus* spp. Forest**
Sassafras - Oak species Forest
Identifier: CEGL004096

Ecological System(s): Southern Appalachian Oak Forest (CES202.886)

ELEMENT CONCEPT

Global Summary: This community consists of deciduous forests dominated or codominated by *Sassafras albidum*. Most occurrences developed through catastrophic disturbance such as fire and/or partial clearcuts. These upland forests are found in patches along exposed slopes. Forests are primarily below 915 m (3000 feet) elevation and are usually associated with acidic slopes heavily disturbed by catastrophic fire. Forests occur primarily in the Southern Blue Ridge and Cumberland Mountains. This community includes pure, often even-aged stands of *Sassafras albidum*, as well as forests with *Liriodendron tulipifera* and *Quercus* spp. Throughout most of the range, *Carya alba* and *Castanea dentata* are often subcanopy dominants. The herbaceous layer varies widely depending upon geology but is often sparse.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:
Cumberland Gap National Historical Park Environment: Within the park, this community occurs below 760 m (2500 feet) elevation on exposed slopes that were subject to catastrophic fire or partial clearcuts in recent history. Examples are found in the far southeastern part of the park, but probably range throughout the south-facing slope on the Virginia side of the park.
Global Environment: This community consists of deciduous forests dominated or codominated by *Sassafras albidum*. Most examples are heavily impacted by natural catastrophic fire and/or partial clearcuts. These upland forests are found in patches along exposed slopes. Examples are found primarily below 915 m (3000 feet) elevation and are usually associated with acidic slopes heavily disturbed by catastrophic fire. Forests occur primarily in the Southern Blue Ridge and Cumberland Mountains.

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: This community is a fairly short-lived community following catastrophic disturbance. *Sassafras albidum* dominates the canopy until older successional trees such as *Quercus* spp. and *Carya* spp. recover and retake the canopy. Until then, *Sassafras albidum* always dominates. The understory is variable, depending upon the substrate, but can range from very acidic to somewhat basic.
Global Vegetation: This community includes pure, often even-aged stands of *Sassafras albidum*, as well as forests with *Liriodendron tulipifera* and *Quercus* spp. Throughout most of the range, *Carya alba* and *Castanea dentata* are often subcanopy dominants. The herbaceous layer is often sparse and varies, depending upon the underlying geology.

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Sassafras albidum*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Sassafras albidum*

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park: *Sassafras albidum*
Global: *Sassafras albidum*

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:
Global:

CONSERVATION STATUS RANK

Global Rank & Reasons: G5 (31-Jan-2006). Although this forest is a successional type, it is most likely caused by natural and/or anthropogenic catastrophic fire and probably has existed on the landscape in some form or another for quiet a while. As a consequence, this vegetation type is considered to be a common natural type.

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Cumberland Gap National Historical Park Comments:
Global Comments:
Global Similar Associations:
Global Related Concepts:

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: Although only found in the southeastern corner of the park, this community most likely exists in other areas in the Virginia and possibly Kentucky sides of the park.
Global Range: This association is known from the Southern Blue Ridge and Cumberland Mountains of the southeastern U.S. It is known from Virginia and may also occur in North Carolina, Kentucky, and Tennessee.
Nations: US
States/Provinces: KY?, NC?, TN?, VA
USFS Ecoregions: M221Cc:CCC
Federal Lands: NPS (Cumberland Gap)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots: CUGA.67, CUGA.68, CUGA.70.
Local Description Authors: R. White
Global Description Authors: R. White
References: Southeastern Ecology Working Group n.d., TDNH unpubl. data

I.B.2.N.d. Temporarily flooded cold-deciduous forest

Platanus occidentalis - (Liquidambar styraciflua, Liriodendron tulipifera) Temporarily Flooded Forest Alliance

Sycamore - Sweetgum Swamp Forest

Platanus occidentalis - Liquidambar styraciflua / Carpinus caroliniana - Asimina triloba **Forest**

Sycamore - Sweetgum / Ironwood - Common Pawpaw Forest
Identifier: CEGL007340

Ecological System(s): Central Appalachian Floodplain (CES202.608)
South-Central Interior Small Stream and Riparian (CES202.706)

ELEMENT CONCEPT

Global Summary: This forest, dominated by *Platanus occidentalis* and *Liquidambar styraciflua*, occurs on active first bottoms and possibly on levees where flooding may be frequent but is of short duration. The community occurs in the Piedmont of Virginia, North Carolina, South Carolina and Georgia and the Cumberlands, Ridge and Valley, and possibly adjacent provinces of Tennessee and Kentucky. Other woody species common to this community include *Aesculus sylvatica, Cornus florida, Alnus serrulata, Fraxinus americana, Acer rubrum, Asimina triloba, Toxicodendron radicans, Parthenocissus quinquefolia, Ulmus americana, Fagus grandifolia*, and *Euonymus americanus*. In addition, *Arundinaria gigantea* may be present or even abundant. Herbaceous species that may be found include *Arisaema triphyllum, Sanicula canadensis, Saururus cernuus, Campanula divaricata, Laportea canadensis, Salvia lyrata, Chasmanthium latifolium, Dichanthelium dichotomum var. dichotomum, Viola sororia*, and *Carex crinita*. Because of repeated flooding, this community may remain on a site indefinitely. It develops from communities dominated by *Salix* spp. and *Populus* spp., and probably from others.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Palustrine

Cumberland Gap National Historical Park Environment: Within the park, this community is restricted to the largest streams and largest floodplains. It is uncommon in the park and may be too small to map in most instances.

Global Environment: This forest occurs on small to medium-sized streams and on larger streams on active first bottoms and possibly on levees where flooding may be frequent but is of short duration. Because of repeated flooding, this community may remain on a site indefinitely. This is a Zone IV community with a likelihood of 51-100% of flooding with intermittent periodicity for 1-2 months (12.5-25% of total) of the growing season. Flooding usually occurs in late winter and spring. Common soil orders for this community include Entisols, Inceptisols and Alfisols, and soils are relatively fertile because of frequent sediment deposition. It develops from communities dominated by *Salix* spp., *Populus* spp., and probably others.

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: This community is dominated by *Platanus occidentalis* and *Liquidambar styraciflua* with other woody species, including *Acer rubrum, Nyssa sylvatica*, and *Quercus alba*, as prominent canopy species. The tall-shrub layer can be dense with species, especially *Asimina triloba* and *Lindera benzoin*. The herbaceous layer can approach 100% cover. Common herbaceous species include the invasive exotic *Microstegium vimineum*, as well as *Arisaema triphyllum, Amphicarpaea bracteata*, and *Thelypteris noveboracensis*.

Global Vegetation: This forest is dominated by *Platanus occidentalis, Liquidambar styraciflua*, and sometimes *Acer rubrum*. Other canopy trees can include *Liriodendron tulipifera, Quercus phellos, Celtis occidentalis, Juglans nigra, Fraxinus americana, Fraxinus pennsylvanica, Ulmus americana, Fagus grandifolia*, and *Ulmus rubra*. The subcanopy or tall-shrub layer may be dominated by *Asimina triloba* in some examples. Other woody species common to this community include *Carpinus caroliniana, Aesculus sylvatica, Cornus florida, Alnus serrulata, Cercis canadensis, Lindera benzoin, Symphoricarpos orbiculatus, Smilax rotundifolia, Acer rubrum, Toxicodendron radicans, Parthenocissus quinquefolia*, and *Euonymus americanus*. In addition, *Arundinaria gigantea* may be present or even abundant. Herbaceous species that may be found include *Arisaema triphyllum, Sanicula canadensis, Onoclea sensibilis, Saururus cernuus, Campanula divaricata, Laportea canadensis, Salvia lyrata, Chasmanthium latifolium, Chasmanthium laxum, Dichanthelium dichotomum var. dichotomum, Dichanthelium scoparium, Viola sororia*, and *Carex crinita*.

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Liquidambar styraciflua, Platanus occidentalis*
Tall shrub/sapling	Broad-leaved deciduous tree	*Asimina triloba, Lindera benzoin*
Herb (field)	Graminoid	*Microstegium vimineum*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Betula nigra, Liquidambar styraciflua, Liriodendron tulipifera, Platanus occidentalis*
Tree subcanopy	Broad-leaved deciduous tree	*Acer negundo, Carpinus caroliniana*
Tall shrub/sapling	Broad-leaved deciduous tree	*Asimina triloba, Lindera benzoin*
Herb (field)	Forb	*Laportea canadensis, Salvia lyrata*
Herb (field)	Graminoid	*Arundinaria gigantea, Chasmanthium latifolium*

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park:
Global:

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:
Global:

CONSERVATION STATUS RANK

Global Rank & Reasons: G5 (19-May-2005). This is not an inherently rare forest type. It may establish or re-establish itself following canopy removal.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Cumberland Gap National Historical Park Comments:
Global Comments: The former *Platanus occidentalis - (Liquidambar styraciflua, Acer rubrum) / (Carpinus caroliniana) / Onoclea sensibilis* Forest (CEGL007701) was combined with this type (CEGL007340), broadening its range in the Cumberlands and Interior Low Plateau. *Aesculus sylvatica* does not occur in Kentucky. Related vegetation in the Interior Low Plateau may belong in the *Platanus occidentalis - (Fraxinus pennsylvanica, Celtis laevigata, Acer saccharinum)* Temporarily Flooded Forest Alliance (A.288). This association (and its alliance A.289) was originally conceived as having a more montane or upper piedmontane affinity, in contrast to associations in A.288. This type may be more likely in the upper/inner Piedmont (in contrast to *Platanus occidentalis - Celtis laevigata - Fraxinus pennsylvanica / Lindera benzoin - Ilex decidua / Carex retroflexa* Forest (CEGL007730), of A.288, which is more likely in the portions of the Piedmont closer to the Coastal Plain, e.g., the Oconee National Forest).
Global Similar Associations:

- *Platanus occidentalis - (Liquidambar styraciflua, Liriodendron tulipifera) / Asimina triloba* Forest (CEGL006603)
- *Platanus occidentalis - Celtis laevigata - Fraxinus pennsylvanica / Lindera benzoin - Ilex decidua / Carex retroflexa* Forest (CEGL007730)--somewhat overlapping in range, in different alliance (A.288).

Global Related Concepts:

- Eutrophic Seasonally Flooded Forest (Rawinski 1992) B
- IIA6f. "Interior" Small Stream Swamp Forest (Allard 1990) ?
- IIA7g. Sycamore - Sweetgum - American Elm Riverfront Forest (Allard 1990) B
- Red Maple - Black Gum - Sweetgum, HR (Pyne 1994) B
- Sycamore - Pecan - American Elm (25) (USFS 1988) ?
- Sycamore - Sweetgum - American Elm: 94 (Eyre 1980) B
- Sycamore-sweetgum-tuliptree floodplain forest (CAP pers. comm. 1998) ?

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: This community is very uncommon within the park, only occurring along the largest stream floodplains.
Global Range: The community occurs in the Piedmont of Virginia, North Carolina, South Carolina and Georgia. It also occurs along small to medium-sized streams in the Interior Low Plateau, Cumberlands, the Ridge and Valley, and adjacent provinces of Tennessee and Kentucky.
Nations: US
States/Provinces: AL?, GA, KY, MS?, NC, SC, TN, VA
USFS Ecoregions: 221Ha:CCC, 221Hc:CCC, 221He:CCC, 222C:CP, 222D:CP, 222Eb:CCC, 222Ec:CCC, 222Ed:CC?, 222Eg:CC?, 222En:CCC, 222Eo:CCC, 231Ag:CCC, M221Cd:CCC, M221Dc:C??, M221Dd:C??
Federal Lands: DOD (Arnold); NPS (Big South Fork, Cumberland Gap, Obed); USFS (Daniel Boone, Sumter)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots: CUGA.82.
Local Description Authors: R. White
Global Description Authors: S. Landaal, mod. C.W. Nordman
References: Allard 1990, Burns and Honkala 1990b, CAP pers. comm. 1998, Clark and Benforado 1981, Dickson and Segelquist 1978, Evans 1991, Eyre 1980, Faulkner and Patrick n.d., Fleming et al. 2001, Flinchum 1977, Klimas et al. 1981, McWilliams and Rosson 1990, Nelson 1986, Newell and Peet 1995, Putnam 1951, Putnam et al. 1960, Pyne 1994, Rawinski 1992, Schafale and Weakley 1990, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, TNC 1998a, USFS 1988, Wharton 1978, Wharton et al. 1982

I.C.3.N.a. Mixed needle-leaved evergreen - cold-deciduous forest

Tsuga canadensis - Liriodendron tulipifera Forest Alliance

Cumberland/Appalachian Hemlock - Hardwood Cove Forest

***Tsuga canadensis* - *(Fagus grandifolia, Tilia americana* var. *heterophylla) / Magnolia tripetala* Forest**
Eastern Hemlock - (American Beech, Appalachian Basswood) / Umbrella Magnolia Forest
Identifier: CEGL008407

Ecological System(s): Appalachian (Hemlock)-Northern Hardwood Forest (CES202.593)

ELEMENT CONCEPT

Global Summary: This association represents mixed forests of lower slopes, coves, etc. dominated by *Tsuga canadensis* and mesic hardwood species, occurring in the Cumberland Mountains, the Cumberland Plateau of Kentucky and Tennessee, the Southern Ridge and Valley of Tennessee, and the Central Appalachians and Western Allegheny Plateau of West Virginia and potentially southwestern Pennsylvania. It may range into extreme northwestern Georgia and northeastern Alabama, Deciduous associates, which may vary widely in relative frequency, include *Fagus grandifolia, Tilia americana var. heterophylla, Liriodendron tulipifera, Betula alleghaniensis, Betula lenta, Quercus rubra, Fraxinus americana, Carya ovata*, and *Magnolia acuminata*. The relative proportion of *Tsuga* and the various hardwood species may vary greatly; individual stands may be strongly dominated by *Tsuga*, or *Tsuga* may share dominance with one or more of the hardwoods. *Aesculus flava* and/or *Magnolia tripetala* may be present in the canopy or subcanopy, respectively, but these characteristic species may not be dominant in the particular stratum. Some important shrubs include *Rhododendron maximum* (which may dominate shrub layers of some stands), *Rhododendron catawbiense* (within its range), *Ribes cynosbati, Asimina triloba, Viburnum acerifolium*, and the lianas *Aristolochia macrophylla* and *Smilax rotundifolia*. Ferns are diverse and

abundant. Mesic herbaceous components include *Dryopteris marginalis, Dryopteris intermedia, Thelypteris noveboracensis, Polystichum acrostichoides, Asplenium rhizophyllum, Athyrium filix-femina, Arisaema triphyllum, Asarum canadense, Carex plantaginea, Chimaphila maculata, Goodyera pubescens, Hepatica nobilis var. acuta, Maianthemum racemosum, Mitchella repens, Phacelia bipinnatifida, Sanguinaria canadensis, Tiarella cordifolia,* and *Trillium* spp.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:

Cumberland Gap National Historical Park Environment: Within the park, this community occurs over acidic soils on the more protected slopes, most often as a transitional community between a hemlock-dominated lower slope and a hardwood-dominated midslope.

Global Environment: This forest occurs in coves, valleys, bases of cliffs, and lower slopes. Soils are typically derived from slope alluvium and colluvium, composed of acidic shales, siltstones, and sandstones; the soils typically have a high stone content (Martin 1975).

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: Within the park, this community contains a canopy dominated by *Tsuga canadensis* with canopy associates such as *Quercus alba, Acer rubrum, Fagus grandifolia,* and *Betula lenta*. The shrub layer is sparse, as is the herb layer. Some common species include *Dioscorea quaternata, Thelypteris noveboracensis, Polystichum acrostichoides, Hexastylis arifolia, Desmodium nudiflorum, Mitchella repens, Medeola virginiana,* and others.

Global Vegetation: This association is dominated by *Tsuga canadensis* and mesic hardwood species. Deciduous associates, which may vary widely in relative frequency, include *Fagus grandifolia, Tilia americana var. heterophylla, Liriodendron tulipifera, Betula alleghaniensis, Betula lenta, Quercus rubra, Fraxinus americana, Carya ovata,* and *Magnolia acuminata*. The relative proportion of *Tsuga* and the various hardwood species may vary greatly; individual stands may be strongly dominated by *Tsuga*, or *Tsuga* may share dominance with one or more of the hardwoods. *Aesculus flava* and/or *Magnolia tripetala* may be present in the canopy or subcanopy, respectively, but these characteristic species may not be dominant in the particular stratum. Some important shrubs include *Rhododendron maximum* (which may dominate shrub layers of some stands), *Rhododendron catawbiense* (within its range), *Ribes cynosbati, Asimina triloba, Viburnum acerifolium,* and the lianas *Aristolochia macrophylla* and *Smilax rotundifolia* (Caplenor 1965). Ferns are diverse and abundant. Mesic herbaceous components include *Dryopteris marginalis, Dryopteris intermedia, Thelypteris noveboracensis, Polystichum acrostichoides, Asplenium rhizophyllum, Athyrium filix-femina, Arisaema triphyllum, Asarum canadense, Carex plantaginea, Chimaphila maculata, Goodyera pubescens, Hepatica nobilis var. acuta, Maianthemum racemosum, Mitchella repens, Phacelia bipinnatifida, Sanguinaria canadensis, Tiarella cordifolia,* and *Trillium* spp. At the northern limit of this association, some more southern species will be absent (e.g., *Maianthemum racemosum, Rhododendron catawbiense, Phacelia bipinnatifida, Halesia tetraptera*) (J. Fike pers. comm.). One variant of this association is apparently dominated by *Tsuga canadensis* and *Betula alleghaniensis*, with *Tilia americana var. heterophylla* and *Oxydendrum arboreum* (Caplenor 1965).

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Tsuga canadensis*

Global

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Tsuga canadensis*

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park: *Fagus grandifolia, Tsuga canadensis*

Global: *Fagus grandifolia, Rhododendron maximum, Tsuga canadensis*

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:

Global:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4 (5-Apr-2000). Occurrences are threatened by the Hemlock Woolly Adelgid (*Adelges tsugae*), an exotic insect pest.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Cumberland Gap National Historical Park Comments:
Global Comments: This forest is known from the Rock Creek Research Natural Area in the Daniel Boone National Forest, Kentucky (Winstead and Nicely 1976). It is also found at Lilley Cornet Woods in eastern Kentucky (Martin 1975). Some Tennessee occurrences include Fall Creek Falls State Park (Caplenor 1965) and Savage Gulf in the South Cumberland Recreation Area (Quarterman et al. 1972). There is at least one disjunct occurrence of a mesic ravine with *Tsuga canadensis* in the Eastern Highland Rim of DeKalb County, Tennessee (222Eb), which would be accommodated here. The substrate at this site is siliceous limestone of the Mississippian Fort Payne Formation, immediately underlain by upper Ordovician limestones. This association is better defined in the southern part of its range. In the Western Allegheny Plateau of West Virginia, there is some conceptual overlap with *Tsuga canadensis - Fagus grandifolia - Acer saccharum / (Hamamelis virginiana, Kalmia latifolia)* Forest (CEGL005043), in particular a subtype of this "(1) steep-walled sandstone gorges and talus, where *Hydrangea arborescens, Kalmia latifolia*, and *Dryopteris marginalis* may be indicative." Classification difficulties may be encountered where the potential ranges of these two types could overlap (e.g., in parts of Kentucky, Pennsylvania, and West Virginia).
Global Similar Associations:

- *Liriodendron tulipifera - Betula lenta - Tsuga canadensis / Rhododendron maximum* Forest (CEGL007543)
- *Tsuga canadensis - (Liriodendron tulipifera, Fagus grandifolia) / (Magnolia macrophylla, Ilex opaca) / Polystichum acrostichoides* Forest (CEGL004767)
- *Tsuga canadensis - Fagus grandifolia - Acer saccharum / (Hamamelis virginiana, Kalmia latifolia)* Forest (CEGL005043)

Global Related Concepts:

- Hemlock-basswood Community (Caplenor 1965) ?
- Hemlock-yellow birch Community (Caplenor 1965) ?
- Rich hemlock - mesic hardwoods forest (Fike 1999) ?

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: Within the park, this community is rare and exists on protected lower slopes on the Kentucky side of the park.
Global Range: This association occurs in the Cumberland Mountains and Cumberland Plateau of Kentucky and Tennessee, the Southern Ridge and Valley of Tennessee, and the Central Appalachians of West Virginia and possibly southwestern Pennsylvania. It may range into extreme northwestern Georgia and northeastern Alabama. Occurrences in the Interior Low Plateau are rare and of limited extent.
Nations: US
States/Provinces: AL?, GA?, KY, PA?, TN, VA, WV
USFS Ecoregions: 221Ha:CCC, 221Hc:CCC, 221He:CCC, 222Eb:CCC, 222Eo:CCC, 231Cc:PPP, 231Cd:PP?
Federal Lands: NPS (Big South Fork, Cumberland Gap, Obed); USFS (Daniel Boone)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots: CUGA.57.
Local Description Authors: R. White
Global Description Authors: M. Pyne, mod. R. White

References: Caplenor 1965, Fike 1999, Fike pers. comm., Martin 1975, Quarterman et al. 1972, Schmalzer and DeSelm 1982, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, Winstead and Nicely 1976

Southern Appalachian Eastern Hemlock Forest (Typic Type)

***Tsuga canadensis / Rhododendron maximum - (Clethra acuminata, Leucothoe fontanesiana)* Forest**
Eastern Hemlock / Great Rhododendron - (Mountain Sweet-pepperbush, Mountain Doghobble) Forest
Identifier: CEGL007136

Ecological System(s): Appalachian (Hemlock)-Northern Hardwood Forest (CES202.593)

ELEMENT CONCEPT

Global Summary: These are forests of lower or protected slopes and terraces with *Tsuga canadensis* occurring over a dense to patchy shrub stratum of *Rhododendron maximum*. In the southern Appalachians, this forest occurs at elevations greater than 550 m (1800 feet). In Kentucky, disturbed areas may have abundant *Betula lenta* and *Betula alleghaniensis* in the subcanopy. Other canopy species of minor importance may include *Liriodendron tulipifera, Tilia americana var. heterophylla, Pinus strobus, Betula lenta, Magnolia fraseri, Acer rubrum,* and *Fraxinus americana*; these would total less than 25% of the canopy cover. In the Southern Blue Ridge, *Leucothoe fontanesiana* is often a shrub component and sometimes occurs densely. Other typical shrubs can include *Ilex opaca*, *Clethra acuminata*, and *Kalmia latifolia*. Herbs are sparse to moderate, depending on the shrub cover. Typical herbs include *Chimaphila maculata, Goodyera pubescens, Medeola virginiana, Hexastylis shuttleworthii, Mitchella repens, Polystichum acrostichoides, Viola blanda*, and *Galax urceolata*. Bryophyte cover is often dense. Stands in the southern Cumberlands of Kentucky and Tennessee would lack *Leucothoe fontanesiana*; instead, *Clethra acuminata* is a characteristic shrub of these stands.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:
Cumberland Gap National Historical Park Environment: In the park, this community exists on lower protected slopes and some terraces in and near streams at moderate to high elevations (one example was found at 915 m [3000 feet]).
Global Environment: Forests of lower or protected slopes and terraces with *Tsuga canadensis* occurring over a dense to patchy shrub stratum of *Rhododendron maximum*. In the southern Appalachians, this forest occurs at elevations greater than 550 m (1800 feet).

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: In the park, the canopy of this community contains at least 50% cover of *Tsuga canadensis* along with many other codominants (*Acer rubrum, Quercus prinus, Magnolia fraseri, Nyssa sylvatica, Quercus velutina*). Understory species include *Magnolia fraseri, Acer rubrum,* and *Magnolia tripetala*, all at fairly low cover. The shrub layer is heavily dominated by *Rhododendron maximum* but also with a component of *Clethra acuminata*. Where the shrub does not exist, some acid-loving herbs such as *Medeola virginiana* and *Chimaphila maculata* are sometimes found at very low cover.
Global Vegetation: Forests with *Tsuga canadensis* occurring over a dense to patchy shrub stratum of *Rhododendron maximum.* Other canopy species of minor importance may include *Liriodendron tulipifera, Tilia americana var. heterophylla, Pinus strobus, Betula lenta, Magnolia fraseri, Acer rubrum,* and *Fraxinus americana*; these would total less than 25% of the canopy cover. *Leucothoe fontanesiana* is often a shrub component, and sometimes occurs densely. Other typical shrubs include *Ilex opaca, Clethra acuminata*, and *Kalmia latifolia*. Herbs are sparse to moderate, depending on the shrub cover. Typical herbs include *Chimaphila maculata, Goodyera pubescens, Medeola virginiana, Hexastylis shuttleworthii, Mitchella repens, Polystichum acrostichoides*, and *Galax urceolata*. Bryophyte cover is often dense. In Kentucky, disturbed areas may have abundant *Betula lenta* and *Betula alleghaniensis* in the subcanopy. Stands in the southern Cumberlands of Tennessee would lack *Leucothoe fontanesiana*.

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Tsuga canadensis*
Tall shrub/sapling	Broad-leaved evergreen shrub	*Rhododendron maximum*

Global

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Tsuga canadensis*
Tall shrub/sapling	Broad-leaved evergreen tree	*Rhododendron maximum*
Short shrub/sapling	Broad-leaved evergreen shrub	*Leucothoe fontanesiana*

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park: *Clethra acuminata*, *Rhododendron maximum*, *Tsuga canadensis*
Global: *Leucothoe fontanesiana*, *Rhododendron maximum*, *Tsuga canadensis*

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:
Global: *Monotropsis odorata*

CONSERVATION STATUS RANK

Global Rank & Reasons: G3G4 (30-Apr-1998).

CLASSIFICATION

Status: Standard
Classification Confidence: 1 - Strong
Cumberland Gap National Historical Park Comments:
Global Comments: In Kentucky, this association occurs in the eastern part of the state (Appalachian plateaus, Cumberland Mountains).
Global Similar Associations:

- *Pinus strobus - Tsuga canadensis / Rhododendron maximum - (Leucothoe fontanesiana)* Forest (CEGL007102)--dominated by *Pinus strobus* or codominated by *Pinus strobus* and *Tsuga canadensis*.
- *Tsuga canadensis - (Pinus strobus)* Temporarily Flooded Forest (CEGL007143)

Global Related Concepts:

- Canada Hemlock Forest (Typic Subtype) (Schafale 1998b) ?
- Eastern Hemlock: 23 (Eyre 1980) B
- Hemlock Community (Caplenor 1965) ?
- Hemlock, BR (Pyne 1994) B
- Hemlock, CUPL (Fleming and Coulling 2001) B
- IA5b. Southern Appalachian Hemlock Cove Forest (Allard 1990) B

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: This community is rare but occurs in various areas on protected lower slopes and terraces near creeks on the Kentucky side of the park.
Global Range: This community is found in the Southern Appalachians, from North Carolina west into Kentucky.
Nations: US
States/Provinces: GA, KY, NC, SC, TN
USFS Ecoregions: 221Ha:CCC, 221Hc:CCC, 221He:CCC, 222D:??, M221Cc:CCC, M221Cd:CCC, M221Ce:CCC, M221Dc:CCC, M221Dd:CCC
Federal Lands: NPS (Blue Ridge Parkway, Cumberland Gap, Great Smoky Mountains); USFS (Chattahoochee, Cherokee, Daniel Boone, Nantahala, Pisgah, Sumter)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots: CUGA.22 (in part).
Local Description Authors: R. White

Global Description Authors: K.D. Patterson
References: Allard 1990, Caplenor 1965, Evans 1991, Eyre 1980, Fleming and Coulling 2001, Golden 1974, Golden 1981, Lorimer 1980, McLeod 1988, Newell et al. 1997, Oosting and Bourdeau 1955, Patterson 1994, Peet et al. unpubl. data 2002, Pyne 1994, Quarterman et al. 1972, Racine and Hardin 1975, Schafale 1998b, Schafale and Weakley 1990, Southeastern Ecology Working Group n.d., TDNH unpubl. data, Whittaker 1956

I.C.3.N.d. Saturated mixed needle-leaved evergreen - cold-deciduous forest

Tsuga canadensis - Acer rubrum Saturated Forest Alliance

Swamp Forest-Bog Complex (Typic Type)

***Tsuga canadensis - Acer rubrum - (Liriodendron tulipifera, Nyssa sylvatica) / Rhododendron maximum / Sphagnum* spp. Forest**
Eastern Hemlock - Red Maple - (Tuliptree, Blackgum) / Great Rhododendron / Peatmoss species Forest
Identifier: CEGL007565

Ecological System(s): Southern and Central Appalachian Bog and Fen (CES202.300)

ELEMENT CONCEPT

Global Summary: This palustrine forest has a closed or open canopy and an open to dense shrub layer, interspersed with small *Sphagnum*-herb dominated depressions. These forests are found throughout the Southern Blue Ridge, and in the Cumberland Mountains and Cumberland Plateau, at elevations below 1200 m (4000 feet), in poorly drained bottomlands, generally with visible microtopography of ridges and sloughs or depressions. It often occurs near streams and is undoubtedly occasionally flooded. The canopy is composed of various mixtures of evergreen and deciduous species, often dominated by *Tsuga canadensis* and *Acer rubrum*, and less often by *Liriodendron tulipifera*, *Nyssa sylvatica*, *Pinus strobus*, or *Pinus rigida*. The dominant shrubs are usually *Rhododendron maximum, Kalmia latifolia*, and *Leucothoe fontanesiana*, but other shrubs include *Salix nigra, Alnus serrulata, Ilex montana, Cornus amomum, Viburnum nudum var. cassinoides*, and *Toxicodendron vernix*. Herbs in *Sphagnum*-herb dominated openings include *Solidago patula var. patula, Symphyotrichum puniceum (= Aster puniceus), Dalibarda repens, Osmunda cinnamomea, Carex folliculata, Carex gynandra, Carex scabrata, Carex leptalea, Carex stricta, Sarracenia purpurea, Sagittaria latifolia (= var. pubescens)*, and *Leersia virginica*. Herbs in the forested areas include *Glyceria melicaria, Lycopodium obscurum, Onoclea sensibilis, Maianthemum canadense, Thelypteris noveboracensis*, and *Osmunda regalis var. spectabilis*.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Palustrine
Cumberland Gap National Historical Park Environment: Within the park, this community only occurs in boggy situations within the bottomlands of the Martin's Fork watershed.
Global Environment: The type occurs mostly at elevations below 1200 m (4000 feet), in poorly drained bottomlands, generally with visible microtopography of ridges and sloughs or depressions. It often occurs near streams and is undoubtedly occasionally flooded. In Virginia, habitats range from 790-1340 m (2600-4400 feet) elevation and are typically located along small, braided headwaters streams draining visible groundwater discharge. Soils are very strongly acidic (mean pH in plots = 4.8) with low base status.

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: Within the park, this palustrine forest occurs as a mosaic with the open bog communities. The vegetation consists of a closed to open canopy of *Tsuga canadensis* with a heavy shrub layer of *Rhododendron maximum*. Sphagnum is present.
Global Vegetation: This palustrine forest has a closed or open canopy and an open to dense shrub layer, interspersed with small *Sphagnum*- and herb-dominated depressions. The canopy is composed of various

mixtures of evergreen and deciduous species, including *Tsuga canadensis, Acer rubrum, Liriodendron tulipifera, Nyssa sylvatica, Pinus strobus*, and *Pinus rigida*. Canopy dominants vary with elevation. Occurrences at lower elevations tend to be dominated by *Acer rubrum, Liriodendron tulipifera*, and/or *Nyssa sylvatica*, while examples at higher elevations are usually dominated by *Tsuga canadensis* and/or *Betula alleghaniensis*. *Picea rubens* is a minor canopy component at the highest elevations. The dominant shrubs are usually *Rhododendron maximum, Kalmia latifolia*, and *Leucothoe fontanesiana*, but other shrubs may include *Salix nigra, Alnus serrulata, Ilex montana, Cornus amomum, Viburnum nudum var. cassinoides*, and *Toxicodendron vernix*. Herbaceous species of sphagnous openings include *Solidago patula, Symphyotrichum puniceum (= Aster puniceus), Dalibarda repens, Osmunda cinnamomea, Carex folliculata, Carex gynandra, Carex scabrata, Carex leptalea, Carex stricta, Sarracenia purpurea, Sagittaria latifolia (= var. pubescens)*, and *Leersia virginica*. Herbs in more densely shaded areas include *Glyceria melicaria, Lycopodium obscurum, Onoclea sensibilis, Maianthemum canadense, Thelypteris noveboracensis*, and *Osmunda regalis var. spectabilis*.

Overstory composition of the very few documented examples in Virginia is somewhat heterogeneous and may represent an elevational gradient. The lowest-elevation stand (at 790 m or 2600 feet) in Carroll County (Southern Blue Ridge) is codominated by *Acer rubrum* and *Pinus strobus* with minor associates of *Betula alleghaniensis*, and *Tsuga canadensis*. A Giles County (Ridge and Valley) stand at 1160 m (3800 feet) has a mixed canopy of *Acer rubrum, Nyssa sylvatica, Picea rubens*, and *Pinus rigida*. The third stand, located at 1335 m (4380 feet) in Grayson County (Southern Blue Ridge) is overwhelmingly dominated by *Betula alleghaniensis*, with minor associates of *Acer rubrum* and *Picea rubens*. *Rhododendron maximum* is the dominant shrub, and *Osmunda cinnamomea* the dominant herb, at all three sites. Other species prominent in at least two of the three stands include *Kalmia latifolia, Hamamelis virginiana, Rhododendron viscosum, Rubus hispidus, Viola macloskeyi ssp. pallens, Carex trisperma, Glyceria melicaria, Lycopodium obscurum*, and *Carex intumescens*. *Dalibarda repens* is an abundant herb at the Carroll County (lowest-elevation) site, while *Solidago rugosa, Carex ruthii*, and *Carex baileyi* are common at the Grayson County (highest-elevation) site. Mean species richness ranges from 30 to 46 taxa per 400 m2 (mean = 40).

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species

Global

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Tsuga canadensis*
Tree canopy	Broad-leaved deciduous tree	*Acer rubrum*
Short shrub/sapling	Broad-leaved evergreen tree	*Rhododendron maximum*
Short shrub/sapling	Broad-leaved evergreen shrub	*Kalmia latifolia*, *Leucothoe fontanesiana*
Herb (field)	Graminoid	*Carex gynandra*, *Glyceria melicaria*
Herb (field)	Fern or fern ally	*Osmunda cinnamomea*

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park: *Rhododendron maximum*
Global: *Carex folliculata, Carex ruthii, Carex trisperma, Dalibarda repens, Glyceria melicaria, Lycopodium obscurum, Osmunda cinnamomea, Rhododendron maximum, Rhododendron viscosum, Viola macloskeyi* ssp. *pallens*

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:
Global: *Carex ruthii, Chelone cuthbertii, Helonias bullata*

CONSERVATION STATUS RANK

Global Rank & Reasons: G2 (14-Dec-1998). This community is somewhat more common and secure than herbaceous and shrub-dominated nonalluvial wetlands of the Southern Blue Ridge, most of which are ranked G1. However, this community has been severely impacted by development, conversion to pasture and agriculture, and hydrologic alterations--changes which are concentrated in flat areas along streams in the steep landscapes of the Southern Blue Ridge. Most occurrences are small (less than 5 acres), very few

are unaltered, and almost all have experienced alterations of hydrology, which makes their long-term viability questionable.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Cumberland Gap National Historical Park Comments:
Global Comments: Canopy dominants vary with elevation. Occurrences at lower elevations tend to be dominated by *Acer rubrum*, *Liriodendron tulipifera*, and/or *Nyssa sylvatica*, while examples at higher elevations are usually dominated by *Tsuga canadensis*. This community is naturally rare, due to the scarcity of flat, wet sites in the Blue Ridge Mountains and Cumberland Mountains. Its rarity is also due to anthropogenic factors, being located in accessible, low-elevation sites which are prone to logging and agricultural activities. Most historic occurrences of this community have been destroyed or strongly altered by draining, impoundment, or conversion to pasture. This community extends to a few sites in the Appalachian Plateau of Kentucky, where similar seeps are known, but these lack *Leucothoe fontanesiana* and *Sarracenia purpurea*. Higher elevation bogs exist in the Smokies and other portions of the Blue Ridge [see CEGL007877 and CEGL007697, for example], but they occur in much higher elevations, have a higher proportion of *Carex* spp., and occur within a matrix of spruce-fir or northern hardwood forests.
Global Similar Associations:
- *Tsuga canadensis - (Pinus strobus)* Temporarily Flooded Forest (CEGL007143)

Global Related Concepts:
- *Acer rubrum - Betula alleghaniensis / Rhododendron maximum / Osmunda cinnamomea - Carex trisperma* Forest (Fleming and Coulling 2001) ?
- Eastern Hemlock: 23 (Eyre 1980) B
- Eastern hemlock-red maple-great laurel swamp (CAP pers. comm. 1998) ?
- Hemlock-Hardwood (08) (USFS 1988) ?
- IIE1a. Southern Appalachian Bog Complex (Allard 1990) B
- Swamp Forest-Bog Complex (Typic Subtype) (Schafale 1998a) ?

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: This community exists only in the bottomlands of the Martin's Fork drainage.
Global Range: This community is found in the Southern Blue Ridge and Ridge and Valley from Pennsylvania south to Georgia, ranging west into the Cumberland Mountains and Cumberland Plateau of Kentucky.
Nations: US
States/Provinces: GA, KY, NC, PA, SC, TN, VA:S1
USFS Ecoregions: M221Aa:CCC, M221Ac:CCC, M221Bb:CCP, M221Bf:CCC, M221Cc:CCC, M221Da:CCP, M221Db:CCC, M221Dc:CCC, M221Dd:CCC
Federal Lands: NPS (Cumberland Gap); USFS (Chattahoochee, Cherokee, Daniel Boone?, Jefferson, Nantahala, Pisgah)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots: Adjacent to CUGA.41.
Local Description Authors: R. White
Global Description Authors: K.D. Patterson, mod. G. Fleming and P. Coulling
References: Allard 1990, CAP pers. comm. 1998, Evans 1991, Eyre 1980, Fike 1999, Fleming and Coulling 2001, Fleming et al. 2001, Peet et al. unpubl. data 2002, Schafale 1998a, Schafale and Weakley 1990, Southeastern Ecology Working Group n.d., TDNH unpubl. data, USFS 1988, VDNH 2003, Weakley and Schafale 1994

II. Woodland

II.A.4.N.a. Rounded-crowned temperate or subpolar needle-leaved evergreen woodland

Pinus pungens - (Pinus rigida) Woodland Alliance

Blue Ridge Table Mountain Pine - Pitch Pine Woodland (Typic Type)

***Pinus pungens - Pinus rigida - (Quercus prinus) / Kalmia latifolia - Vaccinium pallidum* Woodland**
Table Mountain Pine - Pitch Pine - (Rock Chestnut Oak) / Mountain Laurel - Hillside Blueberry Woodland
Identifier: CEGL007097

Ecological System(s): Southern Appalachian Montane Pine Forest and Woodland (CES202.331)

ELEMENT CONCEPT

Global Summary: This association includes mostly evergreen woodlands dominated by *Pinus pungens* and/or *Pinus rigida*, occurring over a dense ericaceous shrub stratum, on sharp ridges, mostly above 610 m (2000 feet) elevation in the Southern Blue Ridge. This type is also found in limited areas of the inner Piedmont and Cumberland Mountains. This woodland occurs across a wide elevational range (485-1220 m [1600-4000 feet]), on exposed ridges and upper slopes with southerly and westerly exposures, over thin, excessively drained, nutrient-poor soils, and can be associated with rock outcroppings. Canopy coverage can often approach that of a forest, especially in areas where fire has been excluded and deciduous species have significant coverage. Deciduous species that can be important, particularly in the subcanopy, include *Quercus prinus, Quercus coccinea, Quercus stellata, Nyssa sylvatica, Acer rubrum*, and *Oxydendrum arboreum*. *Pinus virginiana* and *Pinus strobus* can have high coverage and even codominate on some sites. The shrub stratum is dominated by ericaceous species, typically *Kalmia latifolia* and *Leucothoe recurva* in the tall-shrub stratum and *Vaccinium pallidum* as a low shrub. Other shrub species vary with location but include *Vaccinium stamineum, Vaccinium simulatum, Vaccinium pallidum, Vaccinium hirsutum, Vaccinium corymbosum, Rhododendron maximum, Rhododendron minus, Gaylussacia ursina, Gaylussacia baccata, Buckleya distichophylla, Pyrularia pubera*, and *Fothergilla major*. Species commonly found in the sparse herb stratum include *Chimaphila maculata, Galax urceolata, Pteridium aquilinum var. latiusculum, Xerophyllum asphodeloides, Chamaelirium luteum, Comptonia peregrina, Leiophyllum buxifolium, Gaultheria procumbens, Iris verna, Dichanthelium* spp., and *Epigaea repens*, although herbaceous species composition will vary within the range of this community. *Smilax glauca* is a common vine. Without periodic fire, this community will gradually succeed into forests dominated by *Acer rubrum* or *Quercus prinus* and *Quercus coccinea*, except on the most extreme sites, where this vegetation is self-perpetuating. It is thought that woodlands dominated by *Pinus pungens* are associated with more xeric conditions than woodlands dominated by *Pinus pungens* in combination with other tree species.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:
Cumberland Gap National Historical Park Environment: Within the park, this community is found on exposed ridges above 610 m (2000 feet) elevation. In general, these ridges are drier than most oak-dominated ridges due to shallow, rocky soils and have been subject to fire in the past 70 years.
Global Environment: This association is typically found on sharp ridges mostly above 610 m (2000 feet) elevation in the Southern Blue Ridge. This woodland occurs across a wide elevation range from 488 to 1220 m (1600-4000 feet) in the southern Appalachians, on exposed ridges and upper slopes with southerly and westerly exposures, over thin, excessively drained, nutrient-poor soils, and can be associated with rock outcroppings. It is thought that woodlands dominated by *Pinus pungens* are associated with more xeric conditions than woodlands dominated by *Pinus pungens* in combination with other tree species (Zobel 1969, Barden 1977).

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: *Pinus pungens* does not occur within the park, so all examples of this community in the park are dominated by a combination of *Pinus rigida* and *Pinus virginiana*. Within the park, this community varies widely due to the effects of pine bark beetle combined with fire suppression. The beetle has killed off much of the canopy of *Pinus pungens* in the park, and fire suppression has limited reproduction of pine in the park. Therefore, most of the remaining stands of this type within the park have either a very limited pine canopy or a recently killed pine canopy with a very dense understory of *Acer rubrum* that is quickly overtopping all other vegetation. *Quercus prinus* is often a component of the canopy and understory as well. In the understory layer, *Oxydendrum arboreum* and *Nyssa sylvatica* are sparse to dense. In the shrub layer, *Vaccinium pallidum* is usually very common. Other shrubs include *Vaccinium* spp. and *Kalmia latifolia*. The herbaceous layer is very sparse. The most common herbs are usually *Chimaphila maculata, Galax urceolata, Pteridium aquilinum, Gaultheria procumbens*, and *Epigaea repens*, although herbaceous species composition will vary within the range of this community. *Smilax glauca* is a common vine.

Global Vegetation: These mostly evergreen woodlands are characteristically dominated by *Pinus pungens* and/or *Pinus rigida*, occurring over a dense ericaceous shrub stratum. Deciduous species that can be important, particularly in the subcanopy, include *Quercus prinus, Quercus coccinea, Quercus stellata* (in lower elevation occurrences), *Nyssa sylvatica, Acer rubrum,* and *Oxydendrum arboreum*. *Pinus virginiana* and *Pinus strobus* can have high coverage and even codominate on some sites. The shrub stratum is dominated by ericaceous species, typically *Kalmia latifolia* and *Leucothoe recurva* in the tall-shrub stratum and *Vaccinium pallidum* as a low shrub. Other shrub species vary with location, but include *Vaccinium stamineum, Vaccinium simulatum, Vaccinium pallidum, Vaccinium hirsutum, Vaccinium corymbosum, Rhododendron maximum, Rhododendron minus, Gaylussacia ursina, Gaylussacia baccata, Buckleya distichophylla, Pyrularia pubera, Castanea dentata, Castanea pumila,* and *Fothergilla major*. Species commonly found in the sparse herb stratum include *Chimaphila maculata, Galax urceolata, Pteridium aquilinum var. latiusculum, Xerophyllum asphodeloides, Chamaelirium luteum, Comptonia peregrina, Leiophyllum buxifolium, Gaultheria procumbens, Iris verna, Melampyrum lineare, Dichanthelium* spp., and *Epigaea repens*, although herbaceous species composition will vary within the range of this community. *Smilax glauca* is a common vine.

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Pinus rigida*
Tree subcanopy	Broad-leaved deciduous tree	*Acer rubrum, Nyssa sylvatica, Oxydendrum arboreum, Quercus prinus*
Tall shrub/sapling	Broad-leaved evergreen shrub	*Kalmia latifolia*
Short shrub/sapling	Broad-leaved deciduous shrub	*Vaccinium pallidum*

Global

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Pinus pungens, Pinus rigida*
Tree subcanopy	Broad-leaved deciduous tree	*Acer rubrum, Nyssa sylvatica, Oxydendrum arboreum, Quercus prinus*
Tall shrub/sapling	Broad-leaved evergreen shrub	*Kalmia latifolia*
Short shrub/sapling	Broad-leaved deciduous shrub	*Vaccinium pallidum*
Herb (field)	Dwarf-shrub	*Galax urceolata*

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park:

Global: *Comptonia peregrina, Epigaea repens, Fothergilla major, Galax urceolata, Gaultheria procumbens, Leiophyllum buxifolium, Pinus pungens, Xerophyllum asphodeloides*

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:

Global: *Buckleya distichophylla, Fothergilla major, Meleagris gallopavo, Pieris floribunda, Robinia hispida* var. *fertilis, Robinia hispida* var. *rosea, Robinia viscosa* var. *viscosa, Tamiasciurus hudsonicus, Vaccinium hirsutum*

CONSERVATION STATUS RANK

Global Rank & Reasons: G3 (30-Apr-1998). This community is endemic to the southern Appalachian Mountains where it is maintained by periodic fire or extreme site conditions. Recent studies show that acreage of this community has decreased due to fire suppression (Turrill and Buckner 1995) and that many remaining examples have substantial hardwood invasion. Lightning-set and high-intensity controlled burns are necessary to maintain and re-establish this community type. In addition, recent pine beetle outbreaks have killed off large areas of this community type in the past five years (1998-2003) in the Southeast. Due to this, the global rank may soon need to be adjusted to G2.

CLASSIFICATION

Status: Standard
Classification Confidence: 1 - Strong
Cumberland Gap National Historical Park Comments:
Global Comments: Other communities with *Pinus pungens* occur in central Pennsylvania and in Virginia. These northern types are thought to have a different species composition and geology than the forests described here. Species associated with *Pinus pungens* in the northern part of its range that do not occur in this community include *Quercus ilicifolia*, *Viburnum acerifolium*, and *Vaccinium angustifolium*. [See *Pinus (pungens, rigida) / Quercus ilicifolia / Gaylussacia baccata* Woodland (CEGL004996).]
Global Similar Associations:

- *Pinus (pungens, rigida) / Quercus ilicifolia / Gaylussacia baccata* Woodland (CEGL004996)--is more northern and with *Quercus ilicifolia*.
- *Pinus rigida - (Pinus pungens) / Rhododendron catawbiense - Kalmia latifolia / Galax urceolata* Woodland (CEGL004985)--occurs at higher elevations (1220-1555 m [4000-5100 feet) and usually includes *Rhododendron catawbiense*.
- *Pinus virginiana - Pinus (rigida, echinata) - (Quercus prinus) / Vaccinium pallidum* Forest (CEGL007119)

Global Related Concepts:

- IA7b. Xeric Pitch Pine/Table Mountain Pine Ridge Forest (Allard 1990) B
- Ridge Pine Heath (Typic Subtype) (Schafale 1998b) ?
- Table Mountain Pine type (Golden 1974) ?
- Xeric Pine Forest (McLeod 1988) ?

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: This community occurs throughout the park on heavily exposed south-facing slopes with shallow soils. It is most common in the southern end of the park.
Global Range: This community ranges throughout the Southern Blue Ridge and Cumberland Mountains, from southwestern Virginia and southeastern Kentucky, south through western North Carolina and eastern Tennessee, into northeastern Georgia and northwestern South Carolina.
Nations: US
States/Provinces: GA, KY, NC, SC, TN, VA
USFS Ecoregions: M221Aa:CCP, M221Ab:CCP, M221Ac:CCC, M221Da:CCC, M221Dc:CCC, M221Dd:CCC
Federal Lands: NPS (Blue Ridge Parkway, Carl Sandburg Home, Cumberland Gap, Great Smoky Mountains); USFS (Chattahoochee, Cherokee, Nantahala, Pisgah, Sumter)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots: CUGA.79, CUGA.93, CUGA.98.
Local Description Authors: R. White
Global Description Authors: M.P. Schafale and A.S. Weakley
References: Allard 1990, Barden 1977, Golden 1974, Golden 1981, Hedlin et al. 1981, McLeod 1988, NatureServe Ecology - Southeastern U.S. unpubl. data, Nelson 1986, Newell and Peet 1995, Peet et al. unpubl. data 2002, Pyne 1994, Racine 1966, Schafale 1998b, Schafale and Weakley 1990, Southeastern Ecology Working Group n.d., TDNH unpubl. data, Turrill and Buckner 1995, Wharton 1978, Whittaker

1956, Williams 1991, Williams and Johnson 1990, Williams and Johnson 1992, Williams et al. 1990a, Zobel 1969

Pinus rigida Woodland Alliance

Hi Lewis Pitch Pine Barrens

***Pinus rigida / Schizachyrium scoparium - Sorghastrum nutans - Baptisia tinctoria* Woodland**
Pitch Pine / Little Bluestem - Yellow Indiangrass - Honesty-weed Woodland
Identifier: CEGL003617

Ecological System(s): Southern Appalachian Montane Pine Forest and Woodland (CES202.331)

ELEMENT CONCEPT

Global Summary: This association includes dry woodlands of the Cumberlands of Kentucky and possibly Virginia on steep, south- to southwest-facing slopes. This community is known from the Kentucky side of Pine Mountain, in the Cumberland Mountains (on the Virginia-Kentucky stateline). It has a canopy strongly dominated by *Pinus rigida*, also with some *Pinus virginiana* (around rock outcrops) and scattered *Quercus prinus* and sometimes *Quercus marilandica*. Canopy coverage varies from 10-80%. Scattered shrubs are present. *Schizachyrium scoparium* and *Sorghastrum nutans* dominate the herb layer, and *Baptisia tinctoria* is also very abundant. This vegetation is fire-maintained, but also strongly influenced by dry conditions.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:
Cumberland Gap National Historical Park Environment: Within the park, this community occurs in very isolated patches on south-facing slopes with very shallow soils and exposed sandstone bedrock.
Global Environment: This association includes dry woodlands of the Cumberlands of Kentucky and possibly Virginia on steep, south- to southwest-facing slopes. It is known from the Kentucky side of Pine Mountain, in the Cumberland Mountains (on the Virginia-Kentucky stateline). This vegetation is fire-maintained, but also strongly influenced by dry conditions.

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: Within the park, this community is extremely rare and declining due to heavy pine beetle damage. The lone example documented from the park contains large-diameter dead *Pinus rigida* with a remaining cohort of live canopy *Quercus prinus* trees. *Oxydendrum arboreum* dominates the subcanopy along with *Quercus prinus* and *Quercus marilandica*. Short shrubs such as *Vaccinium pallidum* and *Gaylussacia baccata* are common. In the herbaceous layer, species include *Danthonia spicata, Schizachyrium scoparium, Sorghastrum nutans, Tephrosia virginiana, Pityopsis graminifolia, Coreopsis major*, and other herbaceous species associated with barrens.
Global Vegetation: The canopy is strongly dominated by *Pinus rigida*, also with some *Pinus virginiana* (around rock outcrops) and scattered *Quercus prinus* and sometimes *Quercus marilandica*. Canopy coverage varies from 10-80%. Scattered shrubs are present. *Schizachyrium scoparium* and *Sorghastrum nutans* dominate the herb layer, and *Baptisia tinctoria* is also very abundant. Other common species may include *Danthonia spicata, Schizachyrium scoparium, Sorghastrum nutans, Tephrosia virginiana, Pityopsis graminifolia, Coreopsis major*, and other herbaceous species associated with barrens. Areas of heavy pine beetle damage may have only standing dead *Pinus rigida*.

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Pinus rigida*

Global

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Pinus rigida*

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park: *Pinus rigida*, *Quercus prinus, Sorghastrum nutans*, *Tephrosia virginiana*
Global: *Pinus rigida*, *Quercus prinus, Sorghastrum nutans*

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:
Global: *Aureolaria pedicularia* var. *austromontana*

CONSERVATION STATUS RANK

Global Rank & Reasons: G2? (4-Oct-2004). This association is limited to a specific aspect in a small area near the Kentucky-Virginia stateline. Threats include pine beetle damage and succession to hardwood (i.e., *Acer rubrum*) dominance. Areas not protected could be developed if accessible. ATV traffic could threaten examples as well.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Cumberland Gap National Historical Park Comments:
Global Comments: The highest quality occurrence known is the Hi Lewis Pine Barrens. Marc Evans argues that this is a mosaic of evergreen and mixed patches and may be best considered a mixed woodland.
Global Similar Associations:

- *Pinus echinata - Quercus prinus - Quercus stellata / Vaccinium pallidum / Pityopsis graminifolia* var. *latifolia* Woodland (CEGL004445)--mixed woodland of the Virginia side of Pine Mountain.
- *Schizachyrium scoparium - Andropogon (gyrans, ternarius, virginicus)* Herbaceous Vegetation (CEGL007707)--a related type not dominated by Eastern red-cedar.

Global Related Concepts:

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: This community appears to only occur on south-facing slopes in the southern end of the park near the border between Kentucky and Virginia.
Global Range: This community is known from the Kentucky side of Pine Mountain, in the Cumberland Mountains (on the Virginia-Kentucky stateline).
Nations: US
States/Provinces: KY, VA?
USFS Ecoregions: M221Ce:CCC
Federal Lands: NPS (Cumberland Gap); USFS (Jefferson?)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots: CUGA.46.
Local Description Authors: R. White
Global Description Authors: R. White
References: Evans 1991, Southeastern Ecology Working Group n.d.

II.B.2.N.a. Cold-deciduous woodland

Fraxinus americana - Carya glabra - (Juniperus virginiana) Woodland Alliance

Dry Calcareous Forest/Woodland (White Ash - Shagbark Hickory Type)

***Fraxinus americana - Carya ovata / Frangula caroliniana / Helianthus hirsutus* Woodland**

White Ash - Shagbark Hickory / Carolina Buckthorn / Whiskered Sunflower Woodland
Identifier: CEGL008458

Ecological System(s): Central Appalachian Alkaline Glade and Woodland (CES202.602)

ELEMENT CONCEPT

Global Summary: This community type is currently known only from a narrow, midslope band of Greenbrier limestone on Little Stone Mountain in Wise County, Virginia, and a narrow band of limestone along the Virginia side of Cumberland Gap National Historical Park. The stand in Wise County, VA and associated limestone outcrops extend for more than 2 km and cover at least 100 ha (240 acres). It is an open to very open forest that locally approaches woodland physiognomy. Maximum tree heights are approximately 23 m, but the majority of trees are <20 m in most areas. The mean cover of canopy and subcanopy trees combined is 60-70%. *Fraxinus americana*, *Carya ovata*, and *Quercus rubra* are the most constant and abundant canopy trees. *Carya ovalis* is a frequent canopy associate, while *Acer saccharum var. saccharum* and *Quercus alba* are infrequent but locally important. The former is also present in the 6- to 10-m tall understory stratum, along with *Ulmus rubra, Juniperus virginiana var. virginiana*, and representatives of the other canopy species. *Cercis canadensis var. canadensis* generally dominates the shrub layer, with *Frangula caroliniana, Cornus florida*, and *Celtis occidentalis* as more-or-less constant and common components. *Ostrya virginiana* may also be present. *Toxicodendron radicans* and *Parthenocissus quinquefolia* are common woody vines that frequently reach into the shrub stratum. The herbaceous layer is variable. *Polymnia canadensis, Helianthus hirsutus, Helianthus microcephalus*, and *Salvia urticifolia* are constant and relatively abundant herbs that assumes great dominance over some areas. *Diarrhena americana* is inconstant but locally dominates bouldery slopes in massive colonies. Very locally, on the most xeric and rocky microtopographic positions, tree cover is open enough for light-demanding plants more characteristic of "barrens" or "glades" to thrive. Included in this group of localized species are *Andropogon gerardii, Oligoneuron rigidum var. rigidum (= Solidago rigida ssp. rigida), Liatris aspera var. intermedia, Blephilia ciliata, Polygonum scandens var. cristatum*, and *Solidago speciosa var. speciosa*. Sites are similar to those occupied by *Acer saccharum - Quercus muehlenbergii / Cercis canadensis* Forest (CEGL006017) but have a higher mean elevation (688 m [2257 feet]), a more south-facing (versus southwest-facing) aspect, and soils with much higher mean calcium levels (mean = 3523 ppm). Soil moisture regime is subxeric, and habitats have high surficial cover of bedrock outcrops, boulders, and stones (mean cover of all three classes combined = 39%).

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:

Cumberland Gap National Historical Park Environment: Within the park, this community occurs on a narrow band of limestone on the midslope of the Virginia side of the park. It appears to extend from near the Tennessee border to the northeastern corner of the park and beyond. The community ranges from 610-855 m (2000-2800 feet) in elevation and tends to occur on very steep south- to southwest-facing slopes just above or below cliffs, caves, or other high-relief features. The soils tend to be very rocky, with large to mid-sized boulders commonly poking above ground.

Global Environment: This community type is currently known only from a narrow, midslope band of Greenbrier limestone on the south flank of Little Stone Mountain, just northeast of Big Stone Gap in Wise County, Virginia. The stand and associated limestone outcrops extend for more than 2 km and cover at least 100 ha (240 acres). Sites are similar to those occupied by the *Quercus muehlenbergii - Acer (nigrum, saccharum var. saccharum) / Ostrya virginiana / Senecio obovatus* Forest (Fleming 1999 type 3.1 = CEGL006017) but have a higher mean elevation (688 m [2257 feet]), a more south-facing (versus southwest-facing) aspect, and soils with much higher mean calcium levels (mean = 3523 ppm). Soil moisture regime is subxeric, and habitats have high surficial cover of bedrock outcrops, boulders, and stones (mean cover of all three classes combined = 39%). Other forests and woodlands characterized by a general abundance of *Fraxinus* and *Carya* have been documented in Virginia primarily on mafic substrates such as greenstone, amphibolite, and diabase, and rarely on granitic rock high in base status (Fleming 1993, Rawinski et al. 1996, Coulling and Rawinski 1999, VDNH unpubl. data).

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: *Fraxinus americana, Carya ovata*, and *Quercus rubra* are the most constant and abundant canopy trees. *Carya ovalis* is a frequent canopy associate In the

6- to 10-m tall understory stratum, *Ostrya virginiana* is most common, along with *Ulmus rubra*, and *Juniperus virginiana var. virginiana*. *Cercis canadensis var. canadensis* generally dominates the shrub layer, with *Frangula caroliniana, Cornus florida*, and *Celtis occidentalis* as more-or-less constant and common components. *Ostrya virginiana* dominates the shrub layers of many plots as well. *Toxicodendron radicans* and *Parthenocissus quinquefolia* are common woody vines that frequently reach into the shrub stratum, and *Rhus aromatica* can often be very common as well. The herbaceous layer (mean stratum cover = 50%) is variable. *Polymnia canadensis, Helianthus hirsutus, Helianthus microcephalus*, and *Salvia urticifolia* are constant and relatively abundant herbs that assume great dominance over some areas.
Global Vegetation: *Fraxinus americana, Carya ovata*, and *Quercus rubra* are the most constant and abundant canopy trees. *Carya ovalis* is a frequent canopy associate, while *Acer saccharum var. saccharum* and *Quercus alba* are infrequent but locally important. The former is also present in the 6- to 10-m tall understory stratum, along with *Ulmus rubra, Juniperus virginiana var. virginiana*, and representatives of the other canopy species. *Cercis canadensis var. canadensis* generally dominates the shrub layer, with *Frangula caroliniana, Cornus florida*, and *Celtis occidentalis* as more-or-less constant and common components. *Ostrya virginiana* dominates the shrub layer of one plot, but observations indicate that it is absent from large areas of the landscape. *Toxicodendron radicans* and *Parthenocissus quinquefolia* are common woody vines that frequently reach into the shrub stratum. The herbaceous layer (mean stratum cover = 63%) is variable. *Polymnia canadensis, Helianthus hirsutus, Helianthus microcephalus*, and *Salvia urticifolia* are constant and relatively abundant herbs that assume great dominance over some areas. *Diarrhena americana* is inconstant but locally dominates bouldery slopes in massive colonies. Constant (?67% constancy) but relatively low cover, characteristic herbs include *Agrimonia rostellata, Doellingeria infirma (= Aster infirmus), Symphyotrichum patens var. patens (= Aster patens var. patens), Symphyotrichum undulatum (= Aster undulatus), Brachyelytrum erectum, Bromus pubescens, Desmodium glutinosum, Dichanthelium boscii, Elymus hystrix, Erigeron pulchellus var. pulchellus, Heuchera longiflora, Lysimachia tonsa, Muhlenbergia sobolifera, Muhlenbergia tenuiflora, Polygonatum biflorum, Packera obovata (= Senecio obovatus), Solidago caesia, Solidago ulmifolia var. ulmifolia*, and *Zizia aptera*. Very locally, on the most xeric and rocky microtopographic positions, tree cover is open enough for light-demanding plants more characteristic of "barrens" or "glades" to thrive. Included in this group of localized species are *Andropogon gerardii, Oligoneuron rigidum var. rigidum (= Solidago rigida ssp. rigida), Liatris aspera var. intermedia, Blephilia ciliata, Polygonum scandens var. cristatum*, and *Solidago speciosa var. speciosa*.

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Fraxinus americana*
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Ostrya virginiana*
Herb (field)	Forb	*Helianthus microcephalus, Salvia urticifolia*

Global

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Fraxinus americana*

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park: *Carya ovata, Frangula caroliniana, Fraxinus americana, Helianthus microcephalus, Ostrya virginiana, Polymnia canadensis, Quercus rubra, Salvia urticifolia, Symphyotrichum patens*
Global: *Carya ovata, Diarrhena americana, Erigeron pulchellus, Frangula caroliniana, Fraxinus americana, Helianthus hirsutus, Helianthus microcephalus, Heuchera longiflora, Lysimachia tonsa, Polymnia canadensis, Solidago ulmifolia, Symphyotrichum patens, Symphyotrichum pratense*

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:
Global: *Cuscuta coryli, Desmodium cuspidatum, Oligoneuron rigidum*

CONSERVATION STATUS RANK

Global Rank & Reasons: G1? (11-Sep-2000). Currently, this vegetation type is known only from two narrow, midslope bands of limestone in Virginia: one on the south flank of Little Stone Mountain, just northeast of Big Stone Gap in Wise County, Virginia (in the Clinch Ranger District of the Jefferson National Forest), and one on the Virginia side of Cumberland Gap National Historical Park. The stands and associated limestone outcrops in Wise County extend for more than 2 km and cover at least 100 ha (240 acres). Productivity of timber is presumably very low in this environment because of dry and rocky conditions. This community is inherently rare because of its unusual geology and topographic position. It appears to be extremely rare in Virginia, but its global status is harder to assess (Fleming 1999).

CLASSIFICATION

Status: Standard

Classification Confidence:

Cumberland Gap National Historical Park Comments:

Global Comments: This type is environmentally similar to *Quercus muehlenbergii - Acer (nigrum, saccharum var. saccharum) / Ostrya virginiana / Senecio obovatus* Forest (Fleming 1999 type 3.1, = *Acer saccharum - Quercus muehlenbergii / Cercis canadensis* Forest (CEGL006017)) but has a very different canopy composition, as well as some significant contrasts in lower stratum floristics. Most noteworthy is the complete or almost complete absence of *Quercus muehlenbergii* (chinquapin oak), normally a dominant tree of dry limestone forests and woodlands, and the relative infrequence of *Acer saccharum var. saccharum*. *Fraxinus americana* and *Carya* spp. are much more abundant in the woody composition of *Fraxinus americana - Carya ovata / Frangula caroliniana / Helianthus hirsutus* Woodland (CEGL008458) (= *sensu* Fleming 1999). Other forests and woodlands characterized by a general abundance of *Fraxinus* and *Carya* have been documented in Virginia primarily on mafic substrates such as greenstone, amphibolite, and diabase, and rarely on granitic rock high in base status (Fleming 1993, Rawinski et al. 1996, Coulling and Rawinski 1999, VDNH unpubl. data). The dominant herbs *Polymnia canadensis* and *Diarrhena americana* are inconstant, low-cover plants in plot-sampled stands of CEGL006017 (Fleming 1999 type 3.1). The constancy and local abundance of *Frangula caroliniana, Helianthus hirsutus, Heuchera longiflora, Lysimachia tonsa*, and other species with Virginia distributions confined to the extreme southwestern mountains also distinguish CEGL008458 (Fleming 1999 type 3.2) from other vegetation types. No recent anthropogenic disturbances were noted in the three sample plots, which were positioned to capture major compositional/environmental variations observed within the large stand on Little Stone Mountain. It was assumed that this stand was selectively logged in the distant past. The productivity of timber, however, is almost certainly quite low because of the dry, rocky site conditions. Despite these constraints, at least portions of the stand appear to be quite old and mature; at least two *Juniperus virginiana* individuals with diameters around 60 cm were observed, and one was aged by increment coring at >150 years. Minor wind or ice damage, drought stresses (wilting), and a fire scar were observed in two of the plots. Because this community contains scattered large hardwoods and is adjacent to more productive mesic forests both upslope and downslope, logging remains a threat to the occurrence. Although some potential habitat in southwestern Virginia remains to be explored, *Fraxinus americana - Carya ovata / Frangula caroliniana / Helianthus hirsutus* Woodland (CEGL008458) (= *sensu* Fleming 1999 type 3.2) appears to be extremely rare in Virginia. Its global status and the robustness of its classification are much harder to assess given the lack of known replication and the lack of detailed information on similar communities within its likely geographic range. Even though plot locations were selected to capture the maximal observed variation in composition on Little Stone Mountain, the three plots consistently clustered as a discrete unit resolved at an early branching level in dendrograms using nine different combinations of clustering strategies and distance measures. As a result of this and additional statistical analyses, it appears that this type is satisfactorily differentiated from *Quercus muehlenbergii - Acer (nigrum, saccharum var. saccharum) / Ostrya virginiana / Senecio obovatus* Forest (Fleming 1999 type 3.1, = *Acer saccharum - Quercus muehlenbergii / Cercis canadensis* Forest (CEGL006017)) in Virginia. It may, however, be more similar to *Quercus muehlenbergii - Acer saccharum* forests that are mostly distributed west and southwest of Virginia. Even though *Carya* spp. are not important in plot-sampled Virginia forests characterized by *Quercus muehlenbergii*, they are important in such communities in Tennessee, Kentucky, and the Ozark Mountains, along with some of the previously mentioned herbaceous species that reach a range limit in southwestern Virginia (Campbell and Meijer 1989, Bryant et al. 1993, Bowen et al. 1995). In a study of woody vegetation in the Tennessee Central Basin, Crites and

Clebsch (1986) found communities sorted along a topographic-moisture gradient. A "*Carya - Juniperus - Quercus* Community" that may be similar to *Fraxinus americana - Carya ovata / Frangula caroliniana / Helianthus hirsutus* Forest (*sensu* Fleming 1999) was classified from subxeric upland habitats. The dominants of the Tennessee community (based on the importance values of woody species >2.5 cm dbh) were *Fraxinus americana*, either *Carya ovata* or *Carya glabra* (pignut hickory), and *Juniperus virginiana*. *Fraxinus americana* was considered a "local successional species."

Global Similar Associations:

- *Acer saccharum - Quercus muehlenbergii / Cercis canadensis* Forest (CEGL006017)
- *Liriodendron tulipifera - Tilia americana* var. *heterophylla - Aesculus flava - Acer saccharum / Magnolia tripetala* Forest (CEGL005222)

Global Related Concepts:

- *Fraxinus americana - Carya ovata / Frangula caroliniana / Helianthus hirsutus - Polymnia canadensis* Woodland (Fleming and Coulling 2001) =
- *Fraxinus americana - Carya ovata / Frangula caroliniana / Helianthus hirsutus* Forest (Fleming 1999)

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: Within the park, this community follows a narrow midslope band of limestone along the Virginia side slope and into Tennessee. It does not occur in Kentucky.

Global Range: Currently, this vegetation type is known only from two narrow, midslope bands of limestone: one on the south flank of Little Stone Mountain, just northeast of Big Stone Gap in Wise County, Virginia, and one on the Virginia side of Cumberland Gap National Historical Park.

Nations: US

States/Provinces: VA:S1

USFS Ecoregions: M221Ca:CC?, M221Cb:CC?, M221Cc:CC?, M221Ce:CCC

Federal Lands: NPS (Cumberland Gap); USFS (Jefferson)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:

Cumberland Gap National Historical Park Plots: CUGA.08, CUGA.35, CUGA.55, CUGA.71, CUGA.75, CUGA.91.

Local Description Authors: R. White

Global Description Authors: G. Fleming and P. Coulling, mod. R. White

References: Bowen et al. 1995, Bryant et al. 1993, Campbell and Meijer 1989, Coulling and Rawinski 1999, Crites and Clebsch 1986, Fleming 1993, Fleming 1999, Fleming and Coulling 2001, Fleming et al. 2001, Rawinski et al. 1996, Southeastern Ecology Working Group n.d., VDNH 2003, VDNH unpubl. data

III. Shrubland

III.A.2.N.b. Hemi-sclerophyllous temperate broad-leaved evergreen shrubland

Rhododendron (catawbiense, carolinianum) - Kalmia latifolia Shrubland Alliance

Southern Appalachian Mountain Laurel Bald

***Kalmia latifolia - Rhododendron catawbiense - (Gaylussacia baccata, Pieris floribunda, Vaccinium corymbosum)* Shrubland**

Mountain Laurel - Catawba Rhododendron - (Black Huckleberry, Mountain Fetterbush, Highbush Blueberry)

Shrubland

Identifier: CEGL003814

Ecological System(s): Southern Appalachian Grass and Shrub Bald (CES202.294)

ELEMENT CONCEPT

Global Summary: This community occurs in the mountains of Georgia, North Carolina, and Tennessee, on ridges and steep, rocky slopes at intermediate elevations (1220-1524 m [4000-5000 feet]). It also occurs in very small patches at elevations higher than 1035 m (3400 feet) in the Cumberland Mountains along the Virginia-Kentucky border. It is a mostly evergreen shrubland, although deciduous shrubs may be present and even locally dominant. Shrubs form a dense, sometimes impenetrable thicket, 1-4 m tall. The most typical shrub dominants are *Kalmia latifolia* and *Rhododendron catawbiense*, although *Gaylussacia baccata, Leiophyllum buxifolium, Pieris floribunda, Rhododendron carolinianum, Rhododendron maximum*, and *Vaccinium corymbosum* are dominant or have high coverage in some occurrences. Other shrubs include *Photinia melanocarpa (= Aronia melanocarpa), Clethra acuminata, Ilex montana, Vaccinium stamineum, Leucothoe recurva*, and *Viburnum nudum var. cassinoides*. Small openings in the shrub canopy are dominated by lichens, bare rock or herbs, with some occurrences having up to 60% exposed rock. Herb cover beneath the shrub canopy is absent or very sparse (<5%) and may include *Galax urceolata, Gaultheria procumbens, Goodyera pubescens, Melampyrum lineare, Mitchella repens*, and *Pteridium aquilinum*. *Smilax rotundifolia* is a common vine. Small, scattered trees are possible (*Acer rubrum, Amelanchier laevis, Betula alleghaniensis, Ilex montana, Magnolia fraseri, Nyssa sylvatica, Oxydendrum arboreum, Picea rubens, Prunus pensylvanica, Quercus rubra*, and *Sorbus americana*) and may be more typical of shrublands resulting from intense fires on less exposed sites. Windfall, landslides, and small, localized, lightning-caused fires are important in the establishment and maintenance of these shrublands. This community can result from secondary succession after fire or logging or can occur as a topo-edaphic climax on steep or exposed sites.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:

Cumberland Gap National Historical Park Environment: Within the park, this community occurs in very isolated patches at the highest elevations. It occurs over shallow soils on ridgetops that are prone to windfall, fire, and drought.

Global Environment: This community occurs in the mountains of Georgia, North Carolina, and Tennessee on ridges and steep, rocky slopes at intermediate elevations (1220-1524 m [4000-5000 feet]). It also occurs in very small patches at elevations higher than 1035 m (3400 feet) in the Cumberland Mountains along the Virginia-Kentucky border.

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: Within the park, this community may have an overarching tree canopy of *Oxydendrum arboreum, Acer rubrum*, and *Nyssa sylvatica*, but it is mostly composed of shrubs in the tall- and short-shrub layers. The most common shrub species are *Rhododendron catawbiense* and *Kalmia latifolia*, though other shrubs may be present. The herbaceous layer is sparse (cover <5%). This type is distinguished from *Kalmia latifolia - Gaylussacia (baccata, brachycera)* Cumberland Shrubland (CEGL008470) by the presence of *Rhododendron catawbiense* and by the relative lack of stunted pine trees.

Global Vegetation: This association typically manifests as a mostly evergreen shrubland, although deciduous shrubs may be present and even locally dominant. These shrubs form a dense, sometimes impenetrable thicket, 1-4 m tall. The most typical shrub dominants are *Kalmia latifolia* and *Rhododendron catawbiense*, although *Gaylussacia baccata, Leiophyllum buxifolium, Pieris floribunda, Rhododendron carolinianum, Rhododendron maximum*, and *Vaccinium corymbosum* are dominant or have high coverage in some occurrences. Other shrubs include *Photinia melanocarpa (= Aronia melanocarpa), Clethra acuminata, Ilex montana, Vaccinium simulatum, Vaccinium stamineum, Leucothoe recurva*, and *Viburnum nudum var. cassinoides*. Small openings in the shrub canopy are dominated by lichens, bare rock or herbs, with some occurrences having up to 60% exposed rock. Herb cover beneath the shrub canopy is absent or very sparse (<5%) and may include *Galax urceolata, Gaultheria procumbens, Goodyera pubescens, Melampyrum lineare, Mitchella repens*, and *Pteridium aquilinum*. *Smilax rotundifolia* is a common vine. Small, scattered trees are possible (*Acer rubrum, Amelanchier laevis, Betula alleghaniensis, Ilex montana, Magnolia fraseri, Nyssa sylvatica, Oxydendrum arboreum, Prunus pensylvanica, Picea rubens, Quercus rubra*, and *Sorbus americana*) and may be more typical of shrublands resulting from intense fires on less exposed sites.

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species
Shrub/sapling (tall & short)	Broad-leaved evergreen shrub	*Rhododendron catawbiense*

Global

Stratum	Lifeform	Species

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park: *Kalmia latifolia, Rhododendron catawbiense*
Global: *Kalmia latifolia, Rhododendron catawbiense*

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:
Global: *Glyceria nubigena*

CONSERVATION STATUS RANK

Global Rank & Reasons: G2G3 (15-Feb-1999). This is a locally common heath bald type in parts of the Southern Blue Ridge and Cumberland Mountains. Some occurrences represent a topo-edaphic climax, while other areas require fire to maintain the physiognomy. Fire-maintained occurrences are threatened by general fire prevention in the mountains.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Cumberland Gap National Historical Park Comments:
Global Comments: These shrublands possibly have a broader distribution and typically occur at lower elevations than other montane shrublands in the *Rhododendron (catawbiense, carolinianum) - Kalmia latifolia* Shrubland Alliance (A.744). In the Southern Blue Ridge, this shrubland generally occurs at elevations over 1200 meters (4000 feet) and grades into forests dominated by *Quercus coccinea, Pinus rigida, Pinus pungens*, and/or *Quercus rubra*. High-elevation occurrences may be compositionally similar to another heath bald community, *Rhododendron carolinianum - Rhododendron catawbiense - Leiophyllum buxifolium* Shrubland (CEGL007876).
Global Similar Associations:

- *Rhododendron carolinianum - Rhododendron catawbiense - Leiophyllum buxifolium* Shrubland (CEGL007876)

Global Related Concepts:

- Blue Ridge Shrub Bald (Ambrose 1990a) B
- Heath Bald (Pyne 1994) B
- Heath Bald (Blueberry Subtype) (Schafale 1998b) ?
- Heath Bald (Low Elevation Subtype) (Schafale 1998b) ?
- IC4a. Heath Bald Shrubland (Allard 1990) B
- Mountain laurel-great laurel summits (CAP pers. comm. 1998) ?

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: This community occurs only on the highest elevations above White Rocks within the park.
Global Range: This community is found in the Blue Ridge Mountains of Georgia, North Carolina, and Tennessee. Examples in the Cumberlands of Kentucky are rare and of limited extent.
Nations: US
States/Provinces: GA, KY, NC, TN
USFS Ecoregions: M221Aa:CPP, M221Be:CPP, M221Dc:CCC, M221Dd:CCC
Federal Lands: NPS (Blue Ridge Parkway, Cumberland Gap, Great Smoky Mountains); USFS (Chattahoochee, Cherokee, Nantahala)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots: CUGA.63.
Local Description Authors: R. White
Global Description Authors: K.D. Patterson, mod. T. Govus and R. White
References: Allard 1990, Ambrose 1990a, CAP pers. comm. 1998, NatureServe Ecology - Southeastern U.S. unpubl. data, Peet et al. unpubl. data 2002, Pyne 1994, Risk 1993, Schafale 1998b, Schafale 2002, Schafale and Weakley 1990, Southeastern Ecology Working Group n.d., TDNH unpubl. data

III.B.2.N.a. Temperate cold-deciduous shrubland

Pueraria montana Vine-Shrubland Alliance

Kudzu Vineland

***Pueraria montana* var. *lobata* Vine-Shrubland**
Kudzu Vine-Shrubland
Identifier: CEGL003882

Ecological System(s):

ELEMENT CONCEPT

Global Summary: This vine-dominated vegetation is dominated by *Pueraria montana var. lobata*, a fast-growing vine native to Asia. The species was introduced into the United States in 1885, primarily as an ornamental and as a potential source for cattle forage. It was subsequently widely used for erosion control in the southeastern United States. This association occupies a variety of sites throughout most physiographic provinces in the Southeast, ranging in size from less than a hectare to 5-10 hectares or more. It chokes out existing vegetation. Edges of examples of this vegetation may consist of small to large trees in the process of being overwhelmed by kudzu. More than 2 million acres of forest land in Alabama, Georgia, Mississippi, Tennessee, North Carolina, and South Carolina are estimated to be infested with kudzu. This association is also known to occur north to central Kentucky, Virginia, and Maryland, and as far west as eastern Texas and Oklahoma.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:
Cumberland Gap National Historical Park Environment: This community may not occur within the official park boundary, but is common just outside the park on the slopes around Cumberland Gap, TN, where it appears to have been planted to control erosion caused by the steep slopes of the railroad grade.
Global Environment: The association occupies a variety of sites throughout most physiographic provinces in the southeastern U.S., with examples ranging in size from less than one hectare to 5-10 hectares or more. It chokes out existing vegetation. Edges of examples of this vegetation may consist of small to large trees in the process of being overwhelmed by kudzu.

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: This community is dominated exclusively by *Pueraria montana var. lobata* where it is present, although newly colonized areas may still have some live canopy trees that may not have been overtopped yet.
Global Vegetation: This vine-dominated vegetation is dominated by *Pueraria montana var. lobata*, a fast-growing vine native to Asia.

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species
Shrub/sapling (tall & short)	Vine/Liana	*Pueraria montana* var. *lobata*

Global

Stratum	Lifeform	Species
Shrub/sapling (tall & short)	Vine/Liana	*Pueraria montana* var. *lobata*

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park: *Pueraria montana* var. *lobata*
Global: *Pueraria montana* var. *lobata*

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:
Global:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (invasive) (24-May-2000). This vegetation is dominated by an exotic species, is of anthropogenic origin, and is thus not a conservation priority. *Pueraria montana var. lobata*, native to Asia, was introduced into the United States in 1885, primarily as an ornamental and as a potential source for cattle forage. More than 2 million acres of forest land in Alabama, Georgia, Mississippi, Tennessee, North Carolina, and South Carolina are estimated to be infested with kudzu.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Cumberland Gap National Historical Park Comments:
Global Comments: *Pueraria montana var. lobata*, native to Asia, was introduced into the United States in 1885, primarily as an ornamental and as a potential source for cattle forage. More than 2 million acres of forest land in Alabama, Georgia, Mississippi, Tennessee, North Carolina, and South Carolina are estimated to be infested with kudzu.
Global Similar Associations:

- *Wisteria sinensis* Vine-Shrubland (CEGL008568)

Global Related Concepts:

- Kudzu thicket (CAP pers. comm. 1998) ?

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: This community occurs on highly disturbed slopes that were planted with kudzu in the early to mid-1900s in many areas surrounding the current park boundary.
Global Range: This vegetation is known to occur in the southeastern United States from central Kentucky, Virginia, and Maryland, south through Tennessee, North Carolina, South Carolina, Georgia, and Alabama to Florida and west through Mississippi and Louisiana to eastern Texas, Arkansas, and Oklahoma (Edwards 1982).
Nations: US
States/Provinces: AL, AR, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA
USFS Ecoregions: 221Hc:CCC, 222Ab:CCC, 222Ag:CCC, 222Ah:CCC, 222An:CCC, 231Bh:CCC, 231Ca:CCC, 231Cd:CCC, 232Bm:CCC, 234:C, M221Aa:CCC, M221Ab:CCC, M221Ca:CCP, M221Cb:CCP, M221Cc:CCP, M221Ce:CCP, M221Db:CCP, M221Dc:CCP, M221Dd:CCC, M222Aa:CCC, M222Ab:CCC, M231Aa:CCC, M231Ab:CCC, M231Ac:CCC, M231Ad:CCC
Federal Lands: DOD (Fort Benning); NPS (Cumberland Gap, Natchez Trace, Vicksburg); TVA (Tellico); USFS (Bankhead, Cherokee, Daniel Boone, George Washington, Jefferson, Oconee?, Ouachita, Ozark, Talladega)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots: None within the park.
Local Description Authors: R. White
Global Description Authors: A.S. Weakley
References: CAP pers. comm. 1998, Edwards 1982, Fleming and Coulling 2001, Hoagland 1998b, Hoagland 2000, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

Rubus (argutus, trivialis) Shrubland Alliance

Blackberry - Greenbrier Successional Shrubland Thicket

***Rubus (argutus, trivialis) - Smilax (glauca, rotundifolia)* Shrubland**
(Southern Blackberry, Southern Dewberry) - (Whiteleaf Greenbrier, Common Greenbrier) Shrubland
Identifier: CEGL004732

Ecological System(s):

ELEMENT CONCEPT

Global Summary: Stands of this successional community develop following disturbance (complete forest canopy removal). These stands are dominated by greenbrier species (*Smilax glauca, Smilax rotundifolia*) and blackberries/dewberries (*Rubus argutus, Rubus trivialis*). Many examples include a great variety of tree saplings and other woody species (*Quercus* spp., *Liquidambar styraciflua, Acer rubrum, Diospyros virginiana, Juniperus virginiana var. virginiana, Rhus copallinum*), herbs (*Solidago* spp., Asteraceae spp., *Helianthus* spp., *Hypericum* spp., *Potentilla simplex*), and grasses (*Andropogon* spp., *Dichanthelium* spp., *Panicum* spp., *Schizachyrium scoparium, Lolium* spp., and *Sorghastrum nutans*). Communities that are surrounded by relatively intact ecosystems will tend to have more native species. Those surrounded by old fields or fragmented by development tend to have *Lonicera japonica* as a codominant vine overtopping much of the blackberry and greenbrier.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:
Cumberland Gap National Historical Park Environment: This community exists in areas that were recently plowed or mowed and then left fallow for 3-5 years.
Global Environment: This community can exist in both lowlands and uplands that have been cleared but have not been further disturbed by continued mowing or plowing for 3-5 years.

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: Vegetation varies greatly, but most examples are dominated by *Rubus argutus* with other shrub and herbaceous species present depending upon the exact age, the soil characteristics of the site, and the seed sources that are nearby.
Global Vegetation: Stands of this association are dominated by greenbrier species (*Smilax glauca, Smilax rotundifolia*) and blackberries/dewberries (*Rubus argutus, Rubus trivialis*). They also contain a great variety of tree saplings and other woody species (e.g., *Quercus* spp., *Liquidambar styraciflua, Acer rubrum, Rhus copallinum*). Some herbs in central Tennessee examples may include *Solidago* spp., Asteraceae spp., *Helianthus* spp., *Hypericum* spp., *Potentilla simplex*; grasses may include *Andropogon* spp., *Dichanthelium* spp., *Panicum* spp., *Schizachyrium scoparium, Lolium* spp., and *Sorghastrum nutans*. Communities that are surrounded by relatively intact ecosystems will tend to have more native species. Those surrounded by old fields or fragmented by development tend to have *Lonicera japonica* as a codominant vine overtopping much of the blackberry and greenbrier.

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species

Global

Stratum	Lifeform	Species

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park:
Global:

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:
Global:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (ruderal) (1-Oct-2001). This type represents ruderal successional vegetation dominated by species native to North America.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Cumberland Gap National Historical Park Comments:
Global Comments: In sandy parts of the southeastern U.S. Coastal Plain (e.g., Fort Benning, Georgia) the common blackberry is *Rubus cuneifolius*, and it does not form monocultural stands worthy of recognition as a vegetation type. At Arnold Air Force Base, Coffee and Franklin counties, Tennessee, this community is often found in powerline corridors and other areas that have experienced total canopy removal.
Global Similar Associations:
Global Related Concepts:

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: This community exists throughout the park in areas that were recently plowed and/or heavily mowed and are recovering.
Global Range: This ruderal successional vegetation could be found throughout the upper southern United States.
Nations: US
States/Provinces: AL?, GA, KY, MS?, NC, SC, TN
USFS Ecoregions: 221Hc:CCC, 221He:CCC, 222Eb:CCC, 222Ed:CCC, 231Aa:CCC, 231Ae:CCC
Federal Lands: DOD (Arnold); NPS (Big South Fork, Blue Ridge Parkway, Cowpens, Cumberland Gap, Kings Mountain, Mammoth Cave, Ninety Six, Obed, Stones River); USFS (Talladega?, Tuskegee?)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots: None within park.
Local Description Authors: R. White
Global Description Authors: M.J. Russo, mod. R. White
References: NatureServe Ecology - Southeastern U.S. unpubl. data, Peet et al. unpubl. data 2002, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, TNC 1998a

Vitis aestivalis Vine-Shrubland Alliance

Montane Grape Opening

***Vitis aestivalis* Vine-Shrubland**
Summer Grape Vine-Shrubland
Identifier: CEGL003890

Ecological System(s): Southern Appalachian Oak Forest (CES202.886)
Ozark-Ouachita Dry-Mesic Oak Forest (CES202.708)

ELEMENT CONCEPT

Global Summary: This community is strongly dominated by the vine *Vitis aestivalis*. Vines, extremely thick in patches and covering nearly every tree as well as the ground, have 50-100% coverage. Trees in the canopy and subcanopy have 0-50% coverage and vary from site to site. The shrub layer is sparse. The herb layer is sparse to moderate, decreasing with vine coverage. Herbaceous composition varies from site to site. Beneath the vine canopy, coarse woody debris and tip-up mounds are typical. The dynamics of this community are poorly understood. It apparently originates from disturbance, such as an ice or wind storm; and can persist for decades. This community can range in size from less than a hectare to ten hectares. In Great Smoky Mountains National Park, this community occurs on steep to very steep, northerly, middle to

upper slopes at intermediate elevations between 600 and 1000 m (2000-3500 feet). All areas sampled showed evidence of disturbance by wind, ice, or logging.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:

Cumberland Gap National Historical Park Environment: Within the park, this community exists in very small patches on steep, rocky areas that are subject to frequent windfall at elevations of 610-915 m (2000-3000 feet). When severe windfall events occur, *Vitis aestivalis* sometimes colonizes the patch where trees once grew, hence creating a "grapehole."

Global Environment: In Great Smoky Mountains National Park, this community occurs on steep to very steep, northerly, middle to upper slopes at intermediate elevations between 600 and 1000 m (2000-3500 feet) (MacKenzie 1993).

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: Within the park, this community is dominated by *Vitis aestivalis* and *Smilax* spp. in the tall-shrub layer. In addition, *Rubus argutus* and *Smilax* spp. may be common in the short-shrub layer. Within the park, this community is often found in a matrix of mixed mesophytic or rich ash-hickory forest or woodland, *Liriodendron tulipifera - Tilia americana var. heterophylla - Aesculus flava - Acer saccharum / Magnolia tripetala* Forest(CEGL005222) and *Fraxinus americana - Carya ovata / Frangula caroliniana / Helianthus hirsutus* Woodland (CEGL008458), respectively.

Global Vegetation: This community is strongly dominated by the vine *Vitis aestivalis*. Vines, extremely thick in patches and covering nearly every tree as well as the ground, have 50-100% coverage. Trees in the canopy and subcanopy have 0-50% coverage and vary from site to site, but typical species include *Acer rubrum, Acer saccharum, Halesia tetraptera var. monticola*, and *Liriodendron tulipifera*. The shrub layer is sparse. The herb layer is sparse to moderate, decreasing with vine coverage. Herbaceous composition varies from site to site but is typical of mesic forests in the area. Some of the more common species from the sampled areas in Great Smoky Mountains National Park are *Ageratina altissima var. altissima, Amphicarpaea bracteata, Arisaema triphyllum ssp. triphyllum, Polystichum acrostichoides, Sanguinaria canadensis*, and *Viola* spp. Beneath the vine canopy, coarse woody debris and tip-up mounds are typical.

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species
Shrub/sapling (tall & short)	Vine/Liana	*Vitis aestivalis*

Global

Stratum	Lifeform	Species
Shrub/sapling (tall & short)	Vine/Liana	*Vitis aestivalis*

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park: *Vitis aestivalis*

Global: *Vitis aestivalis*

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:

Global:

CONSERVATION STATUS RANK

Global Rank & Reasons: G2G3 (11-Aug-1997). This is an uncommon community. It is restricted within its range and could be limited by specific disturbance regimes.

CLASSIFICATION

Status: Standard

Classification Confidence: 2 - Moderate

Cumberland Gap National Historical Park Comments:

Global Comments: This community is important for wildlife, especially bears. In the Great Smoky Mountains, forests previously occupying sites that support this community are mesic forest types, such as cove forests or mesic forest dominated by chestnut oak and red oak. Forests on steep, mesic sites may be more susceptible to treefall and gap formation.

Global Similar Associations:
Global Related Concepts:
- Montane Grape Opening (Schafale 1998b) ?

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: This community occurs throughout the rich oak forests and coves of the midslopes of the park.
Global Range: This community is known from the Great Smoky Mountains of North Carolina and Tennessee and the Cumberland Mountains of Tennessee, Kentucky, and Virginia, and may possibly occur in montane areas of Arkansas and Oklahoma.
Nations: US
States/Provinces: AR?, KY, NC, OK?, TN, VA
USFS Ecoregions: M221Dd:CCC, M222Ab:PPP, M231A:PP
Federal Lands: NPS (Blue Ridge Parkway?, Cumberland Gap, Great Smoky Mountains); USFS (Cherokee, Ozark?)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots: CUGA.74.
Local Description Authors: R. White
Global Description Authors:
References: MacKenzie 1993, Peet et al. unpubl. data 2002, Schafale 1998b, Schafale 2002, Southeastern Ecology Working Group n.d., TDNH unpubl. data

III.B.2.N.g. Saturated cold-deciduous shrubland

Alnus serrulata Saturated Shrubland Alliance

Saturated Alder Thicket

***Alnus serrulata* Saturated Southern Shrubland**
Smooth Alder Saturated Southern Shrubland
Identifier: CEGL003912

Ecological System(s): East Gulf Coastal Plain Small Stream and River Floodplain Forest (CES203.559)
East Gulf Coastal Plain Northern Depression Pondshore (CES203.558)
Western Highland Rim Seepage Fen (CES202.346)

ELEMENT CONCEPT

Global Summary: This broadly defined type represents saturated vegetation dominated by *Alnus serrulata* from several coastal and interior ecoregions of the southeastern United States. It may be subdivided as more information becomes available. Saturated vegetation dominated by *Alnus serrulata* at Fort Benning, Georgia (East Gulf Coastal Plain - Upper East Gulf Coastal Plain transition region), on the upper ends of beaver ponds, is placed here, at least until another specific association is developed if necessary. These are shrub-dominated inclusions in a *Nyssa biflora* saturated forest.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Palustrine
Cumberland Gap National Historical Park Environment: Within the park, this community exists in small patches in shallow-saturated environments usually formed through beaver activity on small and medium-sized streams.
Global Environment: At Fort Benning, Georgia (East Gulf Coastal Plain - Upper East Gulf Coastal Plain transition region), saturated vegetation dominated by *Alnus serrulata* is found on the upper ends of beaver ponds. These are shrub-dominated inclusions in a *Nyssa biflora* saturated forest.

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: Within the park, this association accommodates all saturated stands of *Alnus serrulata*-dominated vegetation.
Global Vegetation: This association accommodates saturated stands of *Alnus serrulata* in a variety of ecoregions and environmental situations. Additional types may be developed if necessary as more information becomes available.

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species
Shrub/sapling (tall & short)	Broad-leaved deciduous tree	*Alnus serrulata*

Global

Stratum	Lifeform	Species
Shrub/sapling (tall & short)	Broad-leaved deciduous tree	*Alnus serrulata*

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park:
Global:

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:
Global:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4 (15-Oct-2002). This is a wide-ranging association that occurs in a variety of ecoregions and environmental situations.

CLASSIFICATION

Status: Standard
Classification Confidence:
Cumberland Gap National Historical Park Comments:
Global Comments: In the Western Highland Rim of Tennessee, small-scale saturated areas dominated by *Alnus serrulata* may form at the margins of seepage areas otherwise dominated by herbaceous plants, classified as *Carex lurida - Carex leptalea - Parnassia grandifolia - Juncus brachycephalus - (Xyris tennesseensis)* Herbaceous Vegetation (CEGL004161). This alliance may cover some of the larger, open acid seeps in Arkansas Interior Highlands and Gulf Coastal Plain (D. Zollner pers. comm.). Saturated vegetation dominated by *Alnus serrulata* at Fort Benning, Georgia (East Gulf Coastal Plain - Upper East Gulf Coastal Plain transition region), on the upper ends of beaver ponds which are inclusions in a *Nyssa biflora* saturated forest apparently belong here, at least until a specific association is developed if necessary.
Global Similar Associations:

- *(Carex interior, Carex lurida) - Carex leptalea - Parnassia grandifolia - Rhynchospora capillacea* Herbaceous Vegetation (CEGL002404)
- *Juncus effusus - Chelone glabra - Scirpus* spp. Southern Blue Ridge Beaver Pond Herbaceous Vegetation (CEGL008433)--can intergrade with *Alnus*-dominated stands.

Global Related Concepts:

- IIC1e. Interior Basin Shrub Swamps (Allard 1990) ?
- IIE1a. Southern Appalachian Bog Complex (Allard 1990) B

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: This community occurs along creeks that have been impounded by beaver dams.
Global Range: This association occurs in several coastal and interior ecoregions of the southeastern United States.
Nations: US
States/Provinces: AL, GA, KY, NC, SC, TN, WV?

USFS Ecoregions: 221He:CCC, 222E:CC, 231A:C?, 231Bc:CCC, M221Cd:CCP, M222:?
Federal Lands: DOD (Fort Benning); NPS (Cumberland Gap, Kings Mountain); USFS (Daniel Boone, Talladega)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots: CUGA.89.
Local Description Authors: R. White
Global Description Authors: Southeast Ecology Group
References: Allard 1990, NatureServe Ecology - Southeastern U.S. unpubl. data, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, Zollner pers. comm.

III.C.2.N.a. Mixed evergreen - cold-deciduous shrubland

Juniperus virginiana - Rhus aromatica Shrubland Alliance

Limestone Cliff Fragrant Sumac Shrubland

***Rhus aromatica - Celtis tenuifolia / Carex eburnea* Shrubland**
Fragrant Sumac - Georgia Hackberry / Bristleleaf Sedge Shrubland
Identifier: CEGL004393

Ecological System(s): Central Interior Calcareous Cliff and Talus (CES202.690)
Central Interior Highlands Calcareous Glade and Barrens (CES202.691)
Central Appalachian Alkaline Glade and Woodland (CES202.602)
Southern Interior Calcareous Cliff (CES202.356)

ELEMENT CONCEPT

Global Summary: This association contains open rocky shrubland vegetation known from limestone and other calcareous cliffs of Daniel Boone National Forest of Kentucky and Cumberland Gap National Historical Park in Virginia and Kentucky. Stands are dominated by *Rhus aromatica* and *Celtis tenuifolia*, with *Carex eburnea* as a characteristic herbaceous species. *Quercus muehlenbergii* is often present as a component of the tall-shrub layer and sometimes present in the canopy. Other shrubs which may be present include *Frangula caroliniana, Physocarpus opulifolius, Philadelphus hirsutus, Viburnum prunifolium, Ptelea trifoliata, Paxistima canbyi*, and *Zanthoxylum americanum*. In addition, *Solidago sphacelata* may be present. A "southern variant" may contain *Hypericum frondosum*. The herbaceous layer at Cumberland Gap is rich and contains such species as *Brachyelytrum erectum, Helianthus* spp., *Packera anonyma*, and *Bromus pubescens*.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:
Cumberland Gap National Historical Park Environment: This community occurs on very shallow soils just above the cliffline of some limestone outcrop areas in the park. This open rocky shrubland grades quickly into woodland and forest vegetation and may only inhabit a strip of 2-5 meters in most places it is located.
Global Environment: This open rocky shrubland vegetation is known from ridgetops, clifftop ledges, and margins of cliffs composed of limestone and other calcareous material in the Daniel Boone National Forest of Kentucky.

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: Within the park, this community is dominated by *Rhus aromatica*. Overhanging trees from the adjacent woodland include *Quercus muehlenbergii* and *Juniperus virginiana*.
Global Vegetation: Stands are dominated by *Rhus aromatica* and *Celtis tenuifolia*, with *Carex eburnea* as a characteristic herbaceous species. *Quercus muehlenbergii* is often present as a component of the tall-shrub layer and sometimes present in the canopy. Other shrubs which may be present include *Frangula caroliniana, Physocarpus opulifolius, Philadelphus hirsutus, Viburnum prunifolium, Ptelea trifoliata,*

Paxistima canbyi, and *Zanthoxylum americanum*. In addition, *Solidago sphacelata* may be present. A "southern variant" may contain *Hypericum frondosum*. The herbaceous layer at Cumberland Gap National Historical Park is rich and contains such species as *Brachyelytrum erectum, Helianthus* spp., *Packera anonyma*, and *Bromus pubescens*.

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Rhus aromatica*

Global

Stratum	Lifeform	Species
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Rhus aromatica*

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park: *Rhus aromatica*
Global: *Rhus aromatica*

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:
Global: *Paxistima canbyi*

CONSERVATION STATUS RANK

Global Rank & Reasons: G3 (28-Sep-2005). This community type occurs within a fairly limited range of habitats in the Cumberlands and Southern Ridge and Valley. It only exists as narrow bands on the shallow soils above and near limestone cliff ledges, so any disturbance in the area of the cliff ledge can lead to destruction of this community. Currently, this community has only been found in Daniel Boone National Forest and Cumberland Gap National Historic Park. Although it may exist in other parts of the Ridge and Valley and Cumberlands, no additional locations have been found. Although the current condition of the examples of this type are good and many of the examples are protected to some extent, the fact that there are only a handful of element occurrences known necessitates giving it a high-priority Global Rank.

CLASSIFICATION

Status: Standard
Classification Confidence: 1 - Strong
Cumberland Gap National Historical Park Comments:
Global Comments:
Global Similar Associations:

- *Juniperus virginiana* var. *virginiana - Forestiera ligustrina - Rhus aromatica - Hypericum frondosum* Shrubland (CEGL003938)--of Tennessee Central Basin and related limestone glades of Kentucky and Alabama.

Global Related Concepts:

- IE1c. Interior Upland Calcareous Cliff (Allard 1990) B

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: This community is extremely rare and occurs only in areas of very shallow soil just on top of limestone cliffs.
Global Range: Known occurrences are currently restricted to eastern Kentucky and extreme southeastern Virginia.
Nations: US
States/Provinces: KY, VA
USFS Ecoregions: 221Hc:CCC, 222Eb:CCC, 222En:CCC, 222Eo:CCC
Federal Lands: NPS (Cumberland Gap); USFS (Daniel Boone)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots: CUGA.92.

Local Description Authors: R. White
Global Description Authors: M. Pyne, mod. R. White
References: Allard 1990, Southeastern Ecology Working Group n.d.

Kalmia latifolia - Gaylussacia baccata Shrubland Alliance

Cumberland Sandstone Glade Heath Shrubland

***Kalmia latifolia - Gaylussacia (baccata, brachycera)* Cumberland Shrubland**
Mountain Laurel - (Black Huckleberry, Box Huckleberry) Cumberland Shrubland
Identifier: CEGL008470

Ecological System(s): Southern Appalachian Grass and Shrub Bald (CES202.294)

ELEMENT CONCEPT

Global Summary: This sandstone glade-related heath shrub-dominated community occurs on sandstone bedrock exposures in the Cumberlands of Kentucky and Virginia (and possibly adjacent Tennessee) at moderate elevations. The vegetation at these sites is low in stature. The tallest shrub is *Vaccinium arboreum* and it seldom is over 2 m in height. Scrubby trees, usually *Quercus coccinea* and *Quercus falcata* (and/or sometimes *Quercus velutina, Quercus marilandica,* or *Quercus stellata*), as well as *Pinus rigida, Pinus virginiana* are seldom are over 3 m. The tree species are dispersed on the landscape with small crowns and little cover. The dominant shrubs are *Kalmia latifolia* (low to the ground, around 0.6 m or less high), *Gaylussacia baccata* and/or *Vaccinium pallidum*. On many, but not all sites, *Gaylussacia brachycera* is the most dominant low-shrub species. Sometimes *Vaccinium stamineum* occurs as well. In the most open areas, *Epigaea repens, Gaultheria procumbens, Danthonia spicata, Cladonia* spp., and in moist pockets, *Dicranum scoparium* are often dominant. Occasionally *Croton willdenowii (= Crotonopsis elliptica)* and *Talinum teretifolium* occur in the open (nearly rock, thin soil, no shrub) areas. These areas grade into oak-pine or pine-oak woodland with an ericaceous shrub layer (*Kalmia latifolia, Vaccinium arboreum / Vaccinium stamineum / Vaccinium pallidum, Gaylussacia baccata / Gaylussacia brachycera*). Here the *Kalmia* is 1-2 m high and the sites are somewhat difficult to traverse. These woodlands in turn grade into oak-pine or pine/oak forest, either with a *Kalmia / Vaccinium / Gaylussacia* layer or more or less leaf litter. This community lacks many of the characteristic southern Appalachian species found in Appalachian heath balds such as *Rhododendron carolinianum, Rhododendron catawbiense, Rhododendron calendulaceum, Leucothoe recurva, Pieris floribunda*, and *Leiophyllum buxifolium*. This association also lacks species of northern affinity (e.g., *Nemopanthus mucronatus, Vaccinium angustifolium, Lycopodium annotinum, Carex polymorpha*, and *Oryzopsis asperifolia*), which are found in related vegetation of the Central Appalachians which is dominated by *Kalmia latifolia* and *Gaylussacia baccata*.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:
Cumberland Gap National Historical Park Environment: This sandstone shrubland community occurs on shallow-soiled sandstone rock outcrops along the ridgeline of Cumberland Gap NHP. It exists as a shrubland with scrubby trees, especially *Pinus* spp. and *Quercus* spp., interspersed throughout.
Global Environment: This sandstone glade heath shrubland occurs on acidic bedrock exposures in the Cumberlands of eastern Kentucky, western Virginia, and possibly adjacent Tennessee.

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: This community is distinguished from the other upland shrubland community in the park by the relative lack of *Rhododendron catawbiense* and by the common appearance throughout of stunted trees such as *Pinus* spp. and *Quercus* spp.
Global Vegetation: This community lacks many of the characteristic southern Appalachian species such as *Rhododendron carolinianum, Rhododendron catawbiense, Rhododendron calendulaceum, Leucothoe recurva, Pieris floribunda, Leiophyllum buxifolium*, as well as the species of northern affinity (e.g., *Nemopanthus mucronatus, Vaccinium angustifolium, Lycopodium annotinum, Carex polymorpha, Oryzopsis asperifolia*), which distinguish related vegetation of the Central Appalachians dominated by *Kalmia latifolia* and *Gaylussacia baccata*.

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species

Global

Stratum	Lifeform	Species

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park:
Global:

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:
Global: *Carex polymorpha, Gaylussacia brachycera*

CONSERVATION STATUS RANK

Global Rank & Reasons: G3 (4-Oct-2004). This shrubland association is limited to acidic bedrock exposures in the Cumberlands of eastern Kentucky and adjacent Virginia. These sites are limited. Unprotected sites are threatened by mining activities, residential development, off-road vehicles, and the decline of *Pinus* spp. (pine) in the Cumberlands after severe southern pine beetle outbreaks.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Cumberland Gap National Historical Park Comments:
Global Comments:
Global Similar Associations:

- *Kalmia latifolia - Gaylussacia baccata - Vaccinium angustifolium - Menziesia pilosa* Shrubland (CEGL003939)--of the Central Appalachians.

Global Related Concepts:

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: This community occurs throughout the sandstone rock outcroppings along the spine of the ridgeline that helps separate Kentucky from Virginia.
Global Range: This sandstone glade heath shrubland occurs in the Cumberlands of Kentucky and Virginia (and possibly adjacent Tennessee).
Nations: US
States/Provinces: KY, TN, VA
USFS Ecoregions: 221Hc:CCC, 221He:CCC
Federal Lands: NPS (Big South Fork, Cumberland Gap, Obed); USFS (Daniel Boone)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots: None.
Local Description Authors: R. White
Global Description Authors: mod. C.W. Nordman
References: Southeastern Ecology Working Group n.d., TDNH unpubl. data

V. Herbaceous Vegetation

V.A.5.N.c. Medium-tall sod temperate or subpolar grassland

Lolium (arundinaceum, pratense) Herbaceous Alliance

Cultivated Meadow

***Lolium (arundinaceum, pratense)* Herbaceous Vegetation**

(Tall Fescue, Meadow Fescue) Herbaceous Vegetation
Identifier: CEGL004048

Ecological System(s):

ELEMENT CONCEPT

Global Summary: This association includes grassland pastures and hayfields, more-or-less cultural, though sometimes no longer actively maintained. The dominant species in this type are the European "tall or meadow fescues" of uncertain and controversial generic placement. These communities are sometimes nearly monospecific but can also be very diverse and contain many native species of grasses, sedges, and forbs. This vegetation is currently defined for the southern Appalachians, Ozarks, Ouachita Mountains, and parts of the Piedmont and Interior Low Plateau, but it is possible throughout much of the eastern United States and southern Canada.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:
Cumberland Gap National Historical Park Environment: Same as global.
Global Environment: This association includes grassland pastures and hayfields, more-or-less cultural, though sometimes no longer actively maintained.

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: The dominant species in this association are the European "tall or meadow fescues" (*Lolium* spp.), but in this part of Kentucky bluegrasses are also common (*Poa* spp.). Other grass and herbaceous species may approach dominance in patches, but the fescues and bluegrasses are overall the most dominant species in this type.
Global Vegetation: The dominant species in this association are the European "tall or meadow fescues" of uncertain and controversial generic placement. Although traditionally treated as *Festuca pratensis (= Festuca elatior)* and *Festuca arundinacea*, these two closely related species are now usually treated as either *Lolium pratense* and *Lolium arundinaceum* (Kartesz 1999) or as *Schedonorus pratensis* and *Schedonorus arundinaceus*. These communities are sometimes nearly monospecific but can also be very diverse and contain many native species of grasses, sedges, and forbs. In the Black Belt region of Alabama and Mississippi, it is commonly found in mixture with *Paspalum dilatatum* (dallisgrass) (Bransby n.d.). The exotics *Lespedeza cuneata* and *Bromus tectorum* may be present in stands.

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species

Global

Stratum	Lifeform	Species

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park:
Global:

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:
Global:

CONSERVATION STATUS RANK

Global Rank & Reasons: GNA (invasive) (5-Jan-2000). This vegetation is dominated by an exotic species, is of anthropogenic origin, and is thus not a conservation priority.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Cumberland Gap National Historical Park Comments:
Global Comments: *Lolium pratense* and *Lolium arundinaceum* are two closely related species which were traditionally treated as *Festuca pratensis (= Festuca elatior)* and *Festuca arundinacea*, and could

alternately be treated as *Schedonorus pratensis* and *Schedonorus arundinaceus*. Conversion to Kartesz (1999) standard has necessitated the shift to the *Lolium* names from *Festuca*.

Global Similar Associations:

- *Dactylis glomerata - Phleum pratense - Festuca* spp. - *Solidago* spp. Herbaceous Vegetation (CEGL006107)
- *Schizachyrium scoparium - Solidago* spp. Herbaceous Vegetation (CEGL006333)

Global Related Concepts:

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: Throughout Hensley Settlement.
Global Range: This association is possible throughout much of the eastern United States and southern Canada.
Nations: CA?, US
States/Provinces: AL, AR, GA, KY, MO, MS, NB?, NC, NS?, OK, QC?, SC, TN, VA, WV
USFS Ecoregions: 221Hc:CCC, 221He:CCC, 222Eg:CCC, 231Ae:CCC, 231Bh:CCC, M221Dc:CCC, M221Dd:CCC, M222Ab:CCC, M231A:CC
Federal Lands: NPS (Big South Fork, Blue Ridge Parkway, Buffalo, Carl Sandburg Home, Cowpens, Cumberland Gap, Fort Donelson, Great Smoky Mountains, Guilford Courthouse, Kings Mountain, Lincoln Birthplace, Mammoth Cave, Natchez Trace, Ninety Six, Obed, Russell Cave, Shiloh, Stones River, Vicksburg); USFS (Cherokee, Ouachita, Ozark)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots:
Local Description Authors: R. White
Global Description Authors: A.S. Weakley
References: Bransby n.d., Heath et al. 1973, Hoagland 2000, Kartesz 1999, NatureServe Ecology - Southeastern U.S. unpubl. data, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

V.A.5.N.k. Seasonally flooded temperate or subpolar grassland

Juncus effusus Seasonally Flooded Herbaceous Alliance

Southern Blue Ridge Beaver Pond Marsh

***Juncus effusus - Chelone glabra - Scirpus* spp. Southern Blue Ridge Beaver Pond Herbaceous Vegetation**
Soft Rush - White Turtlehead - Bulrush species Southern Blue Ridge Beaver Pond Herbaceous Vegetation
Identifier: CEGL008433

Ecological System(s): South-Central Interior Small Stream and Riparian (CES202.706)

ELEMENT CONCEPT

Global Summary: This community occurs in beaver-impounded sites along mountain streams in the Southern Blue Ridge and Cumberland Mountains and Ridge and Valley physiographic provinces. Vegetative composition is highly variable, but *Juncus effusus* is a characteristic dominant. The physiognomy of the type is also extremely variable. Examples of this community range from no shrub cover to high levels of cover depending upon the amount of time since inundation and the fluctuation of the water level over time.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Palustrine

Cumberland Gap National Historical Park Environment: This association exists in beaver ponds along small creeks within the park.
Global Environment: This association is known from moderately high elevations (2000-3000 feet) in the southern terminus of the Blue Ridge and Ridge and Valley physiographic provinces.

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: Composition is highly variable from place to place and time to time. *Juncus effusus* dominates. Other species may include *Carex* spp., *Dichanthelium clandestinum, Leersia* spp., *Microstegium vimineum*, and many others.
Global Vegetation: Composition is highly variable from place to place and time to time. *Juncus effusus* dominates. Other species may include *Chelone glabra, Scirpus atrovirens, Scirpus hattorianus, Hypericum mutilum, Carex gynandra, Oxypolis rigidior, Ludwigia palustris, Mimulus ringens, Eleocharis* spp., *Thelypteris noveboracensis, Leersia virginica, Carex lurida,* and *Carex echinata*.

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species

Global

Stratum	Lifeform	Species

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park:
Global:

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:
Global:

CONSERVATION STATUS RANK

Global Rank & Reasons: G4? (12-Jun-2000).

CLASSIFICATION

Status: Standard
Classification Confidence: 3 - Weak
Cumberland Gap National Historical Park Comments:
Global Comments: As the beaver pond ages, the vegetation may quickly succeed into a shrubby version of this association, eventually becoming an *Alnus*- or *Salix*-dominated association. The variable communities of beaver marshes and meadows are poorly understood. This type may need substantial revision and clarification.
Global Similar Associations:
- *Alnus serrulata* Saturated Southern Shrubland (CEGL003912)

Global Related Concepts:

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: This community occurs in areas where beaver ponds have impounded small creeks and left very shallow-saturated areas that have been colonized by herbaceous vegetation.
Global Range: The distribution of this type is poorly understood, since its circumscription is as yet unclear. It was originally defined from the southern terminus of the Blue Ridge and Ridge and Valley physiographic provinces.
Nations: US
States/Provinces: AL?, GA, KY, NC, TN?
USFS Ecoregions: 231D:CC, M221Dd:CCP
Federal Lands: NPS (Cumberland Gap, Great Smoky Mountains); USFS (Chattahoochee)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:

Cumberland Gap National Historical Park Plots: CUGA.89.
Local Description Authors: R. White
Global Description Authors:
References: NatureServe Ecology - Southeastern U.S. unpubl. data, Schafale and Weakley 1990, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

V.A.5.N.m. Saturated temperate or subpolar grassland

Carex crinita - Osmunda spp. / *Sphagnum* spp. Saturated Herbaceous Alliance

Cumberland Streamside Bog

***Carex gynandra - Scirpus cyperinus - Eriophorum virginicum - Osmunda cinnamomea* Herbaceous Vegetation**
Mountain Fringed Sedge - Woolgrass Bulrush - Tawny Cotton-grass - Cinnamon Fern Herbaceous Vegetation
Identifier: CEGL007771

Ecological System(s): Southern and Central Appalachian Bog and Fen (CES202.300)

ELEMENT CONCEPT

Global Summary: This association consists of patches of saturated vegetation located in areas of flat topography located near streams in the Cumberlands. This community occurs along streams, in flats away from the immediate streambed, at elevations of 610 to 760 m (2000-2500 feet). It is primarily an herbaceous community, but some examples may exhibit a shrub zone. The primary herbaceous species are *Carex gynandra, Juncus effusus, Osmunda cinnamomea, Osmunda regalis var. spectabilis, Doellingeria umbellata (= Aster umbellatus), Polygonum sagittatum, Eriophorum virginicum, Lygodium palmatum, Platanthera clavellata, Platanthera flava var. flava, Lycopus virginicus, Oxypolis rigidior, Chelone glabra, Carex lurida, Carex atlantica, Glyceria melicaria, Scirpus cyperinus, Carex leptalea (ssp. harperi),* and *Solidago rugosa ssp. aspera*. *Sphagnum* spp. are common and include *Sphagnum palustre*. Shrubs can occur as scattered clumps or zones and include *Ilex opaca, Kalmia latifolia, Rhododendron maximum,* and *Photinia pyrifolia (= Aronia arbutifolia).*

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Palustrine
Cumberland Gap National Historical Park Environment: Within the park, this community is restricted to a handful of locations along Martin's Fork where the floodplain widens and allows for flat areas adjacent the streambed (elevations around 760 m [2500 feet]).
Global Environment: This community occurs along streams, in flats away from the immediate streambed, at elevations of 610 to 760 m (2000-2500 feet).

VEGETATION DESCRIPTION

Cumberland Gap National Historical Park Vegetation: This mostly herbaceous community is codominated by a number of herbaceous species, including *Osmunda cinnamomea, Osmunda regalis, Juncus effusus, Oxypolis rigidior, Carex atlantica ssp. atlantica, Viola* spp., and many others, along with a constant mat of Sphagnum moss underneath the field layer. In addition, a number of shrubs are common in the community. These include *Lyonia ligustrina, Ilex opaca, Kalmia latifolia, Photinia melanocarpa, Alnus serrulata*, and others.
Global Vegetation: The primary herbaceous species in this association are *Carex gynandra, Juncus effusus, Osmunda cinnamomea, Osmunda regalis var. spectabilis, Doellingeria umbellata (= Aster umbellatus), Polygonum sagittatum, Eriophorum virginicum, Lygodium palmatum, Platanthera clavellata, Platanthera flava var. flava, Lycopus virginicus, Oxypolis rigidior, Chelone glabra, Carex lurida, Carex atlantica, Glyceria melicaria, Scirpus cyperinus, Carex leptalea (ssp. harperi),* and *Solidago rugosa ssp. aspera*. *Sphagnum* spp. are common and include *Sphagnum palustre*. Shrubs can occur as scattered clumps or zones and include *Ilex opaca, Kalmia latifolia, Rhododendron maximum,* and *Photinia pyrifolia (=*

Aronia arbutifolia). This type apparently lacks many species characteristic of bogs of the Southern Blue Ridge and has some species rarely encountered in Blue Ridge bogs.

MOST ABUNDANT SPECIES

Cumberland Gap National Historical Park

Stratum	Lifeform	Species
Herb (field)	Fern or fern ally	*Osmunda cinnamomea*

Global

Stratum	Lifeform	Species

CHARACTERISTIC SPECIES

Cumberland Gap National Historical Park: *Osmunda cinnamomea*, *Osmunda regalis*
Global:

OTHER NOTEWORTHY SPECIES

Cumberland Gap National Historical Park:
Global:

CONSERVATION STATUS RANK

Global Rank & Reasons: G1?Q (20-Dec-2000). This is a poorly known community type that is apparently restricted to the Cumberland Mountains of Kentucky, Virginia, and possibly Tennessee. Examples are small in size and inventories are lacking. Many examples were impacted in the past by forest clearing and the construction of farm ponds. Examples are threatened by vegetative succession. When without fire, grazing, or other natural disturbance, they become shrub-dominated and less diverse.

CLASSIFICATION

Status: Standard
Classification Confidence: 2 - Moderate
Cumberland Gap National Historical Park Comments:
Global Comments: Examples at Martins Fork (Harlan County, Kentucky) and Falling Water Gap, Virginia. The relationship and distinctiveness of this type relative to other associations in this alliance needs additional consideration. This type apparently lacks many species characteristic of bogs of the Southern Blue Ridge and has some species rarely encountered in Blue Ridge bogs. Vegetation seen at an abandoned millpond in Big South Fork National River and Recreation Area (Tennessee) may fit this concept (M. Pyne pers. comm.).
Global Similar Associations:

- *Glyceria striata - Carex gynandra - Chelone glabra - Symphyotrichum puniceum / Sphagnum* spp. Herbaceous Vegetation (CEGL008438)
- *Osmunda regalis* var. *spectabilis* Seepage Scour Herbaceous Vegetation (CEGL008404)--is less diverse and associated with larger rivers in the Cumberland Plateau of Alabama.

Global Related Concepts:

OTHER COMMENTS

Other Comments:

ELEMENT DISTRIBUTION

Cumberland Gap National Historical Park Range: This community is restricted to flat land adjacent to Martin's Fork.
Global Range: This community type is apparently restricted to the Cumberland Plateau of Kentucky, Virginia, and possibly Tennessee.
Nations: US
States/Provinces: KY, TN?, VA
USFS Ecoregions: 221Hc:CCC, M221Cc:CCC, M221Ce:CCC
Federal Lands: NPS (Big South Fork, Cumberland Gap); USFS (Daniel Boone?)

ELEMENT SOURCES

Cumberland Gap National Historical Park Inventory Notes:
Cumberland Gap National Historical Park Plots: CUGA.41.
Local Description Authors: R. White

Global Description Authors: Southeastern Ecology Group
References: Fleming et al. 2001, Pyne pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data

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Appendix IV. Key to Ecological Systems and Ecological Communities of Cumberland Gap National Historical Park.

This key was developed for Cumberland Gap National Historical Park and is intended to allow field workers and naturalists to quickly identify community types while in the park and its environs. This key does not cover all of the ecosystems of the adjacent region. However, within the boundary and a small buffer area outside of the boundary, we believe this key represents at least 90% of the range of variation of existing vegetation.

The document is structured like a dichotomous key. The user must make a series of choices based on the structure, composition, and environment of the vegetation to arrive at the correct association. If the key leads to a choice that is not reasonable, consider returning to the beginning of the key and reviewing your decisions to confirm that you are confident in all your choices. It may be useful to walk around the area in question to better understand the composition of the area. Small-scale variations within a matrix community may be misleading. In addition, ecotones between ecological communities may have traits of both communities and so may need to be recognized as a blend of both communities. The Ecological System is a broader concept than the association level, so similar communities may fall out in one system. Ecological systems represent recurring groups of biological communities that are found in similar physical environments and are influenced by similar dynamic ecological processes, such as fire or flooding (Comer et al. 2003). The full association name and code (e.g. CEGL002591) appears alongside an underlined title of the type. The CEGL code may be used to refer back to the document or to look association names and information up in other references that use the National Vegetation Classification. The "common name" of the community also appears with the scientific name of the association.

[ALL CAPS AND BRACKETS] signifies an ecological system
Bold faced words signify an NVC ecological community type
Italics signify a community type that hasn't been documented with a plot, but that we suspect is in the park based on past studies.

Key to Communities of Cumberland Gap National Historical Park

1.Wetland

a.Community either dominated by coniferous trees or by shrubs and herbaceous plants

1.Canopy dominated by hemlock (>50% cover) Sphagnum present. Hemlock approaches 100% of canopy in most examples and sometimes co-dominated by red maple, tuliptree, and blackgum. Great rhododendron common. Usually found in conjunction with an open bog (CEGL007771) and limited to the Martin's Fork watershed.

[SOUTHERN AND CENTRAL APP BOG AND FEN SYSTEM]
Swamp Forest-Bog Complex (Typic Type) (7565)

2.Open canopy with high herbaceous or shrub cover

a**.**Shrubland dominated by Alnus serrulata. Can occur as part of a stream floodplain but most often occurs as part of a beaver pond.

Saturated Alder Thicket (CEGL003912)
[SOUTH-CENTRAL INTERIOR SMALL STREAM AND RIPARIAN]

b.Herbaceous dominated

1.Occurs in Martin's Fork at elevations between 2000-2500 feet and is dominated by *Carex gynandra* and *Osmunda cinnamonea*, among others. Can have a high shrub component at times.

[SOUTHERN AND CENTRAL APP BOG AND FEN]
Cumberland Streamside Bog (CEGL007771)

2**.**Occurs below 2000 feet elevation and contains *Carex* spp. and *Scirpus* and *Solidago canadensis* but little *Osmunda cinnamonea*. Can occur in conjuntion with other communities, especially Saturated Alder Thicket (CEGL003912).

[SOUTH-CENTRAL INTERIOR SMALL STREAM AND RIPARIAN]
Southern Blue Ridge Beaver Pond Complex (CEGL008433)

b.Community dominated by deciduous trees.

1.Dominant canopy trees can vary, but usually sycamore and tuliptree are dominant. Sweetgum is present but is usually less common than in the South Central Interior Large Floodplain System occasionally with buckeye and beech, especially around beaver ponds. This community grades into coves as streams and floodplains narrow upstream. Presence of sycamore is a good separator between this montane alluvial community and a cove.

[SOUTH CENTRAL INTERIOR SMALL STREAM AND RIPARIAN SYSTEM]
Sycamore-Sweetgum Piedmont Swamp Forest (CEGL007340)

2.Forest/woodland associated with old homesites and pastures in and near homesites within the floodplains of small to large creeks. Canopy is dominated by Juglans nigra while herbaceous layer is dominated by Verbesina spp. Most likely examples of this community are too small to map.

[HUMAN MODIFIED / SUCCESSIONAL COMMUNITY]
Successional Black Walnut Forest (CEGL007879)

1.Non-wetland

a.Not a forest or woodland

1.Substrate predominantly bedrock with only a small percentage of the surface area vegetated (0-50% vegetated)

[SOUTHERN INTERIOR ACID CLIFF SYSTEM]

No association created for this type since it is mostly rock.

2.Substrate bedrock or not, but with a majority of the surface area vegetated (50-100%)

a.Herbaceous community

[HUMAN MODIFIED / SUCCESSIONAL COMMUNITY]

Old field with at least 25% fescue (*Lolium spp.*) and less than 25% orchard grass (*Dactylus glomerata*) mostly occurring around the Hensley Settlement area.

Cultivated Meadow (CEGL004048)

b.Shrubland/Vineland

1.Shrubland or vineland dominated by deciduous species. Sites generally have sufficient soil to support forests.

a.Shrubland.Successional community dominated by blackberry species (*Rubus)* and/or greenbrier (*Smilax*) along with herbaceous species

[HUMAN MODIFIED / SUCCESSIONAL]

Blackberry-Greenbrier Successional Shrubland Thicket (CEGL004732)

b. Vineland.

1. Small to medium sized gap in forest matrix dominated by wild grape vines (*Vitis*) and assorted shrubs and herbs. Too small to map in most instances.

[SOUTHERN APPALACHIAN OAK FOREST]

Montane Grape Opening (CEGL003890)

2. Not in the park boundary, but just outside. Dominated by invasive exotic kudzu exclusively and typically at low elevations and near steep slopes where it was planted to control erosion.

[HUMAN MODIFIED / SUCCESSIONAL]

Kudzu vineland (CEGL003882)

2.Shrubland/woodland dominated by evergreen species and generally limited to sites with continuous rock outcrops and shallow soils.

a.Sparse shrubland over rock dominated by *Rhus aromatica*, often with a high component of *Juniperus virginiana* and *Quercus muehlenbergii*. This community always grades quickly into CEGL4793 and may be too small to map in most instances.

[CENTRAL APP ALKALINE GLADE & WOODLAND]

Limestone Cliff Fragrant Sumac Shrubland (CEGL004393)

b.Shrubland dominated by shrubs other than red cedar and oak.

[SOUTHERN APP GRASS AND SHRUB BALD]

1.Shrubland dominated by Catawba rhododendron (along with mountain laurel, Pieris floribunda, and blueberries) on steep slopes and ridges – reportedly very rare in the Cumberlands and only at the highest elevations. Generally very open canopy.

So. App Mountain Laurel Bald (CEGL003814)

2.Shrubland dominated by mountain laurel with great rhododendronand only a small amount of Catawba rhododendron. Substrate is bedrock with exposed patches with Pinus rigida, Pinus virginiana, and Quercus spp. present as stunted trees.
Cumberland Sandstone Glade Heath Shrubland (CEGL008470)

b.Forest or woodland

1.Primarily Conifer Dominated Forest (at least >40% conifer dominated) – This percentage number may be as low as 25% for recently pine beetle damaged stands and can be even lower in cases where pine beetle has killed all of the canopy.

a.Dominated or co-dominated by hemlock (>25% canopy cover) with large amounts of Rhodo max in shrub layer (at least 25% cover)
[APPALACHIAN HEMLOCK-HARDWOOD FOREST]

1.Pure hemlock stands only on lower slopes following creeks on protected slopes – usually with at least 25% cover of great rhododendron.
Southern App Eastern Hemlock Forest(Typic Type)(CEGL007136)

2.Mixed stands of hemlock and hardwood at various positions from lower to mid slope often with some cover of great rhododendron in the shrub layer but generally not greater than 25% cover. This community can often be dominated by beech instead of hemlock and can quickly grade into pure hardwood stands upslope.
Cumberland/App Hemlock-Hardwood Forest (CEGL008407)

b.Pines (alive or dead) or red-cedar dominate - Hemlock <25% of cover of forest. Rhododendron maximum <25% cover in shrub layer. Dead pines often dominate where recent pine beetle outbreaks have occurred.

1.Dominated by red cedar – mildly acidic to basic soils. Successional red-cedar dominated (at least 50% of canopy). Occurs in heavily human disturbed landscapes such as abandoned pastures and clear cuts in areas with neutral to basic soils. Only outside of park adjacent to park boundary.
[HUMAN MODIFIED / SUCCESSIONAL]
Red-cedar Successional (CEGL007124)

2.Dominated by pine spp. or dead pine/moderately to very acidic soils

a.Virginia pine dominated successional forest (at least 50% of canopy dominated by Virginia Pine). Distinguished from other pine types in this series by dominance of Virginia pine and by clear signs of recent heavy human disturbace such as plowing or cutting and lack of a diverse herbaceous layer in understory (forest is usually less than 50 years old). May sometimes contain other successional trees such as sweetgum or tuliptree.
[HUMAN MODIFIED / SUCCESSIONAL]
Virginia Pine Successional (CEGL002591)

b.Pinus rigida woodland/forest maintained by fire and/or extreme xeric conditions. Much of the Pinus rigida in these examples has been beetle killed over the past 6 years, so these communities may be dominated by younger understory trees such as chestnut oak or red maple in places. The herbaceous layer should still be the same.

[SOUTHERN APP MONTANE PINE FOREST & WOODLAND]

1. Open canopy (10-80% canopy coverage). Shrub stratum sparse, but herb layer includes such barrens species as little bluestem, Indian grass, and Tephrosia virginiana. Canopy sometimes dominated by Quercus prinus or marilandica. Steep south to southwest facing slopes. Very rare type only documented with one plot.
Hi Lewis Pitch Pine Barrens (CEGL003617)

2.Usually dominated by Pinus rigida, but many examples in park have a closed canopy due to red maple invasion. High cover of Vaccinium pallidum. in understory. South and west facing exposed ridges and upper slopes. Herbaceous layer sparse and not terribly diverse (typical species include *Galax urceolata* and *Epigaea repens*.
Blue Ridge Table Mountain Pine – Pitch Pine Woodland (Typic Type) (7097)

2.Primarily deciduous (at least 60% deciduous canopy)

a.Dominated almost exclusively by oak and/or hickory with =< 50% cover of other tree species in canopy (but sometimes tuliptree can be more than 50% cover in stands that were disturbed in the past. Less than 25% cover of basswood and buckeye and ash combined.

1.Usually >75% chestnut and scarlet oak combined in canopy although black oak can be common. Very few "mesic" canopy species. Acidic lower and mid slopes.
[SOUTHERN AND CENTRAL APPLACHIAN OAK FOREST]

a.Dry forests on exposed slopes and ridgetops with very low herbaceous cover

1.Ridgetop and exposed south facing slopes of chestnut oak and/or scarlet oak with a heavy red maple understory and an ericaceous understory with at least 20% cover of mountain laurel. Very sparse herbaceous layer sometimes including galax or wintergreen, but generally not much diversity. Elevation varies widely.
Chestnut Oak Forest (Xeric Ridge Type) (CEGL006271)

2.Exposed lower, mid, and upper slopes. This community is dry-mesic (less dry than CEGL006271). Mountain laurel is usually not present in significant numbers but Vaccinium pallidum is usually present. Herbaceous layer is sparse and typical of highly acidic substrate, usually with low diversity but sometimes with higher diversity (but always low cover). Some common species include *Desmodium nudiflorum* and *Chimaphila maculata*. This community can be distinguished from other communities by its acid-loving herb layer, its relative lack of mountain laurel,

and its position on lower to midslopes of most all aspects. Mostly on Kentucky side.
Appalachian Montane Oak Hickory Forest (Chestnut Oak Type) (CEGL007267)

b.Mesic forest on north facing slopes or very protected sights below rock outcrops or steep slopes on various exposures – heaths such as great rhodoendron and mountain laurel are usually present in large amounts, often approaching 100% cover. May often be dominated by red maple instead of chestnut oak.
Chestnut Oak Forest (Mesic Slope Heath Type) (CEGL006286)

2.Highest canopy cover oak is usually a mesic to dry-mesic oak (Quercus rubra, muehlenbergii, alba, falcata) with usually <75% cover by Quercus velutina, prinus, or coccinea. Carya spp. sometimes co-dominate the canopy.

Site often is rocky but also is often not rocky and can be extremely acidic to somewhat basic.

a.Very rare communities either dominated by Quercus muehlenbergii or mostly dominated by Q. muehlenbergii. Short statured and near small patches of limestone on low to mid slopes.
[CENTRAL APP ALKALINE GLADE & WOODLAND]
Ridge and Valley Limestone Oak - Hickory Forest (CEGL004793)

b.Not dominated by Quercus muehlenbergii. Common communities, usually mostly northern red oak, though sometimes black oak, white oak, southern red oak, hickory spp. or chestnut oak can dominate or co-dominate.

[SOUTHERN AND CENTRAL APP OAK FOREST]

1.Acidic, low diversity forest with <25% cover of herbs in herb layer at 1200-2900 feet elevation. Normal open acidic forest usually with some Vaccinium spp. on slope. Usually dominated by oaks such as chestnut oak or scarlet oak but occasionally dominated by white oak.
App Montane Oak Hickory Forest (Chestnut Oak Type) (CEGL00 7267)

2.Acidic to basic with low to high base status, high to moderate diversity forest with >25% cover of herbs in herb layer

1.High fern cover (>50% of herb layer are ferns. Can be either white oak or northern red oak dominated.

App Montane Oak-Hickory Forest (Red Oak Type) (CEGL006192)

2.High herb cover, but low fern cover (<50% of total herbaceous cover). Very common on VA side – usually northern red oak dominated, but sometimes with high percentages of Carya ovalis, chestnut oak, white oak, black oak. Substrate very rocky to only slightly rocky and mesic to somewhat dry. Forms two to three distinct bands as one proceeds downslope from ridgecrest on Virginia side of park. Herbaceous cover approaches cove, but can be distinguished from CEGL005222 by having very little Tilia americana and Aesculus in understory and canopy. If measuring soil, base status usually in 50's-90's (exceptions where limestone inclusions create greatly variable base status measurements. Only on VA side of park.
App Montane Oak–Hickory Forest (Rich Type) (CEGL007692)

3. White oak dominated with low to moderate herb cover but moderate to high diversity. Understory has plants of both acidic and calcophilic character. Some indicators include Cercis canadensis and Lindera benzoin alongside Oxydendrum arboreum. Herbaceous plants variable but always more diverse than 7267 and not as high cover and rich as 7692. Elevations below 2000 feet on Virginia side of park (down to Tennessee).

Ridge-and-Valley Dry-Mesic White Oak - Hickory Forest (CEGL007240)

b.Canopy may include oaks and hickories, but is predominantly composed of non-oak/hickory species (usually > 50% of canopy.)

1.Community restricted to upper slopes and interfluves of the highest elevations of the park (>2500 feet)

a.Forest containing a substantial amount of Betula lenta in canopy (>25%). Shrub layer dominated by Rhododendron spp

and/or Kalmia latifolia along with a high density of ferns. Usually a product of past disturbance. Only found on KY side of park.
[CENTRAL AND SOUTHERN APP OAK FOREST] Chestnut Oak Forest (Mesic Heath Subtype): Betula lenta subtype (CEGL006286)

b.Community on rich, disturbed ridgetop soil. Dominated by black walnut with Verbesina spp. in understory. Usually too small to map, so it will be embedded within a polygon of the matrix type.
[HUMAN MODIFIED / SUCCESSIONAL] Successional Black Walnut Forest (CEGL007879)

2.Community present exclusively on the mid to lower slopes and cove areas of the park (< 3000 feet elevation)

a.Young to medium even aged forest dominated by early successional tree species (age=10-60 years old) (>50% tuliptree or sassafras or red maple.
[HUMAN MODIFIED / SUCCESSIONAL]

1.Dominated by tuliptree (at least >50% of canopy)

a.Acidic version (no Cercis canadensis in understory and plenty of indicators of acidic soil (*Mitchella repens, Goodyera pubescens, Oxydendrum arboreum, Cypripedium acaule*). Disturbed >40 years ago and with oaks or other mid successional trees in understory now.
Mid- to Late-Successional Tuliptree - Hardwood Upland Forest (CEGL007221)

b.Calcareous version – Cercis canadensis present – sometimes dominated by young Juglans nigra or Fraxinus americana and can have Quercus muehlenbergii.
Successional Tuliptree Forest (Circumneutral Type) (CEGL007220)

2.Dominated by other than tuliptree.

a.Dominated by Sassafras albidum (probably fire induced community type)
Southern Blue Ridge Successional Sassafras Forest (CEGL004096)

a.Dominated by other than Sassafras

Dominated by a variety of species, usually including Acer rubrum, Nyssa sylvatica, Liriodendron tulipifera, Ilex opaca, and Betula lenta with a fairly sparse shrub and herb layer (although ferns and shrubs such

as Rhododendron maximum and Kalmia lat can often be dominant. Various aspects including on occasion flat areas near creeks up to mid and upper slopes. Only found on KY side.

Southern Appalachian Acidic Mixed Hardwood Forest (CEGL008558)

b.Older (> 60 years old) uneven aged stand not dominated by early successional tree species (although Liriodendron tulipifera, Acer rubrum, and Betula lenta can sometimes dominate young versions of these communities)

1.Low to high diversity forest dominated by Betula lenta or Fagus grandifolia or Acer rubrum or sometimes Liriodendron tulipifera

a.dominated by *Rhododendron maximum* in understory and very low to moderate herb cover.

1.Canopy dominated by beech in overstory, usually with some hemlock - generally in coves.
[APP (HEMLOCK)- N. HARDWOOD FOREST]
Cumberland/Appalachian Hemlock-Hardwood Forest (CEGL008407)

2.Canopy dominated by red maple, usually with some chestnut oak and sometimes with Betula lenta – North facing slopes.
[SOUTHERN APP OAK FOREST]
Chestnut Oak Forest (Mesic Heath Subtype) (CEGL006286)

b.Canopy dominated by beech or tuliptree and sometimes co-dominated by white oak and/or red maple. Without Rhodo max in understory and with some herbs typical of acidic (Smilax rot, Polystichum acrosticoides) and dry-mesic to mesic habitat. Can be more diverse where it begins to intergrade with cove habitat towards lower end of slope.
[SOUTH-CENTRAL INTERIOR MESOPHYTIC FOREST]
Central Interior Beech - White Oak Forest (CEGL007881)

2.High diversity forest or woodland dominated by mesic and/or calcophilic species, but not generally oaks (except occasionally over 50% cover of northern red oak)

a.Dry south facing woodland exclusively in Virginia (60% coverage or less) dominated by Fraxinus americana and Carya ovata with some Quercus rubra with Ostrya virginiana and/or Frangula caroliniana present in the shrub layer and a diverse herbaceous layer usually dominated by species such as Helianthus hirsutus and Salvia urticifolia. Often the canopy is as open as a woodland, but sometimes closed like a forest. Limestone rock usually present.
[CENTRAL APP ALKALINE GLADE AND WOODLAND]
Dry Calcareous Forest/Woodland (White Ash - Shagbark Hickory Type) (CEGL008458)

b.Closed to somewhat open canopy dominated by mesic forest species that can include Fraxinus americana, Liriodendron tulipifera, Tilia, Aesculus, Acer sac, etc. Usually in cove or rich slope area. Very mesic
[SOUTH-CENTRAL INTERIOR MIXED MESOPHYTIC FOREST]
Northern Mixed Mesophytic Forest (CEGL005222)