VASCULAR PLANT INVENTORY AND PLANT COMMUNITY CLASSIFICATION FOR COWPENS NATIONAL BATTLEFIELD

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

Prepared by NatureServe for the National Park Service
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This report consists of the main report along with a series of appendices with information about the plants and plant 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.natureserve.org/explorer.

Cover photo: Old field at dusk in the summer of 2002. 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 Cowpens National Battlefield in three ways:

1) Ecologists from NatureServe established 14 permanently marked one-hectare circular plots within the park in a grid system and another two circular plots in unique ecological areas that were not covered by the initial grid-based plot layout. 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 three natural and nine human-modified or successional vegetation associations (unique ecological assemblages of plants) within the park boundary. In addition, field workers used old literature and site analysis to identify a community type that existed during the Revolutionary War but probably no longer exists in the park. Two of these ecological communities merit special attention. The Floodplain Canebrake is a Coastal Plain and Piedmont community that is extremely rare due to suppression of fire and grazing and changes in land use within the range of cane and once occurred in the park but is no longer present here. The Piedmont Granitic White Oak - Black Oak Woodland is a particularly rare type that is known only from a set of locations in Virginia and one locality within the park at Cowpens.
3) Ecologists collected and vouchered 91specimens, most of them species that are new to the park. These species were added to a list that was begun by King (1997) and Newberry (2001). We now count 542 documented species, varieties, or subspecies of vascular plants in the park (536 species). We estimate that well over 90% of the vascular flora of the park is now documented. The plant species of largest conservation significance in the park is the federally threatened dwarf-flowered heartleaf (*Hexastylis naniflora*) (Department of the Interior 1989*).*

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. Currently, only a few units have compiled the baseline information needed to begin to assess the current state of natural resources at specific parks. Fewer still have begun to track and assess trends over time. 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 October 2001, NatureServe began work on the vascular plant inventory portion of the project at Cowpens National Battlefield.

Cowpens was established to preserve the Revolutionary War history of the area. Its natural history is just as varied as it's human history, and the park contains a globally rare plant species and a globally rare habitat type. The research emphasis at the park has traditionally focused on the human history of the land. However, floristic studies have been performed by a graduate student (King 1997) and a professor at USC-Spartanburg (Newberry 2001). 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 15 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 found in plots that were not already collected by Dr. Newberry (2001) or Ms. King (1997).

NatureServe also worked with photointerpreters from the University of Georgia Center for Remote Sensing and Mapping Science (CRMS) to complete a vegetation map of all of the communities in the park (Welch and Madden 2004).

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

Study Area

Cowpens National Battlefield is located in an old woodland and field landscape located two miles southeast of Chesnee, South Carolina in Cherokee County, South Carolina (National Park Service 1998). The park was established to preserve the battlefield where Daniel Morgan's American army decisively defeated Banastre Tarleton's British troops on January 17, 1781.

The site is 341 ha (843 acres), composed primarily of old fields, shrublands, mixed woods and forests, and riparian areas along the creeks that flow out of the park on all sides of the broad ridge that runs through the middle. Water from the park drains into the Broad River basin (the Pacolet and Broad Rivers). Elevation ranges from approximately 860 feet (262 meters) as the Long Branch of Island Creek exits the park to approximately 985 feet (302 meters) at the highest point of the gentle rise near the visitor's center.

Due to its location in the highly eroded Piedmont ecoregion (Bailey 1994), the park mostly consists of clay loam soils. The vast majority of the land in the park consists of upland slopes and uplands underlain by clay loam and sandy loams from the Appling, Cecil, and Madison series. In addition, the Worsham series of soils exists along the small creeks that flow out of the park. The Worsham series supports forests associated with wet or occasionally flooded environments whereas the other series support upland dry to dry mesic forests, woodlands, shrublands, and fields (Jones 1962). Due to the heavy amount of past agricultural use, most of the landscape and soils are highly eroded clays and many of the drainages are heavily gullied.

Cherokee County's climate consists of mild winters and warm/hot summers. There is no climate station on site, but records from adjacent Spartanburg County, South Carolina show that the coldest month in winter averages 43 degrees F and the warmest summer month average is 79 degrees F. Winters are short and the soil rarely freezes deeper than 4 to 5 inches at any given time. The average rainfall is 48 inches annually, the average length of freeze-free growing is about 227 days, and the amount of snow averages only about 4.6 inches annually (Jones 1962).

Land History

Cowpens National Battlefield Site was established in 1929 and later redesignated as Cowpens National Battlefield in 1972. The land upon which the park is located was settled at the time of the battle and was used as a cattle grazing and holding area (Babits 1998). According to accounts from those at the battle, most of the upland area consisted of a sparse canopy with an open understory with sparse trees. The creekbeds and wet areas were more heavily vegetated and included both heavy forest and canebrakes (Babits 1998). Most of the park shows signs of plowing and agriculture, with the exception of one very small patch of woodland in the upland section of the park and some of the bottomland drainage areas. All areas of the park have at least been logged and used for pasture repeatedly. A sizable portion of the park was occupied by humans until the addition of land in 1972. Since the establishment of the park, many former agricultural fields have grown up into successional forests or shrublands and others have been continuously mowed to approximate the appearance of the battlefield in the 1780's.

Methods

The inventory and monitoring project covers four main areas: permanent plot establishment for future research in the park, a vegetation classification of all the vegetation associations within the park according to the National Vegetation Classification (Grossman et al. 1998), a vascular plant inventory within the park boundary that builds upon the existing plant lists for the park, and a mapping project where NatureServe ecologists work with the mapping team from the University of Georgia to insure that the vegetation communities within the park are mapped using the National Vegetation Classification.

Permanent plot establishment

In order 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), Judy Teague from NatureServe used GIS layers supplied by the National Park Service's Cumberland Piedmont Network. She 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, Judy established an evenly spaced grid system (we chose the approximate grid size of 480 meters by 480 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 using Arcview and 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 upland areas and creekbeds with unusual vegetation. 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 late summer of 2001 and the summer of 2002, we established 14 plots on the grid system and an additional two plots in habitats not covered by any of the grid points (Figure 1). Using the GPS 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 of GPS coordinates may be more than five meters in some cases. In 2002, we recorded additional data at each point and worked in other locations as part of the vegetation mapping work.

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 section of the hectare in which to place our standardized vegetation monitoring plot. Within the plot, we measured environmental characteristics and identified every vascular plant within the plot (see Appendix I for a blank version of the data sheets used). We assigned each species a cover value by strata and an overall cover value for the plot based on a modified Braun Blanquet cover class scale. 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 2002 to resample the plots to attempt to document any species that we had missed the previous summer. The original plot sheets are held by the National Park Service.

We proofed the plot sheets, entered the data into the National Park Service PLOTS database, 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 Piedmont and with written descriptions of each related classification unit. These comparisons, combined with a thorough review of all classification possibilities and a review of the literature for some of these association types, allowed us to produce the current park vegetation classification.

Vascular plant inventory

While gathering plot data, we occasionally discovered plant species within the plots that had not already been documented by either King (1997) or Newberry (2001). 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.

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.

Vegetation mapping

In 2002 and 2003, we returned to Cowpens National Battlefield to follow-up on the first three goals and to cooperate with the University of Georgia Center for Remote Sensing and Mapping Science on their project to map all vegetation communities in the park. We supplied the University of Georgia team with all plot data already collected and a dichotomous key to the communities of the park and we walked throughout the park to help them identify unique mapping units. Since photointerpreters rely heavily on canopy species composition, understory species composition, and disturbance to classify polygons and ecologists rely just as heavily on the shrub and herb layer to classify types, the mapping units and the vegetation classification units do not always "crosswalk" (match up) perfectly. The last step of the project was to reconcile mapping units with vegetation associations to produce mapping units that match up well with the ecological units of the National Vegetation Classification. We continue to work with the University of Georgia team on the mapping; the vegetation map will be produced separately by the Center for Remote Sensing and Mapping Science and will include any crosswalk as specified in the cooperative agreement.

Results

During the species inventory work, we encountered and collected 94 specimens (Tables 2,3) representing 48 new species for the park and three new varieties or subspecies. We created 94 vouchers for the herbarium at Cowpens National Battlefield (Table 3) from the plants we collected and photographed. These specimens are in addition to the extensive collections of plants by King (1997) and Newberry (2001).

In addition to collecting all new plants encountered within the plots, we estimated what percentage of the flora in the park is now documented. Eliminating all varieties and questionable identifications and including previously collected specimens, we believe that researchers have documented 536 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 316.4 using all 16 full plots and the first-order jackknife method, 359.2 using all plots and the second-order jackknife method, 313.0 using just the 14 gridded plots and the first-order jackknife method, and 370.9 using just the 14 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 51.9, the beta value was 4.5, and the gamma value was 235.

Using the information gathered in each plot, we discerned 13 distinct vegetation associations within six distinct ecological systems, as defined by the United States National Vegetation Classification (Table 5). However, only four of the communities identified are considered "natural" as opposed to "semi-natural" or exotic species dominated. The common names of all of the communities are as follows (* = natural community):

Shortleaf Pine Early Successional Forest
Successional Loblolly Pine Forest
Successional Tuliptree – Hardwood Forest
Southern Piedmont Mesic Subacid Oak-Hickory Forest (*)
Interior Southern Red Oak – White Oak Forest (*)
Successional Water Oak Forest
Successional Sweetgum Floodplain Forest
Piedmont Granitic White Oak – Black Oak Woodland (*)
Golden Bamboo Shrubland
Floodplain Canebrake (*)
Blackberry – Greenbrier Successional Shrubland Thicket
Broomsedge Old Field
Cultivated Meadow

While working in the park, we also captured digital images of plots and plants. These images are indexed (Table 6) and a selection of them can be seen in Appendix III.

Finally, we have included the key to associations (Appendix IV). This tool helps those with a basic understanding of vegetation to classify community types within the park efficiently.

Discussion/Conclusions

Species Inventory

The field work from this project added over 48 species to a list of 488 species already documented as present within the current boundary of the park (Table 2). One goal of the Inventory and Monitoring program of the National Park Service is to document at least 90% of the vascular flora of the park. Using various estimates and assumptions, the estimate for total number of species in the park ranged from 316 to 371, a surprising number considering that the actual number documented at this point in time is 536. Taken literally, this figure would mean we had documented between 149% and 171% of the flora of the park. There are a number of possible explanations for this phenomenon. First, it is possible that specimens collected in the past may be identified incorrectly. A number of specimens collected by King (1997) were identified later by other staff and volunteers and may have been taken out of context and identified incorrectly. Second, the King (1997) collection includes a great deal of plants known to be cultivated/planted and/or exotic. When calculating species area curves, garden plants and other landscape plantings are not factored into the equation. If these plants are part of the total species list, the list will natually be much higher than any estimates that include plot data without the plantings. Third, it is possible that the plots that were laid out are not representative of the diversity of habitats in the park. If this is the case, the estimate for the number of species may be lower than the actual number. Another possible reason is that the species area curve equation simply failed to give us good numbers. This approach is admittedly a "one size fits all" approach. If this park has large pockets of high diversity areas and we missed all of them, the species area curve equation is not well equipped to deal with this situation.

Regardless, we feel that well over 90% of the flora in the park has been documented. Obviously, these numbers should only be used as an estimate, since tests of these indices have shown even the best ones to routinely underestimate the number of species in a park. Since we did sample systematically and without bias, we have a more accurate number than if we had sampled only in areas that were of similar vegetation or only focused on particular parts of the park (Palmer 1990, McCune and Grace 2002).

Because of its history of human-induced disturbance, intact ecological communities at Cowpens are only a small fraction of the total acreage. Most of the intact communities are small patches of oak forests and woodlands in the uplands. There is one occurrence of a federally listed threatened species, the dwarf-flowered heartleaf (*Hexastylis naniflora*). This plant occurs almost exclusively on the slopes immediately adjacent to all the small creeks within the park. In addition, Joe Pye weed (*Eupatorium fistulosum*) and black huckleberry (*Gaylussacia baccata*) are considered to be state concern species by the South Carolina Heritage Trust and are found in the park.

Most of the remaining species on the species list are G5 (extremely secure). Other species that are worth mentioning here but that are still somewhat secure (G4 species) include: Indian lovegrass (*Eragrostis pilosa*), hairy lettuce (*Lactuca hirsuta*), Turk's cap lily (*Lilium superbum*), and trailing phlox (*Phlox nivalis*).

The Southern Piedmont Mesic Subacid Oak-Hickory Forest probably contains most of the healthy populations of dwarf-flowered heartleaf, although it may also occur in the Successional Sweetgum Floodplain Forest and Successional Tuliptree-Hardwood Forests in some instances.

The diversity of the upland flora is low due to the successional nature of most of these forests and the lack of a diversity of ages in the upland flora. However, the Piedmont Granitic White Oak-Black Oak Woodland contains habitat for dozens of plant species not found in the rest of the park, such as Carolina silkgrass (*Pityopsis adenolepis*) and shaggy blazing star (*Liatris pilosa var. pilosa*). As such, it is an important habitat in the park that helps boost the total number of native plant species.

An astounding 28% (151) of the plant species in the park are not native to this ecoregion. 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 34 of the 536 species found within the park are considered highly aggressive or are a significant danger to native species within the Southeast or within the state (Miller 2000). These species are probably the biggest single threat to the overall ecological health of the park at this point in time. Along the wood edges, kudzu (*Pueraria montana var. lobata*) and wisteria (*Wisteria floribunda* and *sinensis*) can take hold and eventually overtake the canopy of stands, causing them to become monocultures of these invasive exotics and thereby seriously reducing biodiversity in the area. Golden bamboo (*Phyllostachys aurea*) has been planted in one area of the park and the stand expands yearly clonally, destroying habitat for all other plants as it expands. In the interior woods and forests, shrubs and vines such as silverberry (*Elaeagnus umbellata*), Japanese honeysuckle (*Lonicera japonica*), sweet breath of spring (*Lonicera fragrantissima*), climbing euonymus (*Euonymus fortunei*), English ivy (*Hedera helix*), and European/Chinese/Japanese privet (*Ligustrum vulgare/sinense/japonicum*) all have begun to colonize areas of the understory. Much of the floodplain for the creeks that run through the park is heavily dominated by a combination of exotics, but especially Japanese stiltgrass (*Microstegium vimineum*), multiflora rose (*Rosa multiflora*), and Chinese privet. In fields and newly cleared areas, both wet and dry, mimosa (*Albizia julibrissin*), tree of heaven (*Ailanthus altissima*), Johnson grass (*Sorghum halepense*), multiflora rose, Chinese silvergrass (*Miscanthus sinensis*), princess tree (*Paulownia tomentosa*), paper mulberry (*Broussonetia papyrifera*), bull thistle (*Cirsium vulgare*), shrubby lespedeza (*Lespedeza bicolor*), and Chinese lespedeza (*Lespedeza cuneata*) have colonized areas and seem to be expanding in cover over time. Other species may need monitoring and attention to ensure that they are not spreading, but the ones mentioned above seem to be the most likely candidates for control in the future.

Due to the high amount of disturbance associated with the fuels reduction project in the park, the invasive exotic problems in the shrubland and old field parts of the park are likely to become more acute unless an effort to restore native grasses and implement exotic species control efforts is undertaken. 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.

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 II 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 II, 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:

Shortleaf Pine Early Successional Forest

Stands of shortleaf pine (*Pinus echinata*) within the park may occur in upland areas away from steep to moderate slopes. These communities occur on old abandoned agricultural fields that have been allowed to grow into forests without heavy disturbances such as mowing, heavy grazing, or fire. This community occurs in approximately the same environment as the loblolly pine (*Pinus taeda*) forests and plantations in other parts of the park. The distribution of these two forests is most likely dictated by the proximity of the land to a seed source of either shortleaf pine or loblolly pine or the planting of either species within the areas that later developed to become pine forests. In either case, the environment of both types of forests is one of severe past disturbance followed by a recovery period of between 15 and 60 years.

Shortleaf pine forests are found in heavily farmed and eroded upland areas. Of all of the community types within Cowpens, this type may be the most species-poor. Many stands of this vegetation have absolutely no herbaceous vegetation and few shrubs or herbs. The herbaceous stratum is very sparse and is dominated either by exotics such as Japanese honeysuckle or by species highly tolerant of low-nutrient, high-acidity disturbed soils (ground pine (*Lycopodium digitatum*), poison ivy (*Toxicodendron radicans*), striped prince's pine (*Chimaphila maculata*), Virginia creeper (*Parthenocissus quinquefolia*), roundleaf greenbrier (*Smilax rotundifolia*)). The canopy varies greatly in composition depending upon the age of the forest. Younger forests (ones that were old fields only 20-40 years ago) may have low-statured canopies without an understory and may completely be dominated by shortleaf pine or mixed with loblolly pine. On the other hand, older forests (those between 40 and 60 years of age) may be more diverse since understory species such as tuliptree, red maple, and willow oak may begin to replace the shortleaf pine as they reach the end of their lifespan and senesce.

Successional pine forests are considered a human modified community and thus are of no conservation concern. This type is common due to the large scale abandonment of farmland over the last century in the Piedmont of South Carolina. It dominates patches of the most highly eroded, nutrient poor farmlands in the uplands.

This community is easily invaded by invasive exotic species such as Japanese honeysuckle, Chinese silvergrass, and tree of heaven. Although this community is not of conservation concern, management of the invasive exotics within this community may prevent the spread of these exotics into adjacent higher priority communities.

Successional Loblolly Pine – Sweetgum Forest

This community description encompasses all successional forests dominated by loblolly pine within the park boundary. It is a widespread successional forest type that exists throughout the southeastern United States on land left fallow after past agricultural activities. If left unmanaged or undisturbed, this can be a short-lived forest type, which is likely to succeed with greater age into various oak- and oak-pine-dominated forests.

Within the park, this community occurs in any flat upland areas that were formerly under agriculture. The community can occur alongside a similar community dominated by shortleaf pine (*Pinus echinata*).

The community at Cowpens is composed of at least 60% loblolly pine (*Pinus taeda*). The canopy also often contains a substantial component of shortleaf pine with an understory of sweetgum (*Liquidambar styraciflua*) and various oaks and hickories. Within the park, vegetation varies widely depending upon the density of the canopy. Examples with heavy pine beetle damage from recent outbreaks may have very sparse canopies and relatively high levels of light available to the ground layer. Damaged communities with open canopies can be much more diverse than the average stand, with species such as pink lady's slipper (*Cypripedium acaule*), broomsedge (*Andropogon virginicus*), panicgrass sp. (*Dichanthelium* spp.), Chinese lespedeza (*Lespedeza cuneata*), etc. occurring alongside the usual suspects of Japanese honeysuckle (*Lonicera japonica*) and poison ivy (*Toxicodendron radicans*).

Successional pine forests are considered a human modified community and thus are of no conservation concern. This type is very common due to the large scale abandonment of farmland over the last century in the Piedmont of South Carolina and is one of the most common associations within the park, especially on the flat uplands.

This community is easily invaded by invasive exotic species such as Chinese lespedeza, Japanese honeysuckle, silverberry, and Chinese silvergrass. Although this community is not of conservation concern, management of the invasive exotics within this community may prevent the spread of these exotics into adjacent higher priority communities.

Successional Tuliptree-Hardwood Forest

This forest is widespread throughout the Southeast and results from succession following human activities, such as logging and clearing. Stands are dominated by tuliptree, sometimes to the exclusion of other species.

This upland community occurs primarily on slopes and terraces that are adjacent to the streams of the park. These streams have created small, slightly protected micro-environments that seem to create ideal habitat for the generation of these communities, instead of successional pine communities, after heavy row cropping, terracing, or clearcutting. Evidence of past agriculture is very apparent in many locations where the community has developed on old terraces and other landforms created by past farming activities.

At Cowpens, this community is usually dominated by tuliptree (*Liriodendron tulipifera*) with occasional codominance by red maple (*Acer rubrum*), oaks, and pines. The shrub layer varies from moderate to sparse. The herbaceous layer is usually dominated by a combination of interior

forest species such as dwarf-flowered heartleaf (*Hexastylis naniflora*), Christmas fern (*Polystichum acrostichoides*), and strawberry bush (*Euonymus americana*) and weedy and exotic species such as poison ivy and Japanese honeysuckle. Composition varies depending upon proximity to the creek (drier areas away from the creek tend to have less of an herbaceous layer both because of the difference in moisture and the increased soil disturbance that probably occurred further away from waterways).

This association is considered a human modified community. However, many examples of this community have regenerated enough to supply habitat to the dwarf-flowered heartleaf. Thus, this community should be considered a high priority community within the landscape. It is a common type throughout the Piedmont of South Carolina.

As with other successional communities, this community is easily invaded by invasive exotic species such as Japanese honeysuckle. Management of the invasive exotics within this community may help to sustain healthy populations of the dwarf-flowered heartleaf.

Southern Piedmont Mesic Subacid Oak-Hickory Forest (*)

This community is limited to the most protected low slopes along creeksides. The community often borders the creek and may intergrade into Successional tuliptree-hardwood forest as it proceeds upslope.

Within the park, the canopy of this community is dominated by white oak (*Quercus alba*), sweetgum, tuliptree, and black oak (*Quercus velutina*). The understory is dominated by sourwood (*Oxydendrum arboreum*) and ironwood (*Carpinus caroliniana*). The shrub and herbaceous layers are extremely sparse but may contain a variety of shrubs such as blueberry spp. (*Vaccinium* spp.) and arrowwood spp. (*Viburnum* spp.), as well as herbaceous species such as King Solomon's seal (*Polygonatum biflorum*) and partridgeberry (*Mitchella repens*).
This community is an example of one of the few forests that is older than 50 years. It is also the prime habitat for the dwarf-flowered heartleaf within the park. Thus, this community should be considered a high priority community within the landscape. It is a common type throughout the Piedmont of South Carolina.

This community is more resistant to invasion by exotic species than successional communities. However, silverberry and Japanese honeysuckle can colonize this community and displace native plant species. Management of the invasive exotics within this community may help to sustain healthy populations of the dwarf-flowered heartleaf.

Interior Southern Red Oak – White Oak Forest (*)

This southern red oak - white oak dry forest is found in the Piedmont of Georgia, South Carolina, North Carolina, and Virginia, and in the interior uplands and Cumberland Plateau of Kentucky and Tennessee. It has also been reported from the Upper East Gulf Coastal Plain of Mississippi and Georgia. It generally is a second-growth forest on low-fertility Ultisols. The vegetation is dominated by oaks and lesser amounts of hickories. The canopy is continuous, and several species of oak may be present or codominant. The subcanopy closure is variable, ranging from less than 25% to more than 40% cover, and the shrub and herb layers generally are sparse. Subcanopy species include canopy species and red maple, tuliptree, sourwood, sweetgum,

winged elm, flowering dogwood, blackgum, and Eastern redcedar. The low-shrub stratum can be sparse to moderate and may be dominated by various ericaceous shrubs. Cat greenbrier (*Smilax glauca*) and muscadine (*Vitis rotundifolia*) are common vines..

This is perhaps the most common old forest (more than 60-80 years since plowing) in the park. Stands may have existed for over 80 years without major disturbance (besides selective cutting). These stands occur in the drier uplands of the park away from the more mesic creek bottoms and low slopes on low fertility acidic soil. Fire may have been a component of this community type in the past, especially if it was very light ground fire. However, it is unclear what role it may have had in this community (possibly a transitional community between the fire free creek slopes and the fire prone uplands where the battleground proper now sits).

The canopy can vary quite a bit within this park, but is always dominated by a combination of white oak, scarlet oak (*Quercus coccinea*), southern red oak (*Quercus falcata*), black oak, and sometimes northern red oak (*Quercus rubra*). The understory is generally very well-developed and dense and contains large amounts of sourwood, dogwood (*Cornus florida*), hickory spp., and blackgum (*Nyssa sylvatica*). The shrub stratum is sparse but does often contain hillside blueberry (*Vaccinium pallidum*) and farkleberry (*Vaccinium arboreum*) as dominants. Muscadine (*Vitis rotundifolia*) and cat greenbrier (*Smilax glauca*) are consistently present. Herbs are uncommon in this community, but King Solomon's seal, striped prince's pine, and other dry-mesic subshrubs and herbs may be present in small quantities. It is uncertain at this time what the vegetation of forests/woodlands of this area might look like with an intact fire regime (none of them exist at the moment in a healthy state). However, fire may have thinned out the forest, creating woodland and possibly increasing the diversity of herbaceous and shrub species in the ground layer.

For the most part, examples of this community are second growth stands. They may have been subject to occasional fire in the understory when fire was present on the landscape. These sites are not heavily invaded by invasive exotic species, but monitoring of some of these sites to determine if invasives are gaining a foothold would be prudent due to the high amount of exotic species in the park.

Successional Water Oak Forest

At Cowpens, this community type is found in at least one small patch on a slope just off a gentle ridge. It occurs in a somewhat protected position on the landscape, and was most likely an old field before trees began to outcompete the herbaceous layer.

This community is heavily dominated by *Quercus phellos* and *Quercus nigra* and little else. The shrub layer is heavily dominated by *Smilax* spp., and the herbaceous layer is sparse and species-poor.

This community is a result of disturbance and/or fire suppression of old fields in the Piedmont. This association occurs on mesic or dry-mesic sites, especially on loamy or other fine-textured soils.

This association is considered a human modified community and thus is of little conservation concern. It is a rare type in this area due.

Although this community is not of conservation concern, management of the invasive exotics within this community may prevent the spread of these exotics into adjacent higher priority communities. Japanese honeysuckle seems to be a particularly intense problem in this community.

Successional Sweetgum Floodplain Forest

This community is limited to the floodplains of small and mid-sized creeks within the park. The community occurs in areas formerly occupied by old fields or clearcuts.

The canopy of this community is dominated by a combination of sweetgum and red maple. It may also contain some examples of white oak and tuliptree, but any examples that have over 50% white oak should instead be considered Southern Piedmont Mesic Subacid Oak-Hickory Forest. The understory varies from occurrence to occurrence but usually contains younger sweetgum and red maple. The ground layer is very heavily dominated by tangles of vines and short shrubs, mostly greenbrier, muscadine, and Japanese honeysuckle. Sometimes 100% of the ground layer is covered by various vines and shrubs or Japanese stiltgrass.

This forest is considered a human modified community and thus is of little conservation concern. It is the predominant community type in the creekbeds and adjacent bottomlands in the park. Due to the history of heavy disturbance, it is perhaps the community with the largest invasive exotic problem in the park. It occurs throughout the drainages of the Piedmont of South Carolina.

This community is heavily invaded by invasive exotic species, especially Japanese stiltgrass, Japanese honeysuckle, multiflora rose, oriental ladysthumb (*Polygonum caespitosum var. longisetum*), privet, and silverberry. Although this community is not of conservation concern, management of the invasive exotics within this community may prevent the spread of these exotics into adjacent higher priority communities.

Piedmont Granitic White Oak- Black Oak Woodland

This community exists in upland areas that have not been recently plowed and that have maintained some sort of consistent disturbance regime such as fire, grazing, and/or mowing since settlement. At Cowpens, the community appears to have been maintained by an aggressive regime of mowing to preserve the battleground's open character. Other areas of the park have been plowed and farmed. However, this area appears to have much more intact soils and may have been preserved continuously in its current state for at least the past 70-100 years. The community is fairly dry and well-drained, but supports a substantial herbaceous cover of plants that are tolerant of these conditions but not tolerant of soil disturbance.

The one example of this community at Cowpens consists of a sparse canopy of scarlet oak, white oak, black oak, mockernut hickory (*Carya alba*), and southern red oak (*Quercus falcata*). The understory and shrub layers are fairly poorly developed, but the herb layer is extremely well-developed and diverse. Some of the most common species include little bluestem (*Schizachyrium scoparium*), purpledisk sunflower (*Helianthus atrorubens*), shaggy blazing star, greater tickseed (*Coreopsis major*), rattlesnake fern (*Pteridium aquilinum*), purpletop (*Tridens flavus*), splitbeard

bluestem (*Andropogon ternarius*), goat's rue (*Tephrosia virginiana*), tick trefoil (*Desmodium* spp.), Carolina silkgrass (*Pityopsis adenolepis*), and many others. Herbaceous coverage approaches 100%. Most of these plants will survive light ground fire and may thrive in such a situation, although intense fires may cause damage or death to white oak and mockernut hickory, depending upon the intensity of the burn.

This forest is considered a G1? community, which means that it is a globally rare community, though it hasn't been studied enough and found in enough spots to be sure about the rank. However, it is the highest ranked community in the park and only occurs in one patch of less than one acre.

In order to maintain and improve this community in the future, it will be important to either continue the current mowing regime or reintroduce light ground fire into this area. Adjacent communities are very impacted by exotic species and past farming practices, so it will also be important to monitor this community for invasion of exotics from adjacent stands of *Ligustrum sinense* and *Lonicera japonica*.

Floodplain Canebrake (*)

This association is characterized by dense, often monospecific thickets of the giant or river cane shrub (*Arundinaria gigantea*) occupying large areas referred to as canebrakes. The canebrake shrubland type was historically widespread, but is now rare and occupies very little of its former acreage. It was best developed in streamside flats and alluvial floodplains on ridges and terraces where it was protected from prolonged inundation. Historically, this community covered large areas of many floodplains and streamsides in the Coastal Plain from North Carolina to Texas, Mississippi River Alluvial Plain, Interior Highlands, Interior Low Plateau, Southern Blue Ridge and possibly the Central Appalachians of the southeastern United States. Stands occur on alluvial and loess soils and are often associated with bottomland hardwood forest vegetation. This association is successional and is thought to be maintained by periodic fires and/or grazing. It may have originated following abandonment of aboriginal agricultural fields or other natural and anthropogenic disturbances such as blow-downs and catastrophic floods.

Dense stands of cane (*Arundinaria gigantea ssp. gigantea*) were documented by soldiers during the Revolutionary War as existing along many of the creeks within the present-day park (Babits 1998). They were most likely maintained by fire. They no longer exist within the park boundary. In order to reintroduce this community to the park, it would be important to research the exact locations of these communities in the past and consider whether the current composition of those areas are justifiably transformed. A combination of frequent fire, seeding, and planting would be required to reintroduce cane at this time. Cane is found in the park and may serve as a source for transplanting and/or collecting seed in the years that it produces.

Although this community is locally extinct in this area, it is known to have been composed mainly of tall cane (*Arundinaria gigantea ssp. gigantea*) and other bottomland shrub and herbaceous species as thick "canebrakes."

This community is of major conservation concern. It has disappeared from most of its former range over the past 200 years. Much of this disappearance can be attributed to the loss of fire on the landscape and the loss of grazers in the ecosystem.

Small populations of native cane still exist in sparse patches throughout the park's streamside forests. To restore this community, it would be important to create openings and restore periodic fire to an area of the bottomland. This would encourage the growth of the cane and will help the cane better compete with faster growing but fire intolerant shrubs, trees, and herbs. However, much of the habitat of the dwarf-flowered heartleaf occupies these same creekside forests. Areas without dwarf-flowered heartleaf, but with the correct habitat, may be candidates for restoration in the future.

Golden Bamboo Shrubland

This community represents uplands invaded and dominated by golden bamboo (*Phyllostachys aurea*). It occurs in small to large patches where bamboo has escaped from plantings and established a monoculture.

Luckily, this community is limited in its extent at the present time. It occurs as a clonal patch of bamboo where this species was originally planted at Cowpens.

This community is not of conservation value. As a matter of fact, this community is comprised of an invasive exotic and should be controlled to keep it from spreading and overtaking other natural communities.

Blackberry – Greenbrier Successional Shrubland Thicket

This community exists throughout the park in any area that has been cleared but has not been mowed or burned within 3-5 years.

The vegetation of this community in the park consists of scattered small trees (eastern redcedar (*Juniperus virginiana var. virginiana*), persimmon (*Diospyros virginiana*), sweetgum) and a solid shrub cover of blackberry (*Rubus* spp.) and/or greenbrier (*Smilax* spp.). In addition, many examples of this community are overtopped nearly 100% with Japanese honeysuckle. This community often intergrades with the Cultivated Meadow association.

This association is considered a human modified community and thus is of no conservation concern. It is a very common type in this area due to the large scale abandonment of farmland over the last century in the Piedmont of South Carolina.

Although this community is not of conservation concern, management of the invasive exotics within this community may prevent the spread of these exotics into adjacent higher priority communities.

Successional Broomsedge Vegetation

This association includes vegetation that occurs on old fields, pastures, and rocky sites which is dominated by broomsedge along with other native species typical of old fields. This is a very common and wide-ranging association. Additional components include typical pioneer species; these and other associated species will vary with geography and habitat. This association may develop temporarily following clear-cutting, and will persist indefinitely under a regular mowing

regime, e.g., in powerline corridors. If undisturbed, these grasslands will rapidly succeed to shrubs, and eventually to tree species.

This community is dominated by (more than 50%) native grasses such as broomsedge (*Andropogon virginicus*) rather than fescue (*Lolium* spp.).

This association is considered a human modified community and thus is of little conservation concern. However, old fields dominated by native species can often add quite a lot to the overall biodiversity of a small park. It is a very common type in this area due to the large scale abandonment of farmland over the last century in the Piedmont of South Carolina.

This community is easily invaded by exotic species such as Japanese honeysuckle and privet. Although this community is of low conservation concern, management of the invasive exotics within this community may prevent the spread of these exotics into adjacent higher priority communities.

Cultivated Meadow

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. Within the park, this community occurs as an old field on many sites with a regular mowing regime.

Vegetation is dominated by European exotic grasses such as fescue (*Lolium* spp.).

This community occurs throughout the park in all regularly mowed areas. It is most common in the central core of the park.

This association is considered a human modified community and thus is of no conservation concern. It is a very common type in this area due to the large scale abandonment of farmland over the last century in the Piedmont of South Carolina.

This community is easily invaded by many invasive exotic species, especially Johnsongrass (*Sorghum halepense*), brome, Chinese lespedeza, privet, and Japanese honeysuckle. Although this community is not of conservation concern, management of the invasive exotics within this community may prevent the spread of these exotics into adjacent higher priority communities.

Ecological Community Summary

Of the thirteen associations described above, only four associations are considered natural or not successional. Of these four types, one no longer exists in the park, and the other three occur in areas that have been fallow for more than 50 years. All four of the most natural associations

combined account for one quarter to one third of the park's land area. These communities include the Southern Piedmont Mesic Subacid Oak-Hickory Forest, Interior Southern Red Oak – White Oak Forest, Piedmont Granitic White Oak-Black Oak Woodland, and Floodplain Canebrake**.** When considering priorities for land management, exotic invasive control, preservation, etc., these communities should take higher priority than the successional and exotic-dominated communities.

Of all these communities, the Piedmont Granitic White Oak-Black Oak Woodland is considered the rarest, a G1? community. Ecological communities are generally ranked on a scale of 1 to 5, with 5 being extremely secure throughout its range, and 1 being very rare and not secure. This unusual Piedmont woodland was probably originally maintained by fire and/or grazing. Since the battlefield was set aside and monuments were constructed, this part of the park has been mowed regularly. However, the soil appears intact and probably has either never been plowed or has not been plowed within the past 100 years. Thus, many plants sensitive to plowing have established here and few other places in the park (shaggy blazing star and Carolina silkgrass are two examples). Although all plants in this community are globally secure, this assemblage of plants is fairly unusual for the Piedmont of South Carolina, and therefore should be preserved.

Floodplain canebrakes are the other community type in this report considered in need of conservation (G2). Canebrakes occurred historically as a dominant landscape feature in southeastern United States floodplains at the time of European settlement (Platt 2001). They have rapidly disappeared due to lack of fire and anthropogenic disturbance. Unfortunately, very little is known of the canebrake community since it began disappearing rapidly shortly after European settlement. However, sources have documented that dense canebrakes provided cover for a variety of species now rare or extinct in the southeast, especially bison, swamp rabbits, black bear, passenger pigeons, six species of butterflies not known outside of canebrakes, and the endangered Bachman's warbler. Although this community, per se, is not found within the park, it was hinted at in the notes of several soldiers that participated in the battle (Babits 1998).

This floodplain floor is very impacted by invasive exotics such as privet and Japanese stiltgrass, so as these species become more common, the cane will probably continue to decline. In addition, the community needs a certain amount of disturbance to create ideal conditions, so the lack of fire, grazing, and/or wind disturbance has meant that much of the habitat has grown up into forest.

Although Cowpens National Battlefield has been impacted heavily by past land use practices and settlement, it nevertheless serves as a refuge for plant species and ecological communities that no longer exist in other parts of the region. In particular, it serves as a refuge for the Piedmont Granitic White Oak-Black Oak woodland, potential habitat for the Floodplain Canebrake community, and habitat for the federally threatened dwarf-flowered heartleaf. The battlefield will continue to serve as an important refuge in the middle of a heavily agricultural and increasingly suburbanized landscape.

Overview

Some of the recommendations for the park found throughout this document are summarized below:

1) control invasive exotics in all communities, but especially those in and near the priority natural communities. Privet, bamboo, silverberry, English ivy, Johnsongrass (*Sorghum halepense*), and Japanese honeysuckle may be the most important species on which to focus.
2) Explore the possibility of restoring some of the canebrakes that historically occurred at the time of the Revolutionary War, especially in drainages where there are no dwarf-flowered heartleaf.
3) Continue to protect high quality versions of the oldest ecosystems in the park (Southern Piedmont Mesic Subacid Oak-Hickory Forest, Interior Southern Red Oak Forest, and Piedmont Granitic White Oak – Black Oak Woodland.
4) Protect habitat for the federally threatened dwarf-flowered heartleaf.

Literature Cited

Anderson, M., P. Bourgeron, M.T. Bryer, R. Crawford, L. Engelking, D. Faber-Langendoen, M. Gallyoun, K. Goodin, D.H. Grossman, S. Landaal, K. Metzler, K.D. Patterson, M. Pyne, M. Reid, L. Sneddon, and A.S. Weakley. 1998. International classification of ecological communities: terrestrial vegetation of the United States. Volume II. The National Vegetation Classification System: list of types. The Nature Conservancy, Arlington, Virginia, USA.

ArcView GIS 3.2. 1992. Environmental Systems Research Institute, Inc. Redlands, CA.

Bailey, R. G.; Avers, P. E.; King, T.; McNab, W. H., eds. 1994. Ecoregions and subregions of the United States (map). Washington, DC: USDA Forest Service. 1:7,500,000. With supplementary table of map unit descriptions, compiled and edited by W. H. McNab and R. G. Bailey.

Babits, Lawrence E. 1998. A devil of a whipping: the battle of Cowpens. University of North Carolina Press. Chapel Hill, NC.

Bratton, S.P. and T. Butler. 1982. The distribution of exotic plant species at Cowpens National Battlefield. 18 p.

Critchfield, W.B. and E.L.Little, Jr. 1996. Geographic Distibution of the Pines of the World, USDA Forest Service Misc. Publication 991.

Department of the Interior. 1989. U.S. Fish and Wildlife Service. *Federal Register*, Vol. 54, No. 71. April 14, 1989. Pp. 14964-14967.

Garmin Corporation 1999. Garmin GPS III Plus Owner's Manual and Reference. Garmin International, Olathe, Kansas, USA.

Grossman, D.H., D. Faber-Langendoen, A.S. Weakley, M. Anderson, P. Bourgeron, R. Crawford, K. Goodin, S. Landaal, K. Metzler, K. Patterson, M. Pyne, M. Reid, and L. Sneddon. 1998. International classification of ecological communities: terrestrial vegetation of the United States. Volume 1. The National Vegetation Classification System: development, status, and applications. The Nature Conservancy, Arlington, Virginia, USA.

Heltshe, J.F., and N.E. Forrester. 1983. Estimating species richness using the jackknife procedure. Biometrics 39: 1-12.

Jones, S. M. 1988a. Old-growth forests within the Piedmont of South Carolina. Natural Areas Journal 8:31-37.

Jones, S. M. 1988b. Old-growth, steady state forests within the Piedmont of South Carolina. Ph.D. dissertation, Clemson University, Clemson, SC. 94 pp.

Jones, William. 1962. Soil Survey of Cherokee County, South Carolina. U.S. Department of Agriculture, U.S. Government Printing Office. Washington, DC.

Kartesz, J.T. 1999. A synonymized checklist and atlas with biological attributes for the vascular flora of the United States, Canada, and Greenland. First edition. *In* J.T. Kartesz and C.A. Meacham. Synthesis of the North American Flora, Version 1.0. North Carolina Botanical Garden, Chapel Hill.

King, C.W. 1997. Botanical survey of Cowpens National Battlefield. University of Southern Mississippi. 18 p.

McCune, B., and J.B. Grace. 2002. Analysis of Ecological Communities. MjM Software Design, Gleneden Beach, Oregon.

McCune, B., and M.J. Mefford. 1999. PC-ORD, Multivariate analysis and ecological data, Version 4. MjM Software Design, Gleneden Beach, Oregon.

Miller, James H., Erwin B. Chambliss, and Charles T. Bargeron. 2000. Invasive Plants of the Thirteen Southern States. http://www.invasive.org/south/seweeds.cfm. (Accessed: October 20, 2003).

National Park Service. 1998. Cowpens National Battlefield. Government Printing Office. 1 p.

National Park Service. 2001. Environmental Assessment for the Fire Management Plan of Cowpens National Battlefield. National Park Service.

Natural Resources Conservation Service (PLANTS database). 1991. PLOTS database. The Nature Conservancy/ National Park Service.

NatureServe. 2002. International Classification of Ecological Communities: Terrestrial Vegetation. Natural Heritage Central Databases. NatureServe, Arlington, VA.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: October 20, 2003).

Newberry, G. 2001. Rare plant distribution and proposed collection and inventory of herbaceous plants. University of South Carolina – Spartanburg.

Nichols, Becky, M. Jenkins, J. Rock, K. Langdon, and T. Leibfreid. 2000. Study plan for vertebrate and vascular plant inventories. Appalachian Highlands Network and Cumberland Piedmont Network, National Park Service.

Palmer, M.W. 1990. The estimation of species richness by extrapolation. Ecol. 71.

Welch, Roy and Marguerite Madden. 2004. Cowpens National Battlefield preliminary mapping data provided by NPS with permission. University of Georgia Center for Remote Sensing and Mapping Science.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: October 16, 2003).

Figure 1. Map of Cowpens National Battlefield with all permanent points marked at their actual locations.

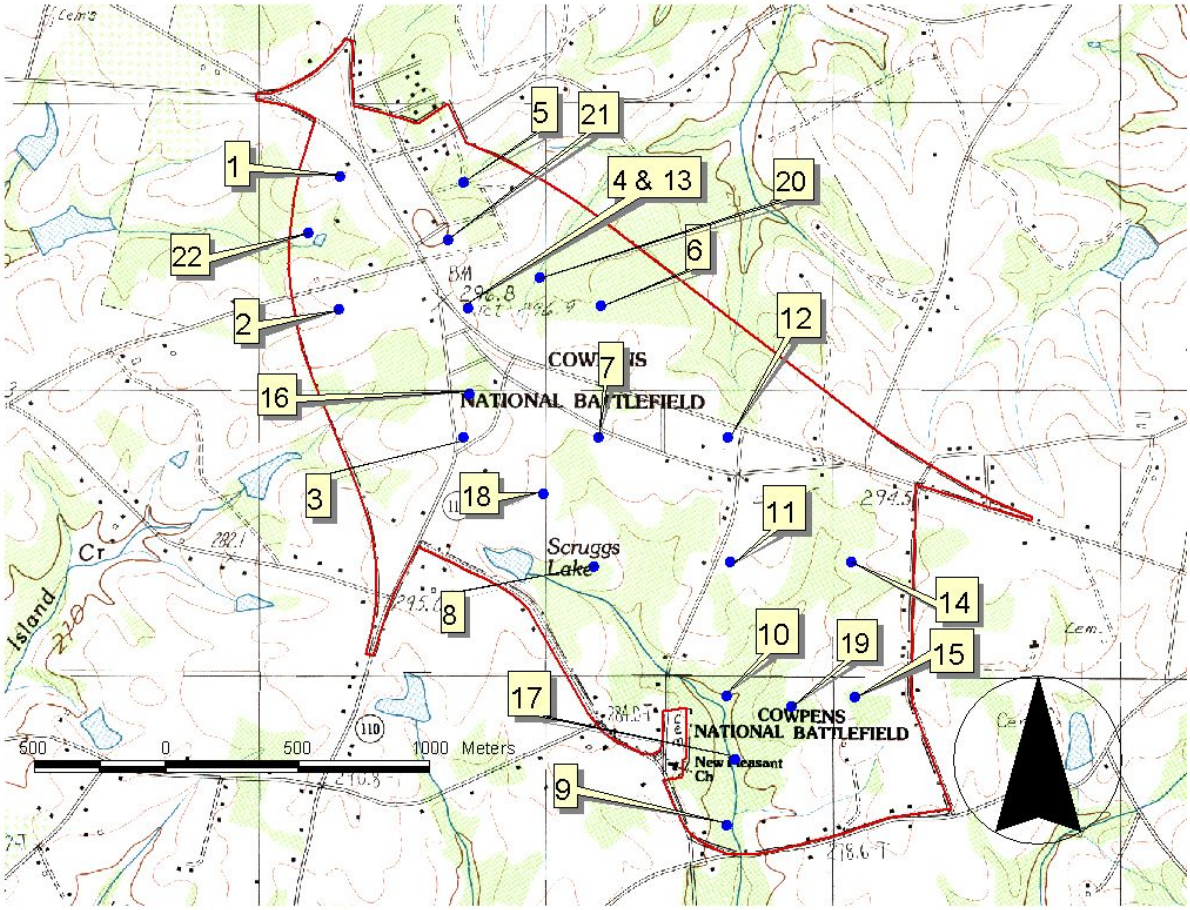
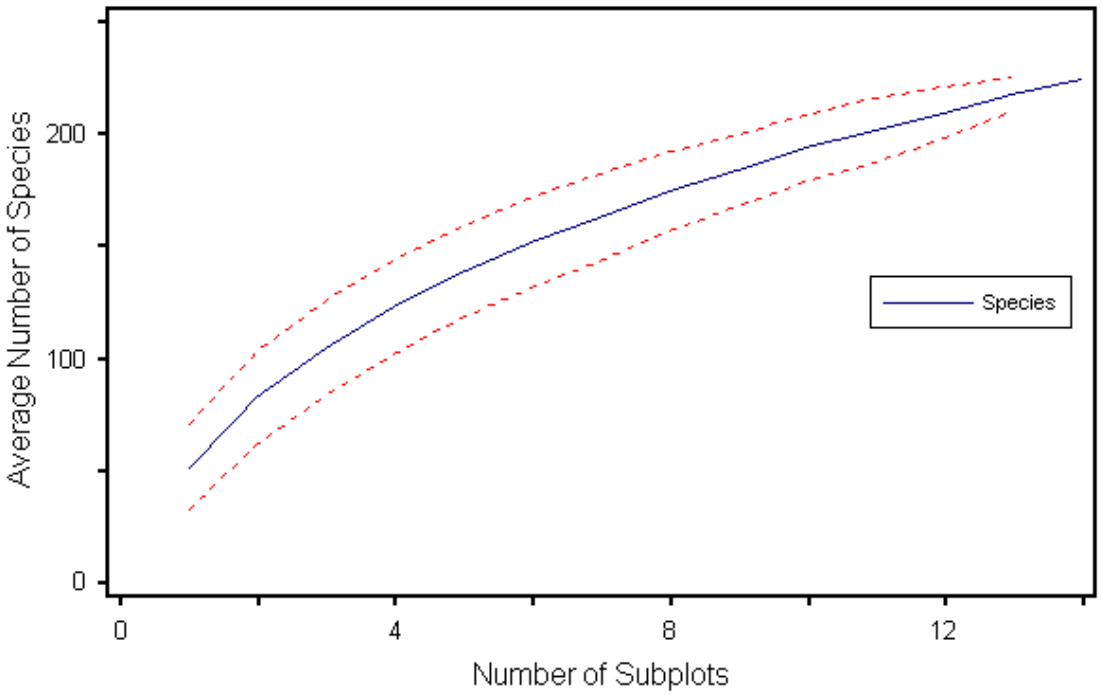


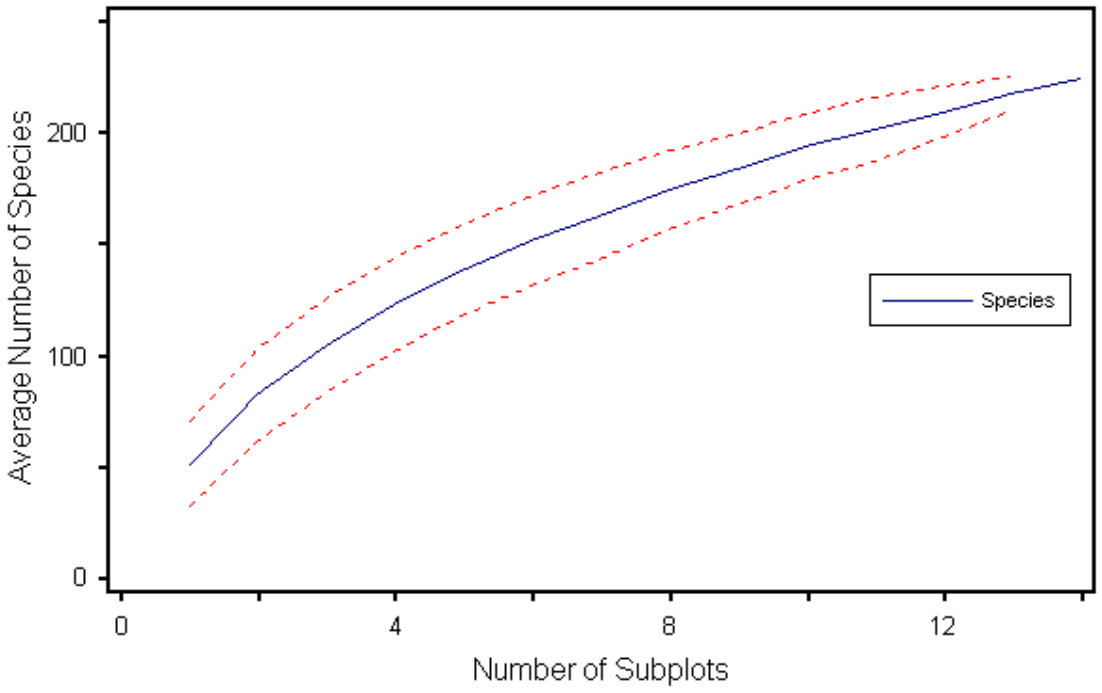
Figure 2. Species area curves for Cowpens National Battlefield derived using data from a) just the 14 gridded plots in the park and b) all 16 plots.

a)



First-order jackknife estimate of number of species in park = 318.8
Second-order jackknife estimate of number of species in park = 379.2

b)



First-order jackknife estimate of number of species in park = 321.2
Second-order jackknife estimate of number of species in park = 367.5

Table 1. Plot numbers and locations for all permanent plots established at Cowpens National Battlefield.

Plot Number	X Coordinate	Y Coordinate	Projection	Zone	Type of plot
1	425300.3	3888949	NAD83	17	FULL
2	425297	3888489	NAD83	17	FULL
3	425731.3	3888043	NAD83	17	FULL
4	425744.7	3888493	NAD83	17	FULL
5	425731.7	3888931	NAD83	17	FULL
6	426191.6	3888292	NAD83	17	FULL
7	426203.4	3888042	NAD83	17	FULL
8	426185.6	3887592	NAD83	17	FULL
9	426648	3886691	NAD83	17	FULL
10	426645.8	3887141	NAD83	17	FULL
11	426659.8	3887607	NAD83	17	FULL
12	426653.1	3888040	NAD83	17	FULL
13	425744.7	3888493	NAD83	17	QUICKPLOT
14	427081.6	3887606	NAD83	17	FULL
15	427096.4	3887137	NAD83	17	FULL
16	425750.6	3888193	NAD83	17	FULL
17	426678.2	3886919	NAD83	17	FULL
18	426007	3887846	NAD83	17	QUICKPLOT
19	426874	3887104	NAD83	17	QUICKPLOT
20	425998	3888600	NAD83	17	QUICKPLOT
21	425679	3888729	NAD83	17	QUICKPLOT
22	425188	3888754	NAD83	17	QUICKPLOT

Table 2. List of all plants documented for park ordered alphabetically by scientific name.

Latin Name	Common Name	TSN	Grank	Data Source
Abelia	abelia	182381	GNR	Newberry 2001
Abelia X grandiflora	glossy abelia	182382	GNR	NatureServe 2001/2002
Abutilon theophrasti	velvetleaf Indian mallow	21674	GNR	King 1997
Acalypha gracilens	slender threeseed mercury	28183	G5	NatureServe 2001/2002
Acalypha rhomboidea	threeseed mercury	28193	G5	Newberry 2001
Acer negundo	box elder	28749	G5	King 1997
Acer nigrum	black maple	182135	G5Q	NatureServe 2001/2002
Acer rubrum	red maple	28728	G5	Newberry 2001
Achillea millefolium	common yarrow	35423	G5	King 1997
Agalinis tenuifolia	slenderleaf false foxglove	33036	G5	King 1997
Agrostis perennans	autumm bentgrass	40423	G5	King 1997 NatureServe 2001/2002
Ailanthus altissima	tree of heaven	28827	GNR	Rogers 2000;
Aira	hairgrass	41375	GNR	Newberry 2001
Ajuga reptans	common bugle weed	32454	GNR	King 1997
Albizia julibrissin	mimosa	26449	GNR	Bratton and Butler, 1982;King 1997
Allium sp.	Wild onion	42634	n/a	King 1997
Alnus serrulata	tag alder	19468	G5	King 1997
Ambrosia artemisiifolia	common ragweed	36496	G5	Newberry 2001
Amelanchier arborea	downy serviceberry	25110	G5	Patton, 1996;King 1997
Amianthium muscitoxicum	flypoison	42775	G4G5	Newberry 2001
Amphicarpaea bracteata	hog-peanut	182067	G5	Newberry 2001; NatureServe 2001/2002
Andropogon gerardii	big bluestem	40462	G5	King 1997
Andropogon ternarius	splitbeard bluestem	40455	G5	Newberry 2001; NatureServe 2001/2002; Plots Database; King 1997
Andropogon virginicus	broomsedge	40456	G5	King 1997
Anemone lancifolia	mountain thimbleweed	18442	G5	Newberry 2001; King 1997 King 1997
Anemone virginiana	tall thimbleweed	18451	G5	King 1997
Anthoxanthum odoratum	sweet vernal grass	41395	GNR	NatureServe 2001/2002
Apios americana	groundnut	25390	G5	King 1997
Arabidopsis thaliana	mouse-ear cress	23041	GNR	King 1997
Arisaema triphyllum	Jack in the pulpit	42525	G5	Newberry 2001
Aristida dichotoma	churchmouse threeawn	41415	G5	Newberry 2001; King 1997
Aristida oligantha	oldfield threeawn	41405	G5	King 1997
Aristida purpurascens	arrowfeather threeawn	41428	G5	King 1997; NatureServe 2001/2002; NPS-COWP Herbarium
Arnoglossum atriplicifolium (called Cacalia atriplicifolia by King 1997)	pale Indian plantain	36583	G5	King 1997

Latin Name	Common Name	TSN	Grank	Data Source
Artemisia vulgaris	wormwood	35505	GNR	King 1997
Arundinaria gigantea	giant cane	40477	G5	Newberry 2001
Asclepias amplexicaulis	clasping milkweed	30244	G5	NatureServe 2001/2002
Asclepias tuberosa	butterflyweed	30313	G5?	King 1997
Asclepias verticillata	eastern whorled milkweed	30320	G5	King 1997
Asimina parviflora	smallflower pawpaw	18113	G5	Newberry 2001
Asimina triloba	pawpaw	18117	G5	Newberry 2001; King 1997
Asparagus officinalis	asparagus	42784	GNR	NatureServe 2001/2002
Athyrium filix-femina ssp. asplenioides (also called Athyrium asplenioides by Newberry 2001 and King 1997)	southern ladyfern	17415	G5	Newberry 2001; King 1997
Aureolaria flava	smooth yellow false foxglove	33484	G5	King 1997
Baccharis halimifolia	eastern baccharis	183760	G5	Newberry 2001
Betula pendula	European white birch	19495	GNR	Bratton and Butler, 1982
Bidens bipinnata	Spanish needles	500993	G5	Newberry 2001; King 1997
Bidens frondosa	sticktights	35707	G5	Newberry 2001
Bignonia capreolata	crossvine	34307	G5	King 1997
Boehmeria cylindrica	smallspike false nettle	19121	G5	King 1997
Botrychium biternatum	southern grapefern	17175	G5	Newberry 2001; NatureServe 2001/2002
Botrychium virginianum	rattlesnake fern	17173	G5	Newberry 2001
Brickellia eupatorioides var. eupatorioides (called Kuhnia eupatorioides by King 1997)	false boneset	526976	G5	King 1997
Bromus commutatus	hairy brome	40497	GNR	King 1997
Bromus japonicus	Japanese brome	40479	GNR	King 1997
Broussonetia papyrifera	paper mulberry	19107	GNR	Newberry 2001; King 1997
Bulbostylis capillaris	densetuft hairsedge	39361	G5	King 1997
Buxus sp.	boxwood	28022	GNR	Bratton and Butler, 1982
Callicarpa americana	American beautyberry	32144	G5	King 1997
Calycanthus floridus	sweet-shrub	18142	G5	Newberry 2001
Calystegia sepium	hedge bindweed	30650	GNR	King 1997
Campsis radicans	trumpet creeper	34309	G5	Newberry 2001
Capsella bursa-pastoris	shepherd's purse	22766	GNR	King 1997
Cardamine hirsuta	hairy bittercress	22797	GNR	Newberry 2001; King 1997
Carex complanata	blue sedge	39551	G5	NatureServe 2001/2002
Carex debilis	white edge sedge	39572	G5	NatureServe 2001-2002.
Carex lurida	shallow sedge	39414	G5	King 1997
Carex muehlenbergii	Muhlenber's sedge	39423	G5	King 1997
Carex nigromarginata	black edge sedge	39719	G5	King 1997
Carex rosea	rosy sedge	39429	G5	King 1997
Carex sp.	sedge	39369	n/a	King 1997
Carpinus caroliniana	ironwood	19504	G5	Newberry 2001

Latin Name	Common Name	TSN	Grank	Data Source
Carya alba (also called Carya tomentosa by Newberry 2001)	mockernut hickory	501306	G5	Patton, 1996;
Carya glabra	pignut hickory	19231	G5	Newberry 2001
Carya illinoinensis	pecan	19234	G5	Newberry 2001
Carya pallida	sand hickory	19244	G5	King 1997
Castanea dentata	American chestnut	19454	G4	Newberry 2001
Catharanthus roseus (was called Vinca rosea by King 1997)	Madagascar perywinkle	30168	GNR	King 1997
Ceanothus americanus	New Jersey tea	28454	G5	King 1997
Celtis laevigata	hackberry	19042	G5	King 1997
Centaurea cyanus	bachelor's button	36954	GNR	BONAP
Centrosema virginianum	butterflypea	25778	G5	King 1997
Cerastium fontanum ssp. vulgare	big chickweed	523831	GNR	NatureServe 2001/2002
Cerastium glomeratum	sticky chickweed	19955	GNR	Newberry 2001
Cercis canadensis	redbud	25782	G5	Newberry 2001
Chaenomeles speciosa (was called Chaenomeles lagenaria by Newberry 2001	flowering quince	508022	GNR	Newberry 2001
Chaerophyllum tainturieri	hairyfruit chervil	29617	G5	King 1997
Chamaecrista fasciculata var. fasciculata (also called Cassia fasciculata by King 1997)	partridge pea	566216	G5	King 1997; NatureServe 2001
Chamaecrista nictitans ssp. nictitans var. nictitans (also called Cassia nictitans by King 1997)	partridge pea	531597	G5	NatureServe 2001/2002
Chamaesyce maculata (also called Euphorbia supina by Newberry 2001)	spotted spurge	565061	G5	Newberry 2001
Chamaesyce nutans	eyebane	501442	G5	King 1997; NatureServe 2001/2002
Chasmanthium laxum	slender woodoats	41548	G5	NatureServe 2001-2002.
Chasmanthium sessiliflorum	longleaf woodoats	41551	G5T5	Newberry 2001
Chelone	turtlehead	33181	n/a	NatureServe 2001/2002
Chenopodium album	lambsquarters	20592	GNR	NatureServe 2001-2002.
Chenopodium ambrosioides	Mexican tea	20590	GNR	King 1997
Chimaphila maculata	striped prince's pine	23767	G5	Newberry 2001; King 1997
Chionanthus virginicus	fringetree	32950	G5	King 1997
Chrysopsis mariana	Maryland goldenaster	202495	G5	BONAP
Chrysopsis mariana (also called Heterotheca mariana by Newberry 2001)	Maryland goldenaster	202495	G5	Newberry 2001
Cinna arundinacea	stout wood-reed	40583	G5	Newberry 2001
Cirsium altissimum	tall thistle	36337	G5	NatureServe 2001-2002.
Cirsium horridulum (also called Carduus spinosissimus by Newberry 2001)	yellow thistle	36379	GNR	NatureServe 2001/2002

Latin Name	Common Name	TSN	Grank	Data Source
Cirsium vulgare (also called Carduus lanceolatus by Newberry 2001)	bull thistle	36428	GNR	Newberry 2001
Clitoria mariana	Atlantic pigeonwings	26542	G5	King 1997
Commelina communis	Asiatic dayflower	39127	GNR	King 1997
Consolida ajacis	rocket larkspur	501621	GNR	
Convolvulus arvensis	field bindweed	30705	GNR	King 1997
Conyza canadensis var. canadensis (also called Erigeron canadensis by Newberry 2001)	Canadian horseweed	527476	G5	NatureServe 2001/2002
Coreopsis major	greater tickseed	37143	G5	King 1997
Cornus amomum	silky dogwood	27799	G5	King 1997
Cornus florida	flowering dogwood	27806	G5	Newberry 2001; King 1997
Cornus foemina	stiff dogwood	27803	G5	NatureServe 2001-2002.
Crataegus	hawthorn	24539	n/a	King 1997
Crataegus flava	yellowleaf hawthorn	24562	G5	Newberry 2001
Crotalaria sagittalis	arrowhead rattlebox	26579	G5	King 1997
Croton glandulosus var. septentrionalis	vente conmigo	527541	G5	NatureServe 2001-2002; King 1997
Cuscuta pentagona var. pentagona (was called Cuscuta campestris by King 1997)	field dodder	527603	G5	King 1997
Cynodon dactylon	bermuda grass	41619	GNR	King 1997
Cyperus aggregatus (was called Cyperus flavus by King 1997)	inflated-scale flatsedge	501912	G5	King 1997
Cyperus echinatus (was called Cyperus ovularis by King 1997)	globe flatsedge	501920	G5	King 1997
Cyperus esculentus	chufa flatsedge	39888	G5	King 1997
Cyperus iria	ricefield flatsedge	39934	GNR	NatureServe 2001-2002.
Cyperus lupulinus ssp. Lupulinus (was called Cyperus filiculmis by King 1997)	Great Plains flatsedge	523933	G5	King 1997
Cyperus pseudovegetus	marsh flatsedge	39896	G5	King 1997
Cyperus retrorsus	pine barren flatsedge	39898	G5	King 1997; BONAP
Cyperus strigosus	stawcolored flatsedge	39901	G5	King 1997
Cypripedium acaule	pink lady's slipper	43534	G5	Newberry 2001
Cytiscus scoparius	Scotch broom	26591	GNR	Newberry 2001
Dactylis glomerata	orchard grass	193446	GNR	King 1997
Datura stramonium	jimsonweed	30520	GNR	King 1997
Daucus carota	Queen Anne's lace	29477	GNR	Newberry 2001; King 1996
Decumaria barbara	woodvamp	24323	G5	King 1997
Desmodium canescens	hoary ticktrefoil	25792	G5	Newberry 2001
Desmodium ciliare	littleleaf tickclover	25793	G5	King 1997
Desmodium glabellum	Dillenius' ticktrefoil	25799	G5	NatureServe 2001-2002.

Latin Name	Common Name	TSN	Grank	Data Source
Desmodium laevigatum	smooth tickclover	25806	G5	Newberry 2001; NatureServe 2001/2002; King 1997
Desmodium lineatum	sand ticktrefoil	25808	G5	Newberry 2001
Desmodium marilandicum	smooth ticktrefoil	25809	G5	Natureserve 2001-2002
Desmodium nudiflorum	nakedflower ticktrefoil	25812	G5	King 1997
Desmodium paniculatum	panicled tickclover	25815	G5	Newberry 2001; King 1997
Desmodium rotundifolium	prostrate ticktrefoil	502020	G5	NatureServe 2001/2002
Desmodium viridiflorum	velvetleaf ticktrefoil	25833	G5?	Natureserve 2001-2002.
Dianthus armeria	Deptford pink	20276	GNR	Newberry 2001
Dichanthelium acuminatum var. acuminatum	tapered rosette grass	527684	G5	Natureserve 2001-2002.
Dichanthelium commutatum (was called Panicum commutatum by King 1997)	variable panicgrass	41647	G5	Natureserve 2001-2002.
Dichanthelium dichotomum var. ramulosum (was called Panicum dichotomum by King 1997)	cypress panicgrass	527691	G5	NatureServe 2001/2002
Dichanthelium laxiflorum (was called Panicum laxiflorum by King 1997)	openflower rosette grass	41661	G5	King 1997
Dichanthelium scoparium (was called Panicum scoparium by King 1997)	velvet panicum	41651	G5	Natureserve 2001-2002.
Dichanthelium sphaerocarpon	roundseed panicgrass	41671	G5	NatureServe 2001/2002
Dichanthelium sphaerocarpon var. isophyllum	roundseed panicgrass	527701	G5	NatureServe 2001/2002
Digitaria cognata var. cognata	fall witchgrass	527714	G5	NatureServe 2001/2002
Digitaria ischaemum	smooth crabgrass	40637	GNR	Newberry 2001; King 1997
Digitaria sanguinalis	hairy crabgrass	40604	G5	Newberry 2001
Dioscorea	wild yam	43366	n/a	King 1997
Dioscorea quaternata	fourleaf yam	43371	G5	Newberry 2001; NatureServe 2001/2002
Dioscorea villosa	wild yam	43367	G4G5	Newberry 2001
Diospyros virginiana	persimmon	23855	G5	Newberry 2001
Diphasiastrum digitatum	Running Cedar	512327	G5	Newberry 2001
Draba verna	spring Whitlowgrass	22923	GNR	Newberry 2001; King 1997
Duchesnea indica	Indian strawberry	25163	GNR	King 1997
Elaeagnus angustifolia	Russian olive	27770	GNR	Bratton and Butler, 1982
Elaeagnus umbellata	silverberry	27776	GNR	Newberry 2001
Eleocharis obtusa	blunt spikerush	40017	G5	King 1997
Elephantopus carolinianus	Carolina elephantsfoot	37297	G5	NatureServe 2001-2002; King 1997
Elephantopus tomentosus	hairy elephantfoot	37300	G5	Newberry 2001; NatureServe 2001/2002
Eleusine indica	Indian goosegrasss	41692	GNR	King 1997
Epigaea repens	trailing arbutus	23646	G5	King 1997
Eragrostis capillaris	lace grass	40774	G5	NatureServe 2001-2002.

Latin Name	Common Name	TSN	Grank	Data Source
Eragrostis hirsuta	bigtop lovegrass	40744	G5	NatureServe 2002; Newberry 2001; King 1997
Eragrostis pilosa	Indian lovegrass	40755	G4	King 1997 ; NatureServe 2001/2002
Eragrostis spectabilis	purple lovegrass	40717	G5	King 1997
Erechtites hieraciifolia	fireweed	37320	G5	Newberry 2001; NatureServe 2001/2002
Eremochloa ophiuroides	centipede grass	41713	GNR	Newberry 2001
Erigeron strigosus	Daisy Fleabane	35951	G5	King 1997
Erodium cicutarium	filaree	29147	GNR	King 1997
Erythronium americanum	dogtooth violet	196365	G5	King 1997
Euonymus americana	strawberry bush	502577	G5	Newberry 2001; King 1997
Euonymus fortunei	climbing euonymus	27950	GNR	Rogers 2000;BONAP database from contributed material.
Eupatorium album	white thoroughwort	35982	G5	King 1997
Eupatorium capillifolium	dogfennel	35978	G5	Newberry 2001
Eupatorium fistulosum	Joe Pye weed	502509	G5?	King 1997
Eupatorium hyssopifolium	hyssopleaf thoroughwort	35979	G5	Newberry 2001; King 1997
Euphorbia corollata	flowering spurge	28057	G5	Newberry 2001
Euphorbia maculata	spotted spurge	28034	G5	Newberry 2001; King 1997
Euphorbia pubentissima	false flowering spurge	28125	G5	NatureServe 2001/2002
Eurybia macrophylla (also called Aster macrophyllus by Newberry 2001)	bigleaf aster	513449	G5	Newberry 2001
Facelis retusa	annual trampweed	37367	GNR	Newberry 2001; King 1997
Fagus grandifolia	American beech	19462	G5	Natureserve 2001-2002.
Ficus carica	common fig	19093	GNR	Bratton and Butler, 1982
Fimbristylis autumnalis	slender fimbry	40111	G5	King 1997
Fragaria virginiana	wild strawberry	24639	G5	King 1997
Frangula caroliniana	Carolina buckthorn	506986	G5	Natureserve 2001-2002.
Fraxinus americana	white ash	32931	G5	NatureServe 2001-2002; King 1997
Fraxinus sp.	ash	32928	n/a	King 1997
Galium aparine	bedstraw	34797	G5	King 1997
Galium circaezans	licorice bedstraw	34800	G5	Newberry 2001
Galium pedemontanum	piedmont bedstraw	34906	GNR	Newberry 2001; King 1997
Galium pilosum var. puncticulosum	hairy bedstraw	528214	G5	NatureServe 2001-2002.
Gaylussacia baccata	black huckleberry	23660	G5	NatureServe 2001-2002.
Gelsemium sempervirens	Carolina jessamine	29932	G5	NatureServe 2001-2002.; King 1997
Gentiana saponaria	moss gentian	29986	G5	Newberry 2001
Geranium carolinianum	Carolina crane's-bill	29105	G5	Newberry 2001; King 1997
Geranium maculatum	spotted geranium	29107	G5	King 1997
Geum canadense	white avens	24645	G5	King 1997
Gleditsia triacanthos	Honey locust	26714	G5	Newberry 2001; King 1997

Latin Name	Common Name	TSN	Grank	Data Source
Goodyera pubescens	downy rattlesnake plantain	43594	G5	Newberry 2001
Halesia carolina	Carolina silverbell	23864	G5	King 1997
Hedera helix	English ivy	29393	GNR	Newberry 2001
Helenium amarum	bitter sneezeweed	36007	G5	Newberry 2001
Helianthus atrorubens	purpledisk sunflower	36620	G5	King 1997
Helianthus divaricatus	woodland sunflower	36636	G5	BONAP; King 1997
Helianthus microcephalus	small woodland sunflower	36654	G5	NatureServe 2001-2002; King 1997
Hemerocallis fulva	orange daylily	42943	GNR	NatureServe 2001-2002.
Heterotheca subaxillaris	camphorweed	37686	G5	Newberry 2001; King 1997
Hexastylis arifolia	little brown jug	502983	G5	Cindy King plant collection:1996; King 1997
Hexastylis heterophylla	variableleaf heartleaf	502985	G4G5Q	King 1997
Hexastylis naniflora	dwarf-flowered heartleaf	194912	G2	Newberry 2001
Hibiscus syriacus	rose-of-Sharon	21638	GNR	Bratton and Butler, 1982
Hieracium gronovii	Gronovi's hawkweed	37710	G5	Newberry 2001; King 1997
Hieracium venosum	rattlesnakeweed	37734	G5	Newberry 2001; King 1997
Houstonia caerulea	azure bluet	35038	G5	Newberry 2001; King 1997
Houstonia purpurea	Venus' pride	35051	G5	Newberry 2001
Houstonia pusilla	tiny bluet	35052	G5	Newberry 2001; King 1997
Huperzia lucidula	shining clubmoss	503079	G5	Newberry 2001; King 1997
Hypericum	St. John's wort	21416	n/a	King 1997
Hypericum calycinum	Aaron's beard	21430	GNR	Bratton and Butler, 1982
Hypericum gentianoides	orangegrass	21420	G5	Newberry 2001; NatureServe 2001/2002
Hypericum hypericoides	St. Andrew's cross	503138	G5	Newberry 2001; NatureServe 2001/2002
Hypericum hypericoides ssp. multicaule	St. Andrew's cross	524170	G5	NatureServe 2001-2002.
Hypericum setosum	hairy St. Johnswort	21459	G4G5	King 1997
Hypochaeris radicata	openflower rosette grass	37794	GNR	Newberry 2001
Hypoxis hirsuta	eastern yellow star-grass	503146	G5	King 1997
Ilex glabra	inkberry	27981	G5	King 1997
Ilex opaca	American holly	27982	G5	Newberry 2001
Ilex verticillata	common winterberry	27985	G5	NatureServe 2001-2002.
Ipomoea coccinea	scarlet morningglory	30770	G?	King 1997
Ipomoea hederacea	ivyleaf morningglory	503177	G5	Newberry 2001
Ipomoea lacunosa	white morninglory	30776	G5?	King 1997 ; King 1997
Ipomoea pandurata	man of the earth	30786	G5	King 1997

Latin Name	Common Name	TSN	Grank	Data Source
Ipomoea purpurea	common morning glory	30789	GNR	King 1997
Ipomoea sagittata	saltmarsh morning glory	30792	G5?	King 1997
Iris verna	dwarf violet iris	43201	G5	NatureServe 2001-2002.
Iris verna var. smalliana	dwarf violet iris	528565	G5	NatureServe 2001-2002.
Itea virginica	Virginia sweetspire	24202	G4	Newberry 2001
Juglans nigra	black walnut	19254	G5	Newberry 2001
Juncus acuminatus	tapertip rush	39221	G5	King 1997
Juncus effusus	common rush	39232	G5	King 1997
Juncus tenuis	path rush	39243	G5	NatureServe 2001-2002.
Juniperus virginiana	eastern red-cedar	18048	G5	Newberry 2001
Kalmia latifolia	mountain laurel	23677	G5	King 1997
Krigia virginica	Virginia dwarfdandelion	37816	G5	King 1997
Kummerowia stipulacea	Korean clover	503293	GNR	Newberry 2001
Kummerowia striata (also called Lespedeza striata by King 1997)	Japanese clover	503294	GNR	Newberry 2001; NatureServe 2001/2002
Lactuca canadensis	Florida blue lettuce	36596	G5	King 1997
Lactuca floridana	Florida lettuce	36599	G5	King 1997
Lactuca hirsuta	hairy lettuce	36601	G4?	King 1997
Lagerstroemia indica	crape myrtle	27110	GNR	Bratton and Butler, 1982
Lamium amplexicaule	henbit	32539	GNR	King 1997
Lamium purpureum	purple deadnettle	32543	GNR	Newberry 2001; King 1997
Laportea canadensis	Canada wood nettle	19127	G5	King 1997
Lathyrus hirsutus	Singletary pea	25845	GNR	?
Lathyrus latifolius	everlasting pea	25856	GNR	Newberry 2001; NatureServe 2001/2002
Leersia virginica	cut grass	40890	G5	Newberry 2001; NatureServe 2001/2002
Lepidium virginicum	Virginia pepperweed	22955	G5	King 1997
Lespedeza	lespedeza	25892	n/a	Bratton and Butler, 1982
Lespedeza bicolor	shrubby lespedeza	25895	GNR	Newberry 2001
Lespedeza cuneata	Chinese lespedeza	25898	GNR	Newberry 2001, NatureServe 2001/2002, NPS-COWP/COWP Herbarium
Lespedeza procumbens	trailing lespedeza	25907	G5	Newberry 2001
Lespedeza repens	creeping lespedeza	503402	G5	NatureServe 2001-2002.
Lespedeza violacea	violet lespedeza	25914	G5	Newberry 2001; NatureServe 2001-2002.
Lespedeza virginica	slender bush clover	25915	G5	King 1997
Leucanthemum vulgare (also called Chrysanthemum leucanthemum by Newberry 2001)	oxeye daisy	37903	GNR	King 1997
Liatris pilosa var. pilosa (also called Liatris graminifolia by King 1997)	shaggy blazing star	531224	G5? T4T5	King 1997

Latin Name	Common Name	TSN	Grank	Data Source
Ligustrum	privet	32973	GNR	Bratton and Butler, 1982
Ligustrum japonicum	Japanese privet	503449	GNR	Bratton and Butler, 1982
Ligustrum sinense	Chinese privet	32979	GNR	Newberry 2001
Ligustrum vulgare	European privet	32980	GNR	Rogers 2000;BONAP database from contributed material.
Lilium superbum	Turk's-cap lily	42723	G4	King 1997
Linaria canadensis	Canada toadflax	33211	G5	King 1997
Linum virginianum	woodland flax	29202	G4G5	King 1997
Liquidambar styraciflua	sweetgum	19027	G5	Newberry 2001
Liriodendron tulipifera	tuliptree	18086	G5	King 1997
Lobelia puberula	downy lobelia	34529	G5	Newberry 2001; King 1997
Lolium perenne ssp. multiflorum (was called Lolium multiflorum by King 1997)	annual ryegrass	40892	GNR	King 1997
Lolium pratense (was called Festuca elatior by King 1997)	meadow fescue	507983	GNR	Newberry 2001
Lonicera fragrantissima	sweet breath of spring	35293	GNR	Newberry 2001
Lonicera japonica	Japanese honeysuckle	35283	GNR	Newberry 2001
Ludwigia alternifolia	seedbox	27335	G5	King 1997
Ludwigia decurrens	wingleaf primrose-willow	27343	G5	King 1997
Ludwigia palustris	marsh primrose-willow	27336	G5	Newberry 2001
Luzula multiflora	common woodrush	39333	G5	NatureServe 2001-2002.
Lycopodium digitatum (was called Lycopodium flabelliforme by King 1997)	fan clubmoss	516506	G5	King 1997
Lycopodium obscurum	ground pine	17032	G5	Newberry 2001
Lycopus virginicus	Virginia bugleweed	32255	G5	King 1997
Magnolia grandiflora	Southern magnolia	18074	G5	Newberry 2001
Maianthemum racemosum ssp. Racemosum (was called Smilacina racemosa by King 1997)	false Solomon's seal	43036	G5	King 1997
Malus pumila (was called Malus sylvestris by Bratton and Butler 1982)	paradise apple	25262	G5	Newberry 2001
Medeola virginiana	Indian cucumber-root	42963	G5	Newberry 2001; King 1997
Medicago	medic clover	183622	n/a	King 1997
Melia azedarach	chinaberry	29024	GNR	Newberry 2001
Melilotus alba	white sweetclover	26149	GNR	King 1997
Microstegium vimineum	Japanese stiltgrass	503829	GNR	Newberry 2001; NatureServe 2001/2002
Mikania scandens	climbing hempvine	36043	G5	King 1997
Mimosa microphylla (was called Schrankia microphylla by King 1997)	littleleaf sensitive-briar	507831	GNR	King 1997
Miscanthus sinensis	Chinese silvergrass	41874	GNR	Newberry 2001
Mitchella repens	partridgeberry	35063	G5	Newberry 2001; King 1997

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Mollugo verticillata	green carpetweed	19899	GNR	Cindy King plant collection:1996; King 1997
Monotropa hypopithys	pinesap	503871	G5	Newberry 2001
Monotropa uniflora	Indianpipe	23778	G5	Newberry 2001
Morus alba	white mulberry	19066	GNR	Bratton and Butler, 1982
Morus rubra	red mulberry	19070	G5	King 1997
Muhlenbergia	muhly	41883	n/a	King 1997
Muhlenbergia schreberi	nimblewill muhly	41939	G5	King 1997
Muscari	grape hyacinth	42976	GNR	King 1997
Muscari neglectum	starch grapehyacinth	503892	GNR	BONAP
Muscari racemosum	grape hyacinth	42979	GNR	King 1997
Narcissus	daffodil	500435	GNR	King 1997
Nyssa sylvatica	blackgum	27821	G5	Newberry 2001
Oenothera fruticosa	narrowleaf evening-primrose	27369	G5	King 1997
Oenothera laciniata	cut-leaved evening primrose	27371	G5	King 1997
Onoclea sensibilis	sensitive fern	17637	G5	King 1997
Ophioglossum vulgatum	Southern adder's tongue	565333	G5	NatureServe 2001-2002.
Osmunda cinnamomea	cinnamon fern	17219	G5	Newberry 2001
Osmunda regalis var. spectabilis	royal fern	529314	G5	Newberry 2001; NatureServe 2001/2002
Oxalis	wood sorrel	29062	n/a	King 1997
Oxalis stricta (was called Oxalis dillenii by Newberry 2001)	Dillen's oxalis	29095	G5	Newberry 2001
Oxydendrum arboreum	sourwood	23690	G5	Newberry 2001
Packera anonyma (was called Senecio smallii by King 1997)	Small's ragwort	518137	G5	King 1997
Panicum anceps	beaked panicgrass	40904	G5	King 1997
Panicum dichotomiflorum	fall panicgrass	40908	G5	King 1997
Parthenium integrifolium	wild quinine	38166	G5	King 1997
Parthenocissus quinquefolia	Virginia creeper	28602	G5	King 1997
Paspalum dilatatum	Dallasgrass	40997	GNR	Newberry 2001
Paspalum floridanum	Florida paspalum	40992	G5	King 1997
Paspalum laeve	field paspalum	41024	G4G5	King 1997
Paspalum notatum	bahiagrass	41000	GNR	King 1997
Paspalum notatum var. saurae	bahiagrass	529414	GNR	Newberry 2001
Passiflora incarnata	purple passionflower	504139	G5	King 1997
Paulownia tomentosa	princess tree	33460	GNR	Bratton and Butler, 1982
Pennisetum glaucum	yellow bristlegrass	565385	GNR	NatureServe 2001/2002
Penstemon laevigatus	eastern smooth beardtongue	33929	G5	King 1997
Philadelphus coronarius	sweet mock orange	24421	GNR	NatureServe 2001-2002.
Phlox carolina	thickleaf phlox	30921	G5?	King 1997
Phlox nivalis	trailing phlox	30967	G4	Newberry 2001; King 1997
Phoradendron serotinum	oak mistletoe	27856	G5	King 1997
Photinia pyrifolia (was called Sorbus arbutifolia by Newberry 2001)	red chokeberry	565398	G5	Newberry 2001; King 1997

Latin Name	Common Name	TSN	Grank	Data Source
Phryma leptostachya	lopseed	504348	G5	King 1997
Phyllostachys	bamboo	42022	GNR	Bratton and Butler, 1982
Phyllostachys aurea	golden bamboo	42023	GNR	King 1997
Physostegia virginiana ssp. Virginiana (was called Dracocephalum virginianum by Newberry 2001)	obedient plant	196102	G5	Newberry 2001
Phytolacca americana	pokeweed	19523	G5	King 1997
Pinus echinata	shortleaf pine	183335	G5	Newberry 2001; NatureServe 2001/2002
Pinus elliottii	slash pine	18036	G5	King 1997
Pinus strobus	white pine	183385	G5	Newberry 2001
Pinus taeda	loblolly pine	18037	G5	Newberry 2001
Pinus virginiana	Virginia pine	183394	G5	Newberry 2001
Piptochaetium avenaceum	blackseed needlegrass	504408	G5	NatureServe 2001-2002.
Pityopsis adenolepis	Carolina silkgrass	196345	G5	NatureServe 2001/2002
Pityopsis aspera	pineland silkgrass	196344	G5	NatureServe 2001-2002.
Pityopsis graminifolia var. graminifolia (also called Heterotheca graminifolia by King 1997 and Newberry 2001)	narrowleaf silkgrass	196350	G5T4	King 1997
Plantago aristata	largebracted plantain	32875	G5	King 1997
Plantago lanceolata	English plantain	32874	GNR	King 1997
Plantago virginica	Virginia plantain	32895	G5	King 1997
Platanthera clavellata (was called Habenaria clavellata by Newberry 2001)	small green wood orchid	43423	G5	Newberry 2001
Platanus occidentalis	sycamore	19020	G5	King 1997
Pleopeltis polypodioides ssp. Polypodioides (was called Polypodium polypodioides by King 1997)	resurrection fern	524534	G5	King 1997
Pluchea camphorata	camphor weed	36061	G5	King 1997
Poa annua	annual bluegrass	41107	GNR	King 1997
Poa pratensis	Kentucky bluegrass	41088	GNR	King 1997
Podophyllum peltatum	mayapple	18850	G5	King 1997
Polygala lutea	orange milkwort	29348	G5	Newberry 2001
Polygonatum biflorum	King Solomon's-seal	43006	G5	Newberry 2001; King 1997
Polygonum	smartweed	20847	n/a	King 1997
Polygonum aviculare	prostrate knotweed	20876	GNR	Newberry 2001
Polygonum caespitosum var. longisetum	oriental ladysthumb	566299	GNR	Newberry 2001; King 1997
Polygonum punctatum	dotted smartweed	20862	G5	Newberry 2001
Polypremum procumbens	juniper leaf	29959	G5	King 1997
Polystichum acrostichoides	Christmas fern	17675	G5	King 1997
Populus alba	white poplar	22451	G5	Newberry 2001

Latin Name	Common Name	TSN	Grank	Data Source
Populus nigra	Lombardy poplar	22468	GNR	Bratton and Butler, 1982
Potentilla canadensis	dwarf cinquefoil	24698	G5	Newberry 2001; King 1997
Potentilla recta	roughfruit cinquefoil	24742	GNR	King 1997
Prenanthes altissima	tall rattlesnakeroot	38273	G5?	King 1997
Prenanthes autumnalis	slender rattlesnakeroot	38275	G4G5	Newberry 2001
Prunella vulgaris	heal all	32381	n/a	King 1997
Prunus americana	American plum	24763	G5	King 1997
Prunus angustifolia	Chickasaw plum	24768	G5	Newberry 2001
Prunus persica	peach	24765	n/a	Bratton and Butler, 1982;
Prunus serotina	black cherry	24764	G5	Newberry 2001; King 1997
Pseudognaphalium obtusifolium ssp. obtusifolium (was called Gnaphalium obtusifolium by Newberry 2001 and King 1997)	rabbit tobacco	525057	G5	Newberry 2001; King 1997
Pseudognaphalium obtusifolium ssp. praecox	rabbit tobacco	525058	G5	NatureServe 2001-2002.
Pteridium aquilinum	bracken fern	17224	G5	Newberry 2001; King 1997
Pueraria montana var. lobata	kudzu	529930	GNR	Bratton and Butler, 1982;King 1997
Pycnanthemum incanum	hoary mountainmint	32662	G5	King 1997
Pycnanthemum tenuifolium	narrowleaf mountainmint	32668	G5	NatureServe 2001-2002.
Pyracantha	pyracantha	25291	GNR	Newberry 2001
Pyrrhopappus carolinianus	Carolina false dandelion	38324	G5	King 1997
Pyrus communis	pear	25295	GNR	Newberry 2001
Quercus alba	white oak	19290	G5	Newberry 2001
Quercus coccinea	scarlet oak	19288	G5	Newberry 2001
Quercus falcata	souther red oak	19277	G5	Newberry 2001
Quercus marilandica	blackjack oak	19374	G5	Newberry 2001
Quercus michauxii	swamp chestnut oak	19279	G5	NatureServe 2001-2002.
Quercus montana	chestnut oak	19379	G5	Newberry 2001
Quercus nigra	water oak	19280	G5	Newberry 2001
Quercus phellos	willow oak	19282	G5	King 1997
Quercus rubra	northern red oak	19408	G5	Newberry 2001
Quercus shumardii	Shumard's oak	19417	G5	King 1997
Quercus stellata	post oak	19422	G5	Newberry 2001
Quercus velutina	black oak	19447	G5	King 1997
Ranunculus abortivus	littleleaf buttercup	18559	G5	Newberry 2001; King 1997
Ranunculus arvensis	corn buttercup	18592	GNR	King 1997
Ranunculus bulbosus	bulbous buttercup	18594	GNR	Newberry 2001; King 1997
Ranunculus hispidus	bristly buttercup	18613	G5	King 1997
Ranunculus parviflorus	smallflower buttercup	18656	GNR	King 1997
Ranunculus recurvatus	blisterwort	18641	G5	King 1997
Rhododendron calendulaceum	flame azalea	23707	G5	King 1997
Rhododendron canescens	piedmont azalea	23712	G5	King 1997

Latin Name	Common Name	TSN	Grank	Data Source
Rhododendron periclymenoides (was called Rhododendron nudiflorum by Newberry 2001)	pink azalea	23726	G5	Newberry 2001
Rhododendron viscosum	swamp azalea	23731	G5	Newberry 2001
Rhus copallina	dwarf sumac	28773	G5	King 1997
Rhus glabra	smooth sumac	28782	G5	Newberry 2001
Rhynchospora glomerata	brownish beaksedge	40174	G5	King 1997
Rosa	rose	24807	n/a	Bratton and Butler, 1982
Rosa carolina	Carolina rose	24808	G4G5	King 1997
Rosa multiflora	multiflora rose	24833	GNR	Newberry 2001
Rosa wichuraiana	memorial rose	24846	GNR	King 1997
Rubus argutus	sawtooth blackberry	24877	G5	King 1997
Rubus bifrons	Himalayan berry	24891	G5	Newberry 2001; King 1997
Rubus flagellaris	northern dewberry	24921	G5	King 1997
Rubus trivialis	southern dewberry	25067	G5	NatureServe 2001-2002.
Rudbeckia hirta	blackeyed susan	36765	G5	King 1997
Rumex acetosella	sheep sorrel	20934	GNR	King 1997
Rumex crispus	curly dock	20937	GNR	King 1997
Rumex hastatulus	heartwing sorrel	20938	G5	Newberry 2001
Saccharum alopecuroidum	silver plumegrass	504929	G5	NatureServe 2001/2002
Saccharum brevibarbe var. contortum	bentawn plumegrass	531431	G5	Rodney Martinez COWP/KIMO Biological Technician
Sagina decumbens	trailing pearlwort	20022	G5	King 1997
Salix nigra	black willow	22484	G5	King 1997
Salix X pendulina (was called Salix babylonica by Bratton and Butler 1982)	weeping willow	507155	GNR	Bratton and Butler, 1982
Salvia lyrata	lyreleaf sage	32690	G5	Newberry 2001
Sambucus canadensis	elderberry	35317	G5	Newberry 2001; King 1997
Sambucus nigra ssp. canadensis	elderberry	525079	G5	King 1997
Sanicula canadensis	Canadian blacksnakeroot	29850	G5	King 1997
Saponaria officinalis	bouncing bet	20039	GNR	Natureserv 2001-2002.
Sassafras albidum	sassafras	18158	G5	King 1997
Schizachyrium scoparium	little bluestem	42076	G5	King 1997
Scirpus cyperinus	bulrush	40228	G5	Newberry 2001
Scleranthus annuus	German knotgrass	20360	GNR	BONAP
Scleria oligantha	littlehead nutrush	40314	G5	King 1997
Scutellaria elliptica	hairy skullcap	32796	G5	King 1997
Scutellaria integrifolia	helmet flower	32801	G5	King 1997
Senna obtusifolia (also called Cassia obtusifolia by King 1997)	sicklepod	505165	G5	King 1997
Setaria geniculata	marsh bristlegrass	41235	GNR	Newberry 2001
Setaria glauca	yellow foxtail	565884	GNR	NatureServe 2001-2002.
Setaria viridis	bottle grass	41231	GNR	King 1997
Sherardia arvensis	blue fieldmadder	35237	GNR	Newberry 2001; King 1997
Sida	sida	21724	n/a	King 1997
Sida spinosa	prickly fanpetals	21732	G5?	Newberry 2001
Silphium compositum	kidneyleaf rosinweed	38394	G5	King 1997

Latin Name	Common Name	TSN	Grank	Data Source
Silphium perfoliatum	cup plant	38403	G5	King 1997
Sisyrinchium albidum	white blue-eyed grass	43241	G5?	King 1997
Smilax bona-nox	saw greenbrier	43341	G5	Newberry 2001
Smilax glauca	cat greenbrier	43342	G5	King 1997
Smilax laurifolia	laurel greenbrier	43345	G5	Newberry 2001
Smilax rotundifolia	roundleaf greenbrier	43346	G5	King 1997
Solanum americanum	smallflower nightshade	30416	G5	King 1997
Solanum carolinense	Carolina horsenettle	30413	G5	Newberry 2001
Solidago altissima	tall goldenrod	36228	G5	Newberry 2001; King 1997
Solidago arguta var. caroliniana	Atlantic goldenrod	530438	G5	King 1997
Solidago canadensis var. scabra	Canadian goldenrod	530448	G5	King 1997
Solidago gigantea	late goldenrod	36259	G5	King 1997
Solidago nemoralis	gray goldenrod	36281	G5	Newberry 2001; NatureServe 2001/2002
Solidago odora	licorice goldenrod	36284	G5	King 1997
Solidago rugosa	wrinkleleaf goldenrod	36299	G5	King 1997 ; NatureServe 2001/2002
Sonchus asper	spiny sowthistle	38424	GNR	King 1997
Sonchus oleraceus	common sow-thistle	38427	GNR	BONAP
Sorghum halepense	Johnsongrass	42111	GNR	Newberry 2001
Spiraea cantoniensis	Reeves' meadowsweet	505334	GNR	Newberry 2001
Spiraea X vanhouttei	Van Houtt's spiraea	25344	GNR	Bratton and Butler, 1982
Stachys latidens	broadtooth hedgenettle	32341	G5	NatureServe 2001-2002.
Steinchisma hians (was called Panicum hians by King 1997)	gaping grass	42155	G5	King 1997
Stellaria media	common chickweed	20169	GNR	Newberry 2001; King 1997
Stenanthium gramineum	eastern featherbells	43041	G4G5	NatureServe 2001-2002.
Streptopus roseus	twisted stalk	43046	G5	King 1997
Strophostyles	fuzzy bean	26199	n/a	King 1997
Stylosanthes biflora	endbeak pencilflower	26973	G5	King 1997
Styrax americanus	American snowbell	505398	G5	Newberry 2001
Styrax grandifolius	bigleaf snowbell	505399	G5	King 1997
Symphoricarpos orbiculatus	Indiancurrant coralberry	35337	G5	Newberry 2001; NatureServe 2001/2002; King 1997
Symphyotrichum dumosum (called Aster dumosus by King 1997)	rice button aster	35511	G5	King 1997
Symphyotrichum lateriflorum	calico aster	522220	G5	NatureServe 2001-2002.
Symphyotrichum pratense (was called Virgulus pratensis by King 1997)	barrens silky aster	522238	G5	King 1997
Taraxacum officinale	dandelion	36213	G5	King 1997
Tephrosia spicata	spiked hoarypea	26996	G4G5	King 1997
Tephrosia virginiana	goat's rue	26998	G5	King 1997

Latin Name	Common Name	TSN	Grank	Data Source
Thelypteris noveboracensis	New York fern	17261	G5	Newberry 2001
Thuja	arborvitae	18043	n/a	Bratton and Butler, 1982
Tilia americana var. heterophylla (was called Tilia heterophylla by King 1997)	American basswood	530692	G5	Newberry 2001
Tipularia discolor	crippled cranefly	43703	G4G5	Newberry 2001; King 1997
Toxicodendron pubescens (was called Rhus toxicodendron by King 1997)	poison oak	505545	G5	King 1997
Toxicodendron radicans ssp. Radicans (was called Rhus radicans by Newberry 2001)	poison ivy	524765	G5	Newberry 2001
Toxicodendron vernix (was called Rhus vernix by King 1997)	poinson sumac	28823	G5	King 1997
Trichostema dichotomum	forked bluecurls	32364	G5	Newberry 2001; King 1997
Tridens flavus	Purpletop	42227	G5	Newberry 2001; NatureServe 2001/2002
Trifolium	clover	26204	n/a	King 1997
Trifolium arvense	rabbitfoot clover	26221	GNR	BONAP
Trifolium campestre	field clover	26231	GNR	Newberry 2001; King 1997
Trifolium pratense	red clover	26313	GNR	Newberry 2001
Trifolium repens	white clover	26206	GNR	Newberry 2001
Trillium	trillium	43054	n/a	King 1997
Triodanis perfoliata	clasping Venus' lookingglass	34615	G5	BONAP
Triodanis perfoliata var. perfoliata (was called Specularia perfoliata by NatureServe staff.)	clasping Venus' lookingglass	521856	G5	King 1997
Ulmus alata	winged elm	19051	G5	King 1997
Ulmus rubra	slippery elm	19050	G5	BONAP
Uvularia puberula (was called Uvularia pudica by Newberry 2001)	mountain bellwort	43111	G5	Newberry 2001
Vaccinium arboreum	farkleberry	23580	G5	Newberry 2001
Vaccinium elliottii	Elliott's blueberry	23592	G5	King 1997
Vaccinium fuscatum (was called Vaccinium atrococcum by King 1997)	black highbush blueberry	23594	G5	Newberry 2001
Vaccinium pallidum (was called Vaccinium vacillans by Newberry 2001)	hillside blueberry	23610	G5	Newberry 2001
Vaccinium stamineum	deerberry	23615	G5	Newberry 2001
Valerianella locusta	Lewiston cornsalad	35392	GNR	Newberry 2001; King 1997
Valerianella radiata	beaked cornsalad	35397	G5	NatureServe 2001-2002.
Verbascum blattaria	moth mullein	33389	GNR	BONAP King 1997
Verbascum thapsus	woolly mullein	33394	GNR	King 1997
Verbena urticifolia	white vervain	32127	G5	King 1997
Verbesina occidentalis	yellow crownbeard	38610	G5	Newberry 2001; King 1997
Veronica arvensis	corn speedwell	33411	GNR	Newberry 2001
Veronica hederifolia	ivyleaf speedwell	33418	GNR	Newberry 2001; King 1997
Veronica peregrina	neckweed	33421	G5	King 1997
Viburnum dentatum	arrowwood	35251	G5	King 1997

Latin Name	Common Name	TSN	Grank	Data Source
Viburnum nudum	possumhaw	35252	G5	NatureServe 2001/2002; King 1997
Vicia	vetch	26329	n/a	King 1997
Vicia sativa ssp. nigra	common vetch	524809	GNR	NatureServe 2001-2002.
Vicia tetrasperma	sparrow vetch	26359	GNR	NatureServe 2001-2002.
Vicia villosa ssp. varia (was called Vicia dasycarpa by Newberry 2001)	winter vetch	524812	GNR	Newberry 2001
Vinca major	greater perywinkle	30237	GNR	King 1997
Vinca minor	common periwinkle	30238	GNR	Rogers 2000;BONAP database from contributed material; King 1997
Viola affinis	sand violet	22035	G5	King 1997
Viola arvensis	European field pansy	22037	GNR	BONAP
Viola bicolor	Johnny-jump-up	22047	GNR	BONAP
Viola hastata	halberdleaf yellow violet	22086	G5	King 1997
Viola palmata	early blue violet	22125	G5	King 1997
Viola pedata	birdfoot violet	22130	G5	King 1997
Viola primulifolia	primrose violet	-503049	G5	Newberry 2001
Viola rafinesquei	field pansy	523327	G5	Newberry 2001; King 1997
Viola sagittata var. sagittata (was called Viola emarginata by King 1997)	arrrowleaf violet	566349	G5	King 1997
Viola sororia (was called Viola papilionacea by Newberry 2001 and King 1997)	common blue violet	22169	G5	NatureServe 2001-2002.; King 1997
Viola X primulifolia	primrose violet	22143	G5	King 1997
Vitis aestivalis	Summer grape	28607	G5	NatureServe 2001/2002
Vitis labrusca	fox grape	28608	G5	NatureServe 2001-2002.
Vitis rotundifolia	muscadine	28609	G5	Newberry 2001
Vitis vulpina	fox grape	28610	G5	King 1997
Wisteria floribunda	Japanese wisteria	27020	GNR	Rogers 2000;BONAP database from contributed material.
Wisteria sinensis	Chinese wisteria	27023	GNR	Newberry 2001
Woodwardia areolata	netted chainfern	17749	G5	Newberry 2001
Xanthorhiza simplicissima	yellowroot	18809	G5	Newberry 2001; King 1997
Yucca filamentosa	Adam's needle	43140	G5	Bratton and Butler 1982;

Basic ranks:
G# = 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
- G#G# = Numeric range rank
- G? = Unranked
- GU = Unrankable
- GH = Historical

GX = Extirpated

GC = Cultural (planted/cultivated)
GM=Modified
GW= Ruderal
GNR = Not ranked (usually because it is an exotic species)
GNRTNR = Not ranked (usually because it is an exotic species)
n/a = not ranked (usually because only genus was identified)

Qualifiers:
? = Inexact numeric rank
Q = Questionable taxonomy

Table 3. List of vouchers that were collected at Cowpens National Battlefield.

Documented Latin Name	CommonName	TSN	Collector	Habitat
Abelia grandiflora	glossy abelia	182382	White, R.; Govus, T.	Oak Savannah
Acalypha gracilens	slender threeseed mercury	28183	White, R., Govus, T.	Quercus alba - Quercus velutina - Quercus stellata / Schizachyrium scoparium - Desmodium spp. Woodland
Acer nigrum	black maple	182135	White, R., Govus, T.	Lolium (arundinaceum, pratense) Herbaceous Vegetation
Agrostis perennans	autumm bentgrass	40423	Govus, T.;White, R.	Unknown
Amphicarpaea bracteata	hog-peanut	182067	Govus, T.;White, R.	Successional Sweetgum floodplain forest
Andropogon ternarius	splitbeard bluestem	40455	Govus, T.;White, R.	Loblolly pine plantation (thinned)
Andropogon ternarius	splitbeard bluestem	40455	Govus, T.;White, R.	Old field
Anthoxanthum odoratum	sweet vernal grass	41395	White, R., Govus, T.	Pinus taeda / Liquidambar styraciflua - Acer rubrum var. rubrum / Vaccinium stamineum Forest
Aristida purpurascens	arrowfeather threeawn	41428	Govus, T.;White, R.	Unknown
Asclepias amplexicaulis	clasping milkweed	30244	White, R., Govus, T.	Successional pine forest and edge of parking lot.
Asparagus officinalis	asparagus	42784	White, R., Govus, T.	Rubus (argutus, trivialis) - Smilax (glauca, rotundifolia) Shrubland
Botrychium biternatum	southern grapefern	17175	White, R.; Govus, T.	Successional Pine-Hardwood Forest
Carex sp.	sedge	39369	White, R., Govus, T.	Rubus (argutus, trivialis) - Smilax (glauca, rotundifolia) Shrubland
Carex complanata	blue sedge	39551	White, R., Govus, T.	Liquidambar styraciflua Temporarily Flooded Forest
Carex debilis	white edge sedge	39572	White, R., Govus, T.	Liquidambar styraciflua Temporarily Flooded Forest
Cerastium fontanum ssp. vulgare	big chickweed	523831	White, R., Govus, T.	Rubus (argutus, trivialis) - Smilax (glauca, rotundifolia) Shrubland
Chamaecrista fasciculata	partridge pea	501383	White, R., Govus, T.	Roadside.
Chamaecrista nictitans	partridge pea	501388	Govus, T.;White, R.	Successional Loblolly Pine Forest
Chamaesyce nutans	eyebane	501442	White, R.; Govus, T.	Old Field
Chasmanthium laxum	slender woodoats	41548	White, R., Govus, T.	Liquidambar styraciflua Temporarily Flooded Forest

Documented Latin Name	CommonName	TSN	Collector	Habitat
Chelone	turtlehead	33181	White, R., Govus, T.	Liquidambar styraciflua Temporarily Flooded Forest
Chenopodium album	lambsquarters	20592	White, R., Govus, T.	Side of road.
Cirsium horridulum	yellow thistle	36379	White, R., Govus, T.	Successional pine forest and edge of parking lot.
Conyza canadensis var. canadensis	Canadian horseweed	527476	White, R., Govus, T.	Pinus taeda / Liquidambar styraciflua - Acer rubrum var. rubrum / Vaccinium stamineum Forest
Croton glandulosus var. septentrionalis	vente conmigo	527541	White, R., Govus, T.	Pinus taeda / Liquidambar styraciflua - Acer rubrum var. rubrum / Vaccinium stamineum Forest
Cyperus iria	ricefield flatsedge	39934	White, R., Govus, T.	Old field.
Desmodium glabellum	Dillenius' ticktrefoil	25799	White, R., Govus, T.	Pinus taeda / Liquidambar styraciflua - Acer rubrum var. rubrum / Vaccinium stamineum Forest
Desmodium laevigatum	smooth tickclover	25806	Govus, T.;White, R.	Oak Savannah
Desmodium marilandicum	smooth ticktrefoil	25809	White, R., Govus, T.	Pinus taeda / Liquidambar styraciflua - Acer rubrum var. rubrum / Vaccinium stamineum Forest
Desmodium rotundifolium	prostrate ticktrefoil	502020	Govus, T.;White, R.	Habitat unknown
Desmodium viridiflorum	velvetleaf ticktrefoil	25833	White, R., Govus, T.	Lolium (arundinaceum, pratense) Herbaceous Vegetation
Dichanthelium acuminatum var. acuminatum	tapered rosette grass	527684	White, R., Govus, T.	Andropogon virginicus var. virginicus Herbaceous Vegetation
Dichanthelium commutatum	variable panicgrass	41647	White, R., Govus, T.	Liquidambar styraciflua Temporarily Flooded Forest
Dichanthelium dichotomum var. ramulosum	cypress panicgrass	527691	White, R., Govus, T.	Liquidambar styraciflua Temporarily Flooded Forest
Dichanthelium scoparium	velvet panicum	41651	White, R., Govus, T.	Pinus taeda / Liquidambar styraciflua - Acer rubrum var. rubrum / Vaccinium stamineum Forest
Dichanthelium sphaerocarpon	roundseed panicgrass	41671	Govus, T.;White, R.	Habitat unknown
Dichanthelium sphaerocarpon	roundseed panicgrass	41671	Govus, T.;White, R.	Habitat unknown
Dichanthelium sphaerocarpon var. isophyllum	roundseed panicgrass	527701	White, R., Govus, T.	Liriodendron tulipifera - Acer rubrum - Quercus spp. Forest

Documented Latin Name	CommonName	TSN	Collector	Habitat
Digitaria cognata var. cognata	fall witchgrass	527714	White, R; Govus, T.	Habitat unknown
Dioscorea quaternata	fourleaf yam	43371	White, R.; Govus, T.	Habitat unknown
Elephantopus carolinianus	Carolina elephantsfoot	37297	White, R., Govus, T.	Old field and streamside.
Elephantopus tomentosus	hairy elephantfoot	37300	White, R.; Govus, T.	Habitat unknown
Eragrostis hirsuta	bigtop lovegrass	40744	White, R., Govus, T.	Andropogon virginicus var. virginicus Herbaceous Vegetation
Eragrostis pilosa	Indian lovegrass	40755	Govus, T.;White, R.	Unknown
Erechtites hieraciifolia	fireweed	37320	White, R.; Govus, T.	Habitat unknown
Euphorbia pubentissima	false flowering spurge	28125	White, R., Govus, T.	Pinus echinata Semi-natural Forest
Fagus grandifolia	American beech	19462	White, R., Govus, T.	Pinus echinata Semi-natural Forest
Frangula caroliniana	Carolina buckthorn	506986	White, R., Govus, T.	Lolium (arundinaceum, pratense) Herbaceous Vegetation
Fraxinus americana	white ash	32931	White, R., Govus, T.	Liriodendron tulipifera - Acer rubrum - Quercus spp. Forest
Galium pilosum var. puncticulosum	hairy bedstraw	528214	White, R., Govus, T.	Lolium (arundinaceum, pratense) Herbaceous Vegetation
Gaylussacia baccata	black huckleberry	23660	White, R., Govus, T.	Roadside young oak-hickory forest.
Gelsemium sempervirens	Carolina jessamine	29932	White, R., Govus, T.	Pinus echinata Semi-natural Forest
Helianthus microcephalus	small woodland sunflower	36654	White, R., Govus, T.	Edge of cemetery.
Hemerocallis fulva	orange daylily	42943	White, R., Govus, T.	Edge of cemetery.
Hexastylis naniflora	dwarf-flowered heartleaf	194912	White, R., Govus, T.	Liriodendron tulipifera - Acer rubrum - Quercus spp. Forest
Hypericum gentianoides	orangegrass	21420	White, R.; Govus, T.	Habitat unknown
Hypericum hypericoides	St. Andrew's cross	503138	White, R.; Govus, T.	Successional Loblolly Pine Forest
Hypericum hypericoides ssp. multicaule	St. Andrew's cross	524170	White, R., Govus, T.	Pinus echinata Semi-natural Forest
Ilex verticillata	common winterberry	27985	White, R., Govus, T.	Dry oak woods adjacent to springhead.
Iris verna var. smalliana	dwarf violet iris	528565	White, R., Govus, T.	Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum Forest

Documented Latin Name	CommonName	TSN	Collector	Habitat
Juncus tenuis	path rush	39243	White, R., Govus, T.	Pinus taeda / Liquidambar styraciflua - Acer rubrum var. rubrum / Vaccinium stamineum Forest
Kummerowia striata	Japanese clover	503294	Govus, T.;White, R.	Old Field
Lathyrus latifolius	everlasting pea	25856	Govus, T.;White, R.	Habitat unknown
Leersia virginica	cut grass	40890	White, R.; Govus, T.	Habitat unknown
Lespedeza cuneata	Chinese lespedeza	25898	Govus, T.;White, R.	Successional Loblolly Pine Forest
Lespedeza repens	creeping lespedeza	503402	White, R., Govus, T.	Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum Forest
Lespedeza violacea	violet lespedeza	25914	Govus, T.;White, R.	Oak Savannah
Lespedeza violacea	violet lespedeza	25914	Govus, T.;White, R.	Scarlet oak dry forest
Luzula multiflora	common woodrush	39333	White, R., Govus, T.	Liquidambar styraciflua Temporarily Flooded Forest
Microstegium vimineum	Japanese stiltgrass	503829	Govus, T.;White, R.	Successional Loblolly Pine Forest
Osmunda regalis	royal fern	529314	Govus, T.;White, R.	Mesic Hardwoods
Pennisetum glaucum	yellow bristlegrass	565385	White, R., Govus, T.	Rubus (argutus, trivialis) - Smilax (glauca, rotundifolia) Shrubland
Philadelphus coronarius	sweet mock orange	24421	White, R., Govus, T.	Pinus echinata Semi-natural Forest
Pinus echinata	shortleaf pine	183335	White, R.; Govus, T.	Habitat unknown
Piptochaetium avenaceum	blackseed needlegrass	504408	White, R., Govus, T.	Dry oak woods adjacent to springhead.
Pityopsis adenolepis	Carolina silkgrass	196345	White, R., Govus, T.	Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum Forest
Pseudognaphalium obtusifolium ssp. praecox	rabbit tobacco	525058	White, R., Govus, T.	Rubus (argutus, trivialis) - Smilax (glauca, rotundifolia) Shrubland
Pycnanthemum tenuifolium	narrowleaf mountainmint	32668	White, R., Govus, T.	Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum Forest
Quercus michauxii	swamp chestnut oak	19279	White, R., Govus, T.	Upland oak-hickory shrink-swell poorly drained.
Rubus trivialis	southern dewberry	25067	White, R., Govus, T.	Liquidambar styraciflua Temporarily Flooded Forest

Documented Latin Name	CommonName	TSN	Collector	Habitat
Saccharum alopecuroidum	silver plumegrass	504929	Govus, T.;White, R.	Successional Pine-Hardwood Forest
Saponaria officinalis	bouncing bet	20039		
Solidago nemoralis	gray goldenrod	36281	White, R.; Govus, T.	Xeric Woods
Solidago rugosa	wrinkleleaf goldenrod	36299	Govus, T.;White, R.	Mesic Hardwoods
Stenanthium gramineum	eastern featherbells	43041	White, R., Govus, T.	Successional white oak.
Symphoricarpos orbiculatus	Indiancurrant coralberry	35337	White, R.; Govus, T.	Shortleaf pine early successional forest
Symphyotrichum lateriflorum	calico aster	522220	White, R., Govus, T.	Old field and streamside.
Tridens flavus	Purpletop	42227	White, R.; Govus, T.	Successional Loblolly Pine Forest
Valerianella radiata	beaked cornsalad	35397	White, R., Govus, T.	Rubus (argutus, trivialis) - Smilax (glauca, rotundifolia) Shrubland
Viburnum nudum	possumhaw	35252	White, R.; Govus, T.	Mesic Hardwoods
Vicia sativa ssp. nigra	common vetch	524809	White, R., Govus, T.	Lolium (arundinaceum, pratense) Herbaceous Vegetation
Vicia tetrasperma	sparrow vetch	26359	White, R., Govus, T.	Pinus echinata Semi-natural Forest
Viola sororia	common blue violet	22169	White, R., Govus, T.	Dry oak woods adjacent to springhead.
Vitis aestivalis	Summer grape	28607	White, R., Govus, T.	Edge of cemetery.

Table 4. Tables of vascular plant diversity measures and species total estimates for Cowpens National Battlefield

	Diversity Measures			
	N	alpha	beta	Gamma
Gridded plots only	14	50.9	4.4	222
Plots off grid only	2	60.0	1.6	98
All plots	16	51.9	4.5	235
Total for park based on number of species on confirmed park list				536

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 536 species confirmed)
First-order jackknife estimate (all plots)	316.4	169%
Second-order jackknife estimate (all plots)	359.2	149%
First-order jackknife estimate (gridded plots)	313.0	171%
Second-order jackknife estimate (gridded plots)	370.9	145%

Table 5. Exotic plant species at Cowpens National Battlefield.

Latin Name	CommonName	TSN	Threat?	Source
Abelia	abelia	182381		
Abelia X grandiflora	glossy abelia	182382		
Abutilon theophrasti	velvetleaf Indian mallow	21674		
Achillea millefolium	common yarrow	35423		
Ailanthus altissima	tree of heaven	28827	Severe Threat	Tennessee Exotic Pest Plants Council (2001); Miller 1996
Ajuga reptans	common bugle weed	32454		
Albizia julibrissin	mimosa	26449	Severe Threat	Tennessee Exotic Pest Plants Council (2001)
Anthoxanthum odoratum	sweet vernal grass	41395		
Arabidopsis thaliana	mouse-ear cress	23041		
Artemisia vulgaris	wormwood	35505	Significant Threat	Tennessee Exotic Pest Plants Council (2001)
Asparagus officinalis	asparagus	42784		
Baccharis halimifolia	eastern baccharis	183760	Native to U.S. but not native to ecoregion	Weakley 2003
Betula pendula	European white birch	19495		
Bromus commutatus	hairy brome	40497	Severe Threat	Tennessee Exotic Pest Plants Council 2001)
Bromus japonicus	Japanese brome	40479	Severe Threat	Tennessee Exotic Pest Plants Council (2001)
Broussonetia papyrifera	paper mulberry	19107	Lesser Threat	Tennessee Exotic Pest Plants Council (2001)
Buxus sp.	boxwood	28022		
Calystegia sepium	hedge bindweed	30650		
Capsella bursa-pastoris	shepherd's purse	22766		
Cardamine hirsuta	hairy bittercress	22797		
Catharanthus roseus (was called Vinca rosea by King 1997)	Madagascar perywinkle	30168		
Centaurea cyanus	bachelor's button	36954	Lesser Threat	Tennessee Exotic Pest Plants Council (2001)
Cerastium fontanum ssp. vulgare	big chickweed	523831		
Cerastium glomeratum	sticky chickweed	19955		
Chaenomeles speciosa (was called Chaenomeles lagenaria by Newberry 2001	flowering quince	508022		

Latin Name	CommonName	TSN	Threat?	Source
Chenopodium album	lambsquarters	20592		
Chenopodium ambrosioides	Mexican tea	20590		
Cirsium horridulum (also called Carduus spinosissimus by Newberry 2001)	yellow thistle	36379		
Cirsium vulgare (also called Carduus lanceolatus by Newberry 2001)	bull thistle	36428	Significant Threat	Tennessee Exotic Pest Plants Council (2001)
Commelina communis	Asiatic dayflower	39127	Threat	Personal experience
Consolida ajacis	rocket larkspur	501621		
Convolvulus arvensis	field bindweed	30705		
Cynodon dactylon	bermuda grass	41619		
Cyperus iria	ricefield flatsedge	39934		
Cytiscus scoparius	Scotch broom	26591		
Dactylis glomerata	orchard grass	193446		
Datura stramonium	jimsonweed	30520		
Daucus carota	Queen Anne's lace	29477	Significant Threat	Tennessee Exotic Pest Plants Council (2001)
Dianthus armeria	Deptford pink	20276		
Digitaria ischaemum	smooth crabgrass	40637		
Draba verna	spring Whitlowgrass	22923		
Duchesnea indica	Indian strawberry	25163		
Elaeagnus angustifolia	Russian olive	27770	Lesser Threat	Tennessee Exotic Pest Plants Council (2001)
Elaeagnus umbellata	silverberry	27776	Severe Threat	Tennessee Exotic Pest Plants Council (2001)
Eleusine indica	Indian goosegrasss	41692		
Eremochloa ophiuroides	centipede grass	41713		

Latin Name	CommonName	TSN	Threat?	Source
Erodium cicutarium	filaree	29147		
Euonymus fortunei	climbing euonymus	27950	Severe Threat	Tennessee Exotic Pest Plants Council 2001)
Facelis retusa	annual trampweed	37367		
Ficus carica	common fig	19093		
Galium pedemontanum	piedmont bedstraw	34906		
Gleditsia triacanthos	Honey locust	26714	Introduced locally (native to U.S.)	Weakley 2003
Hedera helix	English ivy	29393	Severe Threat	Tennessee Exotic Pest Plants Council (2001); Miller 1996
Hemerocallis fulva	orange daylily	42943		
Hibiscus syriacus	rose-of-Sharon	21638		
Hypericum calycinum	Aaron's beard	21430		
Hypochaeris radicata	openflower rosette grass	37794		
Ilex glabra	inkberry	27981	Introduced, but native to U.S.	Weakley 2003
Ipomoea purpurea	common morning glory	30789		Weakley 2003
Itea virginica	Virginia sweetspire	24202	Introduced, but native to U.S.	Weakley 2003
Kummerowia stipulacea	Korean clover	503293	Lesser Threat	Tennessee Exotic Pest Plants Council (2001)
Kummerowia striata (also called Lespedeza striata by King 1997)	Japanese clover	503294	Lesser Threat	Tennessee Exotic Pest Plants Council (2001)
Lagerstroemia indica	crape myrtle	27110		
Lamium amplexicaule	henbit	32539		
Lamium purpureum	purple deadnettle	32543		
Lathyrus hirsutus	Singletary pea	25845		
Lathyrus latifolius	everlasting pea	25856		
Lespedeza	lespedeza	25892		
Lespedeza bicolor	shrubby lespedeza	25895	Significant Threat	Tennessee Exotic Pest Plants Council (2001); Miller 1996
Lespedeza cuneata	Chinese lespedeza	25898	Severe Threat	Tennessee Exotic Pest Plants Council (2001)
Leucanthemum vulgare (also called Chrysanthemum leucanthemum by Newberry 2001)	oxeye daisy	37903		
Ligustrum japonicum	Japanese privet	503449	Significant Threat	Tennessee Exotic Pest Plants Council (2001); Miller 1996

Latin Name	CommonName	TSN	Threat?	Source
Ligustrum sinense	Chinese privet	32979	Severe Threat	Tennessee Exotic Pest Plants Council (2001); Miller 1996
Ligustrum vulgare	European privet	32980	Severe Threat	Tennessee Exotic Pest Plants Council (2001); Miller 1996
Lolium perenne ssp. Multiflorum (was called Lolium multiflorum by King 1997)	annual ryegrass	40892		
Lolium pratense (was called Festuca elatior by King 1997)	meadow fescue	507983	Significant Threat	Tennessee Exotic Pest Plants Council (2001)
Lonicera fragrantissima	sweet breath of spring	35293	Severe Threat	Tennessee Exotic Pest Plants Council (2001)
Lonicera japonica	Japanese honeysuckle	35283	Severe Threat	Tennessee Exotic Pest Plants Council (2001); Miller 1996
Magnolia grandiflora	Southern magnolia	18074	Introduced to park but native to U.S.	Weakley 2003
Medicago	medic clover	183622		
Melia azedarach	chinaberry	29024	Lesser Threat	Tennessee Exotic Pest Plants Council (2001); Miller 1996
Melilotus alba	white sweetclover	26149	Significant Threat	Tennessee Exotic Pest Plants Council (2001)
Microstegium vimineum	Japanese stiltgrass	503829	Severe Threat	Tennessee Exotic Pest Plants Council (2001); Miller 1996
Mimosa microphylla (was called Schrankia microphylla by King 1997)	littleleaf sensitive-briar	507831		
Miscanthus sinensis	Chinese silvergrass	41874	Significant Threat	Tennessee Exotic Pest Plants Council (2001)
Mollugo verticillata	green carpetweed	19899		
Morus alba	white mulberry	19066		
Muscari	grape hyacinth	42976		
Muscari neglectum	starch grapehyacinth	503892		
Muscari racemosum	grape hyacinth	42979		
Narcissus	daffodil	500435		
Paspalum dilatatum	Dallasgrass	40997		
Paspalum notatum	bahiagrass	41000		
Paspalum notatum var. saurae	bahiagrass	529414		
Paulownia tomentosa	princess tree	33460	Severe Threat	Tennessee Exotic Pest Plants Council (2001)
Pennisetum glaucum	yellow bristlegrass	565385		
Philadelphus coronarius	sweet mock orange	24421		
Phyllostachys	bamboo	42022		
Phyllostachys aurea	golden bamboo	42023	Threat!	

Latin Name	CommonName	TSN	Threat?	Source
Pinus elliottii	slash pine	18036	Introduced, but native to U.S.	Weakley 2003
Pinus strobus	white pine	183385	Introduced, but native to U.S.	Weakley 2004
Plantago lanceolata	English plantain	32874		
Poa annua	annual bluegrass	41107		
Poa pratensis	Kentucky bluegrass	41088		
Polygonum aviculare	prostrate knotweed	20876		
Polygonum caespitosum var. longisetum	oriental ladysthumb	566299	Significant Threat	Tennessee Exotic Pest Plants Council (2001)
Populus alba	white poplar	22451	Significant Threat	Tennessee Exotic Pest Plants Council (2001)
Populus nigra	Lombardy poplar	22468		
Potentilla recta	roughfruit cinquefoil	24742		
Prunella vulgaris	heal all	32381		
Prunus persica	peach	24765		
Pueraria montana var. lobata	kudzu	529930	Severe Threat	Tennessee Exotic Pest Plants Council (2001); Miller 1996
Pyracantha	pyracantha	25291		
Pyrus communis	pear	25295		
Ranunculus arvensis	corn buttercup	18592		
Ranunculus bulbosus	bulbous buttercup	18594		
Ranunculus parviflorus	smallflower buttercup	18656		
Rosa multiflora	multiflora rose	24833	Severe Threat	Tennessee Exotic Pest Plants Council (2001)
Rosa wichuraiana	memorial rose	24846		
Rubus bifrons	Himalayan berry	24891		
Rumex acetosella	sheep sorrel	20934		
Rumex crispus	curly dock	20937		
Salix X pendulina (was called Salix babylonica by Bratton and Butler 1982)	weeping willow	507155		
Saponaria officinalis	bouncing bet	20039		
Scleranthus annuus	German knotgrass	20360		
Setaria geniculata	marsh bristlegrass	41235		
Setaria glauca	yellow foxtail	565884		
Setaria viridis	bottle grass	41231	Significant Threat	Tennessee Exotic Pest Plants Council (2001)

Latin Name	CommonName	TSN	Threat?	Source
Sherardia arvensis	blue fieldmadder	35237		
Sonchus asper	spiny sowthistle	38424		
Sonchus oleraceus	common sow-thistle	38427		
Sorghum halepense	Johnsongrass	42111	Severe Threat	Tennessee Exotic Pest Plants Council (2001)
Spiraea cantoniensis	Reeves' meadowsweet	505334		
Spiraea X vanhouttei	Van Houtt's spiraea	25344		
Stellaria media	common chickweed	20169		
Symphoricarpos orbiculatus	Indiancurrant coralberry	35337	Introduced, but native to U.S.	Weakley 2003
Taraxacum officinale	dandelion	36213		
Thuja	arborvitae	18043		
Trifolium	clover	26204		
Trifolium arvense	rabbitfoot clover	26221		
Trifolium campestre	field clover	26231		
Trifolium pratense	red clover	26313		
Trifolium repens	white clover	26206		
Valerianella locusta	Lewiston cornsalad	35392		
Verbascum blattaria	moth mullein	33389		
Verbascum thapsus	woolly mullein	33394		
Veronica arvensis	corn speedwell	33411		
Veronica hederifolia	ivyleaf speedwell	33418		
Vicia	vetch	26329		
Vicia sativa ssp. nigra	common vetch	524809	Significant Threat	Tennessee Exotic Pest Plants Council (2001)
Vicia tetrasperma	sparrow vetch	26359		
Vicia villosa ssp. Varia (was called Vicia dasycarpa by Newberry 2001)	winter vetch	524812		
Vinca major	greater perywinkle	30237		
Vinca minor	common periwinkle	30238	Significant Threat	Tennessee Exotic Pest Plants Council (2001)
Viola arvensis	European field pansy	22037	Introduced	PLANTS
Viola bicolor	Johnny-jump-up	22047		PLANTS
Wisteria floribunda	Japanese wisteria	27020	Significant Threat	Tennessee Exotic Pest Plants Council (2001)
Wisteria sinensis	Chinese wisteria	27023	Significant Threat	Tennessee Exotic Pest Plants Council (2001)

Table 6. Association numbers, plot numbers, and global ranks of all associations identified at Cowpens National Battlefield.

CEGL #	Systems	Ecological Associations (Scientific name)	Ecological Associations (Name #2)	Ecological Associations (Name #3)	Plots	Global Rank
6327	Early Successional	Pinus echinata Early Successional Forest	Shortleaf Pine Early Successional Forest	Shortleaf Pine Early Successional Forest	4, 8 (in part)	GD
6011	Early Successional	Pinus taeda / Liquidambar styraciflua - Acer rubrum var. rubrum / Vaccinium stamineum Forest	Loblolly Pine / Sweetgum - Red Maple / Deerberry Forest	Successional Loblolly Pine Forest	1, 6	GM
7221	Early Successional	Liriodendron tulipifera - Acer rubrum - Quercus spp. Forest	Tuliptree - Red Maple - Oak species Forest	Successional Tuliptree - Hardwood Forest	8 (in part), 14	GD
6227	Southern Piedmont Mesic Forest	Quercus alba - Carya alba / Euonymus americana / Hexastylis arifolia Forest	White Oak - Mockernut Hickory / American Strawberry-bush / Arrowleaf Heartleaf Forest	Southern Piedmont Mesic Subacid Oak - Hickory Forest	7, 17 (in part)	G4G5
7244	Southern Piedmont Dry Oak – (Pine) Forest	Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum Forest	Southern Red Oak - White Oak - Mockernut Hickory / Sourwood / Deerberry Forest	Interior Southern Red Oak - White Oak Forest	5, 7, 15, 21	G4G5
4638	Early Successional	Quercus nigra Forest	Water Oak Forest	Successional Water Oak Forest	18	GM
7330	Southern Piedmont Small Stream and Floodplain Forest	Liquidambar styraciflua Temporarily Flooded Forest	Sweetgum Temporarily Flooded Forest	Successional Sweetgum Floodplain Forest	9, 10, 17 (in part), 20	GD
3722	Southern Piedmont Dry Oak – (Pine) Forest	Quercus alba - Quercus velutina - Quercus stellata / Schizachyrium scoparium - Desmodium spp. Woodland	White Oak - Black Oak - Post Oak / Little Bluestem - Tick-trefoil species Woodland	Piedmont Granitic White Oak - Black Oak Woodland	16	G1?

CEGL #	Systems	Ecological Associations (Scientific name)	Ecological Associations (Name #2)	Ecological Associations (Name #3)	Plots	Global Rank
3836	South-Central Interior Large Floodplain	Arundinaria gigantea ssp. gigantea Shrubland	Giant Cane Shrubland	Floodplain Canebrake		G2?
8560	Exotic Species Dominated	Phyllostachys aurea Shrubland	Golden Bamboo Shrubland	Golden Bamboo Shrubland		GW
4732	Early Successional	Rubus (argutus, trivialis) – Smilax (glauca, rotundifolia) Shrubland	(Southern Blackberry, Southern Dewberry) – (Whiteleaf Greenbrier, Common Greenbrier) Shurbland	Blackberry – Greenbrier Successional Shrubland Thicket	2 (in part), 3 (in part), 12	GC
4044	Successional	Andropogon virginicus var. virginicus Herbaceous Vegetation	Broomsedge Herbaceous Vegetation	Broomsedge Old Field	11	GD
4048	Exotic Species Dominated	Lolium (arundinaceum, pratense) Herbaceous Vegetation	(Tall Fescue, Meadow Fescue) Herbaceous Vegetation	Cultivated meadow	2 (in part), 3 (in part)	GW

Table 7. Plot photo names and photo descriptions for Cowpens National Battlefield.

Photo file name	Date taken	Description of photo
COWPPlot01.jpg	9-13-01	Plot 1
COWPPlot02.jpg	9-13-01	Plot 2
COWPPlot03.jpg	9-13-01	Plot 3
COWPPlot04_a.jpg	9-13-01	Plot 4
COWPPlot04_b.jpg	9-13-01	Plot 4
COWPPlot05.jpg	9-13-01	Plot 5
COWPPlot06.jpg	9-10-01	Plot 6
COWPPlot07_a.jpg	9-12-01	Plot 7
COWPPlot07_b.jpg	9-12-01	Plot 7
COWPPlot07_c.jpg	9-12-01	Plot 7
COWPPlot07_d.jpg	9-12-01	Plot 7
COWPPlot08.jpg	9-10-01	Plot 8
COWPPlot10.jpg	9-11-01	Plot 10
COWPPlot11.jpg	9-11-01	Plot 11
COWPPlot12.jpg	9-12-01	Plot 12
COWPPlot14.jpg	9-12-01	Plot 14
COWPPlot15.jpg	9-11-01	Plot 15
COWPPlot16_a.jpg	9-14-01	Plot 16
COWPPlot16_b.jpg	9-14-01	Plot 16
COWPPlot16_c.jpg	9-14-01	Plot 16
COWPPlot17.jpg	9-14-01	Plot 17
COWPPlot19.jpg	11-16-03	Plot 19
COWPPlot21_a.jpg	11-16-03	Plot 21
COWPPlot21_b.jpg	11-16-03	Plot 21
COWPPlot22_a.jpg	11-16-03	Plot 22
COWPPlot22_b.jpg	11-16-03	Plot 22

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_____
Classifyer _____ 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?

ENVIRONMENTAL / SITE INFORMATION

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)

_ Permanently flooded – Tidal
_ Tidally flooded
_ Irregularly flooded
_ Irregularly exposed

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)
_____% Sand (0.1-2 mm)
_____% Litter, duff
_____% Wood (> 1 cm)
_____% Water
_____% Bare soil
_____% Bryophyte/lichen
_____% Other

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 for strata
Emergent T1				**01** < .5m	**5%**
Tree Can-Opy T2				**02** .5-1m	**10%**
Under Story T3				**03** 1-2m	**20%**
Tall shrub S1				**04** 2-5m	**30%**
Short shrub S2				**05** 5-10m	**40%**
Herb-aceous				**06** 15-20m	**50%**
Non-vascular				**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. Descriptions of alliances and associations found at Cowpens National Battlefield.

Table of Contents for appendix II

I. FOREST

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

I.A.8.N.b.5. PINUS ECHINATA FOREST ALLIANCE

Shortleaf Pine Forest Alliance

Alliance Concept

Summary: This alliance includes forests dominated by *Pinus echinata*, which on very dry sites may be virtually the only tree species present. This is a wide-ranging alliance; it is currently known from wide areas of the eastern United States from the central Appalachians south, through the Southern Blue Ridge and Cumberland Plateau and Mountains, possibly extending into the Piedmont, and in the central United States in the Ouachita Mountains and Ozarks, extending south into the Gulf Coastal Plain. Other pine species may be present in small amounts; these vary with geography and include *Pinus taeda, Pinus virginiana, Pinus pungens*, and *Pinus rigida*. Typical hardwood associates include *Quercus alba, Quercus falcata, Quercus velutina, Quercus coccinea, Quercus marilandica, Nyssa sylvatica, Liquidambar styraciflua, Carya alba*, and *Carya glabra*. Understory species vary across the range of the alliance, but some common components are *Vaccinium arboreum, Vaccinium pallidum, Vaccinium stamineum, Symplocos tinctoria, Ulmus alata, Diospyros virginiana, Acer rubrum, Cornus florida*, and *Oxydendrum arboreum*. One association in the West Gulf Coastal Plain of Arkansas has *Vaccinium elliottii, Aesculus pavia var. pavia*, and *Chasmanthium laxum*. Common herbaceous species in this Coastal Plain association include *Smilax glauca, Silphium compositum, Pteridium aquilinum var. latiusculum, Scleria oligantha, Piptochaetium avenaceum*, and *Tephrosia virginiana*. Some associations can result from natural or anthropogenic disturbances such as fire or windstorms, while others occur naturally on the landscape, are maintained by edaphic situations, and may even be 'climax' on these sites. Soils of these forests are acidic and are derived from sandstone, chert or granitic rock situated on ravines, ridges, and steep, often south-facing, slopes; the surface is often rocky. In the Coastal Plain, this alliance is particularly typical of clay soils, on hillsides, ridges, flats, and low hills. In the Ouachita Mountains and Ozarks, forests of this alliance typically occur on south-facing slopes and saddles, and rocky outcrops and bluffs, but may also occur on lower, north-facing slopes and flat uplands, especially in the Piedmont.

Dynamics: Some associations can result from natural or anthropogenic disturbances such as fire, windstorms, recovering plowed land, or clearcuts, while others occur naturally on the landscape, are maintained by edaphic situations, and may even be 'climax' on these sites. Stands may have suffered damage from the Southern Pine Beetle (*Dendroctonus frontalis*).

Alliance Distribution

Range: This is a wide-ranging alliance; it is currently known from wide areas of the eastern United States from the central Appalachians south, through the Southern Blue Ridge and Cumberland Plateau and Mountains, possibly extending into the Piedmont, and in the central United States in the Ouachita Mountains and Ozarks, extending south into the Gulf Coastal Plain. Associations in this alliance are found in southern Missouri, Alabama, Arkansas, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, and possibly in West Virginia.

Nations: US

States/Provinces: AL AR GA KY LA MD MO MS NC OK SC TN TX WV?

TNC Ecoregions: 38:C, 39:C, 40:C, 41:C, 42:C, 43:C, 44:C, 50:C, 51:C, 52:P, 53:C, 59:C

Federal Lands: DOD (Camp Robinson); NPS (Buffalo, Cowpens, Great Smoky Mountains?, Kings Mountain, Shiloh); TVA (Tellico); USFS (Angelina, Bienville, Chattahoochee, Cherokee?, Daniel Boone, Davy Crockett, De Soto, Holly Springs, Mark Twain, Nantahala, Oconee, Ouachita, Ozark, Sabine, St. Francis, Sam Houston, Sumter, Talladega?, Tombigbee, Tuskegee)

Alliance Sources

Authors: D.J. ALLARD, RW, Southeast **Identifier:** A.119

References: Allard 1990, Allred and Mitchell 1955, Bruner 1931, Cain and Shelton 1994, Eyre 1980, Faber-Langendoen et al. 1996, Foti 1994b, Foti et al. 1994, Fountain and Sweeney 1987, Frothingham et al. 1926, Hoagland 1998a, Nelson 1986, Pyne 1994, Racine 1966

Pinus echinata Early Successional Forest (6327)Shortleaf Pine Early Successional Forest

Shortleaf Pine Early Successional Forest

Ecological Group (SCS;MCS): Semi-natural Wooded Uplands (900-40; 8.0.0.1)

Element Concept

GLOBAL SUMMARY: This association represents early successional *Pinus echinata*-dominated vegetation. This broadly defined type has a wide distribution throughout the native range of *Pinus echinata* where it may develop under a variety of circumstances associated with severe natural and/or anthropogenic disturbance. It is most frequently associated with abandoned agricultural land, unmanaged clearcuts, and burned or eroded areas, where adjacent *Pinus echinata* are able to seed into the newly disturbed area and colonize before other species such as *Pinus taeda*. These are considered semi-natural forests as they typically result from anthropogenic disturbances that fundamentally alter the vegetation structure, floristic composition, and often the physical and chemical structure of the soil. Vegetation tends to be dense with a moderately to extremely barren understory. While *Pinus echinata* is clearly the single most dominant tree, other "oldfield" *Pinus* species (e.g., *Pinus taeda, Pinus virginiana*) and/or other early successional deciduous trees (e.g., *Acer rubrum, Liquidambar styraciflua, Liriodendron tulipifera*) may also be present. Associated woody and herbaceous species vary with geography but are typically ruderal or exotic species.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Upland

Cowpens National Battlefield Environment: Stands of *Pinus echinata* within the park may occur in upland areas away from steep to moderate slopes. These communities occur on old abandoned agricultural fields that have been allowed to grow into forests without heavy disturbances such as mowing, heavy grazing, or fire. This community occurs in approximately the same environment as the *Pinus taeda* forests and plantations in other parts of the park. The distribution of these two forests is most likely dictated by the proximity of the land to a seed source of either *Pinus echinata* or *Pinus taeda* or the planting of either species within the areas that later developed to become pine forests. In either case, the environment of both types of forests is one of severe past disturbance followed by a recovery period of between 15 and 60 years.

Global Environment: This broadly defined type may develop under a variety of circumstances associated with severe natural and/or anthropogenic disturbance. It is most frequently associated with abandoned agricultural land, unmanaged clearcuts, and burned or eroded areas. These are considered semi-natural forests as they typically result from anthropogenic disturbances which fundamentally alter the vegetation structure, floristic composition, and often the physical and chemical structure of the soil.

VEGETATION DESCRIPTION

Cowpens National Battlefield Vegetation: Of all of the community types within Cowpens, this type may be the most species-poor. Many stands of this vegetation have absolutely no herbaceous vegetation and few shrubs or herbs. The herbaceous stratum is very sparse and is dominated either by exotics (*Lonicera japonica*) or by species highly tolerant of low-nutrient, high-acidity disturbed soils (*Lycopodium digitatum, Toxicodendron radicans, Chimaphila maculata, Parthenocissus quinquefolia, Smilax rotundifolia*). The canopy varies greatly in composition depending upon the age of the forest. Younger forests (ones that were old fields only 20-40 years ago) may have low-statured canopies without an understory and may completely be dominated by *Pinus echinata* or mixed with *Pinus taeda*. On the other hand, older forests (those between 40 and 60 years of age) may be more diverse since understory species such as *Liriodendron tulipifera, Acer rubrum,* and *Quercus phellos* may begin to replace the *Pinus echinata* as they reach the end of their lifespan and senesce.

Global Vegetation: *Pinus echinata* is clearly the single most dominant tree. In addition, other "oldfield" *Pinus* species (e.g., *Pinus taeda, Pinus virginiana*) and/or other early successional deciduous trees (e.g., *Acer rubrum, Liquidambar styraciflua, Liriodendron tulipifera*) may also be present. Associated woody and herbaceous species vary with geography but are typically ruderal or exotic species.

Global Dynamics: Composition of this community depends more on past disturbance history and adjacent forest composition than on the micro-environment of the site, although this community is limited to the flat upland sites and is less common on slopes or protected sites. The community can be found on a variety of upland exposures, but is most well developed in areas that were heavily farmed and then abandoned. Over time, the canopy composition

shifts as *Pinus echinata* finishes its short lifespan and other later successional species begin to take advantage of the gaps left by dead and dying pines. At this point, the community can begin to shift to one of a number of community types that are considered “later successional” than this type and possess a canopy that is dominated by hardwoods rather than pines.

MOST ABUNDANT SPECIES

Cowpens National Battlefield

Stratum	Species
CANOPY	*Pinus echinata*

Global

Stratum	Species
CANOPY	*Pinus echinata*

CHARACTERISTIC SPECIES

Cowpens National Battlefield

Stratum	Species
CANOPY	*Pinus echinata*

Global

Stratum	Species
CANOPY	*Pinus echinata*

OTHER NOTEWORTHY SPECIES

Cowpens National Battlefield

Stratum	Species
HERBACEOUS	*Lycopodium digitatum*

GLOBAL SIMILAR ASSOCIATIONS [NVC association gname (CEGL code)]:
Pinus taeda / Liriodendron tulipifera – Acer rubrum var. *rubrum / Vaccinium stamineum* Forest (CEGL006011)--occurs in similar environments with similar disturbance histories, but is dominated by *Pinus taeda* instead of *Pinus echinata*.
GRank & Reasons: GD (00-04-03). This forest represents a ruderal community resulting from succession following anthropogenic disturbance of an area. It is not of conservation concern and does not receive a conservation status rank. Stands have suffered some damage from the Southern Pine Beetle (*Dendroctonus frontalis*).

CLASSIFICATION COMMENTS

Cowpens National Battlefield : Stands have been attacked by pine beetles in the recent past and will change composition as a result. Many of the stands in this park are in the process of transitioning to communities dominated by *Acer rubrum* and *Liriodendron tulipifera*.
Global Classif Comments: In Kentucky, this vegetation is known only from the eastern part of the state. In Louisiana, this successional vegetation occurs in the Florida parishes and may have a dense shrub understory. In Arkansas, old fields succeed to *Pinus echinata*. Stands have suffered some damage from the Southern Pine Beetle (*Dendroctonus frontalis*).

Element Distribution

Cowpens National Battlefield Range: Within the park, this community is well-distributed throughout the uplands. It does not generally occur on the protected slopes along the small waterways that run through the park.
Global Range: This community is found throughout the southeastern United States.
Nations: US
States/Provinces: AL:S?, AR:S?, GA:S?, KY:S?, LA:S?, MO:S?, MS:S?, NC:S?, SC:S?, TN:S?, TX:S?, WV?

TNC Ecoregions: 38:C, 39:C, 40:C, 43:C, 44:C, 50:C, 52:P, 53:C, 59:C
Federal Lands: NPS (Cowpens, Kings Mountain); TVA (Tellico); USFS (Chattahoochee, Daniel Boone, Mark Twain, Ozark, Ouachita, St. Francis, Sumter?)

Element Sources

Cowpens National Battlefield Inventory Notes:
Authors: A.S. Weakley and K.D. Patterson, mod. R.E. Evans, SCS **Confidence:** 2 **Identifier:** CEGL006327
REFERENCES (type in full citation below if reference is new): Allard 1990, Foti 1994b, Foti et al. 1994

I.A.8.N.b.16. PINUS TAEDA FOREST ALLIANCE

Loblolly Pine Forest Alliance

Alliance Concept

Summary: This alliance includes both successional forests, following cropping or site conversion, and natural forests in the Piedmont, Cumberlands and Ridge and Valley, and Coastal Plain of the southeastern United States. Other canopy and subcanopy species that may be present in successional stands are *Liriodendron tulipifera, Acer rubrum, Liquidambar styraciflua, Pinus virginiana, Juniperus virginiana var. virginiana, Quercus stellata, Quercus velutina, Ulmus rubra, Quercus alba, Nyssa sylvatica, Ulmus alata, Cornus florida, Prunus serotina var. serotina*, and *Carya* spp. *Vaccinium* spp., especially *Vaccinium stamineum*, are common in these forests. One association in this alliance occurs on barrier islands in the Mid-Atlantic Coastal Plain. Along with the dominant *Pinus taeda*, canopy associates often include *Quercus falcata, Acer rubrum, Prunus serotina var. serotina*, and *Sassafras albidum*. The tall-shrub layer is comprised of *Morella cerifera (= Myrica cerifera)* and *Vaccinium formosum*. Vines and lianas are always present in abundance; *Vitis rotundifolia* is most commonly present, but *Toxicodendron radicans, Smilax rotundifolia, Smilax glauca*, and *Parthenocissus quinquefolia* are usually present in abundance as well. The herbaceous layer may be sparse, particularly if shrubs and vines are dense, but *Chasmanthium laxum* may be fairly abundant in this community. Other herbs include *Panicum amarum var. amarulum, Eupatorium hyssopifolium*, and *Elephantopus nudatus*. In southern Virginia and North Carolina, *Quercus virginiana* and *Gelsemium sempervirens* may also be present, but *Quercus virginiana* is never abundant and when present is usually restricted to the understory. *Pinus taeda* may occur rarely in the Ouachita Mountains and Ozarks of Arkansas where the species is becoming naturalized, expanding from its native range in the Coastal Plain, where it naturally occurs in low, moist areas (e.g., deep, well-drained soils of floodplains). However, a natural *Pinus taeda* forest association is not recognized for the Ozark or Ouachita region.
Dynamics: The understory of the heavily disturbed examples of this alliance is often dominated by exotic species, to the exclusion of natives. Common invasives are *Lonicera japonica* and *Microstegium vimineum*. Due to the dominance of these species, stand dynamics often shift so that there are less seedlings and saplings in the understory.

Alliance Distribution

Range: This alliance is found in the Cumberland Plateau, Piedmont and Coastal Plains of the southeastern United States, from Delaware and Maryland south and west to Texas, and in the interior to Tennessee and possibly West Virginia.
Nations: US
States/Provinces: AL AR DE FL GA LA MD MS NC OK SC TN TX VA
TNC Ecoregions: 31:P, 39:C, 40:C, 41:C, 42:P, 43:C, 44:C, 50:C, 52:C, 53:C, 55:?, 56:C, 57:C, 58:C, 59:C, 62:C
Federal Lands: DOD (Arnold, Fort Benning, Fort Gordon); NPS (Assateague Island, Cape Hatteras, Chickamauga-Chattanooga, Cowpens, Guilford Courthouse, Kennesaw Mountain, Kings Mountain, Ninety Six, Shiloh?); TVA (Tellico); USFS (Angelina, Apalachicola, Bankhead, Bienville, Chattahoochee, Conecuh, Croatan, Davy Crockett, De Soto, Francis Marion, Holly Springs, Homochitto, Kisatchie, Land Between the Lakes, Oconee, Ouachita, Sabine, Sam Houston, Sumter, Talladega, Tombigbee, Tuskegee, Uwharrie); USFWS (Chincoteague)

Alliance Sources

Authors: D.J. ALLARD, RW, Southeast **Identifier:** A.130
References: Cain and Shelton 1994, Eyre 1980, FNAI 1992a, FNAI 1992b, Felix et al. 1983, Foti 1994b, Foti et al. 1994, Martin and Smith 1991, Martin and Smith 1993

Pinus taeda / Liquidambar styraciflua - Acer rubrum var. rubrum / Vaccinium stamineum Forest Loblolly Pine / Sweetgum - Red Maple / Deerberry Forest

Successional Loblolly Pine Forest

Ecological Group (SCS;MCS): Semi-natural Wooded Uplands (900-40; 8.0.0.1)

Element Concept

GLOBAL SUMMARY: This successional forest of the Piedmont is dominated by *Pinus taeda* over a subcanopy of hardwoods with *Acer rubrum var. rubrum* and *Liquidambar styraciflua* dominant in this stratum. The forest develops following site preparation, with or without site conversion, and also following agriculture. It ranges from the Piedmont of Virginia, through North Carolina, South Carolina, Georgia and Alabama, extending into the adjacent eastern end of the Upper East Gulf Coastal Plain (e.g., Talladega National Forest). Variability exists in species composition and density of subcanopy hardwoods across the geographic range. Stands typically have more-or-less closed canopies, understories dominated by fire-intolerant hardwoods, and shrub-dominated lower strata.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Upland

Cowpens National Battlefield Environment: Within the park, this community occurs in any flat upland areas that were formerly under agriculture. The community can occur alongside and near a similar community dominated by *Pinus echinata*.

Global Environment: This forest follows agricultural cropping or silvicultural site preparation on a variety of sites, and presumably is more likely on moderately dissected topography where fire is a rare occurrence. This community usually is not present on steep slopes and does not occur on wet soils. It occurs on well- to moderately well-drained soils, usually Ultisols, on sites that formerly were under hardwood cover or subjected to agriculture.

VEGETATION DESCRIPTION

Cowpens National Battlefield Vegetation: As with the global description, the community at Cowpens is composed of at least 60% *Pinus taeda*. The canopy also often contains a substantial component of *Pinus echinata* with an understory of *Liquidambar styraciflua* and various oaks and hickories. Within the park, vegetation varies widely depending upon the density of the canopy. Examples with heavy pine beetle damage from recent outbreaks may have very sparse canopies and relatively high levels of light available to the ground layer. Damaged communities with open canopies can be much more diverse than the average stand, with species such as *Cypripedium acaule, Andropogon virginicus, Dichanthelium* spp., *Lespedeza cuneata*, etc. occurring alongside the usual suspects of *Lonicera japonica* and *Toxicodendron radicans*.

Global Vegetation: The tree canopy of *Pinus taeda* is at least 60%. Tree subcanopy density varies with stand history of burning and herbicide application, but generally is <50%. Shrub and herb layer coverages do not exceed 25% and decrease with increasing age of the stand. Other species of pine, especially *Pinus echinata* and *Pinus virginiana* may be sparingly present in the canopy. Other species that may be present in the subcanopy include *Quercus coccinea, Quercus velutina, Quercus alba, Nyssa sylvatica, Carya glabra, Carya alba, Diospyros virginiana, Prunus serotina, Cornus florida, Liriodendron tulipifera*, and *Sassafras albidum*. Other species that may be present in the shrub stratum include *Juniperus virginiana, Vaccinium arboreum, Rhus copallinum, Gaylussacia baccata, Callicarpa americana*, and probably others. The herbaceous layer usually forms <5% cover and contains such species as *Gelsemium sempervirens, Chimaphila maculata, Polystichum acrostichoides*, and *Potentilla canadensis*. An example from Oconee National Forest has a thinned canopy and grassy herbaceous layer.

Global Dynamics: Stands of this forest develop following site preparation, with or without site conversion, and possibly also following agriculture. It is presumably more likely on moderately dissected topography where fire is a rare occurrence.

MOST ABUNDANT SPECIES

Cowpens National Battlefield

Stratum	Species
CANOPY	*Pinus taeda*
SUBCANOPY	*Liquidambar styraciflua, Oxydendrum arboreum*

SHORT SHRUB	*Toxicodendron radicans*

Global

Stratum	Species
TREE CANOPY	*Pinus taeda*
TREE SUBCANOPY	*Acer rubrum, Liquidambar styraciflua, Quercus falcata*
SHORT SHRUB	*Vaccinium stamineum*

OTHER NOTEWORTHY SPECIES

Cowpens National Battlefield

Stratum	Species
HERBACEOUS	*Cypripedium acaule, Desmodium rotundifolium*

GLOBAL SIMILAR ASSOCIATIONS [NVC association gname (CEGL code)]:
Pinus taeda / Liriodendron tulipifera - Acer saccharum Successional Forest (CEGL007105)--of the Ridge and Valley.
Pinus taeda Planted Forest (CEGL007179)--applies to young, dense, monospecific, stands with plantation structure.
Pinus taeda - Liquidambar styraciflua Semi-natural Forest (CEGL008462)--a related, overlapping type.
Acer saccharum - Fraxinus americana - Tilia americana - Liriodendron tulipifera / Actaea racemosa Forest (CEGL006327)--occurs in the same region but is dominated by *Pinus echinata* instead of *Pinus taeda*.
GRank & Reasons: GM (00-07-06). This is a successional forest composed of species native to the southeastern United States; it is not of conservation concern and does not receive a conservation status rank.

Element Distribution

Cowpens National Battlefield Range: This community occurs throughout the park's upland areas but occurs less frequently along the protected creek banks and slopes.
Global Range: This forest ranges from the Piedmont of Virginia, through North Carolina, South Carolina, Georgia and Alabama, extending into the adjacent eastern end of the Upper East Gulf Coastal Plain (e.g., Talladega National Forest).
Nations: US
States/Provinces: AL:S?, GA:S?, MD:S?, NC:S?, SC:S?, VA:S?
TNC Ecoregions: 43:C, 52:C, 58:?
Federal Lands: NPS (Cowpens); USFS (Oconee, Sumter, Talladega, Uwharrie?)

Element Sources

Cowpens National Battlefield Inventory Notes: This community has been impacted heavily by the pine beetle. Many examples of this community are already transitional between a pine type and a hardwood type. Mapping may be a challenge in these areas since assigning associations is difficult for any heavily impacted community.
Authors: S. Landaal, SCS **Confidence:** 3 **Identifier:** CEGL006011
REFERENCES (type in full citation below if reference is new): Allard 1990, Eyre 1980, Felix et al. 1983, NatureServe Ecology - Southeast U.S. unpubl. data, USFS 1988

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

I.B.2.N.a.24. LIRIODENDRON TULIPIFERA FOREST ALLIANCE

Tuliptree Forest Alliance

Alliance Concept

Summary: This alliance includes deciduous forests dominated by *Liriodendron tulipifera*, primarily in areas which were once clearcut, old fields, or cleared by fire or other natural disturbances. These non-wetland forests are also found along mesic stream terraces and on upland mountain benches. Forests in this alliance are abundant in the central and southern Appalachians, below 3000 feet (900 m) elevation, usually associated with disturbance and on the most productive sites, but also occur in the Coastal Plain, Piedmont, Ridge and Valley, and Cumberland Plateau. This alliance includes pure, often even-aged stands of *Liriodendron tulipifera* as well as forests with *Liriodendron tulipifera* associated with other species favored by canopy openings. Associated species vary with geographic location. Throughout most of the range of this alliance, *Acer rubrum, Robinia pseudoacacia, Betula lenta, Acer saccharum*, and *Acer negundo* are common components. In the Piedmont and Coastal Plain, *Liquidambar styraciflua* is a common associate. In the Appalachians, *Halesia tetraptera, Tsuga canadensis, Tilia americana var. heterophylla (= Tilia heterophylla), Prunus serotina var. serotina*, and *Magnolia fraseri* can be additional components. In the Ridge and Valley and Cumberland Plateau, additional species include *Quercus rubra, Magnolia acuminata, Carya alba, Carya glabra, Pinus virginiana, Sassafras albidum, Pinus strobus, Carpinus caroliniana, Asimina triloba*, and *Staphylea trifolia*. Herbaceous strata are not diverse and, in the southern Appalachians, this feature distinguishes these forests from rich cove forests in I.B.2.N.a *Liriodendron tulipifera - Tilia americana var. heterophylla - Aesculus flava - Acer saccharum* Forest Alliance (A.235). Vines can be abundant including *Vitis* spp., *Smilax* spp., *Aristolochia macrophylla*, and *Parthenocissus quinquefolia*. Forests in this alliance occur on middle to lower slopes, sheltered coves and gentle concave slopes, and river terraces over various soils and geologies. Vegetation of this alliance is uncommon in Louisiana.

Dynamics:

Alliance Distribution

Range: This alliance is found in Alabama, Georgia, Kentucky, Louisiana, Mississippi (?), North Carolina, South Carolina, Tennessee, Maryland, Pennsylvania, Virginia, and West Virginia. Forests in this alliance are abundant in the central and southern Appalachians, below 3000 feet (900 m) elevation, but also occur in the Coastal Plain, Piedmont, Ridge and Valley, and Cumberland Plateau.

Nations: US

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

TNC Ecoregions: 43:C, 44:C, 50:C, 51:C, 52:C, 53:P, 58:C, 59:C

Federal Lands: DOD (Arnold, Fort Benning); NPS (Blue Ridge Parkway, Cowpens, Great Smoky Mountains, Guilford Courthouse, Harpers Ferry, Kennesaw Mountain, Kings Mountain, Rock Creek, Shenandoah, Shiloh); TVA (Tellico); USFS (Apalachicola, Bankhead, Bienville, Chattahoochee, Cherokee, Conecuh, Daniel Boone, De Soto, George Washington, Holly Springs, Homochitto, Jefferson, Nantahala, Ocala, Oconee?, Osceola, Pisgah, St. Francis, Sumter, Talladega, Tombigbee, Tuskegee)

Alliance Sources

Authors: D.J. ALLARD, RW, Southeast **Identifier:** A.236

References: Andreu and Tukman 1995, Eyre 1980, Gallyoun et al. 1996, Golden 1974, Horn 1980, McGee and Hooper 1970, Phillips and Shure 1990, Schmalzer 1978, Thomas 1966

Liriodendron tulipifera - Acer rubrum - Quercus spp. ForestTuliptree - Red Maple - Oak species Forest
Successional Tuliptree - Hardwood Forest
Ecological Group (SCS;MCS): Semi-natural Wooded Uplands (900-40; 8.0.0.1)

Element Concept

GLOBAL SUMMARY: The canopy of this semi-natural upland association is dominated by *Liriodendron tulipifera*. *Acer rubrum* is common in the understory along with *Quercus* spp. and occasionally *Liquidambar styraciflua*. These early successional forests often follow cropping, clearcut logging, or other severe disturbance, and are successional to mixed *Quercus* - *Carya* forests. They are potentially widespread. The oak in these stands will frequently be multi-stemmed, resulting from coppicing. Lesser amounts of *Pinus virginiana* and *Pinus echinata* may be present in severely disturbed sites.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Upland
Cowpens National Battlefield Environment: This upland community occurs primarily on slopes and terraces that are adjacent to the streams of the park. These streams have created small, slightly protected micro-environments that seem to create ideal habitat for the generation of these communities, instead of successional pine communities, after heavy row cropping, terracing, or clearcutting. Evidence of past agriculture is very apparent in many locations where the community has developed on old terraces and other landforms created by past farming activities.
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

Cowpens National Battlefield Vegetation: At Cowpens, this community is usually dominated by *Liriodendron tulipifera* with occasional codominance by *Acer rubrum*, *Quercus* spp., and *Pinus* spp. The shrub layer varies from moderate to sparse. The herbaceous layer is usually dominated by a combination of interior forest species such as *Hexastylis naniflora, Polystichum acrostichoides*, and *Euonymus americana* and weedy and exotic species such as *Toxicodendron radicans* and *Lonicera japonica*. Composition varies depending upon proximity to the creek (drier areas away from the creek tend to have less of an herbaceous layer both because of the difference in moisture and the increased soil disturbance that probably occurred further away from waterways).
Global Vegetation: The canopy of this semi-natural upland association is dominated by *Liriodendron tulipifera*. *Acer rubrum* is common in the understory along with *Quercus* spp. (e.g., *Quercus falcata*, *Quercus nigra*, *Quercus velutina*), as well as other early successional hardwoods including *Nyssa sylvatica*. Lesser amounts of *Pinus virginiana* and *Pinus echinata* may be present in severely disturbed sites.
Global Dynamics: This community is widespread in areas that had stand-initiating disturbance such as heavy logging or plowing in the recent past. In areas that have been protected for more than 80 years, this community is uncommon.

MOST ABUNDANT SPECIES

Cowpens National Battlefield

Stratum	Species
CANOPY	*Liriodendron tulipifera*
VINE	*Lonicera japonica*

Global

Stratum	Species
CANOPY	*Liriodendron tulipifera*

OTHER NOTEWORTHY SPECIES

Cowpens National Battlefield

Stratum	Species
FORB	*Hexastylis naniflora*

GLOBAL SIMILAR ASSOCIATIONS [NVC association gname (CEGL code)]:
Liriodendron tulipifera - Acer rubrum - Robinia pseudoacacia Forest (CEGL007219)--resulting from more severe disturbance.
Liriodendron tulipifera - Acer (negundo, rubrum) / Asimina triloba Forest (CEGL007184)
GRank & Reasons: GD (00-08-08). 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.

Cowpens National Battlefield Range: This association occurs throughout the southern end of the park, especially near drainageways that have created small protected draws that are slightly more mesic than the upland area.
Global Range: This association is known from the southern Cumberland Plateau and Piedmont of the southeastern U.S. and may also occur in the Upper East Gulf Coastal Plain and Interior Low Plateau. It is known from Alabama, Georgia, Kentucky, North Carolina, South Carolina, Tennessee, and possibly Virginia.
Nations: US
States/Provinces: AL:S?, GA:S?, KY:S?, NC:S?, SC:S?, TN:S?, VA?
TNC Ecoregions: 43:P, 44:P, 50:C, 52:C
Federal Lands: DOD (Fort Benning); NPS (Cowpens, Guilford Courthouse, Kennesaw Mountain, Kings Mountain, Shiloh); USFS (Bankhead, Daniel Boone, Oconee?, Talladega)

Element Sources

Cowpens National Battlefield Inventory Notes:
Authors: SCS **Confidence:** 3 **Identifier:** CEGL007221
REFERENCES (type in full citation below if reference is new): Gallyoun et al. 1996

I.B.2.N.a.27. QUERCUS ALBA - (QUERCUS RUBRA, CARYA SPP.) FOREST ALLIANCE

White Oak - (Northern Red Oak, Hickory species) Forest Alliance

Alliance Concept

Summary: This alliance is widely distributed in the eastern United States and portions of adjacent Canada and includes dry mesic to mesic upland oak forests dominated by *Quercus alba* and/or *Quercus rubra*, with or without *Carya* species. Stands are 15-25 m tall, with a closed, deciduous canopy. The shrub and herbaceous strata are typically well-developed. *Quercus alba* usually dominates the stands, either alone or in combination with *Quercus rubra* (especially on moister sites) and sometimes *Quercus velutina* (especially on drier sites). Some associations in this alliance are dominated by *Quercus rubra*, although *Quercus alba* is usually also a canopy component. *Carya* species (particularly *Carya alba, Carya glabra* or *Carya ovata*) are typically common either in the canopy or subcanopy. In the southeastern United States, this alliance covers dry-mesic forests of the Piedmont, low Appalachian Mountains, and the Cumberland and Interior Low Plateau, and mesic oak-hickory forests of the Blue Ridge and the interior highlands of the Ozarks and Ouachita Mountains. Associated species include *Carya glabra, Carya ovata, Carya alba, Fraxinus americana, Acer rubrum, Acer leucoderme, Cornus florida, Nyssa sylvatica, Ostrya virginiana, Calycanthus floridus, Pyrularia pubera, Tilia americana var. caroliniana, Oxydendrum arboreum*, and others. This alliance is found throughout the midwestern United States on moderately rich, upland sites. Typical associates include *Fraxinus americana, Ulmus americana, Tilia americana, Acer saccharum, Acer rubrum*, and more locally, *Quercus macrocarpa* and *Quercus ellipsoidalis*.

Stands are found on gentle to moderately steep slopes on uplands and on steep valley sides. The soils are moderately deep to deep and vary from silts to clays and loams. The parent material ranges from glaciated till to limestone, shale, sandstone and other bedrock types. In the midwestern United States, many stands are succeeding to types dominated by *Acer saccharum, Tilia americana, Acer rubrum*, and other mesic tree associates. This succession may be delayed by fire and grazing. In the eastern and southeastern United States, *Liriodendron tulipifera, Fraxinus americana, Acer rubrum*, and other mesic associates often increase after disturbances, such as clearcutting or windstorms, especially in the absence of fire.
Dynamics:

Alliance Distribution

Range: This alliance ranges from Ontario, Canada, throughout the midwestern and eastern United States, south to the very northern edges of the Western and Eastern Gulf Coastal Plains.
Nations: CA US
States/Provinces: AL AR CT DE GA IA IL IN KS KY MA MD ME MI MN MO MS? NC NE NH NJ NY OH OK ON PA RI SC TN VA VT WI WV
TNC Ecoregions: 32:P, 35:C, 36:C, 37:C, 38:C, 39:C, 40:C, 43:C, 44:C, 45:C, 46:C, 47:C, 48:C, 49:C, 50:C, 51:C, 52:C, 53:?, 58:C, 59:C, 60:C, 61:C, 62:C
Federal Lands: COE (Dale Hollow?); DOD (Arnold, Fort Benning); DOE (Oak Ridge); NPS (Carl Sandburg Home, Chickamauga-Chattanooga, Cowpens, Great Smoky Mountains, Guilford Courthouse, Kennesaw Mountain, Kings Mountain, Natchez Trace, Ninety Six, Russell Cave, Shenandoah, Shiloh); TVA (Tellico); USFS (Bankhead, Chattahoochee, Cherokee, Daniel Boone, George Washington, Jefferson, Land Between the Lakes, Mark Twain, Nantahala, Oconee, Ouachita, Ozark, Pisgah, St. Francis, Shawnee, Sumter, Talladega, Tuskegee?, Uwharrie)

Alliance Sources

Authors: D.J. ALLARD/D. FABER-LANG, RW, Midwest **Identifier:** A.239
References: Allard 1990, Ambrose 1990a, Andreu and Tukman 1995, Evans 1991, Eyre 1980, Faber-Langendoen et al. 1996, Foti 1994b, Foti et al. 1994, Fountain and Sweeney 1985, Fralish 1988b, Fralish et al. 1991, Golden 1979, Hoagland 1997, Jones 1988a, Jones 1988b, McLeod 1988, Monk et al. 1990, Nelson 1986, Oakley et al. 1995, Oosting 1942, Rawinski 1992, Robertson et al. 1984, Schafale and Weakley 1990, Swain and Kearsley 2001, Wharton 1978

Quercus alba - Carya alba / Euonymus americana / Hexastylis arifolia ForestWhite Oak - Mockernut Hickory / American Strawberry-bush / Arrowleaf Heartleaf Forest

Southern Piedmont Mesic Subacid Oak - Hickory Forest

Ecological Group (SCS;MCS): Appalachian Highlands Mesic Acid Hardwood Forests (420-10; n/a)

Element Concept

GLOBAL SUMMARY: This type represents mesic, subacid oak-hickory forests of the southern Piedmont and adjacent ecoregions. Stands of this association typically exhibit heavy dominance by *Quercus alba* and *Carya alba*. The canopy or subcanopy may also contain *Fagus grandifolia, Liquidambar styraciflua, Liriodendron tulipifera, Carya ovalis, Prunus serotina, Acer rubrum, Quercus nigra, Quercus falcata, Quercus velutina, Oxydendrum arboreum, Fraxinus* spp., *Halesia* sp., *Nyssa sylvatica*, and *Cornus florida*. Some stands may contain a minor component of *Pinus echinata*. Shrubs include *Euonymus americana, Rhododendron canescens, Calycanthus floridus, Aesculus pavia, Hydrangea quercifolia, Vaccinium elliottii, Vaccinium pallidum, Vaccinium stamineum, Asimina parviflora*, and *Asimina parviflora*. Vines such as *Toxicodendron radicans, Smilax rotundifolia, Smilax glauca, Parthenocissus quinquefolia*, and *Vitis rotundifolia* are abundant. Some typical herbs are *Hexastylis arifolia, Mitchella repens, Polystichum acrostichoides, Dioscorea villosa, Elephantopus tomentosus, Maianthemum racemosum, Coreopsis major, Desmodium nudiflorum*, and *Hypoxis hirsuta*.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Upland

Cowpens National Battlefield Environment: Within the park, this community is limited to the most protected low slopes along creeksides. The community often borders the creek and may intergrade into Successional tuliptree-hardwood forest, *Liriodendron tulipifera - Acer rubrum - Quercus* spp. Forest (CEGL007221), as it proceeds upslope.

Global Environment: This community occupies protected low slopes in the acidic Piedmont where creeks have cut small draws or valleys.

VEGETATION DESCRIPTION

Cowpens National Battlefield Vegetation: Within the park, the canopy of this community is dominated by *Quercus alba, Liquidambar styraciflua, Liriodendron tulipifera*, and *Quercus velutina*. The understory is dominated by *Oxydendrum arboreum* and *Carpinus caroliniana*. The shrub and herbaceous layers are extremely sparse but may contain a variety of shrubs such as *Vaccinium* spp. and *Viburnum* spp., as well as herbaceous species such as *Maianthemum racemosum* and *Mitchella repens*.

Global Vegetation: Stands of this association typically exhibit heavy dominance by *Quercus alba* and *Carya alba*. The canopy or subcanopy may also contain *Fagus grandifolia, Liquidambar styraciflua, Liriodendron tulipifera, Carya ovalis, Prunus serotina, Acer rubrum, Quercus nigra, Quercus falcata, Quercus velutina, Oxydendrum arboreum, Fraxinus* spp., *Halesia* sp., *Nyssa sylvatica*, and *Cornus florida*. Some stands may contain a minor component of *Pinus echinata*. Shrubs include *Euonymus americana, Rhododendron canescens, Calycanthus floridus, Aesculus pavia, Hydrangea quercifolia, Vaccinium elliottii, Vaccinium pallidum, Vaccinium stamineum, Asimina parviflora*, and *Asimina parviflora*. Vines such as *Toxicodendron radicans, Smilax rotundifolia, Smilax glauca, Parthenocissus quinquefolia*, and *Vitis rotundifolia* are abundant. Some typical herbs are *Hexastylis arifolia, Mitchella repens, Polystichum acrostichoides, Dioscorea villosa, Elephantopus tomentosus, Maianthemum racemosum, Coreopsis major, Desmodium nudiflorum*, and *Hypoxis hirsuta* (Golden 1979).

Global Dynamics: This community typically exists on sheltered gentle slopes leading down to drainageways in the Piedmont. It is most likely not fire-tolerant.

MOST ABUNDANT SPECIES

Cowpens National Battlefield

Stratum	Species
CANOPY	*Quercus alba, Liriodendron tulipifera*
SUBCANOPY	*Liquidambar styraciflua, Carpinus caroliniana*

Global

Stratum	Species
CANOPY	*Quercus alba*

GLOBAL SIMILAR ASSOCIATIONS [NVC association gname (CEGL code)]:
Quercus rubra - Quercus alba - Carya glabra / Geranium maculatum Forest (CEGL007237)
Quercus alba - Quercus (rubra, coccinea) - Carya (alba, glabra) / Vaccinium pallidum Piedmont Dry-Mesic Forest (CEGL008475)--similar with a more northerly range.
Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum Forest (CEGL007244)--a less mesic type with range overlap in the southern Piedmont.
Quercus alba - Quercus rubra - Carya glabra - Carya ovata / Viburnum rafinesquianum / Viola tripartita Forest (CEGL007236)--relationship is unclear.
GRank & Reasons: G4G5 (02-09-03). Global rank changed from G5? to G4G5 to better reflect its rarity and the possible uncertainty. This is a somewhat widespread type, but is not secure across its range. The Piedmont is an area of rapid population growth, and at a minimum this forest is threatened by removal of commercially valuable timber species (e.g., *Quercus alba*), conversion to other forest types, and fragmentation and removal in areas of human population growth.

Element Distribution

Cowpens National Battlefield Range: This community is limited to the gentle low slopes and bottoms along the creeks that run out of the park.
Global Range: This association is found in the Piedmont from South Carolina to Alabama.
Nations: US
States/Provinces: AL:S?, GA:S?, SC:S?
TNC Ecoregions: 52:C
USFS Ecoregions: 231A:CC, 231D:CC
Federal Lands: NPS (Cowpens); USFS (Oconee, Sumter?)

Element Sources

Cowpens National Battlefield Inventory Notes:
Authors: J.E. Mohan, SCS **Confidence:** 2 **Identifier:** CEGL006227
REFERENCES (type in full citation below if reference is new): Golden 1979, Peet et al. 2002

I.B.2.N.a.29. QUERCUS ALBA - QUERCUS (FALCATA, STELLATA) FOREST ALLIANCE

White Oak - (Southern Red Oak, Post Oak) Forest Alliance

Alliance Concept

Summary: This alliance contains vegetation that can be described as dry oak and oak - hickory forests. These are usually dominated by a mixture of *Quercus alba* and *Quercus falcata*; *Quercus stellata* may be dominant or codominant. In addition, *Quercus coccinea, Quercus velutina, Quercus marilandica, Carya alba, Carya glabra, Carya pallida, Carya carolinae-septentrionalis, Carya ovata*, and *Fraxinus americana* often are present. Common subcanopy and shrub species include *Oxydendrum arboreum, Acer rubrum, Ulmus alata, Juniperus virginiana var. virginiana, Vaccinium arboreum, Cornus florida, Sassafras albidum, Gaylussacia frondosa (= var. frondosa), Gaylussacia baccata*, *Vaccinium pallidum*, and *Vaccinium stamineum*. Herbaceous species that may be present include *Chimaphila maculata, Polystichum acrostichoides, Asplenium platyneuron, Hexastylis arifolia, Coreopsis major, Tephrosia virginiana, Sanicula canadensis, Desmodium nudiflorum, Desmodium nuttallii, Symphyotrichum urophyllum? (= Aster sagittifolius?), Symphyotrichum patens (= Aster patens), Solidago ulmifolia*, and *Hieracium venosum*. These often are successional forests following logging and/or agricultural cropping (and possibly also chestnut blight in the southern Appalachians). Some examples occur in upland flats and have been called xerohydric because they occasionally will have standing water in the winter due to a perched water table, but are droughty by the end of the growing season. Other occurrences are found on well-drained sandy loam or clay loam soils that are often, although not always, shallow. Karst topography can be found in areas where this alliance occurs. Soils are most often a well-drained sandy loam, although clay loams are not uncommon. Forests of this alliance may occupy narrow bands of dry-mesic habitat transitional between lower and midslope mesic communities and xeric ridgetops. This alliance is found in the Upper East Gulf Coastal Plain, Piedmont, low mountains (including Cumberlands, Ridge and Valley, and low parts of the Southern Blue Ridge), and Interior Low Plateau. Distribution in the Atlantic Coastal Plain, East Gulf Coastal Plain, and Upper West Gulf Coastal Plain needs assessment. In the Shawnee Hills, Knobs, Coastal Plain, and Appalachian Plateau regions of Kentucky, these forests form a common matrix vegetation over acid sandstone and shales. These Kentucky forests are dominated by *Quercus alba* with little or no *Quercus falcata* and occupy middle to upper slope positions. In the southern Illinois portion of the range, examples occur on south- to west-facing slopes where increased temperatures favor *Quercus falcata* over *Quercus rubra*.
Dynamics:

Alliance Distribution

Range: This alliance is found in southern Illinois, Indiana (?), Kentucky, Tennessee, Arkansas, Louisiana (?), Oklahoma (?), Texas (?), Mississippi, Alabama, Georgia, South Carolina, North Carolina, Virginia, Delaware, Maryland, and New Jersey. This alliance is found in the Upper East Gulf Coastal Plain, Piedmont, low mountains, and Interior Low Plateau. Distribution in the Atlantic Coastal Plain, East Gulf Coastal Plain, and Upper West Gulf Coastal Plain needs assessment. In the Shawnee Hills, Knobs, Coastal Plain, and Appalachian Plateau regions of Kentucky, these forests form a common matrix vegetation over acid sandstone and shales.
Nations: US
States/Provinces: AL AR CT DE GA IL IN? KY LA? MA MD MS NC NJ NY OK? SC TN TX? VA
TNC Ecoregions: 32:P, 40:C, 41:P, 42:C, 43:C, 44:C, 50:C, 51:C, 52:C, 53:P, 56:C, 57:P, 58:C, 59:P, 61:C, 62:C
Federal Lands: DOD (Arnold, Fort Benning, Fort Gordon); DOE (Oak Ridge); NPS (Big South Fork, Chickamauga-Chattanooga, Cowpens, Fire Island, Great Smoky Mountains, Guilford Courthouse, Kennesaw Mountain, Shiloh); TVA (Tellico); USFS (Bankhead, Chattahoochee?, Cherokee, Daniel Boone, Holly Springs?, Kisatchie?, Land Between the Lakes?, Oconee, Sabine?, St. Francis, Shawnee, Sumter, Talladega, Tombigbee?, Tuskegee?, Uwharrie); USFWS (Eufaula)

Alliance Sources

Authors: M. PYNE/A.S. WEAKLEY 6-94, RW, Southeast **Identifier:** A.241
References: Allard 1990, Andreu and Tukman 1995, Braun 1950, Diamond 1993, Evans 1991, Eyre 1980, Faber-Langendoen et al. 1996, Fike 1999, Foti 1994b, Foti et al. 1994, Fralish et al. 1991, Golden 1979, Oosting 1942,

Peet and Christensen 1980, Pyne 1994, Robertson and Heikens 1994, Schafale and Weakley 1990, Smith 1991, Sneddon et al. 1996, Swain and Kearsley 2001, Voigt and Mohlenbrock 1964

Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum Forest Southern Red Oak - White Oak - Mockernut Hickory / Sourwood / Deerberry Forest

Interior Southern Red Oak - White Oak Forest

Ecological Group (SCS;MCS): Appalachian Highlands Dry-mesic Oak Forests and Woodlands (401-13; 2.5.3.2)

Element Concept

GLOBAL SUMMARY: This southern red oak - white oak dry forest is found in the Piedmont of Georgia, South Carolina, North Carolina, and Virginia, and in the interior uplands and Cumberland Plateau of Kentucky and Tennessee. It has also been reported from the Upper East Gulf Coastal Plain of Mississippi and Georgia. It generally is a second-growth forest on low fertility Ultisols. The vegetation is dominated by *Quercus* spp. and lesser amounts of *Carya* spp. The canopy is continuous, and several species of *Quercus* may be present or codominant (e.g., *Quercus falcata, Quercus alba, Quercus velutina, Quercus coccinea*, and *Quercus stellata*). The subcanopy closure is variable, ranging from less than 25% to more than 40% cover, and the shrub and herb layers generally are sparse. Subcanopy species include canopy species and *Acer rubrum, Liriodendron tulipifera, Oxydendrum arboreum, Liquidambar styraciflua, Ulmus alata, Cornus florida, Nyssa sylvatica, Juniperus virginiana var. virginiana*, and *Vaccinium arboreum*. The tall-shrub stratum may contain *Rhododendron canescens* and *Vaccinium arboreum*. The low-shrub stratum is sparse to moderate and may be dominated by various ericaceous shrubs such as *Vaccinium pallidum, Vaccinium stamineum, Vaccinium fuscatum*, and *Gaylussacia baccata*. *Smilax glauca* and *Vitis rotundifolia* are common vines. Herbaceous species that may be present include *Aristolochia serpentaria, Symphyotrichum dumosum (= Aster dumosus), Clitoria mariana, Desmodium nudiflorum, Euphorbia corollata, Galium circaezans, Chimaphila maculata, Polystichum acrostichoides, Asplenium platyneuron, Hexastylis arifolia, Coreopsis major, Solidago odora, Tephrosia virginiana, Potentilla simplex, Porteranthus stipulatus, Pteridium aquilinum, Lespedeza* spp., *Dichanthelium* spp., and *Hieracium venosum*.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Upland

Cowpens National Battlefield Environment: This is perhaps the most common old forest (more than 60-80 years since plowing) in the park. Stands may have existed for over 80 years without major disturbance (besides selective cutting). These stands occur in the drier uplands of the park away from the more mesic creek bottoms and low slopes on low fertility acidic soil. Fire may have been a component of this community type in the past, especially if it was very light ground fire. However, it is unclear what role it may have had in this community (possibly a transitional community between the fire free creek slopes and the fire prone uplands where the battleground proper now sits).

Global Environment: Stands are typically found on low fertility Ultisols in the Piedmont, the interior uplands, and the Cumberland Plateau. This community occurs on soils of relatively low fertility; suborders on which this community occurs include Hapludults and Paleudults. Stands are uneven-aged and tree replacement occurs in gaps; severe fires most likely destroy community occurrences although light fires probably are tolerated.

VEGETATION DESCRIPTION

Cowpens National Battlefield Vegetation: The canopy can vary quite a bit within this park, but is always dominated by a combination of *Quercus alba, Quercus coccinea, Quercus falcata, Quercus velutina*, and sometimes *Quercus rubra*. The understory is generally very well-developed and dense and contains large amounts of *Oxydendrum arboreum, Cornus florida, Carya* spp., and *Nyssa sylvatica*. The shrub stratum is sparse but does often contain *Vaccinium pallidum* and *Vaccinium arboreum* as dominants. *Vitis rotundifolia* and *Smilax glauca* are consistently present. Herbs are uncommon in this community, but *Maianthemum racemosum, Chimaphila maculata*, and other dry-mesic subshrubs and herbs may be present in small quantities. It is uncertain at this time what the vegetation of forests/woodlands of this area might look like with an intact fire regime (none of them exist at the moment in a healthy state). However, fire may have thinned out the forest, creating a woodland and possibly increasing the diversity of herbaceous and shrub species in the ground layer.

Global Vegetation: The vegetation is dominated by *Quercus* spp. and lesser amounts of *Carya* spp. The canopy is continuous, and several species of *Quercus* may be present (e.g., *Quercus falcata, Quercus alba, Quercus velutina, Quercus coccinea*, and *Quercus stellata*). The subcanopy closure is variable, ranging from less than 25% to more

than 40% cover, and the shrub and herb layers generally are sparse. Subcanopy species include canopy species and *Acer rubrum, Liriodendron tulipifera, Oxydendrum arboreum, Liquidambar styraciflua, Ulmus alata, Cornus florida, Nyssa sylvatica, Juniperus virginiana var. virginiana*, and *Vaccinium arboreum*. The tall-shrub stratum may contain *Rhododendron canescens* and *Vaccinium arboreum*. The low-shrub stratum is dominated by various ericaceous shrubs such as *Vaccinium pallidum, Vaccinium stamineum, Vaccinium fuscatum*, and *Gaylussacia baccata*. *Smilax glauca* and *Vitis rotundifolia* are common vines. Herbaceous species that may be present include *Aristolochia serpentaria, Symphyotrichum dumosum (= Aster dumosus), Clitoria mariana, Desmodium nudiflorum, Euphorbia corollata, Galium circaezans, Chimaphila maculata, Polystichum acrostichoides, Asplenium platyneuron, Hexastylis arifolia, Coreopsis major, Solidago odora, Tephrosia virginiana, Potentilla simplex, Porteranthus stipulatus, Pteridium aquilinum, Lespedeza* spp., *Dichanthelium* spp., and *Hieracium venosum*.
Global Dynamics: There is no known natural disturbance regime responsible for development or maintenance of this community type. Tree replacement occurs most frequently in single tree-sized gaps. Occasional catastrophic windstorms and fires occur.

MOST ABUNDANT SPECIES

Cowpens National Battlefield

Stratum	Species
CANOPY	*Quercus alba, Quercus coccinea, Quercus falcate, Quercus velutina*
SUBCANOPY	*Oxydendrum arboreum, Cornus florida, Nyssa sylvatica*
SHORT SHRUB	*Vaccinium pallidum*

Global

Stratum	Species
TREE CANOPY	*Carya alba, Quercus alba, Quercus coccinea, Quercus falcata, Q velutina*
TREE SUBCANOPY	*Cornus florida, Oxydendrum arboreum*
SHORT SHRUB	*Vaccinium pallidum, Vaccinium stamineum*

GLOBAL SIMILAR ASSOCIATIONS [NVC association gname (CEGL code)]:
Quercus falcata - Quercus alba - Quercus stellata - Quercus velutina Forest (CEGL005018)
Quercus alba - Carya alba / Euonymus americana / Hexastylis arifolia Forest (CEGL006227)--a more mesic type with range overlap in the southern Piedmont.
Pinus echinata - Quercus alba / Vaccinium pallidum / Hexastylis arifolia - Chimaphila maculata Forest (CEGL008427)--a related mixed type.
GRank & Reasons: G4G5 (99-02-16). This is not a rare forest type, although most examples have been impacted by removal of the more valuable timber species (e.g., *Quercus alba*), and remaining ones on private land are highly vulnerable to canopy removal and conversion to other forest types or other land uses.

Element Distribution

Cowpens National Battlefield Range: This community is limited to the uplands of the park that have not been clearcut or plowed in recent history. They are interspersed with successional pine stands.
Global Range: This southern red oak - white oak dry forest is found in the Piedmont of Georgia, South Carolina, North Carolina, and Virginia, and in the interior uplands and Cumberland Plateau of Kentucky and Tennessee. It has also been reported from the Upper East Gulf Coastal Plain of Mississippi and Georgia.
Nations: US
States/Provinces: AL:S?, GA:S?, KY:S?, MS:S?, NC:S?, SC:S?, TN:S?, VA?
TNC Ecoregions: 43:C, 44:C, 50:C, 52:C, 53:?
USFS Ecoregions: 221Hc:CCC, 222Eb:CCC, 231Ae:CCC
Federal Lands: DOD (Arnold, Fort Benning, Fort Gordon?); DOE (Oak Ridge); NPS (Cowpens, Guilford Courthouse, Kings Mountain, Shiloh); USFS (Daniel Boone, Holly Springs?, Oconee, Sumter, Talladega, Uwharrie); USFWS (Eufaula)

Element Sources

Cowpens National Battlefield Inventory Notes:

Authors: S. Landaal, SCS **Confidence:** 2 **Identifier:** CEGL007244
REFERENCES (type in full citation below if reference is new): ALNHP 2002, Allard 1990, Ambrose 1990a, Evans 1991, Eyre 1980, Golden 1979, Oberholster 1993, Oosting 1942, Peet and Christensen 1980, Peet et al. 2002, Pyne 1994, Rawinski 1992, Schafale and Weakley 1990

A.247—QUERCUS NIGRA FOREST ALLIANCE (I.B.2.N.a.35)

Water Oak Forest Alliance

NatureServe Regions: **Southeast,ECS,SCS ! SHARED ALLIANCE !** **LeadResp: Southeast**

Alliance Concept

Summary: Upland forests dominated or codominated by *Quercus nigra*, in some cases as a result of disturbance and/or fire suppression of more diverse canopied forests. Forests in this alliance occur on mesic or dry-mesic sites, especially on loamy or other fine-textured soils (in contrast to the *Quercus hemisphaerica Forest Alliance (A.53)*, which occurs primarily on coarse-textured sands in drier situations). One association is found along small streams. Stands of this alliance typically contain other *Quercus* spp. (e.g., *Quercus falcata*), *Liquidambar styraciflua*, and *Pinus taeda*. In the Upper Gulf Coastal Plain of Georgia, some examples may contain *Fagus grandifolia*, *Liriodendron tulipifera*, *Carya alba*, and *Cornus florida* in the subcanopy. In Texas, *Quercus nigra* dominates the canopy, with scattered *Quercus virginiana*. The subcanopy/shrub stratum is dense (without fire) and contains *Ilex vomitoria*, *Vaccinium stamineum*, and *Vitis rotundifolia*. In small stream forests of the Gulf Coast Prairies and Marshes Ecoregion and possibly adjacent areas, other shrubs and small trees include *Callicarpa americana* and *Prunus caroliniana*. Woody vines include *Berchemia scandens*, *Parthenocissus quinquefolia*, *Toxicodendron radicans*, and *Ampelopsis arborea*. *Chasmanthium sessiliflorum* is the dominant herb. Other herbs are *Oplismenus hirtellus ssp. setarius (= Oplismenus setarius)*, *Carex cherokeensis*, *Verbesina virginica*, *Ageratina aromatica*, *Asplenium platyneuron var. platyneuron*, *Geum canadense*, and *Polygonum virginianum*. *Tillandsia usneoides* and *Pleopeltis polypodioides ssp. michauxiana* are common epiphytes. This alliance appears to be more abundantly represented (or more 'natural') towards the western end of the Coastal Plain.

Environment: Forests in this alliance occur especially on mesic or dry-mesic sites, especially on loamy or other fine-textured soils (in contrast to the *Quercus hemisphaerica Forest Alliance (A.53)*, which occurs primarily on coarse-textured sands in drier situations). This alliance appears to be more abundantly represented (or more 'natural') towards the western end of the Coastal Plain.

Physiognomy:

Vegetation: This alliance consists of upland forests dominated or codominated by *Quercus nigra*. Stands of this alliance typically contain other *Quercus* spp. (e.g., *Quercus falcata*), *Liquidambar styraciflua*, and *Pinus taeda*. In the Upper Gulf Coastal Plain of Georgia, some examples may contain *Fagus grandifolia*, *Liriodendron tulipifera*, *Carya alba*, and *Cornus florida* in the subcanopy. In Texas, *Quercus nigra* dominates the canopy, with scattered *Quercus virginiana*. The subcanopy/shrub stratum is dense (without fire) and contains *Ilex vomitoria*. In small stream forests of the Gulf Coast Prairies and Marshes Ecoregion and possibly adjacent areas, other shrubs and small trees include *Callicarpa americana* and *Prunus caroliniana*. Woody vines include *Berchemia scandens*, *Parthenocissus quinquefolia*, *Toxicodendron radicans*, and *Ampelopsis arborea*. *Chasmanthium sessiliflorum* is the dominant herb. Other herbs are *Oplismenus hirtellus ssp. setarius (= Oplismenus setarius)*, *Carex cherokeensis*, *Verbesina virginica*, *Ageratina aromatica*, *Asplenium platyneuron var. platyneuron*, *Geum canadense*, and *Polygonum virginianum*. *Tillandsia usneoides* and *Pleopeltis polypodioides ssp. michauxiana* are common epiphytes.

Dynamics:

Similar Alliances:

QUERCUS HEMISPHAERICA FOREST ALLIANCE (A.53) - includes similarly fire-sheltered or fire-suppressed vegetation, but on comparatively sandier or more coarsely textured soils.

QUERCUS ALBA - (QUERCUS NIGRA) FOREST ALLIANCE (A.238) - is more diverse and later-successional.

PINUS TAEDA - QUERCUS NIGRA FOREST ALLIANCE (A.406)

Similar Alliance Comments:

Synonymy:

Comments:

Alliance Distribution

Range: This alliance is found in Alabama, Florida (?), Georgia, Louisiana, Mississippi, South Carolina, and Texas. This alliance appears to be more abundantly represented (or more 'natural') towards the western end of the Coastal Plain.

Nations: US
States: AL FL? GA LA MS SC TX
TNC Ecoregions: 31:C, 40:?, 41:P, 42:?, 43:C, 52:C, 53:C, 55:?, 56:C
USFS Ecoregions: 221Aa:CCC, 231A:CC, 231Bd:CCC, 231Ea:CPP, 231Ef:CPP, 231Eh:CPP, 231Ei:CPP, 231Fa:CPP, 232Ba:CCP, 232Bb:CCP, 232Bg:CC?, 232Bh:CCP, 232Bi:CCP, 232Bj:CC?, 232Bk:CCP, 232Bl:CCP, 232Bm:CCC, 232Bn:CCP, 232Bo:CCP, 232Bp:CCP, 232Bq:CCC, 232Br:CCC, 232Bs:CCC, 232Bu:CC?, 232Bv:CC?, 232Ca:CCC, 232Cb:CC?, 232Dc:CPP, 232Ea:CPP, 232Fa:CPP, 232Fb:CPP, 232Fe:CPP, 234Aa:???, 234Ab:???, 234Ac:???, 234Ag:???, 234Ah:???, 234Ak:???, 234Al:???, 234Am:???, 234An:???, 255Db:CCC
Federal Lands: DOD (Fort Benning, Fort Gordon, Fort Stewart); NPS (Cowpens, Ninety Six); USFS (Talladega?, Tuskegee?); USFWS (San Bernard)

Alliance Sources

Authors: A.S. WEAKLEY **SCS Master:** MP
Origin: 1997-11-26 **Edition:** 96-10-01
References:

CEGL004638—Quercus nigra Forest
Water Oak Forest
Successional Water Oak Forest **ClassifResp: SCS**
Ecological Group [do not edit]: Semi-natural Wooded Uplands (900-40; 8.0.0.1)

Element Concept
Summary: This community is a result of disturbance and/or fire suppression of upland pinelands of the southeastern Coastal Plain and of pinelands and subsequent old fields in the adjacent Piedmont areas. This association usually occurs on mesic or dry-mesic sites, especially on loamy or other fine-textured soils (in contrast to the *Quercus hemisphaerica* Forest Alliance (A.53), which occurs primarily on coarse-textured sands in drier situations). Other oaks (e.g., *Quercus falcata, Quercus phellos, Quercus hemisphaerica*) may be intermixed, as well as *Liquidambar styraciflua*, remnant *Pinus palustris*, weedy *Pinus elliottii var. elliottii*, *Carya* spp., or *Pinus taeda*. In the Upper Gulf Coastal Plain of Georgia, some examples may contain *Fagus grandifolia, Liriodendron tulipifera, Carya alba*, and *Cornus florida* in the subcanopy.

USFWS Wetland System: Upland
Cowpens National Battlefield Environment: At Cowpens, this community type is found in at least one small patch on a slope just off of a gentle ridge. It occurs in a somewhat protected position on the landscape, and was most likely an old field before trees began to outcompete the herbaceous layer.

Environment: This community is a result of disturbance and/or fire suppression of upland pinelands of the southeastern Coastal Plain and adjacent Piedmont areas. This association occurs especially on mesic or dry-mesic sites, especially on loamy or other fine-textured soils. In the Piedmont transition of South Carolina, it may have grown out of areas that had been heavily farmed or cut over in the past, but which did not grow up into *Pinus taeda* forests.

Cowpens National Battlefield Vegetation: This community is heavily dominated by *Quercus phellos* and *Quercus nigra* and little else. The shrub layer is heavily dominated by *Smilax* spp., and the herbaceous layer is sparse and species-poor.

Vegetation: The canopy of this association is dominated by *Quercus nigra*. Other oaks may be intermixed, especially *Quercus phellos*, as well as *Liquidambar styraciflua*, remnant *Pinus palustris*, weedy *Pinus elliottii var. elliottii*, *Carya* spp., or *Pinus taeda*. In the Upper Gulf Coastal Plain of Georgia, some examples may contain *Fagus grandifolia, Liriodendron tulipifera, Carya alba*, and *Cornus florida* in the subcanopy.

Dynamics: This community occurs as a successional community following either degradation of pinelands or recovery from old fields in fairly sandy soils.
Adjacent Associations Comments:
Similar Associations:
Synonymy:
Comments:

MOST ABUNDANT SPECIES
Cowpens National Battlefield

Stratum	Species
CANOPY	*Quercus nigra, Quercus phellos*
SHORT SHRUB	*Smilax* spp.

CHARACTERISTIC SPECIES
Cowpens National Battlefield

Stratum	Species
CANOPY	*Quercus nigra*

Element Global Rank & Reasons
GRank: GM GRankDate: 97-06-25 GRevDate: 02-05-17
GReasons: This vegetation is presumed to be either a result of disturbance of more diverse-canopied hardwood forests, and/or a result of lack of fire on sites which would be dominated by *Pinus palustris*. In the Piedmont area of South Carolina, it may occur on areas formerly codominated by *Quercus oglethorpensis*. In these areas, the *Quercus oglethorpensis* still survives, making this modified community of more conservation value in those areas.
GRank Author: M. Pyne, mod. R. White (Southeast) Edition: 02-05-17
High-ranked species:
Element Distribution
Cowpens National Battlefield Range: Within the park, this community exists in small patches of habitat within the park road's circle.

Range: This community is distributed throughout the traditional range of longleaf pine communities, mainly in the Coastal Plain from Texas up through at least South Carolina. In some parts of its range in South Carolina and Georgia, the community may be found in the Piedmont within 50 miles of the fall-line and may share dominance with other successional pine-dominated communities more common in the Piedmont.
Nations: US
Element Internal Tracking
CCAG Status: 2
Internal Comments: RW 12-03: COWP Plot 18 attributed to this community (NatureServe Ecology unpubl. data 2002), SC? changed to SC. Plots 2 and 4 from Ninety Six (NISI.2, NISI.4) assigned to this community (NatureServe Ecology unpubl. data 2002). RW 3-02: Expanded the definition of this community to include the Piedmont of South Carolina since the community existed at Ninety Six National Historic Site. MP 7-01: USFS (Talladega?, Tuskegee?) added.
TNC Ecoregion Notes: ECO52 added (RW 5-02). ECO43 added from Fort Benning, Georgia (MP 7-00). ECO41 changed from ? to P and ECO42 added (MP 1-00).
Predecessors:
Obsolete Names or Alliances:
Element Sources
Concept Author(s):
Origin: 1997-11-26. Internal Author History: . Edition: 03-03-26
ETC References (*concept*):
CCAG References (*characterization*): NatureServe Ecology - Southeastern U.S. unpubl. data

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

I.B.2.N.d.12. LIQUIDAMBAR STYRACIFLUA - (LIRIODENDRON TULIPIFERA, ACER RUBRUM) TEMPORARILY FLOODED FOREST ALLIANCE

Sweetgum - (Tuliptree, Red Maple) Temporarily Flooded Forest Alliance

Alliance Concept

Summary: This alliance includes a variety of bottomland communities of moderately wet floodplains of the lower Piedmont, Interior Low Plateau, Coastal Plain, and possibly the Cumberland Plateau, ranging into the Ouachita Mountains and Ozarks, and dominated by *Liquidambar styraciflua* with or without some combination of *Liriodendron tulipifera* and *Acer rubrum* as codominants. Canopy and subcanopy associates vary with geography and substrate, but may include *Acer barbatum, Ilex opaca var. opaca, Aesculus sylvatica, Quercus nigra, Carya cordiformis, Platanus occidentalis, Betula nigra, Carpinus caroliniana ssp. caroliniana, Cornus florida, Crataegus flava, Fagus grandifolia, Juglans nigra, Morus rubra var. rubra, Ostrya virginiana var. virginiana, Oxydendrum arboreum, Pinus echinata, Prunus serotina var. serotina, Quercus alba, Quercus rubra var. rubra, Ulmus rubra, Ulmus americana, Ulmus alata, Juniperus virginiana var. virginiana, Nyssa sylvatica, Fraxinus americana,* and *Fraxinus pennsylvanica*. The shrub layer often is well-developed and species include *Euonymus americana, Lindera benzoin var. benzoin, Corylus americana, Viburnum acerifolium, Viburnum nudum var. nudum, Viburnum prunifolium, Viburnum rufidulum, Hamamelis virginiana, Asimina triloba,* and *Ilex decidua* among others. Vines are prominent and species include *Vitis rotundifolia, Apios americana, Campsis radicans, Aristolochia serpentaria, Bignonia capreolata, Dioscorea quaternata, Gelsemium sempervirens, Parthenocissus quinquefolia (= var. quinquefolia), Campsis radicans, Passiflora lutea, Smilax bona-nox, Smilax glauca (= var. glauca), Smilax hugeri, Smilax rotundifolia*, and *Toxicodendron radicans ssp. radicans*. The herbaceous layer can be species-rich and often has good sedge development. Common species in this layer include *Thalictrum thalictroides, Trillium cuneatum, Arisaema triphyllum ssp. triphyllum, Asplenium platyneuron var. platyneuron, Botrychium virginianum, Carex* spp., *Carex impressinervia, Carex striatula, Galium circaezans, Geum canadense, Polystichum acrostichoides,* and *Scutellaria integrifolia* among many others. Soils are relatively acid. The exotics *Microstegium vimineum, Ligustrum sinense*, and *Lonicera japonica* may be common in examples of this alliance. This alliance is fairly common in the lower Piedmont of Georgia, as well as on small stream floodplains and bottoms in all of the Interior Low Plateau of Kentucky (except the Bluegrass region) where it is somewhat successional. *Liriodendron tulipifera* is dominant on disturbed areas of Kentucky and is common on well-drained floodplains of Kentucky without *Liquidambar styraciflua*. Conversely, *Liriodendron tulipifera* is absent in Ouachita - Ozark examples.
Dynamics:

Alliance Distribution

Range: This alliance is fairly common in the lower Piedmont of Georgia (J. Ambrose pers. comm.), as well as on small stream floodplains and bottoms in all of the Interior Low Plateau of Kentucky (except the Bluegrass region) where it is somewhat successional (L. McKinney pers. comm.). *Liriodendron tulipifera* is dominant on disturbed areas of Kentucky and is common on well-drained floodplains of Kentucky without *Liquidambar styraciflua*. Conversely, *Liriodendron tulipifera* is absent in Ouachita - Ozark examples. This alliance is found in Alabama, Arkansas, Georgia, Kentucky, Mississippi, North Carolina, Oklahoma, South Carolina, and Tennessee, Maryland, Virginia, and possibly in Florida (?), but not in Texas.
Nations: US
States/Provinces: AL AR FL? GA KY MD MS NC OK SC TN VA
TNC Ecoregions: 38:C, 39:C, 43:C, 44:C, 50:C, 52:C, 53:?, 56:C, 57:C, 58:C
Federal Lands: DOD (Arnold, Fort Benning, Fort Gordon); DOE (Oak Ridge?, Savannah River Site); NPS (Carl Sandburg Home, Cowpens, Guilford Courthouse, Kennesaw Mountain, Kings Mountain, Mammoth Cave, Shiloh?); USFS (Bankhead?, Bienville, Croatan?, Daniel Boone, Delta, De Soto, Francis Marion?, Holly Springs, Homochitto, Oconee, Ouachita, Ozark, Sumter, Talladega, Tombigbee, Tuskegee, Uwharrie)

Alliance Sources

Authors: D.J. ALLARD, MP, Southeast **Identifier:** A.287

References: Ambrose pers. comm., Foti 1994a, Foti 1994b, Jones et al. 1981b, McKinney pers. comm., Schafale and Weakley 1990

Liquidambar styraciflua Temporarily Flooded ForestSweetgum Temporarily Flooded Forest
Successional Sweetgum Floodplain Forest
Ecological Group (SCS;MCS): Semi-Natural Riparian and Willow Forests (900-45; n/a)

Element Concept

GLOBAL SUMMARY: This association is dominated by *Liquidambar styraciflua*, and occurs on disturbed sites such as wetland old fields. This is a successional community which develops following clearcutting or other disturbance along floodplains of major creeks and other temporarily flooded areas. This association is known from the Piedmont, Interior Low Plateau, Inner South Atlantic Coastal Plain, and possibly other provinces. *Acer rubrum* may be a major component of the canopy and subcanopy and may even partially dominate in some instances. In more mature examples, other canopy/subcanopy species which may occur to a lesser extent and often as scattered emergents are *Quercus alba, Quercus phellos, Quercus nigra, Nyssa sylvatica, Cornus florida,* and *Liriodendron tulipifera*. Stands in the Inner Coastal Plain of South Carolina typically contain *Persea palustris* and *Magnolia virginiana*. The shrub layer contains *Carpinus caroliniana, Itea virginica, Vitis rotundifolia, Parthenocissus quinquefolia, Smilax rotundifolia*, and *Rubus* sp., in addition to canopy/subcanopy species. *Lonicera japonica* is often abundant in the understory. On disturbed sites, the ground layer is typically solid *Microstegium vimineum* or a tangle of *Smilax rotundifolia* and *Rubus* sp. The herbaceous layer may include *Chasmanthium laxum, Carex* spp., *Boehmeria cylindrica*, and *Botrychium biternatum*, sometimes growing on hummocks in standing water.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Wetland
Cowpens National Battlefield Environment: This community is limited to the floodplains of mid-sized creeks within the park. The community occurs in areas formerly occupied by old fields or clearcuts.
Global Environment: This association occurs on disturbed sites such as wetland old fields. This is a successional community which develops following clearcutting or other disturbance along floodplains of major creeks and other temporarily flooded areas. These are productive stream terraces subject of occasional flooding (Jones et al. 1981b).

VEGETATION DESCRIPTION

Cowpens National Battlefield Vegetation: The canopy of this community is dominated by a combination of *Liquidambar styraciflua* and *Acer rubrum*. It may also contain some examples of *Quercus alba* and *Liriodendron tulipifera*, but any examples that have over 50% *Quercus alba* should instead be considered Southern Piedmont Mesic Subacid Oak-Hickory Forest, *Quercus alba - Carya alba / Euonymus americana / Hexastylis arifolia* Forest (CEGL006227). The understory varies from occurrence to occurrence but usually contains younger *Liquidambar styraciflua* and *Acer rubrum*. The ground layer is very heavily dominated by tangles of vines and short shrubs, mostly *Smilax spp., Vitis rotundifolia*, and *Lonicera japonica*. Sometimes 100% of the ground layer is covered by various vines and shrubs or *Microstegium vimineum.*
Global Vegetation: The canopy of this association is dominated by *Liquidambar styraciflua*. *Acer rubrum* may be a major component of the canopy and subcanopy and may even partially dominate in some instances (TNC 1998a). In more mature examples, other canopy/subcanopy species which may occur to a lesser extent and often as scattered emergents are *Quercus alba, Quercus phellos, Quercus nigra, Nyssa sylvatica, Cornus florida,* and *Liriodendron tulipifera*. Stands in the Inner Coastal Plain of South Carolina typically contain *Persea palustris* and *Magnolia virginiana* (Jones et al. 1981b). The shrub layer contains *Carpinus caroliniana, Itea virginica, Vitis rotundifolia, Parthenocissus quinquefolia, Smilax rotundifolia*, and *Rubus* sp., in addition to canopy/subcanopy species. *Lonicera japonica* is often abundant in the understory. On disturbed sites, the ground layer is typically solid *Microstegium vimineum* or a tangle of *Smilax rotundifolia* and *Rubus* sp. The herbaceous layer may include *Chasmanthium laxum, Carex* spp., *Boehmeria cylindrica*, and *Botrychium biternatum*, sometimes growing on hummocks in standing water.

Global Dynamics:

MOST ABUNDANT SPECIES

Cowpens National Battlefield

Stratum	Species
CANOPY	*Liquidambar styraciflua, Acer rubrum*

VINE *Vitis rotundifolia*

CHARACTERISTIC SPECIES

Cowpens National Battlefield

Stratum	Species
SHRUB	*Smilax* spp.

GLOBAL SIMILAR ASSOCIATIONS [NVC association gname (CEGL code)]:
Quercus alba - Carya (alba, ovata) - Liriodendron tulipifera - (Quercus phellos) / Cornus florida Forest (CEGL007709)
Quercus phellos - Quercus alba / Vaccinium fuscatum - (Viburnum nudum) / Carex (barrattii, intumescens) Forest (CEGL007364)
Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. *triphyllum* Forest (CEGL004418)
GRank & Reasons: GD (00-08-08). This is a successional community which develops following clearcutting or other disturbance along floodplains of major creeks and other temporarily flooded areas.

Element Distribution

Cowpens National Battlefield Range: This community is restricted to the semi-flooded flat bottoms near medium-sized creeks within the park. This community is probably only in the south-central/southeastern part of the park where a creek flows from old Scruggs Lake out to the boundary of the park just behind New Pleasant Chapel.
Global Range: This association is known from the Piedmont, Interior Low Plateau, inner South Atlantic Coastal Plain, and possibly other provinces.
Nations: US
States/Provinces: AL:S?, GA?, KY:S?, MS:S?, NC:S?, SC:S?, TN:S?
TNC Ecoregions: 43:C, 44:C, 50:C, 52:C, 56:C, 57:C
USFS Ecoregions: 221Hc:CCC, 222Eb:CCC, 231Aa:CCC, 231Cd:CPP, 231D:CC, 232:C
Federal Lands: DOD (Arnold, Fort Benning?); DOE (Savannah River Site); NPS (Cowpens, Shiloh?); USFS (Bankhead?, Daniel Boone, Oconee?)

Element Sources

Cowpens National Battlefield Inventory Notes:
Authors: SCS **Confidence:** 2 **Identifier:** CEGL007330
REFERENCES (type in full citation below if reference is new): Jones et al. 1981b, TNC 1998a

II. WOODLAND

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

II.B.2.N.a.13. QUERCUS ALBA - QUERCUS STELLATA - QUERCUS VELUTINA - (QUERCUS FALCATA) WOODLAND ALLIANCE

White Oak - Post Oak - Black Oak - (Southern Red Oak) Woodland Alliance

Alliance Concept

Summary: This alliance contains a variety of bedrock- or substrate-influenced, fire-dependent, dry-mesic woodlands with either shallow soils (e.g., over bedrock) or deep, sandy soils. Abundant trees are *Quercus alba, Quercus falcata, Quercus marilandica, Quercus stellata, Quercus velutina, Crataegus* spp., and *Pinus echinata*. In western Arkansas, *Quercus rubra* may be a canopy dominant. Taller shrubs include *Crataegus* spp., *Rhus aromatica, Vaccinium arboreum,* and *Vaccinium pallidum*. *Schizachyrium scoparium* is a common herbaceous species. Others that may be present include *Andropogon gerardii, Helianthus microcephalus, Polygonella americana, Sorghastrum nutans*, and *Solidago odora*. Lichens and mosses are often found in drier stands of this alliance. Stands of this alliance are found on gentle to steep hills, plains, and ridges. Soils are well- to very rapidly drained and very shallow to deep (10-100 cm). Parent material is sand, chert, sandstone, or, rarely, igneous rock with areas of rock or residuum present at the surface. The various associations placed in this alliance include rare fire-maintained diabase and granite woodlands of the Piedmont of Virginia and South Carolina, *Quercus alba*-dominated woodlands of the Ozarks, and *Quercus rubra*-dominated woodlands of the Ouachitas.
Dynamics: This alliance is less xeric than the II.B.2.N.a *Quercus stellata - Quercus marilandica* Woodland Alliance (A.625) and is thus more fire-dependent to maintain a woodland physiognomy.

Alliance Distribution

Range: This alliance is found in Arkansas, South Carolina, Virginia, and Missouri, and possibly Kentucky (?) and Oklahoma (?).
Nations: US
States/Provinces: AR KY? MO OK? SC VA
TNC Ecoregions: 37:C, 38:C, 39:C, 40:C, 42:C, 44:C, 52:C
Federal Lands: DOD (Fort Chaffee, Fort Pickett); NPS (Buffalo?); USFS (Ouachita, Ozark); USFWS (Cossatot River)

Alliance Sources

Authors: S. LANDAAL, RW, Southeast **Identifier:** A.613
References: Eyre 1980, Fountain and Sweeney 1985, Nelson 1985, Smith et al. 2000

Quercus alba - Quercus velutina - Quercus stellata / Schizachyrium scoparium - Desmodium spp. Woodland White Oak - Black Oak - Post Oak / Little Bluestem - Tick-trefoil species Woodland

Piedmont Granitic White Oak - Black Oak Woodland

Ecological Group (SCS;MCS): Appalachian Highlands Dry-mesic Oak Forests and Woodlands (401-13; 2.5.3.2)

Element Concept

GLOBAL SUMMARY: This is a fire-maintained woodland of the Piedmont of Virginia and South Carolina, occurring on soils derived from granitic rock. It may also persist in a slightly altered state due to particularly rigorous mowing regimes. Although the fire or mowing frequency is abnormally high at known sites (on Fort Pickett), this community may be quite similar to some pre-settlement Piedmont communities. Canopy dominants include *Quercus alba, Quercus velutina, Quercus stellata, Quercus falcata, Quercus coccinea, Carya alba, Carya glabra,* and *Liriodendron tulipifera*. The subcanopy may include *Cornus florida* and *Liquidambar styraciflua*, but can also be fairly open. Shrubs and woody vines include *Rhus copallinum, Rhus michauxii, Rhus glabra, Diospyros virginiana, Ulmus alata, Sassafras albidum, Vaccinium pallidum, Vaccinium stamineum, Hypericum hypericoides ssp. multicaule (= Hypericum stragulum), Toxicodendron pubescens, Vitis rotundifolia*. The herb layer is dominated by *Schizachyrium scoparium* or sometimes *Danthonia sericea*, and also includes *Desmodium laevigatum, Desmodium marilandicum, Desmodium nuttallii, Desmodium paniculatum, Desmodium perplexum, Desmodium ciliare, Eupatorium hyssopifolium, Eupatorium godfreyanum, Clitoria mariana, Eupatorium rotundifolium var. ovatum (= Eupatorium pubescens), Eupatorium sessilifolium, Eupatorium altissimum (= Eupatorium saltuense), Galactia regularis, Lespedeza procumbens, Dichanthelium dichotomum, Dichanthelium depauperatum, Solidago pinetorum, Solidago rugosa, Solidago nemoralis, Solidago erecta, Helianthus atrorubens, Coreopsis major, Liatris graminifolia, Andropogon ternarius, Tephrosia virginiana, Clitoria mariana,*and *Sorghastrum elliottii*. At Cowpens in South Carolina, historical accounts from the Revolutionary War (1781) all describe open fields in the area where this community now sits. Historic descriptions of upstate South Carolina uplands from as late as 1775 suggest woodlands and open areas covered with “grasses and the wild pea-vine, growing as high as a horse’s back” were common (Logan 1859). These historical accounts suggest that the remnants in South Carolina and Virginia may indeed approximate the vegetation of the upland areas of the Piedmont of 250 years ago.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Upland

Cowpens National Battlefield Environment: This community exists in upland areas that have not been recently plowed and that have maintained some sort of consistent disturbance regime such as fire, grazing, and/or mowing since settlement. At Cowpens, the community appears to have been maintained by an aggressive regime of mowing to preserve the battleground’s open character. Other areas of the park have been plowed and farmed. However, this area appears to have much more intact soils and may have been preserved continuously in its current state for at least the past 70-100 years. The community is fairly dry and well-drained, but supports a substantial herbaceous cover of plants that are tolerant of these conditions but not tolerant of soil disturbance. In order to maintain and improve this community in the future, it will be important to either continue the current mowing regime or reintroduce light ground fire into this area. Adjacent communities are very impacted by exotic species and past farming practices, so it will also be important to monitor this community for invasion of exotics from adjacent stands of *Ligustrum sinense* and *Lonicera japonica*.

Global Environment: This is a fire-maintained woodland of the Piedmont of Virginia and South Carolina, occurring on soils derived from granitic rock. It may also persist in a slightly altered state due to particularly rigorous mowing regimes. Although the fire or mowing frequency is abnormally high at known sites (on Fort Pickett, Virginia), this community may be quite similar to some presettlement Piedmont communities. At Cowpens in South Carolina, historical accounts from the Revolutionary War (1781) all describe open fields in the area where this community now sits (Babits 1998). Historic descriptions of upstate South Carolina uplands from as late as 1775 suggest woodlands and open areas covered with “grasses and the wild pea-vine, growing as high as a horse’s back” were common (Logan 1859). These historical accounts suggest that the remnants in South Carolina and Virginia may indeed approximate the vegetation of the upland areas of the Piedmont of 250 years ago.

VEGETATION DESCRIPTION

Cowpens National Battlefield Vegetation: The one example of this community at Cowpens consists of a sparse canopy of *Quercus coccinea, Quercus alba, Quercus velutina, Carya alba,* and *Quercus falcata.* The understory and shrub layers are fairly poorly developed, but the herb layer is extremely well-developed and diverse. Some of the most common species include *Schizachyrium scoparium, Helianthus atrorubens, Liatris graminifolia, Danthonia sericea, Coreopsis major, Pteridium aquilinum, Tridens flavus, Andropogon ternarius, Tephrosia virginiana, Desmodium* spp., *Pityopsis aspera var. adenolepis*, and many others. Herbaceous coverage approaches 100%. Most of these plants will survive light ground fire and may thrive in such a situation, although intense fires may cause damage or death to *Quercus alba* and *Carya alba*, depending upon the intensity of the burn.

Global Vegetation: Canopy dominants include *Quercus alba, Quercus velutina, Quercus stellata, Quercus falcata, Quercus coccinea, Carya alba, Carya glabra*, and *Liriodendron tulipifera*. The subcanopy may include *Cornus florida* and *Liquidambar styraciflua*, but can also be fairly open. Shrubs and woody vines include *Rhus copallinum, Rhus michauxii, Rhus glabra, Diospyros virginiana, Ulmus alata, Sassafras albidum, Vaccinium pallidum, Vaccinium stamineum, Hypericum hypericoides ssp. multicaule (= Hypericum stragulum), Toxicodendron pubescens, Vitis rotundifolia*. The herb layer is dominated by *Schizachyrium scoparium* or sometimes *Danthonia sericea*, and also includes *Desmodium laevigatum, Desmodium marilandicum, Desmodium nuttallii, Desmodium paniculatum, Desmodium perplexum, Desmodium ciliare, Eupatorium hyssopifolium, Eupatorium godfreyanum, Clitoria mariana, Eupatorium rotundifolium var. ovatum (= Eupatorium pubescens), Eupatorium sessilifolium, Eupatorium altissimum (= Eupatorium saltuense), Galactia regularis, Lespedeza procumbens, Dichanthelium dichotomum, Dichanthelium depauperatum, Solidago pinetorum, Solidago rugosa, Solidago nemoralis, Solidago erecta, Helianthus atrorubens, Coreopsis major, Liatris graminifolia, Andropogon ternarius, Tephrosia virginiana, Clitoria mariana,* and *Sorghastrum elliottii*.

Global Dynamics: This community's origin is a bit mysterious, but it is hypothesize that it is a remnant of a community type more common in presettlement times when fire was more common on the Piedmont landscape. The community contains plants that are generally not considered threatened or endangered but that are quite rare on the Piedmont landscape outside of rock outcrop and shallow-soiled communities and roadsides (*Liatris graminifolia, Helianthus atrorubens, Pityopsis aspera, Tephrosia virginiana*, and *Schizachyrium scoparium*). Therefore, though altered by human-maintained fire and/or mowing, this community type may best approximate the oak woodland/savanna community of the Piedmont from 250 or more years ago.

MOST ABUNDANT SPECIES

Cowpens National Battlefield

Stratum	Species
CANOPY	*Quercus alba, coccinea, velutina*
HERBACEOUS	*Danthonia sericea, Schizachyrium scoparium*

Global

Stratum	Species
CANOPY	*Quercus alba*
HERBACEOUS	*Schizachyrium scoparium*

CHARACTERISTIC SPECIES

Cowpens National Battlefield

Stratum	Species
HERBACEOUS	*Liatris graminifolia, Tephrosia virginiana, Desmodium spp.*

GLOBAL SIMILAR ASSOCIATIONS [NVC association gname (CEGL code)]:

Quercus alba - Carya glabra / Schizachyrium scoparium - Helianthus divaricatus - Salvia urticifolia - Parthenium auriculatum Woodland (CEGL003721)--differs in underlying geology (granite vs. diabase).

GRank & Reasons: G1? (01-01-30). This community is currently restricted to Fort Pickett, Virginia, and Cowpens National Battlefield in upstate South Carolina, where it is maintained by frequent fires set by military training (VA) and mowing (SC). It is believed, though, that this community may approximate communities which formerly occurred on felsic rock sites of the Piedmont under conditions of more frequent fire. The former

distribution may have extended south from central Virginia through North Carolina and into South Carolina and Georgia. Current acreage of this community is less than 5000 acres.

Element Distribution

Cowpens National Battlefield Range: This community is limited to less than 2-3 acres of the battlefield section of the park.
Global Range: This community is currently restricted to Fort Pickett, Virginia, and Cowpens National Battlefield, South Carolina. It is maintained by frequent fires set by military training (VA) or mowing (SC). It is believed, though, that this community may approximate communities which formerly occurred on felsic rock sites of the Piedmont under conditions of more frequent fire. The former distribution may have extended south from central Virginia through North Carolina and into South Carolina and Georgia.
Nations: US
States/Provinces: SC:S? VA:S?
TNC Ecoregions: 52:C
USFS Ecoregions: 231Ae:CCC
Federal Lands: DOD (Fort Pickett); NPS (Cowpens)

Element Sources

Cowpens National Battlefield Inventory Notes:
Authors: SCS **Confidence:** 2 **Identifier:** CEGL003722
REFERENCES (type in full citation below if reference is new): Babits 1998, Barden 1997, Fleming et al. 2001, Fleming pers. comm., Logan 1859

III. SHRUBLAND

III.A.2.N.g. Temporarily flooded temperate broad-leaved evergreen shrubland

A.795—ARUNDINARIA GIGANTEA TEMPORARILY FLOODED SHRUBLAND ALLIANCE (III.A.2.N.g.1)

Giant Cane Temporarily Flooded Shrubland Alliance

NatureServe Regions: Southeast,ECS,MCS,SCS ! SHARED ALLIANCE ! LeadResp: Southeast

III. Shrubland

Alliance Concept

Summary: This alliance encompasses various temporarily flooded wetlands, including alluvial or loess substrates (streamside flats, bottomlands), dominated by *Arundinaria*, without an overstory, or with widely scattered trees. Evidence suggests that this alliance was widespread historically, covering large areas of many floodplains and streamsides in the Coastal Plain from North Carolina to Texas, the Mississippi River Alluvial Plain north to Illinois and Missouri, Interior Highlands, Interior Low Plateau, Southern Blue Ridge and possibly the Central Appalachians of the southeastern United States. It now occupies very little of its former acreage. Canebrakes are successional communities and may have originated following abandonment of aboriginal agricultural fields or catastrophic disturbances such as windstorms. They are thought to have been maintained in part by fires set by Native Americans. This alliance may be found along larger rivers (Buffalo, White, Norfork) in the Ozarks, as well as in the Wabash and Ohio drainage systems, at least historically. It was also reported historically along the Red and Mississippi rivers in Louisiana, Coastal Prairie rivers in Texas, and the Black, Washita, Arkansas, Pearl, Tombigbee, Yazoo, Savannah (Barden 1997), and St. Mary's rivers. Large, extant canebrakes still exist and have been documented from the Ocmulgee Basin, south of Macon, Georgia. In the Central Appalachians various wetlands, including those on alluvial or loess substrates (streamside flats, bottomlands), were dominated by *Arundinaria*, without an overstory, or with widely scattered trees.

Environment: This alliance is found in wetlands on alluvial or loess substrates. Dense monospecific stands of *Arundinaria gigantea ssp. gigantea* were historically found in bottomlands and streamsides in the southeastern United States. In presettlement times, a single river valley grove could be 2 or 3 miles wide and 100 miles long.

Physiognomy: This shrubland is dominated by the woody grass *Arundinaria gigantea*, a North American member of the bamboo tribe (Bambuseae) of grasses.

Vegetation: Vegetation of this alliance is dominated by *Arundinaria gigantea ssp. gigantea*. Widely scattered trees may be present and the cane thicket may also include various briars (*Smilax* spp.) and other vines.

Dynamics: Vegetation classed within this alliance is successional and is thought to be maintained by periodic fires and may have originated following abandonment of aboriginal agricultural fields or catastrophic disturbances such as windstorms.

Similar Alliances:

ARUNDINARIA GIGANTEA WOODED SHRUBLAND ALLIANCE (A.794)

ARUNDINARIA GIGANTEA SATURATED SHRUBLAND ALLIANCE (A.801)

ARUNDINARIA GIGANTEA SATURATED WOODED SHRUBLAND ALLIANCE (A.804)
Similar Alliance Comments:

Comments: *Arundinaria gigantea* is a common component in many bottomland and streamside communities today. Vegetation characterized by a predominance of *Arundinaria* in the understory of a woodland or forest community would not be classified in this alliance. Today, high-quality examples of this alliance are extremely rare. In pre-colonial times, herds of bison would swim across the Mississippi River in winter, when food was scarce on the prairies, to feed in the huge, lush canebrakes of Kentucky and Tennessee. U.S. President Theodore Roosevelt (1908) offered these comments on Louisiana canebreaks: "The canebrakes stretch along the slight rises of ground, often extending for miles, forming one of the most striking and interesting features of the country. They choke out other growths, the feathery, graceful canes standing in ranks, tall, slender, serried, each but a few inches from his brother, and springing to a height of fifteen or twenty feet. They look like bamboos; they are well-nigh impenetrable to a man on horseback; even on foot they make difficult walking unless free use is made of the heavy bush-knife. It is impossible to see through them for more than fifteen or twenty paces, and often for not half that distance. Bears make their lairs in them, and they are the refuge for hunted things." <http://www.theodore-roosevelt.com/trspeeches.html>.
Alliance Distribution

Range: This alliance was widespread historically but now occupies very little acreage. It may be found along rivers and streamsides in Alabama, Arkansas, Florida, Georgia, Illinois, Indiana, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and possibly Virginia (?).
Nations: US
States: AL AR FL? GA IL IN KY LA MO MS NC OK SC TN TX VA?
TNC Ecoregions: 31:P, 32:P, 38:C, 39:C, 40:C, 41:P, 42:C, 43:P, 44:C, 50:C, 51:C, 52:P, 53:P, 56:C, 57:P, 59:C
Federal Lands: DOD (Fort Benning); NPS (Buffalo, Great Smoky Mountains); USFS (Cherokee?, Mark Twain, Ouachita?, Ozark, St. Francis); USFWS (Little River, San Bernard?)
Alliance Internal Tracking
Predecessors:
Obsolete Names or Formations:

Alliance Sources
Authors: A.S. WEAKLEY, MO. J. TEAG SCS Master: MP
Origin: 1997-11-26 Edition: 02-01-28
References: Barden 1977, Campbell 1980, Campbell 1989b, Davidson 1950, Flores 1984, Foti et al. 1994, Heineke 1987, Hoagland 1998a, Hughes 1966, McInteer 1952, Meanley 1972, Mohr 1901, Platt and Brantley 1992, Platt and Brantley 1997, West 1934

CEGL003836—Arundinaria gigantea ssp. gigantea Shrubland
Giant Cane Shrubland
Floodplain Canebrake **ClassifResp: SCS**
Ecological Group [do not edit]: Interior Highlands Riverfront and Levee Forests and Shrublands (426-45; 1.6.3.6)
Southeastern Coastal Plain Floodplain Shrublands (385-25; 1.6.4.5)

Classification Confidence = 2 **Level** = ASSOCIATION **Classification Used:** GC
NatureServe Regions: **SCS,MCS,ECS ! SHARED ASSOCIATION !**

Element Concept
Summary: This association is characterized by dense, often monospecific thickets of the bamboo shrub *Arundinaria gigantea* occupying large areas referred to as canebrakes. The canebrake shrubland type was historically widespread, but is now rare and occupies very little of its former acreage. It was best developed in streamside flats and alluvial floodplains on ridges and terraces where it was protected from prolonged inundation. Historically, this community covered large areas of many floodplains and streamsides in the Coastal Plain from North Carolina to Texas, Mississippi River Alluvial Plain, Interior Highlands, Interior Low Plateau, Southern Blue Ridge and possibly the Central Appalachians of the southeastern United States. Stands occur on alluvial and loess soils and are often associated with bottomland hardwood forest vegetation. This association is successional and is thought to be maintained by periodic fires. It may have originated following abandonment of aboriginal agricultural fields or other natural and anthropogenic disturbances such as blow-downs and catastrophic floods. Historical accounts report cane as abundant along the Wabash and Ohio drainage systems, as well as common along larger rivers (Buffalo, White, Norfork) in the Ozarks and Ouachitas. It was also reported as common along the Red and Mississippi rivers in Louisiana, Coastal Prairie rivers in Texas, and the Black, Washita, Arkansas, Sabine, Pearl, Tombigbee, Yazoo, Savannah, and St. Mary's rivers. Large, extant canebrakes still exist and have been documented from the Ocmulgee Basin, south of Macon, Georgia. In the Central Appalachians various wetlands, including those on alluvial or loess substrates (streamside flats, bottomlands), were dominated by *Arundinaria*, without an overstory, or with widely scattered trees.

Cowpens National Battlefield Environment: Dense stands of *Arundinaria gigantea ssp. gigantea* were documented during the Revolutionary War as existing along the many of the creeks within the present-day park. They were most likely maintained by fire. They no longer exist within the park boundary. In order to reintroduce this community to the park, it would be important to research the exact locations of these communities in the past and consider whether the current composition of those areas are justifiably transformed. A combination of frequent fire, seeding, and planting would be required to reintroduce cane at this time. Cane is found in the park and may serve as a source for transplanting and/or collecting seed in the years that it produces.

Environment: Stands of this association occur on alluvial and loess soils often affiliated with bottomland hardwood forest vegetation. Historically, it was best developed in streamside flats and alluvial floodplains on ridges and terraces where it was protected from prolonged inundation.

Cowpens National Battlefield Vegetation: Although this community is locally extinct in this area, it is known to have been composed mainly of tall *Arundinaria gigantea ssp. gigantea* and other bottomland shrub and herbaceous species as thick “canebrakes.”

Vegetation: The vegetation is dominated by *Arundinaria gigantea*. Little else is known about its vegetational characteristics. However, information on its historic patterns of distribution provides some clues as to its ecology. General Land Office surveys and other historical accounts indicate that canebrakes were present in southern Illinois, southern Indiana, Kentucky, Missouri, Arkansas, eastern Texas, Louisiana, Tennessee, Mississippi, Alabama, Georgia, and South Carolina. Historical accounts refer to both "pure" stands of cane without an overstory of trees (cane shrublands) and areas with variable overstory closure (woodlands or forests) but with a dense understory dominated by cane as "canebrakes." As currently described, this association refers only to the former, cane shrublands. Cane was abundant along the Wabash and Ohio drainage systems (B. McClain pers. comm. 2000). In Missouri, these canebrakes were also thought to be common in the Ozark Highlands, particularly in southward-draining rivers and streams with finer-textured, more developed soils on upper floodplain terraces (T. Nigh pers. comm. 2000). Stands may be found along larger rivers (Buffalo, White, Norfork) in the Arkansas Ozarks in addition to the Ouachitas. In the Central Appalachians various wetlands, including those on alluvial or loess substrates (streamside flats, bottomlands), were dominated by *Arundinaria*, without an overstory, or with widely scattered trees (Central Appalachian Forest Ecoregional Team pers. comm. 1998). Historic accounts describe large expanses (one area was described as 75 miles long by 1-3 miles wide) of an "ocean of cane" in bottomlands of the Coastal Prairie of Texas (Smeins et al. 1992). No extant occurrences of this vegetation are known from this area today.
Dynamics: A canebrake is an early successional community. It is suggested that Native Americans maintained canebrakes with the use of periodic fire, to provide a ready source of cane for a myriad of uses. Canebrakes may have expanded greatly in cover following the abandonment of aboriginal agricultural lands after the collapse of Native American populations due to exotic diseases (Platt and Brantley 1997).

Adjacent Associations Comments:
Similar Associations:
Comments: This is a general placeholder, covering a broad geographic range, and several associations may ultimately be recognized. Dense, monospecific stands of *Arundinaria gigantea ssp. gigantea* were historically found in bottomland sites in the southeastern United States. Today, high-quality examples are extremely rare, if not absent. Historical accounts refer to both "pure" stands of cane without an overstory of trees (cane shrublands) and areas with variable overstory closure (woodlands or forests) but with a dense understory dominated by cane as "canebrakes." As currently described, this association refers only to the former, cane shrublands.

Element Global Rank & Reasons
GRank: G2? GRankDate: 99-02-15 GRevDate: 99-02-15
GReasons: Stands of this vegetation type were historically widespread, but now are rare or occupy very little acreage. It is thought to be maintained by frequent fire and may have historically resulted from aboriginal agriculture and burning. Dense, monospecific stands of *Arundinaria gigantea ssp. gigantea* were historically found in bottomland sites throughout the

southeastern United States. Today, this vegetation exists as small remnants, and high-quality examples are extremely rare.
GRank Author: K.D. Patterson (Southeast) Edition: 99-02-15
High-ranked species: VERMIVORA BACHMANII (GH)
Element Distribution
Cowpens National Battlefield Range: This community does not exist at the park at the present time, although it was most likely historically present in the swale areas and along some creeks.

Range: This association was widespread historically but now occupies very little acreage. It may be found along rivers and streamsides in Alabama, Arkansas, Florida, Georgia, Illinois, Indiana, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and possibly Virginia (?).
Nations: US
Federal Lands: NPS (Buffalo, Great Smoky Mountains); USFS (Cherokee?, Mark Twain, Ouachita?, Ozark, St. Francis); USFWS (Little River, San Bernard?)
Element Internal Tracking
CCAG Status: 3
Predecessors:
Obsolete Names or Alliances:

Element Sources
Concept Author(s): K.D. Patterson, mod. D. Faber-Langendoen, mod. J. Teague
Origin: 1995-02-01. Internal Author History: KP 2-95. Edition: 02-01-28
ETC References (*concept*): Campbell 1980, Campbell 1989b, Davidson 1950, Foti et al. 1994, Heineke 1987, Hoagland 2000, Hughes 1966, McInteer 1952, Meanley 1972, Mohr 1901, Platt and Brantley 1992, Platt and Brantley 1997
CCAG References (*characterization*): Blair 1938, Campbell 1980, Campbell 1989b, Davidson 1950, Flores 1984, Foti et al. 1994, Heineke 1987, Hoagland 1998c, Hoagland 2000, Hughes 1966, McClain pers. comm., McInteer 1952, Meanley 1972, Mohr 1901, Nigh pers. comm., Nuttall 1821, Peet et al. 2002, Platt and Brantley 1992, Platt and Brantley 1997, Schafale 1998b, Smeins et al. 1992, West 1934

III.A.2.N.f. Temperate broad-leaved evergreen shrubland with a sparse cold-deciduous tree layer

III.A.2.N.f.100. PHYLLOSTACHYS AUREA SHRUBLAND ALLIANCE

Golden Bamboo Shrubland Alliance

Alliance Concept

Summary: This alliance includes stands of *Phyllostachys aurea* which have either been planted or naturalized. These stands occur in upland settings on a variety of soil types.
Dynamics:

Alliance Distribution

Range: This alliance may occur throughout the southeastern United States where this species has become naturalized.
Nations: US
States/Provinces: AL? AR? FL GA LA? MS? NC? SC TN TX VA?
TNC Ecoregions: 31:P, 32:P, 38:?, 39:?, 40:C, 41:C, 42:?, 43:P, 44:?, 50:C, 51:C, 52:?, 53:C, 56:?, 57:?
Federal Lands: NPS (Cowpens, Ninety Six)

Alliance Sources

Authors: R.E. EVANS, MP, Southeast **Identifier:** A.2010
References:

Phyllostachys aurea ShrublandGolden Bamboo Shrubland

Golden Bamboo Shrubland

Ecological Group (SCS;MCS): Exotic Species-Dominated Southeastern Wooded Uplands (900-30; n/a)

Element Concept

GLOBAL SUMMARY: Uplands dominated by *Phyllostachys aurea*.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Upland
Cowpens National Battlefield Environment: Disturbed land in a protected position just below the upland area that has been invaded by this invasive exotic.
Global Environment: Disturbed lands, often near creeks and other mesic areas.

VEGETATION DESCRIPTION

Cowpens National Battlefield Vegetation: Monoculture of *Phyllostachys aurea.*
Global Vegetation: Usually a monoculture of *Phyllostachys aurea* with no light or resources reaching the understory.
Global Dynamics:

MOST ABUNDANT SPECIES

Cowpens National Battlefield

Stratum	Species
TALL SHRUB	*Phyllostachys aurea*

Global

Stratum	Species
TALL SHRUB	*Phyllostachys aurea*

GLOBAL SIMILAR ASSOCIATIONS [NVC association gname (CEGL code)]:
SYNONYMY [OtherName (short citation) relationship. Note]:

GRank & Reasons: GW (01-10-03). This shrubland represents vegetation dominated by an invasive exotic and thus does not receive a conservation. status rank.

Element Distribution

Cowpens National Battlefield Range: Limited to one small area where the bamboo has spread from a planting.
Global Range: This vegetation is possible throughout the southeastern United States.
Nations: US
States/Provinces: AL?, AR?, FL:S?, GA:S?, LA?, MS?, NC?, SC, TN:S?, TX:S?, VA?
TNC Ecoregions: 31:P, 32:P, 38:?, 39:?, 40:C, 41:C, 42:?, 43:P, 44:?, 50:C, 51:C, 52:?, 53:C, 56:?, 57:?
USFS Ecoregions: 231Ae:CCC,231F:PP, 232B:CC, 232E:CP, 255D:PP
Federal Lands: NPS (Cowpens, Kings Mountain, Ninety Six)

Element Sources

Cowpens National Battlefield Inventory Notes:
Authors: SCS **Confidence:** 1 **Identifier:** CEGL008560
REFERENCES (type in full citation below if reference is new):

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

III.B.2.N.a.15. RUBUS (ARGUTUS, TRIVIALIS) SHRUBLAND ALLIANCE

(Southern Blackberry, Southern Dewberry) Shrubland Alliance

Alliance Concept

Summary: This alliance includes successional vegetation which develops following disturbance (complete forest canopy removal) dominated by *Rubus argutus* and/or *Rubus trivialis*. Many examples also contain *Smilax* spp. and a great variety of tree saplings and other woody species. In central Tennessee, these may include *Quercus* spp., *Liquidambar styraciflua, Acer rubrum*, and *Rhus copallinum*. Herbs in central Tennessee examples may include *Solidago* spp., *Aster* spp., *Helianthus* spp., *Hypericum* spp., *Potentilla simplex*; grasses may include *Andropogon* spp., *Dichanthelium* spp., *Panicum* spp., *Schizachyrium scoparium*, and *Sorghastrum nutans*.
Dynamics: Stands of this alliance are successional and develop following disturbance (complete forest canopy removal).

Alliance Distribution

Range: This alliance is found from Tennessee and the Carolinas south into Mississippi, Alabama, and Georgia. Its full distribution has not been documented.
Nations: US
States/Provinces: AL? GA MS? NC SC TN
TNC Ecoregions: 43:C, 44:C, 50:C, 52:C
USFS Ecoregions: 221:P, 222Eb:CCC, 231:P; 221Ae:CCC
Federal Lands: DOD (Arnold); NPS(Cowpens, Ninety Six); USFS (Ouachita, Ozark, Talladega, Tuskegee?)

Alliance Sources

Authors: M.J. RUSSO 2-97, MOD. M., RW, Southeast **Identifier:** A.908
References:

Rubus (argutus, trivialis) - Smilax (glauca, rotundifolia) Shrubland(Southern Blackberry, Southern Dewberry) - (Whiteleaf Greenbrier, Common Greenbrier) Shrubland
Blackberry - Greenbrier Successional Shrubland Thicket
Ecological Group (SCS;MCS): Semi-natural Wooded Uplands (900-40; 8.0.0.1)

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., *Aster* 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: Upland
Cowpens National Battlefield Environment: This community exists throughout the park in any area that has been cleared but has not been mowed or burned within 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

Cowpens National Battlefield Vegetation: The vegetation of this community in the park consists of scattered small trees (*Juniperus virginiana var. virginiana, Diospyros virginiana, Liquidambar styraciflua*) and a solid shrub cover of *Rubus* spp. and/or *Smilax* spp. In addition, many examples of this community are overtopped nearly 100% with *Lonicera japonica* vines. This community may intergrade with Cultivated Meadow, *Lolium (arundinaceum, pratense)* Herbaceous Vegetation (CEGL004048).
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.
Global Dynamics: Stands of this successional community develop following disturbance (complete forest canopy removal) followed by a period of no disturbance of 3-5 years

MOST ABUNDANT SPECIES

Cowpens National Battlefield

Stratum	Species
SHRUB	*Rubus* spp.

GLOBAL SIMILAR ASSOCIATIONS [NVC association gname (CEGL code)]:
SYNONYMY [OtherName (short citation) relationship. Note]:
GRank & Reasons: GD (01-10-03). This type represents ruderal successional vegetation dominated by species native to North America. GRank changed from GW to GD to reflect this composition.

Element Distribution

Cowpens National Battlefield Range: Throughout the park in most every field abandoned 3-10 years ago.
Global Range: This ruderal successional vegetation could be found throughout the upper southern United States.
Nations: US
States/Provinces: AL?, GA:S?, MS?, NC, SC, TN:S?
TNC Ecoregions: 43:C, 44:C, 50:C, 52:C
USFS Ecoregions: 222Eb:CCC; 231Aa:CCC; 231Ae:CCC
Federal Lands: DOD (Arnold); NPS (Cowpens, Ninety Six); USFS (Talladega?, Tuskegee?)

Element Sources

Cowpens National Battlefield Inventory Notes:
Authors: M.J. Russo, SCS **Confidence:** 2 **Identifier:** CEGL004732
REFERENCES (type in full citation below if reference is new): Peet et al. 2002, TNC 1998a

V. HERBACEOUS VEGETATION

V.A.5.N.c. Medium-tall sod temperate or subpolar grassland

V.A.5.N.c.3. ANDROPOGON VIRGINICUS HERBACEOUS ALLIANCE

Common Broomsedge Herbaceous Alliance

Alliance Concept

Summary: This alliance includes vegetation dominated by *Andropogon virginicus var. virginicus* that occurs on old fields, pastures, and rocky sites. Associated species vary with geography and habitat and include typical pioneer species. This is a very wide-ranging alliance. There is no known natural vegetation in this alliance.
Dynamics:

Alliance Distribution

Range: This alliance is found in Alabama, Arkansas, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and Missouri, and possibly Illinois (?), Indiana (?), and elsewhere.
Nations: US
States/Provinces: AL AR GA IL IN? KY LA MO? MS NC OK SC TN TX VA
TNC Ecoregions: 31:C, 32:C, 38:C, 39:C, 40:C, 41:C, 42:C, 43:C, 44:C, 50:C, 51:P, 52:P, 53:C, 56:C, 57:C, 59:C
Federal Lands: DOD (Arnold, Fort Benning, Fort Gordon); NPS (Cowpens, Ninety Six, Shiloh); USFS (Cherokee, George Washington, Jefferson, Oconee?, Ouachita?, Ozark?, Talladega?, Tuskegee?); USFWS (Anahuac, Big Boggy?, Brazoria)

Alliance Sources

Authors: A.S. WEAKLEY, RW, Southeast **Identifier:** A.1208
References: Hoagland 1998a

Andropogon virginicus var. virginicus Herbaceous VegetationCommon Broomsedge Herbaceous Vegetation

Successional Broomsedge Vegetation

Ecological Group (SCS;MCS): Semi-natural Upland Herbaceous Vegetation (900-50; 8.0.0.3)

Element Concept

GLOBAL SUMMARY: This association includes vegetation that occurs on old fields, pastures, and rocky sites which is dominated by *Andropogon virginicus var. virginicus*. This is a very common and wide-ranging association. Additional components include typical pioneer species; these and other associated species will vary with geography and habitat.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Upland

Cowpens National Battlefield Environment: This community occurs as an old field on many sites with a regular mowing regime.

Global Environment: This vegetation typically occurs on old fields, pastures, and rocky sites. It will persist indefinitely under a regular mowing regime, e.g., in powerline corridors.

VEGETATION DESCRIPTION

Cowpens National Battlefield Vegetation: This community is dominated by (more than 50%) native grasses such as *Andropogon virginicus* rather than *Lolium* spp.

Global Vegetation: Stands of this alliance are dominated by *Andropogon virginicus var. virginicus*. Associated species vary with geography and habitat and include typical pioneer species. On the eastern Highland Rim of Tennessee (Arnold Air Force Base), associated species include *Andropogon virginicus, Diodia teres, Aristida dichotoma, Aristida oligantha, Packera anonyma (= Senecio anonymus), Paspalum laeve, Lespedeza virginica*, and *Plantago virginica*. Stands which are kept open by mowing in former agricultural fields and powerline corridors are typically dominated by *Andropogon virginicus* and *Tridens flavus*, with *Rubus argutus* and *Smilax* spp. In clearcuts, *Schizachyrium scoparium, Danthonia spicata*, and *Dichanthelium* spp. are also common, as are occasional *Quercus* spp. and *Rubus argutus*.

Global Dynamics: This association may develop temporarily following clear-cutting, and will persist indefinitely under a regular mowing regime, e.g., in powerline corridors. If undisturbed, these grasslands will rapidly succeed to shrubs, and eventually to tree species.

GLOBAL SIMILAR ASSOCIATIONS [NVC association gname (CEGL code)]:

GRank & Reasons: GD (00-08-08). This is a ruderal community and represents vegetation resulting from succession following anthropogenic disturbance of an area. It is not a conservation priority for its own sake and does not receive a conservation rank.

Element Distribution

Cowpens National Battlefield Range: Throughout the park.

Global Range: This community is possibly found throughout the southeastern United States.

Nations: US

States/Provinces: AL:S?, AR:S?, GA:S?, IL:S?, IN?, KY:S?, LA:S?, MO?, MS:S?, NC:S?, OK:S?, SC:S?, TN:S?, TX:S?, VA:S?

TNC Ecoregions: 31:C, 32:C, 38:C, 39:C, 40:C, 41:C, 42:C, 43:C, 44:C, 50:C, 51:P, 52:P, 53:C, 56:C, 57:C, 59:C

Federal Lands: DOD (Arnold, Fort Benning, Fort Gordon); NPS (Cowpens, Ninety Six, Shiloh); USFS (Cherokee, George Washington, Jefferson, Oconee?, Ouachita?, Ozark?, Talladega?, Tuskegee?); USFWS (Anahuac, Big Boggy?, Brazoria)

Element Sources

Cowpens National Battlefield Inventory Notes:

Authors: SCS **Confidence:** 1 **Identifier:** CEGL004044

REFERENCES (type in full citation below if reference is new): Fleming and Coulling 2001, Hoagland 2000, Penfound 1953, TNC 1998a, Tarr et al. 1980

V.A.5.N.c.8. LOLIUM (ARUNDINACEUM, PRATENSE) HERBACEOUS ALLIANCE

(Tall Fescue, Meadow Fescue) Herbaceous Alliance

Alliance Concept

Summary: This alliance includes pastures, hayfields, and old pastures, more-or-less cultural, though sometimes no longer actively maintained. The dominant species in this alliance are the European 'tall or meadow fescues,' of uncertain and controversial generic placement. Although at one time treated as *Festuca elatior* and *Festuca arundinacea*, these two closely related species are now treated as *Lolium pratense* and *Lolium arundinaceum*, respectively. These communities are sometimes nearly monospecific, but can also be very diverse and contain many native species of grasses, sedges, and forbs.

Dynamics:

Alliance Distribution

Range: This alliance 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. It is found in Arkansas, Georgia, North Carolina, Oklahoma, South Carolina, Tennessee, Virginia, Missouri, and elsewhere.

Nations: CA US

States/Provinces: AR GA MO NB? NC NS? OK ON? QC? SC TN VA

TNC Ecoregions: 38:C, 39:C, 50:C, 51:C, 52:C, 57:C, 59:C

Federal Lands: NPS (Blue Ridge Parkway, Buffalo, Carl Sandburg Home, Cowpens, Great Smoky Mountains, Guilford Courthouse, Kings Mountain, Ninety Six, Shenandoah); USFS (Cherokee, Ouachita, Ozark)

Alliance Sources

Authors: A.S. WEAKLEY 95-05, MOD., RW, Southeast **Identifier:** A.1213

References: Kartesz 1999

Lolium (arundinaceum, pratense) Herbaceous Vegetation(Tall Fescue, Meadow Fescue) Herbaceous Vegetation
Cultivated Meadow
Ecological Group (SCS;MCS): Exotic Species-Dominated Herbaceous Upland Vegetation (900-60; 8.0.0.4)

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: Upland
Cowpens National Battlefield Environment: This community occurs as an old field on many sites with a regular mowing regime.
Global Environment: This association includes grassland pastures and hayfields, more-or-less cultural, though sometimes no longer actively maintained.

VEGETATION DESCRIPTION

Cowpens National Battlefield Vegetation: Vegetation is dominated by European exotic grasses such as *Lolium* spp.
Global Vegetation: The dominant species in this alliance 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.
Global Dynamics: This association varies greatly depending upon the past land-use history and the recent history of the site. Some examples that have been recently farmed may be monocultures of *Lolium*, whereas other fields that were traditionally lightly grazed may have much higher diversity.

GLOBAL SIMILAR ASSOCIATIONS [NVC association gname (CEGL code)]:
GRank & Reasons: GW (00-01-05). This vegetation is dominated by an exotic species, is of anthropogenic origin, and is thus not a conservation priority.

CLASSIFICATION COMMENTS

Element Distribution

Cowpens National Battlefield Range: Throughout the park in areas that are mowed or otherwise maintained in an early successional state (fields, monument areas, and some roadsides).
Global Range: This association is possible throughout much of the eastern United States and southern Canada.
Nations: CA? US
States/Provinces: AR:S?, GA:S?, MO:S?, NB?, NC:S?, NS?, OK:S?, ON?, QC?, SC:S?, TN:S?, VA:S?
TNC Ecoregions: 38:C, 39:C, 50:C, 51:C, 52:C, 57:C, 59:C
Federal Lands: NPS (Blue Ridge Parkway, Buffalo, Cowpens, Carl Sandburg Home, Great Smoky Mountains, Guilford Courthouse, Kings Mountain, Ninety Six, Shenandoah); USFS (Cherokee, Ouachita, Ozark)

Element Sources

Cowpens National Battlefield Inventory Notes:
Authors: SCS **Confidence:** 2 **Identifier:** CEGL004048
REFERENCES (type in full citation below if reference is new): Heath et al. 1973, Hoagland 2000, Kartesz 1999

Appendix III. Photos of selected plots of Cowpens National Battlefield.

Plot 1 at Cowpens National Battlefield.

at Cowpens National Battlefield.

Plot 3 at Cowpens National Battlefield.

Plot 4 at Cowpens National Battlefield.


Plot 5 at Cowpens National Battlefield.


Plot 6 at Cowpens National Battlefield.


Plot 7 at Cowpens National Battlefield.


Plot 8 at Cowpens National Battlefield.


Plot 10 at Cowpens National Battlefield.


Plot 16 at Cowpens National Battlefield.

Appendix IV. Key to EcoGroups and Ecological Communities of Cowpens National Battlefield.

This key was developed for Cowpens National Battlefield and is intended to allow field workers and naturalists to quickly identify community types while in the field. Due to the small size of the park and the limited habitat types available within the park boundary, this key does not cover all of the ecosystems of the adjacent region. However, within the boundary, we believe this key represents 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 get a feel for the composition of the area. This exercise may help you arrive at the correct place in the key since small-scale variations within a matrix community may be misleading.

Where appropriate, the name of the NatureServe Ecological Group appears in [brackets]. The EcoGroup is a broader concept than the association level, so similar communities may fall out in one ecogroup. The full association name and code (e.g. CEGL002591) appears alongside an underlined title of the type. The "common name" of the community also appears with the scientific name of the association.

Key to Ecological Communities of Cowpens

1a. Early successional vegetation dominates. Stands of this type have been cut and/or plowed and/or grazed and/or burned heavily within the last 50 years. Grasses and forbs, shrubs, and/or early successional tree species characteristic of high levels of human-initiated disturbance such as pines, sweetgum, and tuliptree are always dominant. Few to no oak trees are present as canopy trees (except for water and willow oaks in one example).

2a. Wetland vegetation: Wetland habitats such as flatlands along creeks inundated during local flooding events.

3a.Canopy dominated by *Liquidambar styraciflua, Liriodendron tulipifera, Acer rubrum, Platanus occidentalis,* and other trees associated with wet environments. Ground layer varies, but usually contains large amounts of *Smilax spp., Lonicera japonica,* and *Rosa multiflora*.
[SOUTHERN PIEDMONT SMALL STREAM AND FLOODPLAIN FOREST]
Successional Sweetgum Floodplain Forest (CEGL007330)

3b.Bottomland dominated by native giant cane (currently extirpated from park, though there is potential for future occurrences if land management practices change and fire is promoted.
[SOUTH-CENTRAL INTERIOR LARGE FLOODPLAIN]
Floodplain Canebrake (CEGL003836)

2b. Terrestrial Vegetation: Upland habitats not inundated by flood waters (includes upland areas with ephemeral ponds or hardpan soils that drain poorly).
[EARLY SUCCESSIONAL OR EXOTIC SPECIES DOMINATED STANDS]

4a. Old fields

5a. Mainly exotic dominated old fields
Cultivated meadow (CEGL004048)

5b. Mainly native dominated old field
Successional Broomsedge Vegetation (CEGL004044)

4b. Shrublands, thickets, woodlands, and forests (but not old fields)

6a. Shrublands, thickets, and woodlands

7a. Dominated by exotic species, especially Phyllostachys aurea
Golden Bamboo Shrubland (CEGL008560)

7b. Dominated by native species of shrubs.
Upland dominated by blackberry and greenbrier
Blackberry-Greenbrier Successional Shrubland Thicket (CEGL003722)

6b. Forests

8a. Hardwood forest

9a. Canopy dominated by tuliptree
Successional tuliptree-hardwood forest (CEGL007221)

9b. Canopy dominated by water and willow oak
Water oak forest (CEGL004638)

8b. Pine dominated or mixed forest

10a. Canopy of stand dominated by loblolly pine (shortleaf pine may be present but not dominant)
Successional loblolly pine forest (CEGL006011)

10b. Canopy of stand dominated by shortleaf pine (loblolly pine may be present but not dominant)
Shortleaf Pine Early Successional Forest (CEGL006327)

1b. Late successional forest and woodland vegetation dominates. Canopy trees generally are those that are considered to be "late successional", such as oaks and hickories. These stands have generally not been plowed or clearcut for at least 50-100 years, although the understories of some stands may have been burned or mowed more recently.

11a. Forest with a canopy dominated by white oak and with a fairly sparse understory.
[Southern Piedmont Mesic Forest]
Southern Piedmont Mesic Subacid Oak-Hickory Forest (CEGL006227)

11b. Forest or woodland with a canopy not completely dominated by white oak.
[SOUTHERN PIEDMONT DRY OAK – (PINE) FOREST/WOODLAND]

12a. Upland woodland (canopy coverage is usually less than 60 %) with open understory that consists of large amounts of native grasses and forbs and very few shrubs. Understory disturbance has occurred in the form of mowing but may have occurred as sporadic low intensity fires in the past.
Piedmont Granitic White Oak-Black Oak Woodland (CEGL004732)

12b. Dry-mesic upland forest (canopy closure is usually more than 60%) with a sparse herbaceous layer. Understory disturbance very minimal.
Southern red oak – white oak Forest (CEGL007244)