VASCULAR PLANT INVENTORY

AND PLANT COMMUNITY CLASSIFICATION

FOR CARL SANDBURG HOME NATIONAL HISTORIC SITE

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

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: Close-up of a flower of the pink lady's slipper *(Cypripedium acaule*) in an oak-hickory forest at Carl Sandburg Home National Historic Site. Photo by Rickie White.

Acknowledgments

The staff and volunteers of the Carl Sandburg Home National Historic Site provided invaluable support during the project. Superintendent Connie Hudson Backlund, Resource Manager Warren Weber, Museum Curator Lynn White Savage, and Forestry Technician Irene Van Hoff deserve special thanks.

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As usual, NatureServe South staff supported this project in a collaborative and unselfish manner. Judy Teague's ArcView abilities were vital in setting up the sampling system for the work at this park. Tom Govus (independent contractor) and Alan Weakley (now with UNC-CH Herbarium) both lent their considerable plant identification skills to our work, thereby making the product a much more valuable and reliable tool.

Rickie White took all images in this report on a Sony Mavica digital camera.

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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. Park personnel and park volunteers assisted NatureServe ecologists to establish a baseline for Carl Sandburg Home National Historic Site in three ways:

1) Ecologists from NatureServe established eleven permanently marked one-hectare circular plots throughout the park in a grid system and another four in unique ecological areas that were missed by the grid. These plots are available to be used by researchers on studies ranging from bird point counts to individual plant monitoring to herpetological inventories.
2) Ecologists collected data on all unique vegetation communities within the park and found at least fourteen vegetation associations (unique ecological assemblages of plants) within park boundaries. Three associations warrant special attention. The Pinus pungens – Pinus rigida – (Quercus prinus) / Kalmia latifolia – Vaccinium pallidum Woodland (Blue Ridge table mountain pine – pitch pine woodland (typic type)) is considered globally rare and is threatened within the park by hardwood invasion due to suppression of fire. The Selaginella rupestris – Schizachyrium scoparium – Hypericum gentianoides – Bulbostylis capillaris Herbaceous Vegetation (Appalachian low elevation granitic dome) is globally very rare and is threatened within park boundaries by unintentional trampling from park visitors. Finally, the Tsuga canadensis – Liriodendron tulipifera – Betula lenta / Rhododendron maximum Forest is secure throughout its range in the southern Appalachians. However, the example of this association within the park probably represents an older stand of forest within a matrix of younger forest. It is also a mesic community in a park dominated by xeric and dry-mesic communities.
3) Ecologists obtained information about plant species already identified and catalogued in the park museum collection and conducted an inventory for new plant species on the site. NatureServe staff, park staff, and volunteers collected 170 specimens and added over 135 new species to a list that already contained over 375 species. We estimate that between 75 and 95% of the flora in the park is now documented. Some notable species found in the park either during the current studies or in past studies that are globally rare or uncommon include North Fork heartleaf (*Hexastylis rhombiformis*), rough panicgrass (*Dichanthelium leucothrix*), Piedmont ragwort (*Packera millefolia*), Carolina hemlock (*Tsuga caroliniana*), Biltmore's carrion flower (*Smilax biltmoreana*), netted nutrush (*Scleria reticularis*), and Allegheny mountain golden-banner (*Thermopsis mollis*).

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.

Since Carl Sandburg Home National Historic Site was originally protected because of its historic and cultural value, the research emphasis here has usually focused on the history of the owners of the land (Bailey 1980) and the human-influenced landscape (Hart 1993). Some ecological/floristic studies have been completed as well (Blaha, Heiman, and Ulinski 1999), and our study worked upon this foundation of research to accomplish 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).
3) Document at least 90% of the vascular plants within the boundaries of the park.

In addition to these three objectives, NatureServewas invited to work with photointerpreters from the University of Georgia 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 at a later date. The ultimate goal of this project is to deliver the information described in this report to all interested parties, to inform land management and future research at the park, and to ensure that future generations of visitors can enjoy the same natural features that Sandburg did while writing from his wooden chair at the base of Big Glassy Mountain.

Study Area

Carl Sandburg Home National Historic Site is located in Henderson County in the town of Flat Rock, North Carolina. The 108 hectares (267 acres) on this property all lie within the French Broad River drainage and include the old estate, ponds and a large natural area containing Little Glassy Mountain and Big Glassy Mountain. Elevation ranges from 658 meters (2160 feet) to 848 meters (2783 feet).

Gneissic rocks dominate most of Henderson County. Within the park, Henderson Gneiss is exposed and forms scattered rock outcrops that serve as windows to the underlying substrate throughout the park (King 1980). The southern two-thirds of the park include occurrences of these rock outcrops in a matrix of forest with deeper soils. The northern portion of the site is at a

more accessible location and at a lower elevation; it contains the house, lakes, fields, and other human-maintained landscapes.

From the most recent soils map (King 1980), we can discern four types of soil: Ashe stony sandy loam, Codorus loam, Edneyville fine sandy loam, and Tate fine sandy loam. Ashe stony sandy loam underlies most all of the southern half of the park and consists mainly of a shallow layer of sandy loam over a hard granite-gneiss substrate. Edneyville sandy loam underlies most of the northeast third of the park and consists of a deep sandy loam with underlying bedrock at least 40 inches below the surface. Tate fine sandy loam and Codorus loam are found mostly on the northern end of the park under the cultivated and settled area. These soils are much deeper than the other two types, with a surface layer of at least 9 inches of dark brown sandy loam. The underlying bedrock is more than 60 inches below the surface.

Henderson County's climate is mild. There is no climate station on site, but figures from other parts of the county indicate that the mean average temperature is 13 degrees C (56 degrees F). The mean 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 (King 1980).

Land History

Despite its isolated location in the mountains of North Carolina, Flat Rock has a long history of human occupation and settlement. Before Europeans arrived in the mountains, the area was most likely utilized by local Cherokee communities as a hunting grounds (Hart 1993). By the early 1700's, a brisk trade of animal hides and other items developed between the Native Americans in the area and traders in Greenville, South Carolina. They met at a crossroads, which was given the name Flat Rock due to the outcrops where the transactions occurred.

By the early 19th century, a small community of Europeans had settled in the area (Fain 1980). By the early 1830's, the area became well known as a destination for wealthy Charlestonians escaping the heat and humidity of the lowlands. Christopher Gustavus Memminger, a lawyer, politician, and soon to be Secretary of the Confederate Treasury, bought most of what is now Carl Sandburg Home National Historic Site in the mid 1820's and named it Rock Hill for the numerous rock formations (Bailey 1980, National Park Service 1981). He built the house that now stands on the site and established most of the manmade landmarks that exist today, including Front Lake and the front lawn. Subsequent owner Ellison Adger Smyth installed more gardens, added the Side Lake, and renamed the farm "Connemara".

Carl and Lilian "Paula" Sandburg bought Connemara in 1945 and the couple moved her goat farm from their farm in Michigan. They made few improvements to the grounds, encouraging a more "wild" landscape than their predecessors (Hart 1993). Most of the improvements they did make involved changes to accommodate Mrs. Sandburg's growing goatherd. The couple lived here until Carl's death in 1967. Mrs. Sandburg and her daughters moved in 1968. Congress designated the estate as a National Historic Site in 1968 and it opened to the public in 1974.

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 boundaries 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 boundaries as mandated by the *Study Plan for Vertebrate and Vascular Plant Inventories* (Nichols et. al. 2000), ecologists from NatureServe used GIS layers supplied by Tom Savage, a contractor of the National Park Service. We manipulated the GIS layers supplied to us further with the program ArcView (ArcView 1992). We chose a 56-meter buffer around the current park boundary since each point represented the center of a one-hectare circular plot and we did not wish to sample any private holdings outside of the park. With this buffer in place, we established an evenly spaced grid system (we chose the approximate grid size of 270 meters by 270 meters *a priori* based on observations made by a team of park service personnel in 2000 and modified it to 250 meters by 250 meters to allow for the appropriate number of points in the park). We then shifted the entire grid a random distance less than one-half the grid size to the north. 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 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 grid. With 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 for possible plot establishment once the grid points were completed.

Once at the park, we met with park personnel, local researchers, and volunteers, described the project's goals, and asked for their collaboration in the project. Through this process, we identified priority areas of the park for additional plot establishment and species inventory. In the summer of 2001, we established 11 plots on the grid system and an additional four plots off of the grid in habitats not covered by any of the grid points (Figure 1 and Table 1). Using a Garmin GPS III Plus unit (Garmin Corporation 1999) we located the coordinates on the ground and attempted to position ourselves within at least five meters of the "real" map location (the hypothetical location that we created in the lab prior to visiting the site). Once we were within five meters, we monumented each plot with a one foot piece of iron conduit and a small blue anodized aluminum tag with a number corresponding to the plot number attached to an adjacent distinctive tree. General written directions to each permanent plot can be found 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. Due to variation in 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 area within the hectare to place our standardized vegetation monitoring plot. Within the plot, we measured environmental characteristics and identified every vascular plant within the area (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 may have missed the previous summer. The original plot sheets are archived in the Carl Sandburg Home National Historic Site. 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). We compared the plots with similar plots in other parks in the southern Appalachians and 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 Carl Sandburg Home National Historic Site. We collected high quality specimens of all new species encountered where such specimens existed. While searching the park away from the plots, we collected any new specimens encountered and recorded the GPS coordinates using our Garmin GPS unit. With the help of knowledgeable volunteers and staff, 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.

The Integrated Taxonomic Information System (ITIS) is now the standard for all National Park Service plant names. In past projects, researchers have used other naming standards such as Kartesz (1999). Although the two databases are fairly similar, there are some differences in naming conventions between the two. Therefore, some of the older plant collections may have names that are no longer standard names. We hope that these can be changed through annotations in the future. All specimens are housed on the premises of the Carl Sandburg Home National Historic Site and all species data is housed within the national NPSpecies database.

To assess the success of our inventory, we used the program PC-ORD (McCane 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 Carl Sandburg Home NHS 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 walked throughout the park to help them identify unique mapping units. Since photointerpreters rely heavily on canopy and understory species composition and disturbance 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 match up perfectly. The last step will be to work with the mappers 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 that needs to be produced.

Results

During the species inventory work, we encountered and collected 170 specimens (Table 2) of over 135 species that had not been confirmed previously from the park (more than this number if you include varieties of species). Over 55 of these species and varieties of species were county records, having not been previously documented for Henderson County, North Carolina. We created 170 vouchers for the herbarium at Carl Sandburg Home NHS (Table 3) from the plants we collected and photographed in the park.

In addition to collecting all new plants, we were asked to estimate what percentage of the flora in the park is now documented. Including the species already collected before this project with the new species and eliminating all varieties, subspecies, and questionable identifications, we believe that we currently have documented 519 species for the park. The estimates of the number of species in the park that we generated using PC-ORD were 546.5 using all 15 plots and the first-order jackknife method, 645.4 using all plots and the second-order jackknife method, 581.0 using just the 12 gridded plots and the first-order jackknife method, and 692.1 using just the 12 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 67.9, the beta value was 5.9, and the gamma value was 399.

Using the information gathered in each plot in the summer of 2001, we discerned fourteen distinct vegetation associations within eleven distinct ecogroups or "systems", as defined by the United States National Vegetation Classification (Table 1). The common names of the communities are as follows:

Water Lily Aquatic Vegetation
Rush Marsh
Cultivated Meadow/ Old Field
Appalachian Low Elevation Granitic Dome
Blue Ridge Table Mountain Pine – Pitch Pine Woodland (Typic type)
Appalachian White Pine – Xeric Oak Forest
Eastern White Pine Successional Forest
Southern Appalachian Acid Cove Forest (Typic type)
Appalachian Shortleaf Pine – Mesic Oak Forest
Chestnut Oak Forest (Xeric Ridge Type)
Appalachian Montane Oak Hickory Forest (Typic Acidic Type)
Chestnut Oak Forest (Mesic Slope Heath Type)
Appalachian Montane Oak – Hickory Forest (Red Oak type)
Appalachian Montane Oak – Hickory Forest (Chestnut oak type)

While working in the park, we captured some digital images. These images are indexed (Table 6) and a selection of them can be seen in Appendix III. In addition, all of the digital images taken in the park are attached as a separate file.

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 effort from this project added over 135 species to a list of 375 species already present within the current boundaries 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 546.5 to 692.1. Excluding varieties, subspecies, and unidentifiable collections, we have confirmed 519 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 80 and 95% 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 a ballpark 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 we would if we had sampled only in areas that were of similar vegetation or only focused on particular parts of the park (Palmer 1995, McCune and Grace 2002).

In addition to globally rare communities, the park is home to a number of globally rare species. The state threatened and globally rare Piedmont ragwort and globally rare netted nutrush were found in 2001 on at least one of the rock outcrop communities in the park in small numbers. Further searches may be necessary to determine the exact status of these species within the park, but they appear to be both uncommon in the park. These species both depend upon the continued good health of the rock outcrop communities. Other species of note on and around the rock outcrop communities include quill fameflower (*Talinum teretifolium*), rough panicgrass (*Dichanthelium leucothrix*), and creeping aster (*Aster surculosus*).

Carolina hemlock was collected in 1998 (Blaha et. al. 1999), and is probably an important edge species along many of the rock outcrop communities. It is stable within the park for now but the hemlock adelgid has begun to invade adjacent areas including the Great Smoky Mountains National Park and the infestations will probably reach the park in the near future. This adelgid has the potential to kill all of the hemlocks in the park. Other national parks are experimenting with control of the adelgid and these parks should be consulted if the hemlocks are a conservation priority.

Biltmore's carrion flower is omnipresent throughout the park's hardwood communities and was collected in 1999 (Blaha et. al. 1999). Though restricted in its range to a small area of the Blue Ridge, its population seems very secure within park boundaries and with current management practices. Other species of note associated with oak woodlands that were documented for the park over the past surveys include bashful wakerobin (*Trillium catesbaei*), southern woodland violet (*Viola hirsutula*), and American lily-of-the-valley (*Convallaria majuscula*).

Interestingly, the man-made pond communities harbor a number of species of interest. Examples of species that are uncommon in the mountains include little floating bladderwort (*Utricularia radiata*) and forked rush (*Juncus platyphyllus*).

Of the 135+ species, 55 were not documented for the county. Most of the new species found were common and secure across their ranges. There exists a standardized ranking system to rank species based on rarity and prioritize which species should be given resources for protection first. These are called G or global ranks and range from G1 (very imperiled) to G5 (secure). Similarly, there are S ranks within each state for many species. Despite having a G2 and G3 ranked community, there are very few G2 or G3 plants in this landscape (see Table 3 for Granks).

Within the park, the only plants ranked G2 were Piedmont ragwort (*Packera millefolia*), Memminger's ragwort (*Packera x memmingeri*), and North Fork Heartleaf (*Hexastylis rhombiformis*) (Table 3). Piedmont ragwort was the only plant on the state threatened list. Plants ranked G3 or G3G4 included Carolina hemlock (*Tsuga caroliniana*), Biltmore's carrion-flower (*Smilax biltmoreana*), netted nutrush (*Scleria reticularis*), northern catalpa (*Catalpa speciosa* – but probably planted), and Allegheny mountain golden-banner *(Thermopsis mollis*). There were 20 G4 species and 16 G4G5 or G4? ranked species. The remainder have either never been ranked or are G5 species (Table 3).

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:

Eastern Open Marshes and Ponds Ecogroup (480-10)

Nuphar lutea ssp. *advena – Nymphaea odorata* Herbaceous Vegetation Association (CEGL002386)

This wetland association is also known as broadleaf pondlily – white waterlily Herbaceous Vegetation or **Water Lily Aquatic Wetland**. It is found throughout the eastern United States in ponds and other slow-moving water bodies. It can contain yellow pond-lily *(Nuphar lutea ssp. advena*) and/or American white water-lily (*Nymphaea odorata*) as dominants. Other species present include watershield (*Brasenia schreberi*), various pondweed species (*Potamogeton* spp.), and water smartweed (*Polygonum amphibium*).

Within the park, this association is limited to Front Lake. It occurs in areas of open water and consists of American white water-lily along with bladderwort species (*Utricularia* spp.). It is fairly limited in potential habitat, though it could easily develop in Side Lake as well in the future.

This wetland association is secure globally. Due to the lack of natural ponds and the local extinction of beaver populations at the turn of the century, this community became fairly rare in the mountains. With the reintroduction of the beaver, this community may again become more common.

Threats include drastic changes in hydrology, invasive exotic aquatic plant species, and non-point source water pollution from outside the park.

There are no plants of special concern in this association, but this community does support plants that are very rare in the mountains. Examples of these rare plants that occur in the park are little floating bladderwort (*Utricularia radiata*) and American white waterlily (*Nymphaea odorata*).

Eastern Emergent Marshes Ecogroup (480-20)

Juncus effusus Seasonally Flooded Herbaceous Vegetation Association(CEGL004112)

This wetland association is also known as Soft Rush Seasonally Flooded Herbaceous Vegetation or **Rush Marsh**. This broadly defined association exists all across the eastern half of the United States, and consists of permanently, semi-permanently, and saturated areas that include lamp rush as a large portion of the vegetation. These areas can contain high numbers of wetland species such as straw-color flat sedge (*Cyperus strigosus*), broad-leaf cat-tail (*Typha latifolia*), groundnut (*Apios americana*), sedge species, and brownish beak sedge *(Rhynchospora capitellata*). Generally these species are found on the edges of beaver ponds or artificial impoundments.

Within the park, these wetlands exist in a narrow band of between one and ten meters between the farm ponds and old fields, especially at Side Lake. This area is intensively managed through mowing multiple times each field season, so most of the vegetation that survives is low to medium growth herbaceous vegetation. Composition will continue to vary as mowing intensity changes from year to year. There are no clear dominants in this community on site, but some of

the species present include straw-color flat sedge, path rush, lamp rush, woodland bullrush (*Scirpus expansus*), and marsh primrose-willow (*Ludwigia palustris*).

This association is very secure globally. It exists in both man-made areas and areas manipulated by beavers or other disturbance. Within the Southern Blue Ridge, this community is rare across the landscape though still secure.

Threats to this association are the same as with any other wetland ecosystem. Changes in hydrology through draining or changes in the water quality due to pollution upstream affect the composition and diversity of this community. Within the park, changes in mowing practices may have a significant impact on the community composition of this site, though not necessarily a negative one.

Changes in management practices such as mowing or pond level changes will affect this community by changing the species composition. If mowing were to cease, the community would most likely grow into a less diverse shrub thicket. Therefore, an intermediate level of mowing that allows for the growth of herbaceous species but discourages woody growth would probably maximize biodiversity. Experimenting with a low-mow zone (one time/year) within two meters of the water may be a good first step if a more natural ecosystem is desired.

Exotic Species Dominated Herbaceous Upland Vegetation Ecogroup (900-60)

Lolium (arundinaceum, pratense) Herbaceous Vegetation Association (CEGL004048)

Also called (Tall Fescue, Meadow Fescue) Herbaceous Vegetation or **Cultivated Meadow**, this association is an exotic species-dominated grassland that occurs throughout the East and Southeast in cultivated meadows. It can be found at most slopes and aspects, has no canopy, and is dominated by exotic herb species such as meadow fescue (*Lolium pratense*), tall fescue (*Lolium arundinaceum*), and other old field species.

Within the park, these fields are maintained by a combination of mowing and goat and cow grazing. In addition to meadow fescue, they contain large amounts of tall redtop (*Tridens flavus*), common timothy (*Phleum pratense*), orchard grass (*Dactylis glomerata*), and Carolina horsenettle (*Solanum carolinense*). Composition varies widely according to different land uses and mowing intervals. These fields occur throughout the northern portion of the park and continue directly up to the edges of the two manmade lakes in the far north of the park.

This association, essentially a pasture, is very common both globally and locally. Because it is exotic-dominated, it has little conservation value. This community is threatened by any change in land management practices. It cannot exist without active management and would likely succeed into shrubs and then forest if left alone for decades. In addition to management issues, a severe threat to the land in these areas is invasion by exotic species, especially woody plants and vines like Oriental bittersweet (*Celastrus orbiculatus*) and Chinese privet (*Ligustrum sinense*).

Although of little management concern, this community does harbor some native plants not common in other communities in the park (Carolina horsenettle and path rush, for example). To

maintain overall park biodiversity, it will be important to maintain examples of this type in the future.

Appalachian Highlands Granitic Domes Ecogroup(435-10)

Selaginella rupestris – Schizachyrium scoparium – Hypericum gentianoides – Bulbostylis capillaris Herbaceous Vegetation Association (CEGL007690)

This rock outcrop formation is also known as Rock spikemoss – Little Bluestem – Pineweed – Common Hairsedge Herbaceous Vegetation or **Appalachian Low Elevation Granitic Dome**. This association occurs on granitic exfoliation domes in the Piedmont and lower elevations of the Blue Ridge. It can occur on flat rock or steep rock, on any exposure, and usually is below 3000 feet in elevation. It is composed mostly of bare rock with a diverse array of lichens, herbs, and woody species in mats of accumulated soil and along the edges of the rock. In addition, a tree canopy develops in some areas adjacent to deeper soil. Examples of this community usually contain rock spikemoss (*Selaginella rupestris*) as a dominant groundcover along with species such as silky wild oat grass (*Danthonia sericea*), little bluestem (*Schizachyrium scoparium*), and other plants usually associated with prairies, savannas, and open fields.

On site, this association occurs on most all of the granite "flat rock" for which the town below is named. Rock spikemoss is not present on most of the outcrops in the park, but many of the other species that are characteristic of this association such as quill fameflower (*Talinum teretifolium*), orange-grass (*Hypericum gentianoides*), and greater tickseed (*Coreopsis major*), are common on these outcrops.

This association is very rare globally, but is fairly common in patches within the park. There are at least nine large patches of this association within the boundaries, some of which are very high quality examples of this community.

Many threats exist to this association. Within the park, exotic species and common field weeds have replaced the fragile vegetation of these rock outcrops wherever humans have strayed from the path and made new trails. Chinese privet, Nepalese browntop (*Microstegium vimineum*), Asiatic dayflower (*Commelina communis*), and orchard grass were all abundant in disturbed areas of this association. Two examples of impacted areas are the flatrock directly behind the main house and the rocks of the large outcrop along the trail to Big Glassy Mountain. Where the rock outcrops lay far from existing trails, the systems seem to be more stable, with very low numbers of exotics present. In these isolated areas, the biggest problem may be overgrowth of canopy species and shrubs that shade out areas formerly dominated by smaller perennial herbs.

Plants of concern include Michaux's saxifrage (*Saxifraga michauxii*), rough panic grass (*Dichanthelium leucothrix*) (a coastal plain disjunct), Small's ragwort (*Packera anonyma*), and Piedmont ragwort (*Packera millefolia*). In addition, *Packera x memmingeri*, a hybrid between Small's ragwort and Piedmont ragwort has been documented for the outcrops in previous surveys. Most of the plants found on the rock outcrops, even the more globally common ones, are uncommon in the landscape and therefore contribute a disproportionately large amount to the overall biodiversity of the park and the region.

Due to the delicate nature of the communities and their significance both globally and locally, at least a few examples of this community should remain off limits to the public (such as the large outcrop in the southeast corner of the park). Invasive exotics should be controlled and these areas replanted or reseeded using seeds collected adjacent to the bare areas as a seed source. Finally, small isolated patches should be monitored to ensure that they are not completely shaded out by overgrowth of woody species on the edges. Mechanical removal may be justified in areas where herbaceous cover is desired.

Appalachian Highlands Pitch and Table Mtn. Pine Woodlands Ecogroup(401-80)
Pinus pungens - Pinus rigida - (Quercus prinus) / Kalmia latifolia - Vaccinium pallidum Woodland Association (CEGL 007097)

This pine woodland association is also referred to as the Table Mountain Pine - Pitch Pine - (Rock Chestnut Oak) / Mountain Laurel - Hillside Blueberry Woodland or **Blue Ridge Table Mountain Pine - Pitch Pine Woodland (Typic Type)**. Examples of this association occur across a wide elevational range (1600-4000 feet), on exposed ridges and upper slopes with southerly and westerly exposures, over thin, excessively drained, nutrient-poor soils. This community is often associated with rock outcroppings, frequently occurring on the edges of openings maintained by shallow soils.

Within the park, this association occurs on some of the most exposed dry ridgetops and adjacent slopes, especially in the southeast corner of the park (plot 13). Examples within the park contain a large component of scarlet oak (*Quercus coccinea*) and chestnut oak in the canopy due to heavy fire suppression that would have ordinarily thinned out these two hardwood species. Mountain laurel shrubs heavily dominate the understory of this association. The herbaceous layer is poorly developed (only acid-loving herbs such as pink lady's slipper (*Cypripedium acaule*), dwarf violet iris (*Iris verna var. smalliana*), and downy rattlesnake-plantain grow on this site). Kelsey's bristly locust (Robinia hispida var. kelseyi) and Allegheny Mountain golden-banner (Thermopsis mollis) probably existed in this association when it was more open and more light reached the ground.

This pine woodland association is uncommon within the park, occurring only in small areas along ridge lines and adjacent upper slopes. The association has been assigned a G3 status globally, indicating that it is regionally abundant but restricted to only the southern Appalachians and therefore vulnerable and of high conservation value. Although regionally common, this community is not found on many other national park holdings.

Within the park, this community's status is threatened by fire suppression. The canopy is now closed due to heavy recruitment of more fire intolerant species such as scarlet oak, chestnut oak, and red maple. As a consequence, very little regeneration of pitch pine (*Pinus rigida*) has occurred in the past few decades. Although this association was classified as a woodland, it is now effectively a forest with a very heavy understory of mountain laurel. Before canopy and shrub layer closure, this woodland may have contained a larger herb component.

Pitch pine is not considered rare regionally, but may be effectively lost on site without fire to allow for regeneration. Biltmore's carrion flower is a regional endemic that is associated with this association in this park. Kelsey's bristly locust is found in examples of this type within the park, and Allegheny Mountain golden-banner probably existed in this type when the canopy was more open.

Controlled burns are currently being used in the Great Smoky Mountains National Park in part to sustain a similar community there. Due to the fact that this community is regionally endemic, it may warrant special consideration for more aggressive management in the future. Due to the small size of the park, management to benefit this community may be impractical.

Appalachian Highlands Upland White Pine Forests (401-40)

Pinus strobus – Quercus (coccinea, prinus) / (Gaylussacia ursina – Vaccinium stamineum) Forest (CEGL007519)

This mixed oak-pine forest association is referred ot as the Eastern White Pine – (Scarlet Oak, Rock Chestnut Oak) / (Bear Huckleberry, Deerberry) Forest or **Appalachian White Pine – Xeric Oak Forest**. Examples of this association are usually found on upper slopes or ridgetops and contain a dense but short ericaceous shrub layer and a variable mixture of pine and oak in the canopy.

Within the park, the canopy of this association is generally dominated by chestnut oak (*Quercus prinus*) but may also contain smaller amounts of black oak (*Quercus velutina*), scarlet oak (*Quercus coccinea*), Eastern white pine (*Pinus strobus*), and mockernut hickory (*Carya alba*). There is a moderate coverage of deerberry (*Vaccinium stamineum*) and/or bear huckleberry (*Gaylussacia ursina*). Some herbs found in the plot include black-seed speargrass (*Piptochaetium avenaceum*), Pensylvania sedge (*Carex pensylvanica*), false solomon's seal (*Maianthemum racemosa*), rattlesnake plantain (*Goodyera pubescens*), and Carolina lily (*Lilium michauxii*).

This mixed community is uncommon within the park but may occur in small patches throughout the park. It was documented on the top of Little Glassy Mountain. It is a G3 community, signifying that it is globally uncommon/rare.

This community was probably at least partially maintained by fire in the past. Due to succession, the community composition is shifting and will change to a community dominated by oaks with less of a presence of white pines. No species of significance occur in this community.

Semi-natural Wooded Uplands Ecogroup(900-40)

Pinus strobus Successional Forest Association (CEGL007944)

This successional forest is also called **Eastern White Pine Successional Forest**. This association occurs on former old fields or cleared areas of all slopes and aspects at lower and mid elevations within the Blue Ridge. The canopy is generally dominated by an even aged stand of white pine with tuliptree, red maple, and eastern hemlock (*Tsuga canadensis*).

Within the park, there are old patches of these white pines which exist with canopy co-dominants such as white oak, black oak (*Quercus velutina*), and eastern hemlock. The understory contains some great rhododendron and the herb layer is sparse and dominated by acid-loving species such as pink lady's slipper and downy rattlesnake-plantain as well as exotic species such as Japanese honeysuckle (*Lonicera japonica*).

This assemblage is a human-created community associated with former old fields and clear cuts. It is of no conservation value locally or globally. Within the park, the area does harbor a number of exotic species such as Japanese honeysuckle, Chinese yam (*Dioscorea oppositifolia*), princess tree (*Paulownia tomentosa*), English ivy, and Chinese privet. These plants should be controlled to stop their spread into adjacent higher priority ecosystems.

There are no species of concern in this community, although a small population of Biltmore's carrion flower has been documented in an example of this community.

Appalachian Highlands Hemlock-Hardwood Forests Ecogroup(420-25)

Tsuga canadensis - Liriodendron tulipifera - Betula lenta / Rhododendron maximum Forest Association (CEGL007543)

This mixed forest association is also called Eastern Hemlock - Tuliptree - Sweet Birch / Great Rhododendron Forest or **Southern Appalachian Acid Cove Forest (Typic Type)**. It has a diverse and tall canopy with hemlock, tuliptree, birch (*Betula sp.*), and many other species. Usually this community exists adjacent to or along small creeks within coves. The understory consists of a tall great rhododendron layer with some mountain laurel and a very poorly developed herb layer with a substantial amount of highland doghobble (*Leucothoe fontanesiana*).

Within the park, this community is the only example of an old-growth or older stand of trees and the only example of a mesic cove forest. This example consists of a very tall canopy of large old birches, white oaks, tuliptrees, black gum (*Nyssa sylvatica*), red maple, and Fraser's magnolia, with a very tall layer of great rhododendron and mountain laurel. The stand is probably not old growth since there is an old road bed adjacent to the community. However, it is still the location of the largest and possibly the oldest trees in the park. The herb layer is very sparse, but does contain some small amounts of galax, striped prince's pine, and Biltmore's carrion flower (*Smilax biltmoreana*).

This association is considered common throughout the acidic coves and gorges of the southern Appalachians. It is the more acidic, less diverse version of the rich cove forest. Within the park,

the only example of this association is in the far southeastern corner of the property. Here the community is well developed along the narrow creek corridor and its adjacent steep slopes as the creek flows out of the park.

This acid cove community appears stable. There are no plants of concern in this association, though the trees in this part of the park are probably the oldest in the park. Since it is very close to the edge of the park, this site should be visited once a year to ensure that human activities that are incompatible with the forest's health have not occurred.

Appalachian Highlands Dry-Mesic Oak Forests and Woodlands (401-13) OR Appalachian Highlands Xeric Shortleaf Pine Woodlands and Forests (401-30)

Pinus echinata – Quercus alba / Vaccinium pallidum / Hexastylis arifolia – Chimaphila maculata Forest (CEGL008427)

This mixed forest is also called Shortleaf Pine – White Oak / Hillside Blueberry / Arrowleaf Heartleaf – Stiped Wintergreen Forest or **Appalachian Shortleaf Pine – Mesic Oak Forest**. It has a diverse canopy of oak species such as white oak, southern red oak (*Quercus falcata*), and post oak (*Quercus stellata*) along with shortleaf pine (*Pinus echinata*). The community occurs only at low elevations in the Appalachians in areas near the Blue Ridge escarpment and the adjacent Piedmont.

Within the park, this community occurs only in small areas in the north of the park, especially near the current administrative building. It conists of a canopy of white oak, southern red oak, shortleaf pine, white pine, post oak, and scarlet oak. In addition, the understory consists of a moderate amount of sourwood and blackgum. The tall shrub layer contains a small amount of mountain laurel.

This association is common and is considered secure in its range. It is of low conservation priority. No species of concern occur in this association.

The community appears stable, though shortleaf pine may senesce over time and be replaced only by more oaks. Since it occurs only at one part of the park, the biggest threat is probably development inside the park boundary.

Appalachian Highlands Xeric Oak Forests Ecogroup (401-10)
Quercus (prinus, coccinea) / Kalmia latifolia / (Galax urceolata, Gaultheria procumbens) Forest Association (CEGL006271)

This oak forest association is also referred to as the (Rock Chestnut Oak, Scarlet Oak) / Mountain Laurel / (Galax, Wintergreen) Forest or **Chestnut Oak Forest (Xeric Ridge Type)**. Examples of this association are usually found on south to west facing steep slopes. They contain dense thickets of mountain laurel (*Kalmia latifolia*) and normally contain a poorly developed herbaceous understory.

Within the park, the canopy of this association is generally dominated by chestnut oak (*Quercus prinus*). The understory of this association is thick with white pine (*Pinus strobus*), sourwood (*Oxydendrum arboreum*), red maple (*Acer rubrum var. rubrum*), and other fire intolerant species. The shrub layer is dominated by mountain laurel while the sparse herb layer is composed of galax (*Galax urceolata*) and very small amounts of marginal wood fern (*Dryopteris marginalis*), partridgeberry (*Mitchella repens*), and downy rattlesnake-plantain.

This oak forest association is uncommon within the park but very common and secure throughout its range. It was found in one location in the central part of the park, though it most likely occurs on other slopes not visited during this sampling.

Within the park, this community's composition has changed significantly over the past century. The understory is now heavily dominated by fire intolerant species such as white pine and red maple. As a consequence of this increased competition and shading, there seems to be very little oak regeneration (White 2001, personal observation). This indicates that disturbance may have played more of a role in this ecosystem in the past. Further changes to this community should be expected as the fire intolerant species reach the canopy. We found no species of particular significance associated with this community within the park.

Appalachian Montane Oak-Hickory Forests EcoGroup (410-40)
Quercus alba – Quercus (rubra, prinus) / Rhododendron calendulaceum Kalmia latifolia – (Gayllusacia ursina) Forest Association (CEGL007230)

This oak forest association is also called White Oak - (Northern Red Oak, Rock Chestnut Oak) / Flame Azalea - Mountain Laurel - (Bear Huckleberry) Forest or **Appalachian Montane Oak Hickory Forest (Typic Acidic Type)**. It is found on dry acidic slopes and lacks any species found on lower slopes or on circumneutral soils. The canopy is composed of various oak species but may also contain hickory species (*Carya sp.*), tuliptree (*Liriodendron tulipifera*), red maple, and Fraser's magnolia (*Magnolia fraseri*). Although the herb layer is sparse, it can be very diverse.

Within the park, this association is best developed on east facing mid-slopes. The canopy tends to be dominated by a combination of white oak, chestnut oak, and mockernut hickory (*Carya alba*). The understory contains red maple, white pine, and sourwood, and the herb layer is very diverse with overall species diversity approaching 60 species per 20 x 50-meter plot in some

examples. The herb layer in this association can vary between extremely diverse and only moderately diverse on some transitional sites.

This oak forest association is very common, perhaps the most common community within park boundaries. Globally, this community is secure, as it is throughout the Blue Ridge.

This is perhaps the most stable of all of the communities within the park. Like other forests, it is somewhat threatened by red maple invasion. However, the understory of this community is adapted to a more mesic and shady environment than most of the other communities mentioned here and so has probably not been altered as much as the other oak forests by the heavier maple cover. Exotic species such as Chinese privet (*Ligustrum sinense*) and English ivy (*Hedera helix*) could become a problem in this community if not controlled properly, but the areas sampled in 2001 seemed to be free of most exotic species.

Carolina lily (*Lilium michauxii*) was found in this community but not elsewhere in the park. Biltmore's carrion flower, an endemic plant of this part of North and South Carolina, is also present in healthy numbers in examples of this association.

No management is currently needed, though examples of this community closest to the developed portion of the park should be monitored to detect invasive exotic plants before they become a problem.

Appalachian Montane Oak-Hickory Forests EcoGroup(410-40)

Quercus prinus – Quercus rubra / Rhododendron maximum / Galax urceolata Forest Association (CEGL006286)

This oak forest association is also referred to as Rock Chestnut Oak - Northern Red Oak / Great Rhododendron / Galax Forest or **Chestnut Oak Forest (Mesic Slope Heath Type)**. It is found on protected, north-facing slopes within the southern Blue Ridge. The ericaceous shrub layer of great rhododendron (*Rhododendron maximum*) is tall and well developed while the herb layer is mostly composed of leaf litter with some galax and striped prince's-pine (*Chimaphila maculata*).

Within the park, as is true globally, the community is limited to north facing lower and middle slopes. The occurrences of this association contain chestnut oak and northern red oak (*Quercus rubra*) in the canopy. All examples have a very high coverage of great rhododendron in the shrub layer and very low or no herb cover.

This oak forest association is fairly common in the park but seems to be limited to the lower portions of north facing slopes. It is fairly common and secure outside the park although it is limited in distribution to the Southern Blue Ridge . It is most well developed on the steep northwest facing slope of Glassy Mountain in the extreme southwestern corner of the park.

The oaks in this community are not regenerating naturally, probably due to lack of fire. Oaks are being replaced by more shade tolerant species such as red maple and white pine. There are no species of particular concern within this ecosystem. Any management for this ecosystem

would best be done in the far southwestern corner of the park where the community is best developed.

Appalachian Montane Oak – Hickory Forests (410-40)

Quercus rubra – Acer rubrum / Calycanthus floridus – Pyrularia pubera / Thelypteris noveboracensis Forest (CEGL006192)

This hardwood forest association is also called Northern Red Oak – Red Maple / Sweet-shrub – Buffalo-nut / New York Fern Forest or **Appalachian Montane Oak-Hickory Forest (Red Oak Type)**. It occurs on mostly northern to eastern and southeastern slope faces, slopes over acid soils. The canopy is dominated by red oak with red maple, tulip poplar, and white oak. The understory is quite variable, but often has a sparse shrub layer and sparse to medium herb layer.

Within the park, this community is dominated by red oak. The shrub layer is sparse and herb cover is sparse to moderate. Some herb species include solomon's seal *(Polygonatum biflorum*), perfoliate bellwort (*Uvularia perfoliata*), licorice bedstraw (*Galium circazaens*), and violet iris (*Iris verna var. smalliana*).

This association is uncommon in the park, but common and secure regionally. There are no species of concern found in this community at this time.

Appalachian Montane Oak – Hickory Forests (410-40)

Quercus prinus – (Quercus rubra) – Carya spp. / Oxydendrum arboreum – Cornus florida Forest (CEGL007267

This community exists at low to intermediate elevations in the southern Blue Ridge escarpment area. The canopy is dominated by chestnut oak but can be codominated by red maple. The shrub stratum and herb stratum are sparse, with only acid loving species present.

Within the park, this community occurs on some northeast-facing dry slopes within the park. The community seems to exist in areas where fire suppression and logging have created opportunities for more mesic species such as red maple to establish in the understory. A mixture of chestnut oak, northern red oak, white oak, and hickory species dominates canopies of this stand within the park and the subcanopy is dominated by sourwood, dogwood, blackgum, and red maple. The herb layer is sparse and mostly consists of patches of galax, trailing arbutus, and downy rattlesnake-plantain.

The community is changing as red maple increases its dominance in the canopy. Otherwise, the community is secure within the park. There are no species of concern present in this association.

Ecological Community Summary

Of the fourteen associations described above, the two associations that warrant the most attention are the rock outcrop and pine woodland communities. The G2 community of rock outcrops is imperiled throughout its range, but it is locally abundant within the park. The rock outcrop areas (CEGL007690) in the southeast corner of the park are the most intact and may sustain themselves without aggressive management. However, the rock outcrops closest to the trail to Big Glassy are more vulnerable due to exotic species invasion and soil erosion from the adjacent trail.

The G3 community pine woodland (CEGL007097) is an interesting and important community. However, its status within the park in the future is in serious doubt. This area has been fire suppressed for many years and is now in the process of being replaced by a more dense forest of fire intolerant species. The original structure of the woodland can be seen in the canopy pine trees, but many of these trees will be displaced by the more mesic fire intolerant species now creeping into the canopy. Aggressive tactics such as fire and possibly even cutting might be needed to ensure the survival of this community on site if this community is a local priority.

For a park of its size, Carl Sandburg Home has an amazing diversity of ecological communities. The park contains forests and woodlands, rock outcrops and cove forests, fields and ponds. Though only 108 ha (267 acres), Carl Sandburg Home is home to at least 519 species of vascular plants and fourteen different ecological communities. In addition to preserving a great cultural resource, this park also preserves a significant ecological resource in a rapidly developing area that, if managed properly, will allow the region to maintain its ecological heritage.

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Figure 1. Map of Carl Sandburg Home National Historic Site with all permanent points marked at their actual locations.

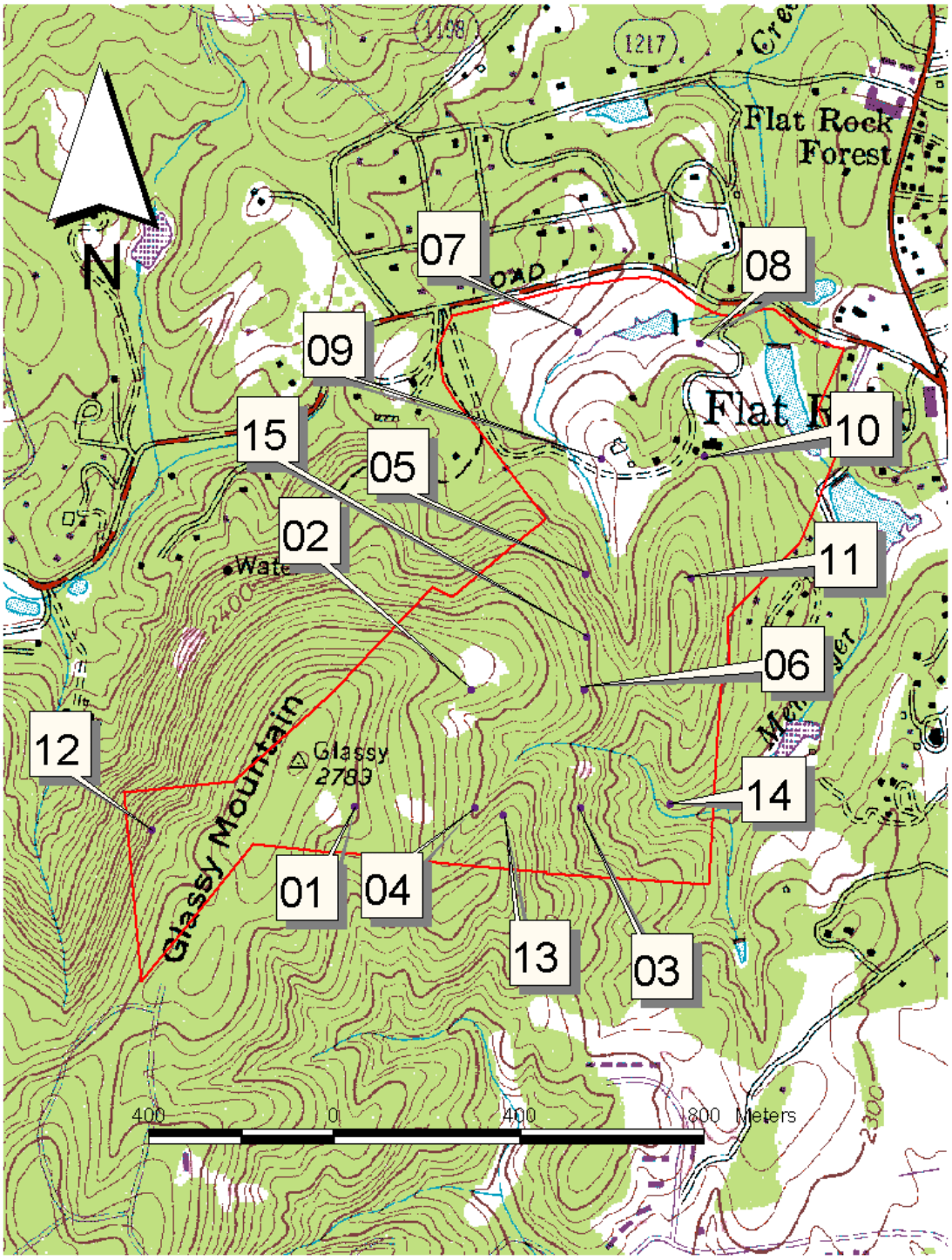
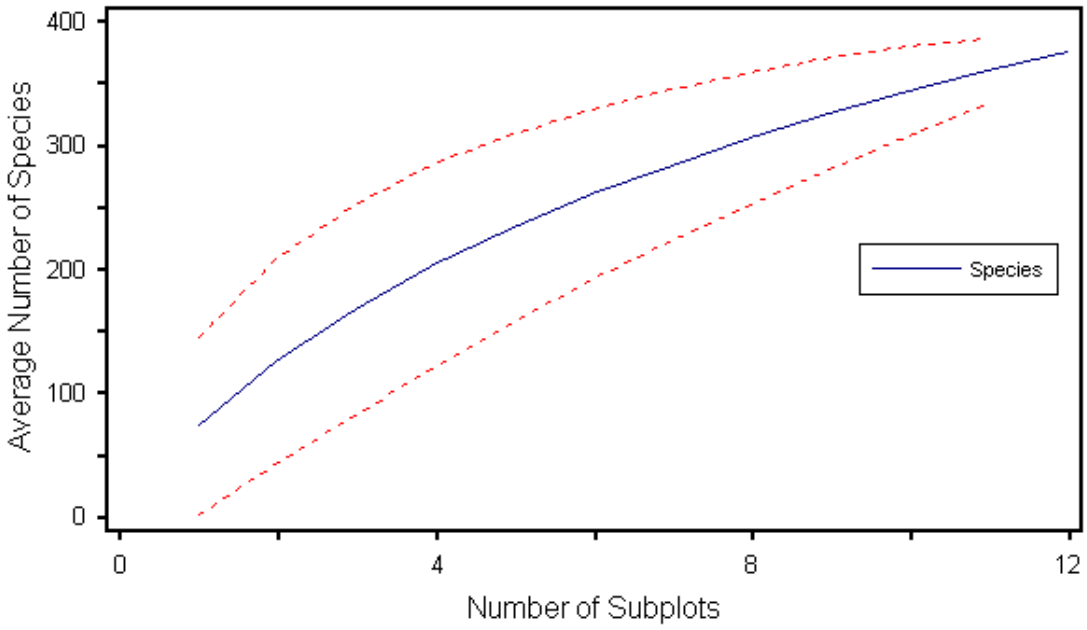


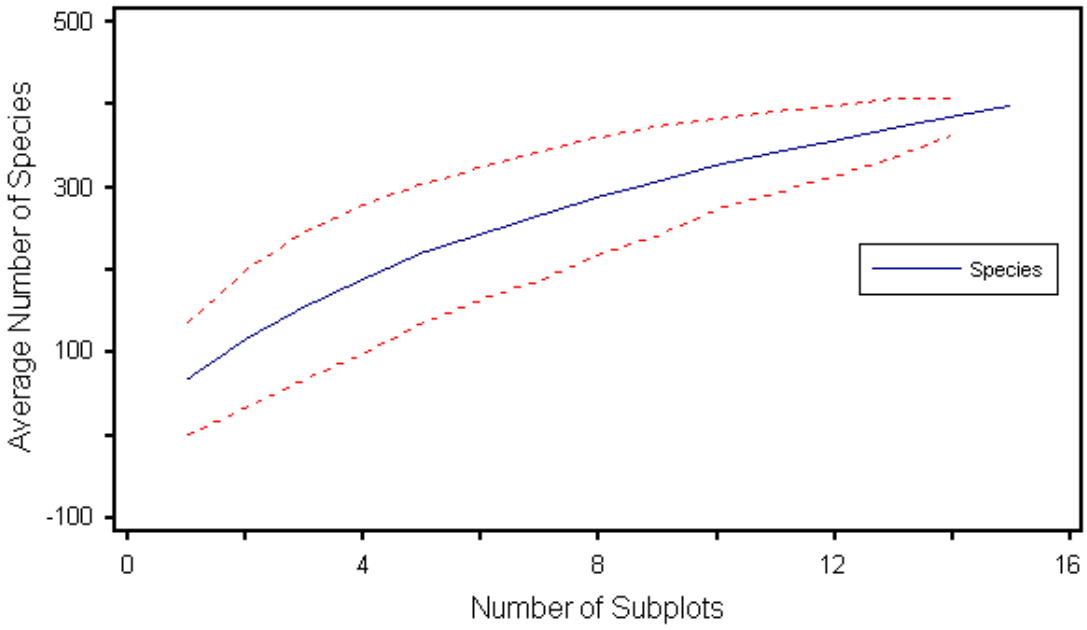
Figure 2. Species area curves for Carl Sandburg Home National Historic Site derived using data from a) just the 12 gridded plots in the park and b) all 15 plots.

a)



First-order jackknife estimate of number of species in park = 546.5
Second-order jackknife estimate of number of species in park = 645.4

b)



First-order jackknife estimate of number of species in park = 581.0
Second-order jackknife estimate of number of species in park = 692.1

Table 1. Plot numbers and locations for all permanent plots established at Carl Sandburg Home National Historic Site.

Plot Number	X Coordinate	Y Coordinate	Projection	Zone
1	367583	3903119	NAD27	17
2	367835	3903371	NAD27	17
3	368070	3903116	NAD27	17
4	367841	3903117	NAD27	17
5	368080	3903618	NAD27	17
6	368078	3903371	NAD27	17
7	368066	3904142	NAD27	17
8	368329	3904120	NAD27	17
9	368115	3903870	NAD27	17
10	368339	3903873	NAD27	17
11	368308	3903610	NAD27	17
12	367146	3903069	NAD27	17
13	367902	3903101	NAD27	17
14	368265	3903125	NAD27	17
15	368084	3903486	NAD27	17

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

Scientific Name	Common Name
Acalypha gracilens	slender threeseed mercury
Acalypha rhomboidea	Virginia threeseed mercury
Acer palmatum	Japanese maple
Acer rubrum var. rubrum	red maple
Acer rubrum var. trilobum	red maple
Acer saccharum var. saccharum	sugar maple
Achillea millefolium	common yarrow
Actaea racemosa	black cohosh
Agalinis purpurea	purple false foxglove
Ageratina altissima var. altissima	white snakeroot
Agrimonia parviflora	harvestlice
Agrostis perennans	autumm bentgrass
Ailanthus altissima	tree-of-heaven
Alnus serrulata	alder
Ambrosia artemisiifolia	ragweed
Ambrosia trifida	great ragweed
Amelanchier arborea	downy service-berry
Amelanchier laevis	allegheny service-berry
Ampelopsis brevipedunculata	porcelainberry
Amphicarpaea bracteata	American hogpeanut
Antennaria plantaginifolia	plantainleaf pussytoes
Anthoxanthum odoratum	sweet vernalgrass
Apios Americana	groundnut
Aplectrum hyemale	Adam and Eve
Apocynum androsaemifolium	flytrap dogbane
Apocynum cannabinum	Indianhemp
Aquilegia canadensis	American columbine
Arabidopsis thaliana	mouseear cress
Aralia spinosa	devil's walkingstick
Arctium minus	lesser burdock
Arenaria serpyllifolia	thymeleaf sandwort
Arisaema triphyllum ssp. triphyllum	Jack in the pulpit
Aristida dichotoma	churchmouse threeawn
Aristolochia serpentaria	Virginia snakeroot
Artemisia vulgaris	mugwort
Arthraxon hispidus	hairy jointgrass

Scientific Name	Common Name
Asclepias amplexicaulis	clasping milkweed
Asclepias incarnata ssp. pulchra	swamp milkweed
Asclepias syriaca	common milkweed
Asclepias tuberosa ssp. tuberosa	butterfly milkweed
Asclepias variegata	white milkweed
Asparagus officinalis	asparagus
Asplenium platyneuron	ebony spleenwort
Athyrium filix-femina ssp. asplenioides	southern ladyfern
Aureolaria laevigata	entireleaf yellow false foxglove
Aureolaria virginica	downy yellow false foxglove
Barbarea verna	early yellowrocket
Barbarea vulgaris	Yellow rocket
Berberis thunbergii	Japanese barberry
Betula lenta	sweet birch
Betula nigra	river birch
Bidens bipinnata	Spanish needles
Bidens frondosa	devil's beggartick
Boehmeria cylindrica	small-spike false nettle
Botrychium dissectum	cutleaf grapefern
Botrychium virginianum	rattlesnake fern
Bromus cathartica	rescue brome
Bulbostylis capillaris	densetuft hairsedge
Buxus sempervirens	common boxwood
Calamagrostis cinnoides	arctic reedgrass
Calycanthus floridus var. glaucus	sweet-shrub
Calystegia sepium	hedge bindweed
Campanula divaricata	small bonny bellflower
Cardamine hirsuta	hairy bittercress
Carex aestivalis	summer sedge
Carex atlantica ssp. atlantica	Atlantic sedge
Carex cephalophora	oval-leaf sedge
Carex crinita	fringed sedge
Carex debilis	white edge sedge
Carex gracilescens	slender looseflower sedge
Carex intumescens	greater bladder sedge
Carex laevivaginata	wooly sedge
Carex lurida	shallow sedge
Carex pensylvanica	Pennsylvania sedge

Scientific Name	Common Name
Carex retroflexa	reflexed sedge
Carex scoparia	pointed broom sedge
Carex styloflexa	bent sedge
Carex swanii	Swan’s sedge
Carex virescens	ribbed sedge
Carya alba	mockernut hickory
Carya glabra	pignut hickory
Carya ovalis	pignut hickory
Carya pallida	sand hickory
Castanea dentata	American chestnut
Catalpa speciosa	northern catalpa
Ceanothus americanus	New Jersey tea
Celastrus orbiculata	Oriental bittersweet
Cerastium brachypetalum	gray chickweed
Cerastium fontanum ssp. vulgare	common mouse-ear chickweed
Cercis canadensis var. canadensis	redbud
Chamaecrista nictitans ssp. nictitans var. nictitans	sensitive partridge pea
Chamaelirium luteum	fairywand
Chamaesyce maculata	spotted sandmat
Chamaesyce nutans	spotted sandmat
Chelone spp.	turtlehead
Chenopodium album	lambsquarters
Chenopodium ambrosioides	Mexican tea
Chimaphila maculata	striped prince’s pine
Chionanthus virginicus	fringetree
Chrysopsis mariana	Maryland goldenaster
Cirsium vulgare	bull thistle
Clematis virginiana	devil’s darning needles
Clethra acuminata	mountain sweetpepperbush
Clethra acuminata	mountain sweetpepperbush
Collinsonia canadensis	richweed
Comandra umbellata	bastard toadflax
Commelina communis	Asiatic dayflower
Commelina virginica	Virginia dayflower
Conium maculatum	poison hemlock
Convallaria majuscula	American lily of the valley
Conyza canadensis var. pusilla	Canadian horseweed

Scientific Name	Common Name
Coreopsis major	Canadian horseweed
Coreopsis tripteris	tall tickseed
Cornus amomum	silky dogwood
Cornus florida	flowering dogwood
Corydalis sempervirens	rock harlequin
Corylus americana	American hazelnut
Crataegus flava	yellowleaf hawthorn
Croton willdenowii	two-fruit rushfoil
Cunila origanoides	common dittany
Cuscuta sp.	dodder
Cymbalaria muralis	Kenilworth ivy
Cyperus retrorsus	pine barren flatsedge
Cyperus strigosus	strawcolored flatsedge
Cypripedium acaule	pink lady's slipper
Dactylis glomerata	orchard grass
Danthonia compressa	flattened oatgrass
Danthonia sericea	downy oatgrass
Danthonia spicata	poverty oatgrass
Daucus carota	Queen Annes lace
Dennstaedtia punctilobula	eastern hayscented fern
Deschampsia flexuosa	wavy hairgrass
Desmodium nudiflorum	nakedflower ticktrefoil
Desmodium nudiflorum	nakedflower ticktrefoil
Desmodium nuttallii	Nuttall's ticktrefoil
Desmodium rotundifolium	prostrate ticktrefoil
Dichanthelium boscii	Bosc's panicgrass
Dichanthelium clandestinum	deertongue panicgrass
Dichanthelium commutatum	variable panicgrass
Dichanthelium depauperatum	starved panicgrass
Dichanthelium dichotomum	cypress panicgrass
Dichanthelium dichotomum var. yadkinense	forked witch grass
Dichanthelium leucothrix	rough panicgrass
Dichanthelium sphaerocarpon var. sphaerocarpon	roundseed panicum
Digitaria sanguinalis	hairy crabgrass
Diodia teres	poor joe
Diodia virginiana	Virginia buttonweed

Scientific Name	Common Name
Dioscorea oppositifolia	Chinese yam
Dioscorea quaternata	Whorled wild yam
Diospyros virginiana	persimmon
Drosera rotundifolia	roundleaf sundew
Dryopteris intermedia	intermediate woodfern
Dryopteris marginalis	marginal woodfern
Duchesnea indica	Indian strawberry
Dulichium arundinaceum	threeway sedge
Echinochloa crus-galli var. crus-galli	large barnyardgrass
Elaeagnus umbellata	silverberry
Eleocharis obtusa	blunt spikerush
Elephantopus tomentosus	hairy elephantfoot
Eleusine indica	Indian goosegrass
Elymus virginicus	Virginia wildrye
Epigaea repens	trailing arbutus
Epilobium ciliatum	hairy willowherb
Eragrostis capillaris	lace grass
Eragrostis cilianensis	lovegrass
Erechtites hieracifolia	pilewort
Erigeron annuus	annual fleabane
Erigeron philadelphicus	Philadelphia fleabane
Erigeron pulchellus	robin’s plantain
Erigeron strigosus	Daisy Fleabane
Euonymus alata	burning bush
Euonymus americana	stawberry bush
Euonymus fortunei	climbing euonymus
Eupatorium capillifolium	dogfennel
Eupatorium maculatum	spotted joepyeweed
Eupatorium perfoliatum	boneset
Eupatorium purpureum	sweetscented joepyeweed
Eupatorium rotundifolium	roundleaf thoroughwort
Euphorbia corollata var. corollata	Northern flowering spurge
Euphorbia pubentissima	false flowering spurge
Eurybia divericata	white wood aster
Eurybia macrophylla	bigleaf aster
Eurybia surculosa	creeping aster
Fagus grandifolia	American beech
Fragaria virginiana	wild strawberry

Scientific Name	Common Name
Fraxinus americana	white ash
Galax urceolata	galax
Galinsoga ciliata	shaggy soldier
Galium aparine	bedstraw
Galium circaezans	woods bedstraw
Galium latifolium	purple bedstraw
Galium tinctorium	stiff marsh bedstraw
Galium triflorum	fragrant bedstraw
Gaura biennis	biennial beeblossom
Gaylussacia baccata	black huckleberry
Gaylussacia ursina	bear huckleberry
Geranium carolinianum	Carolina geranium
Geum canadense	white avens
Geum vernum	heartleaf avens
Glandularia canadensis	rose mock vervain
Glecoma hederacea	creeping charlie
Glyceria striata	fowl mannagrass
Gnaphalium obtusifolium	rabbit tobacco
Goodyera pubescens	downy rattlesnake plantain
Gratiola viscidula	Short’s hedgehyssop
Hamamelis virginiana	witch-hazel
Hedera helix	English ivy
Helianthus divericatus	woodland sunflower
Heuchera americana	American alumroot
Hexastylis rhombiformis	North Fork heartleaf
Hieracium gronovii	Gronovi’s hawkweed
Hieracium paniculatum	Allegheny hawkweed
Hieracium venosum	rattlesnakeweed
Hosta ventricosa	blue hosta
Houstonia caerulea	azure bluet
Houstonia purpurea	purple bluets
Hydrangea radiata	silverleaf hydrangea
Hypericum calycinum	Aaron’s beard
Hypericum gentianoides	orangegrass
Hypericum hypericoides	St. Andrew’s cross
Hypericum mutilum	dwarf St. Johnswort
Hypericum prolificum	shrubby St. Johnswort
Hypericum punctatum	spotted St. Johnswort

Scientific Name	Common Name
Hypericum virgatum	sharp-leaf St. Johnswort
Hypochaeris radicata	false dandelion
Hypoxis hirsuta	Yellow star-grass
Ilex ambigua	Carolina holly
Ilex crenata	Japanese holly
Ilex opaca	American holly
Ilex verticillata	common winterberry
Impatiens capensis	jewelweed
Ipomoea coccinea	red morningglory
Ipomoea pandurata	man-of-the-earth
Ipomoea purpurea	common morningglory
Iris cristata	dwarf crested iris
Iris verna var. smalliana	dwarf violet iris
Juglans nigra	black walnut
Juncus acuminatus	tapertip rush
Juncus dichotomus	forked rush
Juncus effusus	lamp rush
Juncus tenuis	path rush
Juniperus virginiana var. virginiana	red cedar
Kalmia latifolia	mountain laurel
Krigia virginica	Virginia dwarfdandelion
Kyllinga pumila	low spikesedge
Lactuca canadensis	Florida blue lettuce
Lathyrus latifolius	everlasting peavine
Lechea minor	thymeleaf pinweed
Lechea racemulosa	Illinois pineweed
Leersia virginica	rice cutgrass
Lepidium virginicum	peppergrass
Lespedeza cuneata	Chinese lespedeza
Leucanthemum vulgare	oxeye daisy
Leucothoe fontanesiana	highland doghobble
Leucothoe recurva	redtwig doghobble
Liatris spicata	dense gayfeather
Ligustrum sinense	Chinese privet
Lilium michauxii	Carolina lily
Lindernia monticola	piedmont false pimpernel
Linum striatum	ridged yellow flax
Linum virginianum	woodland flax

Scientific Name	Common Name
Liriodendron tulipifera	tuliptree
Lobelia amoena	southern lobelia
Lobelia cardinalis	cardinalflower
Lobelia inflata	Indian tobacco
Lobelia puberula	downy lobelia
Lobelia siphilitica	great lobelia
Lolium perenne ssp. multiflorum	annual rye grass
Lonicera flava	yellow honeysuckle
Lonicera japonica	Japanese honeysuckle
Lonicera sempervirens	trumpet honeysuckle
Ludwigia alternifolia	seedbox
Ludwigia palustris	marsh primrose-willow
Lycopodium digitatum	fan clubmoss
Lycopodium obscurum	ground pine
Lycopus uniflorus	northern bugleweed
Lycopus virginicus	Virginia bugleweed
Lyonia ligustrina	maleberry
Lysimachia ciliata	fringed loosestrife
Lysimachia lanceolata	lanceleaf loosestrife
Lysimachia quadrifolia	lanceleaf loosestrife
Lysimachia terrestris	earth loosestrife
Magnolia fraseri	Fraser’s magnolia
Mahonia bealei	Beale’s Oregon-grape
Mahonia japonica x lorariifolia	Japanese Oregon-grape
Maianthemum canadense	Canada mayflower
Maianthemum racemosum ssp. racemosum	false Solomon’s seal
Medeola virginiana	Indian cucumber
Medicago lupulina	black medic clover
Melica mutica	oniongrass
Mentha piperita ssp. Piperita	peppermint
Microstegium vimineum	Japanese stiltgrass
Mimulus ringens	Allegheny monkeyflower
Minuartia groenlandica	sandwort
Miscanthus sinensis	Chinese silvergrass
Mitchella repens	partridgeberry
Mollugo verticillata	carpetweed
Monarda clinopodia	white bergamot
Monotropa hypopithys	pinesap

Scientific Name	Common Name
Monotropa uniflora	Indianpipe
Morus alba	white mulberry
Muhlenbergia schreberi	nimblewill
Murdannia keisak	Aneilema
Myriophyllum aquaticum	brazilian watermilfoil
Nymphaea odorata	American white waterlily
Nyssa sylvatica	black gum
Oenothera biennis	common evening primrose
Osmunda cinnamomea	cinnamon fern
Oxalis stricta	sourgrass
Oxydendrum arboreum	sourwood
Oxypolis rigidior	stiff cowbane
Packera anonyma	Small's ragwort
Packera aurea	golden ragwort
Packera memmingeri	Memminger's ragwort
Packera millefolia	piedmont ragwort
Panicum anceps	beaked panicgrass
Panicum dichotomiflorum	fall panicgrass
Panicum flexile	wiry panicgrass
Panicum virgatum var. virgatum	switchgrass
Parthenocissus quinquefolia	Virginia creeper
Paspalum laeve	field paspalum
Passiflora lutea	passionflower
Paulownia tomentosa	princess tree
Perilla frutescens	beefsteakplant
Phlox amoena	hairy phlox
Photinia melanocarpa	black chokeberry
Physalis longifolia var. subglabrata	longleaf groundcherry
Physocarpus opulifolius	common ninebark
Phytolacca americana	pokeweed
Pilea pumila	Canada clearweed
Pinus echinata	shortleaf pine
Pinus rigida	pitch pine
Pinus strobus	white pine
Pinus virginiana	Viginia pine
Piptochaetium avenaceum	blackseed needlegrass
Pityopsis graminifolia var. graminifolia	narrowleaf silkgrass
Plantago aristata	largebracted plantain

Scientific Name	Common Name
Plantago lanceolata	English plantain
Plantago rugelii	Rugel's plantain
Platanthera clavellata	small green wood orchid
Platanus occidentalis	sycamore
Poa annua	annual bluegrass
Polygala curtissii	Curtiss' milkwort
Polygala polygama	bitter milkwort
Polygonatum biflorum var. biflorum	King Solomon's seal
Polygonatum caespitosum var. longisetum	oriental ladysthumb
Polygonatum pubescens	hairy Solomon's seal
Polygonum cuspidatum	Japanese knotweed
Polygonum sagittatum	arrowleaf tearthumb
Polygonum scandens var. scandens	climbing knotweed
Polygonum tenue	pleatleaf knotweed
Polypodium virginianum	rock polypody
Polystichum acrostichoides	Christmas fern
Populus alba	white poplar
Portulaca oleracea	common purslane
Potentilla canadensis	dwarf cinquefoil
Potentilla recta	roughfruit cinquefoil
Prenanthes altissima	tall rattlesnakeroot
Prunella vulgaris	heal all
Prunus cerasus	sour cherry
Prunus serotina var. serotina	black cherry
Pteridium aquilinum	bracken fern
Pycnanthemum flexuosum	Appalachian mountain mint
Pycnanthemum verticillatum	whorled mountain mint
Pyrularia pubera	buffalo nut
Quercus alba	white oak
Quercus coccinea	scarlet oak
Quercus falcata	Southern red oak
Quercus marilandica	blackjack oak
Quercus prinus	chestnut oak
Quercus rubra	northern red oak
Quercus stellata	post oak
Quercus velutina	black oak
Ranunculus abortivus	smallflower buttercup
Ranunculus bulbosus	bulbous buttercup

Scientific Name	Common Name
Ranunculus hispidus	bristly buttercup
Ranunculus recurvatus	littleleaf buttercup
Ranunculus repens	creeping buttercup
Rhexia mariana var. mariana	Maryland meadowbeauty
Rhexia virginica var. virginica	Virginia meadow-beauty
Rhododendron arborescens	smooth azalea
Rhododendron calendulaceum	flame azalea
Rhododendron maximum	rosebay rhododendron
Rhododendron periclymenoides	pink azalea
Rhus copallinum var. latifolia	winged sumac
Rhynchospora capitellata	brownish beaksedge
Rhynchospora recognita	globe beaksedge
Robinia hispida var. kelseyi	Kelsey's locust
Robinia pseudoacacia	black locust
Rosa bracteata	Macartney rose
Rosa canina	dog rose
Rosa carolina	Carolina rose
Rosa multiflora	multiflora rose
Rosa palustris	swamp rose
Rubus argutus	sawtooth blackberry
Rubus flagellaris	northern dewberry
Rubus hispidus	bristly dewberry
Rubus occidentalis	black raspberry
Rudbeckia hirta	blackeyed susan
Rumex acetosella	sheep sorrel
Rumex crispus	curly dock
Sagittaria latifolia var. pubescens	hairy broadleaf arrowhead
Salix caprea	goat willow
Salix nigra	black willow
Sambucus canadensis	American elder
Sanicula canadensis	Canada blacksnakeroot
Sassafras albidum	sassafras
Saxifraga michauxii	Michaux's saxifrage
Schizachyrium scoparium var. scoparium	little bluestem
Schoenoplectus purshianus	weakstalk bulrush
Scirpus atrovirens	green bulrush
Scirpus cyperinus	bulrush
Scirpus expansus	woodland bulrush

Scientific Name	Common Name
Scleria reticularis	netted nutrush
Scutellaria elliptica	hairy skullcap
Scutellaria integrifolia var. integrifolia	Hyssop skullcap
Scutellaria lateriflora	mad dog skullcap
Selaginella rupestris	rock spikemoss
Sericocarpus linifolius	narrowleaf whitetop aster
Seriocarpus asteroides	white-topped aster
Setaria geniculata	marsh bristlegrass
Setaria glauca	pearl millet
Sida spinosa	prickly sida
Silene stellata	widowsfrill
Silene virginica	firepink
Sisymbrium officinale	hedge mustard
Sisyrinchium mucronatum	needle-tip blue-eyed-grass
Smilax biltmoreana	Biltmore's carrionflower
Smilax biltmoreana	Biltmore's carrionflower
Smilax glauca	cat greenbrier
Smilax rotundifolia	roundleaf greenbrier
Solanum americanum	smallflower nightshade
Solanum carolinense	Carolina horsenettle
Solidago arguta	Atlantic goldenrod
Solidago caesia	wreath goldenrod
Solidago canadensis var. scabra	tall goldenrod
Solidago curtisii	Curtis' goldenrod
Solidago gigantea	late goldenrod
Solidago juncea	early goldenrod
Solidago odora	licorice goldenrod
Solidago patula	roundleaf goldenrod
Solidago roanensis	Roan Mountain goldenrod
Solidago rugosa	wrinkleleaf goldenrod
Sparganium americanum	American bur-reed
Sphenopholis nitida	Shiny wedgescale
Spiraea japonica	Japanese spiraea
Spiranthes cernua	nodding ladies'-tresses
Spiranthes odorata	marsh ladies-tresses
Stellaria media	common chickweed
Stellaria pubera	star chickweed
Symphyotrichum dumosum	rice button aster

Scientific Name	Common Name
Symphyotrichum lateriflorum	calico aster
Symphyotrichum patens	late purple aster
Symphyotrichum puniceum	purplestem aster
Talinum teretifolium	quill fameflower
Taraxacum officinale	dandelion
Teucrium canadense	germander
Thalictrum clavatum	mountain meadow-rue
Thalictrum dioicum	early meadowrue
Thalictrum revolutum	waxyleaf meadowrue
Thelypteris noveboracensis	New York fern
Thermopsis mollis	Allegheny Mountain goldenbanner
Tilia americana var. heterophylla	American basswood
Tipularia discolor	crippled cranefly
Toxicodendron radicans	poison ivy
Tradescantia subaspera	zigzag spiderwort
Trautvetteria caroliniensis	Carolina bugbane
Trifolium pratense	red clover
Trifolium repens	White clover
Trillium catesbaei	bashful wakerobin
Triodanis perfoliata	clasping Venus' looking glass
Tsuga canadensis	Canada hemlock
Tsuga caroliniana	Carolina hemlock
Typha latifolia	cattail
Ulmus americana	American elm
Utricularia gibba	humped bladderwort
Utricularia radiata	little floating bladderwort
Uvularia sessilifolia	sessileleaf bellwort
Vaccinium corymbosum	highbush blueberry
Vaccinium corymbosum	highbush blueberry
Vaccinium fuscatum	black highbush blueberry
Vaccinium pallidum	Hillside blueberry
Vaccinium simulatum	upland highbush blueberry
Vaccinium stamineum	deerberry
Verbascum thapsus	mullein
Verbena urticifolia	white vervain
Verbesina	crownbeard
Vernonia noveboracensis	New York ironweed
Veronica hedaraefolia	ivyleaf speedwell

Scientific Name	Common Name
Veronica officinalis	common gypsyweed
Veronica peregrina	neckweed
Veronica serpyllifolia	thymeleaf speedwell
Viburnum acerifolium	mapleleaf viburnum
Viburnum nudum	possumhaw
Viburnum prunifolium	blackhaw
Vicia carolina	Carolina vetch
Vicia sativa	garden vetch
Vinca major	greater periwinkle
Vinca minor	lesser periwinkle
Viola cucullata	marsh blue violet
Viola hastata	halberdleaf yellow violet
Viola hirsutula var. hirsutula	southern wood violet
Viola pedata	birdfoot violet
Viola rotundifolia	roundleaf yellow violet
Viola sagittata var. sagittata	Triangle leaf violet
Viola sororia	Confederate violet
Viola X primulifolia	primrose-leaf violet
Vitis aestivalis	summer grape
Vitis rotundifolia	muscadine
Wisteria floribunda	Japanese wisteria
Woodsia obtusa	bluntlobe cliff fern
Woodwardia areolata	netted chainfern
Xanthium strumarium	cocklebur
Xanthorhiza simplicissima	yellowroot
Xyris torta	common yelloweyed grass
Zizia aurea	golden alexanders
Zizia trifoliata	meadow alexanders

Table 3. All vouchers and observations that exist for Carl Sandburg Home NHS.

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Acalypha gracilens	slender threeseed mercury	28183	109301	White, R., Weakley, A., Ferguson, T.	Old field	G5
Acalypha rhomboidea	Virginia threeseed mercury	28193	109302	White, R., Weakley, A.	Old field, roadside edge and farm pond	G5
Acer palmatum	Japanese maple	182136	109442	Govus, T., Ferguson, T.	Successional white pine-hemlock-oak forest	N/A
Acer rubrum	red maple	28728	108123	Pearson, L. Ulinski,A.	White pine - hemlock disturbed woodland	G5
Acer rubrum	red maple	28728	108614	Heiman, K. & Ulinski, A.		G5
Acer rubrum var. trilobum	red maple	182127	108124	Ulinski, A.	Wet pond margin herbaceous vegetation	G5
Acer saccharum var. saccharum	sugar maple	28732	109303	White, R., Weakley, A.	Streambank	G5
Achillea millefolium	common yarrow	35423	107901	Blaha, M. & Ulinski, A.		n/a
Agalinis purpurea	purple false foxglove	33007	107902	Blaha, M. & Ulinski, A.		G5
Ageratina altissima var. altissima	white snakeroot	182398	109304	White, R., Weakley, A.	Granite flatrock	G5
Agrimonia parviflora	harvestlice	25098	107903	Blaha, M. & Ulinski, A.		G5
Agrostis perennans	autumm bentgrass	40423	109305	White, R., Weakley, A.	Granite flatrock	G5
Ailanthus altissima	tree-of-heaven	28827	108125	Heiman, K.	White pine/rhodo 2nd growth	n/a
Alnus serrulata	alder	19468	108126	Ulinski, A.	Wet pond margin herbaceous veg	G5
Ambrosia artemisiifolia	ragweed	36496	107904	Blaha, M. & Ulinski, A.		G5
Ambrosia trifida	great ragweed	36521	109306	White, R., Weakley, A.	Weedy edge	G5

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Amelanchier arborea	downy service-berry	25110	n/a	Observed		G5
Amelanchier arborea var. arborea	downy service-berry	182037	n/a	Observed		G5
Amelanchier laevis	allegheny service-berry	532087	n/a	Observed		n/a
Ampelopsis brevipedunculata	porcelainberry	28632	109307	White, R., Weakley, A.	Streambank	G5
Amphicarpaea bracteata	American hogpeanut	182067	109308	White, R., Weakley, A.	Old field, roadside edge and farm pond	G5
Aneilema keisak	Aneilema	39125	107907	Blaha, M. & Ulinski, A.		G?
Antennaria plantaginifolia	plantainleaf pussytoes	36717	107908	Blaha, M. & Ulinski, A.		G5
Anthoxanthum odoratum	sweet vernalgrass	41395	108127	Heiman, K.	Pinus strobus/rhododendron 2nd growth	G?
Apios americana	groundnut	25390	109309	White, R., Weakley, A.	Old field, roadside edge and farm pond	G5
Aplectrum hyemale	Adam and Eve	43489	107910	Blaha, M. & Ulinski, A.		G5
Apocynum androsaemifolium	flytrap dogbane	30156	108128	Ulinski, A.	Pasture	G5
Apocynum cannabinum	Indianhemp	30157	108128	Ulinski, A.	Pasture	G5
Apocynum cannabinum	Indianhemp	30157	107911			G5
Aquilegia canadensis	American columbine	18730	109455	Govus, T.	Rich wooded slope with Quercus rubra and prinus	G5
Arabidopsis thaliana	mouseear cress	23041	109447	Govus, T.	Rock outcrop	G?
Aralia spinosa	devil's walkingstick	29378	108129	Ulinski, A.	Low elevation granitic dome	G5
Arctium minus	lesser burrdock	36546	109310	White, R., Weakley, A., Ferguson, T.	Old field	G?

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Arenaria serpyllifolia	thymeleaf sandwort	20270	109435	Govus, T.	Cow pasture and adjacent pond	G?
Arisaema triphyllum ssp. triphyllum	Jack in the pulpit	42526	109311	Weakley,A., White,R.,Ferguson, T.	Seep (shaded)	G5
Aristida dichotoma	churchmouse threeawn	41415	108131	Langdon, K.	Low elevation granitic dome	G5
Aristolochia serpentaria	Virginia snakeroot	18342	108132	Heiman, K.	Dry white oak - hickory forest	G4
Aronia melanocarpa	black chokeberry	25127	108088	Blaha, M. & Ulinski, A.		G5
Artemisia vulgaris	mugwort	35505	108133	Heiman, K. Ulinski, A.	White pine hemlock disturbed woodland	G?
Arthraxon hispidus	hairy jointgrass	41445	109312	White, R., Weakley, A.	Streambank	G?
Asclepias amplexicaulis	clasping milkweed	30244	109313	White, R., Weakley,A., Ferguson, T.	Cow pasture and adjacent pond	G5
Asclepias incarnata ssp. pulchra	swamp milkweed	184806	107912	Blaha, M. & Ulinski, A.		G5
Asclepias incarnata ssp. pulchra	swamp milkweed	184806	108632	Ulinski, A.	White pine/hemlock disturbed woodland	G5
Asclepias syriaca	common milkweed	30310	108134	Ulinski, A.	Pasture	G5
Asclepias tuberosa ssp. tuberosa	butterfly milkweed	30314	107913			G5
Asclepias variegata	white milkweed	30319	107914			G5
Asparagus officinalis	asparagus	42784	109314	White, R., Weakley, A., Ferguson, T.	Cow pasture and adjacent pond	G5?
Asplenium platyneuron	ebony spleenwort	17355	107915	Blaha, M. & Ulinski, A.	Pinus strobus/hemlock anthropogenic woodland	G5

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Aster divaricatus var. divaricatus	white wood aster	35558	107916		White pine/rhododendron 2nd growth	G5
Aster dumosus	rice button aster	35511	107917			G5
Aster lateriflorus	calico aster	35601	107918			G5
Aster macrophylla	bigleaf aster	35608	109437	Govus, T.	Cow pasture and adjacent pond	G5
Aster patens	late purple aster	35624	107919			G5
Aster patens	late purple aster	35624	108621	Langdon, K.	Dry white oak - hickory forest	G5
Aster solidagineus	white-topped aster	35656	108135	Heiman, K.	Xeric Chestnut oak forest	G5
Aster solidagineus	white-topped aster	35656	107921			G5
Aster surculosus	creeping aster	35662	108623	Ulinski, A.	Low elevation granitic dome	G4G5
Athyrium filix-femina ssp. asplenioides	asplenium ladyfern	17415	107922	Blaha, M. & Ulinski, A.	Pinus strobus/hemlock anthropogenic woodland	G5
Aureolaria laevigata	entireleaf yellow false foxglove	33486	108137	Ulinski, A.	Dry white oak - hickory forest	G5
Aureolaria virginica	downy yellow false foxglove	33490	107923			G5
Barbarea verna	early yellowrocket	22743	108138	Ulinski, A.	Mowed area	G?
Barbarea vulgaris	Yellow rocket	22741	107924			G?
Berberis thunbergii	Japanese barberry	18835	107925	Blaha, M. & Crowell, W.		n/a
Berberis thunbergii	Japanese barberry	18835	108245	Langdon, K.	Pinus strobus/rhododendron 2nd growth	n/a
Betula lenta	sweet birch	19487	109315	Weakley, A., White, R., Ferguson, T.	Seep (shaded)	G5

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Betula nigra	river birch	19480	109316	White, R., Weakley,A., Ferguson, T.	Streamside	G5
Bidens bipinnata	Spanish needles	500993	107926	Blaha, M. & Ulinski, A.		G5
Bidens frondosa	devil's beggartick	35707	107927	Blaha, M. & Ulinski, A.		G5
Boehmeria cylindrica	small-spike false nettle	19121	107928	Blaha, M. & Ulinski, A.		G5
Botrychium dissectum	cutleaf grapefern	17171	108139	Heiman, K.	Pinus strobus/rhodo 2nd growth	G5
Botrychium virginianum	rattlesnake fern	17173	108140	Heiman, K.	Xeric Chestnut oak forest	G5
Bromus cathartica	rescue brome	501066	109440	White, R., Govus, T., Ferguson, T.	Old field, roadside edge and farm pond	n/a
Bulbostylis capillaris	densetuft hairsedge	39361	108141	Langdon, K.	Low elevation granitic dome	G5
Buxus sempervirens	common boxwood	501097	Observed	Van Hoff, I.		n/a
Calamagrostis cinnoides	arctic reedgrass	506859	109317	White, R., Weakley,A., Ferguson, T.	Rock (flatrock)	G5
Calycanthus floridus var. laevigatus	sweet-shrub	532851	107929	Blaha, M. & Ulinski, A.		G5
Calystegia sepium	hedge bindweed	30650	109326	White, R., Weakley, A.	Maintenance yard adjacent to park office	G5
Campanula divaricata	small bonny bellflower	34482	108142	Ulinski, A.	Xeric Chestnut oak forest	G4
Cardamine hirsuta	hairy bittercress	22797	108143	Ulinski, A.	Mowed area	G?
Carex aestivalis	summer sedge	39482	108610	Heiman, K.	White pine/rhodo 2nd growth	G4
Carex atlantica ssp. atlantica	Atlantic sedge	523747	108253	Heiman, K.	Wet pond margin herbaceous vegetation	G5

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Carex cephalophora	oval-leaf sedge	39383	109456	Govus, T.	Rich wooded slope with Quercus rubra and prinus	G5
Carex crinita	fringed sedge	39385	108144	Heiman, K.	Wet pond margin herbaceous vegetation	G5
Carex crinita	fringed sedge	39385	108603	Heiman, K.	Wet pond margin herbaceous vegetation	G5
Carex debilis	white edge sedge	39572	108145	Heiman, K.	Wet pond margin herbaceous vegetation	G5
Carex debilis var. pubera	white edge sedge	527086	108255	Heiman, K.	Pinus strobus/rhododendron 2nd growth	G5
Carex gracilescens	slender looseflower sedge	39618	108615	Heiman, K.	White pine/rhododendron 2nd growth	G5
Carex intumescens	greater bladder sedge	39403	108256	Heiman, K.	Wet pond margin herbaceous vegetation	G5
Carex laevivaginata	wooly sedge	39410	108254	Heiman, K.	Wet pond margin herbaceous vegetation	G5
Carex lurida	shallow sedge	39414	108252	Heiman, K.	Wet pond margin herbaceous vegetation	G5
Carex lurida	shallow sedge	39414	108624	Heiman, K.	Wet pond margin herbaceous vegetation	G5
Carex pensylvanica	Pennsylvania sedge	39749	109318	White, R., Weakley, A.	Successional white pine-hemlock-oak forest	G5
Carex retroflexa	reflexed sedge	39782	109438	White, R., Govus, T., Ferguson, T.	Old field, roadside edge and farm pond	G5
Carex scoparia	pointed broom sedge	39432	108147	Heiman, K.	Wet pond margin herbaceous vegetation	G5

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Carex styloflexa	bent sedge	39823	109462	R. White and T. Govus	Found in/near Appalachian Montane Oak-Hickory Forest (Red oak type)	G4G5
Carex swanii	Swan's sedge	39437	108264	Heiman, K.	Dry white oak - hickory forest	G5
Carex virescens	ribbed sedge	39867	108251	Heiman, K.	Pinus strobus/rhodo 2nd growth	G5
Carya alba	mockernut hickory	501306	108148	Heiman, K. & Ulinski, A.	Xeric Chestnut oak forest	G5
Carya alba	mockernut hickory	501306	107930	Blaha, M. & Ulinski, A.		G5
Carya glabra	pignut hickory	19231	108275	Heiman, K.	Dry White Oak-Hickory Forest	G5
Carya ovalis	pignut hickory	19241	108265	Heiman, K. & Ulinski, A.	Dry White Oak-Hickory Forest	G5
Carya pallida	sand hickory	19244	109319	White, R., Weakley, A.	Granite flatrock	G5
Castanea dentata	American chestnut	19454	109320	White, R., Weakley, A.	Chestnut oak forest	G4
Catalpa speciosa	northern catalpa	34315	109446	White, R., Van Horn, I.	White pine successional/ old field border	G3G4
Ceanothus americanus	New Jersey tea	28454	107932	Blaha, M. & Ulinski, A.		G5
Celastrus orbiculata	Oriental bittersweet	27975	107933	Blaha, M & Ulinski, A.		n/a
Cerastium brachypetalum	gray chickweed	19949	109321	White, R., Weakley,A., Ferguson, T.	Cow pasture and adjacent pond	n/a
Cerastium fontanum ssp. vulgare	common mouse-ear chickweed	523831	108150	Ulinski, A.	Mowed area	n/a
Cercis canadensis var. canadensis	redbud	527241	109406	White, R., Weakley, A.	Streambank near parking lot	G5

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Chamaecrista nictitans ssp. nictitans var. nictitans	sensitive partridge pea	531597	108149	Ulinski, A.	White pine/hemlock anthropogenic woodland	?
Chamaelirium luteum	fairywand	42894	108151	Heiman, K.	Xeric Chestnut oak forest	G5
Chamaesyce maculata	spotted sandmat	501435	108169	Ulinski, A.	Pasture	G5
Chamaesyce nutans	spotted sandmat	501442	109322	White, R., Weakley,A., Ferguson, T.	Old field	G5
Chelone spp.	turtlehead	33181	108297	Ulinski, A.	Wet pond margin herbaceous vegetation	?
Chenopodium album	lambsquarters	20592	109323	White, R., Weakley, A.	Old field, roadside edge and farm pond	G5
Chenopodium ambrosioides	Mexican tea	20590	107936	Blaha, M. & Ulinski, A.		G?
Chimaphila maculata	striped prince's pine	23767	107937	Blaha, M. & Ulinski, A.		G5
Chionanthus virginicus	fringetree	32950	108152	Ulinski, A.	Dry white oak - hickory forest	G5
Chionanthus virginicus	fringetree	32950	107938	Blaha, M. & Ulinski, A.		G5
Chrysopsis mariana	Maryland goldenaster	202495	107988	Blaha, M. & Ulinski, A.		G5
Cimicifuga racemosa	black cohosh	18757	109448	Govus, T.	Trailside in dry oak forest	G4
Cirsium vulgare	bull thistle	36428	109324	White, R.	Cow pasture	G5
Clematis virginiana	devil's darning needles	18716	109325	White, R., Weakley,A., Ferguson, T.	Old field	G5
Clethra acuminata	mountain sweetpepperbush	23457	108153	Heiman, K.	Dry white oak - hickory forest	G4
Clethra acuminata	mountain sweetpepperbush	23457	108281	Langdon, K.	White pine/hemlock disturbed woodland	G4

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Collinsonia canadensis	richweed	32474	109454	Govus, T.	Seepage slope along NW boundary of park	G5
Comandra umbellata	bastard toadflax	501614	108154	Heiman, K. Ulinski, A.	Old orchard	G5
Commelina communis	Asiatic dayflower	39127	108274	Ulinski, A.	Seep	G5
Commelina virginica	Virginia dayflower	39128	108289	Blaha, M. & Ulinski, A.	Lower elevation granitic dome	G5
Conium maculatum	poison hemlock	29473	Observed	Van Hoff, I.		G5
Convallaria majuscula	American lily of the valley	506910	109327	White, R., Weakley, A.	Oak forest	G4?
Conyza canadensis var. pusilla	Canadian horseweed	527478	107963	Blaha, M. & Ulinski, A.		?
Coreopsis major	Canadian horseweed	37143	108636	Not Provided	No Field notes	G5
Coreopsis tripteris	tall tickseed	37154	108637	Blaha, M. & Ulinski, A.	No Field notes	G5
Cornus amomum	silky dogwood	27799	108155	Ulinski, A.	Wet pond margin herbaceous vegetation	G5
Cornus florida	flowering dogwood	27806	107942	Blaha, M. & Ulinski, A.		G5
Corydalis sempervirens	rock harlequin	19010	107943	Blaha, M. & Ulinski, A.		G4G5
Corylus americana	American hazelnut	19506	109328	White, R., Weakley, A.	Old field, roadside edge and farm pond	G5
Crataegus flava	yellowleaf hawthorn	24562	108619	Heiman, K. Ulinski, A.	Low elevation granitic dome	G5
Croton willdenowii	two-fruit rushfoil	506921	108156	Heiman, K. Ulinski, A.	Low elevation granitic dome	G5
Croton willdenowii	two-fruit rushfoil	506921	107944	Blaha, M. & Ulinski, A.		G5
Croton willdenowii	two-fruit rushfoil	506921	108630	Langdon, K.	Low elevation granitic dome	G5
Cunila origanoides	common dittany	32483	107945	Blaha, M. & Ulinski, A.		G5

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Cuscuta sp.	dodder	30710	109329	Weakley, A., White, R., Ferguson, T.	Seep (shaded)	?
Cymbalaria muralis	Kenilworth ivy	33579	107946	Blaha, M., and Ulinski, A.		n/a
Cyperus retrorsus	pine barren flatsedge	39898	109330	White, R., Weakley, A.	Granite flatrock	G5
Cyperus strigosus	strawcolored flatsedge	39901	109331	White, R., Weakley,A., Ferguson, T.	Old field	G5
Cypripedium acaule	pink lady's slipper	43534	107947	Blaha, M. & Ulinski, A.		G5
Dactylis glomerata	orchard grass	193446	108157	Heiman, K.	Mowed area	n/a
Danthonia compressa	flattened oatgrass	41637	108159	Heiman, K.	Dry white oak - hickory forest	G5
Danthonia compressa	flattened oatgrass	41637	108631	Heiman, K.	Dry white oak - hickory forest	G5
Danthonia sericea	downy danthonia	41635	108160	Heiman, K.	Pinus strobus/rhododendron 2nd growth	G5?
Danthonia spicata	poverty oatgrass	41642	109332	Weakley, A.	In Quercus prinus - Quercus rubra / Rhododendron maximum / Galax urceolata Forest	G5
Daucus carota	Queen Annes lace	29477	107948	Blaha, M. & Ulinski, A.		n/a
Dennstaedtia punctilobula	eastern hayscented fern	17491	107949	Blaha, M. & Ulinski, A.	White pine/hemlock disturbed woodland	G5
Deschampsia flexuosa	wavy hairgrass	40595	108616	Heiman, K.	Low elevation granitic dome	G5
Deschampsia flexuosa	wavy hairgrass	40595	108612	Heiman, K.	Low elevation granitic dome	G5
Desmodium nudiflorum	nakedflower ticktrefoil	25812	108161	Ulinski, A.	Mowed area	G5

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Desmodium nudiflorum	nakedflower ticktrefoil	25812	107950	Blaha, M. & Ulinski, A.		G5
Desmodium nuttallii	Nuttall's ticktrefoil	25813	109333	White, R., Weakley,A., Ferguson, T.		G5
Desmodium rotundifolium	prostrate ticktrefoil	502020	109334	White, R., Weakley, A.	Quercus alba - Quercus montane slope	G5
Dichanthelium boscii	Bosc's panicgrass	41655	109335	White, R., Weakley, A.	Chestnut oak woodland	G5
Dichanthelium clandestinum	deertongue panicgrass	41656	109336	White, R., Weakley, A.	Old field, roadside edge and farm pond	G5
Dichanthelium commutatum	variable panicgrass	41647	109337	White, R., Weakley, A.	Chestnut oak woodland	G5
Dichanthelium depauperatum	starved panicgrass	41658	109338	White, R., Weakley, A.	Granite flatrock	G5
Dichanthelium dichotomum	cypress panicgrass	41659	108618	Langdon, K.	Dry white oak - hickory forest	G5
Dichanthelium dichotomum	cypress panicgrass	41659	108620	Langdon, K.	Dry white oak /hickory forest	G5
Dichanthelium commutatum (old Ashei group)	openflower rosette grass	41661	109461	R. White and T. Govus		G5
Dichanthelium leucothrix	rough panicgrass	502034	109339	White, R., Weakley, A.	Granite flatrock	G4?
Dichanthelium sphaerocarpon var. sphaerocarpon	roundseed panicum	527702	109340	White, R., Weakley, A.	Granite flatrock	G5
Digitaria sanguinalis	hairy crabgrass	40604	109341	White, R., Weakley,A., Ferguson, T.	Cow pasture and adjacent pond	G5
Diodia teres	poor joe	34789	107952	Blaha, M. & Ulinski, A.		G5
Diodia virginiana	Virginia buttonweed	34790	107953	Blaha, M. & Ulinski, A.		G5
Dioscorea oppositifolia	Chinese yam	502075	108162	Ulinski, A.	On fence	n/a

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Dioscorea quaternata	Whorled wild yam	43371	107954	Blaha, M. and Ulinski, A.		G5
Diospyros virginiana	persimmon	23855	108163	Savage, L. Ulinski, A.	Pasture	G5
Diospyros virginiana	persimmon	23855	108294	Blaha, M. & Ulinski, A.	Low elevation granitic dome	G5
Drosera rotundifolia	roundleaf sundew	22017	109451	Govus, T.	Seepage slope along NW boundary of park	G5
Dryopteris intermedia	intermediate woodfern	17538	108164	Heiman, K.	Creekside	G5
Dryopteris marginalis	marginal woodfern	17541	109342	White, R., Weakley,A., Ferguson, T.	Rock (flatrock)	G5
Duchesnea indica	Indian strawberry	25163	108165	Ulinski, A.	Mowed area	G5
Duchesnea indica	Indian strawberry	25163	108602	Heiman, K. & Ulinski, A.	Mowed area	G5
Dulichium arundinaceum	threeway sedge	40009	108263	Heiman, K.	Wet pond margin herbaceous vegetation	G5
Echinochloa crus-galli var. crus-galli	large barnyardgrass	527837	109343	White, R., Weakley,A., Ferguson, T.	Old field	n/a
Elaeagnus umbellata	silverberry	27776	108166	Blaha, M. and Ulinski, A.		n/a
Eleocharis	spikerush	40010	108232	Ulinski, A.	Low elevation granitic dome	?
Eleocharis obtusa	blunt spikerush	40017	107957	Blaha, M. & Ulinski, A.		G5
Elephantopus tomentosus	hairy elephantfoot	37300	107958	Blaha, M. & Ulinski, A.	Wet pond margin herbaceous vegetation	G5
Elephantopus tomentosus	hairy elephantfoot	37300	108167	Ulinski, A.	Pasture	G5

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Eleusine indica	Indian goosegrass	41692	109344	White, R., Weakley, A.	Old field, roadside edge and farm pond	n/a
Elymus virginicus	Virginia wildrye	40681	109345	Weakley, A.	Oak forest	G5
Epigaea repens	trailing arbutus	23646	107959	Blaha, M. & Ulinski, A.		G5
Epilobium ciliatum	hairy willowherb	27293	107960	Blaha, M. & Ulinski, A.		G5
Eragrostis capillaris	lace grass	40774	109347	White, R., Weakley,A., Ferguson, T.	Cow pasture and adjacent pond	?
Eragrostis cilianensis	lovegrass	40719	109348	White, R., Weakley,A., Ferguson, T.	Cow pasture and adjacent pond	G5
Erechtites hieracifolia	pilewort	37320		Observed		G5
Erigeron annuus	annual fleabane	35804	107962	Blaha, M. & Ulinski, A.		G5
Erigeron philadelphicus	Philadelphia fleabane	35809	109436	Govus, T.	Cow pasture and adjacent pond	G5
Erigeron pulchellus	robin's plantain	35808	107964	Blaha, M. & Ulinski, A.		G5
Erigeron strigosus	Daisy Fleabane	35951	107965	Blaha, M. & Ulinski, A.		G5
Euonymus alata	burning bush	502576		Observed by Van Hoff 2001		n/a
Euonymus americana	stawberry bush	502577	107966	Blaha, M. & Ulinski, A.		G5
Euonymus fortunei	climbing euonymus	27950		Observed by Remaley 1998		n/a
Eupatorium capillifolium	dogfennel	35978	109349	White, R., Weakley, A.	Granite flatrock	G5
Eupatorium maculatum	spotted joepyeweed	502517	107967	Blaha, M. & Ulinski, A.		G5
Eupatorium perfoliatum	boneset	35980	107968	Blaha, M. & Ulinski, A.		G5

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Eupatorium purpureum	sweetscented joepyeweed	502522	107969	Blaha, M. & Ulinski, A.		G5
Eupatorium purpureum	sweetscented joepyeweed	502522	108269	Heiman, K.	Low elevation granitic dome	G5
Eupatorium rotundifolium	roundleaf thoroughwort	36001	109350	White, R., Weakley, A.	Granite flatrock	G5
Eupatorium rotundifolium	roundleaf thoroughwort	36001	108282	Langdon, K.	Xeric Chestnut oak forest	G5
Euphorbia corollata var. corollata	Northern flowering spurge	28057	107971	Blaha, M & Ulinski, A.		G5
Euphorbia pubentissima	false flowering spurge	28125	107972	Blaha, M. & Ulinski, A.		G5
Fagus grandifolia	American beech	19462	109351	White, R., Weakley, A., Ferguson, T.	Forest	G5
Fragaria virginiana	wild strawberry	24639	107973	Blaha, M. & Ulinski, A.		G5
Fraxinus americana	white ash	32931	109352	White, R., Weakley, A.	Successional white pine-hemlock-oak forest	G5
Galax urceolata	galax	502705		Blaha, M. & Ulinski, A.		G5
Galinsoga ciliata	shaggy soldier	196283	107975	Blaha, M. & Ulinski, A.	Wet pond margin herbaceous vegetation	G5
Galium aparine	bedstraw	34797	107976	Blaha, M. & Crowell, W.		G5
Galium circaezans	woods bedstraw	34800	107977	Blaha, M. & Ulinski, A.		G5
Galium latifolium	purple bedstraw	34883	107978	Blaha, M. & Ulinski, A.	Wet pond margin herbaceous vegetation	G5
Galium latifolium	purple bedstraw	34883	108170	Ulinski, A.	Xeric Chestnut oak forest	G5
Galium tinctorium	stiff marsh bedstraw	34803	107979	Blaha, M. & Ulinski, A.	Pinus strobus/hemlock anthropogenic woodland	G5

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Galium triflorum	fragrant bedstraw	34933	109353	White, R., Weakley,A., Ferguson, T.	Forest	G5
Gaura biennis	biennial beeblossom	27642	109354	White, R., Weakley, A., Ferguson, T.	Cow pasture and adjacent pond	G5
Gaylussacia baccata	black huckleberry	23660	109355	White, R., Weakley, A.	Successional white pine-hemlock-oak forest	G5
Gaylussacia ursina	bear huckleberry	23666	107981	Blaha, M. & Ulinski, A.		G4
Geranium carolinianum	Carolina geranium	29105	107982	Blaha, M. & Ulinski, A.		G5
Geum canadense	white avens	24645	107983	Blaha, M. & Ulinski, A.		G5
Geum vernum	heartleaf avens	24664	109441	White, R., Govus, T., Ferguson, T.	Old field, roadside edge and farm pond	G5
Glandularia canadensis	rose mock vervain	502784	109356	White, R., Weakley, A.	Maintenance yard adjacent to park office	G5
Glecoma hederacea	creeping charlie	32501	108171	Heiman, K. Ulinski, A.	Mowed area	n/a
Glyceria striata	fowl mannagrass	40833	108611	Heiman, K.	Wet pond margin herbaceous vegetation	G5
Gnaphalium obtusifolium	rabbit tobacco	36694	107984	Blaha, M. & Ulinski, A.		G5
Goodyera pubescens	downy rattlesnake plantain	43594	107985	Blaha, M. & Ulinski, A.		G5
Gratiola viscidula	Short's hedgehyssop	33200	107986	Blaha, M. & Ulinski, A.		G4G5
Gratiola viscidula	Short's hedgehyssop	33200	108278	Langdon, K.	Wet pond margin herbaceous vegetation	G4G5
Hamamelis virginiana	witch-hazel	19033	109357	White, R, Weakley, A.	Edge between mowed field and woods	G5

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Hedera helix	English ivy	29393	Observed	Observed by Remaley 1998; Van Hoff 2001		n/a
Helianthus divericatus	woodland sunflower	36636	109459	Govus, T.	Rich wooded slope with Northern Red oak and Chestnut oak	G5
Heuchera americana	American alumroot	24340	107989	Blaha, M. & Ulinski, A.		G5
Heuchera americana	American alumroot	24340	108173	Heiman, K. Ulinski, A.	Low elevation granitic dome	G5
Hexastylis rhombiformis	North Fork heartleaf	502988	109470	R. White, T. Govus	Hardwood ravine	G2
Hieracium gronovii	Gronovi's hawkweed	37710	107990	Blaha, M. & Ulinski, A.		G5
Hieracium paniculatum	Allegheny hawkweed	37718	107991	Blaha, M. & Ulinski, A.		G5
Hieracium venosum	rattlesnakeweed	37734	107992	Blaha, M. & Ulinski, A.		G5
Hosta ventricosa	blue hosta	42953	109358	White, R., Weakley, A.	Old field, roadside edge and farm pond	n/a
Houstonia caerulea	azure bluet	35038	107993	Blaha, M. & Ulinski, A.		G5
Houstonia purpurea	purple bluets	35051	107994	Blaha, M. & Ulinski, A.		G5
Houstonia purpurea	purple bluets	35051	108174	Ulinski, A.	Xeric Chestnut oak forest	G5
Hydrangea radiata	silverleaf hydrangea	503097	109359	White, R, Weakley, A.	Edge between mowed field and woods	G5?
Hypericum calycinum	Aaron's beard	21430	Observed	Observed by Van Hoff 2001		G?
Hypericum gentianoides	orangegrass	21420	107995	Blaha, M. & Ulinski, A.		G5
Hypericum hypericoides	St. Andrew's cross	503138	107996	Blaha, M. & Ulinski, A.		G5

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Hypericum mutilum	dwarf St. Johnswort	21421	107997	Blaha, M. & Ulinski, A.		G5
Hypericum mutilum	dwarf St. Johnswort	21421	108175	Savage, L. Ulinski, A.	Wet pond margin herbaceous vegetation	G5
Hypericum prolificum	shrubby St. Johnswort	21455	109362	White, R., Weakley,A., Ferguson, T.	Front Lake border	G5
Hypericum punctatum	spotted St. Johnswort	21422	107998	Blaha, M. & Ulinski, A.		G5
Hypericum virgatum	sharp-leaf St. Johnswort	515022	109360	White, R., Weakley, A., Ferguson, T.	Rock (flatrock)	G4?
Hypochaeris radicata	false dandelion	37794	107999	Blaha, M. & Ulinski, A.		n/a
Hypochaeris radicata	openflower rosette grass	41661		Tom Govus	Found in/near App Montane Oak-Hickory Forest (Red oak type)	n/a
Hypochaeris radicata	false dandelion	37794	109460	White, R., Govus, T., Ferguson, T.	Old field, roadside edge and farm pond.	n/a
Hypoxis hirsuta	Yellow star-grass	503146	108000	Blaha, M. & Ulinski, A.		G5
Ilex ambigua	Carolina holly	27987	109363	White, R., Weakley, A.	Chestnut oak forest	G5
Ilex crenata	Japanese holly	503156	109364	White, R., Weakley, A., Ferguson, T.	Old field	n/a
Ilex opaca	American holly	27982	108176	Blaha, M & Ulinski, A.		G5
Ilex verticillata	common winterberry	27985	108177	Heiman, K.	Creekside	G5
Ilex verticillata	common winterberry	27985	108606	Langdon, K.	Wet pond margin herbaceous vegetation	G5
Impatiens capensis	jewelweed	29182	108001	Blaha, M. & Ulinski, A.		G5

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Ipomoea coccinea	red morningglory	30770	108178	Savage, L. Ulinski, A.	Pasture	n/a
Ipomoea pandurata	man-of-the-earth	30786	108002	Blaha, M. & Ulinski, A.		G5
Ipomoea purpurea	common morningglory	30789	108179	Ulinski, A.	Mowed area	n/a
Iris cristata	dwarf crested iris	43204	108003	Blaha, M. & Ulinski, A.		G5
Iris verna var. smalliana	dwarf violet iris	528565	109365	Weakley, A.	Rocky outcrop island	G5
Juglans nigra	black walnut	19254	108180	Ulinski, A.	Mowed area	G5
Juncus acuminatus	tapertip rush	39221	108261	Heiman, K.	Wet pond margin herbaceous vegetation	G5
Juncus dichotomus	forked rush	39264	Observed	Blaha, M. & Ulinski, A.		G5
Juncus effusus	lamp rush	39232	108181	Heiman, K.	Wet pond margin herbaceous vegetation	G5
Juncus platyphyllus	forked rush	39306	108260	Heiman, K.	Dry white oak - hickory forest	G5
Juncus tenuis	path rush	39243	108158	Heiman, K.	Dry white oak - hickory forest	G5
Juncus tenuis	path rush	39243	108182	Heiman, K.	Dry white oak - hickory forest	G5
Juniperus virginiana var. virginiana	red cedar	18048	108183	Blaha, M. & Ulinski, A.		G5
Kalmia latifolia	mountain laurel	23677	108004	Blaha, M. & Ulinski, A.		G5
Krigia virginica	Virginia dwarfdandelion	37816	109431	Govus, T., Ferguson, T., Van Hoff, I.	Granite flatrock	G5
Kyllinga pumila	low spikesedge	503298	109367	White, R., Weakley, A.	Maintenance yard adjacent to park office	G5
Lactuca canadensis	Florida blue lettuce	36596	108005	Blaha, M. & Ulinski, A.		G5

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Lathyrus latifolius	everlasting peavine	25856	108006	Blaha, M. & Ulinski, A.		n/a
Lechea minor	thymeleaf pinweed	22290	108638	Blaha, M. & Ulinski, A.	No Field notes	G5
Lechea racemulosa	Illinois pineweed	22295	109368	White, R., Weakley, A.	Granite flatrock	G5
Leersia virginica	rice cutgrass	40890	109369	White, R., Weakley,A., Ferguson, T.	Old field	G5
Lepidium virginicum	peppergrass	22955	108007	Blaha, M. & Ulinski, A.	A rock wall	G5
Lepidium virginicum	peppergrass	22955	108604	Ulinski, A.	Mowed area	G5
Lepidium virginicum	peppergrass	22955	108287	Blaha, M. & Ulinski, A.	Rock wall	G5
Lespedeza cuneata	Chinese lespedeza	25898	109370	White, R., Weakley, A.	Old field, roadside edge and farm pond	n/a
Leucanthemum vulgare	oxeye daisy	37903	107939	Blaha, M. & Ulinski, A.		n/a
Leucothoe fontanesiana	highland doghobble	23553	108008	Blaha, M. & Ulinski, A.		G5
Leucothoe recurva	redtwig doghobble	23554	109371	White, R., Weakley, A.	In Quercus prinus - Quercus rubra/ Rhododendron maximum/ Galax urceolata Forest	G4G5
Liatris spicata	dense gayfeather	37944	109372	White, R., Weakley, A.	Rock edge	G5
Ligustrum sinense	Chinese privet	32979	108009	Blaha, M. & Ulinski, A.		n/a
Lilium michauxii	Carolina lily	42741	109373	White, R., Weakley, A.	Chestnut oak forest	G4G5
Lindernia monticola	piedmont false pimpernel	33225	108268	Heiman, K.	Wet pond margin herbaceous vegetation	G4
Linum striatum	ridged yellow flax	29223	108011	Blaha, M. & Ulinski, A.		G5
Linum virginianum	woodland flax	29202	108617	Blaha, M.	Dry white oak - hickory forest	G4G5

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Liriodendron tulipifera	tuliptree	18086	108012	Blaha, M. & Ulinski, A.		G5
Lobelia amoena	southern lobelia	34504	108013	Blaha, M. & Ulinski, A.		G4?
Lobelia cardinalis	cardinalflower	34505	109374	White, R., Weakley, A.	Maintenance yard adjacent to park office	G5
Lobelia inflata	Indian tobacco	34524	108014	Blaha, M. & Ulinski, A.		G5
Lobelia puberula	downy lobelia	34529	109375	Weakley,A., White, R., Ferguson, T.	Seep (shaded)	G5
Lobelia siphilitica	great lobelia	34531	108184	Blaha, M. & Ulinski, A.		G5
Lolium perenne ssp. multiflorum	annual rye grass	524260	108186	Heiman, K.	Dry white oak - hickory forest	n/a
Lonicera flava	yellow honeysuckle	35292	109471	R. White	Shrubby thicket near granite rock outcropping	G5?
Lonicera japonica	Japanese honeysuckle	35283	108015	Blaha, M. & Ulinski, A.		n/a
Lonicera sempervirens	trumpet honeysuckle	35303	108267	Heiman, K. & Ulinski, A.	Dry white oak - hickory forest	G5
Ludwigia alternifolia	seedbox	27335	108016	Blaha, M. & Ulinski, A.		G5
Ludwigia palustris	marsh primrose-willow	27336	109376	White, R., Weakley, A.	Old field, roadside edge and farm pond	G5
Lycopodium digitatum	fan clubmoss	17028	108187	Ulinski, A.	Pinus strobus/rhodo 2nd growth	G5
Lycopodium obscurum	ground pine	17032	108188	Ulinski, A.	White pine/ hemlock disturbed woodland	G5
Lycopus uniflorus	northern bugleweed	32257	108017	Blaha, M. & Ulinski, A.		G5
Lycopus uniflorus	northern bugleweed	32257	108247	Blaha, M. & Ulinski, A.	Wet pond margin herbaceous vegetation	G5

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Lycopus virginicus	Virginia bugleweed	32255	108018	Blaha, M. & Ulinski, A.		G5
Lycopus virginicus	Virginia bugleweed	32255	108295	Blaha, M. & Ulinski, A.	Xeric chestnut oak forest	G5
Lyonia ligustrina	maleberry	23559	108189	Langdon, K.	Low elevation granitic dome	G5
Lyonia ligustrina	maleberry	23559	108300	Heiman, K.	Dry white oak - hickory forest	G5
Lysimachia ciliata	fringed loosestrife	23984	108019	Blaha, M. & Ulinski, A.		G5
Lysimachia lanceolata	lanceleaf loosestrife	23991	109377	White, R., Weakley,A., Ferguson, T.	Forest	G5
Lysimachia lanceolata	lanceleaf loosestrife	23991	109469	Tom Ferguson	Slope	G5
Lysimachia lanceolata	lanceleaf loosestrife	23991	109468	Tom Ferguson	Slope	G5
Lysimachia lanceolata	lanceleaf loosestrife	23991	109467	Tom Ferguson	Slope	G5
Lysimachia lanceolata	lanceleaf loosestrife	23991	109466	Tom Ferguson	Slope	G5
Lysimachia quadrifolia	lanceleaf loosestrife	23991	108020	Blaha, M. & Ulinski, A.		G5
Lysimachia terrestris	earth loosestrife	23985	108021	Blaha, M. & Ulinski, A.		G5
Magnolia fraseri	Fraser's magnolia	18073	108190	Ulinski, A.	Dry white oak - hickory forest	G5
Mahonia bealei	Beale's Oregon-grape	18846	109378	White, R., Weakley, A., Ferguson, T.	Front Lake border	n/a
Mahonia japonica x lorariifolia	Japanese Oregon-grape	-307		Van Hoff 2001		n/a
Maianthemum canadense	Canada mayflower	503653	109445	White, R.	Roadside	G5
Maianthemum racemosum ssp. racemosum	false Solomon's seal	524297	108221	Ulinski, A.	Dry white oak - hickory forest	G5

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Maianthemum racemosum ssp. racemosum	false Solomon's seal	524297	108081	Blaha, M. & Ulinski, A.	Dry white oak/hickory forest	G5
Medeola virginiana	Indian cucumber	42963	108022	Blaha, M. & Ulinski, A.		G5
Medicago lupulina	black medic clover	503721	108191	Heiman, K. Ulinski, A.	Pasture	n/a
Melica mutica	oniongrass	41858	108262	Heiman, K.	Dry white oak - hickory forest	G5
Mentha piperita ssp. Piperita	peppermint	-502583	108192	Ulinski, A.	Pasture	n/a
Microstegium vimineum	Japanese stiltgrass	503829	108193	Heiman, K.	Wet pond margin herbaceous vegetation	n/a
Mimulus ringens	Allegheny monkeyflower	33235	108023	Blaha, M. & Ulinski, A.		G5
Minuartia groenlandica	sandwort		Observed	Blaha, M. & Ulinski, A.		G5
Miscanthus sinensis	Chinese silvergrass	41874	108194	Langdon, K.	Low elevation granitic dome	n/a
Mitchella repens	partridgeberry	35063	108024	Blaha, M. & Ulinski, A.		G5
Mollugo verticillata	carpetweed	19899	108025	Blaha, M. & Ulinski, A.		n/a
Monarda clinopodia	white bergamot	32288	108195	Heiman, K.	Dry white oak - hickory forest	G5
Monotropa hypopithys	pinesap	503871	108196	Heiman, K. Ulinski, A.	Dry white oak - hickory forest	G5
Monotropa uniflora	Indianpipe	23778	108026	Blaha, M. & Ulinski, A.		G5
Morus alba	white mulberry	19066	109379	White, R.	Cow pasture	n/a
Muhlenbergia schreberi	nimblewill	41939	109380	White, R., Weakley, A.	Edge of impoundment	G5
Myriophyllum aquaticum	brazilian watermilfoil	503904	108197	Savage, L. Ulinski, A.	Aquatic	n/a
Myriophyllum aquaticum	brazilian watermilfoil	503904	108273	Langdon, K.	Aquatic	n/a

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Nymphaea odorata	American white waterlily	18384	109381	White, R., Weakley, A., Ferguson, T.	Front Lake border	G5
Nyssa sylvatica	black gum	27821	108266	Heiman, K. & Ulinski, A.	Low elevation granitic dome	G5
Oenothera biennis	common evening primrose	27368	109382	White, R., Weakley,A., Ferguson, T.	Rocky outcrop just behind main house	G5
Osmunda cinnamomea	cinnamon fern	17219	108198	Heiman, K.	Stream bank	G5
Oxalis stricta	sourgrass	29095	108029	Blaha, M. & Ulinski, A.		G5
Oxydendrum arboreum	sourwood	23690	108030	Blaha, M. & Ulinski, A.		G5
Oxypolis rigidior	stiff cowbane	29544	108031	Blaha, M. & Ulinski, A.	Wet pond margin herbaceous vegetation	G5
Packera anonyma	Small's ragwort	518137	109383	White, R., Weakley, A.	Granite flatrock	G5
Packera aurea	golden ragwort	518139	109384	White, R., Weakley,A., Ferguson, T.	Forest	G5
Packera millefolia	piedmont ragwort	565366	109385	White, R., Weakley,A., Ferguson, T.	Rock (flatrock)	G2
Panicum anceps	beaked panicgrass	40904	109386	White, R., Weakley,A., Ferguson, T.	Old field	G5
Panicum dichotomiflorum	fall panicgrass	40908	Observed	Blaha, M. & Ulinski, A.		G5
Panicum dichotomum var. yadkinense	forked witch grass	538261	108622	Blaha, M. & Ulinski, A.		G?
Panicum flexile	wiry panicgrass	40918	109387	White, R., Weakley,A., Ferguson, T.	Rock (flatrock)	G5

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Panicum virgatum var. virgatum	switchgrass	529371	109388	White, R., Weakley, A.	Granite flatrock	G5
Parthenocissus quinquefolia	Virginia creeper	28602	108032	Blaha, M. & Ulinski, A.		G5
Paspalum laeve	field paspalum	41024	109340	White, R., Weakley, A.	Granite flat rock	G4G5
Passiflora lutea	passionflower	22226	109389	White, R., Weakley, A.	Maintenance yard adjacent to park office	G5
Paulownia tomentosa	princess tree	33460	Observed	Remaley 1998; Van Hoff 2001		n/a
Perilla frutescens	beefsteakplant	32634	108199	Ulinski, A.	Pasture	n/a
Phlox amoena	hairy phlox	30910	109458	Govus, T.	Rich wooded slope with Northern Red oak and Chestnut oak	G4
Physalis longifolia var. subglabrata	longleaf groundcherry	529629	109390	White, R., Weakley, A.	Old field, roadside edge and farm pond	n/a
Physocarpus opulifolius	common ninebark	25282	109391	White, R., Weakley,A., Ferguson, T.	Rocky outcrop just behind main house	G5
Phytolacca americana	pokeweed	19523	108033	Blaha, M. & Ulinski, A.		G5
Pilea pumila	Canada clearweed	19130	108034	Blaha, M. & Ulinski, A.		G5
Pinus echinata	shortleaf pine	183335	109392	White, R., Weakley, A.	Granite flatrock	G5
Pinus rigida	pitch pine	183376	108200	Heiman, K. Ulinski, A.	Low elevation granitic dome	G5
Pinus strobus	white pine	183385	108643	Heiman, K. Ulinski, A.	Low elevation granitic dome	G5
Pinus virginiana	Viginia pine	183394	108201	Heiman, K. Ulinski, A.	Low elevation granitic dome	G5
Piptochaetium avenaceum	blackseed needlegrass	504408	108228	Heiman, K.	Pinus strobus/rhododendron 2nd growth	G5

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Piptochaetium avenaceum	blackseed needlegrass	504408	108609	Heiman, K.	White pine/rhodo 2nd growth	G5
Pityopsis graminifolia var. graminifolia	narrowleaf silkgrass	196350	108172	Ulinski, A.	Low elevation granitic dome	G5
Plantago aristata	largebracted plantain	32875	108035	Blaha, M. & Ulinski, A.		G5
Plantago lanceolata	English plantain	32874	108036	Blaha, M. & Ulinski, A.		G5
Plantago rugelii	Rugel's plantain	504439	108202	Heiman, K.	Dry white oak - hickory forest	G5
Plantago rugelii	Rugel's plantain	504439	108639	Blaha, M.	No Field notes	G5
Platanthera clavellata	small green wood orchid	43423	107987	Blaha, M. & Ulinski, A.	White pine/rhododendron 2nd growth	G5
Platanus occidentalis	sycamore	19020	108203	Savage, L. Ulinski, A.		G5
Poa annua	annual bluegrass	41107	109444	White, R.	Parking lot area	n/a
Polygala curtissii	Curtiss' milkwort	29332	108037	Blaha, M. & Ulinski, A.		G5
Polygala curtissii	Curtiss' milkwort	29332	108634	Blaha, M. & Ulinski, A.	Low elevation granitic dome	G5
Polygala polygama	bitter milkwort	29308	108277	Heiman, K.	Low elevation granitic dome	G5
Polygonatum biflorum var. biflorum	King Solomon's seal	529768	109393	White, R., Weakley, A.	Successional white pine-hemlock-oak forest	G5
Polygonatum pubescens	hairy Solomon's seal	43007	108038			G5
Polygonum caespitosum var. longisetum	oriental ladysthumb	529778	108039	Blaha, M. & Ulinski, A.	Pinus strobus/rhodo 2nd growth	?
Polygonum caespitosum var. longisetum	oriental ladysthumb	529778	108293	Blaha, M. & Ulinski, A.	Wet pond margin herbaceous vegetation	?

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Polygonum cuspidatum	Japanese knotweed	20889	109394	White, R., Weakley,A., Ferguson, T.	Front Lake border	n/a
Polygonum sagittatum	arrowleaf tearthumb	20863	108041	Blaha, M. & Ulinski, A.		G5
Polygonum scandens var. scandens	climbing knotweed	20924	108042	Blaha, M. & Ulinski, A.		G5
Polygonum tenue	pleatleaf knotweed	20929	108292	Blaha, M. & Ulinski, A.	Low elevation granitic dome	G5
Polypodium virginianum	rock polypody	17242	109395	White, R., Weakley, A.	Successional white pine-hemlock-oak forest	G5
Polystichum acrostichoides	Christmas fern	17675	108043	Blaha, M. & Ulinski, A.	Pinus strobus/hemlock anthropogenic woodland	G5
Populus alba	white poplar	22451	Observed	Remaley 1998		G5
Portulaca oleracea	common purslane	20422	109396	White, R., Weakley,A., Ferguson, T.	Cow pasture and adjacent pond	n/a
Potentilla canadensis	dwarf cinquefoil	24698	108044	Blaha, M. & Ulinski, A.	Xeric Chestnut oak forest	G5
Potentilla recta	roughfruit cinquefoil	24742	108045	Blaha, M. & Ulinski, A.		?
Prenanthes altissima	tall rattlesnakeroot	38273	109397	White, R., Weakley, A.	Chestnut oak woodland	G5?
Prunella vulgaris	heal all	32381	108046	Blaha, M. & Ulinski, A.		G5
Prunus cerasus	sour cherry	24773	Observed	Van Hoff 2001		n/a
Prunus serotina var. serotina	black cherry	24764	Observed	Blaha, M. & Ulinski, A.		G5
Pteridium aquilinum	bracken fern	17224	108204	Ulinski, A.	Pinus strobus/rhododendron 2nd growth	G5
Pycnanthemum flexuosum	Appalachian mountain mint	32660	108048	Blaha, M. & Ulinski, A.		G5

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Pycnanthemum verticillatum	whorled mountain mint	32669	108246	Langdon, K.	Low elevation granitic dome	G5
Pyrularia pubera	buffalo nut	504705	108049			G5
Pyrularia pubera	buffalo nut	504705	108244	Heiman, K.	Pinus strobus/rhodo 2nd growth	G5
Quercus alba	white oak	19290	108050	Blaha, M. & Ulinski, A.		G5
Quercus alba	white oak	19290	108605	Heiman, K.	Low elevation granitic dome	G5
Quercus coccinea	scarlet oak	19288	109398	White, R., Weakley, A.	Chestnut oak forest	G5
Quercus falcata	Southern red oak	19277	108205	Heiman, K. Ulinski, A.	Pasture	G5
Quercus marilandica	blackjack oak	19374	109449	Govus, T.	Granitic rock outcrop	G5
Quercus prinus	chestnut oak	19398	108051	Blaha, M. & Ulinski, A.		G5
Quercus prinus	chestnut oak	19398	108206	Ulinski, A.	Low elevation granitic dome	G5
Quercus rubra	northern red oak	19408	Observed	Ulinski, A.		G5
Quercus stellata	post oak	19422	108207	Heiman, K.	Low elevation granitic dome	G5
Quercus velutina	black oak	19447	108208	Heiman, K. Ulinski, A.	Low elevation granitic dome	G5
Ranunculus abortivus	smallflower buttercup	18559	108209	Heiman, K. Ulinski, A.	Mowed area	G5
Ranunculus bulbosus	bulbous buttercup	18594	108210	Ulinski, A.	Mowed area	?
Ranunculus hispidus	bristly buttercup	18613	109399	White, R., Weakley, A.	Maintenance yard adjacent to park office	G5
Ranunculus recurvatus	littleleaf buttercup	18641	108053	Blaha, M. & Ulinski, A.		G5
Ranunculus recurvatus	littleleaf buttercup	18641	108211	Ulinski, A.	Mowed area	G5
Ranunculus repens	creeping buttercup	18642	108054	Blaha, M. & Ulinski, A.	Wet pond margin herbaceous veg	G?

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Rhexia mariana var. mariana	Maryland meadowbeauty	529993	108055	Blaha, M. & Ulinski, A.		G5
Rhexia virginica var. virginica	Virginia meadow-beauty	27686	108056	Blaha, M. & Ulinski, A.		G5
Rhododendron arborescens	smooth azalea	23703	108212	Heiman, K. Ulinski, A.	Wet pond margin herbaceous vegetation	G4G5
Rhododendron calendulaceum	flame azalea	23707	108057	Blaha, M. & Ulinski, A.		G5
Rhododendron maximum	rosebay rhododendron	23721	108058	Blaha, M. & Ulinski, A.		G5
Rhododendron periclymenoides	pink azalea	23726	108059	Blaha, M. & Ulinski, A.		G5
Rhus copallinum var. latifolia	winged sumac	530007	109400	White, R., Weakley, A.	Granite flatrock	G5
Rhynchospora capitellata	brownish beaksedge	40145	109401	White, R., Weakley, A., Ferguson, T.	Rocky outcrop just behind main house	G5
Rhynchospora recognita	globe beaksedge	565459	109402	White, R., Weakley, A.	Granite flatrock	G5?
Robinia hispida var. kelseyi	Kelsey's locust	530082	109443	White, R. and Ferguson, T.	Pinus rigida woodland	G4
Robinia pseudoacacia	black locust	504804	109403	White, R., Weakley, A.	Successional white pine-hemlock-oak forest	G5
Rosa	rose	24807	108063	Blaha, M. & Ulinski, A.		?
Rosa bracteata	Macartney rose	24817	109434	Govus, T.	Cow pasture and adjacent pond	G5
Rosa canina	dog rose	24819	109432	Govus, T., Ferguson, T., Van Hoff, I.	Granite flatrock	G?
Rosa carolina	Carolina rose	24808	108060	Blaha, M. & Ulinski, A.		G4G5

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Rosa multiflora	multiflora rose	24833	108061	Blaha, M. & Ulinski, A.	Low elevation granitic dome	n/a
Rosa palustris	swamp rose	24809	108062	Blaha, M. & Ulinski, A.		G5
Rubus argutus	sawtooth blackberry	24877	108213	Heiman, K. Ulinski, A.	Low elevation granitic dome	G5
Rubus flagellaris	northern dewberry	24921	108064	Blaha, M. & Ulinski, A.		G5
Rubus hispidus	bristly dewberry	24943	108065	Blaha, M. & Ulinski, A.		G5
Rubus occidentalis	black raspberry	24854	109404	White, R., Weakley, A.	Old field, roadside edge and farm pond	G5
Rudbeckia hirta	blackeyed susan	36765	108066	Blaha, M. & Ulinski, A.		G5
Rumex acetosella	sheep sorrel	20934	108067	Blaha, M. & Ulinski, A.		n/a
Rumex crispus	curly dock	20937	108068	Blaha, M. & Ulinski, A.		n/a
Sagittaria latifolia var. pubescens	hairy broadleaf arrowhead	38908	108070	Blaha, M. & Ulinski, A.		G5
Salix caprea	goat willow	22515	109405	White, R., Weakley, A.	Streambank	n/a
Salix nigra	black willow	22484	108214	Heiman, K. Ulinski, A.	Wet pond margin herbaceous vegetation	G5
Sambucus canadensis	American elder	35317	108071	Blaha, M. & Ulinski, A.		G5
Sambucus canadensis	American elder	35317	108283	Savage, L., Ulinski, A.	Pasture	G5
Sanicula canadensis	Canada blacksnakeroot	29850	108286	Blaha, M. & Ulinski, A.	Dry white oak - hickory forest	G5
Sassafras albidum	sassafras	18158	108215	Ulinski, A.	Dry white oak - hickory forest	G5
Sassafras albidum	sassafras	18158	108248	Blaha, M., Ulinski, A.	Dry white oak - hickory forest	G5

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Saxifraga michauxii	Michaux's saxifrage	24284	108074	Blaha, M. & Ulinski, A.		G4G5
Schizachyrium scoparium var. scoparium	little bluestem	530264	109407	White, R., Weakley, A.	Granite flatrock	G5
Schoenoplectus purshianus	weakstalk bulrush	507792	109408	White, R., Weakley, A., Ferguson, T.	Cow pasture and adjacent pond	G4G5
Scirpus atrovirens	green bulrush	40227	108627	Ulinski, A.	Pasture	G5?
Scirpus cyperinus	bulrush	40228	108299	Ulinski, A.	Wet pond margin herbaceous vegetation	G5
Scirpus expansus	woodland bulrush	40257	108613	Savage, L, Ulinski, A.	Wet pond margin herbaceous vegetation	G4
Scleria reticularis	netted nutrush	40316	109409	White, R., Weakley, A.	Rock edge	G3G4
Scutellaria elliptica	hairy skullcap	32796	108216	Ulinski, A.	Xeric Chestnut oak forest	G5
Scutellaria integrifolia var. integrifolia	Hyssop skullcap	32801	108076	Blaha, M. & Ulinski, A.		G5
Scutellaria lateriflora	mad dog skullcap	32765	108077	Blaha, M. & Ulinski, A.		G5
Scutellaria lateriflora	mad dog skullcap	32765	108217	Heiman, K.	Wet pond margin herbaceous vegetation	G5
Selaginella rupestris	rock spikemoss	17091	108218	Langdon, K.	Low elevation granitic dome	G5
Selaginella rupestris	rock spikemoss	17091	108284	Heiman, K.	Low elevation granitic dome	G5
Senecio anonymus	Small's ragwort	36095	108079	Blaha, M. & Ulinski, A.	Low elevation granitic dome	G5
Senecio memmingeri	Memminger's ragwort	521335	108626	Blaha, M. & Ulinski, A.	Low elevation granitic dome	G2
Sericocarpus linifolius	narrowleaf whitetop aster	508090	109410	White, R., Weakley, A.	Granite flatrock	G5

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Setaria geniculata	marsh bristlegrass	41235	109431	White, R., Weakley, A.	Maintenance yard adjacent to park office	n/a
Setaria glauca	pearl millet	41246	109411	White, R., Weakley, A.	Maintenance yard adjacent to park office	G5
Sida spinosa	prickly sida	21732	108249	Blaha, M., Ulinski, A.	Wet pond margin herbaceous vegetation	G5?
Silene stellata	widowsfrill	20127	109412	White, R., Weakley, A.	Quercus alba - Quercus montana slope	G5
Silene virginica	firepink	20141	108080	Blaha, M. & Ulinski, A.		G5
Sisymbrium officinale	hedge mustard	23316	108219	Ulinski, A.	Pasture	n/a
Sisyrinchium mucronatum	needle-tip blue-eyed-grass	43239	108220	Ulinski, A.	Xeric Chestnut oak forest	G5
Smilax biltmoreana	Biltmore's carrionflower	505253	108222	Heiman, K.	Xeric Chestnut oak forest	G3G4
Smilax biltmoreana	Biltmore's carrionflower	505253	108082	Blaha, M. & Ulinski, A.		G3G4
Smilax biltmoreana	Biltmore's carrionflower	505253	108285	Ulinski, A.	Xeric Chestnut oak forest	G3G4
Smilax glauca	cat greenbrier	43342	108223	Heiman, K.	Dry white oak - hickory forest	G5
Smilax rotundifolia	roundleaf greenbrier	43346	108224	Ulinski, A.	White pine/ hemlock disturbed woodland	G5
Solanum americanum	smallflower nightshade	565523	109413	White, R., Weakley,A., Ferguson, T.	Old field	G5
Solanum carolinense	Carolina horsenettle	30413	108083	Blaha, M. & Ulinski, A.		G5
Solidago arguta	Atlantic goldenrod	36230	109414	White, R., Weakley, A.	Granite flatrock	G5
Solidago caesia	wreath goldenrod	36238	Observed	Blaha, M. & Ulinski, A.		G5

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Solidago canadensis var. scabra	tall goldenrod	530448	108084	Blaha, M. & Ulinski, A.	Wet pond margin herbaceous vegetation	G5
Solidago curtisii	Curtis' goldenrod	36242	109415	White, R., Weakley, A.	Quercus alba - Quercus montana slope	G4G5Q
Solidago gigantea	late goldenrod	36259	108257	Heiman, K.	Dry white oak - hickory forest	G5
Solidago juncea	early goldenrod	36270	109416	White, R., Weakley, A.	Chestnut oak woodland	G5
Solidago odora	licorice goldenrod	36284	108085	Blaha, M. & Ulinski, A.		G5
Solidago patula	roundleaf goldenrod	36288	109453	Govus, T.	Seepage slope along NW boundary of park	G5
Solidago roanensis	Roan Mountain goldenrod	36298	109417	White, R., Weakley, A.	Granite flatrock	G4G5
Solidago rugosa	wrinkleleaf goldenrod	36299	Observed	Blaha, M. & Ulinski, A.		G5
Sparganium americanum	American bur-reed	42313	108089	Blaha, M. & Ulinski, A.		G5
Sphenopholis nitida	Shiny wedgescale	41281	109472	T. Govus	Rich wooded slope	G5
Spiraea japonica	Japanese spiraea	25335	108090	Blaha, M. & Ulinski, A.		G5
Spiranthes cernua	nodding ladies'-tresses	43444	109418	White, R., Weakley, A., Ferguson, T.	Rock (flatrock)	G5
Spiranthes odorata	marsh ladies-tresses	505343	108091	Blaha, M. & Ulinski, A.		G5
Stellaria media	common chickweed	20169	108227	Heiman, K. Ulinski, A.	Mowed area	n/a
Stellaria pubera	star chickweed	20193	108095	Blaha, M. & Ulinski, A.	Dry white oak - hickory forest	G5
Symphyotrichum puniceum	purplestem aster	522241	109419	Weakley,A., White, R., Ferguson, T.	Seep (shaded)	G5

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Talinum teretifolium	quill fameflower	20458	108096	Blaha, M. & Ulinski, A.		G4
Taraxacum officinale	dandelion	36213	108229	Ulinski, A.	Mowed area	n/a
Teucrium canadense	germander	32352	107905	Blaha, M. & Ulinski, A.	Wet pond margin herbaceous vegetation	G5
Thalictrum clavatum	mountain meadow-rue	18663	108230	Heiman, K.	Low elevation granitic dome	G4
Thalictrum dioicum	early meadowrue	18669	109452	Govus, T.	Seepage slope along NW boundary of park	G5
Thalictrum revolutum	waxyleaf meadowrue	18660	109420	White, R., Weakley, A.		G5
Thelypteris noveboracensis	New York fern	17261	108097	Blaha, M. & Ulinski, A.	Xeric Chestnut oak forest	G5
Thermopsis mollis	Allegheny Mountain goldenbanner	27002	109450	White, R., Jackson, Phyllis	Dry woods	G3G4
Tilia americana var. heterophylla	American basswood	530692	109421	White, R., Weakley, A., Ferguson, T.	Cow pasture and adjacent pond	G5
Tipularia discolor	crippled cranefly	43703	108099	Blaha, M. & Ulinski, A.		G4G5
Tipularia discolor	crippled cranefly	43703	108276	Heiman, K.	Dry white oak - hickory forest	G4G5
Toxicodendron radicans	poison ivy	28821	108231	Heiman, K. Ulinski, A.	Dry white oak - hickory forest	G5
Tradescantia subaspera	zigzag spiderwort	39176	109465	Tom Govus	Rich wooded slope	G5
Trautvetteria caroliniensis	Carolina bugbane	18803	109422	Weakley,A., White, R., Ferguson, T.	Seep (shaded)	G5
Trifolium pratense	red clover	26313	108100	Blaha, M. & Ulinski, A.		n/a
Trifolium repens	White clover	26206	108101	Blaha, M. & Ulinski, A.		n/a

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Trillium catesbaei	bashful wakerobin	43064	108102	Blaha, M. & Ulinski, A.		G4
Triodanis perfoliata	clasping Venus' looking glass	34615	108226	Ulinski, A.	Mowed area	G5
Tsuga canadensis	Canada hemlock	183397	108645	Ulinski, A.	Low elevation granitic dome	G5
Tsuga caroliniana	Carolina hemlock	183399	108233	Ulinski, A.	White pine/ hemlock disturbed woodland	G3
Tsuga caroliniana	Carolina hemlock	183399	108608	Ulinski, A.	White pine/ hemlock disturbed woodland	G3
Typha latifolia	cattail	42326	108234	Savage, L. Ulinski, A.	Wet pond margin herbaceous vegetation	G5
Ulmus americana	American elm	19049	109423	White, R., Weakley, A.	Old field, roadside edge and farm pond	G5?
Utricularia gibba	humped bladderwort	34452	108103			G5
Utricularia gibba	humped bladderwort	34452	108291	Blaha, M. & Ulinski, A.	Aquatic	G5
Utricularia radiata	little floating bladderwort	34462	108235	Shuman, L. Ulinski, A.	Aquatic	G4
Uvularia sessilifolia	sessileleaf bellwort	43112	108104	Blaha, M. & Ulinski, A.	Xeric Chestnut oak forest	G5
Uvularia sessilifolia	sessileleaf bellwort	43112	108633	Blaha, M. & Ulinski, A.	Xeric Chestnut oak forest	G5
Uvularia sessilifolia	sessileleaf bellwort	43112	108641		No Field notes	G5
Vaccinium	blueberry	23571	108270	Heiman, K. & Ulinski, A.	Low elevation granitic dome	?
Vaccinium corymbosum	highbush blueberry	23573	108259	Blaha, M., Ulinski, A.	Low elevation granitic dome	G5
Vaccinium corymbosum	highbush blueberry	23573	108258	Heiman, K.	Low elevation granitic dome	G5
Vaccinium fuscatum	black highbush blueberry	23594	109424	Weakley,A., White, R., Ferguson, T.	Seep (shaded)	G5

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Vaccinium pallidum	Hillside blueberry	23610	Observed	Blaha, M. & Ulinski, A.		G5
Vaccinium simulatum	upland highbush blueberry	23614	109425	White, R., Weakley, A.	Quercus alba - Quercus montana slope	G5
Vaccinium stamineum	deerberry	23615	108105	Blaha, M. & Ulinski, A.		G5
Verbascum thapsus	mullein	33394	108107	Blaha, M. & Ulinski, A.		n/a
Verbena urticifolia	white vervain	32127	108108	Blaha, M. & Ulinski, A.		G5
Verbesina	crownbeard	38594	108296	Ulinski, A.	Pasture	?
Vernonia noveboracensis	New York ironweed	38644	108109	Blaha, M. & Ulinski, A.		G5
Veronica hedaraefolia	ivyleaf speedwell	33418	109433	Govus, T., Van Hoff, I.	Old field	n/a
Veronica officinalis	common gypsyweed	33398	108110	Blaha, M. & Ulinski, A.		G5
Veronica peregrina	neckweed	33421	109439	White, R., Govus, T., Ferguson, T.	Old field, roadside edge and farm pond	G5
Veronica serpyllifolia	thymeleaf speedwell	33423	108111	Blaha, M. & Ulinski, A.		G5
Viburnum acerifolium	mapleleaf viburnum	35255	108236	Heiman, K. Ulinski, A.	Dry white oak - hickory forest	G5
Viburnum nudum	possumhaw	35252	108237	Langdon, K.	Pinus strobus/rhododendron 2nd growth	G5
Viburnum prunifolium	blackhaw	35253	108238	Heiman, K. Ulinski, A.	Pinus strobus/rhododendron 2nd growth	G5
Vicia carolina	Carolina vetch	26334	109457	Govus, T.	Rich wooded slope with Northern Red oak and Chestnut oak	G5
Vicia sativa	garden vetch	26355	108239	Ulinski, A.	Mowed area	n/a
Vicia sativa ssp. nigra	garden vetch	524809	108112	Blaha, M. & Ulinski, A.		n/a

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Vinca major	greater periwinkle	30237	108240	Ulinski, A.	Pinus strobus/rhodo 2nd growth	n/a
Vinca minor	lesser periwinkle	30238	109426	White, R, Weakley, A.	Edge between mowed field and woods	n/a
Viola cucullata	marsh blue violet	505709	108113	Blaha, M. & Ulinski, A.		G4G5
Viola hastata	halberdleaf yellow violet	22086	Observed	Blaha, M. & Ulinski, A.		G5
Viola hirsutula var. hirsutula	southern wood violet	22087	108115	Blaha, M. & Ulinski, A.		G4
Viola pedata	birdfoot violet	22130	109427	White, R., Weakley, A.	Chestnut oak woodland	G5
Viola rotundifolia	roundleaf yellow violet	22159	109428	White, R., Weakley, A.	Streamside in Rhododendron thicket	G5
Viola sagittata var. sagittata	Triangle leaf violet	22162	108640	Blaha, M. & Ulinski, A.	No Field notes	G5
Viola sororia	Confederate violet	22169	108241	Ulinski, A.	White pine/ hemlock disturbed woodland	G5
Viola X primulifolia	primrose-leaf violet	22143	108116	Blaha, M. & Ulinski, A.		?
Viola X primulifolia	primrose-leaf violet	22143	108298	Ulinski, A.		?
Vitis aestivalis	summer grape	28607	108250	Heiman, K.	Low elevation granitic dome	G5
Vitis aestivalis	summer grape	28607	108117	Blaha, M. & Ulinski, A.		G5
Vitis rotundifolia	muscadine	28609	108118	Blaha, M. & Ulinski, A.		G5
Wisteria floribunda	Japanese wisteria	27020	Observed	Remaley 1998; Van Hoff 2001		n/a
Woodsia obtusa	bluntlobe cliff fern	17744	108119	Blaha, M. & Ulinski, A.	Rock wall	G5
Woodwardia areolata	netted chainfern	17749	109429	White, R., Weakley,A., Ferguson, T.	Streamside	G5

Scientific Name	Common Name	TSN #	Catalog Number	Collector(s)	Habitat	Global Rank
Xanthium strumarium	cocklebur	530873	Observed	Blaha, M. & Ulinski, A.		n/a
Xanthorhiza simplicissima	yellowroot	18809	108243	Ulinski, A.	Wet pond margin herbaceous vegetation	G5
Xanthorhiza simplicissima	yellowroot	18809	108642	Blaha, M. & Ulinski, A.	White pine/hemlock anthroprogenic woodland	G5
Xyris torta	common yelloweyed grass	39117	108644	Blaha, M., Ulinski, A	Wet pond margin herbaceous vegetation	G5
Xyris torta	common yelloweyed grass	39117	108290	Blaha, M., Ulinski, A	Wet pond margin herbaceous vegetation	G5
Xyris torta	common yelloweyed grass	39117	108625	Blaha, M., Ulinski, A	Wet pond margin herbaceous vegetation	G5
Zizia aurea	golden alexanders	29906	108122	Blaha, M.	White pine/rhododendron 2nd growth	G5
Zizia trifoliata	meadow alexanders	29908	109430	White, R., Weakley, A.	Quercus alba - Quercus montana slope	G5

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

	Diversity Measures			
	N	alpha	beta	gamma
Gridded plots only	11	73.1	5.1	376
Plots off grid only	4	38	2.6	100
All plots	15	67.9	5.9	399
Total for park				519

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)	581	89%
Second-order jackknife estimate (all plots)	692.1	75%
First-order jackknife estimate (gridded plots)	546.5	95%
Second-order jackknife estimate (gridded plots)	645.4	80%

Table 5. Association numbers, plot numbers, and global ranks of all associations identified at Carl Sandburg Home National Historic Site.

CEGL #	Ecogroup	Ecological Associations (Scientific name)	Ecological Associations (Name #2)	Ecological Associations (Name #3)	Plot	Global Rank
2386	Eastern Open Marshes and Ponds	Nuphar lutea ssp. advena - Nymphaea odorata Herbaceous Vegetation	Broadleaf Pondlily - White Waterlily Herbaceous Vegetation	Water Lily Aquatic Wetland	-	G4G5
4112	Eastern Emergent Marshes	Juncus effusus Seasonally Flooded Herbaceous Vegetation	Soft Rush Seasonally Flooded Herbaceous Vegetation	Rush marsh	-	G5
4048	Exotic Species Dominated Herbaceous Upland Vegetation	Lolium (arundinaceum, pratense) Herbaceous Vegetation	(Tall Fescue, Meadow Fescue) Herbaceous Vegetation	Cultivated meadow	7,8,9	GW
7690	Appalachian Highlands Rock Outcrops	Selaginella rupestris - Schizachyrium scoparium - Hypericum gentianoides - Bulbostylis cappilaris Herbaceous Vegetation	Rock Spikemoss - Little Bluestem - Pineweed - Common Hairsedge Herbaceous Vegetation	Southern App. Low Elevation Granitic Dome	2,3	G2
7097	Appalachian Highlands Pitch and Table Mountain Pines Woodlands	Pinus pungens - Pinus rigida - (Quercus prinus) / Kalmia latifolia - Vaccinium pallidum Woodland	Table Mountain Pine - Pitch Pine - (Rock Chestnut Oak) / Mtn Laurel - Hillside Blueberry Woodland	Blue Ridge Table Mtn Pine - Pitch Pine Woodland (Typic type)	13	G3
7519	Appalachian Highlands Upland Pine Forests	Pinus strobus - Quercus (coccinea, prinus)/(Gaylussacia ursina - Vaccinium stamineum) Forest	Eastern White Pine - (Scarlet Oak, Rock Chestnut Oak) / (Bear Huckleberry, Deerberry) Forest	Appalachian White Pine - Xeric Oak Forest	11	G3
7944	Semi-natural Wooded Uplands	Pinus strobus Successional Forest	Eastern White Pine Successional Forest	Eastern White Pine Successional Forest	10	GD

CEGL #	Ecogroup	Ecological Associations (Scientific name)	Ecological Associations (Name #2)	Ecological Associations (Name #3)	Plot	Global Rank
7543	Appalachian Highlands Hemlock-Hardwood Forests	Tsuga canadensis - Liriodendron tulipifera - Betula lenta / Rhododendron maximum Forest	Eastern Hemlock - Tuliptree - Sweet Birch / Great Rhododendron Forest	Southern Appalachian Acid Cover Forest (Typic type)	14	G5
8427	App Hglnds Dry-Mesic Oak Forests and Wdlnds or App Shortleaf Pine-Mesic Oak Forest	Pinus echinata - Quercus alba / Vaccinium pallidum / Hexastylis arifolia - Chimaphila maculata Forest	Shortleaf Pine - White Oak / Hillside Blueberry / Arrowleaf Heartleaf - Striped Wintergreen Forest	Appalachian Shortleaf Pine - Mesic Oak Forest	-	G3G4
6271	Appalachian Highlands Xeric Oak Forests	Quercus (prinus, coccinea) / Kalmia latifolia / (Galax urceolata, Gaultheria procumbens) Forest	(Rock Chestnut Oak, Scarlet Oak) / Mountain Laurel / (Galax, Wintergreen) Forest	Chestnut Oak Forest (Xeric Ridge Type)	5	G5
7230	Appalachian Montane Oak-Hickory Forests	Quercus alba - Quercus (rubra, prinus) / Rhododendron cal - Kalmia latifolia (Gaylussacia ursina) Forest	White Oak - (Northern Red Oak, Rock Chestnut Oak) / Flame Azalea - Mountain Laurel - (Bear Huckleberry) Forest	Appalachian Montane Oak Hickory Forest (Typic Acidic Type)	1	G5
6286	Appalachian Montane Oak-Hickory Forests	Quercus prinus - Quercus rubra / Rhododendron maximum / Galax urceolata Forest	Rock Chestnut Oak - Northern Red Oak / Great Rhododendron / Galax Forest	Chestnut Oak Forest	12, 4	G4
6192	Appalachian Montane Oak-Hickory Forests	Quercus rubra - Acer rubrum / Calycanthus floridus - Pyrularia pubera / Thelypteris noveboracensis Forest	Northern Red Oak - Red Maple / Sweet-shrub - Buffalo-nut - New York Fern Forest	Appalachian Montane Oak Hickory Forest (Red Oak Type)	15	G4?
7267	Appalachian Montane Oak-Hickory Forests	Quercus prinus - (Quercus rubra) - Carya spp. / Oxydendrum arboreum - Cornus florida Forest	Rock Chestnut Oak - (Northern Red Oak) - Hickory Spp. / Sourwood - Flowering Dogwood Forest	Appalachian Montane Oak Hickory Forest (Chestnut Oak Type)	6	G4G5

Table 6. Plot photo names and photo descriptions

Photo file name	Date taken	Description of photo
CarlSandburgHome2.jpg	Spring 2002	Front of Carl Sandburg Home
CarlSandburgHome.jpg	Spring 2002	Front of Carl Sandburg Home
Cypripediumacaule.jpg	Spring 2002	Pink lady's slipper
Cypripediumacaule2.jpg	Spring 2002	Pink lady's slipper
MemmingerAralspinosa.jpg	Fall 2001	Specimen of Aralia spinosa collected by E.R. Memminger and housed at UNC-CH Herbarium in Chapel Hill, NC. Probably collected in what is now the park.
MemmingerSarrrubra.jpg	Fall 2001	Specimen of Sarracenia rubra collected by E.R. Memminger and housed at UNC-CH Herbarium in Chapel Hill, NC. Probably collected outside of current park boundary, but Anne Ulinski suggests one of man-made ponds may be on top of an old bog???
Plot15.jpg	5/7/02	Photo from center of 1 hectare of plot 15
Plot15b.jpg	5/7/02	Photo from center of 1 hectare of plot 15
Plot15c.jpg	5/7/02	Photo from center of 1 hectare of plot 15
Plot15d.jpg	5/7/02	Photo from center of 1 hectare of plot 15
Plot9-Tomwithgoats.jpg	5/6/02	Photo of part of plot 9 hectare with botanist Tom Govus and goats.
Plot9andgoats.jpg	5/6/02	Photo of part of plot 9 hectare with goats.
Plot9b.jpg	Spring 2002	Photo of goats in Plot 9
Plot9c.jpg	Spring 2002	Photo of goats in Plot 9
Plot9d.jpg	Spring 2002	Photo of goats in Plot 9
Plot9e.jpg	Spring 2002	Photo of goats in Plot 9
TomFerguson.jpg	Spring 2002	Photo of Tom Ferguson on isolated rock outcrop in interior of park away from main nature trails.
Sisyrinchium.jpg	Spring 2002	Photo of Sisyrinchium (Blue-eyed grass) near trail.
Rockoutcrop.jpg	Spring 2002	Photo of granite dome
Rockoutcropb.jpg	Spring 2002	Photo of granite dome
Loniceraflava.jpg	Spring 2002	Photo of Lonicera flava
Hexastylisrhombiformis1.jpg	5/12/02	Photo of Hexastylis rhombiformis
Hexastylisrhombiformis2.jpg	Spring 2002	Hexastylis rhombiformis
Hexastylisrhombiformis3.jpg	Spring 2002	Hexastylis rhombiformis
Hexastylisrhombiformis4.jpg	Spring 2002	Hexastylis rhombiformis
Hexastylisrhombiformis5.jpg	Spring 2002	Hexastylis rhombiformis
Hexastylisrhombiformis6.jpg	Spring 2002	Hexastylis rhombiformis

Appendix I. Plot sheets used for permanent plots (original field forms may appear different since this was formatted to fit in this report)

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

Provisional community name_____
__

*Classified community name*_____
_____
Classifyer _____ Date_____

*TUSNVC Elcode*_____ *EONum-Suffix*_____

Sublocation (I.D.able feature on topo map)_____

USGS Quad name_____ *Quad code (if known)* _____

Survey date:_____ **Surveyors:**_____

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

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

_**Digital photos** _**Regular camera** _**No pictures taken** **Roll# or disc #**_____ **Frame #**_____

Plot representativeness (is the matrix the same?)_____

_____
_____

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

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

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

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

Coordinate accuracy _____ **m / ft** **UTM Zone**_____ **GPS location with respect to permanent marker if not 0,0: x**___ **y**___

_ *Estimated position marked on Topo. Sheet.* **Elevation** _____ **m / ft** topo map? altimeter? DEM? GPS?

ENVIRONMENTAL / SITE INFORMATION

Measured Slope _____

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

Measured Aspect __ ___ ° (N=0 °)

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

Compass: magnetic ? / corrected?

Topographic Postion

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

Cowardin System

_ *Upland* _ *Palustrine*
- Estuarine _ *Lacustrine*
_*Riverine*

Landform (check most applicable)

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

Geology

Igneous Rocks:

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

Sedimentary Rocks:

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

Metamorphic Rocks:

_ Gneiss
_Schist
_Slate and Phyllite
_Marble
_ Serpentine (Ultramafic)
Y Other _____

Hydrologic Regime (check only for wetlands)

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

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

Salinity/Halinity Modifiers:

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

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

Environmental comments:

_____

Landscape comments:

Soil Texture:

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

Soil Taxon Description:
_____
_____
_____

Drainage:

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

Soil depth (optional):_____

Ground cover

(adds to 100%)

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

Leaf type:
Broad-leaved
Needle-leaved
Microphyllous
Graminoid
Broad-leaved herbaceous
Pteridophyte
Extremely xeromorphic

Leaf phenology (dominant stratum)

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

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

DISTURBANCE

Natural and Anthropogenic Disturbance
_ logging _ fire _ Hydrologic
_ erosion _ trails/roads _ Agriculture
_ grazing _ wind/ice damage _ Old Growth
_ pine bark beetle _ exotic plants _ Fire Suppression
_ dogwood anthracnose _ adelgid _ RCW
_ ORV _ feral hogs

Disturbance in plot, of type and severity (0-5, 0=no disturbance, 5= extreme disturbance):

___*human:*_____

___*natural:*_____

___ *fire:when?*_____

___ *clear-cut: when?*_____

___
*animal*_____

Disturbance comments:

Current land use:

Former land use:

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

QUANTITATIVE VEGETATION SAMPLE

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

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

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

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

Cover cls
1 trace
2 0.1-1%
3 1-2%
4 2-5%
5 5-10%

6 10-25%

7 25-50%

8 50-75%

9 75-95%

10 **>**95%

SPECIES COMPOSITION AND COVER/ABUNDANCE CLASS BY STRATUM

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

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

T1: Emergent

T2: Tree Can

T3 Subcanopy

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

S2 Short Shrub (< 1m)

H Herbaceous

N Nonvascular

V Vines (lianas)

E Epiphytes

Appendix II. Descriptions of alliances and associations found at Carl Sandburg Home National Historic Site.

INTERNATIONAL CLASSIFICATION OF ECOLOGICAL COMMUNITIES:

TERRESTRIAL VEGETATION OF THE UNITED STATES

Carl Sandburg Home National Historic Site

Report from
Biological Conservation Datasystem
December, 2002

by

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

This subset of the International Classification of Ecological Communities (ICEC) covers vegetation alliances and associations attributed to the Carl Sandburg Home National Historic Site**.** 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

The following citation should be used in any published materials, which reference these data:
NatureServe. 2002. International Classification of Ecological Communities: Terrestrial Vegetation. Natural Heritage Central Databases. NatureServe, Arlington, VA.

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

These data are extracted from:

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

This document may be generally cited as follows:

NatureServe[1]. 2002. International classification of ecological communities: Terrestrial vegetation of the United States. Carl Sanburg Home National Historic Site subset. NatureServe, Arlington, VA and NatureServe South, Durham, NC.

[1] NatureServe (formerly called "Association for Biodiversity Information" ("ABI")) is an international organization including NatureServe regional offices, a NatureServe central office, U.S. State Natural Heritage Programs, and Conservation Data Centres (CDC) in Canada and Latin America and the Caribbean. Ecologists from the following organizations have contributed the development of the ICEC:

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

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

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

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

I. Forest

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

I.A.8.N.b.14. PINUS STROBUS FOREST ALLIANCE

Eastern White Pine Forest Alliance

ALLIANCE CONCEPT

Summary: This alliance, found near the Great Lakes and in the southern Appalachian Mountains and northeastern United States, is composed of dry-mesic to mesic pine forests. Stands of this alliance are characterized by a moderate to complete tree canopy. The shrub layer is absent to well-developed, while the herbaceous layer is moderately to poorly developed. Understory vegetation is sparse where the canopy is closed, due to the limited amount of light and the duff buildup on the forest floor. The overstory is heavily dominated by coniferous trees, usually *Pinus strobus* alone but sometimes with *Pinus resinosa*. Other canopy and subcanopy trees include *Abies balsamea* (in the northern part of this alliance's range), *Acer rubrum, Betula papyrifera, Populus tremuloides*, and *Thuja occidentalis*. The shrub layer typically contains species such as *Acer spicatum, Corylus cornuta, Diervilla lonicera, Linnaea borealis*, and *Vaccinium* spp., especially *Vaccinium myrtilloides* and *Vaccinium angustifolium*. The herb layer contains species adapted to the dry-mesic nature of stands of this alliance. These include *Aralia nudicaulis, Eurybia macrophylla (= Aster macrophyllus), Gaultheria procumbens*, and *Maianthemum canadense*.

Stands of this alliance are found on loamy sand, sandy loam, loam, and clay loam soils which are typically moderately deep to deep (60-100 cm) except in the Driftless Area where they may be very shallow. The soils are acidic and rarely contain a significant amount of organic material. Stands of this alliance are often found on glacial till or outwash plains, although in northeastern Minnesota they occur near lakes and on lower slopes. This alliance can be found on a variety of landscapes, varying from nearly level to rolling across much of its range to steep slopes in the Driftless Area. In the southern Appalachians these forests occur below 3000 feet (900 m) elevation on upper slopes and ridgetops protected by higher landforms, or as successional forests on abandoned agricultural land.

Dynamics:

ALLIANCE DISTRIBUTION

Range: This alliance is found in Michigan, northern Wisconsin, northern and eastern Minnesota, extreme northeastern Iowa, Maine, New Hampshire, North Carolina, South Carolina, Georgia, Tennessee, Kentucky (?), and Virginia. In Canada, it is found in Ontario.

Nations: CA US

States/Provinces: GA IA KY? MA ME MI MN NB? NC NH NS? NY ON PA QC? SC TN VA VT WI WV

TNC Ecoregions: 46:C, 47:C, 48:C, 49:C, 50:C, 51:C, 59:C, 60:C, 61:C, 62:C, 63:C, 64:P

USFS Ecoregions: 212Aa:CC?, 212Ab:CC?, 212Ba:CCP, 212Bb:CCP, 212Ca:CCC, 212Cb:CCC, 212Da:CCC, 212Ea:CP?, 212Eb:CP?, 212Ec:CPP, 212Fa:C??, 212Fb:C??, 212Fc:C??, 212Ga:C??, 212Ha:CCC, 212Hb:CCP, 212He:CCP, 212Hh:CCC, 212Hi:CCP, 212Hj:CCC, 212Hl:CCC, 212Hm:CCC, 212Ho:CCC, 212Hp:CCC, 212Hq:CCP, 212Hr:CCC, 212Hs:CCP, 212Ht:CCP, 212Hu:CCP, 212Hv:CCP, 212Hw:CCP, 212Hx:CCP, 212Hy:CCP, 212Ia:CCC, 212Ja:CCP, 212Jb:CCC, 212Jc:CCC, 212Je:CCC, 212Jf:CC?, 212Jj:CC?, 212Jl:CCC, 212Jm:CCC, 212Jn:CCP, 212Jr:CCC, 212Ka:CCC, 212Kb:CCC, 212La:CCC, 212Lb:CCC, 212Lc:CCC, 212Ld:CCP, 212Ma:CCC, 212Mb:CCC, 212Na:CCC, 212Nb:CCC, 212Nc:CCC, 212Nd:CCP, 221Af:CCP, 221Al:CCP, 221Ba:CPP, 221Ha:CCC, 221Hb:CCC, 221Hc:CCC, 221He:CCC, 221Ja:C??, 221Jc:C??, 222En:CCC, 222Eo:CCC, 222Ib:C??, 222Ic:C??, 222Id:C??, 222Ie:C??, 222If:C??, 222Lc:CCC, 222Ld:CCC, 222Le:CCC, 222Lf:CCC, 222Ma:CCC, 222Mc:CCC, 231:C, M212Ab:CCC, M212Ac:CCC, M212Ae:CCC, M212Ag:CCC, M212Ba:CCC, M212Cb:CCC, M212Cc:CCC, M212Da:CCP, M212Db:CCP, M212Dc:CCP, M212Ea:C??, M212Eb:C??, M212Fa:C??, M212Fb:C??, M221Aa:CCC, M221Ab:CCC, M221Ac:CCC, M221Bb:CCC, M221Bd:CCC, M221Bf:CCP, M221Cb:CPP, M221Cd:CPP, M221Da:CCC, M221Db:CCC, M221Dc:CCC, M221Dd:CCC

Federal Lands: NPS (Acadia, Carl Sandburg Home, Great Smoky Mountains, Voyageurs); USFS (Chattahoochee, Cherokee, Daniel Boone, George Washington, Jefferson, Nantahala, Pisgah, Sumter)

ALLIANCE SOURCES

Authors: D.J. ALLARD, RW, MCS **Identifier:** A.128

References: Allard 1990, Burns and Honkala 1990a, Curtis 1959, DeYoung 1979, DuMond 1970, Eyre 1980, Faber-Langendoen et al. 1996, Govus 1982, Hinkle 1989, Kuchler 1964, MNNHP 1993, Ohmann and Ream 1971, Patterson 1994, Pyne 1994, Schafale and Weakley 1990, Sims et al. 1989, Tobe et al. 1992

Pinus strobus Successional Forest

Eastern White Pine Successional Forest

Eastern White Pine Successional Forest

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

ELEMENT CONCEPT

GLOBAL SUMMARY: This forest is an early successional forest dominated by *Pinus strobus*, typically with a very dense canopy and little understory. This successional forest is commonly associated with anthropogenic disturbance and could potentially occur anywhere within the range of the *Pinus strobus* Forest Alliance (A.128). Associated woody and herbaceous species vary with geography but are typically ruderal or exotic species that favor openings or disturbance. In the Southern Blue Ridge, where this association was originally defined, typical canopy and subcanopy associates include *Liriodendron tulipifera, Acer rubrum, Pinus rigida*, and *Liquidambar styraciflua*, with *Tsuga canadensis* often forming a dense shrub stratum. In this ecoregion, it occurs in former old fields and on formerly cleared flats along streams. In the Daniel Boone National Forest of Kentucky, *Pinus strobus* is spreading from plantings, especially in the Red River Gorge.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:

Carl Sandburg Home National Historic Site Environment: Within the park, this community occurs on a variety of soil types and exposures. Its distribution depends more on past disturbance than substrate or exposure.

Global Environment: This wide-ranging successional forest is commonly associated with anthropogenic disturbance and could potentially occur anywhere within the range of the *Pinus strobus* Forest Alliance (A.128). Associated woody and herbaceous species vary with geography but are typically ruderal or exotic species that favor openings or disturbance.

VEGETATION DESCRIPTION

Carl Sandburg Home National Historic Site Vegetation: Within the park, there are old patches of white pines which exist with canopy codominants such as white oak, black oak (*Quercus velutina*), and eastern hemlock. The understory contains some great rhododendron, and the herb layer is sparse and dominated by acid-loving species such as pink lady's slipper and downy rattlesnake-plantain as well as exotic species such as Japanese honeysuckle (*Lonicera japonica*).

Global Vegetation: In the Southern Blue Ridge, where this association was originally defined, typical canopy and subcanopy associates include *Liriodendron tulipifera, Acer rubrum, Pinus rigida*, and *Liquidambar styraciflua*, with *Tsuga canadensis* often forming a dense shrub stratum. In this ecoregion, it occurs in former old fields and on formerly cleared flats along streams. In the Daniel Boone National Forest of Kentucky, *Pinus strobus* is spreading from plantings, especially in the Red River Gorge.

Global Dynamics:

MOST ABUNDANT SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
TREE CANOPY	*Pinus strobus, Quercus alba, Quercus velutina, Tsuga canadensis*
TREE SUB-CANOPY	*Acer rubrum, Tsuga canadensis*
TALL SHRUB	*Rhododendron maximum*

Global

Stratum	Species

CHARACTERISTIC SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
TREE CANOPY	*Pinus strobus*
FORB	*Goodyera pubescens*
VINE/LIANA	*Lonicera japonica*

Global

Stratum	Species

OTHER NOTEWORTHY SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species

Global

Stratum	Species

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

GRank & Reasons: GD (01-02-11). This forest represents early successional vegetation and is thus not of conservation concern and does not receive a conservation status rank.

CLASSIFICATION COMMENTS

Carl Sandburg Home National Historic Site:

Global Classif Comments: This weedy type may be expected to occur throughout the range of the alliance but has only been attributed in areas where Nature Conservancy ecoregional planning or other project-specific needs have documented its occurrence. Rangewide review should greatly expand its geographic scope.

ELEMENT DISTRIBUTION

Carl Sandburg Home National Historic Site Range: This successional forest exists close to areas disturbed by farming activities within the park. It exists in some patches within the fields on the north of the park and just behind the Carl Sandburg Home, all areas that were probably logged and grazed at some point in the past.

Global Range: This weedy type may be expected to occur throughout the range of the alliance (i.e., from Michigan, northern Wisconsin, northern and eastern Minnesota, extreme northeastern Iowa, Maine and New Hampshire south to North Carolina, South Carolina, Georgia, Tennessee, Kentucky (?), and Virginia, as well as in Ontario, Canada). It has only been documented in areas where project-specific needs have required it

Nations: US
States/Provinces: GA:S?, KY?, MI?, MN:S?, NC:S?, NY?, PA?, SC:S?, TN:S?, VA:S?, WI?, WV:S?
TNC Ecoregions: 47:P, 48:P, 49:C, 50:C, 51:C, 59:C, 60:P
USFS Ecoregions: 221Ha:CCC, 221Hb:CCC, 221Hc:CCC, 221He:CCC, 222En:CCC, 222Eo:CCC, M221Aa:CCC, M221Ab:CCC, M221Cd:CPP, M221Da:CCC, M221Db:CCC, M221Dc:CCC, M221Dd:CCC
Federal Lands: NPS (Carl Sandburg Home, Great Smoky Mountains); USFS (Cherokee?, Daniel Boone, George Washington, Jefferson)

ELEMENT SOURCES

Carl Sandburg Home National Historic Site Inventory Notes:
Authors: K.D. Patterson, SCS **Confidence:** 2 **Identifier:** CEGL007944
REFERENCES (type in full citation below if reference is new): Fleming and Coulling 2001, NatureServe Ecology - Southeast U.S. unpubl. Data

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

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

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

ALLIANCE CONCEPT

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

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

Dynamics:

ALLIANCE DISTRIBUTION

Range: This alliance ranges from Ontario, Canada, throughout the midwestern and eastern United States, south to the very northern edges of the Western and Eastern Gulf Coastal Plains.

Nations: CA US

States/Provinces: AL AR CT DE GA IA IL IN KS KY MA MD ME MI MN MO MS? NC NE NH NJ NY OH OK ON PA RI SC TN VA VT WI

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, prinus) / Rhododendron calendulaceum - Kalmia latifolia - (Gaylussacia ursina) Forest

White Oak - (Northern Red Oak, Rock Chestnut Oak) / Flame Azalea - Mountain Laurel - (Bear Huckleberry) Forest

Appalachian Montane Oak Hickory Forest (Typic Acidic Type)

Ecological Group (SCS;MCS): Appalachian Montane Oak-Hickory Forests (410-40; n/a)

ELEMENT CONCEPT

GLOBAL SUMMARY: These forests occur in a wide elevation range (2000-4500 feet) in the Southern Blue Ridge and in the Blue Ridge/Piedmont transition, on protected sites, typically lower slopes, bottoms, and coves. Stands of this deciduous forest association are dominated or codominated by *Quercus alba*, occurring with other *Quercus* species (*Quercus rubra, Quercus prinus, Quercus coccinea*). Associated species are characteristically montane, and typical of acidic forests. This association lacks indicators of circumneutral soils and also lacks low elevation dry sites species such as *Pinus echinata, Quercus falcata, Quercus stellata*, and *Quercus marilandica*. Species other than oaks that can be important in the canopy include *Carya alba, Carya glabra, Liriodendron tulipifera, Acer rubrum*, and *Magnolia fraseri*. Common species in the subcanopy/sapling strata include *Cornus florida, Acer rubrum, Carya* spp., *Liriodendron tulipifera, Magnolia fraseri, Nyssa sylvatica, Oxydendrum arboreum, Pinus strobus*, and *Halesia tetraptera*. Shrub cover is sparse to very dense, and is often dominated by deciduous heaths. *Kalmia latifolia* and *Gaylussacia ursina* are usually present, but other shrub species can include *Euonymus americana, Rhododendron calendulaceum, Vaccinium stamineum, Vaccinium pallidum, Viburnum acerifolium, Calycanthus floridus, Pyrularia pubera, Ilex montana, Halesia tetraptera*, and *Hamamelis virginiana*. *Smilax glauca* and *Vitis rotundifolia* are common vines. The herbaceous stratum is sparse to moderate in coverage, but often rich in species, approaching the diversity but not the coverage of rich cove forests. Associated herbaceous species vary with elevation. Often there is a dominant fern stratum, with *Thelypteris noveboracensis* and *Polystichum acrostichoides* most typically dominant.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:

Carl Sandburg Home National Historic Site Environment: Within the park, this association is best developed on east-facing midslopes.

Global Environment: These forests occur in a wide elevation range (2000-4500 feet) in the Southern Blue Ridge and in the Blue Ridge/Piedmont transition, on protected sites, typically lower slopes, bottoms, and coves.

VEGETATION DESCRIPTION

Carl Sandburg Home National Historic Site Vegetation: The canopy tends to be dominated by a combination of *Quercus alba, Quercus prinus,* and *Carya alba*. The understory contains *Acer rubrum, Pinus strobus,* and

Oxydendrum arboreum, and the herb layer is very diverse with overall species diversity approaching 60 species per 20 x 50-meter plot in some examples. The herb layer in this association can vary between extremely diverse and only moderately diverse on some transitional sites. Most examples of this community within the park have a fairly sparse shrub layer.

Global Vegetation: The canopies of stands of this association are dominated or codominated by *Quercus alba*, occurring with other *Quercus* species (*Quercus rubra, Quercus prinus, Quercus coccinea*). Species other than oaks that can be important in the canopy include *Carya alba, Carya glabra*, *Liriodendron tulipifera, Acer rubrum*, and *Magnolia fraseri*. Stands lack indicators of circumneutral soils and also lack low elevation dry sites species such as *Pinus echinata, Quercus falcata, Quercus stellata*, and *Quercus marilandica*. Common species in the subcanopy/sapling strata include *Cornus florida, Acer rubrum, Carya* spp., *Liriodendron tulipifera, Magnolia fraseri, Nyssa sylvatica, Oxydendrum arboreum, Pinus strobus*, and *Halesia tetraptera*. Shrub cover is sparse to very dense, and is often dominated by deciduous heaths, including *Kalmia latifolia* and *Gaylussacia ursina*. Other shrub species can include *Euonymus americana, Rhododendron calendulaceum, Vaccinium stamineum, Vaccinium pallidum, Viburnum acerifolium, Calycanthus floridus, Pyrularia pubera, Ilex montana, Halesia tetraptera*, and *Hamamelis virginiana*. *Smilax glauca* and *Vitis rotundifolia* are common vines. The herbaceous stratum is sparse to moderate in coverage, but often rich in species, approaching that of rich cove forests (but with a different composition). Associated herbaceous species vary with elevation. Some of the more constant species include *Parthenocissus quinquefolia, Dioscorea quaternata, Dichanthelium* spp., *Carex pensylvanica, Chimaphila maculata, Desmodium nudiflorum, Goodyera pubescens, Maianthemum racemosum ssp. racemosum*, and *Trillium catesbaei*. Other species include *Dichanthelium laxiflorum, Oclemena acuminata (= Aster acuminatus), Eurybia divaricata (= Aster divaricatus), Galax urceolata, Galium latifolium, Lysimachia quadrifolia, Mitchella repens, Viola hastata* and *Melanthium parviflorum*. Often there is a dominant fern stratum, with *Thelypteris noveboracensis* and *Polystichum acrostichoides* most typically dominant. Other ferns include *Athyrium filix-femina ssp. asplenioides, Dennstaedtia punctilobula*, and *Dryopteris intermedia*.

Global Dynamics:

MOST ABUNDANT SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
TREE CANOPY	*Carya alba, Quercus alba, Quercus prinus, Quercus rubra*
TREE SUB-CANOPY	*Acer rubrum, Cornus florida, Oxydendrum arboreum, Pinus strobus, Quercus prinus*
TALL SHRUB	*Kalmia latifolia, Rhododendron calendulaceum*
SHORT SHRUB	*Vaccinium pallidum, Vaccinium stamineum*
GRAMINOID	*Carex pensylvanica, Piptochaetium avenaceum*
FORB	*Galax urceolata*
VINE/LIANA	*Smilax biltmoreana*

Global Stratum	Species
TREE CANOPY	*Carya alba, Carya glabra, Quercus alba, Quercus coccinea, Quercus prinus, Quercus rubra*

CHARACTERISTIC SPECIES

Carl Sandburg Home National Historic Site

Stratum	**Species**
GRAMINOID	*Piptochaetium avenaceum*
VINE/LIANA	*Smilax biltmoreana*

Global Stratum	Species

OTHER NOTEWORTHY SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species

Global

Stratum Species

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

- Quercus prinus - (Quercus rubra) - Carya spp. / Oxydendrum arboreum - Cornus florida Forest (CEGL007267)--is drier and less diverse.

GRank & Reasons: G5 (98-04-30).

CLASSIFICATION COMMENTS

Carl Sandburg Home National Historic Site:

Global Classif Comments: This association is meant to cover the typical acidic, oak-hickory forests of the Southern Blue Ridge Mountains. It has a broad concept, and there is potential for subdividing this type by moisture, elevation, or undergrowth. It can be distinguished from *Quercus prinus - (Quercus rubra) - Carya* spp. / *Oxydendrum arboreum - Cornus florida* Forest (CEGL007267) by higher species diversity and the presence of a substantial amount of *Quercus alba*.

ELEMENT DISTRIBUTION

Carl Sandburg Home National Historic Site Range: Within the park, this association is best developed on east-facing acidic midslopes, mostly in the southern half of the park.

Global Range: This community is found in the Southern Blue Ridge and the Blue Ridge/Piedmont transition of the eastern United States.

Nations: US
States/Provinces: GA:S?, NC:S?, SC:S?, TN:S?
TNC Ecoregions: 51:C, 52:P
USFS Ecoregions: 231Ag:CCC, M221Dc:CCC, M221Dd:CCC
Federal Lands: NPS (Carl Sandburg Home, Great Smoky Mountains); USFS (Chattahoochee, Cherokee, Nantahala, Pisgah, Sumter)

ELEMENT SOURCES

Carl Sandburg Home National Historic Site Inventory Notes:
Authors: SCS **Confidence:** 2 **Identifier:** CEGL007230
REFERENCES (type in full citation below if reference is new): Allard 1990, Ambrose 1990a, Major et al. 1999, NatureServe Ecology - Southeast U.S. unpubl. data, Nelson 1986, Peet et al. 2002, Schafale 1998b, Schafale and Weakley 1990

Quercus rubra - Acer rubrum / Calycanthus floridus - Pyrularia pubera / Thelypteris noveboracensis Forest

Northern Red Oak - Red Maple / Sweet-shrub - Buffalo-nut / New York Fern Forest
Appalachian Montane Oak - Hickory Forest (Red Oak Type)
Ecological Group (SCS;MCS): Appalachian Montane Oak-Hickory Forests (410-40; n/a)

ELEMENT CONCEPT

GLOBAL SUMMARY: This association includes *Quercus rubra* forests at intermediate elevations (mostly below 3500 feet, ranging from 2000-4000 feet) in the Southern Blue Ridge Escarpment, and may possibly range into adjacent areas of the Central Appalachians and Cumberland Plateau. These forests occur on mostly northern to eastern and southeastern, mid to upper, moderately steep slopes of intermediate exposure over acidic soils. The canopy is dominated by *Quercus rubra*, often with *Acer rubrum* and/or *Liriodendron tulipifera* codominating, and occasionally with a high component of *Quercus alba* in the canopy.. Other minor canopy species may include *Betula lenta, Carya alba, Carya glabra, Halesia tetraptera, Quercus prinus*, and *Magnolia fraseri*. The subcanopy and sapling strata include the canopy species, as well as *Halesia tetraptera, Betula lenta, Tsuga canadensis, Cornus florida, Acer pensylvanicum*, and *Oxydendrum arboreum*. The shrub stratum is typically sparse but may have local dominance by *Gaylussacia ursina* or *Rhododendron maximum*. Other typical species in the shrub stratum include *Castanea dentata, Calycanthus floridus, Pyrularia pubera, Rhododendron calendulaceum, Vaccinium corymbosum*, and *Viburnum acerifolium*. Herbaceous cover is sparse to moderate but can be species rich. Ferns can be locally

dominant, typically *Thelypteris noveboracensis* and *Athyrium filix-femina ssp. asplenioides*. Other typical species include *Eurybia divaricata (= Aster divaricatus), Carex* spp. (e.g., *Carex aestivalis, Carex debilis, Carex digitalis, Carex laxiflora var. laxiflora, Carex pensylvanica), Chimaphila maculata (= var. maculata), Desmodium nudiflorum, Dioscorea quaternata, Eupatorium purpureum, Galium latifolium, Galax urceolata, Goodyera pubescens, Houstonia purpurea var. purpurea, Lysimachia quadrifolia, Maianthemum racemosum ssp. racemosum, Medeola virginiana, Polygonatum biflorum, Polystichum acrostichoides, Solidago curtisii (= Solidago caesia var. curtisii),* and *Uvularia puberula*. Common vines are *Smilax rotundifolia, Smilax glauca,* and *Vitis aestivalis*. This forest is distinguished from High Elevation Red Oak forests [see associations in I.B.2.N.a *Quercus rubra* Montane Forest Alliance (A.272)] by lack of species such as *Betula alleghaniensis, Ilex montana, Vaccinium simulatum*, and by lacking abundant *Hamamelis virginiana*, as well as its occurrence at lower elevations. In the Southern Blue Ridge Escarpment region, these montane oak - hickory forests seem to occupy environments intermediate between more protected forests dominated by *Quercus alba* and drier, more exposed *Quercus prinus* forests.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:

Carl Sandburg Home National Historic Site Environment: Within the park, this association is best developed on east- and north-facing midslopes, especially on the slopes of Big Glassy Mountain. In the example we found, it appeared to occur adjacent to a drier *Quercus alba*-dominated slope.

Global Environment: This association includes *Quercus rubra* forests at intermediate elevations (mostly below 3500 feet, ranging from 2000-4000 feet) in the Southern Blue Ridge Escarpment, and may possibly range into adjacent areas of the Central Appalachians and Cumberland Plateau. These forests occur on mostly northern to eastern and southeastern, mid to upper, moderately steep slopes of intermediate exposure over acidic soils.

VEGETATION DESCRIPTION

Carl Sandburg Home National Historic Site Vegetation: The closed canopy is dominated by *Quercus rubra, Liriodendron tulipifera, Carya alba*, and to some extent *Quercus prinus*. The understory contains mostly *Oxydendrum arboreum* and *Liriodendron tulipifera*. The shrub layer is sparse but contains some *Pinus strobus, Sassafras albidum*, and *Magnolia fraseri* saplings. The herbaceous layer is sparse to moderate, with no clear dominant. Some important herbs include *Polygonatum biflorum, Smilax biltmoreana, Iris verna, Viola hastata, Medeola virginiana,* and others. In addition, vines such as *Toxicodendron radicans, Parthenocissus quinquefolia,* and *Vitis rotundifolia* are common.

Global Vegetation: The canopy is dominated by *Quercus rubra*, often with *Acer rubrum* and/or *Liriodendron tulipifera* codominating, and occasionally with a high component of *Quercus alba* in the canopy.. Other minor canopy species may include *Betula lenta, Carya alba, Carya glabra, Halesia tetraptera, Quercus prinus*, and *Magnolia fraseri*. The subcanopy and sapling strata include the canopy species, as well as *Halesia tetraptera, Betula lenta, Tsuga canadensis, Cornus florida, Acer pensylvanicum*, and *Oxydendrum arboreum.* The shrub stratum is typically sparse but may have local dominance by *Gaylussacia ursina* or *Rhododendron maximum*. Other typical species in the shrub stratum include *Castanea dentata, Calycanthus floridus, Pyrularia pubera, Rhododendron calendulaceum, Vaccinium corymbosum*, and *Viburnum acerifolium*. Herbaceous cover is sparse to moderate but can be species rich. Ferns can be locally dominant, typically *Thelypteris noveboracensis* and *Athyrium filix-femina ssp. asplenioides*. Other typical species include *Eurybia divaricata (= Aster divaricatus), Carex* spp. (e.g., *Carex aestivalis, Carex debilis, Carex digitalis, Carex laxiflora var. laxiflora, Carex pensylvanica), Chimaphila maculata (= var. maculata), Desmodium nudiflorum, Dioscorea quaternata, Eupatorium purpureum, Galium latifolium, Galax urceolata, Goodyera pubescens, Houstonia purpurea var. purpurea, Lysimachia quadrifolia, Maianthemum racemosum ssp. racemosum, Medeola virginiana, Polygonatum biflorum, Polystichum acrostichoides, Solidago curtisii (= Solidago caesia var. curtisii),* and *Uvularia puberula*. Common vines are *Smilax rotundifolia, Smilax glauca,* and *Vitis aestivalis*. This forest is distinguished from High Elevation Red Oak forests [see associations in I.B.2.N.a *Quercus rubra* Montane Forest Alliance (A.272)] by lack of species such as *Betula alleghaniensis, Ilex montana, Vaccinium simulatum*, and by lacking abundant *Hamamelis virginiana*, as well as its occurrence at lower elevations. In the Southern Blue Ridge Escarpment region, these montane oak - hickory forests seem to occupy environments intermediate between more protected forests dominated by *Quercus alba* and drier, more exposed *Quercus prinus* forests.

Global Dynamics:

MOST ABUNDANT SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
TREE CANOPY	*Carya alba, Liriodendron tulipifera, Quercus rubra*
TREE SUB-CANOPY	*Liriodendron tulipifera, Oxydendrum arboreum*

Global

Stratum	Species
TREE CANOPY	*Acer rubrum, Quercus rubra*
TREE SUB-CANOPY	*Acer rubrum, Calycanthus floridus, Halesia tetraptera var monticola, Oxydendrum arboreum, Pyrularia pubera*
SHORT SHRUB	*Gaylussacia ursina*
FORB	*Galax urceolata*
FERN	*Thelypteris noveboracensis*

CHARACTERISTIC SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
TREE CANOPY	*Quercus rubra*
FORB	*Iris verna*

Global

Stratum	Species
TREE CANOPY	*Quercus rubra*
TALL SHRUB	*Calycanthus floridus, Pyrularia pubera*

OTHER NOTEWORTHY SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
FORB	*Lilium michauxii*

Global

Stratum	Species

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

- Quercus alba - Quercus (rubra, prinus) / Rhododendron calendulaceum - Kalmia latifolia - (Gaylussacia ursina) Forest (CEGL007230)--contains more than 50% *Quercus alba* in the canopy.
- Quercus rubra / (Vaccinium simulatum, Rhododendron calendulaceum) / (Dennstaedtia punctilobula, Thelypteris noveboracensis) Forest (CEGL007300)--is a high-elevation forest.

GRank & Reasons: G4? (00-01-03). This community is uncommon but secure within its range. It is often overlooked in surveys or not recognized as distinct, thus it is much more common than the number of documented occurrences suggests. Resolution of taxonomic issues that distinguish this community from similar associations may lead to a range extension.

CLASSIFICATION COMMENTS

Carl Sandburg Home National Historic Site:

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

ELEMENT DISTRIBUTION

Carl Sandburg Home National Historic Site Range: Within the park, this association is best developed on east- and north-facing acidic midslopes, mostly in the central and southern part of the park.

Global Range: This association is found in the Southern Blue Ridge Escarpment and may possibly range into adjacent areas of the Central Appalachians and Cumberland Plateau.

Nations: US
States/Provinces: GA:S?, NC:S?, SC:S?, TN:S?, VA?
TNC Ecoregions: 50:?, 51:C, 59:?
USFS Ecoregions: M221Dc:CCP, M221Dd:CCC
Federal Lands: NPS (Carl Sandburg Home, Great Smoky Mountains); USFS (Chattahoochee, Nantahala, Sumter)

ELEMENT SOURCES

Carl Sandburg Home National Historic Site Inventory Notes:
Authors: SCS **Confidence:** 2 **Identifier:** CEGL006192
REFERENCES (type in full citation below if reference is new): Allard 1990, Ambrose 1990a, Nelson 1986, Peet et al. 2002, Schafale 1998b, Schafale and Weakley 1990, Simon pers. comm.

I.B.2.N.a.36. QUERCUS PRINUS - (QUERCUS COCCINEA, QUERCUS VELUTINA) FOREST ALLIANCE

Rock Chestnut Oak - (Scarlet Oak, Black Oak) Forest Alliance

ALLIANCE CONCEPT

Summary: This alliance includes xeric oak forests strongly dominated by *Quercus prinus* or *Quercus prinus* with admixtures of *Quercus coccinea* and/or *Quercus velutina*, occurring in the southern and central Appalachians, Ridge and Valley, Cumberland Plateau, Piedmont, Interior Low Plateau, and possibly in the northern Appalachians. In the Piedmont and Ridge and Valley, and in areas transitional to these provinces, *Quercus stellata* and *Quercus marilandica* may be canopy associates. Other canopy/subcanopy associates include *Acer rubrum, Amelanchier arborea, Carya alba, Carya glabra, Cornus florida, Hamamelis virginiana, Magnolia fraseri, Nyssa sylvatica, Oxydendrum arboreum, Pinus rigida, Pinus strobus, Quercus alba, Quercus rubra, Robinia pseudoacacia*, and *Sassafras albidum*. In the Appalachians, a dense ericaceous shrub layer is characteristic, with species such as *Gaylussacia baccata, Gaylussacia ursina, Kalmia latifolia, Leucothoe recurva, Rhododendron maximum, Vaccinium pallidum*, and *Vaccinium stamineum*. In the upper Piedmont *Kalmia latifolia, Vaccinium arboreum*, and *Vaccinium pallidum* are common. In the montane distribution of this alliance, forests of this alliance have replaced forests formerly dominated or codominated by *Castanea dentata*, and chestnut sprouts are common in the understory. Other shrub species found in forests of this alliance include *Chionanthus virginicus, Diospyros virginiana, Robinia hispida, Sassafras albidum, Styrax grandifolius, Symplocos tinctoria, Viburnum acerifolium, Viburnum prunifolium*, and *Viburnum rufidulum*. Herbaceous cover is typically sparse in these dry, rocky forests and species vary with geographic location. Some typical herbaceous species include *Antennaria plantaginifolia, Aureolaria laevigata, Chamaelirium luteum, Chimaphila maculata, Danthonia spicata, Dichanthelium commutatum, Dichanthelium dichotomum, Dioscorea quaternata, Epigaea repens, Galax urceolata, Galium latifolium, Gaultheria procumbens, Goodyera pubescens, Hieracium venosum, Lysimachia quadrifolia, Medeola virginiana, Monotropa uniflora, Potentilla canadensis, Pteridium aquilinum, Stenanthium gramineum, Uvularia puberula*, and *Uvularia sessilifolia*. These forests occur on convex, upper slopes and ridgetops, south-facing slopes, over thin, rocky, infertile soils in the Appalachians, typically below 3500 feet (1066 m), where windthrow and ice damage are common natural disturbances. In the Piedmont these forests occur on low mountains and hills, on rocky, well-drained, acidic soils, sometimes associated with outcrops of quartzite, or other resistant rock.
Dynamics:

ALLIANCE DISTRIBUTION

Range: This alliance occurs in the southern and central Appalachians, Ridge and Valley, Cumberland Plateau, Piedmont, Interior Low Plateau, and possibly in the northern Appalachians. It is found in Illinois, Indiana, Ohio, Connecticut, Delaware, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, Alabama, Georgia, Kentucky, North Carolina, South Carolina, and Tennessee, and possibly Maine (?), Maryland (?), Mississippi (?), and West Virginia (?).
Nations: US
States/Provinces: AL CT DE GA IL IN KY MA MD ME NC NH NJ NY OH PA RI SC TN VA VT WV

TNC Ecoregions: 38:C, 43:P, 44:C, 45:C, 48:C, 49:C, 50:C, 51:C, 52:C, 59:C, 60:C, 61:C, 63:C
USFS Ecoregions: 212Ec:PPP, 212Fa:PPP, 212Fb:PPP, 212Fc:PPP, 212Fd:PPP, 212Ga:PPP, 212Gb:PPP, 221Aa:CC?, 221Ac:CCP, 221Ad:CCP, 221Ae:CCC, 221Af:CCC, 221Ag:CCC, 221Ah:CCC, 221Ai:CCP, 221Aj:CCP, 221Ak:CCP, 221Al:CC?, 221Am:CCC, 221Ba:CCC, 221Bb:CCC, 221Bc:CCC, 221Bd:CCP, 221Da:CCC, 221Db:CCP, 221Dc:CCC, 221Ea:CCC, 221Eb:CCP, 221Ec:CCC, 221Ed:CCP, 221Ee:CCP, 221Ef:CCC, 221Eg:CCC, 221Fa:CCP, 221Fb:CCP, 221Hc:CC?, 221I:CP, 221Ja:CCP, 221Jb:CCC, 221Jc:CCP, 222Aq:CCC, 222Cf:CCP, 222Cg:CCP, 222Da:CCP, 222Db:CCC, 222Dc:CCP, 222De:CCC, 222Dg:CCP, 222Dh:CCP, 222Dj:CCP, 222Eb:CCC, 222Eg:CCC, 222Ei:CCC, 222Ek:CCP, 222El:CCC, 222Em:CCC, 222Eo:CCC, 222Fd:CCC, 222Hb:CCC, 231Aa:CCP, 231Ad:CCC, 231Ae:CCC, 231Af:CCC, 231Ag:CCC, 231Ak:CCC, 231Al:CCC, 231Am:CCP, 231An:CCP, 231Ao:CCP, 231Ap:CCP, 231Be:CPP, 231Cd:CCC, 231Dc:CCC, 232Aa:PPP, 232Ac:PPP, 232Ad:PPP, 232Ba:PP?, 232Bc:PP?, 232Bd:PPP, 232Br:PPP, 232Ch:PPP, M212Ba:CPP, M212Bb:CPP, M212Ca:CCC, M212Cb:CCC, M212Cc:CCC, M212Cd:CCP, M212De:CCC, M212Eb:CPP, M221Aa:CCC, M221Ab:CCC, M221Ac:CCC, M221Ad:CCC, M221Ba:CCC, M221Bb:CCC, M221Bc:CCC, M221Bd:CCC, M221Be:CCC, M221Bf:CCC, M221Ca:CPP, M221Cb:CPP, M221Cc:CPP, M221Cd:CPP, M221Ce:CPP, M221Da:CCC, M221Db:CCC, M221Dc:CCC, M221Dd:CCC
Federal Lands: DOD (Fort Knox); NPS (Carl Sandburg Home, Chickamauga-Chattanooga, Great Smoky Mountains, Harper's Ferry, Kings Mountain, Rock Creek, Russell Cave); 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. FABER-LANGENDOEN/D.J., RW, ECS **Identifier:** A.248
References: Allard 1990, Arends 1981, Callaway et al. 1987, Cooper 1963, DuMond 1970, Evans 1991, Eyre 1980, Faber-Langendoen et al. 1996, Fleming and Moorhead 1996, Gibbon 1966, Golden 1974, Martin 1989, McLeod 1988, Mowbray 1966, Nelson 1986, Newell and Peet 1996a, Patterson 1994, Peet and Christensen 1980, Rawinski 1992, Rawinski et al. 1996, Schafale and Weakley 1990, Schmalzer 1978, Tobe et al. 1992, Wells 1974, Wheat 1986, Whittaker 1956

Quercus (prinus, coccinea) / Kalmia latifolia / (Galax urceolata, Gaultheria procumbens) Forest

(Rock Chestnut Oak, Scarlet Oak) / Mountain Laurel / (Galax, Wintergreen) Forest
Chestnut Oak Forest (Xeric Ridge Type)
Ecological Group (SCS;MCS): Appalachian Highlands Xeric Oak Forests and Woodlands (401-10; n/a)

ELEMENT CONCEPT

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

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:

Carl Sandburg Home National Historic Site Environment: Although it occurs primarily on south- to west-facing slopes in the Blue Ridge, examples of this community in the park are found on northeast-facing, extremely steep slopes. Examples are found adjacent to numerous rock outcrops, indicating that the xeric nature of this community may be caused by a combination of shallow soil and extremely fast rainfall runoff.

Global Environment: This community occurs over shallow, rocky soils, primarily on south- to west-facing slopes and ridgetops. This community includes xeric ridgetop forests in the Southern Blue Ridge, ranging south and east into the upper Piedmont and north into the Central Appalachians, and possibly west into the Ridge and Valley.

VEGETATION DESCRIPTION

Carl Sandburg Home National Historic Site Vegetation: Within the park, the canopy of this association is generally dominated by *Quercus prinus*. The understory of this association is thick with *Pinus strobus, Oxydendrum arboreum, Acer rubrum*, and other fire-intolerant species. The shrub layer is dominated by *Kalmia latifolia*, while the sparse herb layer is composed of *Galax urceolata* and very small amounts of *Dryopteris marginalis, Mitchella repens*, and *Goodyera pubescens*.

Global Vegetation: Stands of this association are forests with canopies strongly dominated by *Quercus prinus* and/or *Quercus coccinea*, with lesser amounts of *Quercus velutina, Quercus rubra, Quercus falcata, Oxydendrum arboreum, Nyssa sylvatica*, and *Acer rubrum var. rubrum*, occurring over a typically dense shrub stratum dominated by ericaceous species. The shrub layer may vary between evergreen and deciduous dominance. Typical shrub species include *Kalmia latifolia, Rhododendron maximum, Vaccinium stamineum, Vaccinium pallidum, Gaylussacia ursina, Gaylussacia baccata*, and *Leucothoe recurva*. *Castanea dentata* may occur abundantly as root sprouts. The herb layer is typically sparse and includes subshrubs such as *Epigaea repens* and *Gaultheria procumbens*. Other common species include *Chamaelirium luteum, Chimaphila maculata, Galax urceolata, Magnolia fraseri, Sassafras albidum, Symplocos tinctoria, Smilax rotundifolia*, and *Smilax glauca*. This community is distinguished by its overall floristic composition, with a high abundance of acid-loving ericaceous species, which are indicative of this community's extremely infertile, acid soils. In the Great Smoky Mountains *Acer rubrum* is often dominant or codominant in these forests, presumably on former American Chestnut (*Castanea dentata*) sites. In the Blue Ridge-Piedmont transition, below 2800 feet elevation, where this community is often associated with *Pinus rigida* forests and woodlands, *Quercus falcata* may be a component of the canopy, and the shrub stratum is strongly dominated by *Vaccinium pallidum*.

Global Dynamics:

MOST ABUNDANT SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
TREE CANOPY	*Quercus prinus*
TREE SUB-CANOPY	*Oxydendrum arboreum, Pinus strobus, Quercus prinus*
TALL SHRUB	*Kalmia latifolia*
FORB	*Galax urceolata*
FERN	*Dryopteris marginalis*

Global

Stratum	Species
TREE CANOPY	*Quercus coccinea, Quercus prinus*
TREE SUB-CANOPY	*Acer rubrum, Nyssa sylvatica, Oxydendrum arboreum*
TALL SHRUB	*Kalmia latifolia, Vaccinium stamineum*
SHORT SHRUB	*Vaccinium pallidum*
FORB	*Epigaea repens, Galax urceolata, Gaultheria procumbens*

CHARACTERISTIC SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species

Global

Stratum	Species
TREE CANOPY	*Quercus coccinea, Quercus prinus*
TREE SUB-CANOPY	*Acer rubrum, Nyssa sylvatica, Oxydendrum arboreum, Sassafras albidum*

TALL SHRUB	*Kalmia latifolia, Vaccinium stamineum*
SHRUB	*Castanea dentata, Castanea pumila, Gaylussacia baccata, Rhododendron periclymenoides*
SHORT SHRUB	*Vaccinium pallidum*
FORB	*Galax urceolata*

OTHER NOTEWORTHY SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species

Global

Stratum	Species

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

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

GRank & Reasons: G5 (97-12-31).

CLASSIFICATION COMMENTS

Carl Sandburg Home National Historic Site:

Global Classif Comments: In the Great Smoky Mountains *Acer rubrum* is often dominant or codominant in these forests, presumably on former American chestnut (*Castanea dentata*) sites. In the Blue Ridge-Piedmont transition, below 2800 feet elevation, where this community is often associated with *Pinus rigida* forests and woodlands, *Quercus falcata* may be a component of the canopy, and the shrub stratum is strongly dominated by *Vaccinium pallidum*. A similar association defined for the southern Cumberland Plateau, *Quercus prinus - (Quercus coccinea) / Carya pallida / Vaccinium arboreum - Vaccinium pallidum* Forest (CEGL008431), occurs over sandstone or other geologies not as acid as the Blue Ridge type and lacks species indicative of the Blue Ridge association, such as *Kalmia latifolia, Gaylussacia ursina, Gaylussacia baccata*, and *Gaultheria procumbens*.

ELEMENT DISTRIBUTION

Carl Sandburg Home National Historic Site Range: Within the park, this community has only been confirmed for the northeast-facing slope just upslope from the trout pond near the old apple orchard (plot 5).

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

Nations: US
States/Provinces: GA:S?, KY:S?, NC:S?, SC:S?, TN:S?, VA:S?
TNC Ecoregions: 50:C, 51:C, 52:P, 59:C
USFS Ecoregions: 231Ag:CCC, M221Aa:CCC, M221Ab:CCC, M221Bd:CCC, M221Be:CCC, M221Ca:CPP, M221Cb:CPP, M221Cc:CPP, M221Ce:CPP, M221Da:CCC, M221Db:CCP, M221Dc:CCC, M221Dd:CCC
Federal Lands: NPS (Carl Sandburg Home, Great Smoky Mountains); USFS (Chattahoochee, Cherokee, Daniel Boone, George Washington, Jefferson, Nantahala, Pisgah, Sumter)

ELEMENT SOURCES

Carl Sandburg Home National Historic Site Inventory Notes:

Authors: SCS **Confidence:** 1 **Identifier:** CEGL006271
REFERENCES (type in full citation below if reference is new): Allard 1990, CAP pers. comm. 1998, Evans 1991, Eyre 1980, Fleming and Coulling 2001, Fleming and Moorhead 2000, Fleming et al. 2001, Golden 1974, Major et al. 1999, McLeod 1988, NatureServe Ecology - Southeast U.S. unpubl. data, Nelson 1986, Peet et al. 2002, Pyne 1994, Rawinski et al. 1996, Schafale 1998b, Schafale and Weakley 1990, Whittaker 1956

I.B.2.N.a.38. QUERCUS PRINUS - QUERCUS RUBRA FOREST ALLIANCE

Rock Chestnut Oak - Northern Red Oak Forest Alliance

ALLIANCE CONCEPT

Summary: This alliance includes dry-mesic oak forests, codominated by *Quercus prinus* and *Quercus rubra*, at moderate elevations in the Blue Ridge, Ridge and Valley, and High Alleghenies of Virginia, western North Carolina, eastern Tennessee, South Carolina, and Georgia. It also includes transitional oak - hickory forests of Lower New England and the Northern Piedmont. This alliance may possibly range into the upper Piedmont and into the eastern fringes of the Cumberland Mountains and Appalachian Plateau of Kentucky, but no associations have been defined for these regions. The majority of the forests in this alliance occur in areas previously dominated by *Castanea dentata*, and chestnut sprouts are common in the understory. The canopy of forests in this alliance tend to be dominated by *Quercus rubra* and/or *Quercus prinus*, although other mesic hardwood species can codominate or be present in the canopy and subcanopy. Typical tree associates include *Liriodendron tulipifera, Acer rubrum, Hamamelis virginiana, Acer pensylvanicum*, and *Oxydendrum arboreum*. In the Appalachian Mountains, shrub layers are often dense and dominated by ericaceous species, *Rhododendron maximum* (especially on northerly aspects), *Rhododendron minus, Kalmia latifolia, Gaylussacia* spp., and *Vaccinium* spp. Herbaceous coverage tends to be inversely proportional to the shrub coverage. *Galax urceolata* and *Gaultheria procumbens* are components in sparse herb strata. Other herbs typical of these forests include *Solidago curtisii, Lysimachia quadrifolia, Thelypteris noveboracensis, Gentiana decora, Sanicula trifoliata, Prenanthes altissima, Dichanthelium* spp. (*Dichanthelium boscii, Dichanthelium commutatum, Dichanthelium dichotomum), Carex pensylvanica, Polystichum acrostichoides, Chimaphila maculata, Desmodium nudiflorum, Galium latifolium, Houstonia purpurea*, and *Maianthemum racemosum ssp. racemosum*. In montane landscapes, these forest occur on intermediate positions of elevation and aspect, on protected, often rocky slopes. Forests in this alliance are also found on sandstone boulderfields and outcrops in Virginia's Ridge and Valley.
Dynamics:

ALLIANCE DISTRIBUTION

Range: This alliance ranges from the southern Blue Ridge, north through the Ridge and Valley, and High Alleghenies of Virginia, and into some areas of Lower New England and the Northern Piedmont. This alliance may possibly range into the upper Piedmont and into the eastern fringes of the Cumberland Mountains and Appalachian Plateau of Kentucky, but no associations have been defined for these regions.
Nations: US
States/Provinces: GA KY MD? NC NJ? PA SC TN VA WV
TNC Ecoregions: 49:?, 50:P, 51:C, 52:C, 59:C, 61:C
USFS Ecoregions: 212G:??, 221Am:CPP, 221Da:CPP, 221Db:CPP, 221Eb:C??, 221F:C?, 221H:C?, 221J:C?, 231Aa:PPP, 231Ag:PP?, M221Aa:CCC, M221Ab:CCC, M221Ac:CCC, M221Ad:CCC, M221Ba:CCC, M221Bb:CCC, M221Bc:CCC, M221Bd:CCC, M221Bf:CCC, M221Ca:C??, M221Cb:C??, M221Cc:C??, M221Cd:C??, M221Ce:C??, M221Da:CCC, M221Db:CCC, M221Dc:CCC, M221Dd:CCC
Federal Lands: NPS (Carl Sandburg Home, Great Smoky Mountains, Harper's Ferry); USFS (Chattahoochee, Cherokee, George Washington, Jefferson, Nantahala, Pisgah, Sumter)

ALLIANCE SOURCES

Authors: D.J. ALLARD 6-94, MOD. S., RW, SCS **Identifier:** A.250
References: Ambrose 1990a, Evans 1991, Eyre 1980, Fleming and Moorhead 1996, Golden 1981, Livingston and Mitchell 1976, McLeod 1988, Mowbray 1966, Nelson 1986, Nowacki and Abrams 1992, Rheinhardt 1981, Schafale and Weakley 1990

Quercus prinus - (Quercus rubra) - Carya spp. / Oxydendrum arboreum - Cornus florida Forest

Rock Chestnut Oak - (Northern Red Oak) - Hickory species / Sourwood - Flowering Dogwood Forest

Appalachian Montane Oak Hickory Forest (Chestnut Oak Type)

Ecological Group (SCS;MCS): Appalachian Montane Oak-Hickory Forests (410-40; n/a)

ELEMENT CONCEPT

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

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:

Carl Sandburg Home National Historic Site Environment: This community occurs on some northeast-facing dry slopes within the park. The community seems to exist in areas where fire suppression and logging have created opportunities for more mesic species such as *Acer rubrum* to establish in the understory.

Global Environment:

VEGETATION DESCRIPTION

Carl Sandburg Home National Historic Site Vegetation: Canopies of this stand within the park are dominated by a mixture of *Quercus prinus, Quercus alba, Quercus rubra*, and *Carya* spp. The subcanopy is dominated by *Oxydendrum arboreum, Cornus florida, Nyssa sylvatica*, and *Acer rubrum var. rubrum*. The herb layer is sparse and mostly consists of acidic species such as *Galax urceolata, Epigaea repens*, and *Goodyera repens*.

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

purpurea, Lysimachia quadrifolia, Maianthemum racemosum ssp. racemosum, Polystichum acrostichoides, Prenanthes spp., *Thalictrum thalictroides, Thelypteris noveboracensis, Uvularia perfoliata, Uvularia puberula, Uvularia sessilifolia,* and *Viola* spp. (e.g., *Viola blanda, Viola hastata, Viola X palmata, Viola tripartita*).

Global Dynamics:

MOST ABUNDANT SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
TREE CANOPY	*Quercus alba, Quercus prinus, Quercus rubra*
TREE SUB-CANOPY	*Acer rubrum, Cornus florida, Nyssa sylvatica, Oxydendrum arboreum*
FORB	*Epigaea repens, Galax urceolata, Goodyera pubescens*

Global

Stratum	Species
TREE CANOPY	*Quercus prinus, Quercus rubra*
TREE SUB-CANOPY	*Cornus florida, Oxydendrum arboreum*

CHARACTERISTIC SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
TREE CANOPY	*Quercus prinus*
TREE SUB-CANOPY	*Oxydendrum arboreum*

Global

Stratum	Species
TREE CANOPY	*Quercus prinus, Quercus rubra*
TREE SUB-CANOPY	*Cornus florida, Oxydendrum arboreum*

OTHER NOTEWORTHY SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species

Carya spp. are also dominant and diagnostic in the tree canopy.

Global

Stratum	Species

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

- Quercus prinus - Quercus rubra - Carya (glabra, alba) / Gaylussacia baccata Forest (CEGL006057)

GRank & Reasons: G4G5 (97-08-15).

CLASSIFICATION COMMENTS

Carl Sandburg Home National Historic Site:

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

ELEMENT DISTRIBUTION

Carl Sandburg Home National Historic Site Range: This community is documented for the central part of the park on the west slope of Little Glassy.

Global Range: This community occurs in the Southern Blue Ridge and Piedmont transition areas of western North Carolina, eastern Tennessee, northwestern South Carolina, and northeastern Georgia. It may possibly extend into Virginia.

Nations: US
States/Provinces: GA:S?, NC:S?, SC:S?, TN:S?, VA?
TNC Ecoregions: 51:C, 52:C
USFS Ecoregions: 231Aa:PPP, M221Dc:CCC, M221Dd:CCC
Federal Lands: NPS (Carl Sandburg Home, Great Smoky Mountains); USFS (Chattahoochee, Cherokee, Nantahala, Pisgah, Sumter)

ELEMENT SOURCES

Carl Sandburg Home National Historic Site Inventory Notes:
Authors: SCS **Confidence:** 2 **Identifier:** CEGL007267
REFERENCES (type in full citation below if reference is new): Allard 1990, Ambrose 1990a, NatureServe Ecology - Southeast U.S. unpubl. data, Nelson 1986, Peet et al. 2002, Schafale 1998b, Schafale and Weakley 1990, Simon pers. comm.

Quercus prinus - Quercus rubra / Rhododendron maximum / Galax urceolata Forest

Rock Chestnut Oak - Northern Red Oak / Great Rhododendron / Galax Forest
Chestnut Oak Forest (Mesic Slope Heath Type)
Ecological Group (SCS;MCS): Appalachian Montane Oak-Hickory Forests (410-40; n/a)

ELEMENT CONCEPT

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

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:

Carl Sandburg Home National Historic Site Environment: Within the park, as is true globally, the community is limited to north-facing, lower and middle slopes.

Global Environment: This is typically a mid-slope to lower slope type, but it can be found on upper slopes in a more sheltered position (M. Schafale pers. comm.).

VEGETATION DESCRIPTION

Carl Sandburg Home National Historic Site Vegetation: The occurrences of this association contain *Quercus prinus* and *Quercus rubra* in the canopy. All examples have a very high coverage of *Rhododendron maximum* in the shrub layer and very low herb cover.

Global Vegetation: The canopy can contain *Betula alleghaniensis (= Betula lutea), Pinus strobus, Quercus alba, Nyssa sylvatica, Magnolia fraseri*, and *Oxydendrum arboreum*. It is intermediate between acidic cove forest and Chestnut Oak (*Quercus prinus*) forest (M. Schafale pers. comm.).

Global Dynamics:

MOST ABUNDANT SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
TREE CANOPY	*Liriodendron tulipifera, Pinus strobus, Quercus prinus*
TREE SUB-CANOPY	*Acer rubrum, Nyssa sylvatica, Oxydendrum arboreum, Quercus prinus*
TALL SHRUB	*Rhododendron maximum*

Global

Stratum	Species
TREE CANOPY	*Quercus prinus, Quercus rubra*
TALL SHRUB	*Rhododendron maximum*

CHARACTERISTIC SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
TREE CANOPY	*Quercus prinus*
TREE SUB-CANOPY	*Rhododendron maximum*

Global

Stratum	Species
TREE CANOPY	*Quercus prinus, Quercus rubra*
TALL SHRUB	*Rhododendron maximum*
FORB	*Galax urceolata*

OTHER NOTEWORTHY SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species

Global

Stratum	Species

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

- Quercus (prinus, coccinea) / Kalmia latifolia / (Galax urceolata, Gaultheria procumbens) Forest (CEGL006271)
- Quercus rubra / (Kalmia latifolia, Rhododendron maximum) / Galax urceolata Forest (CEGL007299)
- Quercus prinus - (Quercus rubra) - Carya spp. / Oxydendrum arboreum - Cornus florida Forest (CEGL007267)

GRank & Reasons: G4 (99-12-21). This community is uncommon, but not rare, throughout most of its range. As currently defined, it is a regional endemic, found only in the Southern Blue Ridge. This community is often overlooked or not distinguished separately in inventories, thus it is more common than the number of documented occurrences suggests.

CLASSIFICATION COMMENTS

Carl Sandburg Home National Historic Site:

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

ELEMENT DISTRIBUTION

Carl Sandburg Home National Historic Site Range: Within the park, this association is widespread. It covers most of the northwestern slope of Big Glassy Mountain within the park and a good portion of the northeast-facing slopes in the southern part of the park.

Global Range: This community occurs in the Southern Blue Ridge of northeastern Georgia, northwestern South Carolina, north through eastern Tennessee and western North Carolina. Its range extends into the upper Piedmont of North Carolina and possibly into Virginia's Blue Ridge.

Nations: US
States/Provinces: GA:S?, NC:S?, SC:S?, TN:S?, VA?
TNC Ecoregions: 51:C, 52:C, 59:?
USFS Ecoregions: M221A:C?, M221B:C?, M221C:C?, M221Dc:CCC, M221Dd:CCC
Federal Lands: NPS (Carl Sandburg Home, Great Smoky Mountains); USFS (Chattahoochee, Cherokee, Nantahala, Sumter)

ELEMENT SOURCES

Carl Sandburg Home National Historic Site Inventory Notes:
Authors: SCS **Confidence:** 2 **Identifier:** CEGL006286
REFERENCES (type in full citation below if reference is new): Allard 1990, NatureServe Ecology - Southeast U.S. unpubl. data, Peet et al. 2002, Schafale 1998b, Schafale and Weakley 1990, Schafale pers. comm., Simon pers. comm.

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

I.C.3.N.a.14. PINUS ECHINATA - QUERCUS (ALBA, FALCATA, STELLATA, VELUTINA) FOREST ALLIANCE

Shortleaf Pine - (White Oak, Southern Red Oak, Post Oak, Black Oak) Forest Alliance

ALLIANCE CONCEPT

Summary: This alliance occurs in the southeastern United States from the Inner Coastal Plain and Piedmont, ranging north and west through the Cumberland Plateau, Ridge and Valley, and low Blue Ridge, and from eastern Texas and Louisiana, through the Ouachita Mountains and Ozarks. It includes mesic to dry-mesic forests with mixed evergreen and deciduous canopies where *Pinus echinata* and one or more of the nominal *Quercus* spp. occur in varying ratios. In some associations *Pinus taeda* may be a dominant evergreen canopy component. *Quercus rubra* codominates in associations in the Ozarks and Ouachita Mountains. Other common species vary greatly with geography, but can include *Carya alba, Carya texana, Sassafras albidum, Oxydendrum arboreum, Acer rubrum, Nyssa sylvatica, Cornus florida, Vaccinium arboreum, Vaccinium pallidum, Vaccinium stamineum, Chimaphila maculata, Tephrosia virginiana, Coreopsis major*, and others. Forests in this alliance occur on dry hilltops, upper slopes, and ridges on acidic soils. The alliance also includes associations from some more non-acidic substrates, including hilltops and upper slopes in Louisiana associated with the Cook Mountain Formation and with calcareous prairies on the Fleming Formation in eastern Texas.
Dynamics:

ALLIANCE DISTRIBUTION

Range: This alliance occurs in the southeastern United States from the inner Coastal Plain and Piedmont, ranging north and west through the Cumberland Plateau, Ridge and Valley, and low Blue Ridge, and from eastern Texas and Louisiana, through the Ouachita Mountains and Ozarks. Associations have been defined in Alabama, Arkansas, Georgia, Kentucky, Illinois, Louisiana, Missouri, North Carolina, South Carolina, Oklahoma, Tennessee, Texas, and Virginia. However, the alliance is thought to also occur in Mississippi, and possibly in Ohio (?). In Mississippi, this vegetation would be more likely found in the middle and inner Coastal Plain.
Nations: US
States/Provinces: AL AR GA IL KY LA MO MS? NC OH? OK SC TN TX VA? WV?
TNC Ecoregions: 32:C, 38:C, 39:C, 40:C, 41:C, 43:C, 44:P, 49:P, 50:C, 51:C, 52:C, 53:C, 56:C, 57:P

USFS Ecoregions: 221Ea:PP?, 221Eb:PP?, 221Ec:PPP, 221H:PP, 221I:PP, 221J:PP, 222Aa:CCC, 222Ab:CCC, 222Ad:CCC, 222Af:CCC, 222Ag:CCC, 222Ah:CCC, 222Aj:CCC, 222Ak:CCC, 222Al:CCC, 222An:CCC, 222Aq:CCC, 222D:CP, 222E:CP, 222F:C?, 231Aa:CCP, 231Ab:CCC, 231Ac:CCC, 231Ad:CCP, 231Ae:CCC, 231Af:CCC, 231Ag:CCP, 231Ah:CCP, 231Ai:CCP, 231Aj:CCP, 231Ak:CCP, 231Al:CCP, 231Am:CCP, 231An:CCP, 231Ao:CCP, 231Ap:CCP, 231Ba:CCP, 231Bb:CCP, 231Bc:CCC, 231Bd:CCC, 231Be:CCP, 231Bf:CCP, 231Bg:CCP, 231Bh:CCP, 231Bi:CCP, 231Bj:CCP, 231Bk:CCP, 231Bl:CCP, 231Ca:CCP, 231Cb:CCP, 231Cc:CCP, 231Cd:CCP, 231Ce:CCP, 231Cf:CCP, 231Cg:CCP, 231Da:CCP, 231Db:CCC, 231Dc:CCC, 231Dd:CCC, 231De:CCP, 231Ea:CCC, 231Eb:CC?, 231Ee:CC?, 231Ef:CCC, 231Eg:CC?, 231Eh:CCC, 231Ga:CCC, 231Gb:CCC, 231Gc:CCC, 232Ba:CCC, 232Bj:CCP, 232Fa:CCC, 232Fb:CCC, 232Fc:CCC, 232Fd:CCC, 232Fe:CCC, 234Ab:PPP, M221C:CP, M221Dc:CCC, M221Dd:CCC, M222Aa:CCC, M222Ab:CCC, M231Aa:CCC, M231Ab:CCC, M231Ac:CCC, M231Ad:CCC
Federal Lands: DOD (Fort Benning); NPS (Carl Sandburg Home, Hot Springs, Kennesaw Mountain, Shiloh?); USFS (Angelina, Chattahoochee, Cherokee, Daniel Boone, Davy Crockett, Kisatchie, Oconee, Ouachita, Ozark, Sabine, Sam Houston, Shawnee, St. Francis, Sumter, Talladega, Tuskegee?, Uwharrie)

ALLIANCE SOURCES

Authors: D.J. ALLARD/D. FABER-LANG, RW, SCS **Identifier:** A.394
References: Allard 1990, Cain and Shelton 1994, Campbell et al. 1996, Diamond 1993, Eyre 1980, Faber-Langendoen et al. 1996, Foti 1994b, Foti and Guldin 1994, Foti et al. 1994, Fountain and Sweeney 1985, Fountain and Sweeney 1987, Halls and Homesley 1966, Hoagland 1998a, Johnson 1986a, Kennedy 1973, Martin and Smith 1991, Martin and Smith 1993, Pyne 1994, Rice and Penfound 1959, Schafale and Weakley 1990, USFS 1990

Pinus echinata - Quercus alba / Vaccinium pallidum / Hexastylis arifolia - Chimaphila maculata Forest

Shortleaf Pine - White Oak / Hillside Blueberry / Arrowleaf Heartleaf - Striped Wintergreen Forest

Appalachian Shortleaf Pine - Mesic Oak Forest

Ecological Group (SCS;MCS): Appalachian Highlands Xeric Shortleaf Pine Woodlands and Forests (401-30; n/a)
Appalachian Highlands Dry-mesic Oak Forests and Woodlands (401-13; 2.5.3.2)

ELEMENT CONCEPT

GLOBAL SUMMARY: This association includes forests dominated by a mixture of *Pinus echinata* and mesophytic and dry-mesophytic oaks (e.g., *Quercus alba, Quercus rubra, Quercus velutina*) occurring in the Piedmont of the southeastern United States, ranging north and west through the Southern Ridge and Valley, Cumberland Plateau, low Southern Blue Ridge, upper Piedmont, perhaps extending into the Interior Low Plateau of Kentucky and Tennessee. These forests occur on low to middle slope positions, on protected to intermediately exposed sites. The mixed evergreen - deciduous canopy is dominated by *Pinus echinata* and *Quercus alba*, sometimes with high coverage by other *Quercus* spp. (*Quercus velutina, Quercus coccinea, Quercus falcata, Quercus rubra*). Xerophytic *Quercus* spp. such as *Quercus prinus, Quercus stellata*, as well as other species of pines may be present, but are typically not abundant. A well-developed subcanopy is typical, with species such as *Acer rubrum, Nyssa sylvatica, Carya glabra, Cornus florida*, and *Oxydendrum arboreum*. The shrub stratum is sparse to patchy with low shrubs (*Vaccinium pallidum, Vaccinium stamineum, Vaccinium arboreum, Chimaphila maculata*), and vines (*Vitis rotundifolia*). The herb stratum is patchy to absent. *Hexastylis arifolia* is a typical herb. Stands without fire management may experience invasion by *Acer rubrum*. *Piptochaetium avenaceum* may be an important grass in more open stands.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:

Carl Sandburg Home National Historic Site Environment: Within the park, this association is best developed on the flat, protected, lower slopes of the northern end of the park.

Global Environment: These forests occur on low to middle slope positions, on protected to intermediately exposed sites.

VEGETATION DESCRIPTION

Carl Sandburg Home National Historic Site Vegetation: Examples of this community within the park vary widely in their canopy composition. All are dominated by a mixture of several tree species including *Quercus alba, Quercus falcata, Pinus echinata, Pinus strobus, Quercus stellata*, and *Quercus coccinea*. In addition, the understory consists of a moderate amount of *Oxydendrum arboreum* and *Nyssa sylvatica*. The tall-shrub layer contains a small amount of *Kalmia latifolia*, whereas the short-shrub layer contains a moderate amount of *Vaccinium* spp.

Global Vegetation: The mixed evergreen - deciduous canopy of stands is dominated by *Pinus echinata* and *Quercus alba*, sometimes with high coverage by other *Quercus* spp. (*Quercus velutina, Quercus coccinea, Quercus falcata, Quercus rubra*). Xerophytic *Quercus* spp. such as *Quercus prinus, Quercus stellata,* as well as other species of pines may be present, but are typically not abundant. A well-developed subcanopy is typical, with species such as *Acer rubrum, Nyssa sylvatica, Carya glabra, Cornus florida,* and *Oxydendrum arboreum*. The shrub stratum is sparse to patchy with low shrubs (*Vaccinium pallidum, Vaccinium stamineum, Vaccinium arboreum, Chimaphila maculata*), and vines (*Vitis rotundifolia*). The herb stratum is patchy to absent. *Hexastylis arifolia* is a typical herb. Stands without fire management may experience invasion by *Acer rubrum*. *Piptochaetium avenaceum* may be an important grass in more open stands. A dense forest from the Talladega National Forest, Talladega Ranger District, included here, is dominated by *Quercus coccinea, Pinus echinata*; other canopy components include *Quercus velutina, Quercus alba, Quercus falcata, Liriodendron tulipifera, Pinus taeda, Carya glabra*, and *Liquidambar styraciflua*. The patchy shrub layer includes *Vaccinium arboreum, Vaccinium pallidum, Viburnum acerifolium*, and *Acer rubrum*. The sparse herbaceous layer is characterized by *Piptochaetium avenaceum*, which may be an important grass in more open stands.

Global Dynamics:

MOST ABUNDANT SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
TREE CANOPY	*Pinus echinata, Pinus strobus, Quercus alba, Quercus falcata*
TREE SUB-CANOPY	*Nyssa sylvatica, Oxydendrum arboreum*
TALL SHRUB	*Kalmia latifolia*
SHORT SHRUB	*Vaccinium pallidum, Vaccinium stamineum*

Global

Stratum	Species
TREE CANOPY	*Pinus echinata, Quercus alba, Quercus coccinea, Quercus falcata, Quercus stellata*

CHARACTERISTIC SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
TREE CANOPY	*Quercus falcata, Quercus stellata*

Global

Stratum	Species
TREE CANOPY	*Pinus echinata, Quercus falcata, Quercus stellata*

OTHER NOTEWORTHY SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species

Vaccinium spp. are also diagnostic short shrubs.

Global

Stratum Species

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

- Pinus echinata - Quercus (prinus, falcata) / Oxydendrum arboreum / Vaccinium pallidum Forest (CEGL007493)
- Pinus echinata - Quercus stellata - Quercus prinus - Carya glabra / (Danthonia spicata, Piptochaetium avenaceum) Forest (CEGL007500)--is a more open, grassy variant.
- Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum Forest (CEGL007244)--is a related, primarily deciduous type with representation in the Piedmont and Ridge and Valley but not in the Blue Ridge.
- Quercus alba - Quercus falcata / Vaccinium (arboreum, hirsutum, pallidum) Forest (CEGL008567)--is a related, primarily deciduous type of the Ridge and Valley and parts of the Southern Blue Ridge adjacent to the Ridge and Valley.

GRank & Reasons: G3G4 (00-06-12). Although this association has a reasonably wide potential natural range, shortleaf pine (*Pinus echinata*) populations seem to have undergone rangewide declines in vigor and extent. This phenomenon is especially pronounced in the range of this type, primarily due to changes in fire regime and to depredations of the Southern Pine Beetle (*Dendroctonus frontalis*). This community has had little inventory, but the total acreage in viable condition is believed to be quite limited. The more mesic to submesic habitat of this association may never have been common and is likely more vulnerable to successional changes than more xeric stands. Further, stands of this association are threatened by removal of commercially valuable tree species (e.g., *Quercus alba, Quercus rubra, Pinus echinata*), as well as by conversion to commercial forest plantations, and by the effects of continued fire suppression, which would inhibit the reproduction of *Pinus echinata* and cause the grass-dominated herbaceous layer to deteriorate. Following the removal of the commercially valuable species, and in the absence of fire, stands could become populated with successional hardwoods (e.g., *Liriodendron tulipifera, Liquidambar styraciflua*) as well as less fire-adapted pines (*Pinus taeda, Pinus virginiana*). The range in the rank reflects the need for further inventory and evaluation of this community.

CLASSIFICATION COMMENTS

Carl Sandburg Home National Historic Site:

Global Classif Comments: This forest has an overall more mesophytic species composition and occurs on deeper soil or on more protected sites than the more extreme shortleaf pine - oak forest, *Pinus echinata - Quercus (prinus, falcata) / Oxydendrum arboreum / Vaccinium pallidum* Forest (CEGL007493). In the Daniel Boone National Forest (Kentucky) this vegetation is important as part of a pine-oak matrix which is significant for restoration of Red-cockaded Woodpecker (*Picoides borealis*) habitat. *Piptochaetium avenaceum* may be an important grass in more open stands.

ELEMENT DISTRIBUTION

Carl Sandburg Home National Historic Site Range: This community occurs in the northern third of the park, particularly north and west of the visitor's center.

Global Range: This community occurs in the Piedmont of the southeastern United States, ranging north and west through the Southern Ridge and Valley, Cumberland Plateau, and low Southern Blue Ridge, perhaps extending into the Interior Low Plateau of Kentucky and Tennessee.

Nations: US
States/Provinces: AL:S?, GA:S?, KY:S?, NC:S?, SC:S?, TN:S?, VA?
TNC Ecoregions: 44:P, 50:C, 51:C, 52:C
USFS Ecoregions: 221H:PP, 221I:PP, 221J:PP, 222E:PP, 231Ab:CCC, 231C:CP, 231Db:CCC, 231Dc:CCC, M221C:CP, M221Dc:CCC, M221Dd:CCC
Federal Lands: NPS (Carl Sandburg Home); USFS (Chattahoochee, Cherokee, Daniel Boone, Sumter, Talladega)

ELEMENT SOURCES

Carl Sandburg Home National Historic Site Inventory Notes:
Authors: SCS **Confidence:** 2 **Identifier:** CEGL008427
REFERENCES (type in full citation below if reference is new): NatureServe Ecology - Southeast U.S. unpubl. Data

I.C.3.N.a.22. PINUS STROBUS - QUERCUS (COCCINEA, PRINUS) FOREST ALLIANCE

Eastern White Pine - (Scarlet Oak, Rock Chestnut Oak) Forest Alliance

ALLIANCE CONCEPT

Summary: This alliance includes dry pine - oak forests dominated by *Pinus strobus* occurring with *Quercus coccinea* and/or *Quercus prinus*. Typical species in the subcanopy are *Oxydendrum arboreum, Acer rubrum var. rubrum, Nyssa sylvatica*, and *Cornus florida*. These forests often have dense ericaceous shrub strata with species such as *Rhododendron maximum, Kalmia latifolia, Vaccinium* spp., or *Gaylussacia* spp. Herbaceous strata have low species richness and are composed of species typical of dry montane forests, such as *Galax urceolata, Viola hastata, Chimaphila maculata, Goodyera pubescens, Epigaea repens, Smilax glauca, Smilax rotundifolia*, and *Chamaelirium luteum*. These forests occur on dry topographic settings at low elevations (below 3000 feet) in the Blue Ridge escarpment region, on upper slopes and ridgetops. In the Ridge and Valley of Virginia, these forests are known from north-facing slopes over shale substrates and on lower to middle elevation knobs and side ridges.
Dynamics:

ALLIANCE DISTRIBUTION

Range: This alliance is found in Georgia, North Carolina, South Carolina, Tennessee, and may also be found in Virginia (?).
Nations: US
States/Provinces: GA MD? NC SC TN VA WV
TNC Ecoregions: 50:C, 51:C, 52:C, 59:C
USFS Ecoregions: 221Hb:CCC, 221He:CCC, 222Eo:CCC, 231Aa:CC?, 231Ae:CCC, 231Ak:CCC, 231Al:CC?, 231Ap:CCC, M221Aa:CCC, M221Ab:CCC, M221Da:CCC, M221Db:CCP, M221Dc:CCC, M221Dd:CCC
Federal Lands: NPS (Carl Sandburg Home, Great Smoky Mountains); USFS (Chattahoochee, Cherokee?, George Washington, Jefferson, Nantahala, Pisgah, Sumter)

ALLIANCE SOURCES

Authors: K.D. PATTERSON/S. SIMON, RW, SCS **Identifier:** A.402
References: Allard 1990, Ambrose 1990a, DuMond 1970, Eyre 1980, Gattis 1992, Patterson 1994, Pyne 1994, Schafale and Weakley 1990

Pinus strobus - Quercus (coccinea, prinus) / (Gaylussacia ursina, Vaccinium stamineum) Forest

Eastern White Pine - (Scarlet Oak, Rock Chestnut Oak) / (Bear Huckleberry, Deerberry Forest

Appalachian White Pine - Xeric Oak Forest

Ecological Group (SCS;MCS): Appalachian Highlands Upland White Pine Forests (401-40; n/a)

ELEMENT CONCEPT

GLOBAL SUMMARY: This association represents mixed forests of the southern Appalachian Mountains with *Pinus strobus, Quercus prinus*, and *Quercus coccinea*, occurring singly or in combination, each contributing 25-75% of the total canopy coverage. Open subcanopies are composed of *Oxydendrum arboreum, Acer rubrum var. rubrum, Nyssa sylvatica*, and *Cornus florida*. The shrub stratum is dominated by deciduous heath species, typically *Gaylussacia ursina* or *Vaccinium stamineum*. Other species in the shrub/sapling stratum may include *Vaccinium pallidum, Leucothoe recurva, Kalmia latifolia, Castanea dentata*, or *Acer rubrum var. rubrum*. On rocky sites, *Deschampsia flexuosa* may be common. This community occurs on exposed upper slopes and ridgetops at elevations below 920 m (3000 feet) in the southern Appalachian Mountains.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:

Carl Sandburg Home National Historic Site Environment: This community occurs on the exposed upper ridgetops and extreme upper slopes of the park.

Global Environment: This community occurs on exposed upper slopes and ridgetops at elevations below 920 m (3000 feet) in the southern Appalachian Mountains.

VEGETATION DESCRIPTION

Carl Sandburg Home National Historic Site Vegetation: This example consists of a canopy of *Quercus prinus* contributing around 50% of the cover along with smaller amounts of *Quercus velutina, Quercus coccinea, Pinus strobus*, and *Carya alba*. There is a moderate coverage of *Vaccinium stamineum* in the short-shrub layer and a sparse herb layer with no clear dominant. Some herbs found in the plot include *Piptochaetium avenaceum, Carex pensylvanica, Maianthemum racemosum, Goodyera pubescens*, and *Lilium michauxii*.

Global Vegetation: Stands of this forest association typically contain *Pinus strobus* (contributing 25-75% of the canopy coverage) and *Quercus prinus* and/or *Quercus coccinea* (occurring singly or in combination) as 25-75% of the canopy coverage. Open subcanopies are composed of *Oxydendrum arboreum, Acer rubrum var. rubrum, Nyssa sylvatica*, and *Cornus florida*. The shrub stratum is dominated by deciduous heath species, typically *Gaylussacia ursina* or *Vaccinium stamineum*. Other species in the shrub/sapling stratum may include *Vaccinium pallidum, Leucothoe recurva, Kalmia latifolia, Castanea dentata*, or *Acer rubrum var. rubrum*. On rocky sites, *Deschampsia flexuosa* may be common.

Global Dynamics:

MOST ABUNDANT SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
TREE CANOPY	*Carya alba, Pinus strobus, Quercus prinus*
TREE SUB-CANOPY	*Pinus strobus*
SHORT SHRUB	*Vaccinium pallidum, Vaccinium stamineum*

Global

Stratum	Species
TREE CANOPY	*Pinus strobus, Quercus coccinea, Quercus prinus*
TREE SUB-CANOPY	*Acer rubrum var rubrum, Oxydendrum arboreum*
SHORT SHRUB	*Gaylussacia ursina, Vaccinium stamineum*

CHARACTERISTIC SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
TREE CANOPY	*Pinus strobus*
SHORT SHRUB	*Gaylussacia ursina, Vaccinium stamineum*

Global

Stratum	Species
TREE CANOPY	*Pinus strobus, Quercus coccinea, Quercus prinus*
TALL SHRUB	*Kalmia latifolia*
SHORT SHRUB	*Gaylussacia ursina, Vaccinium stamineum*

OTHER NOTEWORTHY SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
FORB	*Lilium michauxii*

Global

Stratum	Species

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

GRank & Reasons: G3 (00-01-04). This community has a restricted range and is uncommon. It is not threatened or particularly vulnerable.

CLASSIFICATION COMMENTS

Carl Sandburg Home National Historic Site:

Global Classif Comments:

ELEMENT DISTRIBUTION

Carl Sandburg Home National Historic Site Range: Within the park, this association is only known from the upper slopes and ridgetop of Little Glassy Mountain.

Global Range: This community is known from the escarpment region of the Southern Blue Ridge and may extend into Virginia.

Nations: US
States/Provinces: GA:S?, NC:S?, SC:S?, TN:S?, VA?
TNC Ecoregions: 51:C, 52:C
USFS Ecoregions: 221Hb:CCC, 221He:CCC, 222Eo:CCC, M221Db:CCP, M221Dc:CCC, M221Dd:CCC
Federal Lands: NPS (Carl Sandburg Home, Great Smoky Mountains); USFS (Chattahoochee, Cherokee?, Nantahala, Pisgah, Sumter)

ELEMENT SOURCES

Carl Sandburg Home National Historic Site Inventory Notes:
Authors: SCS **Confidence:** 1 **Identifier:** CEGL007519
REFERENCES (type in full citation below if reference is new): Allard 1990, Ambrose 1990a, Patterson 1994, Peet et al. 2002, Pyne 1994, Schafale 1998b, Schafale and Weakley 1990

I.C.3.N.a.33. TSUGA CANADENSIS - LIRIODENDRON TULIPIFERA FOREST ALLIANCE

Eastern Hemlock - Tuliptree Forest Alliance

ALLIANCE CONCEPT

Summary: Forests in this alliance are dominated by *Tsuga canadensis*, occurring with various hardwood species of mesic forests, including *Liriodendron tulipifera, Tilia americana var. heterophylla, Magnolia acuminata, Quercus rubra, Fraxinus americana, Betula lenta, Fagus grandifolia, Halesia tetraptera*, and others. Common shrubs are *Rhododendron maximum, Kalmia latifolia*, and *Leucothoe fontanesiana*. Herbaceous cover is typically sparse and includes acid-loving species such as *Polystichum acrostichoides, Goodyera pubescens, Thelypteris noveboracensis, Galax urceolata, Hexastylis* sp., and *Tiarella cordifolia*. These forests occur in deep coves, moist flats, and ravines, but are occasionally found along larger stream bottoms, typically at elevations below 1060 m (3500 feet). Forests in this alliance include acidic cove forests and mesic successional forests, mostly of the southern and central Appalachians, but also occurring in the Cumberland Plateau and Cumberland Mountains of Kentucky, Tennessee, and Alabama, the Allegheny Plateau of West Virginia, and isolated occurrences in the Interior Low Plateau of Indiana and Tennessee.
Dynamics:

ALLIANCE DISTRIBUTION

Range: Forests in this alliance include acidic cove forests and mesic successional forests, mostly of the southern and central Appalachians, but also occurring in the Cumberland Plateau and Cumberland Mountains of Kentucky, Tennessee, and Alabama, the Allegheny Plateau of West Virginia, and isolated occurrences in the Interior Low Plateau of Indiana and Tennessee. This alliance is found in Alabama, Georgia, Kentucky, North Carolina, South Carolina, Tennessee, Maryland, Pennsylvania, Virginia, Indiana, Ohio, and West Virginia.
Nations: US
States/Provinces: AL GA IN KY MD NC OH PA SC TN VA WV
TNC Ecoregions: 44:C, 45:C, 48:C, 49:C, 50:C, 51:C, 52:C, 58:C, 59:C, 61:C
USFS Ecoregions: 212:C, 221Db:PPP, 221Ea:PCC, 221Ec:PCC, 221Ed:PCC, 221Ef:PCC, 221Eg:PCC, 221Fa:PCC, 221Fb:PCC, 221Ha:PCC, 221Hb:PCC, 221Hc:PCC, 221He:PCC, 222De:C??, 222Eb:CCC, 222Ek:CCC, 222Em:CCC, 222Eo:CCC, 222Hb:CCC, 222Hf:CCC, 231Aa:CCC, 231Ap:CCP, 231Ca:CCC, 231Cc:CCP, 231Cd:CCC, 232Ad:CCC, 232Bt:CCC, M221Aa:CCC, M221Ab:CCC, M221Ca:CPP, M221Cb:CPP, M221Cc:CPP, M221Ce:CPP, M221Da:CCC, M221Db:CCC, M221Dc:CCC, M221Dd:CCC, M231Ad:CCC
Federal Lands: NPS (Carl Sandburg Home, Great Smoky Mountains, Mammoth Cave); USFS (Bankhead, Chattahoochee, Cherokee, Daniel Boone, George Washington, Jefferson, Nantahala, Pisgah, Sumter)

ALLIANCE SOURCES

Authors: D. TAYLOR, RW, SCS **Identifier:** A.413
References: Cooper and Hardin 1970, Eyre 1980, Fike 1999, Gettman 1974, Golden 1974, Malter 1977, McLeod 1988, Newell and Peet 1995, Newell et al. 1997, Patterson 1994, Pyne 1994, Schafale and Weakley 1990, Winstead and Nicely 1976

Liriodendron tulipifera - Betula lenta - Tsuga canadensis / Rhododendron maximum Forest

Tuliptree - Sweet Birch - Eastern Hemlock / Great Rhododendron Forest

Southern Appalachian Acid Cove Forest (Typic Type)

Ecological Group (SCS;MCS): Appalachian Highlands Hemlock-Hardwood Forests (420-25; 2.5.3.4)

ELEMENT CONCEPT

GLOBAL SUMMARY: This association includes hemlock-hardwood forests of lower to intermediate elevations in the Southern Blue Ridge and upper Piedmont, ranging from southwestern Virginia, south and west to northwestern Georgia. These communities occur at low to middle elevations (1300-3500 feet) in the mountains and foothills, generally in coves, gorges, or sheltered slopes, over acid soils. The canopy is usually dominated by *Tsuga canadensis* but can be comprised mainly of deciduous trees such as *Liriodendron tulipifera, Betula lenta*, and *Acer rubrum*. Other deciduous species more typical of 'rich' coves may occur as scattered individuals; *Tilia americana var. heterophylla, Fraxinus americana*, and *Fagus grandifolia*. Other canopy/subcanopy species often include *Quercus alba, Quercus rubra, Magnolia fraseri, Ilex opaca var. opaca, Calycanthus floridus, Halesia tetraptera var. tetraptera*, and *Pinus strobus*. *Rhododendron maximum* is scattered to dominant in the shrub stratum. Other typical shrubs include *Kalmia latifolia* and *Leucothoe fontanesiana*. Herbaceous cover is sparse but can be diverse and is composed of acid-loving species. Typical herbs include *Polystichum acrostichoides, Dennstaedtia punctilobula, Goodyera pubescens, Mitchella repens, Thelypteris noveboracensis, Galax urceolata, Viola rotundifolia, Hexastylis* sp., and *Tiarella cordifolia*.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:

Carl Sandburg Home National Historic Site Environment: Within the park, this association is found in only one cove in the far southeastern section of the park at about 650 m. It occurs on extremely acidic soils within the park.

Global Environment: Over its full geographic range, this association is typically found at lower to intermediate elevations (400-1060 m or 1300-3500 feet) in the southern Appalachians and adjacent foothills. Habitats are located on gentle to steep, lower slopes and in coves or gorges with acidic soils. The type often occurs in linear patches along stream bottoms and in steep ravines. Although frequently associated with streams, it is not a wetland. Habitats in the Virginia part of the range are similar and are mostly situated below 900 m (3000 feet) elevation. Soils collected from plots are extremely acidic (mean pH = 3.9) and infertile, with high iron and aluminum levels and very low total base saturation.

VEGETATION DESCRIPTION

Carl Sandburg Home National Historic Site Vegetation: This example consists of a very tall canopy of large old to medium-aged *Betula lenta, Quercus alba, Liriodendron tulipifera, Nyssa sylvatica, Acer rubrum*, and *Magnolia fraseri*, with a very tall layer of *Rhododendron maximum* and *Kalmia latifolia*. The herb layer is very sparse, but does contain some small amounts of *Galax urceolata, Chimaphila maculata*, and *Smilax biltmoreana*.

Global Vegetation: This association encompasses hemlock - hardwood forests with canopies dominated by mixtures of *Tsuga canadensis* with deciduous trees such as *Liriodendron tulipifera, Betula lenta*, and *Acer rubrum*. Other deciduous species more typical of fertile coves, including *Tilia americana var. heterophylla, Fraxinus americana*, and *Fagus grandifolia*, may occur as scattered individuals. Minor overstory and understory species include *Quercus alba, Quercus rubra, Magnolia fraseri, Ilex opaca, Calycanthus floridus, Halesia tetraptera*, and *Pinus strobus*. *Rhododendron maximum* is scattered to dominant in the shrub stratum. Other typical shrubs include *Kalmia latifolia* and *Leucothoe fontanesiana*. Herbaceous cover is sparse but can be diverse and is composed of acid-loving species. Typical herbs include *Polystichum acrostichoides, Goodyera pubescens, Mitchella repens, Thelypteris noveboracensis, Galax urceolata, Hexastylis* spp., and *Tiarella cordifolia*.

Virginia examples of this association are similar to those further south but generally lack *Ilex opaca, Calycanthus floridus, Halesia tetraptera*, and *Leucothoe fontanesiana*. Presumably because of past logging, *Tsuga canadensis* is absent or confined to the understory in some stands, which have mixed canopies of *Liriodendron tulipifera, Betula lenta, Acer rubrum, Magnolia acuminata, Quercus rubra*, and/or *Nyssa sylvatica*. *Hamamelis virginiana* and *Acer pensylvanicum* are additional, frequent understory species. The shrub layers of Virginia occurrences are consistently dominated by dense (usually >50% cover), often nearly impenetrable colonies of

Rhododendron maximum. Frequent low-cover species of sparse herb layers include *Galax urceolata, Chimaphila maculata, Eurybia divaricata (= Aster divaricatus), Arisaema triphyllum, Monotropa uniflora, Mitchella repens,* and *Medeola virginiana*. The spectacular sedge *Cymophyllus fraserianus* is often associated with this forest.

Global Dynamics:

MOST ABUNDANT SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
TREE CANOPY	*Acer rubrum, Betula lenta, Liriodendron tulipifera, Magnolia fraseri, Nyssa sylvatica, Quercus alba*
TREE SUB-CANOPY	*Nyssa sylvatica, Oxydendrum arboreum*
TALL SHRUB	*Rhododendron maximum*
SHORT SHRUB	*Leucothoe fontanesiana*

Global

Stratum	Species
TREE CANOPY	*Betula lenta, Liriodendron tulipifera, Tsuga canadensis*
TALL SHRUB	*Rhododendron maximum*

CHARACTERISTIC SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
TREE CANOPY	*Betula lenta, Liriodendron tulipifera, Magnolia fraseri, Nyssa sylvatica*
TALL SHRUB	*Rhododendron maximum*
SHORT SHRUB	*Leucothoe fontanesiana*
FORB	*Chimaphila maculata, Galax urceolata, Viola rotundifolia*

Global

Stratum	Species
TREE CANOPY	*Betula lenta, Liriodendron tulipifera, Tsuga canadensis*
TALL SHRUB	*Rhododendron maximum*
SHRUB	*Leucothoe fontanesiana*
GRAMINOID	*Luzula echinata*
FORB	*Galax urceolata, Tiarella cordifolia, Waldsteinia fragarioides*

OTHER NOTEWORTHY SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species

Global

Stratum	Species

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

- Betula alleghaniensis - (Tsuga canadensis) / Rhododendron maximum / Leucothoe fontanesiana Forest (CEGL007861)
- Tsuga canadensis - (Fagus grandifolia, Tilia americana var. heterophylla) / Magnolia tripetala Forest (CEGL008407)

GRank & Reasons: G5 (97-12-01). Within its range, this community type occurs extensively in suitable mesic habitats. Occurrences are subject to compositional modification by outbreaks of hemlock woolly adelgid (*Adelges tsugae*), an exotic insect pest that causes decline and eventual mortality of Tsuga canadensis.

CLASSIFICATION COMMENTS

Carl Sandburg Home National Historic Site:

Global Classif Comments: Deciduous trees more typical of 'rich' coves, such as *Aesculus flava, Tilia americana var. heterophylla*, and *Acer saccharum*, are present in this forest only as minor components, if at all. Likewise, rich-site herbs, such as *Actaea racemosa (= Cimicifuga racemosa), Caulophyllum thalictroides, Actaea pachypoda*, and *Adiantum pedatum*, are absent or nearly so. This forest is distinguished from "northern hardwood forests" by the lack of or near absence of *Fagus grandifolia, Betula alleghaniensis, Aesculus flava*, and the presence of low-elevation species, such as *Betula lenta* and *Liriodendron tulipifera*, and generally by a more depauperate herb layer. An interesting example from the Piedmont/Blue Ridge transition of Georgia (Cedar Creek Canyon, Chattahoochee National Forest) has high coverage of *Rhododendron minus* and other foothills/Piedmont species such as *Liquidambar styraciflua* and *Aesculus sylvatica*.

This community type is grossly under-represented by plot data considering its extensive distribution in southwestern Virginia. In the 900-1060 m (3000-3500 feet) elevation range, the type becomes transitional to *Betula alleghaniensis - (Tsuga canadensis) / Rhododendron maximum / Leucothoe fontanesiana* Forest (CEGL007861), which lacks lower-elevation species such as *Liriodendron tulipifera* and *Galax urceolata*, and contains many species characteristic of higher elevations and northern latitudes.

Similar vegetation has been observed in coves of the Cumberland Mountains of southwestern Virginia (e.g., Clinch Ranger District: Dark Hollow, Roaring Branch, Pick Breeches and Flannery Ridges,) but comprehensive data are needed to determine whether these stands are part of this forest types or transitional to *Tsuga canadensis - (Fagus grandifolia, Tilia americana var. heterophylla) / Magnolia tripetala* Forest (CEGL008407). The latter unit apparently has an extensive distribution in the Cumberland Plateau of Kentucky and Tennessee, the Southern Ridge and Valley of Tennessee, and the Central Appalachians of West Virginia and southwestern Pennsylvania.

ELEMENT DISTRIBUTION

Carl Sandburg Home National Historic Site Range: Within the park, this association is restricted to a small area in the far southeastern corner of the current 2002 boundary.

Global Range: This community occurs in the Southern Blue Ridge and peripherally in the upper Piedmont, ranging from southwestern Virginia, south and west to northwestern Georgia.

Nations: US
States/Provinces: GA:S?, NC:S?, SC:S?, TN:S?, VA:S?, WV:S?
TNC Ecoregions: 50:P, 51:C, 52:C, 59:C
USFS Ecoregions: 231Aa:CCC, M221Aa:CCC, M221Ab:CCC, M221Ca:CPP, M221Cb:CPP, M221Cc:CPP, M221Ce:CPP, M221Da:CC?, M221Db:CCC, M221Dc:CCC, M221Dd:CCC, M231Ad:CCC
Federal Lands: NPS (Carl Sandburg Home, Great Smoky Mountains); USFS (Chattahoochee, Cherokee, Jefferson, Nantahala, Pisgah, Sumter)

ELEMENT SOURCES

Carl Sandburg Home National Historic Site Inventory Notes:
Authors: K.D. Patterson, mod. G. Fleming and P. Coulling, SCS **Confidence:** 1 **Identifier:** CEGL007543
REFERENCES (type in full citation below if reference is new): Allard 1990, Eyre 1980, Fleming and Coulling 2001, Fleming et al. 2001, Gettman 1974, NatureServe Ecology - Southeast U.S. unpubl. data, Newell and Peet 1995, Patterson 1994, Patterson et al. 1994, Peet et al. 2002, Schafale 1998b, Schafale and Weakley 1990

II. Woodland

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

II.A.4.N.a.23. PINUS PUNGENS - (PINUS RIGIDA) WOODLAND ALLIANCE

Table Mountain Pine - (Pitch Pine) Woodland Alliance

ALLIANCE CONCEPT

Summary: This alliance includes woodland vegetation in the southern and central Appalachians, dominated or codominated by *Pinus pungens*, with or without some admixture of *Pinus rigida* and/or *Pinus virginiana*. This

alliance also includes woodlands dominated by *Pinus rigida* that occur within the geographic area where *Pinus pungens* occurs as a canopy dominant. Common canopy and subcanopy associates include *Quercus prinus, Quercus coccinea, Castanea dentata, Nyssa sylvatica, Acer rubrum,* and *Oxydendrum arboreum*. Typical shrubs include *Gaylussacia baccata, Vaccinium pallidum, Vaccinium stamineum, Vaccinium corymbosum, Vaccinium simulatum, Gaylussacia ursina, Rhododendron maximum, Kalmia latifolia, Rhododendron carolinianum, Rhododendron catawbiense, Leucothoe recurva,* and *Leiophyllum buxifolium*. In the central Appalachians and in the Virginia portion of the Southern Blue Ridge, *Quercus ilicifolia* is a characteristic shrub. Herbaceous species composition will vary within the range of this alliance. Species commonly found in the sparse herb stratum include *Galax urceolata, Pteridium aquilinum var. latiusculum, Xerophyllum asphodeloides, Fothergilla major, Comptonia peregrina,* and the subshrubs *Gaultheria procumbens,* and *Epigaea repens*. These woodlands typically occur at elevations from 760-1220 m (2500-4000 feet), on xeric ridges and exposed, steep side-slopes over thin, excessively drained, nutrient-poor soils and are often associated with rock outcroppings. Without periodic fire, these woodlands will gradually succeed into forests dominated by *Quercus prinus* and *Quercus coccinea*, except on the most extreme sites, where this vegetation is self-perpetuating. The primary range of associations in this alliance is the Appalachian Mountains (within the range of *Pinus pungens*), although the nominal species, *Pinus pungens*, has insular occurrences in the Upper Piedmont.

Dynamics: Without periodic fire, these woodlands will gradually succeed into forests dominated by *Quercus prinus* and *Quercus coccinea,* except on the most extreme sites, where this vegetation is self-perpetuating.

ALLIANCE DISTRIBUTION

Range: The primary range of associations in this alliance is the Appalachian Mountains (within the range of *Pinus pungens*), although the nominal species, *Pinus pungens*, has insular occurrences in the Upper Piedmont. This alliance is found in Georgia, North Carolina, South Carolina, Tennessee, Maryland, Pennsylvania, Virginia, and West Virginia.

Nations: US

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

TNC Ecoregions: 51:C, 52:C, 59:C, 61:C

USFS Ecoregions: 231Ak:CCC, 231Al:CCC, M221Aa:CCC, M221Ab:CCC, M221Ac:CCC, M221Ce:C??, M221Da:CCC, M221Db:CCC, M221Dc:CCC, M221Dd:CCC

Federal Lands: NPS (Carl Sandburg Home, Great Smoky Mountains, Shenandoah); USFS (Chattahoochee, Cherokee, George Washington, Jefferson, Nantahala, Pisgah, Sumter)

ALLIANCE SOURCES

Authors: A.S. WEAKLEY, RW, SCS **Identifier:** A.521

References: Allard 1990, Barden 1977, Golden 1981, McLeod 1988, Nelson 1986, Newell and Peet 1995, Pyne 1994, Racine 1966, Rawinski et al. 1996, Schafale and Weakley 1990, Sutherland et al. 1993, Thomas 1966, Turrill and Buckner 1995, Wharton 1978, Whittaker 1956, Williams 1991, Williams and Johnson 1990, Williams and Johnson 1992, Williams et al. 1990a, Zobel 1969

Pinus pungens - Pinus rigida - (Quercus prinus) / Kalmia latifolia - Vaccinium pallidum Woodland

Table Mountain Pine - Pitch Pine - (Rock Chestnut Oak) / Mountain Laurel - Hillside Blueberry Woodland

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

Ecological Group (SCS;MCS): Appalachian Highlands Pitch and Table Mountain Pine Woodlands (401-80; n/a)

ELEMENT CONCEPT

GLOBAL SUMMARY: This association includes mostly evergreen woodlands dominated by *Pinus pungens* and/or *Pinus rigida,* occurring over a dense ericaceous shrub stratum, on sharp ridges, mostly above 2000 feet elevation in the Southern Blue Ridge. This type is also found in limited areas of the inner Piedmont. This woodland occurs across a wide elevational range (1600-4000 feet), on exposed ridges and upper slopes with southerly and westerly exposures, over thin, excessively drained, nutrient-poor soils, and can be associated with rock

outcroppings. Canopy coverage can often approach that of a forest, especially in areas where fire has been excluded and deciduous species have significant coverage. Deciduous species that can be important, particularly in the subcanopy, include *Quercus prinus, Quercus coccinea, Quercus stellata, Nyssa sylvatica, Acer rubrum,* and *Oxydendrum arboreum*. *Pinus virginiana* and *Pinus strobus* can have high coverage and even codominate on some sites. The shrub stratum is dominated by ericaceous species, typically *Kalmia latifolia* and *Leucothoe recurva* in the tall-shrub stratum and *Vaccinium pallidum* as a low shrub. Other shrub species vary with location, but include *Vaccinium stamineum, Vaccinium simulatum, Vaccinium pallidum, Vaccinium hirsutum, Vaccinium corymbosum, Rhododendron maximum, Rhododendron minus, Gaylussacia ursina, Gaylussacia baccata, Buckleya distichophylla, Pyrularia pubera*, and *Fothergilla major*. Species commonly found in the sparse herb stratum include *Chimaphila maculata, Galax urceolata, Pteridium aquilinum var. latiusculum, Xerophyllum asphodeloides, Chamaelirium luteum, Comptonia peregrina, Leiophyllum buxifolium, Gaultheria procumbens, Iris verna, Dichanthelium* spp., and *Epigaea repens*, although herbaceous species composition will vary within the range of this community. *Smilax glauca* is a common vine. Without periodic fire, this community will gradually succeed into forests dominated by *Quercus prinus* and *Quercus coccinea*, except on the most extreme sites, where this vegetation is self-perpetuating. It is thought that woodlands dominated by *Pinus pungens* are associated with more xeric conditions than woodlands dominated by *Pinus pungens* in combination with other tree species.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:

Carl Sandburg Home National Historic Site Environment: This pine woodland association is found mostly on ridgelines and adjacent slopes within the park.

Global Environment: This association is typically found on sharp ridges mostly above 2000 feet elevation in the Southern Blue Ridge. This woodland occurs across a wide elevation range (1600-4000 feet) in the southern Appalachians, on exposed ridges and upper slopes with southerly and westerly exposures, over thin, excessively drained, nutrient-poor soils, and can be associated with rock outcroppings. It is thought that woodlands dominated by *Pinus pungens* are associated with more xeric conditions than woodlands dominated by *Pinus pungens* in combination with other tree species (Barden 1977, Zobel 1969).

VEGETATION DESCRIPTION

Carl Sandburg Home National Historic Site Vegetation: Within the park, this community's status is threatened by fire suppression. The canopy is now almost completely closed due to heavy recruitment of more fire-intolerant species such as scarlet oak, chestnut oak, and red maple. In addition, very little regeneration of pitch pine (*Pinus rigida*) has occurred in the past few decades. Although this association was classified as a woodland, it is now effectively a forest with a very heavy understory of mountain laurel. Before canopy and shrub layer closure, this woodland may have contained a larger herb component.

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

Global Dynamics: Canopy coverage in stands of this association can often approach that of a forest, especially in areas where fire has been excluded and deciduous species have significant coverage. Without periodic fire, this community will gradually succeed into forests dominated by *Quercus prinus* and *Quercus coccinea*, except on the most extreme sites, where this vegetation is self-perpetuating.

MOST ABUNDANT SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
TREE CANOPY	*Pinus rigida*
TREE SUB-CANOPY	*Acer rubrum, Nyssa sylvatica, Oxydendrum arboreum, Quercus prinus*
TALL SHRUB	*Kalmia latifolia*

Global

Stratum	Species
TREE CANOPY	*Pinus pungens, Pinus rigida*
TREE SUB-CANOPY	*Acer rubrum, Nyssa sylvatica, Oxydendrum arboreum, Quercus prinus*
TALL SHRUB	*Kalmia latifolia*
SHORT SHRUB	*Vaccinium pallidum*
FORB	*Galax urceolata*

CHARACTERISTIC SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
TREE CANOPY	*Pinus rigida*
TALL SHRUB	*Kalmia latifolia*
SHORT SHRUB	*Gaylussacia baccata, Vaccinium simulatum*

Global

Stratum	Species
TREE CANOPY	*Pinus pungens*
TALL SHRUB	*Fothergilla major*
SHORT SHRUB	*Comptonia peregrina, Leiophyllum buxifolium*
FORB	*Epigaea repens, Galax urceolata, Gaultheria procumbens, Xerophyllum asphodeloides*

OTHER NOTEWORTHY SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species

Global

Stratum	Species

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

- Pinus (pungens, rigida) / Quercus ilicifolia / Gaylussacia baccata Woodland (CEGL004996)

GRank & Reasons: G3 (98-04-30). This community is endemic to the southern Appalachian Mountains where it is maintained by periodic fire or extreme site conditions. Recent studies show that acreage of this community has decreased due to fire suppression (Turrill and Buckner 1995) and that many remaining examples have substantial hardwood invasion. Lightning-set and high-intensity controlled burns are necessary to maintain and re-establish this community type.

CLASSIFICATION COMMENTS

Carl Sandburg Home National Historic Site:

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

ELEMENT DISTRIBUTION

Carl Sandburg Home National Historic Site Range: Within the park, this community has only been confirmed for one ridgeline in the south-central portion of the park, but probably occurs elsewhere in the southern half of the park.

Global Range: This community ranges throughout the Southern Blue Ridge, from southwestern Virginia, south through western North Carolina and eastern Tennessee, into northeastern Georgia and northwestern South Carolina.

Nations: US
States/Provinces: GA:S?, NC:S?, SC:S?, TN:S?, VA?
TNC Ecoregions: 51:C, 52:C, 59:?
USFS Ecoregions: M221Aa:CCP, M221Ab:CCP, M221Ac:CCC, M221Da:CCC, M221Dc:CCC, M221Dd:CCC
Federal Lands: NPS (Carl Sandburg Home, Great Smoky Mountains); USFS (Chattahoochee, Cherokee, Nantahala, Pisgah, Sumter)

ELEMENT SOURCES

Carl Sandburg Home National Historic Site Inventory Notes:
Authors: SCS **Confidence:** 1 **Identifier:** CEGL007097
REFERENCES (type in full citation below if reference is new): Allard 1990, Barden 1977, Golden 1974, Golden 1981, Hedlin et al. 1981, McLeod 1988, NatureServe Ecology - Southeast U.S. unpubl. data, Nelson 1986, Newell and Peet 1995, Peet et al. 2002, Pyne 1994, Racine 1966, Schafale 1998b, Schafale and Weakley 1990, Turrill and Buckner 1995, Wharton 1978, Whittaker 1956, Williams 1991, Williams and Johnson 1990, Williams and Johnson 1992, Williams et al. 1990a, Zobel 1969

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

ALLIANCE CONCEPT

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

ALLIANCE DISTRIBUTION

Range: This alliance is currently defined for the southern Appalachians, Ozarks, Ouachita Mountains, and parts of the Piedmont and Interior Low Plateau, but it is possible throughout much of the eastern United States and southern Canada. It is found in Arkansas, Georgia, North Carolina, Oklahoma, South Carolina, Tennessee, Virginia, Missouri, and elsewhere.
Nations: CA US
States/Provinces: AR GA MO NB? NC NS? OK ON? QC? SC TN VA
TNC Ecoregions: 38:C, 39:C, 50:C, 51:C, 52:C, 57:C, 59:C
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:

Carl Sandburg Home National Historic Site Environment: Within the park, these fields occur in areas that are managed through mowing, goat or cow grazing, or a combination of the two.

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

VEGETATION DESCRIPTION

Carl Sandburg Home National Historic Site Vegetation: In addition to *Lolium pratense (= Festuca pratensis)*, these fields contain large amounts of *Tridens flavus, Phleum pratense, Dactylis glomerata*, and *Solanum carolinense*. Composition varies widely with land use and mowing intervals.

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

Carl Sandburg Home National Historic Site

Stratum	Species
GRAMINOID	*Festuca pratensis, Tridens flavus*

Global

Stratum	Species

CHARACTERISTIC SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
GRAMINOID	*Festuca pratensis, Tridens flavus*

Global

Stratum	Species

OTHER NOTEWORTHY SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species

Global

Stratum	Species

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

Carl Sandburg Home National Historic Site:

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

Carl Sandburg Home National Historic Site Range: This association ranges throughout the eastern third of the park. Most locations that are grazed or mowed have developed this association.

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

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

V.A.5.N.k. Seasonally flooded temperate or subpolar grassland

V.A.5.N.k.14. JUNCUS EFFUSUS SEASONALLY FLOODED HERBACEOUS ALLIANCE

Soft Rush Seasonally Flooded Herbaceous Alliance

ALLIANCE CONCEPT

Summary: This alliance includes wetland herbaceous vegetation dominated or codominated by *Juncus effusus*. These communities are most characteristically seasonally flooded, but in some cases, examples may have temporarily or semipermanently flooded hydrologies. Still, all these are conceptually placed in this alliance, at least until more detailed information is available. These marshy communities vary greatly in size, situation, geographical location, species composition, and naturalness. Some are beaver-made or human-made impoundments. It should be noted that this species has a very wide ecological amplitude, and additional alliances with different hydrologies may need to be defined.
Dynamics: It should be noted that *Juncus effusus* has a very wide ecological amplitude, and additional alliances with different hydrologies may need to be defined.

ALLIANCE DISTRIBUTION

Range: This alliance is found in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and elsewhere.

Nations: US
States/Provinces: AL AR FL GA KY LA MS NC OK SC TN TX VA
TNC Ecoregions: 43:C, 44:C, 50:C, 51:C, 52:C, 53:P, 56:P, 57:P, 58:C, 59:C
USFS Ecoregions: 222C:CC, 222D:CC, 222Eb:CCC, 222F:CC, 222H:CC, 231Ca:CCP, 231Cd:CCP, 231Db:CCC, 232:C, M221Ab:CCC, M221Dc:CCC, M221Dd:CCC
Federal Lands: DOD (Arnold, Fort Benning); NPS (Carl Sandburg Home, Great Smoky Mountains); USFS (Bankhead, Chattahoochee, Cherokee?, Oconee?, Talladega)

ALLIANCE SOURCES

Authors: A.S. WEAKLEY 5-95, MOD. A, MP, SCS **Identifier:** A.1375
References: Diamond 1993, Hoagland 1997, Hoagland 1998a, Nelson 1986, Schafale and Weakley 1990

Juncus effusus Seasonally Flooded Herbaceous Vegetation

Soft Rush Seasonally Flooded Herbaceous Vegetation
Rush Marsh
Ecological Group (SCS;MCS): Eastern Emergent Marshes (480-20; 1.4.1.2)

ELEMENT CONCEPT

GLOBAL SUMMARY: This broadly defined type represents freshwater marsh vegetation dominated by *Juncus effusus*. Additional types may be developed as more information becomes available. This vegetation may occur in natural or artificial ponds, including beaver-enhanced ones. In various parts of its broad range as currently defined, associated species may include *Andropogon glomeratus, Cyperus* spp., *Typha latifolia, Scirpus cyperinus, Triadenum walteri, Apios americana*, and *Galium aparine*. This type includes seasonally to temporarily flooded vegetation dominated or codominated by *Juncus effusus* in the central and southern Appalachians.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: PALUSTRINE

Carl Sandburg Home National Historic Site Environment: Within the park, these wetlands exist in a narrow band 1-10 m wide between the farm ponds and old fields, especially at Side Lake. All wetlands were man-made, though some sources at the park suggest that there may have been seepage areas where the ponds currently lay. This area is intensively managed through mowing multiple times each field season, so most of the vegetation that survives is low- to medium-growth herbaceous vegetation.

Global Environment: This is a seasonally (to temporarily) flooded marsh vegetation type; it may occur in natural or artificial ponds, including beaver-enhanced ones.

VEGETATION DESCRIPTION

Carl Sandburg Home National Historic Site Vegetation: Composition will continue to vary as mowing intensity changes from year to year. There are no clear dominants in this community on site, but some of the species present include *Cyperus strigosus, Juncus tenuis, Juncus effusus, Scirpus expansus*, and *Ludwigia palustris.*

Global Vegetation: This type is currently broadly and literally defined, based on dominance by *Juncus effusus*. In various parts of its broad range as currently defined, associated species may include *Andropogon glomeratus, Cyperus* spp., *Typha latifolia, Scirpus cyperinus, Triadenum walteri, Apios americana*, and *Galium aparine*. In Georgia, Wharton (1978) cites *Carex rostrata, Carex stipata, Schoenoplectus pungens (= Scirpus americanus)*, and *Sagittaria latifolia* as associates of beaver pond vegetation containing *Juncus effusus*.

Global Dynamics:

MOST ABUNDANT SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
GRAMINOID	*Juncus effusus*

Global

Stratum	Species
GRAMINOID	*Juncus effusus*

CHARACTERISTIC SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
GRAMINOID	*Cyperus strigosus, Juncus effusus, Juncus tenuis*

Global

Stratum	Species
GRAMINOID	*Juncus effusus*

OTHER NOTEWORTHY SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species

Global

Stratum	Species

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

GRank & Reasons: G5 (01-03-28). This is a broadly defined, widely distributed, and reasonably secure vegetation type.

CLASSIFICATION COMMENTS

Carl Sandburg Home National Historic Site:

Global Classif Comments: Though this association was not seen at the Bankhead National Forest, it is expected to occur there.

ELEMENT DISTRIBUTION

Carl Sandburg Home National Historic Site Range: Within the park, this association occurs only along a narrow band between open water and old field vegetation around Side Lake.

Global Range: The range of this broadly defined association has not been fully described. It is confirmed as occurring in the Central Appalachians and is thought to occur in the Interior Low Plateau, Cumberland Plateau, Southern Ridge and Valley, Southern Blue Ridge, Piedmont, Chesapeake Bay Lowlands, and the Coastal Plain from the Mid-Atlantic to the Upper East Gulf Coastal Plain.

Nations: US
States/Provinces: AL:S?, AR:S?, FL:S?, GA:S?, KY:S?, LA:S?, MS:S?, NC:S?, OK:S?, SC:S?, TN:S?, TX:S?, VA:S?
TNC Ecoregions: 43:C, 44:C, 50:P, 51:C, 52:P, 53:P, 56:P, 57:P, 58:P, 59:C
USFS Ecoregions: 222Eb:CCC, 231Ca:CPP, 231Cd:CPP, 231Db:CCC, M221Ab:CCC, M221Dc:CCC, M221Dd:CCC
Federal Lands: DOD (Arnold, Fort Benning); NPS (Carl Sandburg Home, Great Smoky Mountains); USFS (Bankhead, Cherokee?, Oconee?, Talladega)

ELEMENT SOURCES

Carl Sandburg Home National Historic Site Inventory Notes:
Authors: SCS **Confidence:** 2 **Identifier:** CEGL004112
REFERENCES (type in full citation below if reference is new): Allard 1990, Fleming et al. 2001, Hoagland 1998c, Hoagland 2000, Peet et al. 2002, TNC 1998a, Wharton 1978

V.B.2.N.b. Low temperate or subpolar perennial forb vegetation

V.B.2.N.b.11. SELAGINELLA (TORTIPILA, RUPESTRIS) HERBACEOUS ALLIANCE

(Twisted-hair Spikemoss, Rock Spikemoss) Herbaceous Alliance

ALLIANCE CONCEPT

Summary: This alliance includes vegetation characterized by shallow vegetation mats of mosses, lichens, and shallow-rooted vascular plants occurring on smooth rock substrates or rock with few crevices or fractures (e.g., granitic exfoliation domes). It includes communities found in the Blue Ridge and Piedmont of the Carolinas and Georgia. Associations in this alliance can be found at elevations up to 5000 feet (1525 m) in the Blue Ridge, but occur below 3000 feet (915 m) in the Piedmont. This alliance has sparse to dense (10-90%) coverage by *Selaginella tortipila* or *Selaginella rupestris* and physiognomically complex zones with many other dominants. Woody species from adjacent woodlands and shrublands may be scattered components in these associations, especially in marginal zones between open rock and forested vegetation. The vegetation of associations in this alliance has few deep-rooted forbs, shrubs, or trees and is dominated by shallow-rooted perennials and annuals growing in established vegetation mats. Associated species vary with elevation, exposure, and geology. Species characteristic of high-elevation associations include *Hypericum buckleii, Packera millefolia (= Senecio millefolium), Carex biltmoreana, Carex umbellata, Solidago simulans, Danthonia epilis (= Danthonia sericea var. epilis), Trichophorum caespitosum (= Scirpus cespitosus), Rhododendron catawbiense*, and *Leiophyllum buxifolium*. Lower elevation associations typically include *Grimmia laevigata, Andropogon virginicus, Coreopsis major, Danthonia spicata, Schizachyrium scoparium*, and *Talinum teretifolium*. Some unique associations with circumneutral influence include species indicative of high pH soils such as *Arabis laevigata, Cheilanthes lanosa, Dodecatheon meadia, Sedum glaucophyllum*, and *Hylotelephium telephioides (= Sedum telephioides)*. Granitic domes, in general, are uncommon, especially at high elevations in the Blue Ridge, where they are threatened by heavy recreational use. Granitic dome communities are also known from the Piedmont of North Carolina and Georgia, where the associations are more xeric and differ floristically from the montane associations.

Dynamics:

ALLIANCE DISTRIBUTION

Range: This alliance includes communities found in the Blue Ridge and Piedmont of the Carolinas and Georgia, and may extend into Virginia (?).

Nations: US

States/Provinces: GA NC SC VA?

TNC Ecoregions: 51:C, 52:C

USFS Ecoregions: 231Ad:CCC, M221Dc:CCC

Federal Lands: NPS (Carl Sandburg Home); USFS (Chattahoochee, Nantahala, Oconee, Pisgah, Sumter)

ALLIANCE SOURCES

Authors: K.D. PATTERSON, RW, SCS **Identifier:** A.1985

References: Allard 1990, DuMond 1970, Nelson 1986, Schafale and Weakley 1990, Wiser 1993, Wiser et al. 1996

Selaginella rupestris - Schizachyrium scoparium - Hypericum gentianoides - Bulbostylis capillaris Herbaceous Vegetation

Rock Spikemoss - Little Bluestem - Pineweed - Common Hairsedge Herbaceous Vegetation

Appalachian Low-Elevation Granitic Dome

Ecological Group (SCS;MCS): Appalachian Highlands Granitic Domes (435-10; n/a)

ELEMENT CONCEPT

GLOBAL SUMMARY: This association includes vegetation found on granitic exfoliation domes of the Piedmont and lower elevation portions of the Blue Ridge. It occurs on gently sloping to steep exposures of smooth, exfoliating granite or similar massive igneous or metamorphic rock, such as granitic gneiss. The substrate has few cracks or irregularities for soil accumulation, and most of the areal extent is bare rock. This association typically occurs at elevations below 3000 feet (914 m), but may be found at slightly higher elevations. This community occurs in large patches, ranging in size from a few acres to over 100 acres. Vegetation consists primarily of lichens on bare rock or of shallow mats generally dominated by *Selaginella rupestris* occurring with other distinctive species. Woody species from adjacent woodlands and shrublands may be scattered components, rooted in deeper soil pockets, older stable vegetation mats, and in marginal zones between the exposed rock and adjacent forests. *Selaginella rupestris* is almost always a major dominant of the vegetation mats. However, distribution of *Selaginella rupestris* can be spotty, so there are examples of this association that do not contain this species. Other characteristic herbaceous species are *Baptisia tinctoria, Cheilanthes lanosa, Coreopsis major, Corydalis sempervirens, Danthonia sericea, Lindernia monticola, Phlox nivalis, Schizachyrium scoparium, Scleria triglomerata*, and *Talinum teretifolium*. Common woody species include *Carya pallida*, *Chionanthus virginicus, Fraxinus americana, Juniperus virginiana, Kalmia latifolia, Pinus echinata, Pinus rigida, Quercus prinus (= Quercus montana), Rhododendron minus, Ulmus alata*, and *Vaccinium stamineum*.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System:

Carl Sandburg Home National Historic Site Environment: On site, this association occurs on most of the granite "flat rock" for which the town below is named.

Global Environment:

VEGETATION DESCRIPTION

Carl Sandburg Home National Historic Site Vegetation: *Selaginella rupestris* is not present on most of the outcrops in the park, but most of the other species characteristic of this association such as *Talinum teretifolium, Hypericum gentianoides*, and *Coreopsis major* are found on these outcrops.

Global Vegetation: In stands of this type, the vegetation consists primarily of lichens on bare rock, or of shallow mats generally dominated by *Selaginella rupestris* occurring with other distinctive species. Woody species from adjacent woodlands and shrublands may be scattered components, rooted in deeper soil pockets, older stable vegetation mats, and in marginal zones between the exposed rock and adjacent forests. *Selaginella rupestris* is almost always a major dominant of the vegetation mats. However, distribution of *Selaginella rupestris* can be spotty, so there are examples of this association that do not contain this species. Other characteristic herbaceous species are *Baptisia tinctoria, Cheilanthes lanosa, Coreopsis major, Corydalis sempervirens, Danthonia sericea, Lindernia monticola, Phlox nivalis, Schizachyrium scoparium, Scleria triglomerata*, and *Talinum teretifolium*. Common woody species include *Carya pallida, Chionanthus virginicus, Fraxinus americana, Juniperus virginiana, Kalmia latifolia, Pinus rigida, Quercus prinus (= Quercus montana), Rhododendron minus, Ulmus alata*, and *Vaccinium stamineum*.

In an example of this association in the Chattahoochee National Forest (upper Piedmont of Stephens County, Georgia, 231Ad34, ca. 303-350 m elev.), mats of *Selaginella rupestris* dominate the stand. Widely scattered trees include *Pinus virginiana* and *Quercus prinus*. A prevalent shrub is *Rhus aromatica*. Other herbs include *Ageratina aromatica, Agrostis perennans, Andropogon* sp. *Cheilanthes lanosa, Packera anonyma (= Senecio anonymus), Solanum ptychanthum*?, and the characteristic *Talinum teretifolium*. Examples of this association on granite gneiss at Carl Sandburg Home National Historic Site also contained patches of *Amelanchier laevis* and *Pinus virginiana* scattered in pockets of deeper soil.

Global Dynamics:

MOST ABUNDANT SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
GRAMINOID	*Bulbostylis capillaris, Deschampsia flexuosa*
FORB	*Hypericum gentianoides, Saxifraga michauxii*

Global

Stratum	Species

CHARACTERISTIC SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
GRAMINOID	*Schizachyrium scoparium*
FORB	*Croton willdenowii, Saxifraga michauxii, Talinum teretifolium*

Global

Stratum	Species

OTHER NOTEWORTHY SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
GRAMINOID	*Dichanthelium leucothrix*

Global

Stratum	Species

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

- Selaginella tortipila - Krigia montana - Houstonia longifolia Herbaceous Vegetation (CEGL004283)
- Selaginella rupestris - Schizachyrium scoparium - Hylotelephium telephioides - Allium cernuum Herbaceous Vegetation (CEGL004991)

GRank & Reasons: G2 (98-04-30). Granitic domes are uncommon communities. Only 20 percent of the Piedmont Plateau is granite (Radford and Martin 1975), and only a small percentage of this granite occurs as massive, unweathered bodies that produce flatrocks and domes. Past quarrying has leveled many former granite domes (McVaugh 1943). This community provides open vistas that are attractive to humans, thus these fragile areas are threatened by pressures of recreational use. Given the island-like nature of this community, it is the habitat for many rare and endemic species and provides a unique contribution to biodiversity.

CLASSIFICATION COMMENTS

Carl Sandburg Home National Historic Site:

Global Classif Comments: Occurrences of this community have structural and compositional similarities to *Selaginella tortipila - Krigia montana - Houstonia longifolia* Herbaceous Vegetation (CEGL004283), which is typically at higher elevations (over 3000 feet) and contains a suite of species not found at lower elevations. Occurrences vary locally based on slope steepness, aspect, age of vegetation mats, and smoothness of rock substrate. Some occurrences may be difficult to distinguish from *Selaginella rupestris - Schizachyrium scoparium - Hylotelephium telephioides - Allium cernuum* Herbaceous Vegetation (CEGL004991), which is characterized by the presence of plants characteristic of higher pH conditions, better developed soils, and flat to gently sloping rock surfaces. This community is floristically similar to granitic flatrock communities which are scattered throughout the Piedmont from Virginia to Alabama. However, the steep domes described here lack the shallow pools and other microhabitats characteristic of the fractured rock in granitic flatrock communities, and thus have different vegetative components.

ELEMENT DISTRIBUTION

Carl Sandburg Home National Historic Site Range: This association occurs on most of the occurrences of exposed flat rock within the park. These flat rocks are most numerous in the southern half of the park, though a few examples exist in the northern section.

Global Range: This community is known from the Piedmont region of Georgia and North Carolina, and lower elevations of the Blue Ridge Mountains, where steep, dome-shaped outcrops of granitic rock occur. Notable examples are in DeKalb County, Georgia, and in Alexander County, North Carolina.

Nations: US
States/Provinces: GA:S?, NC:S?, SC?
TNC Ecoregions: 51:C, 52:C
USFS Ecoregions: 231Ad:CCC, M221:C
Federal Lands: NPS (Carl Sandburg Home); USFS (Chattahoochee)

ELEMENT SOURCES

Carl Sandburg Home National Historic Site Inventory Notes:
Authors: SCS **Confidence:** 2 **Identifier:** CEGL007690
REFERENCES (type in full citation below if reference is new): Keever 1942, Keever et al. 1951, McVaugh 1943, Peet et al. 2002, Quarterman et al. 1993, Radford and Martin 1975, Schafale 1998b, Schafale and Weakley 1990, Schafale pers. comm., Taggart 1973, Wharton 1978

V.C.2.N.a. Permanently flooded temperate or subpolar hydromorphic rooted vegetation

V.C.2.N.a102. NYMPHAEA ODORATA - NUPHAR SPP. PERMANENTLY FLOODED TEMPERATE HERBACEOUS ALLIANCE

White Waterlily - Yellow Pondlily species Permanently Flooded Temperate Herbaceous Alliance

ALLIANCE CONCEPT

Summary: This alliance, common throughout most of the eastern and central United States and adjacent Canadian provinces, contains vegetation which may occur in a variety of slow-moving water bodies, including rivers, millponds, blackwater rivers, streams, shallow ponds or lakes, or on shores of deeper water bodies including freshwater tidal areas. The water depth is generally greater than 0.5 m and up to 2 m. Stands are dominated by hydromorphic rooted aquatic plants, typically *Nuphar lutea* (any of its various subspecies), with or without *Nymphaea odorata*. Emergent vegetation is less than 25%, and typically plant species diversity is low. Other species present may include *Utricularia* spp., *Potamogeton* spp., and others. In the north, *Brasenia schreberi* may be locally dominant. Other characteristic northern species include *Nymphaea tetragona* and *Potamogeton amplifolius*. Associates found in the Midwest include *Polygonum amphibium*. In the Southeast, examples may include the floating or emergent 'pad-leaved' species *Nelumbo lutea* or *Nymphoides aquatica*. Submerged aquatic species which may be present include *Cabomba caroliniana, Ceratophyllum demersum*, and *Heteranthera dubia*. Stands of this alliance are permanently to semipermanently flooded.
Dynamics:

ALLIANCE DISTRIBUTION

Range: This alliance is common throughout most of the eastern and central United States and adjacent Canadian provinces. It is also found in Oregon, Washington, California, Idaho, Colorado, and possibly Wyoming (?).
Nations: CA US
States/Provinces: AL AR BC CA CO CT DE FL GA IA ID IL IN KY LA MA MB MD ME MI MN MO MS NC NH NJ NY OH OK ON OR PA RI SC TN TX VA VT WA WI WV WY?
TNC Ecoregions: 10:C, 20:C, 2:C, 31:C, 32:P, 36:C, 37:C, 39:C, 40:P, 41:C, 42:C, 43:C, 44:C, 45:C, 46:C, 47:C, 48:C, 49:C, 50:C, 51:C, 52:C, 53:C, 55:C, 56:C, 57:C, 58:C, 59:C, 60:?, 61:C, 62:C, 63:C, 6:C
USFS Ecoregions: 212Cb:CCC, 212Ha:CPP, 212Hb:CPP, 212He:CPP, 212Hh:CPP, 212Hi:CPP, 212Hj:CPP, 212Hk:CPP, 212Hl:CPP, 212Hm:CPP, 212Hn:CPP, 212Ho:CPP, 212Hp:CPP, 212Hq:CPP, 212Hr:CPP, 212Hs:CPP, 212Ht:CPP, 212Hu:CPP, 212Hv:CPP, 212Hw:CPP, 212Hx:CPP, 212Hy:CPP, 212Ib:CPP, 212Ja:CCP, 212Jb:CCP, 212Jc:CCP, 212Je:CCP, 212Jf:CCP, 212Jj:CCP, 212Jk:CCP, 212Jl:CCP, 212Jm:CCC, 212Jn:CCP, 212Jo:CCP, 212Jr:CCP, 212Ka:CPP, 212La:CCP, 212Lb:CCC, 212Lc:CCP, 212Ld:CCC, 212Ma:CPP, 212Mb:CPP, 212Na:CPP, 212Nb:CPP, 212Nc:CPP, 221A:CC, 221B:CC, 221Ea:CCC, 221Ed:CC?, 221Ef:CCC, 221He:CCC, 222Ch:CCC, 222Db:CCC, 222Gc:C??, 222Ha:CCC, 222Ja:CCC, 222Jb:CCC, 222Je:CCC, 222Ji:CCC, 222Jj:CCC, 222Kf:CCC, 222Kg:CCC, 222Kh:CCC, 222Kj:CCC, 231Bc:CCC, 231Ga:CCC,

231Gb:CCC, 231Gc:CCC, 232Ac:CCC, 232Bf:CCC, 232Bg:CCC, 232Bj:CC?, 232Ca:CCC, 232Cb:CCC, 232Cc:CC?, 232Cd:CCC, 232Ch:CCC, 232Dc:CCC, 234Ac:CC?, 234An:CCC, 242A:CC, 251Cf:CCC, 251Dd:CCC, 251Dg:CCC, 251Eb:CCC, M212:C, M221Aa:CCC, M221Ab:CCC, M221Ac:CCC, M221Ad:CCC, M221Ba:CCC, M221Bb:CCC, M221Bc:CCC, M221Bd:CCC, M221Be:CCC, M221Bf:CCC, M221Da:CCC, M221Dc:CCC, M221Dd:CCC, M331A:CC, M331D:CC, M331H:CC, M332E:CC, M333A:CC, M333B:CC, M333D:CC

Federal Lands: DOD (Eglin, Fort Benning); NPS (Acadia, Carl Sandburg Home, Isle Royale, Voyageurs); USFS (Angelina, Conecuh, Croatan?, Davy Crockett, Kisatchie, Ocala, Ozark, Sabine, Sam Houston?, Talladega); USFWS (Okefenokee, Reelfoot)

ALLIANCE SOURCES

Authors: M. PYNE, MOD. M.S. REID, MP, SCS **Identifier:** A.1984

References: Ambrose 1990a, FNAI 1990, Faber-Langendoen et al. 1996, Foti et al. 1994, Harris et al. 1996, Heineke 1987, Hoagland 1998a, Kovalchik 1993, Marr et al. 1980, Penfound 1952, Ramaley 1909, Sawyer and Keeler-Wolf 1995, Schafale and Weakley 1990, Wharton 1978, Wolfe 1990

Nuphar lutea ssp. advena - Nymphaea odorata Herbaceous Vegetation

Broadleaf Pondlily - White Waterlily Herbaceous Vegetation

Water Lily Aquatic Wetland

Ecological Group (SCS;MCS): Eastern Open Ponds and Marshes (480-10; 1.4.1.1)

ELEMENT CONCEPT

GLOBAL SUMMARY: This rooted aquatic or open marsh community occupies shallow water depressions, oxbow ponds, backwater sloughs of river floodplains, slow moving streams, ponds, and small lakes throughout the central and eastern United States. It is dominated by rooted, floating-leaved aquatic species, with both submergent and emergent aquatics also present. *Nuphar lutea ssp. advena* and *Nymphaea odorata* are dominants. Other species present may include *Brasenia schreberi*, various *Potamogeton* spp., *Polygonum amphibium*, and *Polygonum amphibium var. emersum (= Polygonum coccineum).* Submerged aquatics more common in the southern part of the range include *Cabomba caroliniana, Ceratophyllum demersum*, and *Heteranthera dubia*.

ENVIRONMENTAL DESCRIPTION

USFWS Wetland System: LACUSTRINE

Carl Sandburg Home National Historic Site Environment: This community occupies two very old manmade ponds on the premises.

Global Environment: This community occupies shallow water depressions, oxbow ponds, and backwater sloughs of river floodplains, ponds, and small lakes.

VEGETATION DESCRIPTION

Carl Sandburg Home National Historic Site Vegetation: It occurs in areas of open water and consists of *Nymphaea odorata* along with *Utricularia* spp.

Global Vegetation: This community is dominated by rooted, floating-leaved aquatic species, with both submergent and emergent aquatics also present. *Nuphar lutea ssp. advena* and *Nymphaea odorata* are dominants. Other species present include *Brasenia schreberi*, various *Potamogeton* spp., *Polygonum amphibium*, and *Polygonum amphibium var. emersum (= Polygonum coccineum)* (Anderson 1982). Submerged aquatic species more common in the southern part of the range include *Cabomba caroliniana, Ceratophyllum demersum*, and *Heteranthera dubia*. This broadly conceived type may include ponds, or zones of ponds, dominated by *Nymphaea odorata*, with or without *Nuphar lutea ssp. advena*.

Global Dynamics:

MOST ABUNDANT SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
FLOATING AQUATIC	*Nymphaea odorata*

Global

Stratum	Species

CHARACTERISTIC SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species
FLOATING AQUATIC	*Nymphaea odorata*

Global

Stratum	Species

OTHER NOTEWORTHY SPECIES

Carl Sandburg Home National Historic Site

Stratum	Species

Utricularia spp. are also dominant aquatic forbs.

Global

Stratum	Species

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

GRank & Reasons: G4G5 (96-10-03). The dominant species in stands of this vegetation are widespread across the eastern and central United States and adjacent Canada. This is not a rare or imperiled vegetation type, even though its occurrence is poorly documented. Stands may occur in natural lakes and ponds or in artificial impoundments.

CLASSIFICATION COMMENTS

Carl Sandburg Home National Historic Site:

Global Classif Comments: Occurs in borrow pits on Kisatchie National Forest. On the Conecuh National Forest (Alabama), vegetation of this alliance occurs in Gum Pond and Open Pond as a mix of *Nymphaea odorata* and *Nuphar lutea ssp. advena*.

ELEMENT DISTRIBUTION

Carl Sandburg Home National Historic Site Range:

Global Range: This rooted aquatic community occupies shallow, quiet waters throughout the central and eastern United States, extending from Maine to Ontario and Minnesota, south to Oklahoma and east to Georgia.

Nations: CA US
States/Provinces: AL:S?, AR:S?, CT:S?, DE:S?, GA:S?, IA:SU, IL:S?, IN:S?, KY:S?, LA:S?, MA:S?, MD:S?, ME:S5, MI:S?, MN:S?, MO:S?, MS:S?, NC:S?, NH:S?, NJ:S?, NY:S?, OH:S?, OK:S?, ON:S?, PA:S?, RI:S?, SC:S?, TN:S?, TX:S?, VA:S?, VT:S?, WI:S?, WV:S?
TNC Ecoregions: 31:C, 32:P, 36:C, 37:C, 39:C, 40:P, 41:C, 42:C, 43:C, 44:C, 45:C, 46:C, 47:C, 48:C, 49:C, 50:C, 51:C, 52:C, 53:C, 55:P, 56:C, 57:C, 58:C, 59:C, 60:?, 61:C, 62:C, 63:C
USFS Ecoregions: 212Cb:CCC, 212Hb:CPP, 212Ja:CCP, 212Jb:CCP, 212Jc:CCP, 212Je:CCP, 212Jf:CCP, 212Jj:CCP, 212Jl:CCP, 212Jm:CCC, 212Ka:CPP, 221Ea:CCC, 221Ed:CC?, 221Ef:CCC, 221He:CCC, 222Ch:CCC, 222Db:CCC, 222Gc:C??, 222Ha:CCC, 222Ja:CCC, 222Jb:CCC, 222Ji:CCC, 222Jj:CCC, 222Kf:CCC, 222Kg:CCC, 222Kh:CCC, 222Kj:CCC, 231Bc:CCC, 231Ga:CCC, 231Gb:CCC, 231Gc:CCC, 232Bf:CCC, 232C:CC, 232D:CC, 234Ac:CC?, 234An:CCC, 251Cf:CCC, 251Dd:CCC, 251Dg:CCC, 251Eb:CCC, M221Aa:CCC, M221Ab:CCC, M221Ac:CCC, M221Ad:CCC, M221Ba:CCC, M221Bb:CCC, M221Bc:CCC, M221Bd:CCC, M221Be:CCC, M221Bf:CCC, M221Da:CCC, M221Dc:CCC
Federal Lands: DOD (Fort Benning); NPS (Acadia, Carl Sandburg Home); USFS (Angelina, Conecuh, Davy Crockett, Kisatchie, Ocala, Ozark, Sabine, Sam Houston?, Talladega); USFWS (Reelfoot)

ELEMENT SOURCES

Carl Sandburg Home National Historic Site Inventory Notes:

Authors: D. Faber-Langendoen, MCS **Confidence:** 3 **Identifier:** CEGL002386

REFERENCES (type in full citation below if reference is new): Ambrose 1990a, Anderson 1982, FNAI 1990, Fleming et al. 2001, Foti et al. 1994, Gawler 2002, Hoagland 2000, NAP pers. comm. 1998, NatureServe Ecology - Southeast U.S. unpubl. data, Peet et al. 2002, Penfound 1953, Schafale and Weakley 1990, Zanoni et al. 1979

Appendix III. Photos of some of the plots and plants of Carl Sandburg Home NHS.

Carl Sandburg Home (photo taken from front field)

Pink lady's slipper (*Cypripedium acaule*) in bloom within park boundary.

Herbarium specimen of Devil's-walking stick (*Aralia spinosa*) that resides at the NCU Herbarium in Chapel Hill, NC.

Photo of Plot 15 at Carl Sandburg Home National Historic Site

Photo of Plot 9

Rock outcrop

Lonicera flava (yellow honeysuckle)

North Fork heartleaf (*Hexastylis rhombiformis*)

Appendix IV. Key to EcoGroups and Ecological Communities of Carl Sandburg Home National Historic Site.

This key was developed for Carl Sandburg Home National Historic Site 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 diversity of adjacent natural areas in the region, this key may not be useful outside of the park boundary. However, within the boundary, we believe this key represents the range of variation of existing vegetation.

The document is structured like a dichotomous key. The user must make a series of choices based on the structure, composition, and environment of the vegetation to arrive at the correct association. If the key leads to a choice that is not reasonable, consider returning to the beginning of the key and reviewing your decisions to confirm that you are confident in all your choices. It may be useful to walk around the area in question to get a feel for the composition of the area. This exercise may help you arrive at the correct place in the key since small-scale variations within a matrix community may be misleading.

Where appropriate, the name of the NatureServe Ecological Group appears in [brackets]. The EcoGroup is a broader concept than the association level, so similar communities may fall out in one ecogroup. The full association name and code (e.g. CEGL002386) appears alongside an underlined title of the type. The "common name" of the community also appears with the scientific name of the association.

1a. Wetland (palustrine) communities

2a. Open water communities with low vegetation cover within man-made or beaver ponds. Indicator species: Broadleaf pondlily (Nuphar lutea)
[EASTERN OPEN MARSHES AND PONDS]
Water Lily Aquatic Wetland - Nuphar lutea ssp. advena – Nymphaea odorata Herbaceous Vegetation (CEGL002386)

2b. Communities with a high herbaceous cover (>75% cover) adjacent to man-made or beaver ponds. Indicator species: Soft rush (Juncus effusus), Cattail (Typha latifolia)
[EASTERN EMERGENT MARSHES]
Rush Marsh - Juncus effusus Seasonally Flooded Herbaceous Vegetation (CEGL004112)

1b. Upland Terrestrial Vegetation (non-wetland communities)

3a. Non-Forested Vegetation (trees generally have less than 25% canopy coverage)

4a. Exotic species dominated old field. Indicator species: Common species: Fescue (Lolium spp.), Redtop (Tridens flavus)
[EXOTIC SPECIES DOMINATED HERBACEOUS UPLAND]
Cultivated Meadow - Lolium (arundinaceum, pratense) Herbaceous Vegetation (CEGL004048)

4b. Native species dominated granitic rock outcropping. Indicator species: Michaux' saxifrage (Saxifraga michauxii), Common species: Appalachian fameflower (Talinum teretifolium), Dense-tuft hair sedge (Bulbostylis cappilaris), Silky wild oat grass (Danthonia sericea).
[APPALACHIAN HIGHLANDS GRANITIC DOMES]
Appalachian Low-Elevation Granitic Dome - Selaginella rupestris–Schizachyrium scoparium– Hypericum gentianoides – Bulbostylis cappilaris (CEGL007690)

3b. Forested Vegetation (tree coverage > 25%)

5a. Forest canopy with at least 25% canopy coverage by conifer species (sometimes even less in non-typal variations of CEGL007519).

6a. Forest canopy dominated by xeric coniferous trees and deciduous oaks (pitch pine (Pinus rigida), Table Mountain pine (Pinus pungens), scarlet oak (Quercus coccinea), chestnut oak (Quercus prinus))

7a. Woodland canopy dominated by pitch pine but not a granite outcropping. Caution: Examples of this community at Carl Sandburg Home are fire suppressed and therefore have a higher than normal proportion of oak species such as scarlet oak (Quercus coccinea) in the canopy.

[APPALACHIAN HIGHLANDS PITCH AND TABLE MOUNTAIN PINE WOODLAND]

Blue Ridge Table Mountain Pine - Pitch Pine Woodland (Typic Type) - Pinus pungens–Pinus rigida–(Quercus prinus) / Kalmia latifolia–Vaccinium pallidum Woodland (CEGL007097)

7b. Forest canopy dominated by a mix of white pine (Pinus strobus) with xeric oak species (chestnut oak (Quercus prinus) and scarlet oak (Quercus coccinea)). Caution: Some examples of this community may have lower than normal amounts of white pine. Indicator species: white pine (Pinus strobus), black-seed spear grass (Piptochaetium avenaceum). Common species: chestnut oak (Quercus prinus), white pine (Pinus strobus), mockernut hickory (Carya alba), deerberry (Vaccinium stamineum).

[APPALACHIAN WHITE PINE – XERIC OAK FOREST]

Appalachian White Pine - Xeric Oak Forest - Pinus strobus – Quercus (coccinea, prinus), (Gaylussacia ursina, Vaccinium stamineum) Forest (CEGL007519)

6b. Forest canopy dominated by dry-mesic and mesic conifers and hardwoods (Pinus echinata, Pinus strobus, Tsuga canadensis, Quercus alba, Liriodendron tulipifera, Quercus falcata)

8a. Successional community (young forest with an even aged structure). Indicator species: white pine (Pinus strobus)

[SEMI-NATURAL WOODED UPLAND]

Eastern White Pine Successional Forest - Pinus strobus Successional Forest (CEGL007944)

8b. Natural community (uneven aged canopy)

9a. Protected cove surrounded by steep to moderate slopes. [Indicator species: Great rhododendron (Rhododendron maximum), round-leaf yellow violet (Viola rotundifolium).

[APPALACHIAN HIGHLANDS HEMLOCK HARDWOOD FOREST]

Southern Appalachian Acid Cove Forest (Typic Type) - Tsuga canadensis – Liriodendron tulipifera – Betula lenta / Rhododendron maximum Forest (CEGL007543)

9b. Flat area or low slope containing examples of oak species such as post oak (Quercus stellata) and southern red oak (Quercus falcata) found more commonly in the Piedmont than the mountains. CAUTION: Some examples of this community may contain less than 25% shortleaf pine (Pinus echinata). Indicator species: southern red oak (Quercus falcata)
[APPALACHIAN HIGHLANDS DRY-MESIC OAK FORESTS AND WOODLANDS OR APPALACHIAN SHORTLEAF PINE – MESIC OAK FOREST]
Appalachian Shortleaf Pine - Mesic Oak Forest - Pinus echinata – Quercus alba / Vaccinium pallidum / Hexastylis arifolia – Chimaphila maculata Forest (CEGL008427)

5B. Forest canopy usually at least 90% deciduous trees.

10a. Forest canopy dominated by hardwoods but not oaks (less than 25% oak cover). Protected cove surrounded by steep to moderate slopes. [Indicator species: Great rhododendron (Rhododendron maximum), round-leaf yellow violet (Viola rotundifolia).
[APP HIGHLANDS HEMLOCK HARDWOOD FOREST]
Southern Appalachian Acid Cove Forest (Typic Type) - Tsuga canadensis – Liriodendron tulipifera – Betula lenta / Rhododendron maximum Forest (CEGL007543)

10b. Forest canopy dominated by oak species (at least 50% cover by oaks).

11a. Forest shrub layer > 25% mountain laurel (Kalmia latifolia), xeric in nature, and in exposed slope positions. Forest dominated exclusively by chestnut oak (Quercus prinus) and scarlet oak (Quercus coccinea)
[APPALACHIAN HIGHLANDS XERIC OAK FORESTS AND WOODLANDS]
Chestnut Oak Forest (Xeric Ridge Type - Quercus (prinus, coccinea) / Kalmia latifolia / (Galax urceolata, Gaultheria procumbens) Forest (CEGL006271)

11b. Forest shrub layer <25% mountain laurel (Kalmia latifolia), sub-xeric to mesic in nature, and in both protected and exposed locations. Forest canopy sometimes dominated by chestnut oak (Quercus prinus) or other oaks but never dominated or co-dominated by scarlet oak (Quercus coccinea)
[APPALACHIAN MONTANE OAK-HICKORY FOREST] (all communities from this point down are the same ecogroup)

12a. Forest heavily dominated by white oak (Quercus alba) with only occasionally large amounts of red oak (Quercus rubra). Indicator species: white oak (Quercus alba), hickory (Carya spp.), Common species: white oak (Quercus alba), chestnut oak (Quercus

prinus), northern red oak (Quercus rubra), early lowbush blueberry (Vaccinium pallidum), black-seed spear grass (Piptochaetium avenaceum).
Appalachian Montane Oak Hickory Forest (Typic Acidic Type) - Quercus alba – Quercus (rubra, prinus) / Rhododendron calendulaceum – Kalmia latifolia – (Gaylussacia ursina) Forest (CEGL007230)

12b. Forest canopy dominated by a mixture of oaks, but Quercus alba usually less than 25% of canopy cover.

13a. Steep slope with nearly 100% cover of Rhododendron maximum in the tall shrub layer. Indicator species: chestnut oak (Quercus prinus),great rhododendron (Rhododendron maximum), Common species: chestnut oak (Quercus prinus), great rhododendron (Rhododendron maximum).
Chestnut Oak Forest (Mesic Slope Heath Type - Quercus prinus – Quercus rubra / Rhododendron maximum / Galax urceolata Forest (CEGL006286)

13b. Steep to moderate slope with <25% cover of Rhododendron maximum in the tall shrub layer.

14a. Forest canopy <25% chestnut oak (Quercus prinus) and >50% northern red oak (Quercus rubra), relatively mesic community with moderate species diversity. Indicator species: red oak (Quercus rubra)
Appalachian Montane Oak - Hickory Forest (Red Oak Type) - Quercus rubra – Acer rubrum / Calycanthus floridus – Pyrularia pubera / Thelypteris noveboracensis Forest (CEGL006192)

14b. Forest canopy >25% Quercus prinus and < 50% Quercus rubra, relatively dry-mesic with low species diversity. Indicator species: chestnut oak (Quercus prinus), Common species: Quercus rubra.
Quercus prinus – (Quercus rubra) – Carya spp. / Oxydendrum arboreum – Cornus florida Forest (CEGL007267)