VASCULAR PLANT INVENTORY AND PLANT COMMUNITY CLASSIFICATION FOR GUILFORD COURTHOUSE NATIONAL MILITARY PARK

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: Botanists Milo Pyne and Beth Flokstra at work in plot 7 at Guilford Courthouse National Military Park. Photo by Rickie White.

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Summary

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

1) NatureServe ecologists established and thoroughly inventoried eight permanently marked one-hectare circular plots within the park in a grid system and another five circular plots in unique ecological areas that were not covered by the initial grid-based plot layout. In addition, we established three plots where only the dominant flora was noted. 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 distinct vegetation communities within the park and identified four natural and seven human-modified or successional vegetation associations (ecological assemblages of plants) within the park boundary. Two ecological communities may warrant special attention due to their relatively high global rank and their relatively high biodiversity. The Acidic Piedmont Mesic Mixed Hardwood Forest has a high diversity of understory plant and animal spring ephemerals, is a later successional forest, and occurs only on the steeper slopes that occur in the park. The Piedmont Small Stream Sweetgum Forest harbors the highest diversity of plant species of any community in the park and is the only wetland forest in the park.
3) Ecologists conducted an inventory of all vascular plant species in the park. NatureServe staff and park volunteers collected and vouchered 255 new species to add to the list of species already found at the park. We now count 353 documented species, varieties, or subspecies of vascular plants in the park (346 species). We estimate that between 76% and 92% of the vascular flora of the park is now documented. Some species of note include the crippled cranefly orchid (*Tipularia discolor*), Carolina lily (*Lilium michauxii*), wild yam (*Dioscorea villosa*), black bugbane (*Cimicifuga racemosa*), and Virginia snakeroot (*Aristolochia serpentaria*). Although none of these species are threatened or endangered, they are relatively uncommon in this region and preservation and interpretation of these species will enhance botanical and educational opportunities in the park.

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 parks 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 August 2001, NatureServe began work on the vascular plant inventory portion of the project at Guilford Courthouse National Military Park.

Since Guilford Courthouse National Military Park was originally protected because of its historic value, the research emphasis here has traditionally focused on the human history of the land. The only floristic studies completed in the park documented all of the woody vascular plant species (Seifert 1938, Novac 1976) and invasive exotic species (Remaley 1996). There has been no attempt until now to inventory all vascular plants. With all of this in mind, we began to work on accomplishing three 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, NatureServe 2002).
3) Document at least 90% of the vascular plants within the boundaries of the park.

In addition to these three objectives, we were also asked to work 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.

The map and crosswalk will be completed in conjunction with the University of Georgia. The ultimate goal of this 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 will visit a park that is both ecologically and historically intact.

Study Area

Guilford Courthouse National Military Park is located within the city of Greensboro in Guilford County, North Carolina. The 89 hectares (220 acres) of this property all lie within the upper Cape Fear River drainage. Elevation ranges from 241 meters (790 feet) where Richland Creek leaves the park to 265 meters (870 feet) near the Visitors' Center.

The park straddles two geological units: the Charlotte Belt and the Carolina Slate Belt (Stephens 1977). Because of this division, the park is underlain by a combination of metamorphosed porphyritic granite and biotite schist (Murdock 1947).

From the most recent soils map (Stephens 1977), we can discern at least four types of soil: Cecil sandy loam, Cecil-Urban land complex, Madison sandy loam, and Wehadkee silt loam. Cecil sandy loam is by far the most common soil type in the park. It underlies most of the upland portion of the park, or roughly 90% of the land area. This soil type consists of a surface layer of brown sandy loam and a thick subsoil of yellowish red sandy clay loam and red clay. Most of the intensive cultivation occurred on Cecil sandy loam. As a result, the soils under most of the eastern third of the park are considered to be eroded versions of this type. The Cecil-Urban land complex consists of areas of Cecil sandy loam that have been heavily disturbed or developed by humans. Madison sandy loam occurs on fairly steep slopes on both sides of Richland Creek and consists of a surface layer of reddish brown sandy loam and a subsoil of red clay. Wehadkee silt loam is only found on the bottomlands of Richland Creek and the old lakebed of Lake Wilfong and consists of a surface layer of brown silt loam about 8 inches thick and a subsoil of silt loam. The organic matter content of this type is higher than for the other soil types in the park.

Guilford County's climate is mild. Although there is no climate station on site, figures from other parts of the county indicate that the mean average temperature is 13 degrees C (56 degrees F). The annual average rainfall is 1.42 m (56 inches), the average length of freeze-free growing is 180 days, and the snow cover lasts yearly from one to 15 days (Stephens 1977).

Land History

Guilford Courthouse National Military Park was the first Revolutionary War site to be protected as a national park (Baker 1981). The land upon which the park is located had been settled by Quakers long before the Revolution and was already mostly cultivated in corn or as open field for grazing when the battle occurred. In 1781, only small parcels in the western third of the park were not under direct cultivation at that time (Baker 1981). According to first hand accounts of the battle, most of the uncultivated land in the area was dense forest. After the battle, the land continued to be cultivated, but eventually came under the ownership of the Guilford Battle Ground Company. This company was organized in 1887 to "redeem, preserve, and beautify the battleground" (Guilford Battle Ground Company 1893). As a part of its mission to "beautify" the area, the company built a pond and kept much of the area clear of undergrowth and heavy forest. Pictures from the late 1890's show gazebos, carriage trails, and much open area (Guilford Battle Ground Company 1893).

In 1917, the land was transferred to the United States War Department (Baker 1981). Once the National Park Service began to operate the park in 1933, the mission had changed from one of recreation to one of historic preservation. The lake was removed and the land ceased to be intensively managed. Due to the varied history of the land area, most of the land is considered to be successional, since most of the present forest cover originated after 1933.

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 list for the park, and a crosswalk of the associations to mapping units used for the vegetation map being created by the University of Georgia.

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 et al. 2000), NatureServe personnel used GIS layers supplied by the National Park Service's Cumberland Piedmont Network. Using the program ArcView (ArcView 1992), we chose a 56-meter buffer around the current park boundary so that noparts of any of the one hectare plots would fall outside of the park boundary. With this buffer in place, we established an evenly spaced grid system (we chose the approximate grid size of 250 meters by 250 meters *a priori* based on observations made by a team of park service personnel in 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. Since Guilford Courthouse NMP is very small, it was challenging to place one hectare plots that did not overlap with the existing points. However, by examining the grid layout and the layers provided to us by the National Park Service, we noticed that the far southwest corner and the far southeast corner both had unique features that would not be sampled by the current grid. 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, local researchers, and volunteers, described the project's goals, and asked for their input in the project. Through this process, we identified priority areas of the park for additional plot establishment and species inventory. In the summer of 2001, we established eight plots on the grid system and an additional three plots off of the grid in habitats not covered by any of the grid points (Figure 1). In 2002, we established another two permanent plots and took data at three other locations as part of the vegetation mapping work. 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 office prior to visiting the site). Once we were within five meters, we monumented each plot with a one foot piece of iron conduit driven into the ground 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 GPS signal strength, accuracy may be more than five meters in some cases.

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 archived at Guilford Courthouse National Military Park. Please contact the archivist or resource manager at the park for details and specific plot locations.

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, NatureServe 2001). 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 also searched for any plant species not already on the species list for Guilford Courthouse National Military Park. While searching the park outside of the plots, we collected any new specimens encountered and recorded the GPS coordinates using our Garmin GPS unit. We walked through areas thought to harbor unique species and collected any that were new or potentially new to the park. 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 our inventory, 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, we returned to Guilford Courthouse National Military Park 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 (not detailed in this report) will be to work 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 288 specimens (Tables 2,3) of over 255 species that had not been confirmed previously from the park (more than this number if you include varieties of species). We created 288 vouchers for the herbarium at Guilford Courthouse National Historic Site (Table 3) from the plants we collected and photographed.

In addition to collecting all new plants encountered, we were asked to estimate what percentage of the flora in the park is now documented. Eliminating all varieties, subspecies, and questionable identifications and including previously collected specimens, we believe that we currently have documented 346 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 403.6 using all 13 full plots (excluding the 3 partially sampled plots) and the first-order jackknife method, 457.2 using all plots and the second-order jackknife method, 376.4 using just the eight gridded plots and the first-order jackknife method, and 442.7 using just the eight gridded plots and the second-order jackknife method (Table 4). In addition, we calculated alpha, beta, and gamma diversity values for the park based on information gathered from the plot data (Table 4). The alpha value for all plots combined was 67.1, the beta value was 4.4, and the gamma value was 293.

Using the information gathered in each plot in the summer of 2001, we discerned eleven distinct vegetation associations within six distinct ecogroups, as defined by the United States National Vegetation Classification (Table 5). However, only four of the communities identified are considered "natural" as opposed to either "semi-natural" or exotic species dominated. The common names of all of the communities are as follows (* = natural community):

Virginia Pine Successional Forest
Shortleaf Pine Early Successional Forest
Successional Loblolly Pine – Sweetgum Forest
Acidic Piedmont Mesic Mixed Hardwood Forest(*)
Tuliptree – Hardwood Successional Forest
Piedmont Dry – Mesic Oak – Hickory Forest(*)
Southern Red Oak – White Oak Forest(*)
Piedmont Small Stream Sweetgum Forest(*)
Wisteria Vineland
Blackberry – Greenbrier Successional Shrubland Thicket
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 quickly and easily.

Discussion/Conclusions

Species Inventory

The field work from this project added over 255 species to a list of 90 species already present within the current boundary of the park (Table 2). The goal of this portion of the project 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 376.4 to 455.6. Excluding varieties, subspecies, and unidentifiable collections, we have confirmed 346 species within the park. First-order jackknife estimates often underestimate number of species whereas second-order jackknife estimates often overestimate the number of species (McCune and Grace 2002). Using all of the plot data (Figure 2), we found that between 76 and 92% of the species in the park have been documented. Based on our own knowledge of the park and our belief that we have covered a good deal of the park in our searches, we feel that we have successfully documented around 90% of the vascular flora of the park. 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 most likely 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 and the severe fragmentation of the surrounding landscape, there are few intact ecological communities at Guilford Courthouse. In addition, there are no occurrences of federal or state rare or endangered species. Most species in the park are common throughout the upper Piedmont. However, a few species warrant special attention because they are uncommon in suburban landscapes such as the matrix surrounding this park. These plants offer glimpses into what the city of Greensboro's flora may have looked like hundreds of years ago and the park serves as a last refuge for these forest plants within the city limits. Plants that are uncommon in the immediate area include the crippled cranefly orchid (*Tipularia discolor*), Carolina lily (*Lilium michauxii*), wild yam (*Dioscorea villosa*), black bugbane (*Cimicifuga racemosa*), and Virginia snakeroot (*Aristolochia serpentaria*). Each of these species lives in one of the oak-hickory or beech slope communities in the park and, with the exception of the cranefly orchid, these species tend to occur only in areas that have not been plowed within the past 80-100 years. Many of these species were used medicinally by settlers and Native Americans and may contribute a great deal to future interpretation efforts at the park. In addition, they may serve as a seed source for future efforts to restore other areas of the park impacted by invasive exotic species. All other species mentioned above are considered G5, or extremely secure globally. Although there are no populations of particularly rare or sensitive species in the park, the overall biodiversity of the park is still relatively high considering the size of the park and this is mainly due to a diversity of successional states and the wetland areas.

At least 25% of the plant species in the park are not native to the park. Most of these species were plantings or are harmless present day components of the flora. However, at least 28 of the 346 species found within the park are considered aggressive or potentially aggressive invasive species that may outcompete and replace native species under certain circumstances. 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, Oriental bittersweet (*Celastrus orbiculatus*) continues to increase in sunny spots with plenty of support from adjacent vines and trees. In the interior woods and forests, Russian/autumn olive (*Elaeagnus spp.*), Japanese honeysuckle, Chinese and Japanese privet, and Oregon grape (*Mahonia bealei*) all have begun to colonize areas of the understory. Finally, much of the floodplain for the creeks that run through the park is heavily dominated by a combination of exotics, but especially Japanese stiltgrass, golden bamboo (*Phyllostachys aurea*), and multiflora rose (*Rosa multiflora*). Vines such as wisteria, English ivy, and kudzu (*Pueraria montana var. lobata*) can often start in an old field successional area and quickly move into adjacent communities without intervention. Other species may need monitoring and other attention to assure that the species are not spreading. These species include English ivy (*Hedera helix*), princess tree (*Paulownia tomentosa*), tree of heaven (*Ailanthus altissima*), paper mulberry (*Broussonetia papyrifera*), sweet autumn virgin's bower (*Clematis terniflora*), Chinese fir (*Cunninghamia lanceolata*), Chinese yam (*Dioscorea oppositifolia*), climbing euonymus (*Euonymus fortunei*), ground-ivy (*Glechoma hederacea*), creeping lilyturf (*Liriope spicatum*), January-jasmine (*Lonicera fragrantissima*), bridalwreath spiraea (*Spiraea prunifolia*), and common periwinkle (*Vinca minor*). 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 ecogroup or ecosystem 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:

Virginia Pine Successional Forest

This human influenced association is limited to the upland areas of the park and is generally found on sites with a long history of land use. Virginia pine (*Pinus virginiana*) is a short lived tree that specializes in colonizing areas that have been heavily eroded or denuded to mineral soil. Some past land uses may have included yearly row crops for long periods of time, cotton, or repeated logging without any type of erosion control. Examples of this association occur from Pennsylvania to Alabama in the Piedmont.

Within the park, this community occurs in any location that was heavily farmed, grazed, or logged in the past 70 years. In places, a solid canopy of Virginia pine has formed. In other locations it is co-dominant with sweetgum and shortleaf pine (*Pinus echinata*). In general the

herbaceous layer is extremely poor. However, the shrub and understory layers can be very dense with seedlings and saplings of later successional species such as Florida maple (*Acer barbatum*) and red maple. Due to its highly disturbed nature, this community can be home to a number of invasive exotics, especially Japanese honeysuckle.

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 North Carolina. Within the park, this community is most common in the central and eastern sections of the park in areas formerly under intense cultivation.

This community is easily invaded by invasive exotic species such as 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.

Shortleaf Pine Early Successional Forest

This human influenced association is also limited to the upland areas of the park. Shortleaf pine colonizes plowed areas shortly after they are left fallow. The community type overlaps with that of the Virginia Pine Early Successional Forest in this part of the state, though Virginia pine is generally found in areas that were more heavily eroded prior to forest regeneration.

Within the park, this community occurs in any location that was heavily farmed, grazed, or logged in the past 70 years. In places, a solid canopy of shortleaf pine has formed. In other locations it is co-dominant with sweetgum and Virginia pine. In general the herbaceous layer is extremely poor. However, the shrub and understory layers can be very dense with seedlings and saplings of later successional species such as Florida maple (*Acer barbatum*) and red maple. Due to its highly disturbed nature, this community can be home to a number of invasive exotics, especially Japanese honeysuckle.

As with the successional loblolly pine – sweetgum forest and the Virginia Pine Early Successional Forest, this association is considered a human modified community and thus is of no conservation concern. It is a very common type in the western parts of this area due to the large scale abandonment of farmland over the last century in the Piedmont of North Carolina. Within the park, this community is most common in the central and eastern sections of the park in areas formerly under intense cultivation.

As with the Virginia Pine Early Successional Forest, this community is easily invaded by invasive exotic species such as 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.

Successional Loblolly Pine – Sweetgum Forest

Examples of this association are found in a wide variety of upland areas that have been altered in the past by farming or logging and are now regenerating. This type is one of the most common communities in the southeastern United States, but is most likely planted within the park, since Guilford Courthouse is just outside of the natural range of loblolly pine (*Pinus taeda*) (Burns and Honkala 1990, Critchfield 1966).

Stands within the park are strongly co-dominated by loblolly pine, Virginia pine, and sweetgum (*Liquidambar styraciflua*), but also may contain an understory of red maple (*Acer rubrum var. rubrum*). Vines such as poison ivy (*Toxicodendron radicans*), muscadine (*Vitis rotundifolia*), Japanese honeysuckle, and English ivy (*Hedera helix*) can invade the understory, especially in the drier habitats. Herbaceous species including marsh seedbox (*Ludwigia palustris*) and the invasive exotic Japanese stiltgrass (*Microstegium vimineum*) dominate depression areas. Shade tolerant species of trees are very common in the shrub layer and understory.

This community is considered a human modified community and thus is of no conservation concern. This type is common throughout the Piedmont due to the history of large scale abandonment of farmland over the last century. Within the park, this community is most common in the central and eastern sections of the park in areas formerly under intense cultivation.

Loblolly pine successional communities are easily invaded by invasive exotic species such as wisteria (*Wisteria sinensis*), Japanese honeysuckle, English ivy, and Japanese stiltgrass. 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. The control of wisteria may be especially crucial in these areas due to its aggressive nature within the park boundary.

Acidic Piedmont Mesic Mixed Hardwood Forest

This community is generally found on undisturbed steep slopes adjacent to streams. It often persists in areas that are so steep that they were not plowed but were probably heavily logged. Under natural conditions these forests are uneven-aged, with old trees present alongside younger trees. Reproduction occurs primarily in canopy gaps. Rare, severe natural disturbances such as wind storms may allow pulses of increased regeneration and allow the less shade-tolerant species to remain in the community (Schafale and Weakley 1990).

Within the park, this community occurs only on east facing sheltered steep slopes adjacent to streams. The canopy of stands within the park is closed and consists of American beech with smaller amounts of red oak (*Quercus rubra*) and southern red oak (*Quercus falcata*). Flowering dogwood (*Cornus florida*), red maple, and American beech are common in the understory. The short shrub and herbaceous layers are sparse, with striped prince's pine (*Chimaphila maculata*) and Christmas fern (*Polysticum acrosticoides*) being the most common herb species. Spring ephemerals include mayapple (*Podophyllum peltatum*) and bloodroot (*Sanguinaria canadensis*).

This community is fairly common throughout its range in the Piedmont. It has most likely persisted on the landscape due to its occurrence on steep sites that are less susceptible to human disturbance (Schafale and Weakley 1990). It is ranked G3G4, meaning that it is somewhat threatened but stable globally. Within the park, this community is quite rare. The only known occurrences are on steep east and north facing slopes along Richland Creek and its tributaries.

Threats to this association within the park are minimal. The examples within the park are relatively stable and have not been disturbed recently. There is little invasive exotic growth within this community. At least two trails are present along the slope where this community exists and may contribute to erosion of the slope.

Most threats to this ecosystem are from events beyond our control (windstorm, beech bark disease). No on-site management can protect this ecosystem from those events. It might be important, however, to monitor the trails that run by this community to ensure that erosion along the trail and trampling in the forest is kept to a minimum.

Successional Tuliptree – Hardwood Forest

Examples of this association 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 .Examples occur throughout the Southeast from Alabama to Virginia.

Within the park, this community occurs in a wide variety of environments. It is most commonly associated with slightly protected gentle slopes whereas the successional pine communities often occur in more exposed flat upland positions on the landscape. This association occurs on sites that were formerly agriculture, so past land use history dictates current composition more than soils, exposure, or other environmental factors. Vegetation composition within the park varies widely in this broadly defined modified community. All occurences are dominated by tuliptree (*Liriodendron tulipifera*), but with differing levels of co-dominance by trees such as sweetgum, Virginia pine, scarlet oak (*Quercus coccinea*), and blackgum (*Nyssa sylvatica*). The shrub layer is usually fairly thick with saplings of later successional species such as Florida maple (*Acer barbatum*) and beech (*Fagus grandifolia*) and some exotic species such as Chinese privet (*Ligustrum sinense*) and wisteria. Due to its highly disturbed nature, this community harbors numerous invasive exotic vines and shrubs.

As with the successional loblolly pine – sweetgum forest, 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 North Carolina. Within the park, this community is most common in the central and eastern sections of the park in areas formerly under intense cultivation.

As with the successional loblolly pine – sweetgum forest, this community is easily invaded by invasive exotic species such as wisteria, Japanese honeysuckle, English ivy, and Japanese

stiltgrass. 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. The control of wisteria may be especially crucial in these areas due to its aggressive nature within the park boundaries. The wisteria vine-shrubland community most likely started out in a successional tuliptree community until the wisteria vines began overtopping the canopy trees and killing them to form a more open area of wisteria.

Piedmont Dry – Mesic Oak – Hickory Forest

The sites on which this vegetation is found are described as `intermediate' in soil moisture (Jones 1988a, 1988b). In North Carolina, this is a matrix type, probably the most common forest type remaining in the Piedmont.

Within the park, this community occurs on Cecil sandy loam on very broad, smooth upland areas. Examples of this community within the park consist of a closed canopy dominated by white oak (*Quercus alba*) along with smaller amounts of red oak, mockernut hickory (*Carya alba*), and tuliptree. The understory is very dense and consists of numerous stems of red maple, Florida maple, and flowering dogwood. The understory is sparse but better developed than other upland associations in the park. Plants in the herbaceous layer include wild yam (*Dioscorea villosa*), striped prince's pine, American lopseed (*Phryma leptostachya*), and solomon's seal (*Polygonatum biflorum*). Muscadine is a common vine groundcover. Other plants of note that have been reported in the park in this association include bugbane (*Cimicifuga racemosa*), Carolina lily (*Lilium michauxii*), and feathery false solomon's seal (*Maianthemum racemosa*). Spring ephemerals such as bloodroot and mayapple occur in small patches of this community.

This community was probably the matrix community in the area prior to farming and other human-induced activities. Within the state, it is still a very common community and is considered globally secure. Within the park, it is now restricted to small patches in the eastern part of the park near the visitor's center, mainly in areas where human disturbance has not occurred this century. Although this is a common community, the highest quality examples of this community should be preserved since they harbor a number of species which aren't found in other sections of the park and which may rely on those small parcels for their continued survival.

Threats to this community within the park, as with all of the other communities in this fragmented landscape, are mostly with invasive exotic species. Although not currently a large threat, Chinese privet is present in some examples of this community. A relatively unknown exotic, Chinese fir (Cunninghamia lanceolata) occurs in some areas of the park and may begin to occur in this community. If it does, it should be controlled immediately. Finally, the high population of white-tailed deer may be heavily impacting spring ephemerals in this community. Signs of deer browsing are present everywhere and it is well known that deer often impact spring ephemerals more heavily than most plants since they are the first plants to leaf out in late winter or early spring and are easily found by hungry deer. Monitoring of deer effects on vegetation may be important if spring ephemerals are a priority for conservation in the park.

Some species seen in this association are not found in most other associations in the park. These include Carolina lily, black bugbane, and kidney leaf buttercup. None of these plants are threatened or endangered, but they are rare in fragmented landscapes such as Guilford Courthouse National Military Park and should be given some special consideration.

Again, this community is still common and fairly secure throughout the region. However, high quality examples of this community are not so common. A particularly good example of this community is located south of the visitor's center within the loop road. Another example is located just to the west of Old Battleground Road as the road heads out of the southern part of the park.

Southern Red Oak – White Oak Forest

Stands are typically found on low fertility Ultisols throughout the Uplands of the Piedmont of the Southeast.

Within the park, stands are found on the drier uplands of the park over Cecil sandy loam. The canopy is dominated by southern red oak, post oak (*Quercus stellata*), white oak (*Quercus alba*), and pignut hickory (*Carya glabra*). The understory is dominated by oak saplings along with red maple, sweetgum, and Virginia pine. The shrub layer consists of small amounts of deerberry (*Vaccinium stamineum*) and/or early lowbush blueberry (*Vaccinium pallidum*). The herbacous layer is poorly developed and contains such acid loving species as striped prince's pine and downy rattlesnake plantain (*Goodyera pubescens*).

Although considered less common than the related Piedmont Dry – Mesic Oak-Hickory Forest, this community is still quite common and secure throughout its range in the southeast United States. Within the park, it occurs mostly in the northeast quarter of the park in upland areas.

Threats to this association are the same as with the Piedmont Dry – Mesic Oak-Hickory Forest. Invasive exotics may become a problem in the future, but are currently not prevalent.

This community is secure throughout its range, but the highest quality examples of this community should be considered in any future development plans in the park. One such high quality area occurs just east of the northern parking lot off of Old Battleground Road.

Piedmont Small Stream Sweetgum Forest

The canopy, subcanopy, shrub, and herbaceous layers of this floodplain community often are diverse and well-developed. The canopy is usually dominated by sweetgum with co-dominance from a variety of other bottomland species.

Within the park, this community is limited to the floodplains of Chewacla sandy loam along the medium sized creek that flows through the park (Richland Creek). Some examples of this association fall in the old Lake Wilfong pond bed and therefore are very low quality examples because of the recent disturbance history. Other examples in the center of the park are of slightly

higher quality. All are heavily degraded by changes in hydrology and exotic species invasion. The canopy of this association tends to be extremely variable and diverse. Sweetgum, tuliptree, sycamore (*Platanus occidentalis*), American beech, red maple, and boxelder (*Acer negundo*) are all considered possible co-dominants. Black walnut (*Juglans nigra*) and black cherry (*Prunus serotina*) may also occur in small numbers. The understory can be very dense and may contain flowering dogwood, Florida maple, and most of the canopy species listed previously. The shrub layer consists of northern spicebush (*Lindera benzoin*) and American hazelnut (*Corylus americana*) in the higher quality examples of this association, but also may contain very high cover of the exotics multiflora rose (*Rosa mulitflora*) and Chinese privet (*Ligustrum sinense*) in the lower quality versions. The exotic Japanese stiltgrass dominates the herbaceous layer of this association (20-100% coverage), but other species still manage to compete. In the high quality example, herbaceous species include American lopseed, solomon's seal, Christmas fern, blue violet (*Viola sororia*), and various sedge species (*Carex* species). In addition, exotics such as autumn olive (*Elaeagnus umbellata*), English ivy, Japanese honeysuckle, Chinese privet, multiflora rose, sweet autumn virgin's bower (*Clematis terniflora*), and wisteria are present and may be increasing in coverage over time.

This community is the most threatened community that exists within the park. It has a global rank of G3, meaning that it is only somewhat secure throughout its range. The community itself is fairly extant, but high or medium quality examples of the community are extremely rare due to the high rate of invasion of exotic species, changes in hydrology related to development upstream, and channelization of some streams in the Piedmont. All of these factors have turned once healthy versions of this community into monocultures of Japanese stiltgrass and shrubby exotics. Within the park, the biggest threat is a combination of hydrology changes and exotic species. Some examples of this community in the park have close to 100% coverage of Japanese stiltgrass. This undoubtedly has lowered native plant diversity in the herbaceous layer. Many of the channels in the park are now 2 feet or more below the rest of the stream bottom due to erosion from "flashy" streams. Since this is the most diverse ecosystem in the park, these issues should be cause for concern.

Many species found on the park species list only occur in this community. These include black walnut, sycamore, Northern spicebush, cardinal flower (*Lobelia cardinalis*), American hog-peanut (*Amphicarpaea bracteata*), sensitive fern (*Onoclea sensibilis*) and others. None are threatened or endangered, but they only exist within this particular community in the park.

The biggest management issues in this community are exotic species invasion and "un-natural hydrology". If at all possible, Japanese stiltgrass should be contained in areas where it is most prevalent. Other species that seriously threaten biodiversity in this community and should be removed include sweet autumn virgin's bower (*Clematis terniflora*), Chinese privet, and multiflora rose. All of these species have been observed as large patches in this community. Removal of these species could be extremely costly and time intensive. Since the task of invasive species removal is so labor intensive but a relatively simple procedure, one idea would be to recruit volunteers from the local community to adopt the stream area and remove by hand the worst invasive exotics. In areas where Japanese stiltgrass has been established for multiple years, it may be necessary to reintroduce native seed into the area so that native plants can more readily compete with and replace the removed exotic vegetation. Changes in hydrology caused

by changes in land use upstream have clearly impacted the creek system, causing "flashiness" which tends to erode rather than replenish the banks of the river. New development upstream from this watershed will only exacerbate this problem, so it is suggested that the park monitor new development upstream and attempt to inform landownders about the consequences of new impermeable surfaces to the park. In addition, it may be important to look at ways to reverse the effects of the erosion to restore the bottomland to its original state.

Wisteria Vineland

This exotic dominated association occurs in a wide variety of habitats, but tends to occur in areas that were formerly successional loblolly pine – sweetgum forests or successional tuliptree forests. Since wisteria invades by overtopping trees, this community tends to occur in highly fragmented areas that are near old homesteads or other past human habitations where wisteria persists after planting. This community is rare across the landscape at this point, but there is the potential for it to occupy more land as fragmentation continues to occur.

Within the park, the wisteria vineland consists of a monoculture of wisteria (*Wisteria sinensis* and/or *Wisteria japonica*), probably caused by a windstorm or other severe disturbance that occurred adjacent to an old homesite with the plant already established. The past land use history and disturbance patterns are probably much more important than the underlying soil and hydrology in determining the distribution of this community within the park. In the areas most affected by the infestation, there are no surviving trees and the wisteria covers 100% of the area.

This community can occur throughout the Southeast in the Piedmont and coastal areas. Locally, it occurs in any areas where it has been left untended and has reached the canopy of a forest.

Since this is an undesirable invasive exotic dominated association, there are no threats to this system. However, this system itself does threaten all adjacent associations and has the potential to permanently change adjacent tracts of forests into monocultures of wisteria.

Management of this community has already begun and should continue to be the highest priority for management in the park. While visiting the park, it was clear that efforts to rid the area of wisteria had been partially successful. However, most stems were still alive and will require multiple years of treatment. Once the wisteria removal has reduced the vines to stumps, it will be important to monitor the area for years to come to ensure that no new wisteria sprouts up in the area. Most of these areas were formerly farm land, so reintroducing pines and old field species may expedite its return to a successional forest.

Blackberry – Greenbrier Successional Shrubland Thicket

This early successional community type occurs on recently abandoned farmland or land which is mowed at an infrequent interval (every 2 to 5 years rather than annually). The community is dominated by stands of blackberry and dewberry, but can also contain a diverse assemblage of herbaceous old field species in gaps in the blackberry and wetland species in areas adjacent to creeks.

Within the park, this community occurs in conjunction with the cultivated meadow association in areas that are mowed infrequently. It can occur in both upland and lowland sites as long as it is surrounded by old field or other open herbaceous or shrubby habitat since this community relies on full sun. The community mostly depends upon infrequent mowing so that larger trees do not take hold and overshadow the herbaceous and shrubby components of the forest.

This community occurs throughout the Southeast in suitable habitat with an infrequent mowing regimen or in newly abandoned plowed farmfields. Within the park, it occurs in the open area battlefield in the center of the park, near an old abandoned house in the northwest part of the park, and in the field near the old Guilford Courthouse site.

This community is a human-created association and is secure throughout its range. In order to sustain this community, occasional mowing (every 2-5 years) is necessary.

Cultivated Meadow

This exotic species-dominated grassland occurs throughout the East and Southeast. It can be found at most slopes and aspects, has no canopy, and is dominated by a mixture of exotic herb species and native grasses and forbs. It is maintained by yearly mowing.

Within the park, this association occurs wherever there are areas that have been mowed regularly. This mowing has occurred on battlefield sites and around monuments throughout the park. The vegetation of this community at the park is surprisingly diverse. Some of the mowed fields have probably not been plowed for a long time, allowing a diverse assemblage of plant species to occupy some areas. Other examples are mowed multiple times per year and have much lower diversity. Most examples of this type have high concentrations of fescue (*Lolium arundinaceum* = [*Festuca arundinacea*]), but they also contain large numbers of such species as little bluestem (*Schizachyrium scoparium*), rice button American aster (*Symphiotricum dumosum*), and panicle-leafed tick-trefoil (*Desmodium paniculatum*) along with smaller numbers of such species as deertongue *(Dichanthelium clandestinum*), lyre-leaf sage (*Salvia lyrata*), gray goldenrod (*Solidago nemoralis*), beaked panic grass (*Panicum anceps*), Canadian horseweed (*Conyza canadensis*), Virginia creeper *(Parthenocissus quinquefolia*), poison ivy, and hairy small-leaf tick-trefoil (*Desmodium ciliare*). One 20x50 meter plot contained over 50 species. Other examples of this community in the park are much less diverse.

This cultivated community occurs throughout the Southeast and north into the northeastern United States. The community occurs wherever fields are left fallow or grazed and so is still fairly common throughout. Within the park, it occurs around most of the monuments and in the mowed central area of the main battle.

Threats to this community include the cessation of mowing and the invasion by non-native species. At this point, the community is comprised of a large number of exotics. However, these exotic species do not form monocultures and allow for high native species diversity as well. Therefore, exotics are not yet a significant threat to the system.

Although this is a modified association and not a priority for conservation globally, this community does help maintain a higher level of biodiversity at the park. Many native species that are unable to grow in forests do grow in this community, especially the battlefield proper. Species that grow in this community but not in other places in the park include Elliott's bluestem (*Andropogon gyrans*), deertongue, beaked panic grass, narrow-leaf mountain mint (*Pycnanthemum tenuifolium*), little bluestem, and cankerweed (*Prenanthes serpentaria*), just to name a few. None of these are threatened or endangered, but they occur in no other communities in the park and so would not persist in this landscape without this community.

Ecological Community Summary

Of the eleven associations described above, only four associations are considered natural or not successional. These four association types occur in areas that have had more time to recover since they were plowed. Most may have not been plowed for at least 80 years or occur in bottomland areas that recover more quickly from stand initiating disturbance. All four of the most natural associations combined only account for about one half to two thirds of the park's land area. These communities include the Acidic Piedmont Mesic Mixed Hardwood Forest, Piedmont Dry – Mesic Oak – Hickory Forest, Southern Red Oak – White Oak Forest, and Piedmont Small Stream Sweetgum Forest. It may be important to prioritize these communities highly when considering land management and future land use.

Of these, the Piedmont Small Stream Sweetgum Forest is considered the rarest; a G3 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 community type is also the most diverse of all communities in the park and has the largest management challenges. Examples of this community in the park are very impacted by invasive exotics such as privet and Japanese stiltgrass. In addition, changes in hydrologic regime have created a creek system that is more "flashy" and incised and therefore floods less frequently but floods with more force when extreme rain events occur. It may be important to focus on this creek corridor, both increasing the control and management of exotic species there and interpreting the flora of this system along the trails that pass through it.

The cultivated meadow, though a human created community, is important for the biodiversity of the park as a whole since this community contains species that historically existed only in more open areas created by fire and/or grazing. Without this community type, the plant species list of Guilford Courthouse would be much lower. Surprisingly, examples within the park harbor a high diversity of native species. This community may also be the most amenable to restoration of additional native species that may have been prominent components of old fields and large forest openings during the Revolutionary War (little bluestem, poverty oatgrass (*Danthonia spicata*), blazing star (*Liatris spp.*), silkgrass (*Pityopsis graminifolia*), yellow wildindigo (*Baptisia* tinctoria), etc.). In order to preserve the genetic composition of local plant populations, local seed sources would be the best source for any introductions or restoration.

Although Guilford Courthouse National Military Park does not contain any rare or endangered species and has been impacted heavily by past land use practices, it nevertheless serves as refuge for plant species and ecological communities that no longer exist within the urban and suburban areas of Greensboro and its environs. Therefore, the ecological communities and plants are of relative significance for the region and every effort should be made to focus attention on those natural communities that might serve as the best examples of each community to be preserved, enhanced, and possibly interpreted for future visitors.

Overview

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

1) control invasive exotics in all communities, but especially those near natural communities,
2) continue to remove wisteria,
3) focus intense management such as invasive exotic removal, native plant reintroduction, and creek stabilization on creek corridors where Piedmont Small Stream Sweetgum Forest occurs,
4) Consider continuing to manage cultivated meadows to maintain overall park biodiversity and consider options for increasing biodiversity in meadows,
5) Continue to protect high quality versions of the Southern Red Oak – White Oak Forest, the Acidic Piedmont Mixed Mesic Hardwood Forest, and the Piedmont Dry-Mesic Oak-Hickory Forest.

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Figure 1. Map of Guilford Courthouse National Military Park with all permanent points marked.

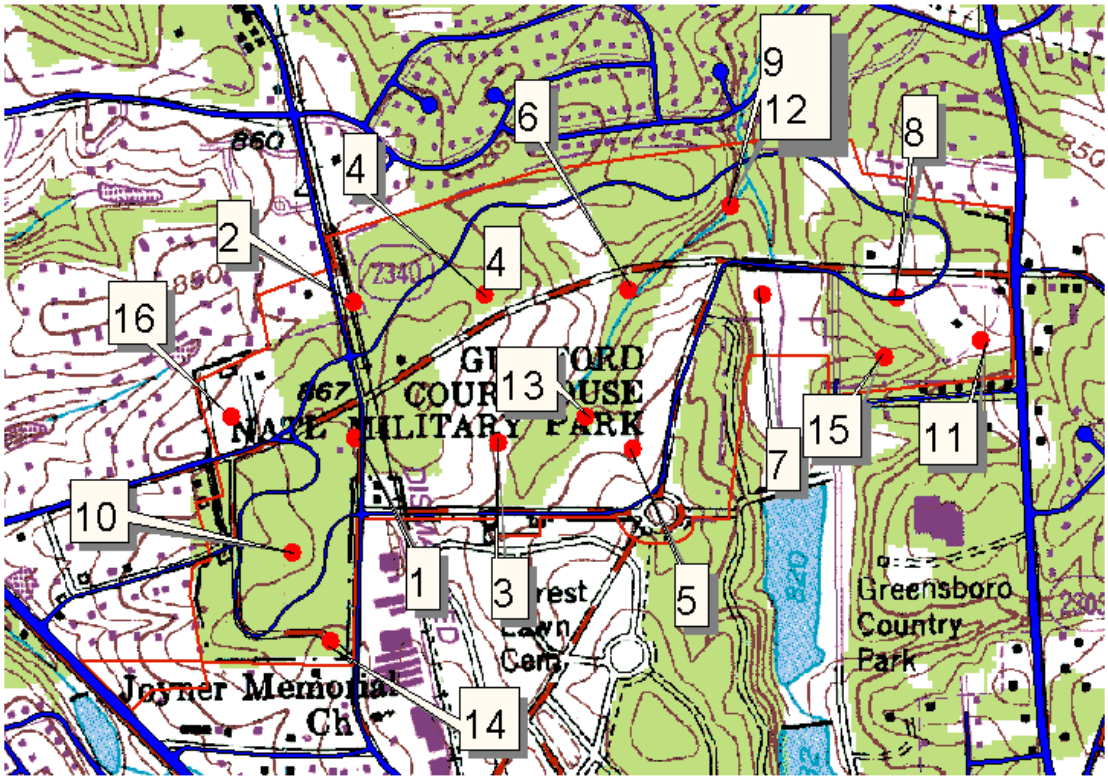
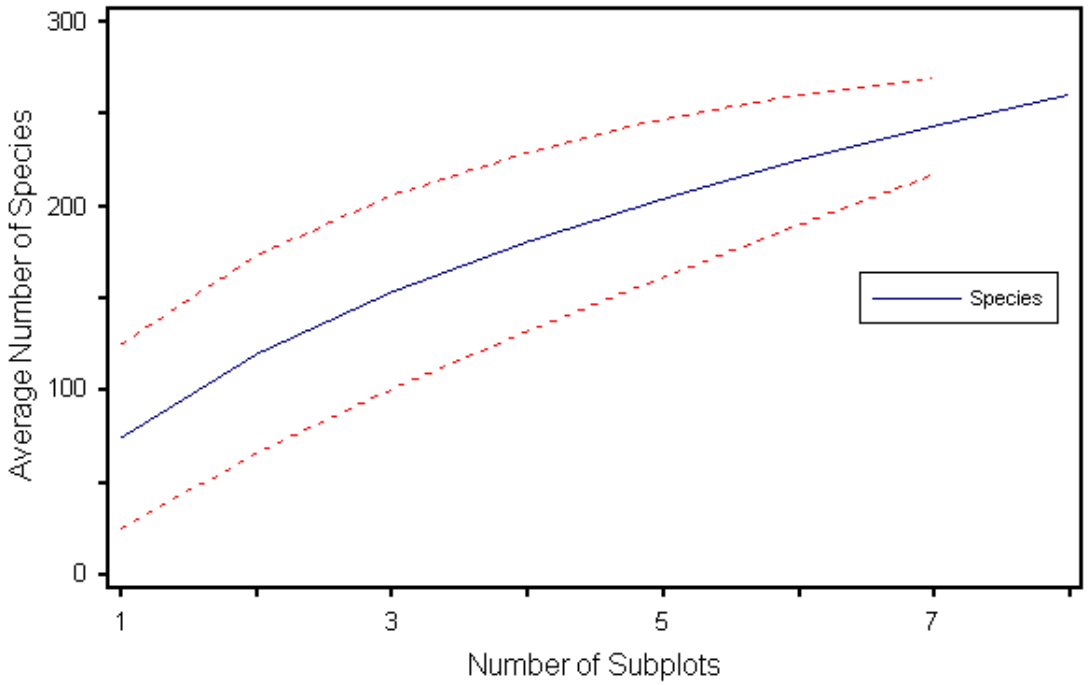


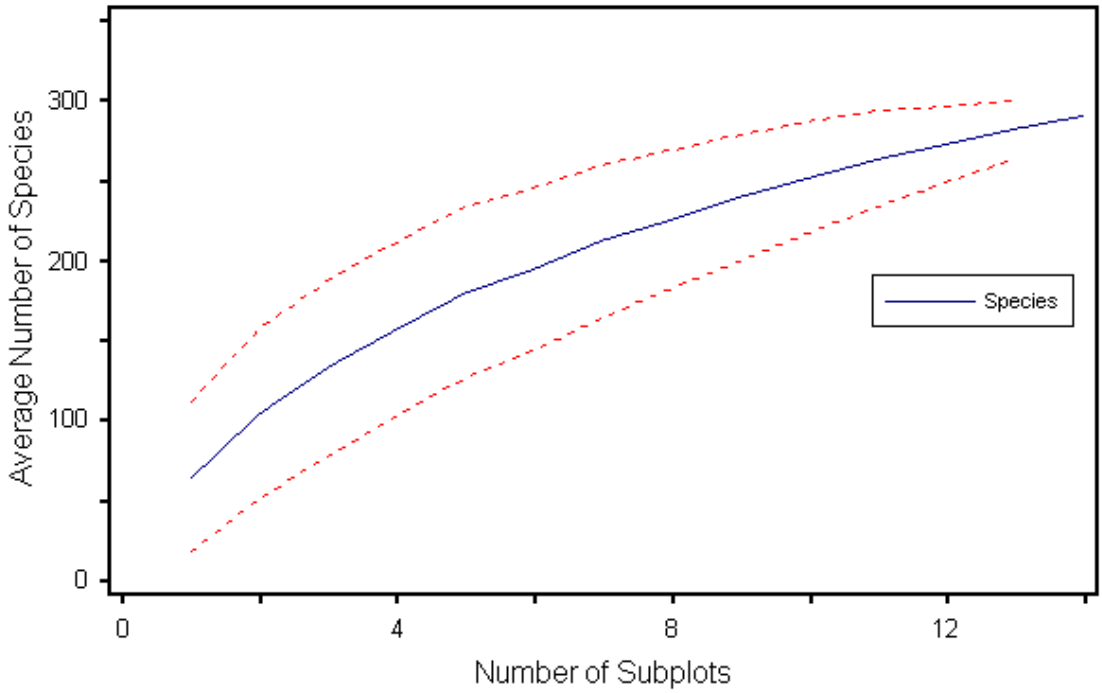
Figure 2. Species area curves for Guilford Courthouse National Military Park a) from only the 8 gridded plots in the park and b) from all 14 plots.

a)



First-order jackknife estimate of number of species in park = 376.4
Second-order jackknife estimate of number of species in park = 442.7

b)



First-order jackknife estimate of number of species in park = 403.4
Second-order jackknife estimate of number of species in park = 455.6

Table 1. Plot numbers and locations for all permanent plots established at Guilford Courthouse National Military Park.

Plot Number	X Coordinate	Y Coordinate	Projection	Zone	Type of plot
1	603849	3999160	NAD83	17	FULL
2	603847	3999405	NAD83	17	FULL
3	604113	3999151	NAD83	17	FULL
4	604088	3999418	NAD83	17	FULL
5	604356	3999140	NAD83	17	FULL
6	604347	3999428	NAD83	17	FULL
7	604593	3999420	NAD83	17	FULL
8	604839	3999413	NAD83	17	FULL
9	604533	3999581	NAD83	17	FULL
10	603735	3998949	NAD83	17	FULL
11	604993	3999335	NAD83	17	FULL
12	604533	3999581	NAD83	17	Part of plot 9
13	604269	3999199	NAD83	17	QUICKPLOT
14	603805	3998786	NAD83	17	QUICKPLOT
15	604815	3999306	NAD83	17	FULL
16	603622	3999199	NAD83	17	FULL

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

Scientific Name	Common Name
Acalypha gracilens	slender threeseed mercury
Acalypha rhomboidea	Virginia threeseed mercury
Acer barbatum	florida maple
Acer negundo	boxelder
Acer rubrum	red maple
Acer saccharinum	silver maple
Acer saccharum	sugar maple
Acer spicatum	mountain maple
Achillea millefolium	common yarrow
Aesculus sylvatica	painted buckeye
Agalinis tenuifolia	slenderleaf false foxglove
Agrimonia rostellata	beaked agrimony
Ailanthus altissima	tree of heaven
Albizia julibrissin	mimosa
Allium canadense	meadow garlic
Allium vineale	wild garlic
Alnus serrulata	alder
Ambrosia artemisiifolia	annual ragweed
Amelanchier arborea	serviceberry
Amphicarpa bracteata	hog peanut
Andropogon gyrans	Elliott's bluestem
Andropogon virginicus var. virginicus	broomsedge
Anemone virginiana	tall thimbleweed
Antennaria plantaginifolia	woman's tobacco
Anthoxanthum odoratum	sweet vernalgrass
Apios americana	groundnut
Aplectrum hyemale	Adam and Eve
Apocynum cannabinum	Indianhemp
Aristolochia serpentaria	Virginia snakeroot
Artemisia vulgaris	common wormwood
Arthraxon hispidus	small carpgrass
Asclepias syriaca	common milkweed
Asclepias tuberosa	butterfly milkweed
Asplenium platyneuron	ebony spleenwort
Athyrium filix-femina ssp. asplenioides	asplenium ladyfern
Bidens bipinnata	Spanish needles
Bidens frondosa	devil's beggartick
Boehmeria cylindrica	smallspike false nettle
Botrychium biternatum	sparselobe grapefern
Botrychium dissectum	cutleaf grapefern
Botrychium dissectum var. obliquum	cut leaf grape fern
Botrychium virginianum	rattlesnake fern

Scientific Name	Common Name
Broussonetia papyrifera	paper mulberry
Campsis radicans	trumpet creeper
Cardamine hirsuta	hairy bittercress
Carex crinita	fringed sedge
Carex hirsutella	fuzzy wuzzy sedge
Carex laxiculmis var. laxiculmis	spreading sedge
Carex lurida	shallow sedge
Carya glabra	pignut hickory
Carya laciniosa	shellbark hickory
Carya ovalis	pignut hickory
Carya ovata	shagbark hickory
Carya tomentosa	mockernut hickory
Celastrus orbiculatus	oriental bittersweet
Centaurea cyanus	garden cornflower
Cercis canadensis	redbud
Chaenomeles japonica	Maule's quince
Chaerophyllum tainturieri	hairyfruit chervil
Chamaecrista nictitans	partridge pea
Chelone glabra	white turtlehead
Chimaphila maculata	striped prince's pine
Chionanthus virginicus	white fringetree
Chrysopsis mariana	Maryland goldenaster
Cichorium intybus	chicory
Cimicifuga racemosa	black bugbane
Cinna arundinacea	sweet woodreed
Cladrastis	yellowwood
Clematis terniflora	sweet autumn virginsbower
Clematis virginiana	virgin's bower
Commelina communis	Asiatic dayflower
Conyza canadensis	horseweed
Corallorrhiza odontorhiza	autumn coralroot
Cornus florida	flowering dogwood
Cortaderia sp.	pampas grass
Corylus americana	hazelnut
Cryptotaenia canadensis	Canadian honewort
Cunninghamia lanceolata	Chinese fir
Cynodon dactylon	Bermudagrass
Cyperus retrorsus	pine barren flatsedge
Cyperus strigosus	strawcolored flatsedge
Dactylis glomerata	orchard grass
Daucus carota	Queen Anne's lace
Desmodium canescens	hoary ticktrefoil
Desmodium ciliare	hairy smallleaf ticktrefoil

Scientific Name	Common Name
Desmodium cuspidatum	largebract ticktrefoil
Desmodium laevigatum	smooth ticktrefoil
Desmodium nudiflorum	nakedflower ticktrefoil
Desmodium paniculatum	panicledleaf ticktrefoil
Desmodium paniculatum var. paniculatum	panicledleaf ticktrefoil
Desmodium pauciflorum	fewflowered tickclover
Desmodium rotundifolium	prostrate ticktrefoil
Dianthus armeria	Deptford pink
Dichanthelium boscii	Bosc's panicgrass
Dichanthelium clandestinum	deertongue
Dichanthelium dichotomum var. dichotomum	cypress panicgrass
Dichanthelium laxiflorum	openflower rosette grass
Dichanthelium ovale var. addisonii	Addison's rosette grass
Dichanthelium sphaerocarpon var. isophyllum	roundseed panicgrass
Digitaria sanguinalis	hairy crabgrass
Diodia virginiana	Virginia buttonweed
Dioscorea oppositifolia	Chinese yam
Dioscorea villosa	wild yam
Diospyros virginiana	Persimmon
Duchesnea indica	Indian strawberry
Elaeagnus angustifolia	Russian olive
Elaeagnus pungens	thorny olive
Elaeagnus umbellata	autumn olive
Elephantopus carolinianus	Carolina elephantsfoot
Elymus hystrix var. hystrix	eastern bottlebrush grass
Elymus virginicus	Virginia wildrye
Epifagus virginiana	beechdrops
Eragrostis hirsuta	bigtop lovegrass
Eragrostis spectabilis	purple lovegrass
Erechtites hieracifolia	burnweed
Erigeron annuus	eastern daisy fleabane
Euonymus americanus	hearts-a-bustin'
Euonymus fortunei	climbing euonymus
Eupatorium altissimum	tall joepyeweed
Eupatorium fistulosum	trumpetweed
Eupatorium hyssopifolium	hyssopleaf thoroughwort
Eupatorium purpureum	sweetscented joepyeweed
Fagus grandifolia	american beech
Fragaria virginiana	Virginia strawberry
Fraxinus americana	white ash
Galium aparine	stickywilly
Galium circaezans	licorice bedstraw
Galium triflorum	fragrant bedstraw

Scientific Name	Common Name
Gaylussacia baccata	black huckleberry
Geranium carolinianum	Carolina geranium
Geum sp.	avens
Geum virginianum	cream avens
Glechoma hederacea	ground-ivy
Gleditsia triacanthos	honeylocust
Glyceria striata	fowl mannagrass
Goodyera pubescens	downy rattlesnake plantain
Hamamelis virginiana	witchhazel
Hedera helix	English ivy
Helenium amarum	yellowdicks
Helianthus microcephalus	small woodland sunflower
Hemerocallis fulva	orange daylily
Hieracium gronovii	queendevil
Holcus lanatus	common velvetgrass
Houstonia caerulea	azure bluets
Huperzia lucidula	shining clubmoss
Hypericum perforatum	common St. Johnswort
Hypericum punctatum	spotted St. Johnswort
Hypericum stragulum	St. Andrew's Cross
Ilex crenata	Japanese holly
Ilex opaca	american holly
Impatiens capensis	jewelweed
Ipomoea pandurata	bigroot morningglory
Iris germanica	German iris
Juglans nigra	black walnut
Juncus effusus	common rush
Juncus tenuis	poverty rush
Juniperus virginiana	eastern redcedar
Kummerowia striata	Japanese clover
Kyllinga brevifolia	shortleaf spikesedge
Lactuca floridana	woodland lettuce
Lamium amplexicaule	henbit deadnettle
Leersia virginicus	rice cutgrass
Lepidium virginicum	Virginia pepperweed
Lespedeza cuneata	Chinese lespedeza
Lespedeza frutescens	shrubby lespedeza
Lespedeza hirta	hairy lespedeza
Leucanthemum vulgare	oxeyedaisy
Ligustrum japonicum	Japanese privet
Ligustrum sinense	Chinese privet
Ligustrum vulgare	European privet
Lilium michauxii	Carolina lily

Scientific Name	Common Name
Lindera benzoin	northern spicebush
Liquidambar styraciflua	sweetgum
Liriodendron tulipifera	tulip poplar
Liriope spicatum	creeping lilyturf
Lobelia cardinalis	cardinalflower
Lobelia inflata	Indian tobacco
Lobelia puberula	downy lobelia
Lolium perenne ssp. multiflorum	Perennial rye grass
Lonicera fragrantissima	January jasmine
Lonicera japonica	Japanese honeysuckle
Lonicera sempervirens	trumpet honeysuckle
Lonicera sempervirens var. sempervirens	trumpet honeysuckle
Ludwigia palustris	marsh seedbox
Lycopodium digitatum	fan clubmoss
Lycopus virginicus	Virginia waterhorehound
Lysimachia quadrifolia	whorled yellow loosestrife
Magnolia grandiflora	sweetbay
Magnolia tripetala	umbrella magnolia
Magnolia virginiana	sweetbay
Mahonia bealei	Beale's Oregon-grape
Maianthemum racemosum	Solomon's plume
Malus pumila	paradise apple
Melilotus officinalis	yellow sweetclover
Microstegium vimineum	Japanese stiltgrass
Modiola caroliniana	Carolina modiola
Morus rubra	red mulberry
Muhlenbergia schreberi	nimblewill muhly
Nandina domestica	nandina
Narcissus sp.	daffodil
Nyssa sylvatica	black gum
Onoclea sensibilis	sensitive fern
Ornithogalum umbellatum	Star-of-Bethlehem
Oxalis stricta	sourgrass
Oxydendrum arboreum	sourwood
Packera anonyma	Small's ragwort
Panicum anceps	beaked panicum
Parthenocissus quinquefolia	Virginia creeper
Paspalum pubiflorum	hairyseed paspalum
Passiflora incarnata	purple passionflower
Passiflora lutea	yellow passionflower
Paulownia tomentosa	princess tree
Pennisetum glaucum	pearl millet
Penstemon australis	beardtongue

Scientific Name	Common Name
Philadelphus inodorus	scentless mock orange
Phoradendron leucarpum	mistletoe
Photinia villosa	redtip
Phryma leptostachya	American lopseed
Phyllostachys aurea	golden bamboo
Phyllostachys meyeri	Meyer's bamboo
Physalis heterophylla	clammy groundcherry
Phytolacca americana	American pokeweed
Picea excelsa	Norway spruce
Pilea pumila	Canadian clearweed
Pinus echinata	shortleaf pine
Pinus palustris	longleaf pine
Pinus strobus	eastern white pine
Pinus taeda	loblolly pine
Pinus virginiana	virginia pine
Plantago lanceolata	narrowleaf plantain
Plantago rugelii	blackseed plantain
Platanus occidentalis	sycamore
Poa annua	annual bluegrass
Poa autumnalis	autumn bluegrass
Podophyllum peltatum	mayapple
Polygonatum biflorum	king Solomon's seal
Polygonum caespitosum	oriental ladysthumb
Polygonum punctatum	dotted smartweed
Polygonum sagittatum	arrowleaf tearthumb
Polygonum virginianum	jumpseed
Polystichum acrostichoides	Christmas fern
Potentilla canadensis var. canadensis	dwarf cinquefoil
Prenanthes sp.	rattlesnakeroot
Prenanthes altissima	tall rattlesnakeroot
Prenanthes serpentaria	cankerweed
Prunella vulgaris	common selfheal
Prunus avium	sweet cherry
Prunus cerasus	sour cherry
Prunus serotina	black cherry
Pueraria montana var. lobata	kudzu
Pycnanthemum incanum	hoary mountainmint
Pycnanthemum tenuifolium	narrowleaf mountainmint
Pyrus communis	pear
Quercus alba	white oak
Quercus coccinea	scarlet oak
Quercus falcata	southern red oak
Quercus hemisphaerica	Darlington oak

Scientific Name	Common Name
Quercus laurifolia	laurel oak
Quercus lyrata	overcup oak
Quercus marilandica	blackjack oak
Quercus phellos	willow oak
Quercus prinus	chestnut oak
Quercus rubra	northern red oak
Quercus shumardii	shumard oak
Quercus stellata	post oak
Quercus velutina	black oak
Ranunculus abortivus	littleleaf buttercup
Ranunculus bulbosus	bulbous buttercup
Rhododendron maximum	rosebay rhododendron
Rhododendron periclymenoides	pink azalea
Rhus aromatica	fragrant sumac
Rhus copallina	winged sumac
Rhus glabra	fragrant sumac
Robinia pseudoacacia	black locust
Rosa multiflora	multiflora rose
Rubus argutus	sawtooth blackberry
Rubus flagellaris	northern dewberry
Rubus occidentalis	black raspberry
Rudbeckia fulgida	orange coneflower
Ruellia caroliniensis	Carolina wild petunia
Rumex obtusifolius	bitter dock
Sagittaria latifolia	broadleaf arrowhead
Salix alba var. vitellina	golden willow
Salix caroliniana	coastal plain willow
Salix discolor	pussy willow
Salix nigra	black willow
Salvia lyrata	lyreleaf sage
Sambucus canadensis	american elder
Sanguinaria canadensis	bloodroot
Sanicula canadensis var. canadensis	Canadian blacksnakeroot
Sanicula smallii	Small's blacksnakeroot
Sassafras albidum	sassafras
Schizachyrium scoparium	little bluestem
Scutellaria elliptica	hairy skullcap
Scutellaria integrifolia	helmet flower
Scutellaria lateriflora	blue skullcap
Sisyrinchium mucronatum	needle-tip blue-eyed-grass
Smilax bona-nox	saw greenbrier
Smilax glauca	cat greenbrier
Smilax herbacea	smooth carrionflower

Scientific Name	Common Name
Solanum carolinense	Carolina horsenettle
Solidago arguta	Atlantic goldenrod
Solidago caesia	wreath goldenrod
Solidago canadensis	Canada goldenrod
Solidago erecta	slender goldenrod
Solidago nemoralis	gray goldenrod
Solidago pinetorum	Small's goldenrod
Solidago speciosa	showy goldenrod
Sorghum halepense	Johnsongrass
Spiraea prunifolia	bridalwreath spirea
Staphylea trifolia	american bladdernut
Stellaria media	common chickweed
Symphyotrichum dumosum	rice button aster
Taraxacum officinale	common dandelion
Thuja occidentalis	arborvitae
Tilia americana var. heterophylla	American basswood
Tipularia discolor	crippled cranefly
Toxicodendron radicans ssp. radicans	eastern poison ivy
Tridens flavus	Tall redtop
Trifolium pratense	red clover
Trifolium repens	white clover
Tripsacum dactyloides	eastern gramagrass
Tsuga canadensis	eastern hemlock
Ulmus americana	American elm
Ulmus pumila	Siberian elm
Uvularia perfoliata	perfoliate bellwort
Vaccinium arboreum	farkleberry
Vaccinium pallidum	blueridge blueberry
Vaccinium stamineum	deerberry
Vaccinium stamineum var. candicans	deerberry
Vernonia noveboracensis	New York ironweed
Veronica hederifolia	ivyleaf speedwell
Viburnum acerifolium	mapleleaf viburnum
Viburnum dentatum	arrow-wood viburnum
Viburnum dilatatum	linden arrowwood
Viburnum nudum	possumhaw
Viburnum prunifolium	blackhaw
Viburnum rufidulum	rusty viburnum
Viburnum setigerum	tea viburnum
Vicia angustifolia	garden vetch
Vinca minor	common periwinkle
Viola sororia	common blue violet
Vitis aestivalis	summer grape

Scientific Name	Common Name
Vitis rotundifolia	muscadine
Vitis vulpina	fox grape
Wisteria floribunda	Japanese wisteria
Woodwardia areolata	netted chainfern

Table 3. List of vouchers that were collected at Guilford Courthouse NMP.

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Acalypha gracilens	slender threeseed mercury	28183	11687	White, R., Pyne, M.	Old field.	G5
Acalypha rhomboidea	Virginia threeseed mercury	28193	11688	White, R., Pyne, M., and Flokstra, B.	White oak forest	G5
Acer barbatum	florida maple	28759	11689	White, R., Pyne, M., Flokstra, B.	Liriodendron tulipifera - Acer rubrum - Quercus spp. Forest	G4G5 Q
Acer barbatum	florida maple	28759	11690	White, R., Pyne, M.	Beech forest	G4G5 Q
Achillea millefolium	common yarrow	35423	11691	White, R., Pyne, M.	Old field.	G5
Agalinis tenuifolia	slenderleaf false foxglove	33036	11692	White, R., Pyne, M.	Old field	G5
Agrimonia rostellata	beaked agrimony	25100	11693	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Allium canadense	meadow garlic	42635	11695	White, R., Nordman, C.	Tulip poplar dominated bottomland	G5
Allium canadense	meadow garlic	42635	11694	White, R., Nordman, C.	Tulip poplar dominated bottomland	G5
Allium vineale	wild garlic	42637	11696	White, R., Pyne, M., and Flokstra, B.	White oak forest	G?
Ambrosia artemisiifolia	annual ragweed	36496	11697	White, R., Pyne, M.	Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum Forest	G5
Amelanchier arborea	serviceberry	25110	11698	White, R., Nordman, C.	Successional Pine community	G5
Amphicarpa bracteata	hog peanut	25388	11699	White, R., Pyne, M.	Oak forest	G5
Andropogon gyrans	Elliott's bluestem	182527	11700	White, R., Pyne, M.	Old field.	G5

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Andropogon virginicus var. virginicus	broomsedge	182523	11701	White, R., Pyne, M.	Old field.	G5T5
Anemone virginiana	tall thimbleweed	18451	11702	White, R., Pyne, M.	Old field.	G5
Antennaria plantaginifolia	woman's tobacco	36717	11703	White, R., Pyne, M.	Old field.	G5
Anthoxanthum odoratum	sweet vernalgrass	41395	11704	White, R., Nordman, C.	Oak-hickory, white oak phase.	G?
Apios americana	groundnut	25390	11705	White, R., Pyne, M., and Flokstra, B.	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. triphyllum Forest	G5
Aplectrum hyemale	adam and eve	43489	11707	White, R., Pyne, M., Flokstra, B.	Liriodendron tulipifera - Acer rubrum - Quercus spp. Forest	G5
Aplectrum hyemale	adam and eve	43489	11706	Pyne, M.	Mesic slope and floodplain.	G5
Apocynum cannabinum	Indianhemp	30157	11708	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Aristolochia serpentaria	Virginia snakeroot	18342	11709	White, R., Pyne, M.	Old field.	G4
Artemisia vulgaris	common wormwood	35505	11710	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G?
Arthraxon hispidus	small carpgrass	41445	11711	White, R.		G?
Asclepias syriaca	common milkweed	30310	11712	White, R., Nordman, C.	Old field.	G5
Asclepias tuberosa	butterfly milkweed	30313	11713	White, R., Pyne, M.	Old field	G5?
Asplenium platyneuron	ebony spleenwort	17355	11714	White, R., Pyne, M.	Pine woods.	G5

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Athyrium filix-femina ssp. asplenioides	asplenium ladyfern	17415	11715	White, R., Pyne, M., and Flokstra, B.	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. triphyllum Forest	G5T?
Bidens bipinnata	Spanish needles	500993	11716	White, R., Pyne, M.	Roadside.	G5
Bidens frondosa	devil's beggartick	35707	11717	White, R., Pyne, M., and Flokstra, B.	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. triphyllum Forest	G5
Boehmeria cylindrica	smallspike false nettle	19121	11718	Pyne, M.	Mesic slope and floodplain.	G5
Botrychium biternatum	sparselobe grapefern	17175	11719	White, R.		G5
Botrychium dissectum	cutleaf grapefern	17171	11720	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Botrychium dissectum var. obliquum	cut leaf grape fern	17172	11721	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5T?
Botrychium virginianum	rattlesnake fern	17173	11722	White, R.		G5
Broussonetia papyrifera	paper mulberry	19107	11723	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G?
Campsis radicans	trumpet creeper	34309	11724	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Cardamine hirsuta	hairy bittercress	22797	11725	White, R.	White oak forest	G?
Carex crinita	fringed sedge	39385	11726	White, R., Pyne, M., and Flokstra, B.	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. triphyllum Forest	G5

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Carex hirsutella	fuzzy wuzzy sedge	39636	11727	White, R.		G5
Carex laxiculmis var. laxiculmis	spreading sedge	527109	11728	White, R., Nordman, C.	Oak-hickory, white oak phase.	G5T?
Carex lurida	shallow sedge	39414	11729	White, R., Nordman, C.	Tulip poplar dominated bottomland	G5
Centaurea cyanus	garden cornflower	36954	11730	White, R., Nordman, C.	Old field.	G?
Chaenomeles japonica	Maule's quince	508021	11731	White, R.	Oak-hickory forest.	G?
Chaerophyllum tainturieri	hairyfruit chervil	29617	11732	White, R.		G5
Chamaecrista nictitans	partridge pea	501388	11733	White, R., Pyne, M.	Old field.	G5
Chelone glabra	white turtlehead	33182	11736	White, R., Pyne, M., and Flokstra, B.	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. triphyllum Forest	G5
Chimaphila maculata	striped prince's pine	23767	11737	Pyne, M.	Mesic slope and floodplain.	G5
Chionanthus virginicus	white fringetree	32950	11738	White, R., Pyne, M., and Flokstra, B.	Oak woods.	G5
Chrysopsis mariana	Maryland goldenaster	202495	11739	White, R., Pyne, M.	Old field.	G5
Cichorium intybus	chicory	36763	11740	White, R., Pyne, M.	Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum Forest	G?
Cimicifuga racemosa	black bugbane	18757	11741	White, R., Pyne, M.	Oak forest	G4
Cinna arundinacea	sweet woodreed	40583	11742	White, R., Pyne, M.	Pine woods.	G5

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Clematis terniflora	sweet autumn virginsbower	18712	11743	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G?
Clematis virginiana	virgin's bower	18716	11744	Pyne, M.	Mesic slope and floodplain.	G5
Commelina communis	Asiatic dayflower	39127	11745	White, R., Pyne, M., and Flokstra, B.	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. triphyllum Forest	G5
Conyza canadensis	horseweed	37113	11746	White, R., Pyne, M.	Old field.	G5
Corallorrhiza odontorhiza	autumn coralroot	43525	11747	White, R., Pyne, M., Flokstra, B.	Liriodendron tulipifera - Acer rubrum - Quercus spp. Forest	G5
Cryptotaenia canadensis	Canadian honewort	29475	11750	Pyne, M.	Mesic slope and floodplain.	G5
Cynodon dactylon	Bermudagrass	41619	11751	White, R., Pyne, M.	Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum Forest	G?
Cyperus retrorsus	pine barren flatsedge	39898	11752	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Cyperus strigosus	strawcolored flatsedge	39901	11753	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Dactylis glomerata	orchard grass	193446	11755	White, R., Nordman, C.	Oak-hickory, white oak phase.	G?
Dactylis glomerata	orchard grass	193446	11754	White, R., Pyne, M.	Old field.	G?
Daucus carota	Queen Anne's lace	29477	11756	White, R., Pyne, M.	Old field.	G?
Desmodium canescens	hoary ticktrefoil	25792	11758	White, R., Pyne, M., and Flokstra, B.	White oak forest	G5

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Desmodium canescens	hoary ticktrefoil	25792	11757	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Desmodium ciliare	hairy smallleaf ticktrefoil	25793	11759	White, R., Pyne, M.	Old field.	G5
Desmodium cuspidatum	largebract ticktrefoil	25795	11760	White, R., Pyne, M., Flokstra, B.	Oak woods and roadside.	G5
Desmodium laevigatum	smooth ticktrefoil	25806	11761	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Desmodium nudiflorum	nakedflower ticktrefoil	25812	11762	Pyne, M.	Mesic slope and floodplain.	G5
Desmodium paniculatum	panicledleaf ticktrefoil	25815	11763	White, R., Nordman, C.	Oak-hickory, white oak phase.	G5
Desmodium paniculatum var. paniculatum	panicledleaf ticktrefoil	527679	11764	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5T5
Desmodium pauciflorum	fewflowered tickclover	25816	11765	White, R., Pyne, M., Flokstra, B.	Oak woods and roadside.	G5
Desmodium rotundifolium	prostrate ticktrefoil	502020	11766	Nordman, C.	Disturbed area	G5
Dianthus armeria	Deptford pink	20276	11767	White, R., Nordman, C.	Tulip poplar dominated bottomland	G?
Dichanthelium boscii	Bosc's panicgrass	41655	11768	White, R., Pyne, M.	Oak forest	G5
Dichanthelium clandestinum	deertongue	41656	11769	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5?
Dichanthelium dichotomum var. dichotomum	cypress panicgrass	527691	11770	White, R., Nordman, C.	Oak-hickory, white oak phase.	G5T5
Dichanthelium laxiflorum	openflower rosette	41661	11772	White, R., Nordman, C.	Oak-hickory, white oak phase.	G5

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
	grass					
Dichanthelium laxiflorum	openflower rosette grass	41661	11771	White, R., Pyne, M.	Pine woods.	G5
Dichanthelium ovale var. addisonii	Addison's rosette grass	527697	11773	White, R., Pyne, M.	Old field.	G5T5
Dichanthelium sphaerocarpon var. isophyllum	roundseed panicgrass	527701	11774	White, R.		G5T5
Digitaria sanguinalis	hairy crabgrass	40604	11775	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Diodia virginiana	Virginia buttonweed	34790	11776	White, R., Pyne, M., and Flokstra, B.	Oak woods.	G5
Dioscorea oppositifolia	Chinese yam	502075	11777	White, R., Nordman, C.	Tulip poplar dominated bottomland	G?
Dioscorea villosa	wild yam	43367	11778	White, R., Pyne, M., and Flokstra, B.	Oak woods.	G4G5
Lycopodium digitatum	fan clubmoss	17028	11779	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Duchesnea indica	Indian strawberry	25163	11781	Nordman, C.	Disturbed area	G5
Duchesnea indica	Indian strawberry	25163	11780	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Elaeagnus angustifolia	Russian olive	27770	11782	White, R., Pyne, M.	Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum Forest	G?

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Elaeagnus pungens	thorny olive	502223	11783	White, R., Pyne, M.	Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum Forest	G?
Elaeagnus umbellata	autumn olive	27776	11784	White, R., Pyne, M.	Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum Forest	G?
Elephantopus carolinianus	Carolina elephantsfoot	37297	11785	Pyne, M.	Mesic slope and floodplain.	G5
Elymus hystrix var. hystrix	eastern bottlebrush grass	527866	11786	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5T5
Elymus virginicus	Virginia wildrye	40681	11787	White, R., Pyne, M.	Old field.	G5
Epifagus virginiana	beechdrops	34276	11788	White, R.	Beech forest.	G5
Eragrostis hirsuta	bigtop lovegrass	40744	11789	White, R., Pyne, M.	Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum Forest	G5
Eragrostis spectabilis	purple lovegrass	40717	11790	White, R., Pyne, M.	Old field.	G5
Erechtites hieracifolia	burnweed	505920	11791	White, R., Pyne, M., and Flokstra, B.	White oak forest	G5
Erigeron annuus	eastern daisy fleabane	35804	11792	White, R., Nordman, C.	Old field.	G5
Euonymus americanus	hearts-a-bustin'	27947	11793	White, R., Pyne, M.	Oak forest	G5
Euonymus fortunei	climbing euonymus	27950	11794	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G?

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Eupatorium altissimum	tall joepyeweed	502498	11795	White, R., Pyne, M.	Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum Forest	G5
Eupatorium fistulosum	trumpetweed	502509	11796	White, R., Pyne, M.	Old field	G5?
Eupatorium hyssopifolium	hyssopleaf thoroughwort	35979	11797	White, R., Pyne, M.	Old field.	G5
Eupatorium purpureum	sweetscented joepyeweed	502522	11798	White, R., Pyne, M., and Flokstra, B.	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. triphyllum Forest	G5
Fragaria virginiana	Virginia strawberry	24639	11799	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Galium aparine	stickywilly	34797	11800	White, R., Nordman, C.	Old field.	G5
Galium circaezans	licorice bedstraw	34800	11801	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Galium triflorum	fragrant bedstraw	34933	11802	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Galium triflorum	fragrant bedstraw	34933	11803	White, R., Nordman, C.	Tulip poplar dominated bottomland	G5
Geranium carolinianum	Carolina geranium	29105	11804	White, R., Nordman, C.	Old field.	G5
Geum	avens	24644	11805	White, R., Pyne, M., and Flokstra, B.	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. triphyllum Forest	?

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Geum virginianum	cream avens	24665	11807	Nordman, C.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Geum virginianum	cream avens	24665	11806	White, R.		G5
Glechoma hederacea	groundivy	502801	11808	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G?
Glyceria striata	fowl mannagrass	40833	11809	White, R., Nordman, C.	Tulip poplar dominated bottomland	G5
Goodyera pubescens	downy rattlesnake plantain	43594	11810	White, R., Pyne, M., Flokstra, B.	Liriodendron tulipifera - Acer rubrum - Quercus spp. Forest	G5
Helenium amarum	yellowdicks	36007	11811	White, R., Pyne, M.	Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum Forest	G5
Helianthus microcephalus	small woodland sunflower	36654	11812	White, R., Pyne, M.	Old field	G5
Helianthus microcephalus	small woodland sunflower	36654	11813	Nordman, C.	Disturbed area	G5
Hemerocallis fulva	orange daylily	42943	11814	White, R., Pyne, M., and Flokstra, B.	Oak woods.	G?
Hieracium gronovii	queendevil	37710	11815	White, R., Nordman, C.	Oak-hickory, white oak phase.	G5
Holcus lanatus	common velvetgrass	41773	11816	White, R., Nordman, C.	Old field.	G?
Houstonia caerulea	azure bluets	35038	11817	White, R., Pyne, M.	Old field.	G5
Huperzia lucidula	shining clubmoss	503079	11818	White, R., Pyne, M., Flokstra, B.	Liriodendron tulipifera - Acer rubrum - Quercus spp. Forest	G5
Hypericum perforatum	common St.	21454	11819	White, R., Pyne, M.	Old field.	G?

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
	Johnswort					
Hypericum punctatum	spotted St. Johnswort	21422	11820	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Hypericum stragulum	St. Andrew's Cross	515018	11821	White, R., Pyne, M., and Flokstra, B.	Oak forest	?
Ilex crenata	Japanese holly	503156	11822	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G?
Ilex opaca	american holly	27982	11823	White, R., Pyne, M.	Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum Forest	G5
Impatiens capensis	jewelweed	29182	11824	White, R., Pyne, M., and Flokstra, B.	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. triphyllum Forest	G5
Ipomoea pandurata	bigroot morningglory	30786	11825	White, R., Pyne, M.	Old field.	G5
Iris germanica	German iris	43207	11826	White, R., Pyne, M.	Old field.	G?
Juncus effusus	common rush	39232	11827	White, R., Pyne, M., and Flokstra, B.	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum Forest	G5
Juncus effusus	common rush	39232	11828	White, R., Pyne, M.	Pine woods.	G5
Juncus tenuis	poverty rush	39243	11829	White, R., Pyne, M., and Flokstra, B.	White oak forest	G5
Kummerowia striata	Japanese clover	503294	11830	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G?

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Kyllinga brevifolia	shortleaf spikesedge	503295	11831	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Lactuca floridana	woodland lettuce	36599	11832	Pyne, M.	Mesic slope and floodplain.	G5
Lamium amplexicaule	henbit deadnettle	32539	11833	White, R., Pyne, M., and Flokstra, B.	White oak forest	G?
Leersia virginicus	white grass	40890	11979	White, R.	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. triphyllum Forest	G5
Lepidium virginicum	Virginia pepperweed	22955	11834	White, R., Nordman, C.	Oak-hickory, white oak phase.	G5
Lespedeza cuneata	Chinese lespedeza	25898	11835	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G?
Lespedeza frutescens	shrubby lespedeza	515841	11836	White, R., Pyne, M.	Old field.	G5
Lespedeza hirta	hairy lespedeza	25900	11837	White, R., Pyne, M., and Flokstra, B.	Oak forest	G5
Leucanthemum vulgare	oxeyedaisy	37903	11838	White, R., Nordman, C.	Old field.	G?
Ligustrum japonicum	Japanese privet	503449	11840	White, R.	Oak-hickory forest.	G?
Ligustrum japonicum	Japanese privet	503449	11839	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G?
Lilium michauxii	Carolina lily	42741	11978	White, R., Pyne, M., Flockstra, B.	Oak Forest	G4G5
Lindera benzoin	northern spicebush	18147	11841	Pyne, M.	Mesic slope and floodplain.	G5
Liriope spicatum	creeping lilyturf	503502	11842	White, R.		G?

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Lobelia cardinalis	cardinalflower	34505	11843	White, R., Pyne, M., and Flokstra, B.	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. triphyllum Forest	G5
Lobelia inflata	Indian tobacco	34524	11844	White, R., Pyne, M., and Flokstra, B.	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. triphyllum Forest	G5
Lobelia puberula	downy lobelia	34529	11845	White, R., Pyne, M.	Old field	G5
Lolium perenne ssp. multiflorum	perennial rye grass	524260	11846	White, R.		G?T?
Lonicera fragrantissima	January jasmine	35293	11847	White, R., Nordman, C.	Successional Pine community	G?
Lonicera fragrantissima	January jasmine	35293	11848	White, R., Nordman, C.	Successional Pine community	G?
Lonicera sempervirens var. sempervirens	trumpet honeysuckle	528900	11849	White, R., Pyne, M., and Flokstra, B.	Oak woods.	G5T5
Ludwigia palustris	marsh seedbox	27336	11850	White, R., Pyne, M., and Flokstra, B.	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. triphyllum Forest	G5
Lycopus virginicus	Virginia waterhorehound	32255	11853	White, R., Pyne, M., and Flokstra, B.	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. triphyllum Forest	G5
Lycopus virginicus	Virginia waterhorehound	32255	11854	White, R., Nordman, C.	Tulip poplar dominated bottomland	G5
Lysimachia quadrifolia	whorled yellow loosestrife	23997	11855	White, R., Nordman, C.	Oak-hickory, white oak phase.	G5
Mahonia bealei	Beale's Oregon-grape	18846	11856	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G?

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Maianthemum racemosum	Solomon's plume	503655	11858	White, R., Pyne, M., and Flokstra, B.	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. triphyllum Forest	G5
Maianthemum racemosum	Solomon's plume	503655	11857	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Malus pumila	paradise apple	25262	11860	White, R.	Oak-hickory forest.	G5
Malus pumila	paradise apple	25262	11859	White, R., Pyne, M.	Pine woods.	G5
Melilotus officinalis	yellow sweetclover	26150	11861	White, R., Pyne, M.	Old field.	G?
Modiola caroliniana	Carolina modiola	21851	11862	White, R., Pyne, M., and Flokstra, B.	White oak forest	G5
Muhlenbergia schreberi	nimblewill muhly	41939	11863	White, R., Pyne, M., and Flokstra, B.	White oak forest	G5
Nandina domestica	nandina	18848	11864	White, R., Pyne, M., Flokstra, B.	Liriodendron tulipifera - Acer rubrum - Quercus spp. Forest	G?
Narcissus	daffodil	500435	11865	White, R., Pyne, M., Flokstra, B.	Oak woods and roadside.	G?
Onoclea sensibilis	sensitive fern	17637	11866	White, R., Pyne, M., and Flokstra, B.	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. triphyllum Forest	G5
Ornithogalum umbellatum	Star-of-Bethlehem	42754	11867	White, R.	Oak-hickory forest.	?
Oxalis stricta	sourgrass	29095	11868	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Packera anonyma	Small's ragwort	518137	11869	White, R., Pyne, M.	Old field.	G5

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Panicum anceps	beaked panicum	40904	11870	White, R., Pyne, M.	Old field.	G5
Parthenocissus quinquefolia	Virginia creeper	28602	11871	White, R., Pyne, M., and Flokstra, B.	White oak forest	G5
Paspalum pubiflorum	hairyseed paspalum	40994	11872	White, R., Pyne, M., and Flokstra, B.	White oak forest	G5
Paspalum pubiflorum	hairyseed paspalum	40994	11873	White, R., Pyne, M.	Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum Forest	G5
Passiflora incarnata	purple passionflower	504139	11875	White, R., Nordman, C.	Old field.	G5
Passiflora incarnata	purple passionflower	504139	11874	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Passiflora lutea	yellow passionflower	22226	11876	White, R., Pyne, M.	Old field	G5
Penstemon australis	Eustis Lake beardtongue	33823	11879	White, R., Pyne, M.	Old field.	G5
Persicaria virginiana	jumpseed	20931	11880	Pyne, M.	Mesic slope and floodplain.	G5
Philadelphus inodorus	scentless mock orange	24429	11881	White, R., Nordman, C.	Successional Pine community	G4G5
Phoradendron leucarpum	mistletoe	504341	11882	White, R.	Oak-hickory forest.	G5
Photinia villosa	redtip	504347	11883	White, R., Pyne, M.	Old field.	G?
Phryma leptostachya	American lopseed	504348	11884	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5

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Physalis heterophylla	clammy groundcherry	30601	11885	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Phytolacca americana	American pokeweed	19523	11886	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Pilea pumila	Canadian clearweed	19130	11887	White, R., Pyne, M., and Flokstra, B.	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. triphyllum Forest	G5
Plantago lanceolata	narrowleaf plantain	32874	11888	White, R., Nordman, C.	Oak-hickory, white oak phase.	G5
Plantago rugelii	blackseed plantain	504439	11889	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Plantago rugelii	blackseed plantain	504439	11890	White, R., Pyne, M.		G5
Poa annua	annual bluegrass	41107	11891	White, R., Nordman, C.	Old field	G?
Poa autumnalis	autumn bluegrass	41111	11892	White, R., Nordman, C.	Tulip poplar dominated bottomland	G5
Podophyllum peltatum	mayapple	18850	11893	White, R.	Beech forest.	G5
Polygonatum biflorum	Solomon's seal	43006	11894	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Polygonum caespitosum	oriental ladysthumb	20852	11895	White, R., Pyne, M., and Flokstra, B.	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. triphyllum Forest	?
Polygonum caespitosum	oriental ladysthumb	20852	11896	White, R., Pyne, M.		?

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Polygonum punctatum	dotted smartweed	20862	11897	White, R., Pyne, M., and Flokstra, B.	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. triphyllum Forest	G5
Polygonum sagittatum	arrowleaf tearthumb	20863	11898	White, R., Pyne, M., and Flokstra, B.	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. triphyllum Forest	G5
Polystichum acrostichoides	Christmas fern	17675	11899	White, R., Pyne, M., Flokstra, B.	Liriodendron tulipifera - Acer rubrum - Quercus spp. Forest	G5
Potentilla canadensis var. canadensis	dwarf cinquefoil	529812	11900	White, R., Pyne, M.	Pine woods.	G5T?
Prenanthes	rattlesnakeroot	38268	11903	White, R., Pyne, M., Flokstra, B.	Liriodendron tulipifera - Acer rubrum - Quercus spp. Forest	?
Prenanthes altissima	tall rattlesnakeroot	38273	11901	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5?
Prenanthes serpentaria	cankerweed	38286	11902	White, R., Pyne, M.	Old field.	G5
Prunella vulgaris	common selfheal	32381	11904	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Prunus avium	sweet cherry	24770	11906	White, R.	Virginia pine successional forest.	G?
Prunus avium	sweet cherry	24770	11905	White, R., Pyne, M., and Flokstra, B.	White oak forest	G?
Prunus cerasus	sour cherry	24773	11907	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G?
Pycnanthemum incanum	hoary mountainmint	32662	11877	White, R., Pyne, M.	Old field.	G5

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Pycnanthemum tenuifolium	narrowleaf mountainmint	32668	11878	White, R., Pyne, M.	Old field.	G5
Quercus hemisphaerica	Darlington oak	195108	11908	White, R., Pyne, M., Flokstra, B.	Liriodendron tulipifera - Acer rubrum - Quercus spp. Forest	G5
Ranunculus abortivus	littleleaf buttercup	18559	11909	White, R., Pyne, M., and Flokstra, B.	White oak forest	G5
Ranunculus bulbosus	bulbous buttercup	18594	11910	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G?
Rhododendron maximum	rosebay rhododendron	23721	11911	White, R., Pyne, M.	Old field	G5
Robinia pseudoacacia	black locust	504804	11912	White, R., Pyne, M.	Old field	G5
Rubus argutus	sawtooth blackberry	24877	11913	White, R., Nordman, C.	Oak-hickory, white oak phase.	G5
Rubus flagellaris	northern dewberry	24921	11914	White, R., Pyne, M., Flokstra, B.	Liriodendron tulipifera - Acer rubrum - Quercus spp. Forest	G5
Rubus flagellaris	northern dewberry	24921	11976	White, R., Pyne, M., and Flokstra, B.	White oak forest	G5
Rubus occidentalis	black raspberry	24854	11915	White, R., Pyne, M., and Flokstra, B.	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. triphyllum Forest	G5
Rudbeckia fulgida	orange coneflower	36770	11917	White, R., Pyne, M.	Old field	G5
Ruellia caroliniensis	Carolina wild petunia	34373	11918	White, R., Pyne, M.	Old field.	G5
Rumex obtusifolius	bitter dock	20939	11920	White, R., Pyne, M., and Flokstra, B.	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. triphyllum Forest	G?

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Rumex obtusifolius	bitter dock	20939	11919	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G?
Sagittaria latifolia	broadleaf arrowhead	38908	11921	White, R., Pyne, M., and Flokstra, B.	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. triphyllum Forest	G5
Salvia lyrata	lyreleaf sage	32690	11922	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Sambucus canadensis	american elder	35317	11923	White, R., Pyne, M., and Flokstra, B.	White oak forest	G5
Sanguinaria canadensis	bloodroot	18990	11924	White, R.	Oak woods.	G5
Sanguinaria canadensis	bloodroot	18990	11925	White, R., Pyne, M., and Flokstra, B.	Oak woods.	G5
Sanicula canadensis var. canadensis	Canadian blacksnakeroot	530236	11926	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5T5
Sanicula smallii	Small's blacksnakeroot	29860	11927	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Sassafras albidum	sassafras	18158	11928	White, R., Pyne, M., Flokstra, B.	Liriodendron tulipifera - Acer rubrum - Quercus spp. Forest	G5
Schizachyrium scoparium	little bluestem	42076	11929	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Scutellaria elliptica	hairy skullcap	32796	11930	White, R., Nordman, C.	Oak-hickory, white oak phase.	G5
Scutellaria integrifolia	helmet flower	32801	11931	White, R., Pyne, M.	Old field.	G5

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Scutellaria lateriflora	blue skullcap	32765	11932	White, R., Pyne, M., and Flokstra, B.	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. triphyllum Forest	G5
Pennisetum glaucum	pearl millet	565385	11933	White, R., Pyne, M.	Old field.	G5
Sisyrinchium mucronatum	needle-tip blue-eyed-grass	43239	11935	White, R., Nordman, C.	Oak-hickory, white oak phase.	G5
Smilax bona-nox	saw greenbrier	43341	11936	White, R., Pyne, M., Flokstra, B.	Liriodendron tulipifera - Acer rubrum - Quercus spp. Forest	G5
Smilax glauca	cat greenbrier	43342	11937	White, R., Pyne, M., and Flokstra, B.	Oak woods.	G5
Smilax herbacea	smooth carrionflower	43356	11938	Pyne, M.	Mesic slope and floodplain.	G5
Solanum carolinense	Carolina horsenettle	30413	11940	White, R., Nordman, C.	Old field.	G5
Solanum carolinense	Carolina horsenettle	30413	11939	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Solidago arguta	Atlantic goldenrod	36230	11941	White, R., Pyne, M., and Flokstra, B.	Oak woods.	G5
Solidago caesia	wreath goldenrod	36238	11947	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Solidago canadensis	Canada goldenrod	36224	11942	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Solidago erecta	slender goldenrod	36252	11943	White, R., Pyne, M., and Flokstra, B.	Oak forest	G5

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Solidago nemoralis	gray goldenrod	36281	11944	White, R., Pyne, M.	Old field.	G5
Solidago pinetorum	Small's goldenrod	36290	11945	White, R., Pyne, M.	Old field.	G5
Solidago speciosa	showy goldenrod	36310	11946	White, R., Pyne, M.	Old field	G5
Sorghum halepense	Johnsongrass	42111	11948	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G?
Spiraea prunifolia	bridalwreath spirea	25337	11949	Nordman, C.	Liriodendron tulipifera - Acer rubrum - Quercus spp. Forest	G5
Stellaria media	common chickweed	20169	11951	White, R., Pyne, M., and Flokstra, B.	White oak forest	G?
Stellaria media	common chickweed	20169	11950	White, R., Pyne, M.	Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum Forest	G?
Symphyotrichum dumosum	rice button aster	522200	11952	White, R., Pyne, M.	Old field.	G5
Taraxacum officinale	common dandelion	36213	11953	White, R., Pyne, M., and Flokstra, B.	White oak forest	G5
Tipularia discolor	crippled cranefly	43703	11954	White, R., Pyne, M., Flokstra, B.	Oak woods and roadside.	G4G5
Tipularia discolor	crippled cranefly	43703	11955	White, R., Pyne, M., and Flokstra, B.	Oak woods.	G4G5
Tridens flavus	Tall redtop	42227	11956	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Trifolium pratense	red clover	26313	11957	White, R., Pyne, M.	Old field.	G?
Trifolium repens	white clover	26206	11958	White, R., Nordman, C.	Oak-hickory, white oak phase.	G?

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Tripsacum dactyloides	eastern gramagrass	41287	11959	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Ulmus americana	American elm	19049	11960	White, R., Pyne, M.	Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum Forest	G5?
Uvularia perfoliata	perfoliate bellwort	43110	11961	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Vaccinium stamineum var. candicans	deerberry	541559	11962	White, R., Pyne, M., Flokstra, B.	Liriodendron tulipifera - Acer rubrum - Quercus spp. Forest	G5
Vernonia noveboracensis	New York ironweed	38644	11964	White, R., Pyne, M.	Old field.	G5
Vernonia noveboracensis	New York ironweed	38644	11963	White, R., Pyne, M., and Flokstra, B.	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. triphyllum Forest	G5
Veronica hederifolia	ivyleaf speedwell	33418	11965	White, R., Pyne, M., and Flokstra, B.	White oak forest	G?
Viburnum acerifolium	mapleleaf viburnum	35255	11966	White, R., Pyne, M., and Flokstra, B.	Oak woods.	G5
Viburnum dentatum	arrow-wood viburnum	35251	11967	White, R., Pyne, M., and Flokstra, B.	White oak forest	G5
Viburnum dilatatum	linden arrowwood	505677	11977	White, R., Pyne, M.	Near developed site	G?
Viburnum setigerum	tea viburnum	565596	11968	White, R., Pyne, M.	Old field	G?
Vicia angustifolia	garden vetch	26330	11969	White, R., Pyne, M.	Old field	G?

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Viola sororia	common blue violet	22169	11971	White, R., Pyne, M., and Flokstra, B.	White oak forest	G5
Viola sororia	common blue violet	22169	11970	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Vitis aestivalis	summer grape	28607	11972	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Vitis vulpina	fox grape	28610	11974	White, R., Nordman, C.	Oak-hickory, white oak phase.	G5
Vitis vulpina	fox grape	28610	11973	White, R., Pyne, M.	Successional Liriodendron - Liquidambar - Pinus virginiana forest.	G5
Woodwardia areolata	netted chainfern	17749	11975	White, R., Pyne, M., and Flokstra, B.	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. triphyllum Forest	G5

Table 4. Tables of vascular plant diversity measures and species total estimates

	Diversity Measures			
	N	alpha	beta	Gamma
Gridded plots only	8	74.9	3.5	260
Plots off grid only	5	54.8	2.6	142
All plots	13	67.1	4.4	293
Total for park				346

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 519 species confirmed)
First-order jackknife estimate (all plots)	403.6	86%
Second-order jackknife estimate (all plots)	457.2	76%
First-order jackknife estimate (gridded plots)	376.4	92%
Second-order jackknife estimate (gridded plots)	442.7	78%

Table 5. Association numbers, plot numbers, and global ranks of all associations identified at Guilford Courthouse National Military Park.

CEGL #	System (Ecogroup)	Ecological Associations (Scientific name)	Ecological Associations (Name #2)	Ecological Associations (Name #3)	Plots	Global Rank
2591	Semi-natural Wooded Uplands	Pinus virginiana Successional Forest	Virginia Pine Successional Forest	Virginia Pine Successional Forest	16 (in part)	GC
6327	Semi-natural Wooded Uplands	Pinus echinata Early Successional Forest	Shortleaf Pine Early Successional Forest	Shortleaf Pine Early Successional Forest	16 (in part)	GC
8462	Semi-natural Wooded Uplands	Pinus taeda - Liquidambar styraciflua Semi-natural Forest	Loblolly Pine - Sweetgum Semi-natural Forest	Successional Loblolly Pine - Sweetgum Forest	11	GM
8465	Appalachian Highlands Mesic Acid Hardwoods Forest	Fagus grandifolia - Quercus rubra / Cornus florida / Polystichum acrostichoides - Hexastylis virginica Forest	American Beech - Northern Red Oak / Flowering Dogwood / Christmas Fern - Virginia Heartleaf Forest	Acidic Piedmont Mesic Mixed Hardwood Forest	12	G3G4
7221	Semi-natural Wooded Uplands	Liriodendron tulipifera - Acer rubrum - Quercus spp. Forest	Tuliptree - Red Maple - Oak species Forest	Successional Tuliptree - Hardwood Forest	3, 5, 8, 15	GM
8475	Appalachian Highlands Dry-Mesic Oak Forests and Woodlands	Quercus alba - Quercus (rubra, coccinea) - Carya (alba, glabra) / Vaccinium pallidum Piedmont Dry-Mesic Forest	White Oak - (Northern Red Oak, Scarlet Oak) - (Mockernut Hickory, Pignut Hickory) / Hillside Blueberry Piedmont Dry-Mesic Forest	Piedmont Dry-mesic Oak - Hickory Forest	1,10, 14	G5?
7244	Appalachian Highlands Dry-Mesic Oak Forests and Woodlands	Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum Forest	Southern Red Oak - White Oak - Mockernut Hickory / Sourwood / Deerberry Forest	Southern Red Oak - White Oak Forest	2, 4	G4G5
4418	Appalachian Highlands Small Stream Forests	Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum Forest	Sweetgum / Northern Spicebush / Jack-in-the-Pulpit Forest	Piedmont Small Stream Sweetgum Forest	7, 9	G4?
8568	Exotic Species-Dominated Southeastern Wooded	Wisteria sinensis Vine-Shrubland	Wisteria Vine-Shrubland	Wisteria Vineland	13	GM

CEGL #	System (Ecogroup)	Ecological Associations (Scientific name)	Ecological Associations (Name #2)	Ecological Associations (Name #3)	Plots	Global Rank
	Uplands					
4732	Semi-Natural Wooded Uplands	Rubus (argutus, trivialis) – Smilax (glauca, rotundifolia) Shrubland	(Southern Blackberry, Southern Dewberry) – (Whiteleaf Greenbrier, Common Greenbrier) Shurbland	Blackberry – Greenbrier Successional Shrubland Thicket	6, in part	GC
4048	Exotic Species Dominated Herbaceous Upland Vegetation	Lolium (arundinaceum, pratense) Herbaceous Vegetation	(Tall Fescue, Meadow Fescue) Herbaceous Vegetation	Cultivated meadow	6	GW

Key to Global Ranks:

G1 = Critically imperiled
G2 = Imperiled
G3 = Rare or uncommon (vulnerable)
G4 = Apparently secure
G5 = Secure
GC = Cultural (planted/modified)
GW= Weedy (i.e. dominated by exotics)
GM= Modified

Table 6. Plot photo names and photo descriptions

Photo file name	Date taken	Description of photo
Plot1a.jpg	9/25/2001	Plot 1
Plot1b.jpg	9/25/2001	Plot 1
Plot 2a.jpg	9/26/2001	Plot 2
Plot 2b.jpg	9/26/2001	Plot 2
Plot 3a.jpg	9/25/2001	Plot 3
Plot3b.jpg	9/25/2001	Plot 3
Plot4.jpg	9/27/2001	Plot 4
Plot5a.jpg	9/25/2001	Plot 5
Plot5b.jpg	9/25/2001	Plot 5
Plot6a.jpg	9/26/2001	Plot 6
Plot6b.jpg	9/26/2001	Plot 6
Plot7a.jpg	9/27/2001	Plot 7
Plot7b.jpg	9/27/2001	Plot 7
Plot7c.jpg	9/27/2001	Plot 7
Plot8a.jpg	9/24/2001	Plot 8
Plot8b.jpg	9/24/2001	Plot 8
Plot9.jpg	9/26/2001	Plot 9
Plot9a.jpg	9/26/2001	Plot 9
Plot10a.jpg	9/27/2001	Plot 10
Plot11a.jpg	9/28/2001	Plot 11
Plot11b.jpg	9/28/2001	Plot 11
Plot11c.jpg	9/28/2001	Plot 11
Plot12.jpg	9/26/2001	Plot 12
Plot12b.jpg	9/26/2001	Plot 12
Plot12c.jpg	9/26/2001	Plot 12
Plot13a.jpg	9/25/2001	Plot 13
Plot13b.jpg	9/25/2001	Plot 13
Plot13c.jpg	9/25/2001	Plot 13
Plot13d.jpg	9/25/2001	Plot 13
Plot13e.jpg	9/25/2001	Plot 13
Spiranthesovalis1.jpg	Summer 2001	Spiranthes ovalis in bloom
Spiranthesovalis2.jpg	Summer 2001	Spiranthes ovalis in bloom
Spiranthesovalis3.jpg	Summer 2001	Spiranthes ovalis in bloom
Spiranthesovalis4.jpg	Summer 2001	Spiranthes ovalis in bloom
BethFlokstra.jpg	Sep-01	Volunteer Beth Flokstra pressing plants
Liliummichauxii1.jpg	Sep-01	Lilium michauxii
Liliummichauxii2.jpg	Sep-01	Lilium michauxii
MiloPyne.jpg	Sep-01	Milo Pyne pressing plants

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

Provisional community name_____

*Classified community name*_____

Classifyer _____ Date_____ NVC ElCODE_____

Survey date:_____ Surveyor initials:_____

Directions to plot:

Tagged tree is a _____ of _____ cm dbh with tag #_____. Conduit is at a bearing of ____ degrees and ____ m from tree.

Directions to tag tree (including any notes on best access route):

Time taken to walk to plot:_____

PLOT CONFIGURATION (Depict the plot layout with respect to the 1 hectare and attempt to draw in conduit, points where GPS positions were collected, witness trees, locations of pictures taken, and sketches of all communities within the 1 hectare!)

Plot representativeness -Is the 1 hectare all the same? ____YES ____ NO - If not, depict in circle below)

20 x 50 Meter plot

1 ha circle

Est. Extent of occurrence of community:

<1HA 1-10 HA 10-100HA >100HA

PIC #_____ **Description of pic(s):**_____

Select one: UTM OR Lat/long (If lat/long, then values are _____ N _____ W

GPS Techniques/Equipment _Garmin GPS III Plus__ **Datum(pick one)** __NAD 83_OR_NAD27___ Zone:__16__OR__17__

GPS Unit ID _____ **GPS file name** ___ ___ ___ ___ ___ ___ (standard = First letter of park + # of plot (C04)

Field UTM X ___ ___ ___ ___ ___ ___ m E Y ___ ___ ___ ___ ___ ___ ___ m N Elevation _____ m / ft

Averaging performed (at least 120 observations)? _____ Coordinate accuracy _____ m / ft DOP _____ # sats _____

ENVIRONMENTAL / SITE INFORMATION

Measured Slope _____ ° _____ %
__ Flat 0 ° 0 %
__ Gentle 0-5 ° 1-9%
__ Moderate 6-14 ° 10-25%
at steep 15-25 ° 26-49%
__ Steep 27-45 ° 50-100%
__ Very steep 45-69 ° 101-275%
__ Abrupt 70-100 ° 276-300
__ ovrhng/shltrd >100 ° >300%

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

Topographic Postion
_ Interfluve (Ridge/summit/crest) __ Toeslope
__ High Slope (upper/convex slope)
__ Midslope __ Low level (terrace)
__ Lowslope (lower/footslope) __ Channel bed

Cowardin System
_ *Upland* _ *Palustrine*
_ *Estuarine* _ *Lacustrine* _ *Riverine*

Landform (check most applicable)
__ Alluvial flat
__ Alluvial terrace
__ Bald
__ Bank
__ Bar
__ Bench
__ Bottomlands
__ Cliff
__ Cove
__ Depression
__ Draw
__ Exogenous dome
__ Floodplain
__ Gap
__ Gorge
__ Hillslope bedrock outcrop
__ Midslope
__ Nose slope
__ Ridge
__ Ridgetop bedrock outcrop
__ Saddle
__ Seep
__ Toe slope
__ Slope
__ Streambed
__ Streamhead
__ Periglacial boulderfield
__ Ravine

Rock types present:

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

QUALITATIVE ASSESSMENT:

A) HYDROLOGY:

B) LANDSCAPE AND LANDUSE HISTORY (including disturbance history and possible threats to sustainability):

Soil Texture:
__ Sand __ Peat __ Silt loam __Muck
__ Sandy loam __ Loam __ Clay loam __Clay

Drainage:
__ Rapidly drained __ Moderately well drained __Somewhat poorly drained
__ Well drained __ Poorly drained __ *Very poorly drained*

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

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

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

Natural and Anthropogenic Disturbance
_ logging _ fire _ Hydrologic
_ erosion _ trails/roads _ Agriculture
_ grazing/browsing _ wind/ice damage_ Old Growth
_ pine bark beetle _ exotic plants _ Fire Suppression
_ dogwood anthr _ ORV

Disturbance and animal use comments:

QUANTITATIVE VEGETATION SAMPLE

STRATA	STRATA **HEIGHT**	COVER	DOMINANT/DIAGNOSTIC SPECIES	**Height scale**	**Cover clsta**
Emergent T1				**01** < .5m	**5%**
Tree Canopy				**02** .5-1m	**10%**
Understory T3				**03** 1-2m	**20%**
Tall shrub S1				**04** 2-5m	**30%**
Short shrub				**05** 5-10m	**40%**
Herbaceous				**06** 10-15m	**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 COMPOSITION AND COVER/ABUNDANCE CLASS BY STRATUM (enter cover values for each stratum AND for Total cover)

T 1	T 2	T 3	S 1	S 2	H	N	V	E	Total Cover	Name (7 letter code or full name)	Collected? Spec #?	Discar ded ?

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	T 3	S 1	S 2	H	N	V	E	Total cover	Name (7 letter acronym or full name)	Collected? Spec #?	Discarded?

Use bottom of this sheet or additIonal pages for other species in 1 ha plot

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 Guilford Courthouse National Military Park.

NATIONAL VEGETATION CLASSIFICATION:

TERRESTRIAL VEGETATION OF THE UNITED STATES

Guilford Courthouse National Military Park

Report from
Biological Conservation Datasystem
July, 2003

by

NatureServe
1101 Wilson Blvd., 15th floor
Arlington, VA 22209

This subset of the National Vegetation Classification (NVC) covers vegetation alliances and associations attributed to Guilford Courthouse National Military Park**.** This community classification has been developed in consultation with many individuals and agencies and incorporates information from a variety of publications and other classifications. A fully searchable and periodically updated on-line source for the ICEC is at http://www.natureserveexplorer.org. Comments and suggestions regarding the contents of this subset should be directed to Rickie White at the Southern regional office of NatureServe in Durham, North Carolina.

NatureServe

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

I.A. Evergreen forest

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.

Dynamics: 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. 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

USFS Ecoregions: 221Db:CCC, 221Ha:CCP, 221Hc:CCC, 221He:CCC, 221Jb:CCC, 221Jc:CCP, 222A:CC, 222Ej:CPP, 222En:CP?, 222Eo:CPP, 222Hc:CCC, 231Aa:CCC, 231Ab:CCP, 231Ac:CCP, 231Ad:CC?, 231Ae:CCC, 231Ag:CCP, 231Ah:CCP, 231Ai:CCP, 231Aj:CCP, 231Ak:CCP, 231Al:CCC, 231Am:CCP, 231An:CCP, 231Ao:CCP, 231Ap:CCP, 231Bb:CPP, 231Bc:CPP, 231Bd:CPP, 231Be:CPP, 231Bg:CP?, 231Bk:CP?, 231Ca:C??, 231Da:CP?, 231Dc:CPP, 231Ea:CCC, 231Ef:CCC, 231Ej:CCC, 231Fa:CPP, 231Ga:CCC, 231Gb:CCC, 231Gc:CCC, 232Ba:CCC, 232Bb:CCP, 232Bd:CC?, 232Bj:CC?, 232Bk:CC?, 232Bm:CCC, 232Fe:CCC, 234Ab:CCC, M221A:CC, M221B:C?, M221Ca:CC?, M221Cd:CCP, M221Ce:CCC, M221Dc:CCC, M221Dd:CCC, M222A:CC, M231Aa:CCP, M231Ab:CCC, M231Ac:CCC

Federal Lands: DOD (Camp Robinson); NPS (Buffalo, Great Smoky Mountains?, Guilford Courthouse, 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, SCS **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

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 which 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

Guilford Courthouse National Military Park Environment: Pine dominated communities within Guilford Courthouse National Military Park are all semi-natural forests occurring in areas that were formerly cultivated or open parkland and that have been allowed to succeed without disturbance. This community occurs in a variety of environments since the composition is dictated more by past disturbance than by moisture regime or exposure. Within the park, it tends to occur in the flat upland areas that were cultivated 30-70 years ago. In at least one example, it occurs alongside a slope with a much older stand of beech and maple. This community may occur on areas of old farmland but areas that may have been less eroded than other stands with the more tolerant *Pinus virginiana* forests.

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

Guilford Courthouse National Military Park Vegetation: Within the park, this community is dominated by *Pinus echinata* or a combination of *Pinus echinata* and *Pinus virginiana*. The understory tends to be heavily dominated by later successional species such as *Liquidambar styraciflua* and *Acer barbatum*. There are very few herbs but there exists a medium to heavy layer of *Lonicera japonica* on the ground.

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.

MOST ABUNDANT SPECIES

Guilford Courthouse National Military Park

Stratum	Species
CANOPY	*Pinus echinata, Pinus virginiana*
SUBCANOPY	*Acer barbatum, Liquidambar styraciflua*

Global

Stratum	Species
CANOPY	*Pinus echinata*

CHARACTERISTIC SPECIES

Guilford Courthouse National Military Park

Stratum	Species
SHRUB	*Lonicera japonica*

Global

Stratum	Species
SHRUB	*Lonicera japonica*

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

Guilford Courthouse National Military Park: Within the park, this community intergrades with CEGL002591, the *Pinus virginiana* successional forest, and there is no clear dividing line between these two community types. The two communities are also hard to distinguish from aerial photographs. On the ground, the rule of thumb should be that a community is considered to be CEGL006327 if it is mostly dominated by *Pinus echinata* and CEGL002591 if it is mostly domianted by *Pinus virginiana* since both communities exist on the same types of areas. In addition, this community may intergrade with CEGL008462, the *Pinus taeda, Liquidambar styraciflua* type. Within the park, this community is a planted type and should be easy to distinguish from the other pine types.

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

Guilford Courthouse National Military Park Range: Within the park, this community occurs in patches in the central part of the park east of the Greene monument, and in patches along the southeastern part of the loop road. It could cover as much as 20% of the park's surface area.

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:C, 53:C, 59:C
USFS Ecoregions: 221J:CC, 222:C, 231A:C, 231E:CP, 231Ga:CCC, 231Gb:CCC, 231Gc:CCC, 232Bm:CCC, M221A:C?, M221B:C?, M221D:CC, M222A:CC
Federal Lands: NPS (Guilford Courthouse); TVA (Tellico); USFS (Chattahoochee, Daniel Boone, Mark Twain, Ozark, Ouachita, St. Francis, Sumter?)

Element Sources

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

I.A. Evergreen forest

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.

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

USFS Ecoregions: 221D:CC, 221Jb:CCC, 222Cb:CCC, 222Dc:CCC, 222Dd:CCC, 222Eb:CCC, 222Ec:CCC, 222Eg:CCC, 231Aa:CCC, 231Ab:CCC, 231Ac:CCC, 231Ad:CCC, 231Ae:CCC, 231Af:CCC, 231Ag:CCC, 231Ah:CCC, 231Ai:CCC, 231Aj:CCC, 231Ak:CCC, 231Al:CCC, 231Am:CCC, 231An:CCC, 231Ao:CCP, 231Ba:CCC, 231Bb:CCP, 231Bc:CCP, 231Bd:CCC, 231Be:CCP, 231Bf:CCP, 231Bg:CCP, 231Bh:CCP, 231Bi:CCP, 231Bj:CCP, 231Bk:CCP, 231Bl:CC?, 231Ca:CCP, 231Cb:CCP, 231Cc:CCP, 231Cd:CCC, 231Ce:CCC, 231Cf:CCC, 231Cg:CCP, 231Da:CCP, 231Dc:CCC, 231De:CC?, 231Ea:CCC, 231Eb:CC?, 231Ec:CC?, 231Ed:CC?, 231Ef:CC?, 231Eg:CCP, 231Eh:CCC, 231Ei:CC?, 231Ej:CC?, 231Ek:CCP, 231En:CC?, 231Fa:CPP, 231Fb:CP?, 232Ac:CCC, 232Ba:CCC, 232Bb:CC?, 232Bc:CC?, 232Bd:CC?, 232Be:CC?, 232Bg:CCC, 232Bh:CC?, 232Bi:CC?, 232Bj:CCC, 232Bk:CC?, 232Bl:CC?, 232Bm:CCC, 232Bn:CC?, 232Bo:CC?, 232Bp:CC?, 232Bq:CCC, 232Br:CCC, 232Bt:CC?, 232Bu:CC?, 232Bv:CC?, 232Bx:CC?, 232Bz:CCC, 232Ca:CCC, 232Cb:CCC, 232Cc:CC?, 232Ce:CCC, 232Cf:CC?, 232Cg:CC?, 232Ci:CC?, 232Da:CC?, 232Dc:CCC, 232Fa:CC?, 232Fb:CC?, 232Fe:CCC, 255Da:PPP, M221D:??

Federal Lands: DOD (Arnold, Fort Benning, Fort Gordon); NPS (Assateague Island, Cape Hatteras, Chickamauga-Chattanooga, Guilford Courthouse, Kennesaw 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, SCS **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 Semi-natural Forest

Loblolly Pine - Sweetgum Semi-natural Forest

Successional Loblolly Pine - Sweetgum Forest

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

Element Concept

GLOBAL SUMMARY: This community type is broadly defined to accommodate upland forests strongly codominated by *Pinus taeda* and *Liquidambar styraciflua*, resulting from past disturbance (such as agricultural or other land clearing) followed by forest succession. Understory composition differs based on edaphic site and on age and history. This broadly defined type occupies a variety of edaphic sites, ranging from mesic through dry-mesic sites on a wide variety of (generally acidic) soils. 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.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Upland

Guilford Courthouse National Military Park Environment: *Pinus taeda* is beyond its natural range at Guilford Courthouse National Military Park. Therefore, this community is most likely the result of direct planting or escape from nearby plantings of *Pinus taeda*. The community in the park only exists on poorly drained soils in the far eastern section of the park. This area has been heavily impacted by agriculture, home building, and the construction of a road blocking drainage. These activities have conspired to produce a very poorly drained, highly compacted soil, so much of the area contains ephemeral pools and smaller than normal pine and sweetgum trees.

Global Environment: Stands of this community type are strongly codominated by *Pinus taeda* and *Liquidambar styraciflua*, resulting from past disturbance followed by forest succession. This type is more influenced by past land-use history than by specific soil differences. However, it tends to occur on poorly drained and low-nutrient soils, especially in areas that were farmed heavily in the past.

VEGETATION DESCRIPTION

Guilford Courthouse National Military Park Vegetation: At Guilford Courthouse, this community is dominated by *Pinus taeda* and *Liquidambar styraciflua* with some additional trees such as *Pinus virginiana* and *Acer rubrum* in the canopy and understory. The shrub and herbaceous layers are dominated by weedy species such as *Microstegium vimineum, Rosa multiflora, Ligustrum sinense*, and *Toxicodendron radicans*. Due to the strange hydrology created by the raod, some wetland plants such as *Ludwigia palustris, Salix nigra*, and *Juncus effusus* exist in patches where water pools.

Global Vegetation: Stands of this community type are strongly codominated by *Pinus taeda* and *Liquidambar styraciflua*. Some other species which may be present in stands of this association include *Quercus phellos, Quercus nigra, Ulmus alata*, and *Prunus serotina*, along with *Vitis rotundifolia, Toxicodendron radicans, Rubus argutus, Eupatorium capillifolium, Eupatorium hyssopifolium, Erigeron strigosus, Solidago gigantea, Ambrosia artemisiifolia*, and the exotics *Lespedeza cuneata* and *Ligustrum sinense*. Examples of this association in low-lying areas may also have a dense herbaceous layer of *Microstegium vimineum*.

Global Dynamics: This is a short-lived forest type, successional following cropping or other land clearing. It generally succeeds with greater age into various oak- and oak-pine-dominated forests.

MOST ABUNDANT SPECIES

Guilford Courthouse National Military Park

Stratum	Species
CANOPY	*Pinus taeda, Liquidambar styraciflua*
SHRUB	*Ligustrum sinense, Lonicera japonica, Vitis rotundifolia*
HERB	*Microstegium vimineum*

Global

Stratum	Species
CANOPY	*Pinus taeda, Liquidambar styraciflua*

CHARACTERISTIC SPECIES

Guilford Courthouse National Military Park

Stratum	Species
CANOPY	*Pinus taeda*

Global

Stratum	Species
CANOPY	*Pinus taeda*

OTHER NOTEWORTHY SPECIES

Guilford Courthouse National Military Park

Stratum	Species
SUBCANOPY	*Prunus avium*

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

- Liriodendron tulipifera - Pinus taeda Forest (CEGL007521)--with greater dominance by *Liriodendron*.
- Pinus taeda / Saccharum alopecuroidum - (Andropogon spp.) Forest (CEGL007109)--a related *Pinus taeda*-dominated type placed in evergreen.

GRank & Reasons: GM (00-10-20). This forest represents early successional or silviculturally managed vegetation and is thus not of conservation concern and does not receive a conservation status rank.

CLASSIFICATION COMMENTS

Guilford Courthouse National Military Park: This community is easily classified since it is the only community type with *Pinus taeda* present in the park.

Global Classif Comments: This community likely occurs along the northern periphery of the Gulf Coast Prairies and Marshes Ecoregion of eastern Texas.

Element Distribution

Guilford Courthouse National Military Park Range: The community occurs only in a series of low-lying areas on the far eastern part of the park.

Global Range: This altered forest type is widespread in the lowland portions of the southeastern United States, particularly on the Coastal Plain, but also on adjacent inland provinces.

Nations: US
States/Provinces: AL:S?, AR:S?, GA:S?, LA:S?, MS:S?, NC:S?, OK:S?, SC:S?, TX:S?, VA:S?
TNC Ecoregions: 31:P, 39:C, 40:C, 41:C, 43:C, 52:C, 53:C, 56:C, 57:C
USFS Ecoregions: 231Aa:CCC, 231Ab:CCC, 231Ac:CCC, 231Ad:CCC, 231Ae:CCC, 231Af:CCC, 231Fa:CPP, 232Bm:CCC, 232F:CC, 255Da:PPP
Federal Lands: DOD (Fort Benning?); NPS (Guilford Courthouse, Ninety Six); USFS (Angelina, Davy Crockett, Kisatchie, Oconee, Ouachita, Sabine, Sam Houston, Talladega?, Tuskegee?, Uwharrie)

Element Sources

Authors: A.S. Weakley, mod. R. White, SCS **Confidence:** 1 **Identifier:** CEGL008462
REFERENCES (type in full citation below if reference is new): Allard 1990, Eyre 1980, Foti 1994b, Foti et al. 1994, Harcombe and Neaville 1977, Hoagland 2000, NatureServe Ecology - Southeast U.S. unpubl. data, Peet et al. 2002, USFS 1988, Zanoni et al. 1979

I.A.8.N.b.17. PINUS VIRGINIANA FOREST ALLIANCE

Virginia Pine Forest Alliance

I.A. Evergreen forest

Alliance Concept

Summary: This alliance includes forests dominated by *Pinus virginiana* and occurring in the Piedmont from Pennsylvania south to Alabama, and ranging west into the Appalachians, Ridge and Valley, the Cumberland Plateau, and in scattered locales of the Interior Low Plateau. Forests in this alliance may have admixtures of *Pinus taeda, Pinus echinata, Pinus pungens*, and/or *Pinus rigida*. These other species, if present, can have canopy coverage between 1 and 50%. Other associated species vary with the geographic distribution of the alliance. In many associations, a dense ericaceous shrub stratum is typical. This alliance includes both early successional forests resulting from natural or anthropogenic disturbance and natural forests in edaphically extreme situations. Typically, *Pinus virginiana* communities are short-lived as a forest and are more common as woodland communities [see II.C.3.N.a *Pinus (rigida, pungens, virginiana)* - *Quercus prinus* Woodland Alliance (A.677)]. Associated species vary with the geographic distribution of the alliance.

Dynamics: This alliance includes both early successional forests resulting from natural or anthropogenic disturbance and natural forests in edaphically extreme situations. Typically, *Pinus virginiana* communities are short-lived as a forest and are more common as woodland communities [see II.C.3.N.a *Pinus (rigida, pungens, virginiana)* - *Quercus prinus* Woodland Alliance (A.677)].

Alliance Distribution

Range: Forests in this alliance are possible in the Piedmont from Pennsylvania south to Alabama, and ranging west into the Appalachians, Ridge and Valley, the Cumberland Plateau, and in scattered locales of the Interior Low Plateau. The range of the alliance includes parts of Alabama, Delaware, Georgia, Kentucky, New Jersey, North Carolina, South Carolina, Tennessee, Maryland, Pennsylvania, West Virginia, Virginia, Ohio, and Indiana.

Nations: US

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

TNC Ecoregions: 43:C, 44:C, 49:C, 50:C, 51:C, 52:C, 58:P, 59:C, 61:C

USFS Ecoregions: 221D:CC, 221Ec:CCP, 221Ed:CCP, 221Ef:CCP, 221Eg:CCC, 221Ha:CCC, 221Hb:CCC, 221Hc:CCC, 221He:CCC, 221Ja:CCC, 221Jb:CCC, 221Jc:CCC, 222Da:CCC, 222Dc:CCC, 222Dd:CCC, 222Dg:CCC, 222Dj:CCC, 222Eb:CCC, 222Eg:CCC, 222Eh:CCC, 222Ej:CCC, 222El:CCC, 222En:CCC, 222Eo:CCC, 222Fc:CCC, 222Fd:CCC, 222Ff:CCC, 231Aa:CCC, 231Ab:CCC, 231Ac:CCP, 231Ad:CCC, 231Ae:CCC, 231Af:CCP, 231Ag:CCP, 231Ah:CCP, 231Ai:CCP, 231Aj:CCP, 231Ak:CCP, 231Al:CCP, 231Am:CCP, 231An:CCP, 231Ao:CCP, 231Ap:CCP, 231Bc:CCC, 231Ca:CCP, 231Cb:CCP, 231Cc:CCP, 231Cd:CCC, 231Ce:CCP, 231Cf:CCP, 231Cg:CCP, 231Da:CCC, 231Dc:CCC, M221Aa:CCC, M221Ab:CCC, M221Ac:CCC, M221Ba:CC?, M221Bd:CCP, M221Be:CCP, M221Ca:CCP, M221Cb:CCP, M221Cc:CCC, M221Cd:CCC, M221Ce:CCC, M221Da:CCC, M221Db:CCC, M221Dc:CCC, M221Dd:CCC

Federal Lands: DOD (Fort Jackson); NPS (Chickamauga-Chattanooga, Great Smoky Mountains, Guilford Courthouse, Kennesaw Mountain, Kings Mountain, Mammoth Cave, Shiloh); TVA (Tellico); USFS (Bankhead, Chattahoochee, Cherokee, Daniel Boone, George Washington, Jefferson, Land Between the Lakes?, Nantahala, Oconee, Pisgah, Sumter, Talladega, Uwharrie?)

Alliance Sources

Authors: D.J. ALLARD/K.D. PATTERSO, RW, SCS **Identifier:** A.131

References: Allard 1990, Andreu and Tukman 1995, Barden 1977, Burns and Honkala 1990a, Chapman 1957, Cooper 1963, Evans 1991, Eyre 1980, Faber-Langendoen et al. 1996, Frothingham et al. 1926, Gettman 1974, Malter 1977, Nelson 1986, Pyne 1994, Racine 1966, Schafale and Weakley 1990, Whittaker 1956

Pinus virginiana Successional Forest

Virginia Pine Successional Forest

Virginia Pine Successional Forest

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

Element Concept

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

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Upland

Guilford Courthouse National Military Park Environment: Within the park, this community occupies the most heavily degraded old fields within the park. These areas were most likely subject to full canopy removal and heavy erosion before being colonized by ***Pinus virginiana*.** The community occurs in the same vicinity as CEGL006327, the *Pinus echinata* successional forest.

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

VEGETATION DESCRIPTION

Guilford Courthouse National Military Park Vegetation: This community is characterized by the dominance of *Pinus virginiana* in the canopy. The understory and herb layer vary widely, but within the park they generally are sparse with *Acer rubrum* and other later successional species colonizing gaps and areas of pine die-off.

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

Global Dynamics: This is an early successional forest type. Damage from ice storms was the main disturbance observed in these stands in the Tellico Pilot Project study area. In addition, fire and insect infestation are likely damaging agents.

MOST ABUNDANT SPECIES

Guilford Courthouse National Military Park

Stratum	Species
CANOPY	*Pinus virginiana*

Global

Stratum	Species
TREE CANOPY	*Pinus virginiana*
TREE SUB-CANOPY	*Acer rubrum, Cornus florida, Juniperus virginiana, Nyssa sylvatica, Oxydendrum arboreum*
TALL SHRUB	*Cornus florida, Nyssa sylvatica, Oxydendrum arboreum, Vaccinium arboreum, Vaccinium stamineum*
SHORT SHRUB	*Cercis canadensis, Cornus florida, Oxydendrum arboreum, Quercus alba, Sassafras albidum*
HERBACEOUS	*Lonicera japonica, Smilax glauca, Toxicodendron radicans*

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

- Pinus virginiana - Juniperus virginiana var. virginiana - Ulmus alata Forest (CEGL007121)--on more calcareous or circumneutral substrates.

GRank & Reasons: GD (00-06-13). This forest represents early successional vegetation and is thus not of conservation concern.

CLASSIFICATION COMMENTS

Guilford Courthouse National Military Park: This community is sometimes hard to distinguish from CEGL006327. Within the park, CEGL006327 is dominated by *Pinus echinata* and CEGL002591 is dominated by *Pinus virginiana*.

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

Element Distribution

Guilford Courthouse National Military Park Range: This community exists in small patches throughout the eastern half of the park and along New Garden Road as it enters the western part of the park.

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

Nations: US
States/Provinces: AL:S?, GA:S?, IN:S?, KY:S?, MD:S?, NC:S?, NJ:S?, PA:S?, SC:S?, TN:S?, VA:S?, WV:S?
TNC Ecoregions: 50:C, 51:C, 52:C, 58:P, 59:C, 61:C
USFS Ecoregions: 221Ha:CCC, 221Hb:CCC, 221Hc:CCC, 221He:CCC, 221J:CC, 222Ej:CCC, 222En:CCC, 222Eo:CCC, 231Cd:CCC, M221Aa:CCC, M221Ab:CCC, M221Ac:CCC, M221Ca:CCP, M221Cb:CCP, M221Cc:CCP, M221Cd:CCC, M221Ce:CCP, M221Da:CCC, M221Db:CCC, M221Dc:CCC, M221Dd:CCC
Federal Lands: NPS (Great Smoky Mountains, Guilford Courthouse, Shiloh); TVA (Tellico); USFS (Bankhead, Chattahoochee, Cherokee, Daniel Boone, George Washington, Jefferson, Sumter, Uwharrie?)

Element Sources

Guilford Courthouse National Military Park Inventory Notes:
Authors: M. Andreu and M. Tukman, mod. K.D. Patterson, SCS **Confidence:** 1 **Identifier:** CEGL002591
REFERENCES (type in full citation below if reference is new): Allard 1990, Andreu and Tukman 1995, Eyre 1980, Fleming and Coulling 2001, Fleming and Moorhead 2000, Patterson et al. 1999, Pyne 1994

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

I.B.2.N.a.17. FAGUS GRANDIFOLIA - QUERCUS RUBRA - QUERCUS ALBA FOREST ALLIANCE

American Beech - Northern Red Oak - White Oak Forest Alliance

I.B. Deciduous forest

Alliance Concept

Summary: Forests in this alliance occur in non-montane or low-elevation montane mesic situations and are dominated by *Fagus grandifolia* typically with some combination of *Quercus rubra* and/or *Quercus alba*. Associated canopy and subcanopy species can include *Liriodendron tulipifera, Acer saccharum, Magnolia tripetala, Magnolia acuminata* (Ozarks), *Tilia americana var. americana* (Ozarks), *Tilia americana var. heterophylla, Quercus muehlenbergii, Acer rubrum, Cornus florida, Ostrya virginiana, Aesculus sylvatica*, and *Ilex opaca*. Some of these forests, particularly in the Piedmont of South Carolina, the southern Ridge and Valley of Alabama, or in Arkansas, may contain *Acer barbatum* instead of *Acer saccharum*. Shrubs in this alliance include *Vaccinium stamineum, Viburnum rafinesquianum, Euonymus americana*, and, in some occurrences, *Kalmia latifolia*. The herb layer can be relatively lush with such species as *Polystichum acrostichoides, Galium circaezans, Hexastylis arifolia, Hexastylis minor, Desmodium nudiflorum, Erythronium umbilicatum ssp. umbilicatum, Hepatica nobilis var. obtusa, Epifagus virginiana, Tiarella cordifolia var. collina, Trillium* spp., *Heuchera americana, Stellaria pubera, Podophyllum peltatum, Botrychium virginianum*, and others present. These forests often occur on concave and sheltered landforms such as north-facing slopes, low slopes, high terraces along streams, and possibly other situations. The core concept of the range of this alliance includes areas inland from the Coastal Plain, as *Quercus rubra* is absent from large areas of the Coastal Plain (as in North Carolina). Forests in this alliance occur in the Cumberlands and Southern Ridge and Valley, Piedmont and Interior Low Plateau, and on protected slopes and ravines in the Ozarks, central Ouachita Mountains, and Arkansas Valley.

Alliance Distribution

Range: The core concept of the range of this alliance includes areas inland from the Coastal Plain, as *Quercus rubra* is absent from large areas of this region. Forests in this alliance occur in the Cumberlands and Southern Ridge and Valley, Piedmont, and Interior Low Plateau, and on protected slopes and ravines in the Ozarks, central Ouachita Mountains, and Arkansas Valley. This alliance is known from the states of Alabama, Arkansas, Delaware, Georgia, Kentucky, Massachusetts, Maryland, North Carolina, New Jersey, New York, Oklahoma, Pennsylvania, Rhode Island, Tennessee, Virginia, and West Virginia. It may possibly occur in southern Indiana and Connecticut.
Nations: US
States/Provinces: AL AR CT? DE GA IN? KY MA MD NC NJ NY OK PA RI SC TN VA WV
TNC Ecoregions: 38:C, 39:C, 43:C, 44:C, 49:C, 50:C, 51:C, 52:C, 57:C, 58:C, 61:C, 62:C
USFS Ecoregions: 221Ab:CCC, 221Ac:CCC, 221Ad:CCC, 221Ae:CCP, 221Dc:CPP, 221Ea:CCC, 221Ha:CCC, 221Hc:CCP, 221Hd:CCP, 221He:CCC, 221Ja:CCP, 221Jb:CC?, 221Jc:CCP, 222Ab:CCC, 222Ag:CCC, 222An:CCC, 222Cb:CC?, 222Cc:CC?, 222Cd:CC?, 222Ce:CC?, 222Cf:CC?, 222Cg:CC?, 222Da:CCP, 222Db:CCP, 222Dc:CCP, 222Dd:CCP, 222De:CCP, 222Dg:CC?, 222Di:CC?, 222Dj:CC?, 222Ea:CCC, 222Eb:CCC, 222Ec:CC?, 222Ee:CCP, 222Ef:CCP, 222Eg:CCC, 222Eh:CCP, 222Ei:CCP, 222Ej:CCP, 222Ek:CCP, 222Em:CCP, 222En:CCP, 222Eo:CCP, 222F:CC, 231Aa:CCC, 231Ab:CCC, 231Ac:CCC, 231Ad:CCC, 231Ae:CCC, 231Af:CCC, 231Ag:CCC, 231Ah:CCC, 231Ai:CCC, 231Aj:CCC, 231Ak:CCP, 231Am:CCP, 231An:CCC, 231Ao:CCC, 231Ba:C??, 231Bb:C??, 231Be:C??, 231Bg:C??, 231Bh:C??, 231Bi:C??, 231Bk:C??, 231Ca:CCP, 231Cb:CCP, 231Cc:CCP, 231Cd:CCC, 231Ce:CCP, 231Cf:CCP, 231Cg:CCP, 231Da:CCC, 231Db:CCC, 231Dc:CCC, 231Dd:CCC, 231Gb:CCC, 232Aa:CCC, 232Ab:CCC, 232Ac:CCC, 232Ad:CCC, 232Br:CCC, 232Bt:CCC, 232Bx:CCP, 232Bz:CCC, 232C:CC, 234Ab:PPP, M221Dd:CCC, M222Aa:CCC, M222Ab:CCC, M231Aa:CCC, M231Ab:CCC, M231Ac:CCC
Federal Lands: COE (Falls Lake, Jordan Lake, Kerr Reservoir); DOD (Fort Benning); NPS (Buffalo, Guilford Courthouse, Mammoth Cave, Ninety Six, Rock Creek, Shiloh, Thomas Stone); TVA (Tellico); USFS (Bankhead, Chattahoochee, Cherokee?, Conecuh, Daniel Boone, Homochitto, Jefferson?, Land Between the Lakes, Ouachita, Ozark, Sumter, Talladega, Tuskegee, Uwharrie)

Alliance Sources

Authors: D.J. ALLARD, MOD. A.S. WE, RW, SCS **Identifier:** A.229
References: Allard 1990, Ambrose 1990a, Evans 1991, Eyre 1980, Faber-Langendoen et al. 1996, Foti 1994b, Foti et al. 1994, Golden 1979, Jones 1988a, Jones 1988b, Martin and Smith 1991, Pyne 1994, Schafale and Weakley 1990, USFS 1990

Fagus grandifolia - Quercus rubra / Cornus florida / Polystichum acrostichoides - Hexastylis virginica Forest

American Beech - Northern Red Oak / Flowering Dogwood / Christmas Fern - Virginia Heartleaf Forest

Piedmont Acidic Mesic Mixed Hardwood Forest

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

Element Concept

GLOBAL SUMMARY: This association represents the more typical mesic mixed hardwood forest of the Piedmont. The canopy of stands of this association is dominated by mesophytic trees such as *Fagus grandifolia, Quercus rubra, Liriodendron tulipifera, Acer rubrum*, and in the western Piedmont, *Tsuga canadensis*. Typical understory trees include *Cornus florida, Oxydendrum arboreum, Acer rubrum*, and *Ilex opaca*. Shrub species may include *Vaccinium stamineum, Viburnum rafinesquianum, Euonymus americana*, and sometimes *Kalmia latifolia*. The herb layer is often moderately dense and diverse, though it may be sparse under heavy shade. Herb species may include *Polystichum acrostichoides, Viola* spp., *Dichanthelium* spp. (= *Panicum* spp.), *Galium circaezans, Hexastylis arifolia, Hexastylis minor, Desmodium nudiflorum, Erythronium umbilicatum ssp. umbilicatum, Chamaelirium luteum, Epifagus virginiana, Tiarella cordifolia var. collina, Heuchera americana, Stellaria pubera, Podophyllum peltatum, Prenanthes serpentaria, Thalictrum thalictroides, Chrysogonum virginianum var. virginianum, Hepatica nobilis var. obtusa, Thelypteris noveboracensis*, and *Botrychium virginianum*. Exact composition varies locally with position on slope and nature of soil. Western Piedmont sites often have increasing importance of *Tsuga canadensis, Rhododendron* spp., and other species that are more typical of the Southern Blue Ridge.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Upland

Guilford Courthouse National Military Park Environment: Examples of this community at Guilford Courthouse exist on east and north facing relatively steep slopes adjacent to medium sized creeks. These areas are more sheltered than adjacent uplands and also are at a later successional stage since they are not suitable agricultural lands.

Global Environment: Examples of this association predominantly occur on steep but sheltered slopes adjacent to creeks or rivers in the Piedmont. They can occur further upslope, but occurrences are much more likely as one gets closer to streams.

VEGETATION DESCRIPTION

Guilford Courthouse National Military Park Vegetation: Within the park, this community always contains *Fagus grandifolia*, but also contains *Quercus rubra, Quercus alba, Quercus falcata, Acer rubrum*, and *Liriodendron tulipifera*. The understory is typically not very dense but does often contain a fair amount of *Fagus grandifolia* and *Acer rubrum* and very few oaks. The herb layer is generally not very rich, but can contain substantial populations of *Polystichum acrosticoides, Prenanthes spp., Tipularia discolor*, and various spring ephemerals such as *Sanguinaria canadensis*.

Global Vegetation: The canopy of stands of this association is dominated by mesophytic trees such as *Fagus grandifolia, Quercus rubra, Liriodendron tulipifera, Acer rubrum*, and in the western Piedmont, *Tsuga canadensis*. Typical understory trees include *Cornus florida, Oxydendrum arboreum, Acer rubrum*, and *Ilex opaca*. Shrub species may include *Vaccinium stamineum, Viburnum rafinesquianum, Euonymus americana*, and sometimes *Kalmia latifolia*. The herb layer is often moderately dense and diverse, though it may be sparse under heavy shade. Herb species may include *Polystichum acrostichoides, Viola* spp., *Dichanthelium* spp. (= *Panicum* spp.), *Galium circaezans, Hexastylis arifolia, Hexastylis minor, Desmodium nudiflorum, Erythronium umbilicatum ssp. umbilicatum, Chamaelirium luteum, Epifagus virginiana, Tiarella cordifolia var. collina, Heuchera americana, Stellaria pubera, Podophyllum peltatum, Prenanthes serpentaria, Thalictrum thalictroides, Chrysogonum virginianum var. virginianum, Hepatica nobilis var. obtusa, Thelypteris noveboracensis*, and *Botrychium virginianum* (Schafale and Weakley 1990). Exact composition varies locally with position on slope and nature of soil. Western Piedmont sites often have increasing importance of *Tsuga canadensis, Rhododendron* spp., and other species that are more typical of the Southern Blue Ridge.

Global Dynamics: Under natural conditions these forests are uneven-aged, with old trees present. Reproduction occurs primarily in canopy gaps. Rare, severe natural disturbances such as wind storms may allow pulses of

increased regeneration and allow the less shade-tolerant species to remain in the community. However, Skeen, Carter, and Ragsdale (1980) argued that even the shade-intolerant *Liriodendron* could reproduce enough in gaps to persist in the climax Piedmont forests (Schafale and Weakley 1990).

The natural fire regime of the Piedmont is not known but fires certainly occurred periodically. Because Mesic Mixed Hardwood Forests generally occur in moist and topographically sheltered sites, they probably burned only rarely and with low intensity (Schafale and Weakley 1990).

Disturbed areas have increased amounts of pines and weedy hardwoods such as *Liriodendron tulipifera* and *Liquidambar styraciflua*. Many areas have been selectively cut many times and have increased importance of *Fagus grandifolia* and other noncommercial hardwoods relative to oaks (Schafale and Weakley 1990). Other areas that were disturbed in the distant past may be younger and, therefore, may have a higher proportion of oaks with beeches mainly in the understory.

MOST ABUNDANT SPECIES

Guilford Courthouse National Military Park

Stratum	Species
CANOPY	*Fagus grandifolia, Quercus rubra*
SUBCANOPY	*Acer rubrum, Fagus grandifolia*
HERB	*Polystichum acrosticoides*

CHARACTERISTIC SPECIES

Guilford Courthouse National Military Park

Stratum	Species
CANOPY	*Fagus grandifolia*

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

- Fagus grandifolia - Quercus rubra / Ostrya virginiana - Acer (barbatum, leucoderme) / Actaea racemosa - Sanguinaria canadensis Forest (CEGL008466)--the basic Piedmont equivalent.

GRank & Reasons: G3G4 (01-01-18). While not as extensive as the oak-hickory forests, Mesic Mixed Hardwood Forest communities are fairly common. Their occurrence on steep sites has allowed many of them to escape, until recently, with less disturbance than most upland communities (Schafale and Weakley 1990). Some examples with old forest can be found. Selective timbering may have decreased the importance value of more desirable hardwoods (e.g., *Quercus rubra*). Some examples are protected in the Birkhead Mountain Wilderness Area and other parts of the Uwharrie National Forest.

Element Distribution

Guilford Courthouse National Military Park Range: This community exists in the middle of the park on north and east facing steep slopes of the streams.

Global Range: This association is found in the Piedmont of the southeastern United States.

Nations: US
States/Provinces: GA:S?, MD:S?, NC:S?, SC:S?, VA:S?
TNC Ecoregions: 52:C, 58:C
USFS Ecoregions: 231Aa:CCC, 231Ae:CCC
Federal Lands: COE (Falls Lake, Jordan Lake, Kerr Reservoir); NPS (Guilford Courthouse, Ninety Six, Thomas Stone); USFS (Uwharrie)

Element Sources

Guilford Courthouse National Military Park Inventory Notes:
Authors: M.P. Schafale, SCS **Confidence:** **Identifier:** CEGL008465
REFERENCES (type in full citation below if reference is new): Fleming 2001, Fleming et al. 2001, Fleming pers. comm., LeGrand and Dalton 1987, Lea 2002a, Nehmeth 1968, Oosting 1942, Peet and Christensen 1980, Peet et al. 2002, Schafale and Weakley 1990, Skeen et al. 1980

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

Tuliptree Forest Alliance

I.B. Deciduous forest

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.

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 LA MD MS? NC PA SC TN VA WV

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

USFS Ecoregions: 221Ha:CCC, 221Hc:CCC, 221He:CCC, 221Jb:CCC, 222C:CC, 222D:CC, 222Eb:CCC, 222Ed:CCP, 222En:CCC, 222Eo:CCC, 231Aa:CCP, 231Ae:CCC, 231Bc:CCC, 231Cd:CCC, 231Dc:CCC, 232B:CC, 232D:CP, 234Ab:CCC, M221Aa:CCC, M221Ab:CCP, M221Ac:CCC, M221Ad:CCC, M221Bb:CCC, M221Da:CCC, M221Db:CCP, M221Dc:CCC, M221Dd:CCC

Federal Lands: DOD (Arnold, Fort Benning); NPS (Blue Ridge Parkway, Great Smoky Mountains, Guilford Courthouse, Harper's Ferry, Kennesaw Mountain, Kings Mountain, 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, SCS **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. Forest

Tuliptree - 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. 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

Guilford Courthouse National Military Park Environment: This community exists in a variety of habitats ranging from uplands to mesic stream terraces. They occur in areas that were either cropped or clearcut over 50 years ago and often intergrade with successional pine stands in the uplands (CEGL008462 or CEGL002591or CEGL006327) and bottomland stands that were not plowed and contain more *Liquidambar styraciflua* (CEGL004418).

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

Guilford Courthouse National Military Park Vegetation: At Guilford Courthouse, this community is dominated by *Liriodendron tulipifera* but also contains some canopy examples of *Pinus spp., Acer rubrum*, and *Acer barbatum*. The understory may contain saplings of trees such as *Acer spp.* or *Quercus spp.* or may contain smaller trees such as *Cornus florida*. In general, the understory is sparse and dominated by weedy species, especially *Toxicodendron radicans*.

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.

MOST ABUNDANT SPECIES

Guilford Courthouse National Military Park

Stratum	Species
CANOPY	*Lirodendron tulipifera*
SHRUB	*Toxicodendron radicans*

Global

Stratum	Species
CANOPY	*Liriodendron tulipifera*

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.

CLASSIFICATION COMMENTS

Guilford Courthouse National Military Park: This community is distinguished from pine communities by the lack of dominance of pines and by CEGL004418 by the lack of dominance of *Liquidambar styraciflua* and its position away from true bottomlands.

Global Classif Comments: Occurs on the Bankhead National Forest and the Oakmulgee District of the Talladega National Forest.

Element Distribution

Guilford Courthouse National Military Park Range: This community is widespread throughout the park. Occurences are most concentrated in the eastern half of the park.

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
USFS Ecoregions: 221Hc:CCC, 222C:CC, 222D:CC, 222Eb:CCC, 222En:CCC, 222Eo:CCC, 231Aa:CCP, 231Ae:CCC, 231Bc:CCC, 231Cd:CCP, 231Dc:CCC
Federal Lands: DOD (Fort Benning); NPS (Guilford Courthouse, Kennesaw Mountain, Kings Mountain, Shiloh); USFS (Bankhead, Daniel Boone, Oconee?, Talladega)

Element Sources

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

I.B. Deciduous forest

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.

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

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

USFS Ecoregions: 212Fb:CPP, 212Ht:CPP, 212Hx:CPP, 212Jj:C??, 212Ka:CC?, 212Kb:CCC, 212Mb:C??, 212Na:CCP, 212Nb:CC?, 212Nc:CCC, 212Nd:CC?, 221Ad:CCP, 221Ae:CCC, 221Af:CCC, 221Ag:CCC, 221Ah:CCC, 221Ai:CCC, 221Ak:CCC, 221Al:CCC, 221Am:CCC, 221Ba:CCC, 221Bb:CCC, 221Da:CCC, 221Db:CCC, 221Dc:CCC, 221Ea:CCC, 221Ec:CCC, 221Ed:CCP, 221Ef:CCP, 221Eg:CCC, 221Ha:CCC, 221Hb:CCC, 221Hc:CCC, 221Hd:CCC, 221He:CCC, 221Ja:CCP, 221Jb:CCC, 222Aa:CCC, 222Ab:CCC, 222Ac:CCC, 222Ad:CCC, 222Ae:CCC, 222Af:CCC, 222Ag:CCC, 222Ah:CCC, 222Aj:CCC, 222Ak:CCC, 222Al:CCP, 222Am:CCC, 222An:CCC, 222Ao:CCC, 222Ap:CCC, 222Aq:CCC, 222Cb:CCC, 222Cc:CCC, 222Cd:CCC, 222Ce:CCC, 222Cf:CCC, 222Cg:CCC, 222Ch:CCC, 222Da:CCP, 222Db:CCC, 222Dc:CCC, 222Dd:CCP, 222De:CCC, 222Df:CCC, 222Dg:CCP, 222Dh:CCC, 222Di:CCC, 222Dj:CCP, 222Ea:CCC, 222Eb:CCC, 222Ec:CCC, 222Ed:CCC, 222Ee:CCC, 222Ef:CCC, 222Eg:CCC, 222Eh:CCC, 222Ei:CCC, 222Ej:CCP, 222Ek:CCC, 222Em:CCC, 222En:CCC, 222Eo:CCC, 222Fa:CCP, 222Fb:CCC, 222Fd:CCC, 222Fe:CCC, 222Ff:CCC, 222Ga:CCC, 222Gb:CCC, 222Gc:CCC, 222Ha:CCC, 222Hb:CCC, 222Hf:CCC, 222Id:CCP, 222If:CCC, 222Ja:CCC, 222Jb:CCC, 222Jc:CCC, 222Jg:CCC, 222Jh:CCC, 222Ji:CCC, 222Jj:CCC, 222Ke:CCC, 222Kf:CCC, 222Kg:CCC, 222Kh:CCC, 222Kj:CCC, 222Lb:CCC, 222Lc:CCC, 222Le:CCC, 222Lf:CCC, 222Ma:CCC, 222Mb:CCC, 222Mc:CCC, 222Md:CCC, 222Me:CCC, 222Qb:CCC, 231Aa:CCC, 231Ab:CCC, 231Ac:CCC, 231Ad:CCC, 231Ae:CCC, 231Af:CCC, 231Ag:CCC, 231Ah:CCC, 231Ak:CCC, 231Al:CCC, 231Am:CCC, 231An:CCC, 231Ao:CCC, 231Ap:CCC, 231Ba:CCP, 231Bb:CCP, 231Bc:CCP, 231Bd:CCP, 231Be:CCC, 231Bg:CCP, 231Bh:CCP, 231Bk:CCP, 231Ca:CCC, 231Cb:CCC, 231Cc:CCC, 231Cd:CCC, 231Cf:CCC, 231Da:CCC, 231Dc:CCC, 231Dd:CCC, 231De:CCC, 231E:CC, 231Gb:CCC, 232Aa:CCC, 232Ac:CCP, 232Ad:CCC, 232Bq:CCC, 232Br:CCC, 232Bt:CCC, 232Bv:CCC, 232Bx:CCC, 232Ca:CCC, 232Cb:CCC, 234Ac:PPP, 251Aa:CCC, 251Ba:CCC, 251Be:CCC, 251Ca:CC?, 251Cb:CCC,

251Cc:CCC, 251Cd:CCC, 251Ce:CCC, 251Cf:CCC, 251Cg:CCC, 251Ch:CCC, 251Cj:CCC, 251Ck:CCC, 251Cn:CC?, 251Co:CC?, 251Cp:CCC, 251Cq:CCC, 251Dc:CCC, 251Dd:CCC, 251De:CCC, 251Df:CCC, 251Dh:CCP, 251Ea:CCC, M212Bd:CCC, M212Cb:CCC, M212Cc:CCC, M221Aa:CCC, M221Bd:C??, M221Cd:CCC, M221Da:CCC, M221Dc:CCC, M221Dd:CCC, M222Aa:CCC, M222Ab:CCC, M231Aa:CCC, M231Ab:CCC, M231Ac:CCC, M231Ad:CCC

Federal Lands: COE (Dale Hollow?); DOD (Arnold, Fort Benning); DOE (Oak Ridge); NPS (Carl Sandburg Home, Chickamauga-Chattanooga, 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, MCS **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, Wharton 1978

Quercus alba - Quercus (rubra, coccinea) - Carya (alba, glabra) / Vaccinium pallidum Piedmont Dry-Mesic Forest
White Oak - (Northern Red Oak, Scarlet Oak) - (Mockernut Hickory, Pignut Hickory) / Hillside Blueberry Piedmont Dry-Mesic Forest

Dry-Mesic Piedmont Oak - Hickory Forest

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

Element Concept

GLOBAL SUMMARY: This forest is found on submesic to dry-mesic to subxeric upland sites of mid- to upper-slope position with northerly or easterly aspects, or mid to lower slopes with more southerly aspects. In drier landscapes, this type could occupy habitats considered relatively mesic (e.g., concave slopes, lower slopes, shallow ravines). These sites are described as dry to intermediate in soil moisture. The soils are acidic and nutrient-poor, being weathered from felsic metamorphic and sedimentary rocks, or composed of unconsolidated sediments. Stands of this forest are closed to somewhat open, and are dominated by mixtures of oaks and hickories, with *Quercus alba* being most prevalent, along with *Quercus rubra, Quercus coccinea, Quercus velutina, Carya alba, Carya ovalis*, and *Carya glabra*. The *Carya* spp. are common in this type, but often most abundant in the understory. In Virginia examples, *Quercus prinus* is inconstant but sometimes important. In addition, *Pinus* spp., *Liriodendron tulipifera, Liquidambar styraciflua*, and *Acer rubrum* may be common. Understory species include *Acer rubrum, Cornus florida, Oxydendrum arboreum, Ilex opaca*, and *Nyssa sylvatica*. Shrubs include *Vaccinium stamineum, Vaccinium pallidum, Viburnum acerifolium, Viburnum rafinesquianum*, and *Euonymus americana*. In Virginia, *Vaccinium pallidum* is the principal ericad of patchy low-shrub layers, and stands may contain *Calycanthus floridus* (G. Fleming pers. comm. 2001). The woody vines *Vitis rotundifolia* and *Toxicodendron radicans* often are present. Herbs are fairly sparse, with *Hexastylis* spp., *Goodyera pubescens, Chimaphila maculata, Desmodium nudiflorum, Maianthemum racemosum, Polygonatum biflorum, Viola hastata, Tipularia discolor*, and *Hieracium venosum* as some common components (Schafale and Weakley 1990). This association is less nutrient-rich than *Quercus rubra - Quercus alba - Carya glabra / Geranium maculatum* Forest (CEGL007237).

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Upland

Guilford Courthouse National Military Park Environment: At Guilford Courthouse, this community exists in upland areas that have been out of cultivation for more than 80 years. The sites are of intermediate soil moisture and usually have a closed canopy.

Global Environment: The sites on which this vegetation is found are described as `intermediate' in soil moisture (Jones 1988a, 1988b). This association is less nutrient-rich than *Quercus rubra - Quercus alba - Carya glabra / Geranium maculatum* Forest (CEGL007237). Virginia stands occur on submesic to subxeric uplands with acidic, nutrient-poor soils weathered from felsic metamorphic and sedimentary rocks, and unconsolidated sediments. This type frequently occupies somewhat mesic habitats (e.g., concave slopes, lower slopes, shallow ravines) in dry landscapes where Mixed Oak/Heath types are prevalent. It is probably a large-patch or matrix type in some regions (G. Fleming pers. comm. 2001). In North Carolina, this is a matrix type, probably the most common forest type remaining in the Piedmont.

VEGETATION DESCRIPTION

Guilford Courthouse National Military Park Vegetation: This community is generally dominated by *Quercus alba* but may also contain large amounts of *Acer rubrum, Acer barbatum, Carya tomentosa*, and *Quercus rubra*. The understory is usually dominated by *Acer rubrum, Acer barbatum*, and *Cornus florida*. The herbaceous layer ranges from sparse to moderate in coverage and contains such species as *Chimaphila maculata, Dioscorea villosa, Toxicodendron radicans, Maianthemum racemosa*, and other herbs and shrubs associated with Piedmont hardwood forests.

Global Dynamics: Disturbed areas have increased amounts of pines and weedy hardwoods such as *Acer rubrum, Liriodendron tulipifera*, and *Liquidambar styraciflua*, with the amounts depending on the degree of canopy opening. Areas that were cultivated are generally dominated by even-aged pine stands which are replaced by the climax oaks and hickories only as the pines die. Logged areas may have a mixture of hardwoods and pines (Schafale and Weakley 1990).

Under natural conditions these forests are uneven-aged, with old trees present. Reproduction occurs primarily in canopy gaps. Rare, severe natural disturbances such as wind storms may allow pulses of increased regeneration and allow the less shade-tolerant species to remain in the community. However, Skeen, Carter, and Ragsdale (1980)

argued that even the shade-intolerant *Liriodendron* could reproduce enough in gaps to persist in the climax Piedmont forests.

The natural fire regime of the Piedmont is not known, but fires certainly occurred periodically. Most of the component trees are able to tolerate light surface fires with little effect. However, *Acer rubrum* is fairly intolerant of fire and often appears to be out-competing the regeneration of oaks in long-unburned stands. Regular fire may have created a more open forest, with gaps persisting longer than at present and perhaps forming more frequently (Schafale and Weakley 1990).

MOST ABUNDANT SPECIES

Guilford Courthouse National Military Park

Stratum	Species
CANOPY	*Quercus alba*
SUBCANOPY	*Acer rubrum, Cornus florida*

OTHER NOTEWORTHY SPECIES

Guilford Courthouse National Military Park

Stratum	Species
HERB	*Dioscorea villosa, Lilium michauxii*

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

- Quercus rubra - Quercus alba - Carya glabra / Geranium maculatum Forest (CEGL007237)--a related more mesic type.
- Quercus alba - Carya alba / Euonymus americana / Hexastylis arifolia Forest (CEGL006227)--similar with a more southerly range.
- Quercus alba - Carya alba / Vaccinium elliottii Forest (CEGL007224)--of the Coastal Plain.
- Quercus alba - Carya glabra / Mixed Herbs Coastal Plain Forest (CEGL007226)--of the Coastal Plain.
- Quercus alba - Quercus nigra - Quercus falcata / Ilex opaca / Clethra alnifolia - Arundinaria gigantea ssp. tecta Forest (CEGL007862)--of the Coastal Plain.
- Quercus falcata – Quercus alba – Carya alba / Oxydendrum arboreum / Vaccinium stamineum Forest (CEGL007244) overlaps with this community in the Piedmont, but this community is a drier type that usually contains more *Quercus falcata*.

GRank & Reasons: G5? (01-02-06).

CLASSIFICATION COMMENTS

Guilford Courthouse National Military Park: This community is most likely confused with CEGL007244, a drier oak-hickory forest that has a higher proportion of *Quercus falcata* and other dry-mesic oaks and often has a higher density of *Oxydendrum arboreum* than does CEGL008475.

Element Distribution

Guilford Courthouse National Military Park Range: This community exists only on the eastern third of the park, where the land has recovered from disturbance for the longest time. Although probably under agriculture at some point in its history, this section of the park clearly has the oldest forest types.

Global Range: This association is found in the Piedmont and northern Coastal Plain (Chesapeake Bay Lowlands Ecoregion) of Virginia, as well as south in the Piedmont to the Carolinas and possibly Georgia, as well as possibly in related areas of Maryland.

Nations: US
States/Provinces: GA?, MD?, NC:S?, SC:S?, VA:S?
TNC Ecoregions: 52:C, 58:C, 61:C
USFS Ecoregions: 221Db:CCC, 231Aa:CCC, 231Ae:CCC, 232Ad:CCC, 232Bt:CC?, 232Bx:CCC
Federal Lands: NPS (Guilford Courthouse, Ninety Six)

Element Sources

Authors: M.P. Schafale/G.P. Fleming, SCS **Confidence:** 1 **Identifier:** CEGL008475
REFERENCES (type in full citation below if reference is new): Allard 1990, Ambrose 1990a, Fleming et al. 2001, Fleming pers. comm., Jones 1988a, Jones 1988b, Nelson 1986, Patterson pers. comm., Schafale and Weakley 1990, Skeen et al. 1980

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

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

I.B. Deciduous forest

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*.

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

USFS Ecoregions: 221Ad:CPP, 221Dc:C??, 221Ha:CCP, 221Hc:CCC, 221Hd:CCP, 221He:CCP, 221Jb:CCC, 222Ca:CCP, 222Cb:CCC, 222Cc:CCP, 222Cd:CCP, 222Ce:CCP, 222Cf:CC?, 222Cg:CC?, 222Ch:CC?, 222Da:CCC, 222Dc:CCP, 222Dd:CCP, 222De:CCC, 222Df:CCP, 222Dg:CCC, 222Dh:CCC, 222Di:CCP, 222Dj:CCC, 222Ea:CCC, 222Eb:CCC, 222Ec:CCP, 222Ee:CCC, 222Ef:CCC, 222Eg:CCC, 222Eh:CCC, 222Ei:CCC, 222Ej:CCC, 222El:CCC, 222En:CCC, 231Aa:CCC, 231Ab:CCP, 231Ac:CCP, 231Ad:CCP, 231Ae:CCC, 231Af:CCC, 231Ag:CCC, 231Ah:CCP, 231Ai:CCC, 231Aj:CCP, 231Ak:CCC, 231Al:CCC, 231Am:CCC, 231An:CCC, 231Ao:CCC, 231Ap:CCC, 231Ba:CPP, 231Bc:CPP, 231Bd:CPP, 231Be:CP?, 231Ca:CCP, 231Cb:CCP, 231Cc:CCP, 231Cd:CCC, 231Ce:CCP, 231Cg:CCP, 231Da:CCC, 231Dc:CCC, 231De:CCC, 231Ea:CC?, 231Eb:CCC, 232Aa:CCC, 232Ab:CCC, 232Ac:CCC, 232Ad:CCP, 232Bl:CCP, 232Bm:CCP, 232Bn:CCP, 232Bq:CCC, 232Br:CCC, 232Bt:CCC, 232Bv:CCP, 232Bx:CCP, 232Bz:CCP, 232Ca:CP?, 232Ch:CP?, 232Fa:CP?, 234Aa:CC?, 234Ab:CCC, 234Ac:CCP, 234Ae:CCC, 234Ag:CC?, 234Ah:CCP, M221Aa:CC?, M221Ab:CCC, M221Da:CCC, M221Dd:CCC

Federal Lands: DOD (Arnold, Fort Benning, Fort Gordon); DOE (Oak Ridge); NPS (Big South Fork, Chickamauga-Chattanooga, 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)

Alliance Sources

Authors: M. PYNE/A.S. WEAKLEY 6-94, RW, SCS **Identifier:** A.241

References: Allard 1990, Andreu and Tukman 1995, Braun 1950, Diamond 1993, Evans 1991, Eyre 1980, Faber-Langendoen et al. 1996, 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, Sneddon et al. 1996, 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 (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*.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Upland

Guilford Courthouse National Military Park Environment: This community occurs in the driest upland areas of Guilford Courthouse. It seems to occur on the lowest fertility soils and over areas that were probably farm fields or cut over woodlots more than 100 years ago.

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

Guilford Courthouse National Military Park Vegetation: This community is dominated by oak species associated with drier Piedmont sites, including *Quercus stellata, Quercus falcata*, and *Quercus velutina*. The canopy can be quite diverse and may also include significant amounts of *Quercus alba, Quercus rubra, Pinus virginiana, Acer rubrum*, and *Carya glabra*. The understory is dominated by *Acer rubrum* as well as some of the canopy species. In addition, *Oxydendrum arboreum* is usually a major component of the understory. The short shrub layer is usually sparse but dominated by *Vaccinium spp.* and the herb layer is usually devoid of most plants except the occasional dry site herb such as *Chimaphila maculata*.

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, although it is clear that natural disturbance is needed to maintain the current composition of these communties. Tree replacement occurs most frequently in single tree-sized gaps. Occasional catastrophic windstorms and fires occur.

MOST ABUNDANT SPECIES

Guilford Courthouse National Military Park

Stratum	Species
CANOPY	*Quercus stellata, Quercus falcata, Quercus alba*
SUBCANOPY	*Acer rubrum, Oxydendrum arboreum*

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.

CLASSIFICATION COMMENTS

Guilford Courthouse National Military Park: This type grades into CEGL008475 within the park. CEGL008475 is slightly more mesic and is genearlly dominated by *Quercus alba* whereas this community is dominated by more dry-site oaks such as *Quercus stellata* or *Quercus falcata*.

Global Classif Comments: This type grades into *Quercus falcata - Quercus alba - Quercus stellata - Quercus velutina* Forest (CEGL005018) in the northern limits of the range of *Quercus falcata* in southern Illinois, southern Indiana, and northern and western Kentucky, but the limits of the range of both types needs to be clarified in Kentucky.

Element Distribution

Guilford Courthouse National Military Park Range: This community exists in a relatively large patch in the northwestern corner of the park.

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 (Guilford Courthouse, Shiloh); USFS (Daniel Boone, Holly Springs?, Oconee, Sumter, Talladega, Uwharrie)

Element Sources

Authors: S. Landaal, SCS **Confidence:** 2 **Identifier:** CEGL007244
REFERENCES (type in full citation below if reference is new): 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

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

I.B. Deciduous forest

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.

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

USFS Ecoregions: 221Hc:CCC, 222Ab:CCC, 222Ag:CCC, 222An:CCC, 222Cb:CCP, 222Cc:CCP, 222Cd:CCP, 222Ce:CCP, 222Cf:CCP, 222Cg:CCC, 222Da:CCP, 222Db:CCP, 222Dc:CCP, 222Dd:CCP, 222De:CCP, 222Dg:CCP, 222Di:CCP, 222Ea:CC?, 222Eb:CCC, 222Ec:CC?, 222Ed:CC?, 222Ee:CC?, 222Ef:CC?, 222Eg:CCP, 222Eh:CC?, 222Ei:CC?, 222Ej:CC?, 222Ek:CC?, 222En:CC?, 222Eo:CC?, 231Aa:CCC, 231Ab:CC?, 231Ac:CCC, 231Ad:CC?, 231Ae:CCC, 231Af:CCC, 231Ag:CC?, 231Ah:CC?, 231Ai:CC?, 231Aj:CC?, 231Ak:CC?, 231Al:CC?, 231Am:CC?, 231An:CC?, 231Ao:CC?, 231Ap:CC?, 231Ba:CP?, 231Bb:CP?, 231Bc:CP?, 231Bd:CP?, 231Be:CP?, 231Bf:CP?, 231Bg:CP?, 231Bh:CP?, 231Bi:CP?, 231Bj:CP?, 231Bk:CP?, 231Bl:CP?, 231Ca:CP?, 231Cb:CP?, 231Cc:CP?, 231Cd:CPP, 231Ce:CP?, 231Cf:CP?, 231Cg:CP?, 231Da:CC?, 231Db:CC?, 231Dc:CC?, 231Dd:CC?, 231De:CC?, 231Ga:CCP, 231Gb:CCP, 231Gc:CCC, 232Ad:CCC, 232Ba:CCP, 232Bb:CCP, 232Bc:CCP, 232Bd:CCP, 232Be:CCP, 232Bf:CCP, 232Bg:CCP, 232Bh:CCP, 232Bi:CCP, 232Bj:CCP, 232Bk:CCP, 232Bl:CCP, 232Bm:CCP, 232Bn:CCP, 232Bo:CCP, 232Bp:CCP, 232Bq:CCC, 232Br:CCC, 232Bs:CCC, 232Bt:CCP, 232Bu:CCP, 232Bv:CCP, 232Bx:CCP, 232Bz:CCP, 234Ab:PP?, 234An:PPP, M222Aa:CCC, M222Ab:CCC, M231Aa:CCC, M231Ab:CCC, M231Ac:CCC, M231Ad:CCC

Federal Lands: DOD (Arnold, Fort Benning, Fort Gordon); DOE (Oak Ridge?, Savannah River Site); NPS (Carl Sandburg Home, 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, SCS **Identifier:** A.287

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

Liquidambar styraciflua / Lindera benzoin / Arisaema triphyllum ssp. triphyllum Forest
Sweetgum / Northern Spicebush / Jack-in-the-Pulpit Forest
Piedmont Small Stream Sweetgum Forest

Ecological Group (SCS;MCS): Appalachian Highlands Small Stream Forests (423-10; n/a)

Element Concept

GLOBAL SUMMARY: These forests develop along small streams in the Piedmont. The topographic features of floodplains can heavily influence the individual makeup of examples of this association. The canopy, subcanopy, shrub, and herbaceous layers often are well-developed. Dominant canopy species are *Liquidambar styraciflua, Liriodendron tulipifera, Acer barbatum*, and *Acer rubrum var. rubrum*. Common species in the canopy and understory include *Ilex opaca var. opaca, Aesculus sylvatica, 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, Halesia tetraptera var. tetraptera, Arundinaria gigantea ssp. gigantea, Cornus florida*, and *Fraxinus pennsylvanica*. *Euonymus americana, Lindera benzoin var. benzoin*, and *Corylus americana* are common and dominant in the shrub layer. Other shrub species that may be present include *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, Smilax hugeri, Smilax rotundifolia*, and *Toxicodendron radicans ssp. radicans*. The herbaceous layer is 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. Degraded examples of this community may have high species cover but low species diversity due to invasive exotic replacement of native plants. The exotics *Microstegium vimineum, Ligustrum sinense*, and *Lonicera japonica* are common in this community.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Palustrine

Guilford Courthouse National Military Park Environment: This community is restricted to low-lying terraces and the narrow floodplain that runs north-south within the park. Much of the habitat has been heavily altered by human uses ranging from farming to pond creation and subsequent pond drainage, so examples of this community type within the park are very low quality versions of this association.

Global Environment: These forests develop along small streams in the Piedmont. The topographic features of floodplains can heavily influence the individual makeup of examples of this association. The canopy, subcanopy, shrub, and herbaceous layers often are well-developed.

VEGETATION DESCRIPTION

Guilford Courthouse National Military Park Vegetation: Within the park, this community can be dominated by either *Liquidambar styraciflua* or *Liriodendron tulipifera*. The understory generally contains *Liquidambar styraciflua* and examples that are higher up on terraces may also contain species such as *Acer barbatum, Cornus florida*, and *Fagus grandifolia*. *Rosa multiflora, Ligustrum sinense*, and *Lindera benzoin* may all be present in the tall and short shrub layer. The herbaceous layer ranges from moderately dense to very dense and usually contains mostly *Microstegium vimineum* along with other native and non-native wetland and adjacent upland species.

Global Vegetation: The canopy, subcanopy, shrub, and herbaceous layers of stands of this association are often well-developed. Dominant canopy species are *Liquidambar styraciflua, Liriodendron tulipifera, Acer barbatum*, and *Acer rubrum var. rubrum*. Other common species in the canopy and understory include *Ilex opaca var. opaca, Aesculus sylvatica, 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, Halesia tetraptera var. tetraptera, Arundinaria gigantea ssp. gigantea, Cornus florida*, and *Fraxinus pennsylvanica*. *Euonymus americana, Lindera benzoin var. benzoin*, and *Corylus americana* are common and dominant in the shrub layer. Other shrub species that may be present include *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, Smilax hugeri, Smilax rotundifolia*, and *Toxicodendron radicans ssp. radicans*. The herbaceous layer is 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* are common in this community. Other exotics that colonize quickly in disturbed and fragmented versions of this association include *Wisteria sinensis, Rosa multiflora, Clematis terniflora, Hedera helix*, and *Elaeagnus* sp.

Global Dynamics: The topographic features of floodplains of larger streams are poorly differentiated here, and vegetation zonation is absent to poorly defined.

MOST ABUNDANT SPECIES

Guilford Courthouse National Military Park

Stratum	Species
CANOPY	*Liquidambar styraciflua, Liriodendron tulipifera*
HERB	*Microstegium vimineum*

CHARACTERISTIC SPECIES

Guilford Courthouse National Military Park

Stratum	Species
CANOPY	*Liquidambar styraciflua*

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

- Liquidambar styraciflua Temporarily Flooded Forest (CEGL007330)--occurs in the same habitat but is a highly impacted version of this forest that occurs on old farm fields and other second-growth areas.
- Liriodendron tulipifera – Acer rubrum – Quercus spp. Forest (CEGL007221) – occurs in the upland areas surrounding much of this community. Is most easily distinguished by the predominance of Liriodendron tulipifera instead of Liquidambar styraciflua.

GRank & Reasons: G3 (02-05-17). This community, and other types of floodplain forests, are threatened by alteration of the hydroperiod by artificial impoundments or river diversion projects, or the disruption of the floodplain communities by forestry or agriculture. The largest threat, however, is the invasive exotic species that have colonized most of the remaining examples of this association.

CLASSIFICATION COMMENTS

Global Classif Comments: Low-quality occurrences of this type may look very similar to some occurrences of *Liquidambar styraciflua* Temporarily Flooded Forest (CEGL007330). The presence of higher quality patches of native herbs and stands of native shrubs such as *Lindera benzoin* are the best ways to distinguish these two types. In addition, stands of CEGL007330 will generally be more even-aged and single species-dominated than CEGL004418.

Element Distribution

Guilford Courthouse National Military Park Range: This community occurs in the central section of Guilford Courthouse National Miltar Park and is restricted to areas adjacent to the creeks that flow through the park.

Global Range: This community is definitely found in Virginia and North Carolina and may extend into the South Carolina and Georgia Piedmont. It is limited in distribution to the Piedmont of these states, and within the Piedmont, only to those flat, wide stream bottoms of medium-sized creeks.

Nations: US
States/Provinces: GA?, NC:S?, SC?, VA:S?
TNC Ecoregions: 52:C, 58:C
USFS Ecoregions: 231Ae:CCC, 231Af:CCC
Federal Lands: NPS (Guilford Courthouse); USFS (Uwharrie)

Element Sources

Authors: SCS **Confidence:** 3 **Identifier:** CEGL004418
REFERENCES (type in full citation below if reference is new): Fleming et al. 2001, Peet et al. 2002, Schafale and Weakley 1990

III. Shrubland

A.908—RUBUS (ARGUTUS, TRIVIALIS) SHRUBLAND ALLIANCE (III.B.2.N.a.15)

(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*. Stands of this alliance are successional, and develop following disturbance (complete forest canopy removal). Stands of this alliance are successional and develop following disturbance (complete forest canopy removal). These stands are 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*. Stands of this alliance are successional and develop following disturbance (complete forest canopy removal).

Alliance Distribution

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

Alliance Sources

Authors: M.J. RUSSO 2-97, MOD. M. **SCS Master:** RW
Origin: 1997-11-26 **Edition:** 97-06-01

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

Blackberry - Greenbrier Successional Shrubland Thicket

Ecological Group [do not edit]: 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, Rhus copallinum*), herbs (*Solidago* spp., *Aster* spp., *Helianthus* spp., *Hypericum* spp., *Potentilla simplex*), and grasses (*Andropogon* spp., *Dichanthelium* spp., *Panicum* spp., *Schizachyrium scoparium*, and *Sorghastrum nutans*).

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Upland

Guilford Courthouse National Military Park Environment: Within the park, this community exists in any areas that were old fields but that have not been mowed for 3-5 years. This community is composed of *Rubus spp.* along with a series of other "old field" species.

VEGETATION DESCRIPTION

Guilford Courthouse National Military Park Vegetation: Within the park, this community is composed of *Rubus spp., Solidago spp., Aster spp.*, and other old field species. It is only found in areas where the mowing regime is such that these plants have time to establish.

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*, and *Sorghastrum nutans*.

Comments: In sandy parts of the southeastern U.S. Coastal Plain (e.g., Fort Benning, Georgia) the common blackberry is *Rubus cuneifolius*, and it does not form monocultural stands worthy of recognition as a vegetation type. At Arnold Air Force Base, Coffee and Franklin counties, Tennessee, this community is often found in powerline corridors and other areas that have experienced total canopy removal.

MOST ABUNDANT SPECIES

Guilford Courthouse National Military Park

Stratum	Species
SHRUB	*Rubus spp.*

Element Distribution

Guilford Courthouse National Military Park Range: This community exists only in the central and northwestern parts of the park near areas of heavy human disturbance (especially mowing).

Range: This ruderal successional vegetation could be found throughout the upper southern United States.
Nations: US

States: AL?, GA, MS?, NC, SC, TN

TNC Ecoregion: 43, 44, 50, 52 C

USFS Ecoregions: 222Eb:CCC, 231Ae:CCC
Federal Lands: DOD (Arnold); NPS (Guilford Courthouse), USFS (Talladega?, Tuskegee?)

Element Sources

Authors: SCS **Confidence:** 3 **Identifier:** CEGL004732
REFERENCES (type in full citation below if reference is new): TNC 1998a, Peet et al. 2002, TNC 1998a

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

III.B.2.N.a.102. WISTERIA (SINENSIS, FLORIBUNDA) VINE-SHRUBLAND ALLIANCE

(Chinese Wisteria, Japanese Wisteria) Vine-Shrubland Alliance

III. Shrubland

Alliance Concept

Summary: This alliance, dominated either by the invasive exotic Asian vine *Wisteria sinensis* or *Wisteria floribunda*, is most commonly seen in fragmented landscapes near old homesteads and other areas. The oldest colonies of this type may consist of *Wisteria sinensis* or *Wisteria floribunda* and little else since the wisteria slowly overtops and kills all other plants nearby.

Dynamics:

Alliance Distribution

Range: *Wisteria sinensis* and *Wisteria floribunda* are considered invasive exotics throughout the southeastern U.S. and Eastern Seaboard. The alliance was created from data in North Carolina, but it is suspected that it occurs at least in Virginia, North Carolina, South Carolina, Tennessee, Georgia, Florida, Mississippi, Alabama, Louisiana, and Arkansas.

Nations: US

States/Provinces: AL? AR? FL? GA? LA? MS? NC SC? TN? VA?

TNC Ecoregions: 52:C

USFS Ecoregions: 231Ae:CCC

Federal Lands: NPS (Guilford Courthouse)

Alliance Sources

Authors: R. WHITE, RW, SCS **Identifier:** A.2013

Wisteria sinensis Vine-Shrubland

Chinese Wisteria Vine-Shrubland

Wisteria Vineland

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

Element Concept

GLOBAL SUMMARY: This vine-dominated vegetation is dominated by *Wisteria sinensis*, a fast-growing vine native to China. The community is most commonly seen in fragmented landscapes near old homesteads and other areas. The oldest colonies of this type may consist of *Wisteria sinensis* or *Wisteria floribunda* and little else since the wisteria slowly overtops and kills all other plants It has the potential to occur in most southeastern states.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: Upland

Guilford Courthouse National Military Park Environment: Same as global description

Global Environment: This association occurs in a wide variety of habitats, but tends to occur in areas that were formerly second-growth pine or tuliptree woodlands. Since this species invades by overtopping trees, this community tends to occur in highly fragmented areas that are near old homesteads or other past human habitations where wisteria persits. This community is rare across the landscape at this point, but there is the potential for it to occupy more land as fragmentation continues to occur.

VEGETATION DESCRIPTION

Guilford Courthouse National Military Park Vegetation: Same as global description.

Global Vegetation: The vegetation is dominated by *Wisteria sinensis*, an exotic vine native to Asia. Wisteria was introduced as an ornamental vine in the South in the 19th century. It is not nearly as invasive as *Pueraria*, but in forests that have been disturbed by windstorm or other severe disturbances, it can colonize the canopy and spread to adjacent trees. In areas like this, where control has not taken place, this species can colonize more than 1 hectare. All existing vegetation is eventually choked out, leaving mounds of dying or dead trees overtopped by layers of *Wisteria sinensis*.

Global Dynamics: This association chokes out existing vegetation.

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

- Pueraria montana var. lobata Vine-Shrubland (CEGL003882)

GRank & Reasons: GW (02-05-15). This vegetation is dominated by an exotic species, is of anthropogenic origin, and is thus not a conservation priority.

Element Distribution

Guilford Courthouse National Military Park Range: This vegetation is known from one large patch in the south-central portion of the park.

Global Range: This vegetation is known to occur in North Carolina, but most likely occurs throughout the southeastern U.S.

Nations: US
States/Provinces: AL?, AR?, FL?, GA?, LA?, MS?, NC:S?, SC?, TN?, VA?
TNC Ecoregions: 52:C
USFS Ecoregions: 231Ae:CCC
Federal Lands: NPS (Guilford Courthouse)

Element Sources

Authors: R. White, SCS **Confidence:** 2 **Identifier:** CEGL008568
REFERENCES (type in full citation below if reference is new):

V. Herbaceous Vegetation

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

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

(Tall Fescue, Meadow Fescue) Herbaceous Alliance

V.A. Perennial graminoid vegetation

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.

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

USFS Ecoregions: 221:C, 222:C, 231Ae:CCC, M221Dc:CCC, M221Dd:CCC, M222Ab:CCC, M231Aa:CC, M231Ab:CCP, M231Ac:CCP, M231Ad:CCP

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

Alliance Sources

Authors: A.S. WEAKLEY 95-05, MOD., RW, SCS **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

Guilford Courthouse National Military Park Environment: This association occurs in any upland area that is mowed at least yearly.

Global Environment: This association includes grassland pastures and hayfields, more-or-less cultural, though sometimes no longer actively maintained.

VEGETATION DESCRIPTION

Guilford Courthouse National Military Park Vegetation: The vegetation is highly variable, but always contains some exotic grasses such as *Lolium pratense, Lolium arundinaceum, Tridens flavus*, etc. In addition, other species which often have high coverage are *Conyza canadensis, Desmodium paniculatum, Dactylus glomerata, Lonicera japonica, Toxicodendron radicans, Schizachyrium scoparium*, and *Andropogon gyrans*.

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.

MOST ABUNDANT SPECIES

Guilford Courthouse National Military Park

Stratum	Species
FORB	*Symphiotrichum dumosus*
GRASS	*Schizachyrium scoparium, Lolium spp.*

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

Global Classif Comments: *Lolium pratense* and *Lolium arundinaceum* are two closely related species which were traditionally treated as *Festuca pratensis (= Festuca elatior)* and *Festuca arundinacea*, and could alternately be treated as *Schedonorus pratensis* and *Schedonorus arundinaceus*. Conversion to Kartesz (1999) standard has necessitated the shift of this to the *Lolium* names from *Festuca*.

Element Distribution

Guilford Courthouse National Military Park Range: This community exists mostly in the central area of the park near the original site of the battle and in the eastern part of the park around the area where the courthouse formerly stood.

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
USFS Ecoregions: 221:C, 222:C, 231Ae:CCC, M221Dc:CCC, M221Dd:CCC, M222Ab:CCC, M231A:CC
Federal Lands: NPS (Blue Ridge Parkway, Buffalo, Carl Sandburg Home, Great Smoky Mountains, Guilford Courthouse, Ninety Six, Shenandoah); USFS (Cherokee, Ouachita, Ozark)

Element Sources

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

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Appendix III. Photos of selected plots, plants, and people of Guilford Courthouse National Military Park

Plot 1 at Guilford Courthouse National Military Park

Plot 2 at Guilford Courthouse National Military Park

Plot 3 at Guilford Courthouse National Military Park.

Plot 4 at Guilford Courthouse National Military Park

Plot 5 at Guilford Courthouse NMP.

Plot 6 at Guilford Courthouse NMP.

Plot 7 at Guilford Courthouse NMP.

Plot 8 at Guilford Courthouse NMP

Plot 9 at Guilford Courthouse NMP.

Plot 10 at Guilford Courthouse NMP

Plot 11 at Guilford Courthouse NMP.

Plot 12 at Guilford Courthouse NMP.

Plot 13 at Guilford Courthouse NMP.

Carolina lily (*Lilium michauxii*).

Volunteer Beth Flokstra pressing plants.

Lesser ladies' tresses (*Spiranthes ovalis*)

Appendix IV. Key to EcoGroups and Ecological Communities of Guilford Courthouse National Military Park.

This key was developed for Guilford Courthouse National Military Park 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. In addition, ecotones between ecological communities may have traits of both communities and so may need to be classified as both communities.

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 CEGL code may be used to refer back to the document or to look association names and information up in other references that use the National Vegetation Classification. The "common name" of the community also appears with the scientific name of the association.

Key to Ecological Communities of Guilford Courthouse National Military Park

1a. Wetland vegetation: Wetland habitats such as flatlands along creeks inundated during local flooding events. Forest is dominated by either sweetgum (Liquidambar styraciflua), *tuliptree* (Liriodendron tulipifera*), red maple* (Acer rubrum*), or a combination of all three*.
[APPALACHIAN HIGHLANDS SMALL STREAM FORESTS]
Piedmont Small Stream Sweetgum Forest (CEGL004418)

1b. Terrestrial Vegetation: Upland habitats not inundated by flood waters (includes upland areas with ephemeral ponds or hardpan soils that drain poorly)

2a Vegetation dominated by vines or herbaceous vegetation, not trees or shrubs .

3a Exotic vine dominated community. Not plowed/mowed in the past decade.
[EXOTIC SPECIES DOMINATED SOUTHEAST WOODED UPLAND]
Wisteria Vine Shrubland (CEGL008568)

3b. Successional vegetation dominated by exotic herbaceous species. Heavily disturbed (plowed/mowed) within the past decade.
[EXOTIC SPECIES DOMINATED HERBACEOUS UPLAND]
Cultivated meadow (CEGL004048)

2b Forests, woodlands, shrublands (but not vine or herbaceous dominated communities)

4a Successional vegetation resulting from recent disturbance (plowing/ stand initiating clearcut); stand may either be a shrubland or a young forest with canopy dominated by Virginia pine (*Pinus virginiana*), loblolly pine (*Pinus taeda*), shortleaf pine (*Pinus echinata*), and/or tuliptree (*Liriodendron tulipifera*) with other successional species (*Acer rubrum, Acer barbatum*, and occasionally *Liquidambar styraciflua*) as well as some later successional deciduous species in the subcanopy (*Quercus alba, Quercus velutina, Quercus coccinea)*; sites are former fields, pastures, clearcuts, burned or eroded areas.
[SEMI-NATURAL WOODED UPLAND]

5a. Forest

6a. Evergreen/mixed canopy

7a. Upland site with canopy dominated by loblolly pine (*Pinus taeda*) or a combination of loblolly pine and sweetgum (*Liquidambar styraciflua*).
Successional loblolly pine – sweetgum Forest (CEGL008462)

7b. Upland site with canopy dominated by Virginia pine (*Pinus virginiana*) or shortleaf pine (*Pinus echinata*).

8a. Canopy dominated by shortleaf pine (*Pinus echinata*)
Shortleaf Pine Early Successional Forest (CEGL006327)

8b. Canopy dominated by Virginia pine (*Pinus virginiana*)
Virginia Pine Successional Forest (CEGL002591)

6b Hardwood dominated canopy
Successional Tuliptree – Hardwood Forest (CEGL007221)

5b. Shrubland (often is embedded within a matrix of herbaceous or vine dominated vegetation
Blackberry – Greenbrier Successional Shrubland Thicket (CEGL004732)

4b Mature, relatively undisturbed vegetation (at least 70 years since plowing or other severe human-induced disturbance. Late successional species such as oaks and beech dominate the canopy.

9a. Land on steep to moderate slope, beech (*Fagus grandifolia*) is a canopy dominant.
[APP HIGHLANDS MESIC ACID HARDWOODS FOREST]
Acidic Piedmont Mesic Mixed Hardwood Forest (CEGL008465)

9b Land relatively flat or gently sloping, oak dominates canopy
[APP HIGHLANDS DRY-MESIC OAK FORESTS / WOODLANDS]

10a. Over 50% canopy coverage by white oak *(Quercus* alba) and less than 10% by southern red oak (*Quercus falcata)*; relatively mesic environment.
Piedmont Dry-mesic Oak - Hickory Forest (CEGL008475)
10b. Less than 25% of canopy covered by white oak (*Quercus alba*) and more than 10% by southern red oak (*Quercus falcata*); relatively dry environment.
Southern red oak – white oak Forest (CEGL007244)